Ludwig Manfred Jacob, M.D. Ph.D.

Dr. JACOB'S WAY

~ Toward Lasting Health ~

The Most Effective Methods for Avoiding and
Reversing the Diseases of Civilization

Nutricamedia

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To Bruce Jacobs, my wife, my parents,
And my fellow human beings

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Preface by Prof. Claus Leitzmann ND

Dr. Jacob's primary goal for this book is to point a way toward lasting health. At its core is a dietary plan to normalize metabolism, bodyweight, and the *redox*, acid/alkaline, and minerals balances. That facilitates the reduction of abdominal and liver fat and the normalization of blood pressure, triglycerides, cholesterol, blood sugar, and insulin levels. In this way, most of the known *diseases of civilization* can be helped or prevented altogether.

That goal may be holistically approached with a diet that aligned with well-tried observations of naturopathy, a thorough understanding of metabolic processes, and the sum of relevant data from the scientific literature. Important landmarks are found in the dietary practices of indigenous groups known for their high life expectancy in good health. Further useful clues can be taken from the traits *first peoples* evolved out of the wisdom innate in beings of nature and from the soundness of traditions that reveals them to us as also beings of culture able to brave the vicissitudes of human experience for the last 10,000 years.

On that broad terrain Dr. Jacob paved the *Way* that his patients have now been walking for years, and for the most part with good success. They are on the one hand persons suffering from diverse, often chronic as well as serious disorders, and on the other hand people intent on preventing illness or further improving their health. Their common aim is to reach old age in good health.

The book is a happy synthesis of practical health-knowledge that often harks back to antiquity and an up-to-date factual compendium distilled from a wealth of molecular, histological, and epidemiological research data. Dr. Jacob blazes a trail through the jungle of contemporary and often widely divergent claims accompanied by equally divergent dietary recommendations proffered by the experts and those who deem themselves such. Building on a solid scientific foundation, this book details the far-reaching effects of eating, drinking, and other lifestyle factors upon a metabolism whose ability to function smoothly under reasonably ordinary conditions is safeguarded by multiple feedback mechanisms.

Despite the complexity of metabolic interdependencies, Dr. Jacob manages to lay out the rationale for his *Way* in a clear, systematic manner. In order to grasp the weight and comprehensiveness of the book's elucidations, it is necessary — even for professionals — to accord them better than casual concentration. Chapter one encapsulates pertinent material in a synopsis, and Chapter twelve is intended as a practical manual for the benefit of non-professional readers. Both chapters use suitably common terminology for the lay reader.

The book chiefly focuses on the specifics of what can assure harmonious metabolic functions and, conversely, what causes metabolism to malfunction and how to avert or address it as the case may be. Both scenarios involve the interplay of insulin activity, *oxidative stress*, minerals balance, and the acid/alkaline household. Insulin's dominant role in the accumulation of excess bodyweight and its derivative *diseases of civilization* is becoming ever clearer. In this regard, the negative influences that the consumption of animal protein and animal fat exerts upon *insulin resistance* and *hyperinsulinemia* is currently receiving too little attention. Both quality as well as quantity of the animal products consumed today intensify the *insulin resistance* that is initially triggered by a diet rich in isolated sugars and simple carbohydrates.

The role that animal-based food plays in the genesis of *insulin resistance* may be taken as decisive, since neither the high potato consumption once common in Europe nor the historically even higher rice consumption in Asia used to cause it. In our day, it is the addition of excessive dietary protein from animals that ultimately accounts for the modern rise of *metabolic syndrome*, and thus also of fatty liver.

Oxidative stress from smoking, overweight, lack of movement, and other unhealthy practices is moving ever more into the scrutiny of preventive medicine. It has now also become known that metabolic degradation products from sulfur-containing amino acids are apt to considerably increase *oxidative stress*. Remarkable insights emerged in recent decades from the discovery of positive effects engendered by secondary metabolites. Like fibers, these organic chemicals are synthesized exclusively by plants and benefit metabolism in numerous ways, particularly in regard to immune function.

From its inception, naturopathy has understood the acid/alkaline balance as being essential to human health. This was a core component of therapeutic concepts pioneered by the originators of nutrition-based alternative medicine, among them Maximilian Oskar Bircher-Benner (known for Swiss muesli, raw food diet, and sunlight nutrition), Max Gerson (advocate of low-fat, salt-free vegetarian nutrition in the treatment of cancer), Lothar Wendt (identified hypoporopathies or protein-storage diseases), and Max Otto Bruker (proponent of micronutrient-rich "whole food"). Modern mainstream medicine continues to largely ignore this fundamental aspect of health to the detriment of patients who are and will remain sick due to the over-acidity of their bodies. The critically important steps toward achieving an optimal acid/alkaline balance are indispensable to setting out on *Dr. Jacob's Way* in order to regain or improve the health so flawlessly provided for by nature.

In that regard, Dr. Jacob achieved a paramount, innovative contribution as cannot otherwise be found in the literature. He dispenses a crystal-clear understanding of the physiological dictate to properly take into account the critical connection between the mineral and acid/alkaline households that are wholly integrated in nature. Of particular relevance in this is the ratio of sodium to potassium, which today's common diet has thrown into an extreme tilt by overloading the body with sodium and simultaneously starving it of potassium. The book draws on many studies in delivering an in-depth practical understanding of multiple far-reaching implications, and that alone would make it worth reading.

Dr. Jacob's comprehensive exposition of metabolic functions — unique in its regard for the organism's three overarching metabolic systems — effectively confronts the currently rampant error of "low-carb" diets with a solid scientific refutation. Because of the low-carb diets' long-term negative repercussion for health and ecology alike, but also on account of their flaunting of a strong ethical imperative, it is unlikely that they will stay in the running for long. Like other past fads they will be footnoted as but a once fashionable trend.

The book is in no small measure challenging reading. Those having made it through will appreciate the last chapter's well-supported dietary recommendations. These can, however, be profitably taken up — to one's lasting health — even without a grueling tour of the preceding chapters that package the science with professionals' need for unassailable argumentation in mind. The dietary and lifestyle make-over can be readily grasped and undertaken by readers without a background in research or intervention. The food groupings by quantity and quality show kinship with the *Giessen Whole-Foods Diet*.

But here the recommendations are supplemented with up-to-date adaptations and assessment tools from Dr. Jacob's medical practice, along with a distillation of the extant scientific literature under the nutritional criteria "energy-poor, micronutrient-rich, sodium-poor, potassium-rich", and further with material illustrations of how the recommended foods and activities achieve their desired effects on the pH, *redox* and insulin balances.

While the proposed diet does strongly diverge from today's customary heavy meat fare, the transit to purely plant-based food may be made in the stepwise manner of one starting out on a trek into new regions. The dietary aspirant is encouraged to pick the pace that best ensures keeping on toward the goal. Possible digestive issues, allergies, food aversions, and preferences must be answered through appropriate modification of the diet. And, along with giving ample guidance, *Dr. Jacob's Way* not only permits but expressly encourages making co-decisions on foods and meal composition.

Dr. Jacob being a physician, it is no surprise that his dedication to general disease prevention is often overshadowed by a special concern for patients needing intervention. The book can thus be seen as a roadmap for regaining one's health. Dr. Jacob shows why the most promising route is through a predominantly raw food diet that emphasizes plant sources, minimizes salt, and maximizes potassium. Those unable to take this path can benefit from targeted supplementation modeled after healthy nutrition. But the book repeatedly cautions that dietary supplements should only be taken to remedy a specific deficiency, and only for as long as it takes to optimize one's diet or until relief, improvement, or healing has occurred. Other lifestyle factors, Dr. Jacob says, are equally important to health restoration.

To that end, *Dr. Jacob's Way* awakens the reader's appreciation of daily physical activity, the blessings of deep sleep, the positive effects of conscious breathing, the advantages of relaxation, and the ultimate healing power of embracing one's life purpose. Dr. Jacob casts a holistic net that spans the physiological dimension of our existence. The reader finds new hope and receives plenty of motivation for staying on *Dr. Jacob's Way* toward lasting health on this guided tour through the body's unimagined promises of health.

Claus Leitzmann

Preface by Prof. Ingrid Gerhard MD

Much has been written to date regarding the alarming rise in our *diseases of civilization*. And even more speculation has been wrought in the matter of likely causes. At one time it is the result of excessive fat consumption; at another time too much sugar intake gets blamed. Or, is not too much fat at all, but only the wrong kinds, not too much sugar, but only the wrong carbohydrates? Or, is none of this even all that important — just as long as one eats enough fruit and vegetables? Perhaps better not fruit after all, because isn't there too much fructose and thus sugar in those?

The consumers' heads are spinning while they gradually come to no longer believe in anything at all. And so, they just revert to eating what they have always eaten — what tastes good to them, pure and simple. It can't really be so bad with these carbohydrates, not when our life expectancy is going up all the time. Or, can it?

At long last, one physician has gone to the trouble of reviewing and evaluating the literature of recent years, literature on the connections between dietary factors and the incidence of cancer and other *diseases of civilization*. In this endeavor, he builds upon the support from numerous pertinent national and international consumption studies, looks into the studies' sponsors, and searches for likely causes of discrepancies among the various results. In addition, he recruits axiomatic models from foundational research, physiology, and biochemistry.

Too much protein in the form of meat, cold cuts, and dairy products makes one sick. It is no coincidence that many diseases don't even bother showing up during times of war and poverty. Hardly anyone gives serious thought to the whys of this phenomenon. Dr. Jacob's book though goes into great detail regarding the mechanisms by which protein burdens the liver, mucks up the ground substance in connective tissues, poses (*via* methionine) a threat to the circulatory vessels, causes *oxidative stress*, and increases the risk of both diabetes and cancer.

In similar fashion, Dr. Jacob examines the pros and cons of dietary fats. He tracks the supposedly good fats to their source origins. Unsaturated fats differ significantly in their effects when they come from plant oils as opposed to fish. And there as well applies the old adage that *too much will bring more harm than benefit.*

Solid references to the fundamental significance of maintaining balance in the minerals and acid/alkaline households are typically only to be found in very hard-to-come-by, extremely limited specialty literature.

Again, the book deals exhaustively with the functional spectrum of sodium and potassium. It thoroughly explains how our modern diet causes us to be downright addicted with its high sodium content. Excess sodium in combination with a deficit in potassium wreaks havoc on blood pressure and fosters such disparate health-breakdowns as stroke, *insulin resistance*, stomach cancer, dementia, kidney dysfunction, osteoporosis, and autoimmune diseases.

These expositions will make it quite clear to most readers that a plant-based diet alone facilitates lasting good health. It can protect us against cardiovascular diseases, diabetes, cancer, and rheumatism while at the same time keeping us young! Both morbidity and mortality decrease. Dr. Jacob's food pyramid allows readers to implement the guidelines in daily life. For those needing to gradually warm up to the idea the book gives tips on what supplements will help improve their unbalanced diet.

But the book would be incomplete if the rest of the important health factors were not taken into consideration as well — movement, breathing, and relaxation. Additionally, a section is provided for healthcare professionals' to use as a manual in their practice. This will allow them to integrate the wealth of essential information into their daily therapeutic work routine.

This book on state-of-the-art health facilitation cannot be mistaken as simple fare for casually informing oneself about healthy eating. It constitutes a goldmine of nutritional science in which interrelations are unraveled that would otherwise have to be laboriously culled, bit by bit, from the forbiddingly massive scientific literature. More than 1,400 citations render the bibliography commensurately informative.

While highly complex interactions between nutrients and metabolism are discussed they are laid out in logical, understandable sequences. One is constantly surprised by how little of this has gained entry into mainstream medicine, let alone medical schools. If only for that reason, *Dr. Jacob's Way* is destined to become a health-knowledge classic and a trustworthy companion for anyone willing to recognize the role that diet plays in the matter of wellness. It also has all the makings of an invaluable reference book for those who counsel or treat the sick.

People who are encumbered by heavy metals like mercury and other toxic materials will have to observe greater caution during weight reduction, because the process releases poisonous deposits in fat tissues back into the circulation. This is elaborated upon in an appendix section titled *Noxious Chemicals and Environmental High Risk Factors.* As a physician with long experience in Environmental Medicine, I regard this as particularly pertinent information.

Ingrid Gerhard

Foreword

Many a researcher cannot see the forest of reality for the trees of research results.

— Viktor Frankl —

All we humans can ever discern are but minuscule fragments of reality.

The more we focus on a single aspect, the more we lose track of the whole. The archetype of the specialist idiot is that proverbial expert who continues to know more and more about a tinier and tinier speck of reality.

Logically, this is bound to cause one to become increasingly oblivious to the larger context of things which is, after all, the repository of all meanings. This malady of acumen is colloquially known as tunnel vision. It has little or no practical use and cannot but lead to odd conclusions and contradictions.

The story of the blind men and the king's elephant

A king known for his great curiosity assembled seven learned blind men in order for them to examine his elephant and then report their findings to him.

After each of the seven blind men had finished inspecting the elephant with his hands, the king queried them, "You now have experienced my elephant, o' blind ones, have you not?" Self-satisfied, the confident investigators eagerly answered, "Yes, that is very true, Your Highness, we have indeed encountered it."

Thereupon the king inquired again, "What then is an elephant, O' blind, do tell me?"

The blind man touching the elephant's head ascertained that it felt like a very large pot and could therefore only be a pot. The one holding the elephant's ear objected, explaining that it was in fact a soft basket, for that is what it felt like to him.

"No," asserted one who braced himself against the elephant's tusk, "It is most positively a plough share. Just feel how hard and pointed it is." "No way a plough share," said the fourth while stroking the elephant's trunk, "It is not strictly speaking a plough share, but a plough." "Absolutely not," the fifth blind man shouted as he knocked on the elephant's massive torso, "It is clearly nothing other than a grain silo."

And so, the final two blind men, too, corrected the proffered assessments. The elephant's leg had to be a column, the tail tip a brush. Each blind man attested to the absolute veracity of his report and, persuaded by his own perception, began to view all the others as conspirators bent upon tarnishing his reputation as master of factual reportage.

Unable to convince one another by means of word, they had no choice but to resort to their fists and defend the one and only truth by knocking each other to the ground.

The elephant looked on.

This **book's aim is** to build a panoramic view from a jumble of snapshots.

That too can, of course, yield only limited success because as an author I am equally subject to a certain species-habituated blindness (to err is human, after all).

This notwithstanding, the final picture's clarity and the reconciliation of contradictions besetting the science of nutrition should pleasantly surprise the receptive reader.

What seems fairly striking are the parallels between the essential precepts of our existential philosophy, momentarily upholding *perpetual growth* as the ultimate matrix of prosperity, health, and happiness, and the steadily growing corpulence in whichever country that modern philosophy and lifestyle have made their entrance.

Economic growth that bets on quantitative rather than qualitative gains is bound to result in an expansion of quantity and a proportionate reduction of quality.

Those who like it this way are apt to express their approval with a resounding *"Greed rules!"*

Looked at more soberly, it becomes apparent that the view leads to a senseless squandering of resources, as is demonstrated in endless variants by our modern throwaway society. Worse yet, it further results in the exploitation and annihilation of humans, animals, and the natural environment. The fallacy's magnitude is nothing short of baffling.

And the fact that in biology, too, it is class rather than mass that counts is becoming ever more painfully clear to physicians as well.

Following the discovery that *HDL* cholesterol protects against cardiovascular disease, enterprise developed — with considerable effort and ingenuity —drugs targeted to raise *HDL*. Alas, all the trial outcomes were so disappointing that they had to be scrapped.

Although *HDL* did rise in quantity it was of a different quality and no longer protected against arteriosclerosis.

This modern lifestyle has uncannily much in common with tumor cells.

It shares, for instance, an exorbitantly high energy use at the expense of the entire organism, and both subscribe to the maxim of perpetual growth. They are also equally sold on the necessity of expanding to new markets *via* worldwide metastasizing (the process otherwise euphemized as globalization).

In the course of such bold expansion resources are devoured so rapidly that but a plundered, poisonous environment remains for future generations.

Every cancer is ultimately ruined by its own running-wild and dies with its host organism.

These are, by the way, not morbid doomsday fantasies but a straight assessment of things to come, as the *Club of Rome*, in 1972, first correctly prognosticated in the report *Limits to Growth* and the rather aptly titled sequel *The Plundered Planet* newly updated with data encompassing the next 40 years.

Not only have occurrences already proved the earlier prognoses largely true but the new ones are not at all encouraging, especially for our children.

These researchers warned of extreme natural resources shortness accompanied by cost increases and ecosystem collapse. They concluded that failure by humanity to promptly adjust to the situation will raise the specter of regression to preindustrial times.

Having replaced a Creator with a theory, man now holds himself to be the crown of evolution and extracts from this a permanent entitlement to lay waste to the planet.

No other species could possibly act more foolishly.

What animal regards money as its existential *telos* and preempts survival — in but a second of earth history — by using up and turning into toxic rubble the natural resources that aggregated over billions of years?

Pensions and insurance policies now pose as trusted securities in place of responsibly handling one's own health (which gets plundered in the same parasitic fashion as the planet).

Yet only one's health really pays off, while all else is based on feeble promises.

With fading hopes that the future will fix all our problems by means of further progress and more growth we are gradually reaching the limits of growth and can already detect the early signs of a looming crash the course of which can be easily predicted from the fate of previous overreaching empires.

The big difference is that today it is no longer merely a small Roman Empire that gets shrink-wrapped but the entire planet.

The veritable mountain of healthcare-related, ecological, moral, and economic liabilities that already bears so egregiously upon my own generation is doubtlessly bound to do much more so upon future generations.

Nobel laureate Konrad Lorenz once remarked in his foreword to Victor Frankl's book *Man's Search for Meaning*:

Paradoxically — these money grubbers regard themselves as realists and do not want to understand that any exponential growth of their economy within the parameters of our planet's finite space can only end in catastrophe.

They seem unable to grasp that they may only eat what photosynthesis produces through these green plants; and the legend of old King Midas makes as little impression on them as does the Viennese adage that you cannot stuff yourself with golden dumplings.

Is there a scientific justification for the muddle of contradictions that seems to characterize the flood of research results? Or — how independent, really, is empirical science?

The first (and utterly human) problem is that the majority of scientists depend upon financial backers who, of course, pursue their entirely separate agendas on the far opposite shore of truth ascertainment.

A demonstrable case in point is the tobacco industry that had, for many decades, systematically developed and maintained a network of scientists and scientific institutions for the sole purpose of sabotaging authentic science by means of the five-pronged strategy suppression, dilution, diversion, obfuscation, and manipulation (Grüning *et al.*, 2006).

That is how the nefarious tactic of fostering an impasse-type policy much favored by corporate lobby groups is given a veneer of "scientific" legitimation. Financially, the food and pharmaceutical industries are measurably better endowed than the tobacco industry ever was.

Yet, the European Union — together with the Federal Republic — spends great sums on promoting their products that are causally linked to our *diseases of civilization*, whereas healthy vegetables and fruit admittedly receive much lip service but get little promotional assistance.

This is reflected in the disparity of food sales figures. While in 2009, for instance, only 5.9% of total food sales in Germany came from vegetables and fruit, meat accounted for 21%, dairy products for 16%, alcohol for 9.6%, and sweets for 9.2%. In the final analysis that is the reason why milk and meat products derived from industrially mass-bred animals wind up being so reasonably priced and fresh vegetables and fruit come with a relatively high price tag.

The threat of "Big"

Director General of the *World Health Organization*, Dr. Margaret Chan, used admirably plain words when she shared her well-founded concerns with the attendees of a global conference on health that took place in Finland on June 10, 2013:

It is not just Big Tobacco any more. Public Health must also contend with Big Food, Big Soda and Big Alcohol. All of these industries fear regulation and protect themselves by using the same tactics. . . . They include gifts, grants and contributions to worthy causes that cast these industries as respectable corporate citizens in the eyes of politicians and the public. . . .

That is formidable opposition. Market power readily translates into political power. Few governments prioritize health over big business. As we learned from experience with the tobacco industry, a powerful corporation can sell the public just about anything.

Let me remind you. Not one single country has managed to turn around its obesity epidemic in all age groups. This is not a failure of individual will power. This is a failure of political will to take on big business. . . .

When industry is involved in policy-making, rest assured that the most effective control measures will be downplayed or left out entirely. This, too, is well documented and dangerous. (Opening address, 8th Global Conference on Health Promotion).

People, environments, animals and health insurance institutions suffer under our diet and lifestyle while the pharmaceutical industry makes it possible for us to get old nevertheless — and profits handsomely from doing so.

Thus, it also is merely human nature that the food and pharmaceutical industries look after their own interests and protect them using all the means at their disposal.

Empirical science lacks the means for penetrating reality.

The second problem is that we possess no measuring devices for many phenomena or that phenomena occur in a blind spot. One can only find that for which one searches.

Viewed relatively, science did make great progress, but at the same time it is clear that it has still touched only a minuscule fraction of reality as a whole.

In light of this, a bit of humility would befit any honest scientist, yet the stance of too many expounders of "fact" seems to be more akin to that of the sorcerer's apprentice. These two problems would make scientific veracity problematic enough just by themselves.

But there is a problem of even greater fundamental importance.

Nobel Prize winner Werner Heisenberg showed through his *Uncertainty Principle* that the very act of observing modifies reality. Empirical science will thus never be in a position to do full justice to reality or even render an approximate account of it. Research results will always attest to the researchers' perspective and questioning methodology.

In order for the information in this book to take us nearer to reality it will have to approach the topics of diet and *diseases of civilization* from more than a single perspective. The viewpoints, findings, and conclusions to be sifted through must encompass the whole range from worldwide epidemiological data to what happens within the cells' microscopic interior.

Viktor Frankl astutely explained the challenge through his *Dimensional Ontology*.

In perception and thinking, distortions occur over and over . . . because that which is perceived and to be thought about comes into view from just one perspective. Neglecting more-perspective during perception results in truncations, and so in distortions, of phenomena.

In *Anthropologische Grundlagen der Psychotherapie* (1975, p. 182) Frankl wrote:

If one and the same object is projected out of its own dimension into a lower one, then apparently contradictory images of it are created.

If one takes, for example, a drinking glass that geometrically looks like a cylinder, and projects it from its three-dimensional space onto a two-dimensional plane, then a circle will appear in the ground plan and a rectangle in the side view. The projection, moreover, gives the appearance of being a closed figure, whereas the drinking glass is, after all, an open vessel.

If now several different objects are projected from out of their dimensions into a lower one it will not cause contradictory but rather ambiguous results.

Suppose we move a cylinder, a cone, and a ball out of their three-dimensional space and project them onto the two-dimensional plane. A circle must then emerge from the ground plan projection in each of the three cases (*cf.* Figure 1).

Like these objects, man can be projected as well. In this case it will be onto the planes of biology and psychology, if one strips him/her of the specifically human dimension. These resulting images inevitably *do* contradict one another.

That is the case because the projection onto the biological plane displays somatic phenomena while projection onto the psychological plane will have to produce psychological phenomena.

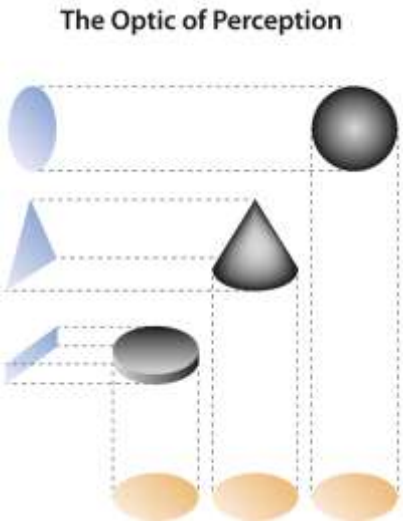


Figure 1: **Frankl's** *Dimensional Ontology* in the instance of optical perception

By *Dimensional Ontology's* reckoning though the inevitably occurring discrepancy will not put into question man's innate unity.

The discovery of people's diets and lifestyles is thus utterly complex.

Studies that are designed one-dimensionally or two-dimensionally are unable to capture a more-dimensional subject. They inevitably yield false results and contradictions.

All the more important it therefore is to contemplate a more-dimensional concept of diets, lifestyles, and their interaction.

Adopting such a conception is fueled by the desire to do reality the most possible justice and to not legitimate unhealthy diets through what one-dimensional pseudo-science puts forth at the behest of soulless corporate lobbies.

Unfortunately, the latter happens quite frequently — and practically always skillfully camouflaged. Once a negative scientific finding regarding animal foods, fast foods, soft drinks, and sugar appears it won't be long before the subtlest counter-campaign begins that will employ enticing, seemingly convincing pseudo-scientific books, the little scrutinized internet, and the real or alleged endorsements of influential institutions. One simply dons a green garb and donates to the cancer-fight, making sure that this too gets prominently publicized. In the USA any election that does not feature a demonstrative citizen-like family meal at a fast food place has nary a chance of being won. If supposedly well-informed experts themselves have trouble keeping an overview it is simply impossible for the ordinary consumer to do so.

The cleverly fabricated contradictions will invariably meet their target. People continue to eat what has always tasted good to them and so meander steadily toward their graves. Corporations make tons of profits; and, nobody is to be blamed for the misery.

Delightful Abstention — Against the Current of the Times

The admittedly polarizing title *Delightful Abstention* is used quite deliberately here. Whoever wants to enjoy living for the long haul must be able to do without. Anybody who wishes for real to freely direct his life must more than anything be free of drives and addictions.

During the course of undergoing my personal dietary change-over I became painfully aware of my own addictions. That was not a pleasant experience, but it was a necessary one. To be honest, I too like the taste of chocolate and milkshakes better than that of fruit and vegetables. At least I used to.

Our concept of freedom is perverted.

Victor Frankl correctly defined it: *All freedom has a "from what" and a "what for". That from which man can be free is the state of being driven. His "I" obtains freedom vis-a-vis his "it". That, however, for the purpose of which man is free is to be responsible. The freedom of humans will thus mean being free from being driven, and being free to be responsible, or being free to have a conscience.*

Without our taking responsibility for ourselves, our health, our contemporaries, our environment, and our shaping the world we will pass on living free is impossible. The scourge of the *diseases of civilization* can only be somewhat eased by modern medicine. And the earth's destruction, too, will not be stopped by much printing of news articles but only by changing our own behavior around consumption.

Animal-derived food not only make us sick but also bring animals grave suffering and earth serious harm — as through deforestation, to name but one unconscionable practice.

And why should I mention Freud now? For, while his psychoanalysis brought patients little help and caused insurance companies great expenses it provided the advertising industry with priceless understanding of how it could optimally exploit people's subconscious drives. The concepts *bread* (addictive, processed food; legal drugs) and *playing* (Hollywood) were finely honed and mixed with the conjured-up illusory sense of freedom — sustained by the mirage of near limitless choices.

In reality, people almost always choose the same things, and the fabled market diversity also turns out to be no more than the monopoly of very few corporations in pursuit of a singular vision of controlling the totality of global markets.

In other words, not we choose our foods but our primitive drives do, manipulated as they are by advertising and artificial flavors.

And so, one who changes his diet and lifestyle swims against a mighty current that with all the might of Natural Law rushes us in the direction of self-destruction. Practicing a responsible enduring lifestyle and a healthy diet is thus a matter of survival not just for our personal life but also for our collective lives. Yet, shifting all the blame onto industry would be too

simplistic and unfair because industry merely gives its customers what they desire. The responsibility lies in our own hands then. And the more people walk this initially difficult but permanently-transforming *Way of Delightful Abstention* and take responsibility for their health and our planet, the more certain it becomes that the food industry, in turn, will start offering sensible products and making their profits by keeping us healthy rather than sick.

I am especially grateful for the Prefaces by Prof. Claus Leitzmann ND and Ingrid Gerhard MD. I greatly esteem them both not only for their known professional competence but also for their exemplary strength of character. They are gentle visionaries and revolutionaries always guided by the desire to serve and help others through their extraordinary work.

Claus Leitzmann turned eighty years-old this year and continues to remain youthful. The nutritional scientist from the town of Giessen, to whom people often refer to as the Diet Pope, is recognized the world over for his leadership role in science. The *International Union of Nutritional Scientists* recently inducted him into their List of Living Legends. He has always been a lateral thinker whose ideas were ahead of his time.

Prof. Leitzmann completed his first training in 1951, when he was known as Germany's "best gardener's apprentice". Perhaps his ability to intuitively grasp and laterally associate things began during these early days of attunement with nature and was later complemented by the cosmopolitan outlook that came with his scientific studies and during his wander years in the USA and in Thailand. In 1974, he cast his roots in Giessen where he qualified as a university lecturer in 1978.

During that time he developed the concept of *Whole-Foods Nutrition*, which he first publicized in 1981 through his book of the same title. It was anything but career-furthering in those years to propagate ideas about sustainability, let alone vegetarianism (plus the lifestyle most compatible with it). While writing over thirty books he trained a new generation of nutritional scientists, all the while contributing vigorously to putting Giessen on the world map.

His seminal scientific treatise demonstrated that a vegetarian whole-foods diet — considered extremist at that time — is not only relatively free of harmful agents but also healthier for us and for Earth along with all her inhabitants. Time-tested and of fundamental importance to the survival of humankind, the diet Prof. Leitzmann advocates reaches beyond mere individual concerns with health and a pleasant life experience.

How relevant and visionary his ideas really are can be recognized in the fact that thirty years after he first proposed them the world's best-endowed charitable group, the *Gates Foundation*, appended *The Future of Food* to their existing prime objective and began calling for a switch from animal-derived protein to plant-derived protein as a more efficient and healthy way of ensuring human sustenance. Prof. Leitzmann has long enjoyed the support of Ille Leitzmann, his energetic, loving, and lovable wife and the mother of their two daughters and two sons. Three of their children have become physicians. Ille Leitzmann has held her husband's back throughout these many years and so enabled him to carry on his important work.

Ingrid Gerhard has practiced and taught medicine for thirty years. In 1993, she founded Germany's first naturopathic outpatient clinic for women at the *University Women's Hospital* in Heidelberg. Anybody familiar with the dubious standing naturopathy then had in the domain

of a university hospital can imagine what an incredible achievement Dr. Gerhard's facility represents, and what kind of resistance she had to battle.

Prerequisite to success were her outstanding medical knowledge and skills, her keen sense for the essential, her open-mindedness, and her ability to think critically while still operating with a healthy portion of common sense.

With remarkable courage and a great willingness to make sacrifices she set her historical mark on German women's medicine. The *Order of Merit of the Federal Republic, 1st Class,* along with numerous other awards attests to the appreciation the German people have for this physician-pioneer who tirelessly fought, not for the sake of ego-satisfaction or career advancement but out of genuine caring, for patients' wellness.

Author of over 300 publications on women's health, naturopathic treatments, and environmental medicine, Dr. Gerhard is well known to both the scientific community and the public, especially since early in her career she became an outspoken critic of dental amalgam.

She enjoyed unflinching support in all of this from her husband Jochen together with whom she also raised two children. Her retirement is in many ways similar to that of Claus Leitzmann. She continues authoring books, giving lectures, and providing health information through her website www.netzwerk-frauengesundheit.com.

Heartfelt thanks also to Dr. Katharina Wirnitzer (Plant-based Nutrition in Competitive Sports, Chapter 11.5) and to my colleague Peter Jennrich (Appendix). Both made valuable contributions to this book.

From the large response and great feedback to the book's first edition, which actually was a compilation rather than an actual book, I concluded that *Dr. Jacob's Way* worked perfectly well not only for me but also for many others. Consequently, the 2nd edition became a book twice the size with numerous tables and figures, three times as many cited studies, and an optimized practical dietary plan.

This book carries the title *Dr. Jacob's Way* because the discoveries and measures I share in Chapter 12 do not just rehearse scientific facts but also describe the personal four-month long path I took toward achieving my own ideal weight and normal values for pulse, blood pressure, and blood composition.

In my case, the amounts of visceral fat and total fat dropped by over 40 percent. The arteriosclerosis index sank from 3.1 to 2.4 (*LDL/HDL*), blood fat values halved, and resting pulse went down by 20 beats per minute. My weight dropped 11 kg and the paunch vanished without my having to count calories. Overall energy and sense of wellbeing improved considerably.

I freely admit that the switch was difficult in the beginning. There was an unconscious fear of giving up something important and winding up starving. But after the initial three weeks my appetite for unhealthy foods had become unnoticeable. Despite high stress during finalizing of this book my total cholesterol remained at 162 mg/dl and the *HOMA*-index at 0.9.

My wife who used to weigh 73 kg reduced to 55 kg and is staying at that weight without real problems. Her *LDL/HDL* quotient now reads 1.3. We are both comfortably holding our weight without any noticeable challenge. The feared yo-yo effect has not made its appearance at any point in our dietary change-over.

My wife and I are not involved in athletics, but we do see to it that our daily walk is demanding enough to cause us to work up a good sweat.

Bruce Jacobs inspired us personally through his example. When I first came to know him in 1999, his blood pressure was regularly 180/105 mm Hg at fifty years of age. Since his father had died following heart surgery at age sixty-five, Bruce resolutely revamped his lifestyle.

He adopted a salt-free vegan diet and took up a program of daily movement. After the switch to a purely plant-based whole foods diet his blood pressure value went down to 120/75 mm Hg. Bruce is now over sixty and presents with the cholesterol values of a young man.

The dietary plan in Chapter 12 distinguishes between prevention and therapy.

Fat intake should be reduced to ten percent of the total energy supply when there is coronary heart disease. For health maintenance that is unnecessary. My wife and I follow the relaxed preventive variant of the dietary plan and take about thirty percent of our energy as fat from plant-based foods.

This book is intended as an invitation.

You alone choose how to apply and integrate the program into your daily life.

When there is illnesses, abstention is in the truest sense of the word necessary, but it is at all times strictly a matter of your personal decision. Voluntary abstention signifies not just inner strength but also produces great outward strength. It gives people back their freedom to assume personal responsibility for their own well-being.

For overweight persons, a strictly plant-based diet can be very helpful, but for the pregnant, the underweight, or those suffering from *cachexia* it could be harmful.

For this reasons, the plan does not forbid any food. It gives quantity indications for a health-promoting practicable diet. All persons who have sincerely followed this program achieved exceptional successes. It is not a conglomerate of odd beliefs but a scientific system.

Try the dietary plan for three months, then recommend to your patients to adopt it too.

Now for a practical note:

This book addresses professionals and interested individuals who have already had some experience with the thematic and command relevant knowledge.

Passages that delve deeply and illuminate interrelations in scientific detail are color-shaded and marked with a magnifying glass. They may be skipped without losing sight of the central theme or sacrificing overall comprehension.

Both Chapter 1 (Very Briefly: The Causes of Our *Diseases of Civilization*) as well as Chapter 12 (*Dr. Jacob's Way* toward Lasting Health) were intentionally kept largely free of study citations and excessive use of scientific jargon. They summarize this book's essential information in a generally understandable manner.

Chapters 2 – 11 enumerate the diet's scientific substantiations, drawing for this upon more than 1,400 published studies.

At the book's base is an elaborately delineated cause-and-effect examination of nutrition in general as well as of the characteristics of a number of distinct dietary patterns in particular, all with a view toward showing how they impact health and relate to the development of our *diseases of civilization*:

1. What is the actual outcome of following a given dietary pattern, not merely after some years, but after decades? Which populations are particularly long-lived? What characterizes them? These questions are dealt with in Chapter 2.
2. What causative factors lie behind the discrete and best-documented effects of a plant-based diet? Following the cause-and-effect principle, Chapters 3 – 9 sharply illuminate the scientifically established influences that nutrition and its individual constituents have on our metabolism, hormones, and physiological processes — all the way through to the level of cells and mitochondria.
3. Chapters 10 and 11 are concerned with the concrete aspects of nutrition and dietary intervention, using as thematic the numerous cited clinical studies.
4. Chapter 12 represents the fruition of all these many discoveries as well as of my own experiences. It delineates a nutritional plan suited to keeping one healthy or healing *diseases of civilization* like *metabolic syndrome*. In this, it calls for entirely natural means following the impeccably intelligent engineering at the base of optimal physical functions and also maps out the way back from less desirable states of health into which we may have descended by our own device.[1]

I wish you much joy in your reading,
Ludwig Manfred Jacob

P.S.: Accounts of your personal experiences and suggestions for future improvements are encouraged and will be treated respectfully and attentively.
info@drjacobsinstitut.de

[1] *Dr. Jacob's Way* cites statistics and references pertaining to dietary habits and food choices prevalent in Germany. These are left intact in the first English edition because they do not materially differ from those found in the English-speaking world, but plans exist for augmenting future editions with examples more immediately relevant to readers in English-speaking countries.

1. Very Briefly: The Causes of Our *Diseases of Civilization*

Although medical advancements banished from Western countries such historical scourges as high infant mortality and infectious diseases, but it appears that a more dangerous plague has taken their place — the so-called *diseases of civilization*.

Do we really keep living longer?

If public media, the life insurance companies, and the pharmaceutical industry are to be believed miraculous healthcare strides taken in modern times now allow us to live statistically much longer than our ancestors did.

In view of these promises it may come as a shock that a 65-year old man in China who managed to survive high infant mortality, rampant infections, and periodic times of famine had in 1981 nearly the same remainder-of-life expectancy as a 65-year old German man.

What is particularly astonishing is that the Chinese man achieved this while contending with a notoriously underdeveloped healthcare system that operates on a small fraction of the towering German healthcare expenditures.

At age 65, this hypothetical Chinese man still had an average of 12.44 years ahead of him for a life total of 77.44 years (Zhang and Zhu, 1984).

His 65-year old German counterpart could anticipate another 13.09 years, bringing his total to 78.09 years (*German Federal Bureau of Statistics*, 2012a).

The Chinese man and his German contemporary thus differed by no more than a rather expensive (in terms of healthcare costs) but otherwise unimpressive 0.65 year.

It is true that we keep steadily getting older, but this is primarily based on life expectancy at birth. That was a relatively brief 35.58 years for a man and 38.45 years for a woman during the statistical period 1871 – 1881.

If a 65-year old German of that period had, however, survived the then prevalent high infant mortality and equally high incidence of death from infectious diseases then he too still had a comparatively high 9.55 years remainder-of-life expectancy.

In that situation he would have become 74.55 years old, only about three years fewer than either the modern Chinese man or the modern German man.

A 65-year old German woman living during that same 1871 – 1881 measuring period could look forward to another 9.96 years before going the way of all things at 74.96 years. In the statistical period of 1980 – 1982 she would have been predicted to pass away at 81.77 years of age, and at 85.68 years of age during the statistical period of 2009 – 2011 (*cf.* Figure 2; *German Federal Bureau of Statistics*, 2012a).

Through the 138 years between the statistical record periods of 1871 – 1881 and 2009 – 2011, a 65-year old German man's life actually lengthened by only 8 years and that of a 65-year old German woman by only 10.72 years.

But rather than getting overly excited about the extra years of life that science has secured for them we wonder what portion of those 8 and 10.72 years the modern German man and woman might have to spend in homecare or as patients in a nursing home.

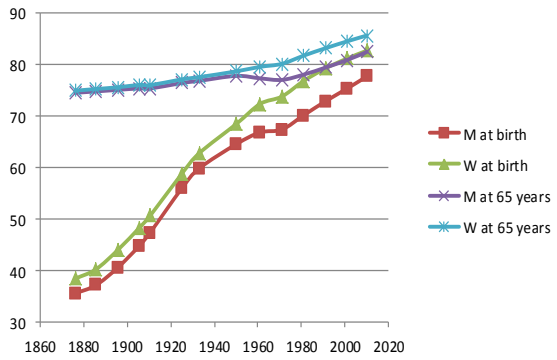


Figure 2: Progress of life expectancy at birth and for 65-year old men (M) and women (W) respectively (German Federal Bureau of Statistics, 2012a)

When it comes to achieving old age in good health we Germans are by no means leading the world, but in the matter of healthcare costs we rank among the very top.

Today, medical progress is focused on fighting, at enormous expenditures and a high strain imposed on the suffering, primarily diseases that were rare or even unknown in 1871 – 1881.

Back then, *diseases of civilization* almost exclusively struck members of the privileged class. Thanks to the dwindling of dietary sensibilities they have meanwhile become most prevalent among the least advantaged. It is thus little wonder that *diseases of civilization* spread explosively in all countries that have allowed the Western lifestyle and diet to gain a foothold.

The Westernization of Asia is already evidencing itself through a rise in overweight, cancer, cardiovascular disease, and metabolic diseases.

In the United States where this lifestyle is at its pinnacle life expectancy is no longer on the rise. In actuality, among the socially disadvantaged it is taking a steep dive. Life expectancy among white women without higher education descended by 5 years since 1990, and white men in similar circumstances lost 3 years (Olshansky *et al.*, 2012).

This might serve to give us a preview of things to come for an economically weakened but grotesquely overfed and wrongly fed Europe.

What are the causes of our *diseases of civilization*?

According to a study published by the British medical journal *Lancet*, from age 50 on Germans can now count on only 13.5 more healthy life-years (Jagger *et al.*, 2008). The Chinese for quite long enjoyed a nearly identical average, but at a fraction of the healthcare cost.

Healthy-life-years expectancy indicates the number of years that a person of a certain age can still expect to spend enjoying good health, taking into consideration age-specific mortality, morbidity, and functional state of health.

Increased consumption of animal-based food, fat, white flour, and sugar, is along with insufficient movement incompatible with the characteristics of a natural human way of life and diet. It is causally and epidemiologically tied to the eruption of *diseases of civilization*. These diseases crop up wherever such lifestyle and dietary changes take over.

Is it possible to combine the modern advantages with recent scientific discoveries in a way that will not only add more years to life but also endow these additional years with more activity and quality of life?

Opinions with regard to what a healthy diet consists of are conflicting and often even polar opposites of one another. For a time, low-fat served as a patent remedy — a heavy blow to the meat and dairy industries since their products are known to contain much saturated fat.

New products were created, somewhat less fat but often quite sugary. That, of course, did not help the situation. It has made it worse because neither Germans nor Americans followed the low-fat diet, as consumption surveys indicated, but they did take to the additional sugar and unhealthy simple carbohydrates.

Then a "new" discovery popped up: Sugar and white flour are fattening as well! The *glycemic index* appeared, and in its wake low-carb diets did away not only with sugar and white flour but with every healthy carbohydrate source as well. By contrast, animal protein somehow managed to retain its aura of the high-quality protein even though research said that only plant-sourced protein is beneficial in the long run.

Next, it was opined that the solution would have to be low-fat, low-carb, and low-protein, meaning simply eating less and engaging in more movement. But that easily leads to deficiency in important essential micronutrients. In the final analysis it must be understood that enduringly healthy nutrition is more complex than can be marketed in the form of a fad diet. Besides, the obesity epidemic is fundamentally related to the fact that we consume more and more ready-packaged foods and that fewer and fewer people are willing or able to take time for preparing real food for themselves.

On close inspection, only small parts of these diet fashion trends and connected sensational teachings can pass the muster of fact. Good marketing, frequently repeated claims, and the targeted exclusion of the other side of truth turn these half-truths into edifices of revealed truth and their half-baked theories into absolutes on the order of hallowed divine precepts.

While working on this book I, once again, took up an in-depth analytical examination of the epidemiological, biochemical, and clinical foundations on which human nutritional understanding rests. In the course of this I realized how much I, too, had been influenced by these trends in the acquisition of my eating patterns. Little by little I began to discard the dubious dogmas I found to be so nefariously at work in my own routines and preferences.

This book is meant to serve as a contribution to universal health by translating scientifically established insights and findings into a health-promoting dietary plan and presenting it in such a manner that anybody may adopt and apply it. The specific objectives are to counterbalance modern society's typical dietary errors, prevent the incidence of, or otherwise offer solutions to already contracted *diseases of civilization* and facilitate the increasing of one's number of healthy life-years.

Original diets in Germany and Asia

Both the German and the Asian original diets were rich in carbohydrates and contained only very small amounts of animal protein, fat, and isolated sugar. Only natural food free of today's industrial products was consumed. As whole foods, the carbohydrate sources supplied both macronutrients as well as valuable essential micronutrients needed for healthy metabolic

functioning. Modern Germans consume fewer carbohydrates, and these are predominantly rapidly absorbable simple carbohydrates such as sugar (50% of carbs consumption!) and white flour. They provide way too much short-term energy and practically none of the micronutrients all metabolic mechanisms require by for efficient processing.

Above all, the consumption of animal fat tripled and that of sugar quadrupled in Germany since the end of the 18th Century, and in many Asian countries during the last few decades. To make things worse, the use of animal protein increased fivefold. Also, humans used to be physically quite active and hunger presented a very real danger that periodically di in fact occur. Today's situation is upside down. In Germany, life gets never threatened by hunger but constantly by overweight — an equally real but much more insidious danger. How can we best adapt our eating habits once useful in famines but deadly in today's overabundance to our daily lives?

The phenomenon of the centenarians on Okinawa

The world's best explanation for the causes of health in longevity is found in the people on the Japanese island of Okinawa. Their guiding principle is to eat only until 80% full, which they express as *hara hachibu*. Beyond just boasting earth's greatest per capita presence of centenarians, Okinawa as recently as 2008 also had 12 positively verified super-centenarians aged 110 and above. In 2013, the worldwide total number of living super-centenarians was merely 63. Yet, Okinawa possesses only 0.0002% of the planetary human population. That is not a recent development. From time immemorial, Okinawa has been called the "Island of the Immortals". Until 2000, Okinawans had the world's highest life expectancy; 78 years for men and 86 years for women. In Okinawa there is additionally a record 80 – 90% lower mortality of cardiovascular disease, breast cancer, and prostate cancer than in the USA or Europe.

The Okinawans' traditional diet rich in plants and carbohydrates but low in calories, fat and protein stands in extreme contrast to the diet of the Canadian Inuit (previously known as Eskimo). They traditionally eat copious quantities of animal fat and protein and consequently exhibit the lowest life expectancy among Canadians (64 years for men and 70 years for women) as well as the highest rates of cancer and cardiovascular disease.

Traditionally-living Okinawans follow basic health rules in both their diet and their lifestyle. Just as their exemplary blending of communal sense with autonomy, and activity with relaxation, their eating is also optimally balanced. They consume only what they need and avoid excess. Their modest intake of food, low in calories and high in micronutrients, represents an enduring success model of healthy eating.

Minimally or non-processed plant foods have low energy-density and high micronutrient-density. In this book, essential micronutrients are defined as every subtle nutrient necessary for living such a potassium and other minerals, vitamins, trace elements, phytochemicals, and fibers — all in health-supporting doses. For instance, sodium chloride, iron, copper, or vitamin A are all necessary micronutrients, but they cease being micronutrients and become toxins in even slightly elevated dosages.

Meanwhile, modern Western dietary patterns keep asserting themselves in Asia, and with catastrophic health repercussions in the form of a pandemic jump in obesity, diabetes, and cardiovascular disease such as Asia had never known. In Asia as well as everywhere they can

be found, Seventh Day Adventists are the exception to that trend of deteriorating health. This group maintains a healthy lifestyle and a wholesome diet for religious reasons. Whereas Okinawans and all other hitherto long-lived populations are on course to increasingly lose their survival advantages the healthy lifestyles of the vegetarian Adventists have made them the world's most long-lived scientifically studied group. Their men on the average get to be 87 years old and their women 88.5 years. This phenomenon is the subject of comprehensive scientific studies known as the *Adventist Health Study 1* and *2* (*cf.* Chapter 2.4).

The first civic duty in a consumer society is to consume.

It is what earns us the designation consumers. The adage *He who consumes much is quickly consumed* is applicable to our metabolism and diet also. As is well known, caloric restriction is the most effective, but hereabouts also the most unpopular measure for averting *oxidative stress* and premature aging. Proven to be nearly as effective in animal studies but more pleasant for humans to carry out is restricting *methionine*, an essential amino acid four times more prevalent in cow's milk than in human mother's milk.

But plant protein is healthier for humans not merely in relation to *methionine*. Sensible combining of protein-yielding plants lets one obtain a biological usability value as high as and even higher than animal protein. This fact is of significance in view of the grave protein deficiency prevalent in developing countries. For our health considerations such a high quality protein offers the additional advantage of allowing us to avoid excess *methionine* which represents such a problem in animal protein.

This will, moreover, prevent the intake of undesirable accompanying substances present in the source medium of animal protein, substances like cholesterol and saturated fatty acids. Abstention from animal-based foods, while at first difficult, is worth every bit of effort.

We pay a steep price for our Western diet.

The excessive and often thoughtless eating of animal protein, sugar, and manufactured foods constitutes the very breeding ground of our *diseases of civilization*.

High-protein and high-fat diets are these days propagated as the answer to overweight, *insulin resistance*, and *hyperinsulinemia*. But highly regarded clinical studies and meta-analyses carried out at *Harvard* as well as the *European Prospective Investigation into Cancer and Nutrition (EPIC) Study* document the opposite.

Animal-based foods are the foremost cause of diabetes. The saturated fatty acids in meat and dairy products are capable of hindering carbohydrate metabolism and bringing about *insulin resistance*. That, in turn, leads to a backing-up of blood glucose and to chronically elevated insulin levels. *Metabolic syndrome* and diabetes can always be seen increasing dramatically when fast-absorbing carbohydrates — particularly sugars — coincide with a high-fat/high-protein diet and a lack of physical movement. Rice never used to cause metabolic problems in China until lots of fat and sugar began to glut the diet. By the same token, potatoes never led to a diabetes problem in preindustrial Germany.

The modern rise in abdominal and liver fat accumulation, as well as in the high incidence of *central insulin resistance* are primarily due to consuming saturated fatty acids (massively present in animal-based food) together with mono and disaccharides in sugars.

More recent evidence suggests that the *branched-chain amino acids* in which meat and dairy products abound also trigger *insulin resistance*. It appears that there is more than one good reason for renouncing a diet that emphasizes the eating of animal products.

Are carbohydrates villainous and proteins saintly?

It has now been scientifically settled that a diet of minimally processed plant-based foods can reliably safeguard against the likelihood of incurring cardiovascular disease and/or cancer. By the same token, consuming excessive amounts of animal-based foods will probably have undesirable consequences. Nevertheless, the ongoing discussions regarding the evils of carbohydrates, good *vs.* bad fats, and the alleged virtues of "high quality" protein from animal sources can be perpetuated *ad infinitum*, all with a transparent aim of confusing the people and preserving the food industry's bottom-line. Such marketing hype will, however, hardly contribute to an actual understanding of healthy nutrition.

Much more promising than designating one or the other specific nutrient as either good or bad is to conduct a thorough examination of the food in its wholeness, its synergy of components, the changes it undergoes in the course of commercial processing, how it is prepared for eating, and how it interacts with other foods in the overall meal composition. It can be generally accepted that carbohydrate-yielding foods contain many health-supporting elements that are not supplied by a low-carb diet.

Complex carbohydrates are the cleanest burning fuel available to the human organism.

Carbohydrates are fully reduced to pure carbon dioxide. By contrast, simple carbohydrates such as glucose, sucrose (a glucose-fructose disaccharide), and refined flour burn with an unhealthy jet-flame. They flood blood and cells too suddenly, driving up the insulin level, and suddenly give way to a renewed hunger attack, because they burn too rapidly. Sources of complex carbohydrates, for example rolled oats and oats, buckwheat, wild rice, chickpeas and similar legumes are all distinguished by providing a slow and long-lasting energy store, and by simultaneously delivering organic minerals, vitamins, and fiber, all of which support efficient metabolization.

Carbohydrates have long been involved in controversy. One reason for this is that the word itself is but a collective term for the large, very diverse group of compounds ranging from simple sugars to branched-chain starch molecules. Another reason is that the blood-sugar effect frequently is erroneously equated with the effect of insulin. The *glycemic index (GI)* is fundamentally different from the *food insulin index (FII)* which is ultimately much more important to metabolism. As a case in point, consumption of milk and meat results in quite a steep insulin distribution but without simultaneously elevating blood sugar. The greater metabolic importance of the *food insulin index* stems from the fact that the hormone insulin's effect is much more varied and critical than the effect of the fuel glucose.

Low-carb, as a designated feature of a plant-sourced diet will, in fact, lower cardiovascular mortality, but low-carb from being crowded out by a meat and dairy predominance will do the precise opposite. Alas, to most Westerners, cheese and steak taste better than broccoli. Consequently, our condemnation is only aimed at this most common variety of low-carb diets, whose scientifically unfounded popularity will ensure, for years to come, a steady flow of profits for the meat and dairy industries.

People who are suffering from metabolic problems will, indeed, see improved blood values from the reduction of carbohydrates. But if, instead, merely the consumption of meat and dairy products is increased the long-term damages are bound to far outweigh the short-term benefit. These foods materially contribute to *endothelial dysfunction* and to *arteriosclerosis*. Additionally, they have other negative long-term consequences, such as an increased risk of cardiovascular mortality. These unwanted and dangerous consequences of many low-carb diets make their continued propagation by the media a monstrous disservice to the public.

Proteins are not primarily fuels, but building blocks.

Proteins are needed in only small quantity. In Germany, the postulated risk of protein deficiency affects only a few individuals but the documented oversupply of protein causes grave harm to many. On Okinawa, for example, the people obtained only 39 grams of mostly plant-derived protein through their traditional diet, and they did very well with them.

All surplus protein overloads the liver and kidneys with nitrogen, ammonia, and sulfuric acid. It brings about an increase in *oxidative stress* and contributes to the occurrence of *protein storage diseases* the conception of which has been formulated and popularized by Professor Lothar Wendt of Frankfurt.

What gets also often overlooked by the protein enthusiasts is that the central ion pump, the sodium/potassium pump, is not only capable of pumping potassium, but also the ammonium ion. With today's high-salt, low-potassium, and excessive protein diet this can readily cause intracellular *protein storage disease*. The bulk of metabolism and the storing of amino acids are intracellular events, after all.

Many studies now indicate that ample animal protein does *not* slim. It fattens!

High amino acid levels go hand-in-hand with abdominal fat buildup and may be regarded as reliable early indicators for future diabetes. The combination of too many saturated fatty acids, animal protein, fast carbohydrates, and insufficient movement will more than anything hasten the appearance of fatty liver, fat-metabolism problems, and *insulin resistance*. These disorders were not known in the past.

Infamously, the progression of *oxidative stress* to *nitrosative stress* aided by the occurrence of reactive nitrogen species is the pathway for exceptionally insidious neurodegenerative diseases such as Alzheimer's and Parkinson's. Another main factor are protein misfoldings produced with the participation of *methionine* and gaseous nitrogen radicals. During early stages that can be countered through a diet of plant foods rich in potassium and phytonutrients. The plant-derived compounds facilitate this effect by antioxidatively stabilizing nitrogen monoxide and preventing its oxidation into peroxinitrite.

Fat is the most energy-dense macronutrient.

Fat can be worth its proverbial weight in gold when the issue is surviving times of famine, but during times of plenty it will just as effectively promote the incidence of *metabolic syndrome* and diabetes. In the presence of insufficient movement a high fat content triggers a feedback inhibition of key enzymes used in carbohydrate metabolism. The fattened cell then protects

itself against repeated glucose overloads by engaging in *insulin resistance*. It, so to speak, battens down the hatches. In doing this, cells actually show themselves to be more health-conscious than some obese people who more often than not will go right on stuffing themselves with more unneeded food. Unutilized glucose now starts backing up all the way to the blood. By that time it is a problem for the entire organism. Intending to make the cells more receptive to the backed-up glucose, the pancreas regulates against this contingency by putting out even more insulin, but the cells choose to survive rather than to drown in glucose. They keep the hatches battened down. In this way the vicious circle of *insulin resistance* and *hyperinsulinemia* is set in motion.

For centuries and billions of humans neither potatoes nor baguettes or white rice had created diabetes. Suddenly today, levels of blood sugar and insulin are becoming pandemic threats. Why? Because they are now being combined with loads of saturated fatty acids, sugar, animal protein, and an unprecedented lack of movement.

Complex carbohydrates are not the culprits but the victims.

The solution to *metabolic syndrome* is not fewer carbohydrates (*i.e.* symptom removal), but less fat, less sugar, and less total caloric energy (*i.e.* elimination of the original cause) — plus, of course, stepped-up movement. In prevention, low-fat indicates 30% of the daily energy supply, preferably as unsaturated fatty acids from plant foods. For those with cardiovascular disease or *metabolic syndrome*, however, low-fat indicates no more than 10% of the daily energy supply. These dosages not only correspond with the original fat intake ratio of traditional German and Asian diets but also brought about excellent results in clinical studies including those long-term studies conducted over many years.

Most cells prefer oxidation of fat over that of carbohydrates. They thus simply reduce their carbohydrate metabolism when fat supply is high. Heightened beta-oxidation of fatty acids then ensues in tandem with an increase in the formation of oxygen and nitrogen radicals and the inhibition of carbohydrate metabolism with a simultaneous development of *insulin resistance* within the muscle cells.

Not only surplus fat but by force of necessity also the backed-up blood sugar is dumped into the liver since fructose, too, is metabolized only in the liver. In this way, high fat and sugar consumption directly fosters fatty degeneration of the liver. With additional protein gorging, so common in the modern diet, fatty liver provokes *central insulin resistance* and chronic *hyperinsulinemia*, the root causes of our metabolic and other *diseases of civilization*. Since fat cells also store and release fat, *cytokines* appear in the course of all that coming and going of fat. Too many *cytokines* will eventually trigger an inflammation-prone metabolic situation. In a prooxidative metabolic milieu even many of the so-called healthy fats such as the omega 3 fatty acids *ALA*, *DHA*, and *EPA* can wind up doing serious harm because they may either get oxidized or were, perhaps, already rancid at consumption.

Movement deficit, too many animal-based foods that are loaded with saturated fatty acids and protein, and *Blitzkrieg* attacks by sugar and quick carbohydrates devoid of essential micronutrients all conspire in an orchestrated way with one another to provoke mitochondrial dysfunction. The macronutrients-glutted but micronutrients-impoverished cells attempt to burn more of the macronutrients, but that no longer works properly. Mass-produced oxygen

and nitrogen radicals proceed to systematically inflict more and more damage on the respiratory chain and other mitochondrial structures.

These attacks are what drive the development of permanent mitochondrial cytopathies that end at long last in the dying out of mitochondria. At that point an additional vicious circle commences. "Undigested" metabolic intermediate products like diglycerides, glucose, amino acids with *AGEs*, and yet other reaction products are thrown together in a climate of chronically elevated *oxidative* and *nitrosative stress* and opportunistically activate a pro-inflammatory, carcinogenic signaling-chain *(e.g. protein kinase C*, *NF-kappaB)*, thereby taking destruction to the blood vessels and then on into every domain of the organism.

Metabolic wastes accumulated during the process make oxygen and nutrient delivery as well as waste elimination more difficult. The metabolic sequences become increasingly inefficient. Material piles up instead of moving. In concrete terms, one keeps gaining weight on the daily consumption of 3,000 *kilocalories* that in earlier times would have been burned without a hitch. The preceding explanations should have made it clear that the whole multi-layered mess cannot be corrected by means of mere supplementation with one or another micronutrient. A causational course of action spanning dietary reform, adequate movement, and sensible weight reduction must be implemented in order to achieve effective reversal.

Insulin makes us first taller, then fatter, and finally sicker.

Insulin is the fattening hormone. It works primarily as an *anabolic* hormone which is attracted to blood sugar and facilitates the cells' intake of glucose, amino acids, minerals, and fats. It promotes protein synthesis and fatty acids synthesis but vigorously hinders fat reduction. Insulin and *insulin-like growth factors* also stimulate cell growth, cell division, and therefore cancer. Through the modern *insulinogenic* diet people do become taller, but they also never cease growing — from a certain age onward though, admittedly, only in girth. An incessant parade of small and large meals, all of which are *insulinogenic* and thus both directly and indirectly create *insulin resistance*, no longer allow metabolism with resting spells, thereby ensuring permanently elevated insulin levels.

According to numerous epidemiological studies, red and processed meat make the biggest contribution to the development of *insulin resistance* and *diabetes mellitus* type 2. In our modern diet, animal-based foods are the chief sources of saturated fatty acids and of the type of protein that is super-loaded with *methionine*. *Advanced glycation end products (AGEs)* are known to form in a diabetic body, where they substantially participate in the development of more sequelae. These second-line diseases are multitudinous and often lead to impairment or disability. As yet little recognized are newer findings that, contrary to previously held opinion, *AGEs* are absorbed in large numbers through the colon also — mainly from the remnants of deep-fried, fried, and grilled animal-based food. It seems highly probable that these *AGEs* have a hand in the genesis of our *diseases of civilization*.

Overloads of saturated fatty acids, iron, and salt, coupled with deficiencies in potassium and magnesium can engender *insulin resistance* as well. The combination of animal protein and high-*glycemic* carbohydrates simultaneously brings on exceptionally strong insulin flooding followed by a rapid drop in blood sugar. Understandably, the brain will very shortly demand the next meal (*cf.* Figure 3). In the long run these up-and-down reactions set the stage for serious metabolic disorders. The hamburger just happens to taste best when plenty of table

salt, sodium glutamate, and *AGEs* fire up the taste buds and the sugar-saturated cola washes the whole thing down. This all creates powerful cravings for more. And since we have turned into slugs and couch potatoes who no longer move enough, the sugary amino acid soup is not converted into energy and muscle mass but over-stimulates the brain instead. No wonder that ever more young children are growing jittery and cannot concentrate any longer. Over decades, this diet rich in fat, protein, and sugar but poor in micronutrients slowly but surely damages the brain *via* complex mechanisms that will be described in detail further on.

Metabolic syndrome and non-alcoholic fatty liver disease

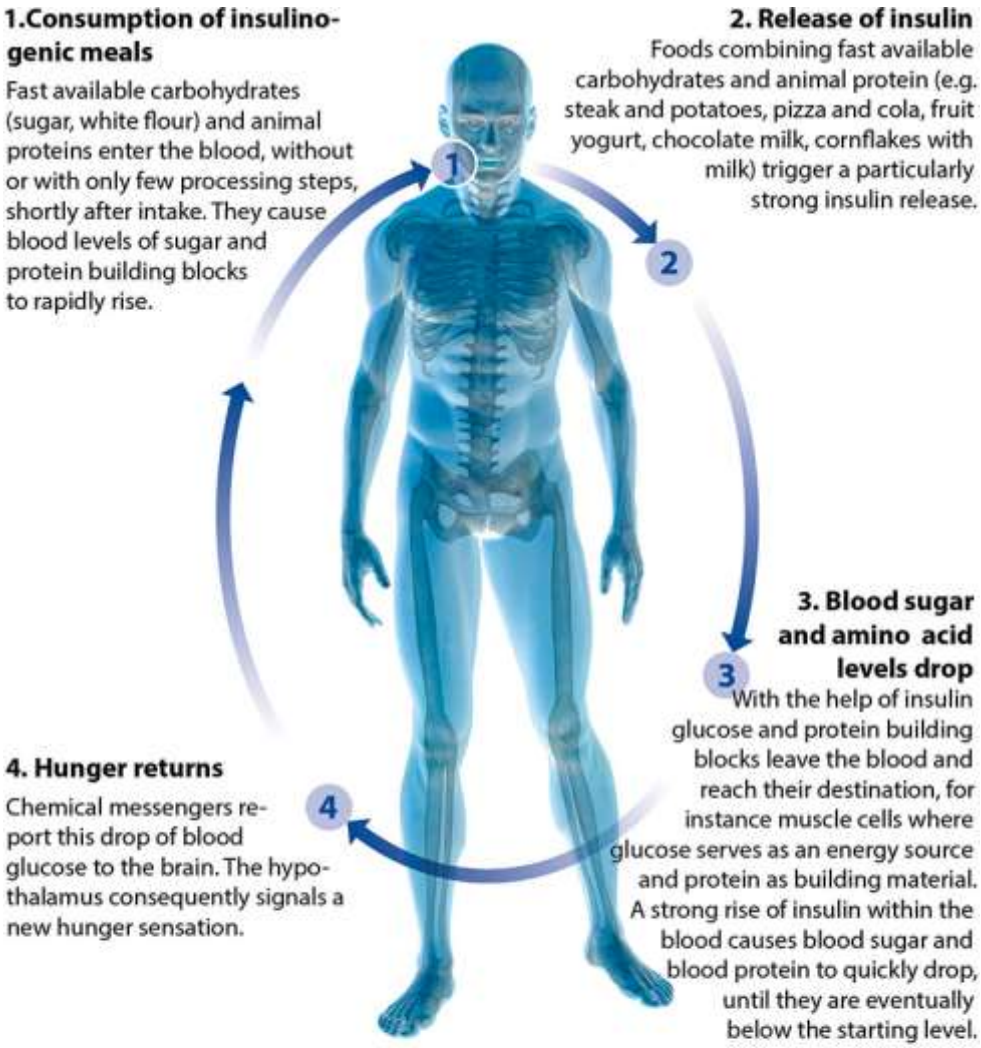
Metabolic syndrome and non-alcoholic fatty liver disease constitute the earliest symptomatic of the *diseases of civilization* in which overeating, insufficient exercise, *insulin resistance*, and *hyperinsulinemia* are the pathogenic culprits. Visceral and intrahepatic fat do not even have to be all that voluminous in order to set *insulin resistance* and *hyperinsulinemia*. Thanks to the modern way of life even slim people are found to be developing non-alcoholic fatty liver disease *(NAFLD)* which always goes together with insulin resistance. Seeing that there is a nearly 50% prevalence in the USA (Williams *et al.*, 2011), *NAFLD* is likely underestimated in Germany. The term *NAFLD* is misleading because while at current consumption levels alcohol may not be as decisive a factor as it is in *alcohol-dependent fatty liver*, it is likely a cofactor in many cases. Alcohol, a liver poison, makes it even harder for the liver to cope with today's normal inundation of superfluous nutrients and all their accompanying pollutants.

Insulin resistance

Insulin resistance does make the cells impervious to insulin's blood sugar regulating action, but due to the compensatory *hyperinsulinemia,* insulin's further effects come into greater prominence. Strongly *anabolic*, insulin will not only foster metabolic disorders, obesity, and cardiovascular disease, but also underpin carcinogenesis, crank up cholesterol synthesis, trigger *sympathicotonia*, and elevate brain tryptophan levels, thereby indirectly stimulating serotonin and *melatonin* synthesis. Insulin's direct impact upon the brain's dopaminergic reward system, and with it the addiction mechanics, is proven too. No ecstasy without its price tag, though. Any artificial raising of levels is answered with downregulation of the receptors or their acquisition of tolerance. The dosage must then be increased in order to get that same effect again. Hippocrates might well have pegged today's diet with the statement *your addictive stuff is your food.* The addiction to insulin's *anabolic*, *sympathomimetic*, *serotonergic* effects shows itself especially in the strong preference for foods that trigger a rapid, intense, and steep insulin release.

Every reduction in blood sugar and insulin gets answered by *insulinogenic* snacking or the consumption of sugary drinks. In light of the insulin effect's great addiction potential it is no wonder that these combinations are among the most popular meals or in-between-meals snacks. Even milk and steak lead to a steep insulin release. This explains why, in the presence of *hyperinsulinemia,* a dietary change along with the associated weight reduction will definitely increase the number of healthy-life-years but is initially a challenging undertaking similar in magnitude to withdrawal from an addictive drug (*cf.* Figure 3). Depriving metabolism of rest periods also fosters *insulin resistance* and development of *metabolic syndrome* and fatty liver. As shown by the *food-insulin index*, an intense *insulinogenic* reaction results from com-

bining quickly absorbed carbohydrates with animal protein as in, for instance, steak and potatoes, milk shakes, fast food or pizza with a soft drink, cornflakes or any other sweetened breakfast cereal with milk, fruit yogurt, and cappuccino or latte macchiato with sugar.



Conclusion: *Carbohydrates, the natural fuel for our cells, are especially important to the brain. Complex carbohydrates burn cleanly and without leaving residues, because the absorption and burning processes take place slowly. Fast available carbohydrates are burnt as a jet flame and can throw metabolism out of equilibrium. Saturated fatty acids briefly lower insulin release but hamper carbohydrate metabolism and, in combination with sugars and lack of movement, lead in the long run to an accumulation of abdominal and liver fat and to chronically elevated blood levels of insulin and sugar. The fattening trio are industrial sugar, meat products and milk products – our very diet of civilization.*

Figure 3: *Insulinogenic* vicious circle

The fact that unhealthy foods with addiction potential are ubiquitous in our society does not make life any easier for us. That is one of the reasons why we find it so hard today to practice sensible moderation and why we routinely eat unhealthy food even though a healthy diet would be well within our reach.

Except, that is, if we deliberately choose a healthy way of life for ourselves. From those who have done it we know that whoever takes the voyage of discovery involving a dietary and lifestyle change will be rewarded with great gains in vitality, quality of life, and typically also additional healthy-life-years.

Animal protein is exceptionally high in acid-forming and prooxidative *methionine*.

Animal protein has unmistakably more sulfur-containing amino acids than plant protein. It therefore burdens the body with non-volatile acids that cannot be eliminated *via* respiration and are thus left for the kidneys to deal with. Till now this fact is not being duly considered in the calculation of the *potential renal acid load* (*PRAL*).

Methionine content is on the average one third higher in animal protein than in plant protein. Restricting *methionine* intake not only slows tumor growth and mitochondrial *oxidative stress* but also unequivocally prolongs the life of laboratory animals.

Animal-based foods are the primary source for European society that is for the most part heavily oversupplied with protein. Surplus *methionine* is reduced to toxic *homocysteine*. The body's unneeded stockpile of oxidation-prone *methionine* and *homocysteine* gives rise to non-volatile acids, and so to more inflammation and *oxidative stress*.

A particularly interesting and pertinent recent discovery shows that oxidized *methionine* promotes *protein-folding disorders* in the proteins of brain and nervous system, thereby triggering neurodegenerative diseases. Among the dreaded disorders are Alzheimer's, with its *beta-amyloid peptides*, and *prion* diseases like bovine *spongiform encephalopathy* (*BSE*).

Protein misfoldings will happen whenever there is elevated *oxidative* and *nitrosative stress*. Faulty proteins are also implicated in other neurodegenerative diseases, such as Parkinson's, Huntingson's, and amyotrophic lateral sclerosis (which is more commonly referred to as Lou Gehrig's disease).

Human mother's milk and plant protein contain the amino acid *cysteine*, one of the *glutathione* precursors, but in mother's milk *cysteine* occurs in a 1:1 ratio with *methionine*.

In cow's milk, as in meat, this ratio is 1:3. From the comparatively low protein and *methionine* content of mother's milk it can be known what is healthy for humans. With 3 times the quantity of total protein and 3.75 times the quantity of total *methionine*, cow's milk is not a species-appropriate food for humans.

Extreme alteration of the sodium/potassium balance

Processed food strains the body's highly efficient but often vulnerable mechanisms through too many unneeded calories and potentially detrimental macronutrients. Worse, it also infuses the organism with dangerous quantities of salt on one hand and far too little potassium on the other. This turning upside down of the balanced ratio intended by nature has made civilized humankind the only mammals suffering from high blood pressure, a condition that is now regarded as the most common cause of death.

The *American Heart Association* confirms that the high-sodium diet damages the heart, the blood vessels, the kidneys, the stomach, as well as the bones — and these problems are independent of and in addition to sodium's blood-pressure raising action.

The *American Heart Association*, along with the *U.S. Food and Nutrition Board* and the *Canadian Council of Food and Nutrition* recommends consuming at least 4.7 grams of potassium each day, and at the same time limiting sodium intake to no more than 1.5 grams (*i.e.* 3.75 g salt).*WHO* also found itself forced to change its guidelines by the overwhelmingly clear position of research in this area of concern.

Prior to the advent of agriculture, people consumed about 1.2 g magnesium, 1.6 g calcium, more than 10 g potassium, but merely 0.8 g sodium. First Peoples like the Yanomani Indians still benefit from that distribution to this day. Their daily intake of potassium is approximately 8 g/day, and like the traditional people of Okinawa they subsist on a predominantly alkaline, mineral-rich, sodium-poor, plant-based diet.

Such a diet is alkaline-forming in the body, protects the kidneys, and averts hypertension.

In sharp contrast with this, the Western diet is characterized by too much animal protein, too much phosphate, too much table salt, too little potassium and magnesium, constant stress (*i.e.* fight-flight response), and laughably little physical movement. This lifestyle and diet result in an extremely altered sodium/potassium ratio and in a dangerous overload of fixed acid generators like chloride, sulfate, and phosphate.

In the same way that the sodium/potassium ratio has been altered to now exhibit an extreme bias toward sodium, the calcium/magnesium ratio underwent a shift in favor of calcium.

It can be shown epidemiologically, clinically, and cytophysiologically that these and similar alterations in the minerals and acid/alkaline households have played a critical role in the alarming progression of high blood pressure, stroke, cardiac arrhythmia, heart attack, heart insufficiency, kidney insufficiency, muscle atrophy, and osteoporosis.

Among the numerous repercussions for metabolism are the far greater incidence of *insulin resistance*, strongly elevated *cortisol* and *aldosterone* levels, and reduced endogenous synthesis of vitamin D.

Salt reduces *nitric oxide syntheses (EC NOSs)* and directly heightens the risk of heart attacks and strokes through its rigidification effect upon the arterial endothelium and the erythrocyte membranes. Potassium, by great distinction, softens the endothelium and normalizes its important function.

Curtailed activity of the sodium/potassium pump and increased sodium/proton antiporter activities are typical in cancer patients. Studies have shown that the higher the intracellular sodium concentration, and the lower the comparative potassium concentration is, the more aggressively cancer tumors will behave.

Routines of physical activity, thyroid hormone therapy, potassium loading, and certain polyphenols can normalize the relative sodium/potassium concentrations and reactivate a sluggish sodium/potassium pump.

Any reduction in sodium/potassium pump activity together with a system over-acidification lowers the voltage value of the cell-membrane potential. It is a crucial event in carcinogenesis since membrane potential regulates cell growth and differentiation.

Overacidification of the tumor niche resulting from a chronic acidosis of the organism represents not only the concomitant condition that facilitates metastasis but is in itself a primary causal factor in carcinogenesis. Keeping this in mind, a plant-based diet with a high proportion of raw food is an effective agent both in cancer prevention and in cancer therapy.

Elevated *aldosterone* and *cortisol* levels

Aldosterone levels normally rise only in the presence of a diet with potassium overage.

When that happens it is meant to facilitate salt reuptake and potassium dumping. Nature-bound peoples therefore have very high *aldosterone* levels, and these cause them no health problems. Never before envisioned, never provided for in the ecology of human evolutionary development, the odd combination of a high-salt diet and pathologically raised *aldosterone* levels is unique to date. More to the point, it is also fatal.

It is well within *aldosterone's* province to mediate some appropriate and necessary stepping up of mechanisms for the elimination of fixed acids and ammonium, but in the process the important minerals magnesium and calcium are eliminated as well. The harmful, destructive sodium chloride gets reclaimed and added to the sodium already present in excessive quantity. Thence it deposits itself in the connective tissues, the lymph, and the cells. High blood pressure is just one of the undesirable consequences.

And, the unhappy union of a high salt consumption with high *aldosterone* activity goes on wreaking havoc. Fibrosis of cardiac muscle, circulatory vessels, and kidneys, along with increased inflammatory activity fomented by *NF-kappaB* molecules, and the appearance of autoimmune disorders are part of the cost that the organism incurs with its high salt intake in the presence of high *aldosterone* levels.

High blood *cortisol* levels and pathological *aldosterone* activity occur under the influence of latent metabolic acidosis spawned by a high-sodium/low-potassium diet rich in animal protein, far greater efforts needed for movement due to the friction imposed by surplus pounds, and the never ending stress of a frenzied, multitasking, hyperspeed performance-driven, multimedia-plugged, and pleasure-addicted pseudo society of misinformed consumers.

A *cortisol* glut or *hypercortisolism* fosters expanded neoglucogenesis, whips the liver into an intensified cholesterol synthesis, and winds up turning into *hyperinsulinemia*. The metabolic happenings engage the cellular defense measure of *insulin resistance* and encourage a more massive deposit of abdominal fat.

The risks of *metabolic syndrome*, *hypertension*, strokes, and heart infarcts are boosted primarily by extra poundage, raised *cortisol* and *aldosterone*, the subsequent retardation of sodium excretion — worsened by the concomitant expulsion of needed potassium and magnesium — movement deficit, less perspiration, and yet more sodium retention.

10 g salt per day would not be a problem for a hardworking heavily perspiring farmhand, but given our sedentary lifestyle, insensible diet, and diminished salt elimination, it constitutes a huge problem that keeps the sodium/potassium ratio distorted and the membrane potential far below what is actually needed.

While the experience of *cardiac arrhythmias* may hint that not all is well, development of an *epithelial tumor* would certainly remove any doubt. But why wait that long when appropriate action could stop the out-of-control merry-go-round?

The intestine — intermediary between human and nutrition

The intestine is the organ with the largest surface (*ca.* 400 square meters), and is thus ideally suited to absorbing nutrients, together with providing the habitat for a complex ecosystem of bacteria, fungi, and yeasts.

It is also one of the body's most important immune organs. An unbalanced, unnatural diet will negatively affect the intestinal flora and our immune defense.

While the supplementation with probiotic bacteria has been propagated for decades and *can* be a sensible short-term measure, it ultimately is the food composition and its resultant metabolic products that determine the intestinal flora's properties. Food constitutes both its environment and its supply of nutrients.

Today's customary fiber-poor, meat-rich diet and frequent use of antibiotics — even in meat and dairy production itself — results in the sacrifice of healthy intestinal bacteria. In the further course of deterioration pathogenic germs can set up shop. Unfriendly microbes like *clostridia* then continue to crowd out the bacteria we need for maintaining our health.

Along the way, the colon's pH value winds up on the alkaline side. And it is not just that the steady consumption of meat constitutes the primary source of pathogens such as *clostridium perfringens*, the meat also serves these as their food and helps them sustain their colony.

Toxins and toxic metabolites of microbes specializing in putrefaction dangerously increase the intestinal wall's permeability, and thus allow antigens to enter the blood. There, they stimulate immune reactions and contribute to the incidence of autoimmune diseases like rheumatoid arthritis. This dysfunction known as leaky gut syndrome is gaining ever greater significance in understanding the connection between food and either health or disease.

Benign intestinal bacteria require a supply of fibers in order to ferment them into short-chain fatty acids like butyrate, one of the intestinal mucosa's main nutrients. By now, the intestinal flora's importance is also being discussed in connection with obesity and *diabetes mellitus* type 2. The cause is, however, not the intestinal flora itself but the diet and lifestyle that favor one type of flora composition over another.

Depending upon their nutrients and the intestinal milieu (*e.g.* its pH value), the bacteria manufacture various metabolites which then exert their influence on us. So, our diet substantially determines what metabolic course our intestinal bacteria will take and whether they are going to be "good" or "bad" for us.

Intestinal milieu changes brought about by the protein-rich Western diet have multi-layered consequences. For one, many more carcinogenic *bile acids* can form in the alkaline colon environment. Additionally, when ammonia, a highly toxic product of protein metabolism occurs in such an environment, it gets absorbed 400 times more efficiently. A healthy colon environment will prevent these effects because it is mildly acidic thanks to the healthy flora's fermentation products such as lactic acid and short-chain fatty acids.

What is the species-specific diet appropriate for humans?

The classic of nutritional science, *Ernährung des Menschen* (Elmadfa and Leitzmann, 2004), intimates that traditional diets correspond much more closely with the natural human makeup than does the modern Western diet. *For almost all humans living today, a diet in accord with*

evolution means a mixed but predominantly plant-based diet. Such, then, might be regarded as man's natural food.

That is seen not only in the history of human development but even today in, among others, the anatomical features of human teeth and intestinal tract, as well as in the specific array of enzymes cultivated there. Humans have, for instance, no capacity for endogenic vitamin C synthesis and are endowed with a slow break-down mechanism for uric acid and cholesterol.

To return, once again, to the "paradisiacal" nature of things on Okinawa, traditionally living Okinawans enjoy a species-specific diet. Their aged ones stay slim throughout life and keep healthy deep into their old days. They successfully manage to integrate the traditional way of life with modern achievements of Western civilization and have the world's longest life expectancy with the most healthy-life-years.

The primary source of food energy is the sweet potato that is rich in complex carbohydrates and carotenoids and ranks low on the *glycemic index*. Sugar and white flour are not part of the traditional menu. But Okinawans do consume large quantities of plant foods that are rich in flavonoids, plant foods such as tofu, vegetables, bitter melon, and turmeric (curcuma).

Oxidative stress being low, their circulatory vessels exhibit little wear and tear even among the oldest. One of the reasons for this is that the diet is rich in antioxidants, and the modesty of their caloric energy supply also helps keep down the formation of free radicals. Their blood contents of antioxidants and isoflavones (from soy) are high. They maintain stable hormone levels way into old age and also keep their levels of lipid peroxides and *homocysteine* low.

The prevalence of dementia is comparatively low too (6.7% among those aged 80 – 90 years). By contrast with the acid-biased Western diet, the Okinawans' has a strongly alkalizing effect upon metabolism and kidneys (*PRAL* value = 75 miliEquivalent; for the *PRAL* value explanation *cf*. Chapter 8.11).

Good genes most likely also contribute to the Okinawans' exceptional longevity, but that factor can only be minor since the advantage disappears when they leave their island and adopt foreign diets and living habits. The modern trend toward fast food and the Western diet has in the meantime already taken its toll. Okinawan men have, sadly, embarked on a counter-evidentiary course in the view of nutritional science.

Thanks to their high susceptibility to Western pleasures, Okinawan men in 2000 plunged from first to last place in Japanese longevity. Their younger generation is the most overweight in all of Japan. That was accomplished with the help of an American fast food chain and a school lunch program that began to offer refined flour and milk. Okinawan women though remained true to their traditional diet and thus continue to boast the world's highest life expectancy with the most healthy-life-years. Tragically, the Okinawa phenomenon will soon be a mere footnote in history.

Especially in Germany there is a need for urgent action!

—Inexplicably, we Germans deem ourselves health-conscious individuals. —

A recent survey carried out by the DKV health insurance company probed for compliance with "the five pillars of a healthy life", sufficient exercise, balanced diet, moderation around alcohol, non-smoking, and little stress. The survey results indicated the very opposite. Barely

11% of the respondents fulfilled all five requirements for being regarded as overall healthy. Yet six out of ten had declared living healthily by their own assessment. Being devoted to a particularly high consumption of fat and animal protein we are now also the fattest Europeans. The *International Association for the Study of Obesity (IASO)* determined that 75.4% of German men and 58.9% of women have a *body mass index (BMI)* above 25. Interestingly, pasta-and-olive-oil-loving Italy has the lowest overweight or obese population among European countries. The *German Cancer Society* warned in an opinion for a hearing by the Lower House of Parliament on the state of German cancer research:

Overweight is increasingly gaining in importance and will in the foreseeable future be the crucial factor in estimating the probability and the mortality rate of cancer and other diseases. In case of failure to reverse *the trend toward steady weight gain* in society all other measures of cancer prevention will be *irrelevant*. The rate of diabetes in Germany grew between ten and twelve-fold during the last 50 years.

The *Robert Koch Institute* examined thousands of federal citizens as part of its study on the health of German adults *DEGS* (Heidemann *et al.*, 2013). 7.2% [4.6 million] of 18 –79 year old subjects stated they had been told that they had diabetic disease. That means that the prevalence of diabetes rose by 38% since1998. That figure does not take into consideration the undiagnosed cases of diabetes. And all this despite the fact that, as the study also showed, Germans keep exercising more and more.

Through the efforts of Lebensform-Bewegung, Bircher-Benner, Bruker, Kneipp, and Kollath it has been known to Germans since the end of the 19th Century that whole grains are good for us whereas sugar and white flour are never so. Unfortunately, these holistic principles of healthy nutrition are now being increasingly lost, even among naturopathic circles, or else replaced by dietary fashion trends with pseudo-scientific rationales. But what the pioneers of a whole foods diet intuited is now being scientifically ascertained and demonstrated.

Primarily responsible for today's strong gains in abdominal and liver fat, and therefore for the occurrence of *central insulin resistance*, are saturated fatty acids from animal-based foods, in combination with sugar and animal protein. Whenever sugar is combined with animal protein (*e.g.* sweetened fruit-yogurt), inordinately high insulin releases follow. These promote the accumulation of body fat and at the same time impede its reduction. Our Western diet's fattening trio are *meat*, *dairy products*, and *industrial sugar*. They are at their most destructive when consumed together. And whenever excessive *salt* use joins, the fattening trio becomes the deadly quartet.

Low-carb diets do effect some improvement by excluding sugar and white flour. However, Atkins, low-carb, and ketogenic "anti-cancer" diets are predicated upon a one-sided and misleading definition of healthy nutrition that focuses purely on its carbohydrate content to the exclusion of essentials that actually endow foods with their real health value.

We humans love simplistic **answers to life's complexity.**

Many see using the facile scapegoat carbs as preferable over critically examining the qualities and likely effects of nutrients, the significance of total energy intake, and the multi-layered interplay of metabolic processes. And yet it is exactly such lazy reductionism that demarcates the path into disease instead of away from it. Empirical tunnel vision wrought by mixing in-

depth aspectual expertise with the hubristic display of negligence toward the larger context of the whole can but progressively sever us from the wisdom innate in us as beings of health.

Reduced carbohydrate diets emphasize the blood sugar level, but numerous studies have conclusively proven that the insulin response exerts a more far-reaching influence. Insulin and *insulin-like growth factors* are strongly *anabolic* agents and play a substantial role in the genesis of our *diseases of civilization*. They do that by directly affecting the central metabolic events — cell growth, *apoptosis*, blood pressure, pulse rate, and cholesterol synthesis.

Yet, cutting-edge research results like the *food-insulin index* known since 1997 are rarely accorded recognition of their significance. Who would have imagined that 260 g of strawberry yogurt triggers nearly double the insulin release of 625 g peeled oranges, or that steak and fish mobilize much more insulin than spaghetti *al dente* (1000 kilojoules per serving)? Human anatomy, the biochemistry of metabolism, and epidemiology all put forth valuable answers regarding what the natural human diet is (*cf.* Elmadfa and Leitzmann, 2004).

Less expedient are diverse speculations around Stone Age genes and the diets derived from them. The Stone Age diets were very diverse in their composition. They also more or less corresponded with all the possibilities that were offered by their respective climate zones. Common to all indigenous peoples are natural, unprocessed foods and very much movement. These two features are also the basis of healthy life in any era of history up to the present moment. Relative proportions of the primary nutrients, carbohydrates, protein, and fat, may vary widely, but they do seem to have a strong bearing on life expectancy and quality of life in old age, as can be seen in the contrasting examples of Okinawans and the Inuit.

The regular movement and the hunger periods that are typical of primitive peoples and correspond with the "protein fast" pioneered by Lothar Wendt (*cf.* Chapter 4.1) lessen the destructive effects of a diet rich in saturated fatty acids and animal protein because the macronutrients are metabolized and do not lead to mitochondrial dysfunction. Yet even the allegedly super-healthy Massai, who live on the milk, blood, and flesh of their pasture cows, show pronounced arteriosclerosis in autopsy studies despite very high level of physical activity.

The same holds true, by the way, for the only Stone Age corpse ever examined. "Ötzi" was murdered at age 45 and subsequently wound up in a glacier crevice, where he remained in deep freeze until his discovery a few years ago. He had a constricted abdominal aorta, high cholesterol values, and suffered from arteriosclerosis. Although he certainly never ate white flour or sugar, he did consume copious quantities of venison.

International epidemiological studies, such as the *China Study*, the still ongoing 1975 study of the centenarians on Okinawa, and the high-caliber *Adventist Health Study* 1 and 2, demonstrate how consistently a diet containing little animal-based food will protect against cancer and cardiovascular disease and extend life with added healthy life years. In the *China Study*, cancer and *diseases of civilization* correlated most strongly with serum-cholesterol values and the consumption of animal protein.

Campbell later demonstrated in animal experiments that the carcinogen *aflatoxin* will provoke liver cancer only when the animals are also fed a diet high in milk protein. Milk products contain not only an abundance of saturated fatty acids but also growth factors like *IGF*-1 and hormones such as estrogen and progesterone and furthermore stimulate their synthesis in human bodies. There, they also activate *anabolic* procarcinogenic cell-signaling pathways as,

for instance, *mTOR* that integrates input from upstream pathways (*e.g.* insulin, *IGF*-1 and 2, and amino acids).

The negative effects of excess animal-based foods and protein keep being underestimated with deplorable regularity. Animal protein exerts a strongly *anabolic*, *insulinogenic* effect. It increases the release of insulin and *insulin-like growth factors*, whose action is both *proliferative* and *antiapoptotic*.

Despite this fact, animal protein has for over a century held the undeserved designation "high quality protein" when, in fact, plant protein is much healthier and thus of higher quality. It is true that cancer cells crave sugar, but they are also quite partial to strongly *anabolic* animal protein and fat.

Many tumors engage in stepping up the oxidization of fatty acids. They need fat so badly that they upregulate endogenous fat synthesis and the expression of *fatty acid synthase*. The combination of animal protein and sugar or other *high glycemic* carbohydrates is especially *anabolic* and increases insulin release the most.

Thanks to the modern diet rich in sugar and animal protein we grow ever larger.

Not just we ourselves grow, cancer cells do too. These, in turn, overexpress the glucose transporters and insulin receptors. The manipulation allows them to handily continue supplying themselves with glucose even when the brain's own blood sugar level is already lethally low.

This may be practically observed in the case of prostate cancer mortality. For decades, Switzerland, Sweden, and Norway led in the consumption of dairy products, meat, and sugar. According to *WHO* data, the result taken in 2000 showed that the age-standardized prostate cancer mortality in each of the three countries was up to 27 times higher than that in Asia. Similar results were obtained when measuring for breast cancer.

A healthy diet will work neither only *catabolically*, as do the low-carb ketogenic diets, nor just *anabolically*, as does glutting with animal protein, animal fat, and simple carbohydrates. It supplies the body with the natural macro and micronutrients it needs for maintaining optimal functioning. And, most importantly, it accomplishes this without overtaxing metabolism.

It is axiomatic that every one-sided overemphasis will metamorphose into the opposite. One frequently observed case in point concerns the permanently *anabolical hyperinsulinemia* from which emerges *diabetes mellitus* type 2 which ultimately turns *catabolic* in its effect — or else will conspire with carcinogens and other detrimental factors to provoke cancer. As such it, again, starts out as an *anabolic* phenomenon, only to then go on producing *catabolic cachexia* in the end stage.

Diets that are touted as being anti-cancer but embrace an exaggerated fat and protein intake stand in conflict with the gold-standard precepts of nutritional science. They must, therefore, be evaluated very critically.

The insatiability we display in our food consumption pattern also characterizes our behavior toward the natural environment. We plunder this planet of ours by extracting aluminum, copper, and even ultra-toxic metals like mercury, lead, cadmium, and uranium in unprecedented quantities. And yet, we like to absolve ourselves by feeling at a loss as to why our bodies are becoming ever more toxic. How hard can it really be though to figure this out?

The end-stops for the mercury we so enthusiastically dug up from the earth are the fish on our dinner plates, the amalgam fillings in our mouths, the *CFL* in our energy-saving light bulbs, and the vaccine-Thiomersal in our blood.

It was the naturopaths and pioneers of environmental science who first recognized the connection between an ever-earlier onset of breast cancer and the synthetics, xenoestrogen, and alien chemical compounds liberally mixed into an endless parade of cosmetic products. By now though science at large is beginning to take notice and investigating the effects these unnatural substances produce in us. That is why we now know that arsenic, aluminum, and copper act as metal-estrogens with far-reaching impact upon our organism. Little by little we are coming to understand that it may not be such a good idea to smear antiperspirants into our armpits in closest proximity, that is, to breast tissue where so much of the lymphatic activity takes place.

Moreover, it is becoming ever clearer that chemicals and heavy metals play a dangerous role in the pathogenesis of our *diseases of civilization*. Every one of these killer substances reaches us *via* many channels not just through our food. That is why the appendix at the end of this book provides concise information on the most critical aspects of the danger. Understanding the problem is doubly important here because during the process of weight reduction these accumulated poisons exit from the fat cells and are released into the blood stream. Healthy awareness and precaution are thus advised.

The healthiest way of life is clinically and epidemiologically documented.

The dietary and lifestyle changes advocated in Chapter 12 are based on, among others, the findings from Okinawa and the *Adventist Health Study*, as well as the best scientifically supported expositions and recommendations put forth by Dean Ornish, Caldwell Esselstyn, and Neal Barnard. The value of the Ornish concept was clinically proven in so many disease situations that *Medicare* now pays for it in the United States.

Multiple clinical studies show that this method facilitates permanent weight reduction while simultaneously alleviating insulin dependence, correcting *diabetes mellitus* type 2, opening constricted coronary arteries, and often also rejuvenating them. Along with clearly stepped-up *telomerase* activity participants in Ornish intervention studies experienced lengthening of their *telomeres* while those of the control group shortened.

And, in another intervention study patients succeeded in delaying the progress of prostate cancer for years. The follow-up biopsy found their carcinogenic and proinflammatory genes to have switched themselves off!

Why make the decision?

A plant-based diet with few or no animal-based foods? Isn't that kind of abstention from accustomed foods too restrictive? Some go as far as to proclaim, "I would rather die sooner than get old without enjoying my life." Mainstream medicine is, unfortunately, unable to free us of the *diseases of civilization*, but as a consolation prize it will stretch out our dying process over decades. So what is there to fret about concerning possible difficulties connected with abstention if it *can* effectively address our diseases and restore us to good health? Besides, that initial sense of being forced to give up something important is a fabrication of the mind. It does not reflect any factual deprivation of pleasures or diminishment in the joy of life.

It is easier than it sounds.

After having gone through the dietary make-over most people do, in fact, realize that both their eating and their life experience have become more pleasurable. One of many examples for this fact is President Bill Clinton whose fondness for steaks and fast food was all but proverbial. Following a heart attack in 2004, he underwent quadruple bypass surgery and received two stents in 2010. On the advice of Dean Ornish he then converted to a purely plant-based diet because, as he explained, he desired to yet be able to experience his grandchildren's growing up. By his own account, Clinton misses nothing with the new plant-based diet. His once so tyrannical cravings for meat simply vanished. He reported having lost 11 kg and feeling healthier than ever before. His daughter Chelsea also lost 11 kg on that same diet and has since then maintained her weight.

Dietary reformation must be rooted in real knowledge.

An ethically motivated vegan diet often looks like a vegan version of fast food. In most cases it will not outlast the appearance of deficiency symptoms and discomfort. Old knowledge of healthy nutrition must first be regained. The goal is not to substitute Tofu Pups™ for hot dogs but to undertake a thorough, lasting dietary reform. In the context of modern society, "survival of the fittest" does not signify survival of the tallest, of the fattest, of the strongest, and certainly not of the most gluttonous, but of the one who is least encumbered by bad health. Life's great never-ceasing challenge is to remain fit in the physical, mental/emotional, and spiritual sense of being fully alive — and that will simply not happen on its own accord.

For the change to be successful it must be holistic in its approach.

On the physical plane, moderation and balance are keys to health. Observance of these principles facilitates health restoration and maintenance. Additional support comes from harmoniously flowing with the rhythmic pulses of tension and relaxation, *anabolism* and *catabolism*, vagus nerve and sympathetic trunk, cell proliferation and *apoptosis*, and keeping balance within the insulin, *redox*, and acid/alkaline households. Moderation and balance are just part of this. Love of self and others, mental and spiritual awareness, pursuing one's own calling, having a heart for relationships, and feeling connected with the whole are equally factors in a healthy, happy, long life. Many psychosocial and epidemiological studies attested to that.

The book's recommendations have been scientifically substantiated.

This professional reference manual was built from the analysis and evaluation of more than 1,400 clinical studies. Chapter 12 describes in a practice-oriented dietary plan that draws upon the clinically and epidemiologically most successful nutritional concepts in the world. It additionally offers my personal understanding and summary synthesis of the all-important insulin, pH, and *redox* effects. Dr. Jacob's dietary plan emphasizes consuming foods with low energy-density and high concentrations of essential micronutrients. That is best accomplished by choosing from an ample, colorful palette of minimally processed plant-based foods low in sodium. These facilitate a physiologically normal influx of macronutrients along with the micronutrients with which nature bonded them in whole foods. In concrete terms, the book's objective is to show how to normalize and optimize the insulin, *redox* and pH balances — and the metabolic processes that depend on them.

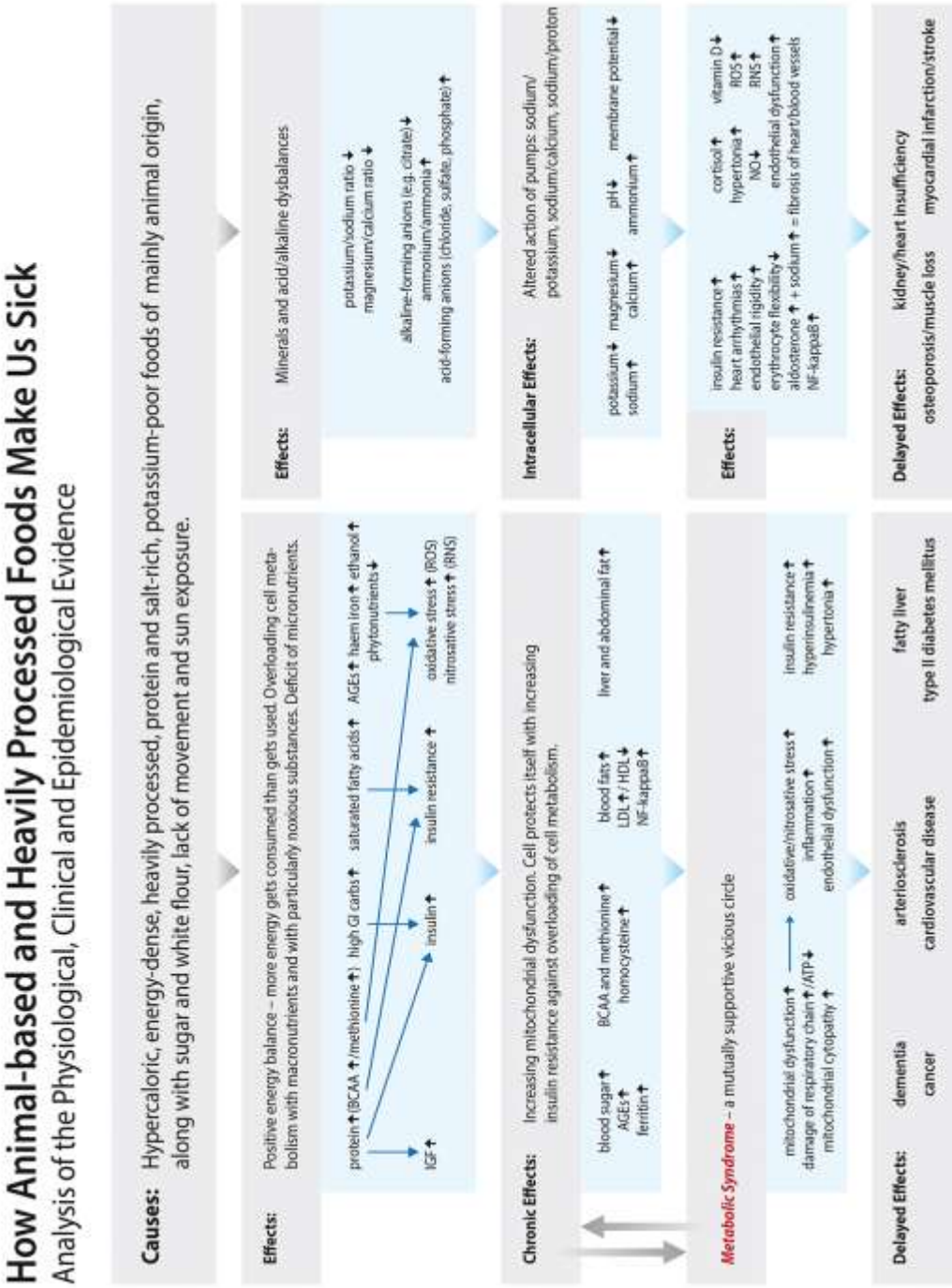


Figure 4: How animal-based and processed foods make us sick

2. Diet and Disease – Evidence from the World Over

The modern Western dietary pattern and lifestyle are the primary reasons for the appearance of *diseases of civilization* like cardiovascular diseases, cancer, diabetes, kidney failure, and various forms of dementia.

This becomes apparent when comparing Western industrialized nations with indigenous peoples who maintained their traditional diets and lifestyles into the modern era.

The inhabitants of the Japanese island of Okinawa represent the best-known example of that rare phenomenon. Okinawa boasts the greatest *per capita* number of long-lived people who stay fit and energetic well into their advanced old age.

Healthy levels of hormones and cholesterol, along with clean arteries slow down the Okinawans' aging process and protect them against incurring *diseases of civilization*. Their characteristic almost entirely plant-based diet is poor in calories, protein, and fat, but rich in complex carbohydrates, fiber, and micronutrients such as minerals, trace minerals, vitamins, and phytochemicals.

A large epidemiological study conducted in pre-industrialized China showed that health also depends upon the type and quantity of protein consumed. Animal-based protein and fat were found to be implicated in the pathogenesis of cancer, cardiovascular disease, and metabolic diseases.

A plant-based whole foods diet affords good protection against the *diseases of civilization* and against premature aging.

In what follows, we highlight the results of comprehensive health studies from Okinawa and China. Traditional diets and lifestyles have a long history in those place and are still being kept to some extent today. This made it possible to scientifically examine them in exceptional detail.

It is true that the culture, geography, and climate in these regions differ from those seen in Germany but the nutritive makeup of their prevalent diet is surprisingly similar to that of what 18th Century Germans used to consume. The d*iseases of civilization* were virtually unknown in Germany's past too.

Migration studies have demonstrated moreover that diet and lifestyle impact health more decisively than do genes.

The instance of prostate cancer illustrates how a lifelong dietary pattern can affect mortality in a very common cancer type: In 2000, the age-standardized mortality risk of prostate cancer was 27 times higher for Swiss, Norwegian, and Swedish men than for Chinese.

According to 2008 *WHO* statistics of Uruguayan men — heavy consumers of beef, dairy, and sugar — they die of prostate cancer 13 times more often than Asians eating little animal food but much protectively active soy, herbs, vegetables, cabbage, mushrooms, and also drink several cups of green tea each day.

Diet is implicated in both tumor promotion and tumor progression.

It is the soil that will determine whether the seeds of individual tumor cells aggregate into a deadly cancer or shrivel up instead.

Unfortunately, Western dietary patterns are now being taken up at an alarming rate and with devastating health consequences in Asia also.

The global exception to that trend are the Seventh Day Adventists, a Christian faith group for whom wholesome living expresses their religious conviction that the body must be honored as God's temple. While earth's longest-lived populations are increasingly losing their survival advantages, the vegetarian Adventists have now become the scientifically most examined and on the average longest-lived population on earth. To this day, they successfully hold to their diet and lifestyle and so continue growing old in good health.

2.1 Island of the Centenarians – the *Okinawa Study*

In previous times *civilization diseases* were as good as nonexistent. *Diabetes mellitus* type 2, caries, adiposity, stroke, heart infarct, rheumatism, high blood pressure, and certain cancers were practically unknown to indigenous peoples enjoying a traditional diet and lifestyle that included much movement and periodic hunger (McCarrison, 1921; Price, 1998; Roos, 1962; Temple and Burkitt, 1994).

But do we want to, should we, or can we even return to such a simple and healthful way of life in order to become free of the dreadful *diseases of civilization*?

European or American studies cannot reveal the benefits of optimal nutrition to us because such healthy nutrition has become so apart from our norms that statistically significant epidemiological studies encounter great difficulty in attempting to populate them.

Yet, when we compare Asians with Europeans and Americans inordinately high differences in the incidence of cardiovascular disease and cancer become readily apparent.

Migration studies also conclusively prove that these effects are not attributable to mere genetic predisposition since unfavorable dietary and lifestyle changes result in forfeiture of the inherited survival advantages.

Yet, diet-supported good health is not an exclusively Asian phenomenon. In Germany, too, people were recorded as having been healthiest during the lean historical periods. Only the relatively recent advent of prosperity made it possible for *diseases of civilization* to arise and now proliferate to precipitous levels.

We are now in the unique position of being able to combine the advantages offered by affluence with the healthy way of life demonstrated by the Okinawans, the best-documented paragons of health and longevity. If we take advantage of this unique opportunity we too may achieve a long AND healthy life.

58 out of 100,000 Okinawans are centenarians (Willcox *et al.*, 2008). The corresponding figures for the USA and Japan are 17.3 and 34.3 respectively (*U.S. Census Bureau*, 2012). And — beyond mere statistical numbers — Okinawans tend to stay healthy and energetic well into their advanced old age.

82 percent of those 92-years old and 66 percent of those 97-years old provide for themselves while for the most part living wholly independently. The *Okinawa Centenarian Study* counted

900 centenarians among its subjects. Twenty of these were 110 years or older. Twelve among the fifteen that were willing to participate in the *Supercentenarian Study* met the inclusion criterion of multiply-documented age verification. All these supercentenarians had enjoyed lifelong good health and presented without any history of cardiovascular disease, cancer, or diabetes (Willcox *et al.*, 2008). The *Gerontology Research Group* assessed the planetary total of verified supercentenarians for the year 2013 as 63 (www.grg.org). To put this into perspective, Okinawa's 1.4 million inhabitants constitute 0.0002 percent of the world population.

Extraordinary longevity is not a new phenomenon for Okinawans. An ancient adage of theirs says that *at 70 you're still a child. Your youth won't meet you till you're 80. And when, at 90, someone invites you to heaven, then say, "Leave me alone and come back when I'm 100."* Is it any wonder then that Okinawa has long been known as the "Island of Immortals"?

By contrast, a fifty-year old German may anticipate an average of 13.5 years more of trouble-free living. In that regard Germany ranks at the low end of the European mean (Jagger *et al.*, 2008), and the number of care-dependent seniors is steadily rising.

Here in the West, people reach the zenith of life between their twentieth and thirtieth years at which point gradual degeneration begins to set in. By the time we reach seventy, we show a net loss of 60% top respiratory capacity, 40% kidneys and liver function, 15 – 30% bone mass, and 30% muscle strength (Willcox *et al.*, 2001).

Okinawa has a markedly lower incidence of cancer and cardiovascular disease than Germany where, at 41% and 25% respectively, they are the top-ranking causes of death (*Statistisches Bundesamt*, № 354). These diseases are decidedly less common in Asian countries than in the West (*cf.* Table 1).

Table 1: The incidence of hormone-dependent cancer and coronary heart disease in inter-country comparison (annual fatalities per 100,000 persons)

Region	Life expectancy	Breast cancer	Ovarian cancer	Prostate cancer	Colon cancer	Cardio-vascular disease
Okinawa*	81.2	6	3	4	8	18
Japan*	79.9	11	3	8	16	22
Hongkong*	79.1	11	3	4	11	40
Sweden*	79.0	34	10	52	19	102
Italy*	78.3	37	4	23	17	55
Greece*	78.1	29	3	20	13	55
USA*	76.8	33	7	28	19	100
(Germany)**	80.2	22	7	16	32	75

*Suzuki *et al.*, 2012, www.okicent.org (*World Health Organization* and *Japan Ministry of Health and Welfare*, 1996); ** *Statistisches Bundesamt*, 2012b.

Since the German data are from 2012, they only partially correspond with other figures in the table that are from 1996. German life expectancy was lower in 1996 and averaged 76.8 years as opposed to 80.2 years in 2012. Okinawans are international front runners with regard to mental health as well. They exhibit lower dementia rates than subjects in the USA. 80 percent of 90-year old Okinawan men and 60 percent of 90-year old women were found to be free of cognitive health disturbances.

2.1.1 What Is the Secret of Okinawa?

Okinawans keep clean arteries and low cholesterol and homocysteine levels in old age. This reduces their rate of coronary heart-disease mortality by 80 percent.

The incidence of cancer, too, is lower on Okinawa.

The Okinawans' lesser likelihood of developing cancer derives from their wholesome lifestyle, low-caloric diet rich in soy and vegetables, and their engaging in much natural movement. At the study's measuring time in 1996, breast and prostate-cancer mortality was 80 percent lower, and ovarian and colon cancers were 50 percent lower than in the United States.

Okinawans' healthy hormone levels

Okinawa's old are biologically younger than their counterparts in the West. Their levels of sex hormones are not overly high in their younger years stay stable in old age (*cf.* Table 2). Sex hormone blood levels among Westerners are typically high up to menopause/andropause at which time they plummet and bring on the typical complaints that are virtually unknown among Okinawans. Stable but never excessive levels of the natural anti-aging hormone *DHEA* give men and women all-round protection, keep their bones strong, and delay their aging.

Table 2: Blood levels of sex hormones among Okinawans and U.S. Americans (Suzuki *et al.*, 2012; www.okinawa.org)

Groups, years of age	*DHEA* (ng/ml)	Testosterone (ng/dl)	Estrogen (pg/ml)
U.S. American men, 70	2.0	314	20.6
Okinawan men, 70	2.6	439	35.7
Okinawan men, 100	0.8	298	12.1
U.S. American women, 70	1.1	17	5.5
Okinawan women, 70	3.0	13	15.5
Okinawan women, 100	0.6	39	4.2
Range of normal values for the above age groups	M 0.5 – 5.5 W 0.3 – 4.5	M 240 – 950 W 20 – 80	M 0 – 50 W 0 – 35

The Okinawans' way of life is strongly divergent from the one prevailing in today's Western cultural milieu. Among its distinguishing features are a healthy mental orientation, moderate but regular natural movement, and lifelong committed religious practice. These are reflected

in their valuing close family ties, maintaining nurturing friendship circles, and having genuine respect for older persons.

Harmony between body and spirit

Okinawans believe that they owe their good health and long lives to the "tending of qi" (chi, life energy). They enjoy living a well-balanced life in harmony with the natural world. Should health problems occur they will likely be treated by a medical doctor in cooperation with the traditional shaman. Spirit and body are given equal consideration (Willcox *et al.*, 2001).

Okinawan's longevity does appear to be somewhat hereditary (Willcox *et al.*, 2006).

Genetic differences between Okinawans and Westerners are known to exist also. Okinawa's centenarians have a genetic polymorphism in the human leukocyte antigen (HLA) system that renders them less prone to inflammatory and autoimmune disease (Takata et al., 1987). This does not mean that genes exclusively determine their great lifespan. How genes interact with the environment is a far more decisive factor in that regard.

It is the Okinawans' lifestyle, health-supporting natural diet, regular physical activity, and positive social traits — all working together in a seamless pattern — that let them make the best of the genes nature gave them. When, subsequent to emigrating, Okinawans adopt Western habits they quickly lose their longevity.

2.1.2 Nutrition among the Okinawans

The Okinawan and Western diets are clearly different. In 1949, traditional Okinawans took in just 1,785 daily calories. For that reason, scientists designated the diet as a moderate form of natural caloric restriction.

Hara Hachi Bu, Okinawans say, *eat till you are 80 percent full*. They end meals following that simple rule. India's ancient *Ayurveda* tradition observes the same principle and counsels its adherents to stop eating after the first burp.

Caloric restriction

As far back as 1930, a research team at *Cornell University* was able to document that caloric restriction prolonged life in all species tested (McCay *et al.*, 1989).

A more recent study involving rhesus monkeys told impressively how caloric restriction, not undernourishment, affected these animals' health and life expectancy. 80 percent of the animals on the calorie-restricted diet but merely 50 percent of the control animals, were still alive after the testing period, which extended over 20 years. Caloric restriction was furthermore found to delay the onset of age-dependent cardiovascular disease, diabetes, cancer, and cerebral atrophy (Colman *et al.*, 2009). As an aside, the aging model rhesus monkeys offer is well-suited for human comparison. They genetically resemble humans and exhibit a 2.5 to 3 times more rapid aging progress but with similar age-dependent diseases and signs of physical degeneration (Colman and Anderson, 2011).

While the Okinawans thus eat only until they are "no longer hungry" we typically eat until we feel "full". Over the course of time this seemingly minute difference will materially affect our

body weight. The daily excess calories to which we are accustomed are ultimately responsible for our insidious and seemingly unstoppable weight gain.

Caloric restriction not only facilitates achieving a healthy body weight but also reduces the *oxidative stress* generated during the metabolization of food. Okinawans demonstrably have few free radicals in their blood (Suzuki *et al.*, 2010). The reason for that is the synergy between their naturally calorie-poor but antioxidant-rich diet and their inherited good genes.

Okinawans' habitual caloric restriction does not mean that they have an unusual predilection for experiencing hunger. In fact, they typically eat larger quantities of food than Americans or Europeans. But it is not just the consumed quantity of foods but also the type — and thus the energy-density — that fundamentally distinguish the Okinawans' diet from ours.

Low energy-density foods are health-promoting.

One of the secrets of the Okinawans' extraordinary health and longevity is the low energy-density of their meals (<1.5 kcal/g). Hamburgers, by contrast, have high energy-density (>2.6 kcal/g). 100 g hamburger yield 280 kcal at a 2.8 kcal/g energy-density. 500 g of a typical Okinawan meal of steamed vegetables with rice or sweet potatoes and miso soup deliver 280 kcal as well, but at the low energy-density of 0.6kcal/g.

Plentiful complex carbohydrates and healthy plant protein, but little fat

In 1949, traditional Okinawans were found to consume 380 g complex carbohydrates a day, mainly as sweet potatoes (nearly 900g/day) and only little rice or grains. At just 3g/day sugar was nearly absent from their diet, at least in isolated form. Most notable was the astonishingly meager daily intake of 12 g fat from oil and fish, and 39 g protein from legumes or fish (Willcox *et al.*, 2007). Fish was a daily food but only about 15 g of it. Meat and dairy products touched the table only on rare occasions.

Willcox *et al.*, examined the Okinawan diet, the traditional Mediterranean diet, as well as the DASH-diet *(Dietary Approaches to Stop Hypertension)*. The researchers discovered the following differences between these three dietary systems and the common Western diet: Poor in unsaturated fats, little meat, white flour products, salt, sugar, and dairy products, but large quantities of low-*GI* complex carbohydrates with an abundance of antioxidants.

An amusing example showing the practical effects of the Okinawa diet and lifestyle

The book *The Okinawa Program* (Willcox *et al.*, 2001) relates a humorous anecdote from the life of the Sensei Uehara from Okinawa. On New Year's Day of 2000, the 96-year old Uehara defeated 39-year old former boxing world champion Katsuo Tokashiki in a televised fight.

From the very first moment of the match the old master displayed unbelievable agility and maneuvering skill in effortlessly and deftly avoiding the boxer's lightning-fast punches.

At one point, about 20 minutes into the contest, Tokashiki dropped his cover for just a moment, and old Uehara landed a single blow — the fight was over. The young boxer was visibly shaken upon recovery by having lost to a 96-year old non-boxer. During the interview following his spectacular demonstration the Sensei jokingly commented about his opponent. *That was easy,* he said, *Tokashiki is just too young and inexperienced to beat me.*

Diet exerts a greater influence than genes do.

The Okinawans' dietary pattern has changed as a result of increasingly widespread Western influence. The men now no longer lead the world in life expectancy. They have even dropped to last place among the Japanese! This goes to prove just how quickly genetic advantages will be lost when unhealthy dietary habits are taken up.

2.1.3 Comparison of the Okinawan and German Diets

A comparison of the traditional Okinawan and 18th Century Germany diets with the modern German diet reveals that the latter is marked by strongly skewed proportions of the three macronutrients protein, fat, and carbohydrates (*cf.* Table 3).

Excessive consumption of meat and dairy products in Germany

The traditional Okinawan diet contained hardly any meat or dairy products.

Yet, it is exactly meat and dairy products that are overrepresented in the diet of the average modern German. Data by the *Food and Agriculture Organization of the United Nations (FAO)* indicates that German daily *per capita* consumption includes 677 g milk (not counting butter) and 241 g meat at slaughter weight (Westhoek *et al.*, 2011).

According to the *BMELV* the actual daily *per capita* meat consumption in Germany is 167 g. This corresponds with 61 kg a year (*BMELV*, 2012). *FAO* data records a daily protein intake of 81 g per person. 32 g of this are plant-based and 49 g animal-based (26 g from meat, 17 g from milk, 3 g from eggs, and 2.5 g from fish or seafood).

German men generally tend to eat more meat, women more dairy products.

Excessive food energy intake

Data published by the *Nationale Verzehrsstudie II (National Consumption Study II)* underestimated the actual consumption, possibly due to the use of questionnaires.

Data from the 1996 *DGE Nutrition Report* (*cf.* Table 3) supports the suspicion that *NVS II* likely underestimated the daily energy intake. In 1994, the per person daily energy intake had already been 3,252 kcal (von Koerber *et al.*, 2012).

The *NVS II* numbers consequently fail to account for Germany's overweight epidemic.

Too great a proportion of fatty acids

Germans' daily saturated fatty acids intake totals 38 g. Only 6 g of this comes from plants but a whole 21 g from dairy (Westhoek *et al.*, 2011). With this, saturated fatty acids account for 17.1 percent of Germans' daily energy intake, which brings it to 144% of the maximally 7% recommended by the *American Heart Association*.

Complex *vs.* simple carbohydrates

Okinawans, as well as18th Century Germans, ate complex carbohydrates almost exclusively. Germans today take over half their carbohydrates as sugar. The other half consists to a significant percentage of equally unhealthy refined flour products.

Far too much sugar

Excessive sugar use is not only an issue in Germany but in every industrialized nation.

Global sugar use jumped from 8 million tons in 1900 to 115 million tons in 2000. During that same period the world's population rose from 1.65 billion to 6.13 billion (Statista, 2013).

That trend continues to worsen. Germany now uses 3 million tons per year, which translates to a yearly per-person consumption of 36.6 kg or a daily consumption of 100 g.

Table 3: Comparison of German and Okinawan nutrient proportions

	Okinawa (Willcox *et al.*, 2007)		18th Century Germany (Lemnitzer, 1977)		Modern Germany (MRI, 2008a)	
Energy intake	1,785 kcal		2,210 kcal		2,123 kcal*	
Carbohydrates % energy intake	382 g 85 %	Complex *CHD* low/middle *GI* (sweet potato)	420 g 77 %	Complex *CHD* low/middle *GI* no sugar	245 g 47 %	*CHD* high-*GI* (*e. g.* pasta) 50 % as sugar
Protein % energy intake	39 g 9 %	Mainly plant	70 g 10 %	Mainly plant	74.5 g 14 %	Mainly animal
Fat % energy intake	12 g 6 %	Mainly plant	25 g 13 %	Mainly plant	80 g 36 %	Mainly animal & processed

*Missing percent are calories from alcohol

The Okinawan diet is richer in essential micronutrients.

In addition to the differences in macronutrients the predominantly plant-based Okinawan diet is also significantly richer in potassium, phytonutrients, vitamins E, C, and folic acid, and contains less phosphate and sodium chloride.

More alkalinizing

Overall, Okinawa's diet acts strongly alkalinizing since it is protein-poor but rich in mineral substances. That creates a daily *PRAL* value *(potential renal acid load)* of -75 mEq.

Okinawans take in a daily average of 5,200 mg potassium, 1,130 mg sodium, 396 mg magnesium, and only 500 mg calcium.

The Western diet, by strong contradistinction, features much more sodium than potassium and also too much phosphate, chloride, and protein. This leads to a higher burden of metabolic acids (50 – 100 mEq) and adds an average of 22 mEq to the *potential renal acid load* (Remer and Manz, 2003).

Hip fractures

Hip fractures are 20 percent less prevalent on Okinawa than on mainland Japan, where they are 40 percent less prevalent than in the USA (Ross *et al.*, 1991). That fact is all the more astounding since the traditional Okinawan consumption of about 500 mg calcium from plant sources falls markedly below that in the USA.

That is likely a benefit of the Okinawans' strongly alkaline-forming, potassium-rich, and protein poor diet (that prevents calcium depletion in bones), foods high in isoflavones, and much natural movement/weight bearing.

With their diet's increasing Westernization the incidence of hip fractures among Okinawans has risen by 188 percent since 1987/1988 (Arakaki *et al.*, 2011).

Industrialization negatively impacted German food quality and consumption patterns.

As was explained before, the dietary ratio of nutrients underwent a radical shift with the progress of industrial development.

Lower quality of foods

The quality of foods has also been negatively impacted by newly invented and implemented processing methods.

Grain is a good example. Whereas the proportion of whole-grain flour sank from almost 100 percent to 10 percent during the past two centuries, the proportion of refined flour (which supplies substantially fewer minerals, vitamins, and fiber) rose to above 80 percent.

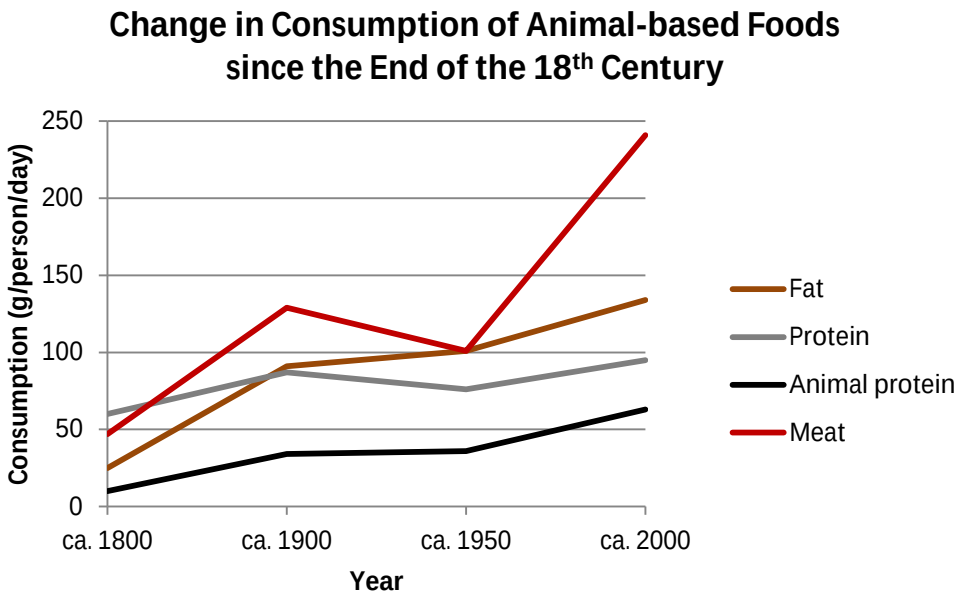
More animal-based foods with industrialization

Industrialization improved agricultural efficiency. Large-scale livestock farming made animal-based foods widely available. This caused an 80 percent surge in meat consumption. Overall intake of protein from animal sources dramatically increased while that from healthier plant sources shrank to a deplorable extent. Consumption of the extraordinarily health-promoting legumes declined by a full 90 percent (*Statistisches Jahrbuch ELF*, 2002).

Increased proportions of animal-based foods and the intensified processing of plant-based foods led to a decline in fiber intake. Fibers perform a critical regulative function within the intestine. They help lower both blood sugar and cholesterol and also have anticarcinogenic and immunomodulating effects (*cf.* Chapter 9.3). It is particularly interesting that in1900, Germans took in 3 g potassium per day by eating 750 g potatoes (Koerber *et al.*, 2012). They thus matched today's average potassium intake just from eating one easily available food. Their total potassium intake was even higher and likely protected them against *diseases of civilization* such as *insulin resistance*, *hypertonia*, and stroke (*cf.* Chapter 7).

Our diet's radical transformation is paralleled by the general decline of our health. During the post-WW II years virtually no type 2 diabetics could be found in all of Germany (Kasper *et al.*, 2004). The *body mass index* then averaged 21 (Löser, 2007), and the prevalence of diabetes was 0.63 percent (Michael and Jutzi, 1991). Today it is 7.2 percent (Heidemann *et al.*, 2013).

The German diabetes rate rose more than tenfold during the last 50 years (Wirth, 2008).



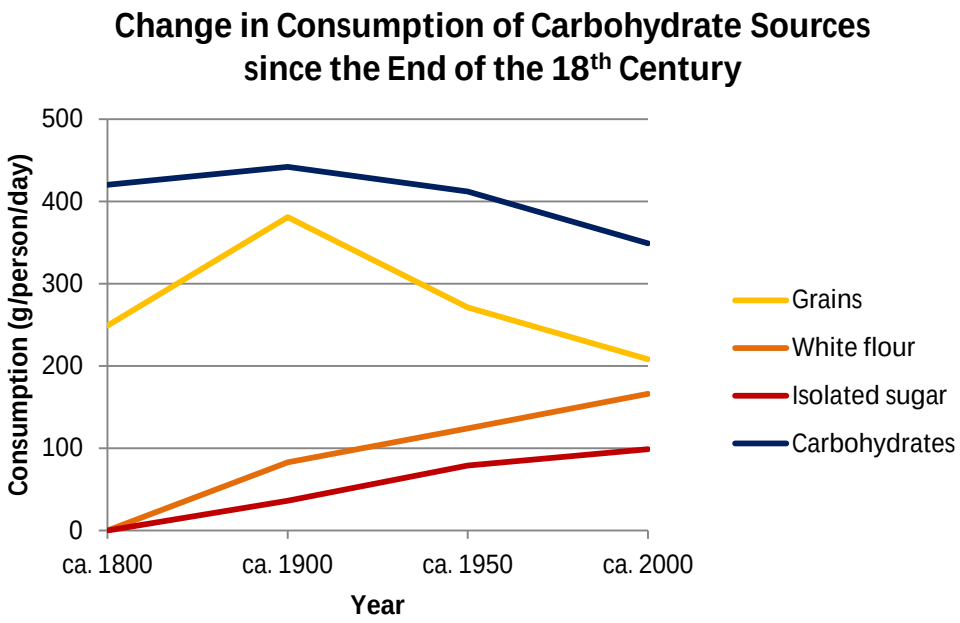


Figure 5: Changes in German food consumption patterns since the end of the 18th Century (von Koerber *et al.*, 2012)

2.2 China Study: Much Plant Protein, Little Animal Protein

The extent of the connection between diet and the occurrence of our *diseases of civilization* was thoroughly examined during the *Cornell-Oxford-China Project* headed by T. Colin Campbell and Junshi Chen of the *Chinese Academy of Preventive Medicine*. That study analyzed lifestyles and diet of 6,500 Chinese. It is notable that the Chinese diet in 1973 – 1975 was quite similar to what ours was before the Industrial Revolution.

Professor Emeritus T. Colin Campbell of *Cornell University* informed the world from the cutting edge of nutritional science for over 40 years. He held positions at the *American Institute of Cancer Research* and the *National Institute of Health* and co-published 350 scientific papers on the subject of his main interest, the connections between cancer and nutrition. During the 1960s, Campbell had alerted the world to the presence of dioxin in chicken feed.

While in the Philippines, he observed that the frequent presence of a high *aflatoxin* load in food primarily affected the wealthy class that had taken to eating foods characteristic of the American dietary model. He later proved this in 27 years of research with laboratory animals.

Among the results he reported is that simply changing the dietary proportion of *casein* (animal protein) can either foster or hem *aflatoxin*-caused cancer growth in livers — independent of someone's genetic predisposition and the co-causal carcinogen *aflatoxin* (Youngman and Campbell, 1992a – c). The occurrence of liver cancer precursors (preneoplastic hotbeds) was largely prevented with a diet containing no more than 5% casein. Controls were fed a 20% casein diet (Youngman and Campbell, 1991).

Qin and colleagues (2007) examined the influence of milk protein on *DMEA*-induced breast tumors through an animal study. Rats were given *DMEA* followed by variants of milk (whole, substitute whole, fat-free and substitute fat-free). The substitutes contained no milk. It was found that the consumption of a natural form of milk led to an increase in the incidence, number, and volume of breast tumors.

Campbell holds the excessive consumption of animal protein responsible for the rise of our *diseases of civilization*. With this, he confirmed the findings of Lothar Wendt, professor of medicine in Frankfurt, who coined the term *protein storage disease* in 1948. While Wendt at that time related animal protein mainly to the occurrence of *metabolic* and cardiovascular diseases, Campbell showed in both preclinical and epidemiological studies that animal protein and animal-based foods in general contribute decisively to the genesis of cancer.

2.2.1 Foundational Insights from the *China Study*

From its beginning in 1983, Campbell headed the *China Project* that counts among the most comprehensive studies of nutrition, lifestyle, and disease in the course of biomedical research. With it, he was able to substantiate his preclinical outcomes.

The *China Study* excelled through the participation of the *Chinese Academy for Preventive Medicine* and two of the world's leading universities, *Cornell* and *Oxford*.

The study investigated mortality from 48 types of cancer and chronic diseases in 65 Chinese districts and correlated it with the diet and blood data of 6,500 delegated participants (100 from each district). From this emerged some 8,000 statistically significant ties between dietary factors and certain diseases.

What makes the China Study so extraordinary in comparison with large epidemiological studies in the USA or Europe is that American and European studies are dealing with a diet that can be rich in animal foods — even among vegetarians — whereas the Chinese diet ranges from rich to very rich in plant-based foods. That type of diet strongly corresponds with the dietary patterns in Europe and the United States before the Industrial Revolution when cancer and cardiovascular disease were still rare.

An argument that people at that time lacked the opportunity to develop diseases of this sort because they mostly died younger cannot apply to either China or Okinawa. Although China in the 1980s did have a lower average life expectancy at birth, this was mainly due to other factors such as high infant mortality.

In 1981, a 65-year old Chinese man still had an average of 12.44 years to live, *in toto* thus 77.44 years (Zhang and Zhu, 1984). In the same year a sixty-five-year old German had 13.09 years of life ahead of him, *in toto* thus 78.09 years (1981; *Statistisches Bundesamt*, 2012a). Despite of the most extremely divergent healthcare costs, the German and Chinese men had nearly the same life expectancy from the age of 65 on.

China has the largest population on earth. Almost 20% of the world's oldest people live there. The great quantity of vegetables and greens that the Chinese consume plays a particularly important role with regard to their longevity. Consistent Vegetable consumption will reduce mortality by some 30% (Dupre *et al*., 2008).

More than 80% of the participants aged 80 – 90 were still active and problem free; rural area 87%, urban area 80%. Among those older than 90 years, 75% (rural area) and 65% (urban area) were still physically and socially active (Zeng *et al*., 2001).

The *China Study* took 93% of their participants from the Han-Chinese population to ensure that genetic factors would be negligible confounders. From the findings of migration studies it was long known that the rate of disease depends less on genes and more on diet, lifestyle, and environmental factors.

In Asia, where people at that time ate very little meat and practically no milk products at all, breast cancer was exceptionally rare, but when Asians immigrated to the USA they not only adopted the foreign lifestyle and diet but, along with it, also acquired the higher risk of breast cancer (*e.g.* Ziegler *et al*., 1993).

Comparison between diets in China and the USA

At the time of data gathering, China had barely begun industrializing. Most of the participants thus sustained themselves through their longtime traditional diet. It was predominantly vegetable-based and contained very little animal protein, fat, and processed food, but much complex carbohydrates, potassium, fiber, and secondary plant matter (phytonutrients, *etc.*).

A comparison between the dietary habits of rural China and the average American diet shows that the Chinese diet is proportionally lower in fat (14% of total energy), substantially higher in fiber (33 g per day), about 30% higher in total energy intake per kg of body weight, and markedly lower in animal-based foods (0 – 20%).

U.S. Americans on the average derive 60 – 80% of their protein from animals. Consumption of animal protein in China was just 10% of that in the USA. These Chinese study subjects were found to have rarely suffered from *diseases of civilization.* During that time, coronary heart

disease *(CHD)* mortality was 17 times higher among U.S. Americans than among rural Chinese. U.S. women had a 5.6 times higher *CHD* mortality risk (Campbell *et al*., 1998).

Consumption of green vegetables was shown to have a risk-lowering effect on *CHD* among the Chinese, whereas high plasma and *apolipoprotein* values, along with the combined index of high intake and urinary elimination of salt distinctly raised that risk in the USA.

The fatal consequences of the Western salt-rich and potassium-poor diet will be thoroughly thematized in Chapter 7.

In the *China Study*, cholesterol-blood values featured as the strongest predictor of cancer and cardiovascular disease, both of which occur with high incidence in the West. The average cholesterol value in China was only 127 mg/dl (without the use of statins). By comparison, the average cholesterol value in 20 to 74-year old U. S. Americans was 203 mg/dl.

Even small proportions of animal foods heightened the risk of incurring elevated cholesterol and Western type *diseases of civilization*. Correlation with animal protein and animal fat was observed first and foremost in this connection.

> — What particularly attests to its quality is that the *China Study*, unlike other investigations, did not use relatively unreliable questionnaires but monitored specific dietary effects by tracking numerous pertinent blood and urine values.

2.2.2 Correlation between Cancer and Dietary Patterns

Breast cancer: U.S. American women had five times the breast cancer mortality of Chinese women among whom it was a distinct rarity. In the *China Study*, breast cancer incidence was associated with measurable effects of dietary fat, raised serum-cholesterol, and excessive estrogenic hormones output.

Such parameters are able to provide measures for comparison with the effects generated by a Western type diet rich in meat and milk products.

Among these effects are the younger age at which Western girls begin menstruating and the higher levels of sex hormones Western women have until menopause. Since women in general are subject to estrogen influence for long stretches of time, Western women are liable to incur a greater risk of breast cancer on account of their high estrogen levels.

Diet strongly affects the hormonal status.

Adding merely small amounts of milk, meat, and fat to the plant-based Chinese diet raised estrogen and other reproductive hormones. Plant fat did not raise the breast cancer risk.

An Italian study by Sieri *et al*., (2002) of 3,367 postmenopausal women supports Campbell's thesis. Comparison of the highest and lowest fat-intake tirciles showed a strong positive connection of total fat (3.78 times the risk) and animal protein (3.78 times the risk) intake with the risk of breast cancer, and a high risk-lowering effect of carbohydrates (0.42 times the risk).

Pasta, which may be safely regarded as one of the Italians' main carbohydrates sources, has a lower *insulinogenic* effect than meat. The Italian study's results are unusually instructive since few clinical studies were designed to measure for the total intake of animal protein.

The China Study yielded additional important findings:

Colon cancer: Colon cancer was found to be distinctly rarer in China than in the USA. Chinese people consumed considerably more fiber and much less meat.

Stomach cancer: *Helicobacter pylori* infections and the consumption of fermented, heavily salted dishes account for China's significantly higher rate of stomach-cancer.

Liver cancer: Liver cancer occurred *ca* 30 times more frequently in China than in the USA. China was found to have a 50 to 100-fold higher portion of citizenry predisposed to liver cancer. The reason was the high prevalence of chronic infections like *hepatitis B* and *C*. People eating large quantities of animal-based food show distinctly higher serum-cholesterol levels and a correspondingly higher cancer risk. The study's authors suspected that the number of Chinese with liver cancer will rise with the adoption of a typical American dietary pattern.

Lung cancer: At the time of the investigation there were very few smokers in China, which is why lung cancer was rare. That has meanwhile changed.

Osteoporosis: Osteoporosis was found to be rare in China even though calcium intake was much lower than in the West. The likely reasons were a low intake of animal protein, more movement, and a physiological adaptation to a low dietary calcium content.

Fat: In 1983, the average consumption of dietary fat was substantially lower in rural China than in the USA (14% *vs.* 36% of energy from the diet); by a second survey in 1989, the difference had shrunk (19% *vs.* 34%). The higher fat intake in China was mainly due to an increase in the consumption of animal products that had already begun during the 1980s.

One of the most important outcomes was the significant positive correlation of fat ingestion and breast-cancer mortality. Lifelong intake of plant-based foods low in fat proved to have a beneficial risk-lowering effect.

Fiber: The average fiber intake was about 3 times higher in China than in the USA. The largest proportion came from grains. The study found that the higher the fiber intake was, the lower was the prevalence of colorectal carcinoma.

Protein: China's average protein intake was only about 65% of that in the USA. More crucial, however, was that merely 10% of the protein came from animal sources, whereas in the USA the proportion was 70%. This also shed light on the differences of the entire dietary pattern.

One of the *China Study's* most significant results showed animal protein to be connected with higher serum-cholesterol (*LDL*/total cholesterol). The lower consumption of plant-protein correlated inversely. An increase in plant-protein intake resulted in larger body sizes. This signifies that plant protein *is* complete and appears to offer exclusive health benefits.

Beta carotene and vitamin C: Both were tested as antioxidant markers in plant-based food. The higher the blood levels of these vitamins measured, the lower was the cancer mortality.

Iron: Their predominantly plant-based diet supplied the Chinese with high-quality food. Unprocessed plant-derived food is able to deliver an adequate supply of iron, while this is no longer the case with industrially processed foods.

Copper: Copper was found to positively correlate with various cancers, and urinary cadmium specifically correlated with liver cancer.

Campbell's book "*China Study*"

Campbell, who had been raised as a meat-and-dairy-loving "farm boy", switched to a plant-based diet only in reaction to his own research findings. Drawing on his experience with the *China Study* research project he co-authored the book of the same title with his physician son. In sum, *people who took the main part of their diet from plant sources were healthiest and tended to be free of chronic diseases.*

On the basis of the project's outcomes and some 750 other scientific studies the authors confirmed a plant-based diet's preventive efficacy for cancer, arteriosclerosis (along with its sequelae, hypertension, bad circulation, heart infarct, and stroke), adiposity, diabetes, macular degeneration, kidney stones, kidney insufficiency, autoimmune disorders, osteoporosis, and neurodegenerative conditions including dementia.

Although Campbell's book offers valuable insights, its conclusions have come to be regarded as debatable — and justifiably so — because they too reductionistically designate the consumption of animal protein as the factor exclusively responsible for bringing about *diseases of civilization* in modern times.

This notwithstanding, excessive intake of protein, particularly that from animal sources, is unquestionably a central marker for the prevalent Western dietary pattern and thus also for the many diet-dependent diseases.

2.3 Meat, Milk, and Sugar: 27 Times Higher Prostate Cancer Mortality

Prostate cancer is the most frequently occurring type of cancer among males. The average age at its occurrence is 70 years. The *Robert Koch Institute* estimates 67,700 new instances for 2012 and a 5-year prevalence of 251,700 (*RKI*). As has been reported by *Statistisches Bundesamt* (2012b), prostate cancer was — with 13,324 deaths in 2011 — the sixth most frequent cause of death among German men, trailing only coronary heart disease, lung cancer, heart infarct, chronic obstructive pulmonary disease, and heart insufficiency.

When analyzing the state of research in regard to the risk factors of prostate-cancer one is confronted with an array of the most contradictory outcomes. The only risk factors that can be discerned as being regarded as definite are age, race (most prominently African American), and latent genetic predisposition.

However, if one looks beyond the mostly one-dimensionally conceived studies and examines the consensus of worldwide epidemiology instead, a relatively clear picture emerges on the other side of stasticial confounders and one-dimensional perspectives that often distort the more-dimensional reality rather than seriously attempt to explain it.

Prostate cancer as a prototype for discussing the dietary connection

Since my doctoral thesis dealt with the chemo preventive and nutritheapeutical effects of polyphenols on prostate cancer it is a self-suggesting choice for me to use as the exemplifying disease for discussing the connection between diet and cancer in this book.

Fundamental aspects of tumor formation

The currently used classic three-stage model of tumor development places the consecutive phases of tumor development into the three distinct categories of *tumor initiation*, *tumor promotion*, and *tumor progression*.

Tumor initiation: In the first stage of cancer development the cell undergoes mutation triggered by a carcinogen. Such a mutation can only persist if it is not arrested by *DNA*-repair enzymes or for as long as the cell has not yet been given over to *apoptosis* (programmed cell death). A cell altered through mutation reacts far more radically to any tumor-promoters (for instance carcinogens delivered through the diet) than does normal tissue.

Tumor promotion: During this phase the initiated cells experience a decades-long growth stimulation by means of clonal selection and amplification (*i.e.* aggregation of preneoplastic cell populations of identical mutation), increased cytogenesis, blocked *apoptosis,* and interaction with signal transduction processes (for example as a consequence of inflammation). The premalignant precursors of prostate cancer are commonly subsumed under the collective expression *prostatic intraepithelial neoplasia (PIN)* (Foster *et al*., 2000). On the basis of autopsy studies it is known that *HGPIN* or high-grade *PIN* antecedes the appearance of a prostate carcinoma by about 10 years (Wu et *al*., 2004a).

In the course of living, many carcinogens can accumulate in the prostate.

Among them are classic carcinogens like heterocyclic amines, polycyclic aromatic hydrocarbons (appear during frying, stewing or grilling of meat), exogenous estrogen-effective substances (endocrine-disrupting chemicals) like *PCP* (polychlorinated biphenyls), phthalates (widely used softeners made of plastics), and bisphenol A *(BPA)* that exhibits hormone-like features. These chemicals have a carcinogenic-direct effect and also induce proliferative stimulation through their estrogenic action.

Metals: Copper, nickel, iron, and other metals entering the body were shown to have prooxidative, proinflammatory, and procarcinogenic effects.

Hormones: Androgens, estrogens, inflammatory processes, and free radicals play significant roles in the promotion of prostate carcinoma. Paradoxically, the incidence of androgen-dependent prostate-cancer is highest in a man's life when the androgenic effect is lowest and the estrogenic highest. This phenomenon conclusively demonstrates the significance of estrogens in the genesis of a prostate carcinoma. Estrogen density increases with age and impacts the *ER-alpha* estrogen receptor while the levels of *ER-beta-agonists* (*3-eta-Adiol, DHEA*) decline. Isoflavones in soy and pomegranates protectively activate *ER-beta* and block *ER-alpha* (Jacob, 2008a). Fermentative metabolites of pomegranate polyphenols work anti-estrogenically and anti-proliveratively in very low concentrations (Larrosa *et al*., 2006).

Tumor progression: Progression of a benign tumor (preneoplastic lesion) to full-fledged malignancy defines the third phase in tumor formation. The degree of a tumor's propensity for invading/metastasizing is decisive for the compass of morbidity and mortality among cancer patients (Marquardt and Pfau, 2004). Prostate carcinomas differ in individual prognosis and

aggressiveness. Due to their unlimited self-regeneration and resistance toward *apoptosis*, cancer stem-cells hold a crucial place in tumor development that was hitherto discounted.

The niche or "microenvironment" plays a key role in cancer genesis. This relatively new concept has parallels in the works of Pischinger and Heine (2004) on the contingencies of tumor-milieu and ground-substance. While therapeutic procedures targeting tumor stem-cells can vitiate the seed of the disease, treatment of the tumor milieu goes farther by actively depriving the tumor of the soil it needs for growth. In weed control it is little use to mow the lawn (so far the operation mode in conventional chemotherapy, which indeed kills tumor cells, but not the tumor stem-cells).

It is vastly more helpful to arrange the nutrients composition so that preeminently nourishing food plants rather than weeds will thrive and simultaneously curb the proliferation of weeds and/or pests by entirely natural means. This preventive effect is achieved more or less by a plant-based diet that is rich in phytonutrients, the ultra-potent anticancer agents (*cf.* Figure6). The comparison of global dietary tracks affirms the critical importance of diet.

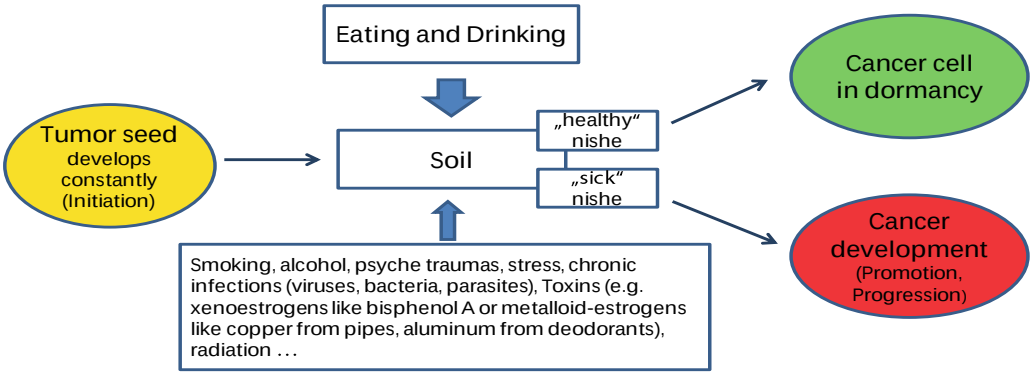


Figure 6: Influencing factors in the formation of a milieu favorable to tumor development

Simply said, the tumor seed appears constantly and in every body because cells become permanently aberrant under the influence of endogenous and exogenous carcinogens.

What is decisive for the formation of a deadly tumor is the soil in which it grows.

Diet plays a central role in this because it not only strongly affects the hormone household (sex hormones and metabolic hormones such as insulin and growth factors), body weight, and body milieu but also delivers materials that will act either protectively or perniciously. It is for this reason that Hippocrates, the father of medicine, said: *Let your foods be your medicines, and let your medicines be your food.*

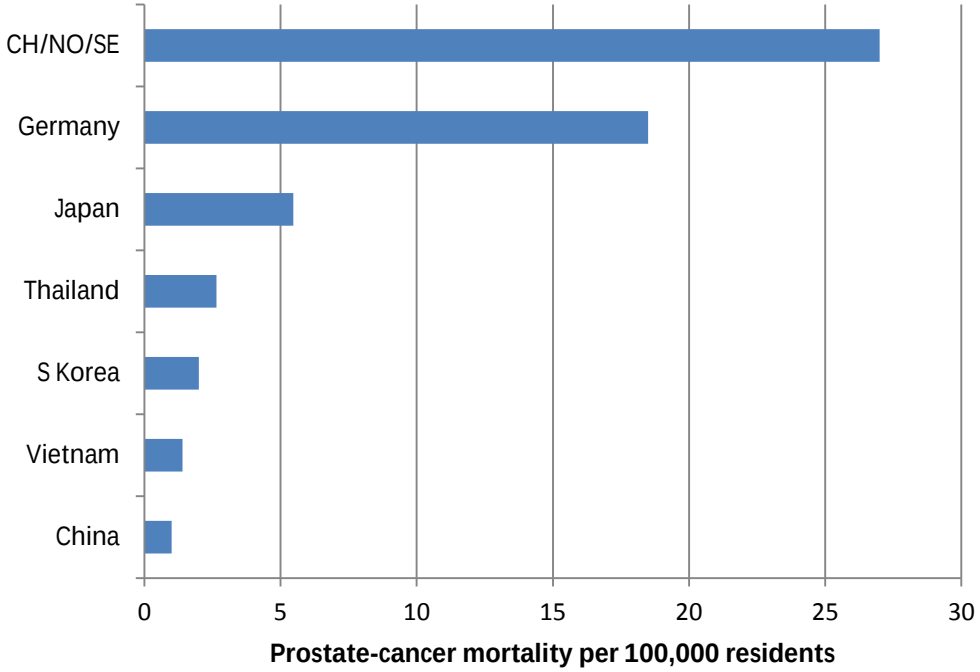


Figure 7: Age-standardized prostate cancer mortality according to *WHO* data for 2000

Diet materially influences prostate-cancer mortality.

Is the occurrence of a prostate carcinoma the consequence of genes and fate or much rather the end result of one's lifelong dietary practices? Comparing worldwide prostate cancer mortality rates with the long-range dietary patterns prevailing in a specific given country leads to illuminating conclusions in that regard.

Dairy consumption and prostate cancer

For centuries, Switzerland, Sweden, and Norway had been the top consumers of dairy products, meat, and sugar. In 2000, the age-standardized prostate cancer in these three European countries mortality rate was — with 27 fatalities per 100,000 men — 27 times higher than in China (1 per 100,000), 19 times higher than in Vietnam (1.4 per 100,000), 13.5 times higher than in South Korea (2 per 100,000), 10 times higher than in Thailand (2.65 per 100,000), and 5 times higher than in Japan (5.47 per 100,000) (*cf.* Figure 7); Ferlay *et al.*, (2000).

The wrong diet nullifies the benefit of good genes.

Asians' survival advantages disappear after they migrate to Western countries and adopt the Western lifestyle and dietary pattern. U.S. Chinese and Japanese exhibited in the 1980s — so,

before the appearance of the *PSA tests* as a possible confounder — a notably higher prostate cancer incidence than their folks back in the home land (Muir *et al*., 1991).

But Westernization is increasingly taking place in Asia itself as well, bringing along with it a steep rise in age-standardized prostate cancer mortality. That climb is the higher, the earlier and more sweepingly Westernization has set in.

This can be seen in the corresponding figures for the by now thoroughly Westernized Philippines. In 2000, for instance, its 11/100,000 mortality rate was no longer all that far from that of the United States and Germany, each with 18/100,000 (Ferlay *et al*., 2000).

In Western countries, age-standardized prostate cancer rates have been declining between 2000 and 2008. Improved therapies and earlier detection made possible by the PSA test are widely credited with that reversal (Collin et al., 2008; Etzioni et al., 2008). By contrast, the rates in Asia continue to be steadily on the rise.

Asian countries' historic increase in the risk of prostate cancer is generally attributed to their ongoing Westernization, particularly their concurrently greater consumption of fat and protein from animal sources, their higher incidence of overweight, and their general reduction in movement (Baade *et al*., 2009).

Colli and Colli (2006) compared the dietary habits (38 foods) and relative degrees of sun exposure of 70 countries with their respective age-standardized prostate cancer mortality. Total calories from animal-based foods (especially fat) and the consumption of meat, milk, sugar, and beverages corresponded with proportional increases in prostate cancer mortality. Frequent consumption of animal-based foods (r = 0.7) and sugar (r = 0.71) raised the mortality rate the most, whereas sun exposure and dietary inclusion of whole grains, oil seeds, soy, and onions was found to act protectively.

The role of lifelong diet and lifestyle pattern in the occurrence of cancer

This chapter explains why lifelong dietary and lifestyle habits are the essential factors in the occurrence of prostate carcinoma are. Decisive here is not only what prostate cancer patients ate during the years immediately preceding their illness but what their diet and lifestyle as a lifelong pattern contributed to their eventual incurring of cancer.

In global comparisons, excessive consumption of meat and dairy in the West correlates with high prostate cancer mortality, while the Asian nutrition model based on rice, soybeans, and vegetables correlates with low mortality (*cf*. Table 4, page 63).

Traditional diet on Okinawa

The original Asian diet in was very poor in the animal protein Westerners value so highly. Yet, that very diet allowed Okinawans to be the world's most long-lived population. In 1949, their traditional daily meals included 15 g fish, only 3 g meat, and practically no dairy products (Willcox *et al*., 2007). The corresponding values for animal-sourced protein was 3.3 g per day and that for plant-sourced protein 35.7 g per day. Okinawans obtained their plant protein primarily from soybeans that also provide large quantities of isoflavones. The phytoestrogenic action of isoflavones has been proven to protect against the development of both prostate and breast cancer.

It is the **Okinawans'** diet as a whole that accounts for their extremely low cancer rate.

The consistently represented essentials of the Okinawans' dietary composition were ample vegetables, sweet potatoes (carotenoids), tofu (isoflavones), greens, spices (*e.g.* turmeric with curcumins), and green tea (rich in polyphenols such as *catechines*) — all within the framework of a low-calorie, micronutrient-dense diet marked by a relatively small total energy intake. (Willcox *et al*., 2007). In the mid-1990s, the absolute non-standardized prostate cancer mortality rate for Japanese men (8/100,000) was double that of the Okinawans (4/100,000) even though Okinawans lived longer than mainland Japanese and so had more time for incurring cancer (*Japan Ministry of Health and Welfare* 1996, okicent.org).

— It should perhaps be mentioned here that the Island of Okinawa only fell to Japan politically as late as 1872. It lies geographically nearer to China and Taiwan than to Japan, and this proximity is reflected in its cultural disposition as well.

Traditional diet in China

The Chinese traditionally ate little fish and meat and virtually no dairy products. Dairy use is still low but an upward trend is noticeable. Fish consumption grew 4-fold in the time since the 1990s. Meat consumption rose more than 14-fold during the past two decades but still amounts to only about half of the Western norm (Brown, 2009).

By all appearances, China — with several decades' delay — is following in the footsteps of Japan whose Westernization had begun in the 1960s and whose 2008 age-standardized prostate cancer mortality was about 150% higher than that of China, Vietnam, and Thailand (Ferlay *et al*., 2010). But that said, China's Westernization took off far more quickly and intensively than had been the case in Japan. This has already led to a rapidly rising incidence of overweight, diabetes, and cardiovascular disease. China's age-standardized prostate cancer mortality rose by 80% since the year 2000 (Ferlay *et al*., 2000 and 2010).

Traditional diet in Japan

The Cambridge World History of Food (2000) reported that Japan looks back on an ancient dietary culture devoid of meat or dairy products. From 675 CE through the 15th Century CE various governmental agencies enforced broad proscriptions against the eating of mammals.

The Buddha's teachings on nonviolence were apparently taken quite seriously. There was no provision for practicing animal husbandry. Milk products failed to take a hold in Japan, China, or Korea because of the widespread lactose intolerance in those countries. Japanese cuisine emphasized preserving the fresh taste of natural foods that have been the culinary standard from time immemorial.

Fish was frequently eaten raw. Overall, the Japanese diet was confined to a low-fat plant fare with an occasional side serving of fish. This changed in the course of Japan's Westernization in the years after WW II, although older Japanese still hold to their traditional dietary patterns, value their slim figures, and enjoy comparatively high longevity. The incidence of prostate cancer in the USA still differed from that in Japan by a factor of 10 in the 1990s when it entailed 120/100,000 Caucasian and 200/100,000 African American but only 12/100,000 Japanese casualties (*e.g.* Matsuda and Saika, 2007).

Caught up in the "Westernized-Japanese" phenomenon, Japanese now immigrate to Hawaii and California and promptly find their prostate cancer risk approaching the rate prevalent in the USA (*California Cancer Registry* 2002, www.ccrcal.org). The Westernization of Japan itself is also beginning to evidence the repercussions that were to be expected. Not only is the present (2008) 23/100,000 incidence of prostate cancer now no more than 73% lower than the USA's 84/100,000 (Ferlay *et al*., 2010), but its mortality is significantly higher as well. What could have happened?

Among the staples of the traditional Japanese diet were green tea, soy, and natto (a *bacillus subtilis* soy bean ferment rich in vitamin K2). Besides the highest-grade plant protein, fibers, and B-vitamins, soy has an abundance of isoflavones that even occur in their bioactive form in miso, another one of its ferments. Trading in all of these known cancer fighters for the notoriously procarcinogenic Western diet can only draw undesirable consequences. One could even say that Japan's Westernization is tantamount to "cancerization".

Japan also stands out in Asia through its seemingly bottomless appetite for fish (Willcox *et al*., 2007). Fish consumption has increased 2.5-fold since 1950. Since the end of WW II additional rises involved milk (20-fold), meat (9-fold), and eggs (7-fold) (Ganmaa *et al*., 2003), and prostate cancer mortality took a dramatic upward turn (*cf*. Figure 8; Suzuki, 2009).

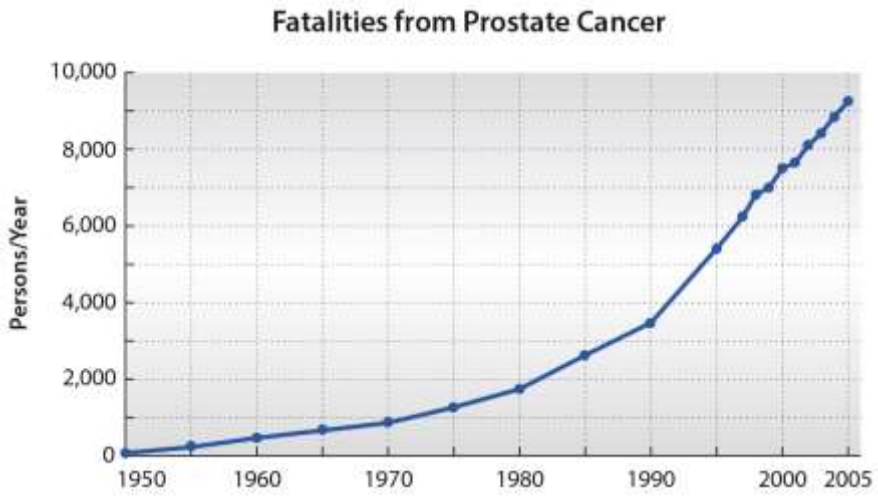


Figure 8: Prostate cancer mortality in Japan

Yet despite these turns for the worse, prostate cancer mortality is still markedly lower in Japan than in Europe, South America, or the United States.

Throughout Westernization, older generations of Japanese maintained their traditional diet and continued to profit from it. That is why Japan still boasts the world's second highest longevity (Willcox *et al.*, 2012) ranking below only the vegetarian Seventh Day Adventists in the United States whose commitment to healthful living is a rare phenomenon.

One of the reasons for modern Japan's remarkable longevity is that meat and dairy consumption was and is perceptibly lower than that of other industrialized nations. It also seems that Japan entered into rethinking mode beginning about 20 years ago.

Japan is now returning to more sensible dietary practices.

The American way of life is rapidly losing its popularity among the Japanese, and a healthy lifestyle in line with long-held values is beginning to reclaim its traditional place in Japan, where a trim and healthy appearance is communally mandated through strong social pressure that can cause individuals considerable stress.

The Japanese government demands compliance with health standards.

Compulsory government-enforced health exams are now being conducted right at the workplace. They include taking girth measurements. Those who flunk are made to participate in health management seminars. (Meal portions, by the way, are smaller in Japan than in Europe or the USA.) The resolute change in dietary awareness gave Japan the world's country-to-country highest life-expectancy with the greatest number of healthy life-years. It further accounts for the declining mortality rates of various types of cancer (Katanoda *et al.*, 2013).

EPIC Study on diet in Europe: Rich in animal protein and fat

At first glance the European *EPIC Study* delivers no stellar revelations regarding the diet-dependent causes of prostate cancer. A more penetrating analysis though does reveal the possible reason: European men are by now all feeding themselves in more or less similarly unhealthy ways. While fish, meat, and dairy consumption varied in many respects and from instance to instance, it was clear that the bulk of protein was animal-sourced. On the average, 32% of the protein derived from meat, 9% from cheese and 7% from milk. Even the lowest quintile (the fifth of the population that takes in the least) still took in an average 47 g animal protein per day. The highest quintile lingered at around 80 g per day (Allen *et al.*, 2008).

Europeans consume 4 to 11 times more protein from meat, cold cuts, cheese, milk, eggs, and fish than the Chinese. Even European men with the lowest animal protein consumption take in 14 times as much as their counterparts on Okinawa. In this regard it is interesting that the German diet of the 18th Century (Lemnitzer, 1977) still resembled a traditional Okinawan diet with respect to its natural balance of macronutrients. According to the *EPIC Study* milk protein intake ramps up the risk of prostate cancer by 22% (Allen *et al*, 2008). The causes are, among others, the excess calcium in milk (that the *World Cancer Research Fund* (*WCRF*, 2007) and the *American Institute for Cancer Research* suspect of raising the prostate cancer risk), milk's *insulin-like growth factors*, and high *IGF*-1 levels from milk-protein (Nora *et al.*, 2007; Miura *et al.*; 2007; Parella *et al.*, 2013). Animal-based foods rich in amino acids raise *IGF*-1 levels and are thus a leading health threat (Allen *et al.*, 2002; Clemmons *et al.*, 1985). Reducing protein intake (Smith *et al.*, 1995) and adopting a purely plant-based diet (Allen *et al.*, 2000 and 2002) will consequently lower *IGF*-1 levels. Cow's milk also delivers sizeable quantities of estrogen and

progesterone, and both play an important role in the development of prostate cancer (Ganmaa *et al*., 2002).

When high-*glycemic* denatured carbohydrates like sugar and refined flour are combined with milk or meat protein they will trigger a particularly high insulin release (Bao *et al*., 2011). At the same time, saturated fatty acids in animal-based foods can provoke *insulin resistance*. Lifelong use of these foods is also implicated in *chronic hyperinsulinemia* and its procarcinogenic reactions. Metabolic processes and hormone household could be permanently impaired by the interaction of these effects, especially in the presence of insufficient movement. The synergetic effect of animal-sourced foods represents a carcinogenic potential hardly examined to date.

A remarkable phenomenon in Europe is the rapid increase in meat consumption among the Mediterranean countries Spain, Portugal, and Greece where it quintupled since 1961 (Brown, 2009). There is but little left of the *Mediterranean Diet*, and that reflects in the high figures for prostate cancer mortality (Ferlay *et al*., 2010). It seems that not even the extra sunlight and satisfactory vitamin D synthesis are any longer sufficient to protect these countries. The *EPIC Study's* finding is not surprising since, to current knowledge, meat and dairy products similarly promote prostate cancer. On the contrary, it explains why positive protection is only possible when one changes old dietary habits and begins to eat predominantly plant-based foods instead of just replacing meat with dairy products. The *EPIC Study* showed that yogurt in particular is a corollary of raised prostate cancer risk (Allen *et al*., 2008).

A study by Jacobsen et al., (1998) proved that substituting soy milk for cow's milk can be efficacious. Men drinking soy beverages lowered their risk of prostate cancer by 70%. Sweden, with its liberal fish consumption (*NOAA*, 2011), is representative of all Scandinavian countries. The prostate cancer mortality rate in Sweden is 20/100,000, in Norway 19/100,000, and in Island 18/100,000. Ferlay *et al*., (2010) explain that high fish intake in these countries offers zero advantage. Asia's prostate cancer mortality soared with increased fish consumption. Eating much fish is thus not the cause of generally lower mortality in Japan and other Asian countries as is occasionally being asserted. Three large studies, the *Prostate Cancer Prevention Trial* (Brasky *et al*., 2011), the *SELECT Study* (Brasky *et al*., 2013), and the *EPIC Study* (Crowe *et al*., 2008a) correlated *DHA* and *EPA* serum levels with prostate cancer, noting a risk-hike from high *DHA* and *EPA* levels — not, as is often assumed, from declining intake of fish-sourced omega-3 fatty acids. (*DHA* = docosahexaenoic acid, *EPA* = eicosapentaenoic acid)

Decades-long high meat and milk consumption in Uruguay

Comparing Asian countries with Uruguay is epidemiologically convenient because similarly high life expectancy eliminates standardization as a possible uncertainty factor. Comparing millions of very old still active Chinese and Okinawans with Uruguayans who in our terms lived "very well" reveals a strong connection between mortality rates and dietary patterns. By virtue of its consistently stable affluence Uruguay has come to be known as South America's Switzerland. Yet, Uruguayans' lifelong diet sharply diverges from Asian dietary practices.

For many decades now, Uruguayans have eaten extremely high quantities of red meat (*Instituto Nacional de Carnes*, 2011) and dairy products (MercoPress, 2011). Accordingly, the 2008 *WHO* numbers show that Uruguayan men are 13 times more likely to die from prostate cancer than Thailanders, Chinese, or Vietnamese (Ferlay *et al*., 2010). It matters little that their grass-

fed cattle supposedly produce superior quality meat (*The New York Times*, 2009). The high omega-3 fatty acid and alpha linolenic acid supply Uruguayans get from eating the meat of pasture-raised cattle apparently provides no advantage. It still raises their prostate cancer risk by a factor of 3.91 (De Stéfani *et al*., 2000). Although Uruguay is now past its heyday of prosperity, Uruguayans spend 3-fold of what their Chinese counterparts expend upon healthcare. In spite of the disparity Uruguayans' life expectancy is lower than that of the Chinese (WHO, 2013a). Germans, too, incurred healthcare costs in 2011 that were 10-fold those of the Chinese (WHO, 2013a) — and with the identical number of healthy life-years (Jagger et al., 2008).

The Harvard *Health Professionals Study* reported that high red meat consumption raised the risks of metastasizing prostate carcinoma by 60%, animal fat by 63%, and dairy products by 40% (Michaud *et al*., 2001). A big role falls to classic carcinogens like heterocyclic amines and polycyclic aromatic hydrocarbons which are released during frying, braising, or grilling (Giovannucci *et al*., 1993). This just goes to prove that gentle food processing and meal preparation are dietary considerations of critical importance. As an aside, the ambivalence of many studies into the usefulness of alpha-linolenic acid and long-chain omega-3 fatty acids from fish in prostate cancer therapy may be chiefly due to the polyunsaturated fatty acids' strong oxidation susceptibility. Uruguayans' lifelong meat-emphasized diet is probably a primary cause of their high mortality from prostate, breast, and colon cancer that prevails despite the country's optimal climate and well-developed social and healthcare nets. Uruguayan women die 4 times as frequently from breast cancer (24.3/100,000) as Chinese women (5.7/100,000). Colon cancer mortality for either sex is 2.3 times higher than in China (16.2 *vs.* 6.9/100,000) (Ferlay *et al*., 2010). Migration studies further showed that moving from a low risk country to Uruguay entails taking on that country's high risk of prostate, breast, esophageal, colon, or uterine cancer (De Stéfani *et al*., 1990). Uruguay's excessive red meat consumption raised the cancer risk of throat and pharynx by a factor of 3.65, esophagus by a factor of 3.36, larynx by a factor of 2.91, stomach by a factor of 2.19, colon by a factor of 3.83, lung by a factor of 2.17, breast by a factor of 1.97, prostate by a factor of 1.87, kidney by a factor of 2.72, and bladder by a factor of 2.11. Total meat intake correlated in a similar way as red meat (Aune *et al*., 2009).

A Uruguayan case control study comparing the highest and lowest quartiles of red meat consumption showed the following correlations with prostate cancer risk: Red meat raised the risk by 100%, sweet desserts by 80%, a high energy intake by 90%, and total fat intake by 80%. By contrast, large amounts of vegetables and fruit lowered the risk by 50%, and vitamins C and E from food lowered it by 60% and 40% respectively (Deneo-Pellegrini *et al*., 1999). Unlike Uruguayans, Chinese people traditionally eat large quantities of isoflavones-rich soy beans and vegetables. A vegetable-rich diet's protective action of slowing an advanced prostatic carcinoma (stage III or IV) was also proven in a study by Kirsh et *al*. (2007). Men who ate lots of vegetables reduced their risk by 59% compared with those who ate less. This effect could be attributed to 40% to the action of vegetables in the crucifer family. Particularly broccoli and/or cauliflower led to a remarkable risk reduction (by 45% and 52% respectively) when consumed more than once a week as opposed to less than once per month.

Cruciferous vegetables are staples for the Chinese. Napa cabbage and bok choy, both favored in China, are especially rich in vitamin C, carotenoids, and glucoseinolates. Richmond et al. (2012) described the protective effect of cruciferous vegetables against metamorphosis of a

non-metastatic prostate tumor into a progressive one. In that study, the top quartile consumers had a 59% lower risk than those in the lowest consumption quartile. Phytonutrients such as sulforaphane (supplied by broccoli), polyphenols (from pomegranates), quercetin, as well as curcumins are all remarkably efficacious in combatting tumor stem-cells (*cf.* Chapter 9.4.4).

Résumé

Global comparisons of widely divergent dietary patterns can explain the extraordinarily steep or promisingly low prostate cancer mortality rates in Uruguay and China/Asia respectively. In global comparison, Uruguay's current (2008) age-standardized prostate cancer mortality rate differentiates itself by a factor of 13. The diet— distinguished by excessive meat and milk consumption — that has now been standard in Uruguay for many decades is a main risk-factor in that country's relatively high prostate cancer mortality. The *EPIC Study* reported that residents of European countries take in multiple-times more animal protein than Asians. The researchers reported a 1.22-fold prostate cancer risk in connection with dairy consumption among Europeans (Allen *et al*., 2008). Germans find themselves in global centerfield with regard to prostate cancer mortality. Unlike traditional diets in Okinawa and Asian countries, the modern diet in Western countries and in many locations in South America is characterized by a high proportion of animal-based food and sugar but little fiber and phytochemicals. Asians not only consume less meat and fewer dairy products but also eat much greater quantities of protectively acting plant-based foods such as soy beans, green tea, vegetables (especially cabbage), herbs, and mushrooms. Diet must be given greater recognition. It would thus make sense to not just replace the ham sandwich with a cheese sandwich but to eat more plant foods like tofu, vegetables, herbs and spices, fruit, and nuts. Such choices would benefit the prostate gland, the cardiovascular system, as well as all other physiological complexes. Alongside a physiologically correct diet critical support is provided by regular exercising, moving in fresh air, adequate sunlight exposure, and intentional relaxation.

Diet is as yet undervalued in mainstream medical understanding.

By official reckoning, only age, race, and family background count as ascertainable risk factors in prostate cancer. Yet in 2000, the traditional Asian diet was credited with a 96% reduction in the risk of dying from prostate cancer. The risk-markup corresponding with a Western lifestyle of little physical activity and a diet heavy in milk and sugar was 2,600 percent. Although lifelong dietary habits must leave their tracks, even late-begun dietary and lifestyle reform is likely to be surprisingly effective in combatting existing prostate cancer. This was shown, for instance, through clinical studies into the efficacy of dietary approaches pioneered by Dean Ornish. Study participants suffering from prostate cancer saw significant changes in tumor genetics while their disease progression at the same time demonstrably stabilized (*cf.* Chapter 11.22).

Much additional information on positive lifestyle changes, optimal nutrition, and effective dietary supplementation in prostate cancer can be found at: www.drjacobsinstitut.de.

Table 4: Worldwide dietary patterns in 2008 — 13 times higher age-standardized prostate cancer mortality in Uruguay than in China

Region	Life expectancy (m/f)	Prostate cancer mortality ASR**	Breast cancer	Fish g/day	Meat (g/day)		Protein consumption (g/day)		
					1961	2002	Protein from milk products	Total animal based protein	Plant-based protein
China	74/77[1]	**2**[5]	6[5]	22 g*[7]/ 84 g[9]	10 g[11]	144 g[11]	2 g[18]	7 – 11 g[14,15]	51 g[15]
Okinawa	79/87[2]	(2)[6]	(4)[6]	15 g*[8]	3 g (1949)[8]		< 0.1 g*[8]	3.3 g*[8]	35.7 g*[8]
Japan	79/86 [1,2]	5[5]	9[5]	62/ *[8] 153 g [9]	21 g[11]	120 g[11]	< 1 g*[8]/ 7[18]	44 g[15] includes fish[9]	43 g[15]
EPIC Study 1 – 5 quintile	77/83[3]	12[5]		18 – 78 g [10]		76 – 194 g [10]	10 g – 27 g[10]	47 – 80 g[10]	29 – 47 g[10]
Germany	78/83 [1,4]	12[5]	17[5]	42 g[9]	175 g[11]	225 g[11]	17.3 g[17]	62 g[15]	35 g[15]
Sweden	80/84[1]	20[5]	15[5]	88 g[9]	138 g[11]	208 g[11]	25.2 g[17]	60 g[15]	30 g[15]
Uruguay	73/80[1]	**26**[5]	24[5]		315 g[11]	252 g out of this 162 g is beef[12]	20.8 g[13]	65 g[16]	35 g[16]

*: Traditional Diet (China: 1981 – 90; Okinawa: 1949; Japan: 1950) **: *ASR*: age-standardized rate; Fatalities per 100,000

Sources: (1) *WHO* data for 2009 (2013a): http://www.who.int/countries/en/; (2) Willcox *et al.*, 2012; (3) European Commission, 2012; (4) *Statistisches Bundesamt*, 2012a; (5) Ferlay *et al.*, 2010; (6) Age-standardized rate on the basis of *Japan Ministry of Health and Welfare* 1996; (7) Dey *et al.*, 2005; (8) Willcox *et al.*, 2007; (9) NOAA, 2011; (10) Allen *et al.*, 2008; (11) Brown, 2009; (12) Instituto Nacional de Carnes, 2011; (13) MercoPress, 2011; (14) Campbell and Campbell, 2006; (15) Frassetto *et al.*, 2000; (16) Conservative estimate based on meat and milk consumption in Uruguay and values for Argentina from Frassetto *et al.*, 2000; (17) Westhoek *et al.*, 2011; (18) FAO (2010).

2.4 The Adventists

2.4.1 Adventists' Lifestyle

The term Seventh-Day Adventists came into use during the 19th Century American Miller Movement. Seventh-Day Adventists are evangelical Christians for whom anticipating the imminent return of Jesus Christ is a central aspect of their belief.

Adventists maintain a health-conscious lifestyle and diet rarely seen today.

They place very high value on community life, personal relationships, and sound moral conduct. Ensuring psychological and physical health is a matter of principle for them as they hold the body to be sacred and treat it accordingly.

It is known that membership in a faith community and regular participation in religious activities can prolong life. According to one study, attendance of at least one service each month was connected with a one third death-risk reduction (Musick *et al*., 2004).

The Adventists' nutrition counsel *(General Conference of Seventh-day Adventists' Nutrition Council)* recommends a vegetarian diet with plenty of whole grains, vegetables, fruit, and moderate quantities of legumes, nuts, and low-fat milk products.

Among Adventists it is generally recommended that foods containing sugar, saturated fats, cholesterol, and salt should be eaten on only rare occasions. The consumption of soft drinks, alcohol, coffee, tea, and any other caffeine-containing beverages is not accepted by Adventists (*GNCY*, 2008).

Excerpt from the Adventists' *Good Eating Guidelines*

1. Eat a generous breakfast, a moderate lunch and an early light supper.
2. Eat slowly.
3. Stop eating as soon as you feel satisfied.
4. Try to eat at the same time each day.
5. Avoid constant snacking.
6. Eat sweets only rarely, in small quantities, and in connection with a meal.
7. Choose whole grain products.
8. Eat fruit, instead of drinking it.
9. Drink at least 10 glasses of water per day.
10. Eat the recommended amount of fruit and vegetables.
11. Avoid stimulants.
12. Avoid or curtail watching TV.
13. Avoid alcohol.
14. Limit fat consumption.
15. Move 5 days per week in accord with your doctor's recommendation.

Adventists strictly avoid drugs (including smoking) and pay attention to sufficient movement within the framework of an overall healthy lifestyle. Equally important to them is maintaining a good balance between work and relaxation.

2.4.2 Average Age of Health-conscious Vegetarians: Men 87 Years, Women 89 Years

Fifty percent of the residents in the Californian town of Loma Linda southeast of Los Angeles are vegetarians. As early as the 1970s and 1980s, the *Adventist Health Study 2 (AHS 2)* involving 96,000 participants from the USA and Canada showed in the series of linked studies by *Loma Linda University* that vegetarian Adventists lived longer than non-vegetarian subjects. Women had a 4.4 years higher and men a 7.3 years higher life expectancy than the average Californian. This statistic has undoubtedly been surpassed by now. The independent *Adventist Health Study 2* (*AHS* 2) is financed by the *National Cancer Institute,* the *US Department of Agriculture,* and the *World Cancer Research Fund* and has been observing 96,000 participants from the USA and Canada since 2002.

Adventists achieve an average life expectancy of 83 years among men and 85.7 years among women — simply by practicing vegetarianism. That respectively represents 9.5 and 6.1 years more than the rest of the Californian population (Fraser and Shavlik, 2001). The corresponding (2009/2011) German life expectancy was 77.7 years among men and 82.7 years among women (*Statistisches Bundesamt*, 2012a).

Combined with a healthy lifestyle the vegetarian diet achieves more. Adventist men committed to such a lifestyle averaged 87 years and women 88.5 years (Fraser and Shavlik, 2001). A healthy lifestyle is to be understood as engaging at least three times per week in intensive physical activity, eating nuts more frequently than 4 times per week, being a lifelong non-smoker, and having a *BMI* index of <25.9 (men) or 25.2 (women).

To be slim is worth it!

Singh *et al*. confined their study to 6,300 adults between the ages of 25 years and 28 years even though not only young people will profit from normal body weight but older people do so in even greater measure.

The study participants, who were tested over a span of 29 years, had never smoked, had never suffered any cardiovascular disease or other chronic disease, and had also kept their normal weight stable for many years.

Fat accumulation after 70 is dangerous.

These researchers established that accumulating fat after the age of 70 shortens life.

Men aged between 75 and 99 years who are exhibiting stable body weight and a *BMI* of more than 22.3, lived on the average 3.7 years fewer, and women of the same age with a *BMI* of more than 22.3 lived 2.1 years fewer (Singh *et al*., 2011). It is thus profitable, especially for men, to maintain a low body weight and to keep trim by means of healthy practices. Healthy slim people are becoming ever rarer.

Unlike among the overall health-aware Adventists, low *BMI* is no longer necessarily indicative of a healthy lifestyle but rather a consequence of disease or a troubled eating comportment.

A plant-based diet ensures normal blood pressure.

Elevated blood pressure plays a leading role in the genesis of cardiovascular disease. Here too, the vegetarian diet proved to be health-promoting. The *AHS* 2 analysis revealed both low systolic (-6.8 mmHg) and low diastolic (- 6.9 mmHg) blood pressure in vegans by comparison with omnivores who were found to be more hypertensive. The use of blood pressure-lowering drugs was also less common among vegetarians and vegans. All the above results could only partially be ascribed to the overall lower *BMI* of vegans and vegetarians (Pettersen *et al*., 2012). The incidence of *hypertonia* was 75% lower among vegans than among omnivores (Fraser, 2009). It is likely that the higher potassium and lower sodium intake characteristic of a vegetarian diet play a significant role in this.

Water cuts the risk of cardiovascular disease by half.

The Adventists' general recommendation to drink plentiful water is entirely justified. This was confirmed in a study by Chan and colleagues: Men who drank five or more glasses à 240 ml per day had a 54% lower risk of developing fatal coronary heart disease in comparison with men who drank only two or fewer glasses. Among women, high water intake reduced the risk by 41%. The risk became higher (>5 glasses *vs.* <2 glasses per day) when the beverage was something other than water. In men the risk increased by 46% and in women by an even greater 147% (Chan *et al*., 2002a).

A plant-based diet prevents *metabolic syndrome* and diabetes.

The occurrence of overweight, *insulin resistance*, and *diabetes mellitus* type 2 was found to be lower among vegetarians in general, and especially among those on a vegan diet. In a focal study involving 15,200 men and 26,187 women within the frame of the *Adventist Health Study* (Tonstad *et al*., 2013) omnivores' diabetes risk was 4-fold that of vegans. After two years 0.54% vegans, 1.08% lacto-ovo vegetarians, 1.29% pesco-vegetarians, 0.92% semi-vegetarians, and 2.12% omnivores, had acquired *diabetes mellitus* (Tonstad *et al*., 2013). Likewise, vegetarians Adventists' risk of *metabolic syndrome* was reduced by 56% compared with non-vegetarians (Rizzo *et al*., 2011).

The mortality of 73,308 Adventists was studied and evaluated during an observation period of 5.8 years. By contrast with non-vegetarians vegetarians had a 52% lesser mortality from kidney failure and a 39% lower mortality from diabetes (Orlich *et al*., 2013). In sum, during the study period all the different types of vegetarians had a 12% and vegans a 15% lower mortality risk compared with non-vegetarians. Cardiovascular mortality was found to be 29% lower among male vegetarians. Although vegans averaged a higher energy intake with 1,897 calories per day, they showed a much lower *BMI* (24.1) than non-vegetarians with a *BMI* of 28.3 (Orlich *et al*., 2013). This validates the epidemiological and biochemical premises underlying the assumption that the combining of meat, milk products, and sugar is particularly apt to bring on *visceral hepatic steatisis* and metabolic diseases. Chapters 7 and 8 of this book describe the physiological processes wherein a salt and protein-rich, potassium-poor diet leads to insulin resistance and gradually kills the kidneys while a plant-based diet offers the best protection for the kidneys.

Inflammatory processes, too, play a decisive role in chronic diseases like diabetes mellitus. It is a known fact that African Americans contract inflammatory disease more frequently. This

led Paalani *et al*. (2011) to measure, among others, *higher IL-6* blood levels in African American than in the Caucasian population. A vegetarian diet can likely countermand this provided that it is augmented by sufficient movement (Paalani *et al*., 2011).

A plant-based diet reduces the risk of cancer.

Not only mortality from cardiovascular disease but also the occurrence of cancer has been analyzed in terms of its responsiveness to a vegetarian diet. Cancer illnesses are the second most frequent cause of death in Western countries — and at least 30% of them are estimated to be diet-dependent. Although Adventists in general practice healthier ways of living in their individual lives clear differences in cancer risk exist within the community's vegetarian and non-vegetarian members.

Study results relating to this can be seen as proof that not only lifestyle but particularly nutrition influences cancer risk as well. The research team at Tantamango-Bartley investigated links between various dietary practices among Adventists and the appearance of cancer. 69,120 *AHS 2* participants were closely examined. The study's outcomes speak for themselves. Vegetarians' cancer risk was 8% lower than that of non-vegetarians. A strictly vegan diet even resulted in a 16% risk reduction. Specific outcomes proved it possible to reduce the risk of gastrointestinal types of cancer by 24%. A vegan diet moreover lowered the risk of cancers affecting women by 34% (Tantamango-Bartlay *et al*., 2013).

An earlier Adventist study was impressively able to substantiate the fact that there is a direct connection between diet and the risk of dying from prostate cancer. There was a quantity-dependent correlation between the consumption of milk, eggs, cheese, and meat and the risk of prostate cancer fatality. Persons regularly eating these foods incurred a 3.6-fold risk increase compared with those eating them infrequently or never at all. The presence of overweight in men additionally raised that risk 2.5-fold over that of men with (more or less) normal-weight (Snowdon *et al*., 1984).

Studies aimed at comparing Adventists with the general populace showed that Adventists' overall healthy way of life contributed its share as well. Adventists allow neither smoking nor the drinking alcoholic beverages. This too helps facilitate their outstanding longevity. Still, *AHS 1* made it clear that Adventists' age and gender-standardized mortality rate of most cancers *not* connected with smoking or drinking comes to only 50 – 75% of that affecting the general population (Phillips, 1975).

Lower total mortality, cancer mortality, and cardiovascular mortality

A 10-year study comparing Dutch Adventists with the Dutch as a whole showed that Adventists clearly have lower age-standardized mortality rates — total: -55%; cancer: -50%; cardiovascular disease: -59% (Berkel and de Waard, 1983). Vegans came out especially well in an analysis of Adventists' diet by Rizzo *et al*. (2013).

One thing that stood out in that connection was the relatively high (10.9 g/day) consumption of soy beans by vegan Adventists. Ovo-lacto vegetarian study participants consumed significantly fewer milk products than Europeans in general, using a mere 4.8 g/day milk protein (150 ml milk) but a full 8 g/day soy protein. (Lowest and highest milk protein intake quintiles in the *Epic Study* were 10 g and 27 g respectively.

Soy is not the basis of a healthy diet, but it can be a valuable component.

Those Adventists who drank a soy beverage more than once per day were shown to have a 70% lower prostate-cancer risk (Jacobsen *et al*., 1998). That study — as, by the way, hundreds of others — along with the tofu-eating inhabitants of Okinawa and China, gives rise to suspicion that the current anti-soy wave may be fueled by scaremongering wielded by vested interests *via* popular science and the internet.

The proportionate distribution of vegan Adventists' median daily energy intake was 29.4% as fat, 14.1% as protein, and 61.7% as carbohydrates. They also took in 46.4 g fiber, 933 mg calcium, 591 mg magnesium, 3,066 mg sodium, and 4,120 mg potassium. With these figures vegan Adventists had the highest daily fiber, magnesium, and potassium intake. With 106 – 108 g/day sugar use was moderately high across all dietary groups and constituted about one third of the total carbohydrate intake. In Germany, 122 g/day of mono and disaccharides represent about half of the total carbohydrate consumption (*MRI*, 2008a). Even non-vegetarian Adventists were found to be more health-conscious and favor a more plant-emphasized diet than the population at large.

Plant-based food reduces the risk of dementia.

As part of the *Adventist Health Study* Giem and colleagues (1993) examined the contiguity between the consumption of animal products and the development of dementia. Their partial study grouped 272 Californians into complements of four each consisting of a vegan, a lacto-ovo vegetarian, and two solid meat eaters. These groups were homogenized on the basis of age and gender. The results underscored that a current meat diet (including fowl and fish) raised the dementia risk by 118% over that connected with a strictly vegetarian diet. When meat consumption from years back was additionally factored in the risk disparity was as high as 199%. A second partial study examined 2,984 participants, admittedly though without controlling for age, gender, and residential area (social milieu) also showed a trend toward deferred dementia occurrence among vegetarians (Giem et al., 1993).

Additional outcomes of the *Adventist Health Study 2* (Tonstad *et al*., 2009 and 2013; Pettersen *et al*., 2012):

- Vegans (pure plant eaters) were an average of 13.6 kg lighter than non-vegetarians, and their *BMI* was by as many as five units lower.
- Both vegetarians and vegans suffered far less frequently from *hypertonia* and *insulin resistance* than non-vegetarians. Non-vegetarian Adventists had a four times higher risk of *diabetes mellitus* type 2 by comparison with the pure plant food eaters.
- Blood levels of *C-reactive protein* (an inflammation marker), *IGF*-1 (a growth factor), and insulin all measured lower in vegetarians.
- Slim people regularly worked out more often, consumed more plant-based food, and more frequently avoided tobacco than overweight persons. It was pointed out that many other lifestyle factors co-accounted for the participants' good health.

These *AHS 2* results showed even more clearly than others had that health conscious vegetarians tend to stay healthier throughout their also longer lifespan.

Eliminating meat has positive effects all by itself, but the vegetables, fruit, nuts, and legumes vegetarians liberally eat can specifically lower the risks of cancer, cardiovascular disease, and *diabetes mellitus* type 2. *Loma Linda University* reported that all of these plant foods were found to also aid weight control and improve brain function. The healthier lifestyle characteristic of vegetarians as a group co-contributed to the study's impressive results.

Adventists differ from other long-lived populations like Asians and especially Okinawans.

While the Asian groups are increasingly losing their longevity by adopting a Western diet and lifestyle, Adventists maintain or even extend theirs. Their health and longevity stem not from a dying tradition only kept up by the most aged, but from a living culture grounded in religion. They honor the body in accord with their belief and maintain it through a healthy diet, much and regular movement, and a consciously balanced way of living.

The roles that a plant-based diet and purposeful living played in the extraordinary life of heart surgeon Ellsworth Wareham

In his book *Blue Zones*, Dan Buettner (2009) gave an account of Dr. Ellsworth Wareham, an Adventist who pioneered open heart-surgery and heart-transplants. At the age of ninety-one Dr. Wareham was still active as a respected (by then only assistant) heart surgeon.Dr. Wareham attributed his physical and mental agility, both atypical for such a high age, to his conscious, active conduct of life and his decades-long vegan diet. The conviction to adopt such a way of life arose from his professional experience as a surgeon. In the course of performing surgeries he was repeatedly struck by how much better vegetarians' arteries were. He related that whenever he encountered a smooth artery the patient in question would most likely turn out to be a vegetarian.

Conversely, it grieved Dr. Wareham that so many people had to have their toes and even legs amputated as a consequence of perfusion problems. These observations motivated him, while still in middle age, to become a vegetarian and regularly drink much water. According to Buettner, the underpinnings of Dr. Wareham's long and exceptionally productive life were his healthy lifestyle, his pursuit of worthwhile goals throughout life, and his constant dedication to tasks expressing his life-purpose.

There is no shortage of populations exemplifying healthy dietary patterns.

Adventists are not the only group demonstrating the advantages of a vegetarian/vegan diet. Many national and international studies reported on populations exhibiting similar dietary patterns supportive of a well-functioning human metabolism in (*cf.* Chapter 11).

Dietary decisions not rooted in physiological understanding are questionable.

It should be regarded an *a priori* consideration to more accurately understand the complex physiological mechanisms involved in the regaining or maintaining of one's optimal health.

Calling yourself a vegetarian, vegan, or neither is ultimately much less relevant than knowing how to integrate your diet and lifestyle so that they will act in a health-promoting rather than a health-destroying way.

3. The Key Function of Insulin

Weight reduction diets frequently focus on limiting the intake of carbohydrates because of the role they play in the development of blood-sugar. In recent years, however, a physiologically better differentiated appraisal of carbohydrates has shifted the emphasis onto their *glycemic index* (*GI*) and *glycemic load* (*GL*) properties.

Simple carbohydrates like sugar and high-*GI* refined carbohydrates like white flour that constitute the bulk of carbohydrate-intake in Germany, lead to rapid, steep rises in blood sugar followed by equally sharp declines. Low-*GI* complex carbohydrates, the foundation of the Okinawans' diet, exert a moderate, sustained influence upon blood sugar and are thus ideal energy generators.

Strong blood-sugar fluctuations with high peaks have long-term negative metabolic repercussions. A specific **food's** insulin action should, in the general context of metabolic actions, be understood as more significant than its blood-sugar effect.

Like the high-*GI* carbohydrates, animal-sourced proteins metabolize for the largest part insulinogenically, but the greatest insulin effect is produced through combining high-*GI* carbohydrates (sugar, white flour) with animal-based protein from meat and/or milk.

Plant protein — and a plant-based diet in general — trigger a more moderate release of insulin and *insulin-like growth factors* (*IGFs*).

The powerfully *anabolic* actions of insulin and *IGFs* stimulate growth, fat storage, and cholesterol synthesis throughout life. Overweight and *hyperinsulinemia* occur in tandem with elevated hormone levels and the presence of proinflammatory, procarcinogenic *cytokines* and *IGFs*. These are prerequisites for the progression of cancer cells. Cancer cells in themselves also overexpress both *IGF* and insulin receptors.

The Western diet's emphasis on animal-based foods as primary source of protein and fat correlates with a high incidence of *insulin resistance*, *hyperinsulinemia*, overweight, *metabolic syndrome*, *diabetes mellitus* type 2, and cancer.

3.1 Simple *vs.* Complex Carbohydrates

The functional distribution of nutrients in the traditional Okinawan diet shows that carbohydrates are manifestly healthier than they are reputed to be, even when they are consumed in higher quantities — provided, of course, that they derive from natural and little processed foods. On Okinawa, such healthy carbohydrates come mainly from sweet potatoes. Many proponents of fad diets injudiciously relegate carbohydrates to the category of fattening foods because they supposedly drive up blood levels of sugar and insulin. "Low-carb" diets thus advocate avoiding carbohydrates altogether and replacing them with foods rich in protein and fat. Yet, Germans typically do not meet the 55% energy intake *via* carbohydrates the *DGE* recommends. Looking at the Okinawan and original 18th Century German diets it can be seen that these recommendations are arguably more in line with a healthy diet than the extreme "low carb" diets (*cf.* Figure 9).

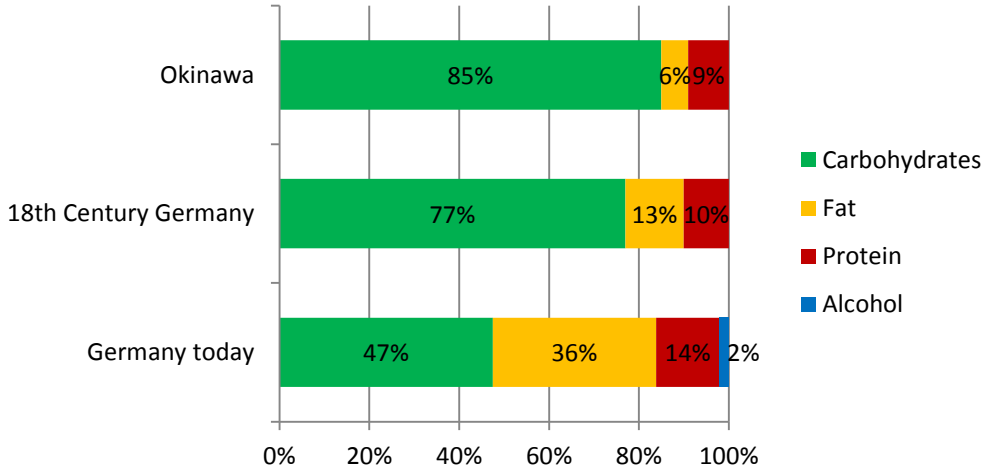


Figure 9: Macronutrients/energy-intake proportions in the diets of Germans and the traditional inhabitants of Okinawa (Willcox et al., 2007; MRI, 2008a; Lemnitzer, 1977)

Carbohydrates are not all created equal. It is the specific characteristics of a carbohydrate that determine its impact upon health. Germans, for instance, eat half of their carbohydrates in the form of complex carbohydrates, primarily as bread (mid to high-*GI*, and a main source of salt), and the other half as *mono* and *disaccharides* (sugar) that have a direct bearing on blood sugar and insulin levels.

By contrast, no isolated sugar was consumed in 18th Century Germany, and traditional Okinawans also take in less than 1% of their carbohydrates in the form of sugar. Their main carbohydrate sources are sweet potatoes and vegetables. They eat these complex carbohydrate foods in a minimally processed state that preserves their low *GI* value.

3.2 *Glycemic Index*, *Glycemic Load*, *Food-Insulin Index*

GI refers to the blood sugar effect a food's carbohydrate proportion produces within the first two hours after consumption. But as such it is a less practical measure because it specifies the blood sugar reaction to an intake of 100 g carbohydrates supplied *via* a certain food and not the reaction to 100 g of the food itself.

White bread and carrots have a similar *GI* value, and yet the consumption of 104 g baguette bread triggers a blood sugar rise equal to the one produced by the consumption of 800 g cooked carrots. Foods' individual *GI* values cover a wide range and serve thus much better as indicators than as scientifically established quantifiers (Vega-López *et al*., 2007).

Despite a large plurality of studies into *GI* effects, the *DGE* position (Strohm, 2013) *apropos GI* and *GL* confines itself to the following: "There might be evidentiary attestation to a high-*GI* diet's raising the risk of obesity (in women), *diabetes mellitus* type 2, coronary heart disease (in women), and malignant colorectal tumor. There is probably also evidence suggesting that a high-*GI* diet raises total cholesterol concentrations."

"The notion of *GI* as factor in the prevention of dietary co-contingent diseases is — apart from probable evidence that it increases the risk of higher total cholesterol concentrations — not supported by concrete evidence."

GL is the product of *GI* and the utilizable quantity of carbohydrates (in g) per food portion divided by 100. It is thus a good indicator of the *GI* response to a given amount of food.

To that, the *DGE* says: "Evidence may exist for a diet-induced high *glycemic load's* raising the risks of a uterine mucosa malignancy and *CHD*. There probably is evidence suggesting that it also raises the risk of elevated triglyceride concentrations."

GI and *GL* may very well be practical indicators, but they also frequently get overestimated, thereby occasioning a one-dimensional, lopsided dietary assessment. Significantly more decisive for the pathogenesis of chronic diseases is the insulin reaction to foods consumed.

Insulin release is also connected with protein blood-levels.

The *food insulin index (FII)* measures the insulin effect triggered by different foods, and that includes the related action of proteins. As of yet, the *insulinogenic* effect of protein remains largely unrecognized in Germany.

This notwithstanding, the interrelation of protein with insulin levels seems obvious in the physiological view because insulin is not just instrumental in the cellular uptake of sugar but in that of amino acids as well.

As in the case of carbohydrates, there is fast and slow blood-flooding with protein.

The "quicker" milk protein triggers an exceptionally high insulin surge. Animal protein from milk and meat (still) contains ample *glutamine* and *leucine*, both of which can elicit a strong insulin release (Li *et al*., 2004) as well as a powerful *IGF*-1 response (*cf.* Figure 10*)*.

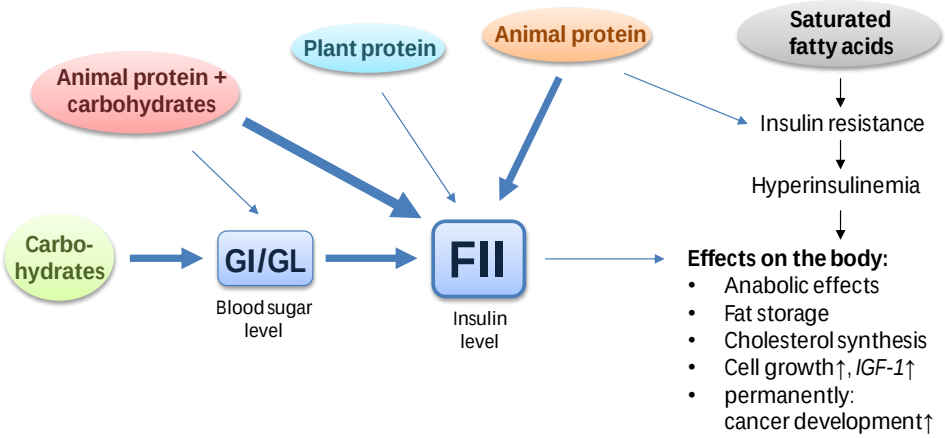


Figure 10: Consequences of nutrients' *food-insulin index* (*FII)* effect

Today's German diet supplies almost double the quantity of protein than that supplied by the traditional Okinawan diet. In the German diet protein is predominantly animal-sourced

whereas Okinawans derive theirs mainly from plants, soy beans in particular. Germans' chief protein sources are meat and dairy products. These supply only few carbohydrates yet trigger a precipitous insulin response.

In the case of milk, the strong insulin response is due to the rapid uptake of milk protein and milk sugar into the blood. Meat and dairy's additionally high content of saturated fatty acids is a factor in the development of *insulin resistance*.

In cancer prevention and cancer therapy it is imperative to avoid incurring *insulin* resistance, *hyperinsulinemia,* and elevated *IGF* levels — or to reverse them if they are already present. This is also true for healthy aging in general.

Animal protein and fat drive the risk higher than carbohydrates.

Although carbohydrates are commonly thought to be responsible for *insulin resistance*, *hyperinsulinemia* and their end stage *diabetes mellitus* type 2, they play only a subordinate role compared with animal protein and fat.

A ten-year follow-up to the *EPIC Study* (Sluijs *et al*., 2010) assessed changes in the diabetes risk of 38,094 Dutch participants. The consumption of animal protein was associated with a 118% higher risk (highest *vs.* lowest quartile) while the consumption of plant-derived protein showed no correlation. A high *glycemic load* raised the risk by 27%, high *GI* levels by 8%, isolated starch by 25%, and carbohydrates as a whole by 15%. Adequate fiber intake lowered the risk by 8%.

A large *Harvard School of Public Health* meta-analysis encompassing 442,101 participants found that red meat drove the diabetes risk up the most (Pan *et al*., 2011). Even after known risk factors (age, *BMI*, and other lifestyle and dietary factors) were taken into account, 100 g of unprocessed red meat per day still accounted for a risk hike of 19%. A mere 50 g processed meat per day, for instance cold-cuts or hamburger, intensified the risk by a whopping 51%, but replacement of processed meat by nuts or wholegrain products lowered the diabetes risk by 32% and 35% respectively.

Steak releases more insulin than pasta.

In the to date most extensive investigation (Bao *et al*., 2011) the effects of foods on insulin secretion (*food insulin index*) it was found that carbohydrate content and *GI* were only able to predict insulin secretion for carbohydrate-rich foods.

Although the *GL* accounted for less than half of the accumulated insulin blood-levels it was nevertheless the most valuable predictor. This *FII* arose from the discoveries of the workgroup around Jennie Brand-Miller, one of the world's leading *GI* researchers. The reference figure for the *FII* is 1,000 kJ dextrose (59 g) with an *FII* of 100.

1,000 kJ of white bread (97 g) reached an *FII* of 73. The fact that white bread is not healthy is nothing new, but that 1,000 kJ (333 g) fish (*FII* 43) and 1,000 kJ (158 g) steak (*FII* 37) lead to a substantially higher insulin release than 1,000 kJ (200 g) pasta (*FII* 29) explains both the slight figure of Italians, rare by prevailing European standards, and the danger of today's popular-scientific suggestions.

Yet, the fact that those who consumed 227 g tofu thereby also consumed 1,000 kJ and 27 g protein, indicated a significantly lower insulin release (*FII* 21). Tofu is the main protein source

of traditional Okinawans. The *FII* connection held surprising implications for women's health since women typically prefer milk products as their primary source of protein.

1,000 kJ sweetened yogurt (260 g) corresponded with an *FII* of 84 and skim milk (1,000 kJ/690 g) with an *FII* of 60. With that it becomes clear that 1,000 kJ skim milk have the same *GL* as 1,000 kJ white beans but with a nearly 3-fold insulin release. A glass of milk taken along with a meal of pasta *al dente* thus more than nullifies the pasta meal's ordinarily low insulin effect.

Although a portion of 59 g cheese demarcates an *FII* of just 33 and concurrently has many saturated fats capable of provoking *insulin resistance*, it boasts exactly as much energy (1,000 kJ) as 625 g oranges (*FII* 44). A low insulin release is also the case with avocados (*FII* 4) and walnuts (*FII* 5).

Extraordinarily high insulin releases are brought on by combining rapidly assimilated carbohydrates with protein, expressly protein derived from milk or meat.

One example for that would be a meal (2,000 kJ) consisting of honeydew melons, bananas, fat free strawberry yogurt, and apple juice (Bao *et al*., 2011). Both yogurt and milk are *insulinogenic* and extremely so when combined with sugar.

The insulin release triggered by the yogurt's animal protein content alone (19 g — thus one third of the entire day's supply) is notably higher than the blood-sugar it induces and the insulin action needed for addressing it.

The meal's high content of rapidly absorbed carbohydrates (90 g) renders its own significant contribution to the problem. The whole meal accounts for an *FII* of 116. The reference value of 100 *FII* is here represented by 2,000 kJ white bread with also19 g protein (but from plants) and 93 g carbohydrates.

Particularly notable is that pasta with lentils (2000 kJ) *does* have 27 g protein and 63 g carbohydrates but only a 45 *FII* . 40 g carbohydrates and 52 g protein in steak & potatoes (also 2,000 kJ) have at 88 nearly double the *FII* (Bao *et al*., 2011; *cf*. Table 5). All outcomes of the study were obtained with healthy, slim study subjects.

Not only rapidly absorbed carbohydrates trigger a high insulin release but animal protein does so even more. For non-insulin dependent diabetics the *insulinogenic* effect of meat is so high that just 50 g meat protein produce the same insulin reaction as do 50 g glucose (Nuttall *et al*., 1984). Glucose-sweetened cottage cheese raises diabetics' total insulin 3.6-fold (Gannon *et al*., 1988). To interpret this solely as animal protein's participation in regenerating insulin levels does not reflect causal thinking. The critical issue is its connection with *Insulin resistance* and *hyperinsulinemia*, for these are the true culprits in disease occurrence.

While fat reduces insulin secretion in healthy people this is clearly no longer true for diabetics. Yes, when healthy people put butter on their potatoes it does lower their blood sugar and will produce the same insulin response as potatoes without butter do (Ercan *et al*., 1994), but in the case of non-insulin dependent diabetics butter will increase both blood sugar and insulin response (Gannon *et al*., 1993).

Epidemiological studies consistently demonstrate that a meat-rich fare markedly raises the incidence of *metabolic syndrome* (Bulló *et al*., 2007; *Lutsey et al*., 2008; Panagiotakos *et al*., 2070; Damião *et al*., 2006) along with that of *diabetes mellitus* type 2 (Fung *et al*., 2004; van Dam *et al*. 2002a; van Dam *et al*., 2002b; Vang *et al*., 2008).

Table 5: Comparing the *food-insulin index* of various foods in units of *1,000 kilojoules (kJ)*

Food item (1,000 kJ)	**Weight (g)**	***GI***	***GL***	***FII***
Glucose	59 g	100	59	100
Jelly Beans	88 g	78	44	117
Mars™ Bar	54 g	62	23	89
Cornflakes + 125 ml skim milk	67 g	81	45	82
Fruit yogurt	260 g	31	**12**	**84**
Skim milk	690 ml	29	**9**	**60**
White beans	281 g (19 g P, 28 g CHD)	31	**9**	**23**
White bread	97 g	70	31	**73**
Oranges	625 g	42	21	**44**
Fish	333 g	0	**0**	**43**
Steak	158 g, 0 g CHD	0	**0**	**37**
Pasta *al dente*	200 g, 49 g CHD	46	23	**29**
Tofu	227 g (27 g P, 7 g CHD)	15	1	**21**
White rice	203 g	72	40	58
Brown rice	148 g	72	38	45
Walnuts	35 g	0	0	5
Avocados	112 g	0	0	4
Steak & Potatoes (2,000 kJ)	52 g P, 40 g CHD	77	**31**	**86**
Pasta with lentils (2,000 kJ)	27 g P, 63 g CHD	42	**27**	**45**
90 g pizza with 600 ml cola	12 g P, 92 g CHD	55	51	85

P: Protein; CHD: Carbohydrate; *GI: Glycemic index; GL: Glycemic load; FII: Food insulin-index*

Plant-eaters incur a distinctly lower risk of developing *insulin resistance* than do meat-eaters (Valachovicová *et al*., 2006); Kuo *et al*., 2004; Hung *et al*., 2006). Vegans as a whole have a lower incidence of overweight, *insulin resistance*, and *diabetes mellitus* type 2.

According to the *Adventist Health Study* (Tonstad *et al*., 2013) that involved 15,200 men and 26,187 women the diabetes risk of mixed eaters was 4-fold that of vegans. Plant consumption in general effected down regulation of insulin secretion and positively altered the availability of free *IGFs.* Plant proteins impact both insulin release and free *insulin-like growth factors* more favorably than animal proteins.

Conspicuous during the study of the oldest of Okinawa was their relatively protein-poor diet (39 g total protein with extremely little animal protein). Two studies by Allen et al. involving vegans, vegetarians, and mixed eaters reported that vegans commanded significantly lower concentrations of *IGFs* and higher concentrations of *IGF*-binding proteins *(IGFBP)* than mixed eaters (Allen *et al*., 2000 and 2002).

A low-fat vegan diet can be highly efficacious in types of cancer marked by *insulin resistance*, colon, breast, and prostate cancers among them. Regular movement, too, will alleviate *insulin resistance* and prevent both the cancer itself as well as potential relapses.

3.3 Insulin and *IGFs* in Cancer Development

Insulin acts first and foremost as an *anabolic hormone*. It serves both *mitogenic* and *anabolic* processes such as cellular intake of glucose, amino acids, minerals, and fats. It also promotes protein biosynthesis and fatty acids synthesis. Insulin and *IGF*-1 blood levels correlate epidemiologically with the respective risks of cancer of the colon, pancreas, endometrium, breast, and prostate.

In regard to carcinogenic diseases the main actions of insulin and *IGFs* are maintenance of cell proliferation and restriction of *apoptosis.* Insulin raises the bioavailability of *IGF*-1, its synthesis, and the synthesis of its compound protein *IGFBP*-1.

IGF-1, an embryonic and adult cell growth factor, is capable of interfering with *apoptosis*. It regulates the cell cycle through modulation by *cyclins*, *cyclin*-dependent *kinases*, and *cyclin*-dependent *kinase* inhibitors. *IGF*-1, and even more so *IGF*-2, play a central role in the niche regulation of embryonic and tumor stem-cells (Bendall *et al.*, 2007). *IGFs* are ordinarily produced in the liver, but tumor cells are independently capable of synthesizing the *mitogenic IGF*-2 (Braun *et al.*, 2011).

IGFs will bind to *IGF*-receptors and occasionally also to insulin receptors. Insulin stimulates the proliferation and inhibits the *apoptosis* of cancer cells in two different ways, directly and indirectly *via IGFs*.

Diabetics who prior to their disease suffered from *insulin resistance* and *hyperinsulinemia* — often over many decades — are known to also carry a significantly higher cancer risk. New but in light of this little surprising is the outcome of a recent Danish study showing that diabetics additionally incur a 50% cancer risk if they are insulin-dependent (Carstensen *et al.*, 2010). Overall, elevated *IGF*-1 levels were found to be associated with cancer manifestations such as colorectal, prostate, and premenopausal mamma carcinomas (Nora *et al.*, 2007). A systematic preview as well as a meta-regression analysis determined that *IGFBP*-3 and *IGF*-1 blood concentrations are positively implicated in the development of frequently occurring types of cancer (Renehan *et al.*, 2004).

The *Physicians' Health Study* examined the nexus of prostate cancer and *IGF*-1 with *IGFB*-3 plasma concentrations. Even without benefit of the Gleason-score, men with high *IGF*-1 and low *IGFBP*-3 (*IGF-binding Protein*-3) levels could be assigned a 9.5-fold risk of incurring advanced prostate cancer. High *IGF*-1 levels corresponded with a risk elevation of about 410%. By contrast, high *IGFBP*-3 levels indicated an 80% lower relative risk (Chan *et al.*, 2002b). Other studies saw stepped-up proliferation of carcinoma cells when elevated *IGF*-1 levels were present (Arnaldez and Helman, 2012). In line with this, individuals afflicted with Laron syndrome (a form of hyposomia marked by a lack of *IGF*-1) were only at small risk of dying from cancer (Gallagher and LeRoith, 2011). *IGF*-1 affects carcinogenesis by regulating cell proliferation and differentiation and concurrently interfering with *apoptosis*. The mechanism involves binding with the *IGF*-1 receptor. The *IFG*-1 receptor thus strongly influences oncogenic transformation processes (Fürstenberger and Senn, 2002).

High *IGF*-1 levels correlate positively with protein consumed (especially animal-sourced protein, *e.g.* milk, cheese) and calcium. By contrast, low *IGF*-1 levels correlate with the consumption of vegetables and carotenoids from orange colored fruit and green-leafed vegetables

(Norat *et al*., 2007). As may be expected from this, vegans show unmistakably lower *IGF*-1 and higher *IGFBP* levels than mixed eaters (Allen *et al*., 2000 and 2002).

In one study, the 93.3 ng/ml *IGF*-1 serum value of 2-month old breast-fed infants was distinctly lower than the 129.8 ng/ml value of infants fed cow's milk (Larnkjaer *et al*., 2008).

A month-long *Harvard* study of Mongolian 2-month olds further determined that the daily consumption of 710 ml whole milk led to elevated *IGF*-1 plasma and growth hormone levels, as well as to a strongly accelerated vertical growth rate of about 1 cm per month (Rich-Edwards *et al*., 2007). That is presumably why Asians, who traditionally consume little animal protein and exhibit lower *IGF*-1 blood levels, are also of smaller body size than Europeans. Asians' higher life expectancy, too, can feasibly be attributed to their generally lower *IGF*-1 levels since *IGF*-1 reduction seems to contribute to the same anti-aging effects as those engendered by caloric restriction (Barzilai and Bartke, 2009).

Another high quality human study examined the combined effects that diet and lifestyle have on *IGF*-1 levels. The first group ate plant-based, protein-poor (0.76 g protein/kg body weight), and calorie-poor (1,989 kcal). The group's 21 participants were little inclined toward physical exertion and walking. The second group consisted of athletes (1.6 g protein/kg body weight; 2,346 kcal) and the third of slightly overweight, status quo-type individuals (1.23 g protein/kg body weight; 2,346 kcal; 26.5 *BMI*). That last group was paired with the two others by age and gender. The study's outcomes correlated physical training, reduction of excess weight, and a long-term diet low in protein and calories with low plasma levels of growth factors and hormones linked to higher cancer risk. But low protein intake had its own protective effects independent of body-fat mass because it produced lower *IGF*-1 levels (Fontana *et al*. 2006).

A connection between *IGF*-1 expression and the makeup of foods consumed could also be established with rats. The messenger *RNA* for*IGF*-1 that is formed in the liver rose with the intake of casein, whereas a wheat protein-based or protein-free diet led to a 60% drop in the *IGF*-1 *mRNA*. *IGF*-1 blood levels measured markedly higher in the casein group than in the soy protein-fed group (Miura *et al*., 2007).

Curtailment of dietary animal protein might also protect against Alzheimer's and other neurodegenerative diseases. In one pertinent study mice were periodically put on a protein-reduced diet. It reduced *IGF*-1 levels by 30 – 70 percent and raised *IGFB*-1 levels 8-fold. This led to improvement in the animals' cognitive performance (Parella *et al*., 2013). The studies cited above demonstrate the advantages of normalized insulin and *IGF*-1 levels, and Dr. Jacob's dietary plan presented in Chapter 12 can facilitate achieving these.

3.3.1 *Insulin Resistance*, *Hyperinsulinemia*, and Overweight in Cancer Genesis

Overweight will not only bring on a higher cancer relapse risk (Bastarrachea *et al*., 1994) but also promote development of a malignant condition itself. *Hyperinsulinemia*, which accompanies and causally provokes both *metabolic syndrome* as well as overweight and often culminates in *diabetes mellitus* type 2, is a particularly significant risk factor toward the development of cancer (Belfiore and Malaguarnera, 2011). Visceral fat tissue is metabolically highly active and distinguishes itself through its ability to auto-manufacture steroidal hormones and proinflammatory signal molecules.

There is an inflammation-cancer connection.

Diabetics exhibit a sublicinally elevated but active inflammatory disposition. Prominently activated at the top end of the cascade of inflammatory and procarcinogenic processes is the transcription factor *NF-kappaB* that stimulates the production of *tumor-necrotic factor* (*TNF-alpha*) and *interleukin*-1 (Braun *et al*., 2011).

TNF-alpha blocks insulin's intracellular signal transduction cascade and, similarly to *IL*-1, promotes *insulin resistance*. Since this only affects insulin's metabolic activities it leaves *mitogenic* metabolic pathways, cell proliferation, and cell migration — along with their combined impact upon tumor generation — unaltered. Surplus insulin even strengthens these (Belfiore and Malaguarnera, 2011).

Insulin resistance could lead to *hyperinsulinemia* and this will, in turn, promote *IGF*-1 production. The resulting cell proliferation and interference with *apoptosis* are a fatal combination facilitating the occurrence of cancer precursors and cancer cells. Cancer cells overexpress insulin receptors and *IGF* receptors, which makes them extraordinarily responsive to *anabolic* stimuli. Both receptors' signal cascades are ultra-active, as are their *mitogenic* effects.

3.3.2 Tumor Stem-cells have a High Affinity for *IGFs* and Insulin

Tumor stem-cells have an unlimited capacity for self-regeneration and are essentially responsible for a tumor's survival and its recurrence subsequent to primary therapy. Both *IGFs* and insulin play critical roles in stem-cell metabolism.

For instance, the pluripotency and high regeneration capability of human embryonic stem-cells depend on the agency of *IGF*-2. (Bendall *et al*., 2007; Belfiore and Malaguarnera, 2011).

Stem-cells are especially well-endowed with type *IR-A* insulin receptors characterized by high affinity for *IGFs*. *IR-A* over-expression of tumor cells will lead to non-differentiation and to stem cell-like behavior. *IR-A* induces for the most part *mitogenic* signal paths and *antiapoptotic* signals (Belfiore and Malaguarnera, 2012).

The physiological control of glucose metabolism is based on phasic insulin secretion that occurs in reaction to nutrient-intake and as a consequence of selective insulin-receptor expression in the target organs. Disturbances of the regulatory platforms amplify insulin-receptors' *mitogenic* and *antiapoptotic* effects and can promote carcinogenesis. Persistent *hyperinsulinemia* on the one hand and aberrant *IR*-overexpression on the other are thus connected with both cancer initiation and promotion (Belfiore and Malaguarnera, 2011).

Systemic diseases such as adiposity, *diabetes mellitus*, and *metabolic syndrome* are not to be thought of as just affecting cardiovascular disease. They are also significant cancer-risk factors (Belfiore and Malaguarnera 2011). Prevention of and intervention in these diseases are best accomplished — and with the fewest side effects — by means of dietary reformation.[2]

[2] It was decided to make the information available even while the translation of *Dr. Jacob's Way* is still in progress. For this reason, only the introductory sections of Chapters 4 – 11 appear here. The full text of these chapters will be introduced in future editions. Full text translation resumes with Chapter 12 in the current version.

4. Too Much Protein Means More Metabolic Waste

Protein serves the body primarily as a building block. According to the *DGE*, the recommended daily protein supply is, give or take, 0.8 gram per kilogram of bodyweight. This translates to 56 g/day for a person weighing 70 kg. Germans are protein oversupplied.

The process of breaking down surplus protein aggregates fixed acids, ammonia, and *homocysteine* and additionally results in *oxidative* and *nitrosative stress*.

The animal-sourced protein that Germans for the most part consume creates a higher potential renal acid load than plant protein does.

Meat breeds a putrefactive flora that alkalinizes the normally slightly acidic colon and releases large quantities of ammonia and other cell poisons that overburden the urea cycle. This necessitates nitrogen detoxification. The resultant paralysis of both citrate cycle and mitochondrial energy generation obstructs metabolism. In the long run it overtaxes liver and kidneys, increases renal calcium elimination, hastens bone resorption, and spurs tumor development *via* prooxidative, proinflammatory signal transduction pathways.

Nowadays, diets rich in protein and fat are marketed as being efficacious in the prevention and treatment of *insulin resistance* and *hyperinsulinemia*. The aforementioned studies involving more than half a million subjects indicate, however, the opposite. Consumption of animal-based foods can be safely designated as the chief cause of diabetes.

As is generally understood, the intake of saturated fatty acids from meat and milk can lead to *insulin resistance* but newer evidence suggests that the branched-chain amino acids abundant in red meat and dairy products, *leucine* in particular, provoke *insulin resistance* as well. Prerequisite to this effect is a deficit in physical movement.

The pioneers of German naturopathy, Kollath, Eppinger, Bruker, Bircher-Benner, and Gerson among them, consistently advocated a predominantly plant-based diet poor in animal protein. Prof. Wendt referred to the cytopathology of diabetes and *hypertonia* as *protein storage disease* and attributed its incidence to the rise in animal protein consumption.

Methionine restriction has been shown to have a positive effect on life expectancy and *oxidative stress* similar to that achieved by means of caloric restriction. Whereas plant protein and human mother's milk have a *methionine/cysteine* ratio of 1:1, animal protein contains approximately three times more *methionine* than *cysteine*.

Methionine breaks down into *homocysteine* that can cause protein defects, immune reactions, and *oxidative stress*, and so contribute to the development of degenerative diseases like diabetes, arteriosclerosis, cardiovascular disease, vascular dementia, and Alzheimer's. The occurrence of oxidized methionine sharply increases when the body's antioxidative protection systems become weakened.

This sets the stage for the appearance of pathological misfoldings in proteins of the brain and nervous system that subsequently manifest as neurodegeneration. Instances are the *beta amyloids* in Alzheimer's, and prion diseases like Creutzfeldt-Jakob *(bovine spongiform encephalopathy)*. A similar pathomechanism is seen at work in the genesis of Parkinson's, Huntington's, and *amyotrophic lateral sclerosis* (also known as Lou Gehrig's disease).

In the ongoing discussions of *nitrosative stress* too little attention is being paid to a critical factor, namely the high intake of nitrogen compounds, *methionine*, and pro-oxidants *via* animal-based foods along with a concurrent deficit in antioxidative protective agents that would otherwise be easily available through a plant-based diet.

The excessive consumption of animal protein exerts an insidious but unrelenting coercion toward developing the above listed diseases. While a chronic overloading with nitrogen (ammonia) may merely lead to reversible brain malfunctions, oxidized *methionine* lies at the core of irreversible *protein-folding diseases* like Alzheimer's dementia.

According to the *World Health Organization*, the global incidence of dementia can be expected to triple between 2010 and 2050.

Red — and especially processed — meat drive up the risk of not only **Alzheimer's demen**tia, but also that of various heart conditions, cardiovascular disease, and diabetes.

Milk**'s** suitability assessment pertaining to adults is "better not" and for children "only in limited quantity". Cow's milk contains progesterone, insulin-like growth factors such as *IGF*-1, and several forms of estrogen. It stimulates their synthesis in humans, provokes a strong insulin action, and activates *anabolic*, procarcinogenic signal-pathways such as, for instance, *mTOR* in cells.

Regular milk consumption can raise the risk of prostate, breast, and ovarian cancers, and promote the occurrences of middle-ear infections, acne, allergies, autoimmune diseases, arteriosclerosis, and neurological disorders.

Whether or not milk products protect against osteoporosis is still being hotly debated.

For those suffering from *cachexia*, malnutrition, immunodeficiency, or heavy metals encumbrance, an increased intake of plant protein — possibly augmented by the *anabolical* regenerative effects of whey protein and omega-3 fatty acids — can be beneficial.

Women who might eat too restrictively on account of a concern with looks can easily incur a protein deficiency.

In light of the realities discussed a protein intake allowing for 10 – 20 percent of the daily energy supply is advisable. This should derive predominantly from plant sources. Unlike meat, cold cuts, eggs, or cheese plant-based foods have health-promoting properties.

5. How Much and What Type of Fat Is Healthy?

Germans on the average take in 36 percent of their energy in the form of fat — much more than the *DGE* recommends. The dominant proportion comes from animal-based foods (dairy products, meat) that boast a high content of saturated fats.

Saturated fats frequently act proinflammatory and promote the development of *metabolic syndrome*, *insulin resistance* in fat tissues, and *reactive oxygen species* (*ROS*). An oversupply of fat burdens the eliminatory channels (*beta-oxidation*) and can trigger *oxidative stress* as well as mitochondrial cytopathy. Subsequent to this, fat cannot be eliminated and must be centrally stored, which leads to abdominal adiposity and fatty liver.

Excessive consumption of even "healthy fats" such as omega-3 fatty acids can have devastating consequences **for one's health**.

The mostly one-sided endorsements of ocean-sourced omega-3 fatty acids often neglect to point out that pertinent research data is not as favorable as the effusive praise would lead one to expect. Among the many undesirable effects are elevation of *LDL*-cholesterol levels, impairment of both innate and acquired immunity among older people, increased proneness to bleeding, and (with long-term use) a possible rise in cardiovascular mortality of people suffering from cardiovascular conditions, particularly congestive heart failure and chronic angina pectoris. High *EPA* and *DHA* serum levels seem to, moreover, correlate with an increased risk of prostate cancer.

Polyunsaturated omega-3 fatty acids are particularly oxidation-prone and thus require targeted antioxidative protection.

Smokers and overweight people tend to suffer higher than normal *oxidative stress*. Cessation of smoking is indispensable for the former, and the latter must adopt a practicable method of healthy weight reduction.

The dietary proportion of saturated fatty acids should be as low as possible and constitute no more than 7 percent of the daily energy intake.

In cases of advanced cardiovascular disease (including coronary heart disease), diabetes, *metabolic syndrome*, fatty liver, or prostate cancer (without cachexia) fat intake should be reduced to 10 percent of total energy in accord with the outcomes of clinical studies discussed in Chapter 11.

A higher intake of omega-3 fatty acids and the added consumption of whey products can deliver positive results in cases of *cachexia*.

6. The Deeper Causes of *Metabolic Syndrome*

Adiposity, *metabolic syndrome*, and *diabetes mellitus* type 2 are becoming an ever greater challenge to our modern healthcare system. Nutrition is a critical factor in mitochondrial energy generation and conversely in the occurrence of all diseases of metabolism. The Western diet characterized by too much sugar, white flour, animal protein, and fat, produces a strong *insulinogenic* effect capable of initiating a vicious circle of *hyperinsulinemia* and *insulin resistance*, along with non-alcoholic fatty liver disease (*NAFLD*).

This kind of backward diet continues to be the norm despite well-documented findings that excessive consumption of not only sugar, but even more so saturated fatty acids and certain amino acids, provokes *insulin resistance* and has thus a causal bearing on the emergence of *metabolic syndrome* and *diabetes mellitus* type 2.

Constant stress, too, contributes to the development of *metabolic syndrome* by raising *cortisol* and *aldosterone* levels. All of this is substantiated by the outcomes of pertinent worldwide studies. The related data also explains why the Western diet consistently correlates with a distinct rise in the incidence of these diseases whenever a given country adopts it.

Subsisting on the Western diet lays the groundwork for incurring proinflammatory abdominal adiposity and *metabolic syndrome*. These, in turn, promote the development of cardiovascular disease, diabetes, dementia, and cancer. The earlier one begins with counteracting this, the better will be the chance of eventual success.

Insulin is a key player in the runup to full-fledged disease occurrence. It promotes *VLDL* (*very low-density lipoprotein*) synthesis within the liver, *hypertriglyceridemia* and *hypercholesterolemia*, elevation of blood pressure and heart rate *via* sympathicus activation, and — in combination with excessive fat intake — facilitates the formation of the highly procarcinogenic estrogens.

Insulin resistance operates in two arenas, peripheral (musculature) and central (liver). Progression of *central insulin resistance* goes hand-in-hand with fattening of the liver. Both fatty liver and *insulin resistance* are abetted by lack of movement and a high saturated fatty acids intake. Excessive alcohol use strains the liver even more.

Non-alcoholic fatty liver is contingent upon the mitochondrial dysfunction that results from habitual consumption of fat-rich foods, inadequate movement, and/or insufficient choline intake. Mitochondrial dysfunction leads to *oxidative* and *nitrosative stress*. Both bring on dysfunction in endothelial cells (the main cause of arteriosclerosis) and in the **body's** cells at large. It also brings about changes in *DNA*, lipids, and proteins, changes liable to culminate in cancer.

Intracellular energy deficit leads to a compensatory escalation of food consumption and promotes lipogenesis. Fructose (for instance as fructose-glucose syrup or saccharose in soft drinks) drives liver lipogenesis. With encroaching abdominal adiposity, free fatty acids in the blood increase in number and engender a proinflammatory metabolic status.

The numerous metabolic alterations resulting from the Western diet and lifestyle conspire to provoke common degenerative conditions like *diabetes mellitus* type 2, cardiovascular/circulatory diseases, neurodegeneration, and cancer.

The destructive alimentary quartet of meat, dairy, sugar, and salt is mirrored in the deadly quartet of abdominal adiposity, *insulin resistance*, *hypertonia*, and *dyslipidemia* that are the basis of *metabolic syndrome*. By contradistinction, the plant-based whole foods diet poor in fat improves the endogenous regulation of blood sugar and insulin and so acts as the vehicle for an optimal preventive approach.

7. Mineral Imbalance: Central Cofactor in the *Diseases of Civilization*

Western diet, perpetual stress, and movement deficit — all so common today — lead to an extremely skewed sodium/potassium ratio and are responsible for the accumulation of too many metabolic acidifiers. Increased intake of animal protein and consumption of convenience foods strongly impact the acid/alkaline household. The formation of inorganic acids from sulfate, phosphate, and chloride during breakdown of these foods is aided by a concurrent decrease in alkaline-forming anions (*e.g.* citrate normally supplied by a plant-based whole foods diet) which the body needs for manufacturing bicarbonate.

In addition, excessive use of table salt and insufficient intake of potassium lead to an unnatural sodium/potassium ratio that hampers the sodium/potassium pump in its function and alters intracellular ion proportions. **Western people's** departure from the natural human diet resulted in the reversal of sodium/potassium and chloride/bicarbonate ratios. The prevalent sodium/potassium ratio shifted by a factor of 100 – 200 from the one seen **in the Yanomami Indians' diet**. (Jansson, 1990).

While the Yanomami, who eat potassium-rich and sodium-poor, know neither *hypertonia* nor kidney failure, the renal performance in most people on today's Western diet tends to be halved with old age, if it does not become insufficient altogether. Kidneys are forced into using the strongly alkaline toxic ammonia as acid buffer in place of the natural dietary alkaline-forming potassium compounds. Among many negative repercussions of this stopgap measure are high blood pressure, *insulin resistance*, and osteoporosis.

Because the electrolyte and acid/alkaline households are inextricably intertwined they must be understood in their synergistic context. As a case in point, acute acidosis leads to *hyperkalemia* but chronic latent acidosis is bound to bring on a pronounced intracellular potassium/magnesium deficit and loss of calcium from the bones. The adrenal hormone *aldosterone* plays a pivotal role in maintaining the electrolyte and acid/alkaline households. Since the original diet of humans and other mammals was sodium-poor and potassium-rich, *aldosterone's* natural functions are reabsorption of sodium and water and elimination of superfluous potassium, acid equivalents, and nitrogen (as ammonia). The modern Western diet and lifestyle severely tax this mechanism nature has engineered.

Constant stress, overweight, *insulin resistance*, and the consumption of acid-forming food cause the *cortisol* and *aldosterone* levels to rise and subsequently activate the *mineralcorticoid receptor*. Even though the Western diet is sodium-rich and potassium-poor, both *aldosterone* and *cortisol* still become upregulated. Superfluous acid equivalents and nitrogen *do* get eliminated from our bodies, but at the same time further sodium chloride retention and elimination of potassium, magnesium, and calcium take place. Whereas high *aldosterone* levels are physiologically indicated when potassium levels are high and sodium levels low, the combination of raised *aldosterone* and sodium levels acts pathologically in the presence of relative potassium deficit. Effective sodium elimination is not possible in this way, which is why sodium and chloride get increasingly deposited in connective tissue, lymph fluid, and cells. The long-term repercussions can be dramatic: Hypertension, edematose conditions, *metabolic syndrome*, kidney diseases, *hypercalciuria*, heart arrhythmia, cardiovascular disease, collagen deposits, inflammatory conditions, heart and

blood-vessel fibrosis, muscular weakness, inflammation-proneness heightened *via NF-kappa* — all the way up to *nephrotic syndrome*.

The intracellular distribution of sodium and potassium gets determined through, among others, action of the *ATP*-dependent sodium/potassium pump. It restores the physiological ion concentration to its proper action potential, brings stray currents back into balance, and in that way affects both electrochemical gradients and cell-membrane potential. The number of available sodium/potassium pumps can be upregulated by means of physical training, thyroid hormone, insulin, glucocorticoids, potassium overload, or intake of certain polyphenols. Conversely, they are downregulated by the motely array of sedentary habits, potassium deficit, *hypoxia*, thyroid sub-function, heart failure, going hungry, diabetes, alcoholism, and muscular dystrophy. The consequences of intracellular potassium/magnesium deficiency and sodium/calcium overage are lowered membrane potential, *insulin resistance*, *hypertonia*, and cardiac arrhythmias.

The sodium/potassium pump is also capable of pumping ammonium ions in place of potassium. A potassium-poor diet thus presumably raises the intracellular nitrogen content, causes the vascular musculature to hypertrophy, and in that manner contributes to *hypertonia* solidification. Once these conditions have manifested, changing the alimentary sodium/potassium ratio will achieve little by itself. One can then restore normal blood pressure only by additionally undertaking the type of protein fast advocated by Wendt. High blood pressure — now the leading risk factor in global mortality — accounts for 13 percent of all fatalities. It arises from the interplay of a potassium-poor, sodium-rich diet, elevated *aldosterone* (and, in case of visceral adiposity, also insulin) levels, and stepped-up reabsorption of sodium chloride.

According to an *American Heart Association* publication (Appel et al., 2011) the negative repercussions of excessive sodium intake are not confined to high blood pressure. Heart, blood vessels, kidneys, stomach, and bones may all be damaged by too much salt, quite apart from its known detrimental effect upon blood pressure. Stroke and heart infarct are not exclusively a consequence of coagulation anomalies or blood vessels hardened by *hypertonia* and constricted by arteriosclerosis. An aberrant sodium/potassium ratio, too, provokes these conditions because sodium hardens blood vessels and erythrocytes while potassium renders them more elastic. An erythrocyte overburdened with sodium and calcium is hard and inflexible. In that state it can no longer easily traverse the capillaries. Any co-occurrence of hardened arterioles and hardened erythrocytes can easily trigger a fatal heart attack or stroke.

While the outdated daily allowance of 2 g potassium is still standard in Germany, both the *American Heart Association* and the *Food and Nutrition Board of the United States* recommend a daily minimum of 4.7 g and advise reducing sodium to maximally 1.5 g/day. *The World Health Organization* has also changed its guidelines to conform to the current state of research. The molar sodium/potassium ratio should be <1. Reducing sodium and simultaneous increasing potassium are requisite to achieving the proper balance. Table 6 below lists the negative effects of excessive sodium intake (particularly as sodium chloride) and the positive effects of a diet rich in potassium (especially alkaline-forming potassium compounds like potassium citrate from vegetables, herbs, and fruit).

Table 6: Impact of sodium and potassium upon physiological functions

Sodium, especially as sodium chloride	**Potassium**, especially alkaline-forming potassium compounds
Raises blood pressure	Normalizes blood pressure
Raises the risk of stroke	Lowers the risk of stroke
Damages the heart (heart insufficiency, fibrosis)	Normalizes heart rhythm
Provokes *oxidative* and *nitrosative* stress *via* activation of *NADPH*-oxidase and superoxide radical formation	Eases oxidative and nitrosative stress by inhibiting *NADPH*-oxidase und superoxide radical formation
Rigidifies the endothelium due to lessened *No* synthase (→ endothelial dysfunction)	Softens the endothelium by means of normal *NO* synthase
Promotes the formation of kidney stones	Protects the kidneys and lowers renal ammonia formation
Promotes mild metabolic acidosis	Balances the acid/alkaline household
Provokes fibrosis of heart, kidneys, and circulatory vessels (*aldosterone* dependent)	
Worsens age-dependent reduction of cognitive performance	Lessens age-dependent reduction of cognitive performance
Raises the risk of osteoporosis	Reduces calcium loss from the bones and renal calcium elimination
Inhibits sodium/potassium pump activity	Increases sodium/potassium pump activity
Lowers cell-membrane potential and intracellular magnesium; raises intracellular sodium and calcium	Heightens cell-membrane potential; lowers intracellular calcium
Raised intracellular sodium and lowered membrane potential are procarcinogenic.	Normal intracellular potassium and membrane potential are anticarcinogenic.
Provokes *insulin resistance*	Improves *insulin sensitivity*
Provokes the development of edema in cells and connective tissue	Promotes diuresis
Gets deposited in connective tissue; furthers lymphangiogenesis (*via VEGF*-C), inflammatory processes, and possibly metastasis	Furthers sodium elimination and thwarts its depositing in connective tissue
Provokes autoimmune diseases	
Raises the risk of stomach cancer	

8. Acid/Alkaline Imbalance: Cofactor in *Diseases of Civilization*

Everyone today cites the acid/alkaline household when the subject of overacidification comes up. For the most part, orthodox physicians still consider overacidification a myth because viewing the extensive scientific documentation was not part of their curriculum. They equate the concept of overacidification with *acidosis*, regarded as a relatively rare condition. They inadvertently use *acidosis*, when, in fact, they mean *acidemia*, low blood pH. Naturopaths, by contrast, apply the word *acidosis* in its correct context.

In medicine, the suffix "*osis*" signifies a pathological change in condition, such as arthrosis or collagenosis. Blood degradations are more properly identified by the use of "*emia*". Rightly understood, *acidosis* thus means a state of being overburdened with acids. Both intracellular space and extracellular matrix can be so affected. The greatest accumulation of acids occurs in the latter.

While it is relatively simple to clear up linguistic inconsistencies, the subject of acidity is in itself quite complex and, at first glance, frequently appears to harbor contradictions. The intake of citric or lactic acid, for instance, is said to be healthy and alkalizing. Similarly, the short-chain fatty acids such as *butyric acid*, *acetic acid*, and *propionic acid* that the boarders in our colon produce do not acidify but promote health. Meat, cheese, and quark (*fromage frais*, cottage cheese), on the other hand, "make sour" even though they do not in the least taste sour to the tongue.

Naturopathy frequently observes correlations and phenomena in a correct manner but just as frequently advances erroneous explanatory models of their causes, and of the biochemical processes underlying them. Acids are, in fact, not the troublemakers. Athletes produce so much lactic acid that their blood really does get overacidic. Yet, this does not harm them but is in a certain sense even healthy.

It is the exceptionally alkaline ammonia and the anionic binding partners (sulfate from the breakdown of sulfur-containing amino acids, chloride and phosphorus compounds) that, together with protons, will form inorganic acids. These compounds are both highly reactive as well as aggressive.

All these substances are vital to the organism in the right quantity but potentially harmful when, on a constant basis, more of them is taken in than eliminated — thus, especially, when with advancing age the buffering reserves become depleted and renal function gets increasingly diminished.

Renal failure is a significant component in the rise of our *diseases of civilization* and closely linked with a salt and protein-rich, relatively potassium-poor diet. This problem is already recognized in the case of strictly carnivorous mammals. One of the primary cause of death in cats is kidney failure. One of the chief reason for this phenomenon is that with a protein-rich, potassium-poor diet, the kidneys use ammoniac as a buffer against the acid load that must be eliminated. The highly toxic ammoniac damages, however, not just the kidneys but other tissues as well. These effects wreak destruction not over the course of months or years, but only after decades. That is why orthodox medicine finds it hard to recognize, let alone acknowledge the causalities, even though these are now well-documented.

Long-term consequences of latent *acidosis* are: Reduction of renal function all the way up

to renal insufficiency, kidney stones, muscle loss, bone demineralization, ion deviations and the connected reduction in membrane potential (with increased excitability and cell proliferation), raised pain sensitivity *via* greater excitability of nociceptors, *hypertonia*, an increased proneness to sustain stroke or heart attack, a proinflammatory milieu, and loss of connective tissue elasticity and function. Chronic metabolic *acidosis* and a sodium-rich, potassium-poor diet can, moreover, diminish intelligence and promote dementia.

The acid/alkaline household is inseparably connected with the mineral household. Both interact in complex ways. The sodium/proton antiporter is the most important channel for intracellular deacidification. With an insufficient supply of the alkaline-forming potassium compounds, the cells experience an overload of sodium and calcium and a simultaneous deficiency in potassium and magnesium. Among the consequences are cellular edemas, hypertonus, stepped-up cytokinesis, as well as a reduced resting membrane potential and concomitant excitability that can lead as far as cardiac arrhythmias.

Many studies report that reduced activity of the sodium/potassium pump and increased activity of the sodium/proton antiporter are typical for cancer patients. The higher the intracellular sodium concentration and the lower the potassium concentration, the more aggressive tumors will be. During the last century, the German physician Max Gerson used a sodium-poor and highly potassium-rich diet in his therapeutic approach to cancer. As it happens, normalization of the sodium/potassium concentration and activation of the sodium/potassium pump can demonstrably be attained through physical activity, thyroid hormone, potassium overloading, and polyphenols. This corresponded in essentials with **Gerson's empirical approach (plenty of raw food, potassium and iodine supplementation;** (*cave* — contraindications).

Chronic *acidosis* of the organism, including overacidification of the tumor niche, not only favors metastasis but is an important causative factor of carcinogenesis in its own right. Reduced sodium/potassium pump activity and overacidification reduce the membrane potential voltage. That is a decisive step in cancer development since membrane potential regulates both cell growth and differentiation.

While sodium bicarbonate effectively deacidifies, it likely aggravates the *anabolic* action of intracellular alkalinization. Especially in the case of cancer, its use is thus not indicated. Within therapeutic application, the activation of the sodium/potassium pump, along with consumption of polyphenols (*e.g.* in form of well-tolerated raw plant foods and, if needed, supplements) are center front — with proper regard for contraindications, of course.

In old age, a mild case of chronic *acidosis* may reduce the **blood's** bicarbonate buffer and, in interaction with impaired circulation, destine erythrocytes for an *acidosis*-induced state of rigidity. A local perfusion problem and the resultant local tissue-*acidosis* lead cause the erythrocytes to swell and rigidify. This portents the end of microcirculation and frequently a heart infarct or stroke.

These coherences show that particularly older people, the overweight, diabetics, postmenopausal women, athletes, and the permanently stressed should take care to obtain a sufficient supply of bases and minerals. Vegetables, herbs, and fruit are rich in potassium, magnesium, and calcium. They also act metabolically alkalizing. Further advantages are provided by physical movement and a healthy intestinal milieu. Of equal importance is a

curtailing of animal protein which, due to its abundance of *methionine* and very well absorbed phosphate, is clearly more acid forming than plant protein.

This rather simple introduction notwithstanding, readers cannot be spared the necessity of gaining a deeper comprehension of the prevailing connections and of the acid/alkaline physiology. Following, this is being kept to but the most essential and to what is relevant for the practical application in everyday life.

9. The Protective Action of Vegetables, Herbs, and Fruit

Herbs, vegetables, and fruit have a lesser energy-density and at the same time contain a great quantity of water and also numerous valuable components such as vitamins, alkaline-forming compounds of potassium and other minerals, fiber, as well as phytonutrients. Among these latter secondary plant substances are polyphenols (the largest group), carotenoids, phytosterols, glucoseinolates, and sulfates. They offer manifold health-promoting benefits and can deliver, to mention just a few, anticarcinogenic, immunomodulating, anti-inflammatory, and cholesterol-lowering effects.

High intake of vegetables and fruit correlates with a reduced risk of chronic conditions such as coronary heart disease, stroke, *hypertonia*, and certain types of cancer. Vegetables and fruit can furthermore support weight reduction and protect against *diabetes mellitus* type 2. The risks of incurring eye diseases, osteoporosis, asthma, chronic obstructive pulmonary disease, rheumatoid arthritis, and dementia may possibly be lowered as well.

The soluble and insoluble fibers contained in plant-based foods lower blood cholesterol levels, promote efficient digestion, and protect against diverticulosis, colon cancer, cardiovascular diseases, *metabolic syndrome*, and diabetes. Fibers support a healthy, slightly acidic colon milieu, a sound colonic mucosa, and a well-functioning metabolism in general *via* their delivery of short-chained fatty acids like the anti-inflammatory butyrate.

Many phytonutrients are not antioxidants in the strict sense of the word. Polyphenols might be best described as *redox* modulators. The anticarcinogenic action of polyphenols derives from their prooxidative action in cancer cells, along with their salubrious effect in healthy cells which accrues from stimulation of endogenous antioxidative protection systems. Phytonutrients concurrently act as inflammation modulators.

The health benefits of plant-based food arise from the synergistic cooperation of nutritive compounds. It is for that reason that vitamins, minerals, trace minerals, and phytonutrients should be abundantly supplied through a predominantly plant-based diet.

The *DGE* recommends consuming five helpings of vegetables and fruit each day, but barely ten percent among Germans meet this. On account of modern dietary habits, a preference for industrially processed foods, and the practices of agri-business, a sufficient intake of vitamins, minerals, fiber, and phytonutrients is by no means assured. In instances of malnutrition or an otherwise faulty diet the use of dietary supplements may be indicated, provided that their proportions are modelled after their natural distribution within vegetables and fruit.

"The best meat is the flesh of fruit."

— Prof. Claus Leitzmann —

10. Diets that Are Dependent upon Animal-based Foods

Our diet is doubtlessly implicated in the rampant occurrence of cancer. That said, opinions about the correct anticancer diet are widely split. In the last few years, a protein-rich variant of the previously touted ketogenic diet was propagated as being both effective and scientifically documented. But a careful review of the state of research epidemiology and nutritional science warrants strong caution in that regard. Proof of efficacy for the ketogenic diet remains absent. The clinical studies conducted to date have a very short testing time and document the side effects of this extreme nutritional method.

The propagated protein and fat-rich diet is at odds with the gold standards held by nutritional science and medicine, with the conclusions and explicit recommendations of the *World Cancer Research Fund (WCRF)* and the *American Institute for Cancer Research (AICR)* based on the review of 500,000, interpretation of 22,100, and final assessment of 7,000 scientific publications, as well as with the recommendations of the *American Heart Association (AHA)*.

The high proportion of animal protein in the ketogenic diet serves cancer cells as a fuel and building material (glutaminolysis), thereby burdening metabolism and affecting it insulinogenically. The excessive quantities of fat breed adipocytes and cancer cells in like measure and can in the long run provoke *insulin resistance*.

New findings show that cancer cells exhibit intensified fat metabolism, heightened beta-oxidation, and increased fatty acids synthesis. These functional changes contribute to mitochondrial uncoupling and to the Warburg effect, thus rendering cancer cells particularly *antiapoptotic* — and resistant chemotherapy, to boot. As long as prostate or breast cancer patient is not encumbered by *cachexia*, a fat-rich diet is not sensible.

Cancer cells are known to supply themselves with glucose *via* overexpression of glucose transporters even when the human has already died from hypoglycemia. Strong carbohydrate restriction thus merely lowers the quality of life and additionally raises the risk of psychological and metabolic disturbances known to accompany extreme low-carb diets.

Preliminary evidence suggests that carbohydrate restriction may be indicated in cases of strongly glucose-fermenting, ultra-aggressive tumors. Dietary recommendations should, however, be formulated in keeping with the best nutritional science, and take into account the content of fiber, minerals, vitamins, and phytonutrients, as well as unhealthy components and insulin action of the recommended foods *(cf. food-insulin index)*. In that regard, non-starchy vegetables, nuts, legumes, berries, healthy fats, and plant protein sources should occupy first place. The *glycemic load*, the rapidity of carbohydrate surge in the blood, and the insulin effect should be the deciding criteria in making choices, not merely the specific carbohydrate proportion.

The concept of low-carb diets typically involves switching to animal-based foods that are poor in carbohydrates and rich in saturated fatty acids and protein. Animal-based foods do have a slight carbohydrate content and low *glycemic index* but contrary to their promise they can sometimes also trigger a steep insulin response and moreover promote *insulin resistance* due to their high content of saturated fatty acids and branched-chain amino

acids. In the case of overweight people who have previously fed themselves the classic fare of civilization, the typical low-carb diets show remarkable short-term weight reduction successes, usually without direct negative health repercussions, and can even effect improvements in blood values, but this is due to the initial rapid water loss accompanying carbs-starving.

Yet, long-term studies spanning more than 3 – 12 months are rarely to be found. Instead of positive results, extant longtime studies have documented increased cancer and cardiovascular mortality. Responsible for that is the excessive consumption of animal-based foods (that raise the risk of coronary heart disease and diabetes as well). Additional health-damaging long-term consequences include impairment of the energy and acid/alkaline balances, overburdening of kidneys and liver, joint complaints, a proinflammatory metabolic state, *metabolic syndrome*, psychological imbalance, and inadequate resiliency.

By contrast, a plant-based low-carb diet is able to lower the risk of cardiovascular disease and diabetes. In the comparison of various weight-reduction diets, the plant-based Ornish diet proved to be more efficacious than low-carb diets using animal-based foods — even when compliance was below par.

The official guidelines for diabetics call for a protein supply of 10 – 20 percent of energy intake, along with restrictions in the consumption of cholesterol, saturated fatty acids, and transfatty acids, all of whom are mainly found in animal-based and processed foods.

11. Plant-based Nutrition Lowers Morbidity and Mortality

A plant-based diet combined with a health-conscious lifestyle can significantly lower the mortality risks of cardiovascular disease, cancer, reactive airway disease, or gastrointestinal disorders. Vegans and vegetarians exhibit lower cholesterol values, less body fat, and less *oxidative stress*. Still, a plant-based diet is hardly commonplace in Western countries. Western men typically eat much meat and while women eat less of it their consumption of dairy products is correspondingly high. Dairy products supply just as much animal protein, saturated fat, and cholesterol — all critical factors implicated in the development of *diseases of civilization*.

Since as far back as the 1980s, the American physician Caldwell Esselstyn has been examining the impact of a plant-based diet poor in fat upon coronary heart disease and was able to show excellent lasting successes. Aortic stenosis was seen to permanently regress in patients with advanced *CHD*. Dean Ornish, too, treats *CHD* with a fat-poor plant diet, movement, and relaxation so successfully that his program is paid for by American insurance companies. Ornish documented regression of coronary sclerosis in well-recognized clinical studies. His program proved to be successful with prostate cancer as well.

Clinical studies into the abstention from animal-based foods found distinct reductions in complaints connected with rheumatic diseases and fibromyalgia. It has been suggested that a diet free of animal-based foods may also inhibit the development of autoimmune diseases. The intestinal flora appears to play an important role in that regard. Clinical studies demonstrated, moreover, that good compliance with a strictly plant-based fat-poor diet supports weight reduction. In diabetics it permanently reduced body weight, levels of blood sugar (*HbA1C* test) and *LDL* cholesterol, as well as the need for medications.

The vegetarian and vegan diets were shown to improve rather than diminish performance capacity in the context of competitive sports. Athletes and players on a plant-based diet have achieved top ranks in competition and showed greater strength, resilience, and endurance in comparison studies involving mixed eaters.

A vegetarian diet also seems to positively affect psychological disposition and reduce the occurrence of stress, anxiety, and depression.

Finally, the benefits of a plant-based diet are not confined to one's own health. It is also better for climate and environment, spares animals much suffering, and is eminently able to ease the global hunger crisis.

A plant-based diet's great significance for health was extensively discussed in Chapter 2. By now the advantages of vegetarian nutrition have become well known to scientific circles in Germany. A study of vegetarians conducted by the *German Cancer Research Center* in Heidelberg *(DKFZ)* between the years 1978 and 1999 found that a vegetarian diet clearly affects the mortality rate when practiced in the frame of an overall health-conscious lifestyle. The relevant age-specific mortality rates were nearly halved among men and reduced by one third among women.

The risk of dying from cardiovascular disease was significantly lower for vegetarians, as were their mortality risks of cancer, airway disease, and gastrointestinal diseases (Chang-Claude *et*

al., 1992, 1993, and 2005). Not only the subjects' vegetarian diet but also their generally more health-conscious lifestyle contributed to these remarkable results. The study included vegans (60 participants) who consumed no animal-derived foods at all, ovo-lacto vegetarians (1,165 participants) who shunned meat but ate eggs and dairy products, and moderate vegetarians (679 participants) who occasionally ate small amounts of meat or fish.

Smoking, high consumption of alcohol, and overweight notably raised mortality in the study population, whereas physical activity acted preventively *vis-a-vis* all causes of death.

The *Gießener Vegetarierstudie (Gießen Vegetarians Study)* headed by Prof. Claus Leitzmann (1988) and encompassing 1,250 subjects additionally measured for blood values. The great disparity among cholesterol levels that was found to exist between vegetarians and vegans showed just how strongly animal products like eggs and dairy affect cholesterol levels even in the absence of meat consumption. While the average total cholesterol value was 220 mg/dl among vegetarians, it measured merely 144 mg/dl among vegans. Vegan women's 2.0 and vegan men's 2.1*LDL/HDL* index fell well within the favorable range (*cf.* Chapter 2).

Vegetarians also represented 34 percent of the 44,561 participants in the *EPIC Oxford Study*. These vegetarians showed a 32 percent lower risk of coronary heart disease compared with non-vegetarians. Adjustment for *BMI* weakened the result only negligibly. Gender, age, *BMI*, smoking status, or the presence of risk factors for ischemic heart diseases did not materially affect the study's results. In addition, the vegetarian subjects' weight, total cholesterol value, and blood pressure were all lower as well (Crowe *et al*., 2013).

A long-term study in Korea (Kim *et al*., 2012) reported that those participants who had been vegetarians for at least 15 years showed lower values not only with regard to cholesterol levels but also to oxidative status and body fat.

Epidemiological studies documented that the risk of dying from a heart condition or cancer of the colon, breasts, prostate, and kidneys rises proportionally with the consumption of meat (*cf.* Chapter 4). Such classic carcinogens as the heterocyclic amines and polycyclic aromatic hydrocarbons — all generated during frying, braising, or grilling of meat — undoubtedly contribute to that significant risk hike (Giovannucci *et al*., 1993).

The insulin effect, *catabolic* end products of protein metabolism (homocysteine, ammonia, reactive oxygen species), and high saturated fatty acids content of animal-based foods play even greater critical roles in the development of the *diseases of civilization*.

For generations, a predominantly plant-based diet could hardly be found in our part of the world. In that regard the *Nationale Verzehrsstudie II (National Consumption Study II)* declared that men prefer meat products as their main source of protein whereas women prefer dairy products, but that both take in approximately 30 – 50% more protein (chiefly from animal sources) than humans require and nutritional scientists recommend (MRI, 2008a).

In parallel with the study results discussed above, steadily increasing consumption of animal-based foods is leading to steep rises in cardiovascular disease and diabetes in Asia too. Korea is one of the countries where the use of animal-based foods has only significantly risen during the last century. While animal-based foods had constituted merely 3% of Koreans' diet in 1969 their proportion had grown to 10.2% by 2007. According to Lim and colleagues, the prevalence of abdominal adiposity rose to 41.3% in South Korea in 2007, taking into consideration the more strict Asian standards pertaining to abdominal girth (men >90 cm, women >80 cm).

Overweight cannot be solely attributed to the consumption of animal-based foods because it also reflects the adoption of a Western lifestyle that includes a higher intake of sugar and a decrease in movement (Kim et *al.*, 2012).

— For further reading I recommend the excellent book *Vegetarische Ernährung* by Prof. Claus Leitzmann and Dr. Markus Keller (available in German only).

12. *Dr. Jacob's Way* toward Lasting Health

Dr. Jacob's Way comprises a lifestyle and diet that produce lasting health and counteract the *diseases of civilization*. The recommendations principally focus on nutrition because what we eat becomes part of us and so doubtlessly plays a decisive role in shaping our health. In this purview the temptation to indulge in unhealthy behavior is exceptionally persuasive.

Dr. Jacob's dietary plan provides a means for linking scientific insights into healthy nutrition with the corresponding concept of practical application. As Prof. Leitzmann has once astutely observed, *without actions all visions are bound to remain mere illusions.*

12.1 We Eat Ourselves Sick instead of Relishing What Is Good

While enduring health does require giving up some things the gains it returns are far greater. Enjoyable eating is in the forefront with Dr. Jacob's dietary plan. Only what tastes good and can be integrated into everyday life will likely be made a permanent part of one's practice.

The optimal dietary plan presented herein unifies the world's most successful clinical and epidemiological concepts of nutrition, giving particular consideration to the respective balances of insulin, pH, and *redox*. Following the recommendations will allow you to effectively and permanently optimize your body weight, abdominal girth, and metabolism. Along the way, your values of triglycerides, cholesterol, blood sugar, insulin, and blood pressure will all become normalized.

The plan's premise is to reduce the intake of caloric energy and sodium on one hand and to simultaneously increase the consumption of potassium and other plant-sourced micronutrients on the other. Its implementation revolves around the nutritional treatment of *metabolic syndrome* and its typically antecedent accumulations of abdominal and liver fat, right down to fatty liver degeneration, *insulin resistance*, and chronically elevated levels of both insulin and blood sugar.

The deadly quartet consisting of excessive abdominal fat formation, *insulin resistance*, metabolic disorders, and high blood pressure corresponds with the unhealthy nutrition based on the four prime components of our "civilized" diet — meat, dairy, sugar, and salt.

Metabolic phenomena may be understood only partly, if not falsely altogether, by looking merely at stray studies. Such insular studies can only furnish us with still pictures of a superdynamic system that, over years and decades, progressively changes under the influence of our diet, engagement in movement, and various environmental factors.

To thus concentrate solely on particular aspects of this multi-layered system is bound to result in the perception of numerous apparent contradictions.

Any self-declared expert can easily support a largely one-dimensional outlook with a plethora of isolated studies and then proceed to market it as scientifically substantiated information.

It is not at all uncommon that unbalanced dietetic recommendations built from such conflicting conceptions earn the weight-reduction seeker nothing but confusion. S/he subsequently stumbles from one lopsided fad diet to another, all the while getting fatter and more morbid. Whatever quintessence then is to emerge from the present intensive inquiry into the extant

worldwide epidemiology, physiology, and pathology of nutrition, and the over 1,400 studies cited (excluding many more that were additionally examined)? This book's explicit objective is to render a description of the forest rather than just numbering its trees. What will serve this goal best is to compare principles since it so happens that we find processes in our environment quite similar to those occurring within our bodies.

Foods dense in energy but sparse in micronutrients overtax our metabolic pathways.

Our metabolic pathways have been designed for processing natural, low-salt foods whose nutrients will — after they have been digested — appear in the blood stream in a gradual manner. In that system engineered by nature micronutrients such as potassium and other minerals, vitamins, phytochemicals, and fibers cooperatively interact with one another to regulate digestion and metabolism.

Packaged ready-to-eat foods are modern industrial products alarmingly high in calories and sodium but far too low in potassium and micronutrients.

Concentrated fast-absorbed nutrients nowadays crowd the body's nutrient-transportation highways, our circulatory vessels. Aggressive sport cars (fast carbohydrates and proteins) and slow convoys of tractor trailers (lipids) cannot but obstruct each other in their progression. The natural health-supporting traffic flow to which our human metabolism was accustomed for millions of years is now out of the question.

Particularly today's high intake of fat inhibits the enzymes and clogs the metabolic channels needed for carbohydrates and consequently causes glucose and various amino acids to back up. This mud-like mass — evidenced by elevated concentrations in individuals who carry surplus abdominal fat — is a telltale indicator of latent diabetic disease.

Ironically, crawling tractor trailers (fats) create the same mayhem on our interstates where they keep the passenger vehicles (proteins and carbohydrates) piled in bumper-to-bumper immobility. This macronutrients gridlock occurs because our metabolic pathways were never designed to accommodate such a high traffic volume.

The ultra-heavy meals typical of the modern diet foster endothelial dysfunction with reduced *nitric oxide* formation and degrade the blood's circulation through the vascular system. That cannot possibly energize. It can only make drowsy.

Metabolic activity is additionally hampered by a deficient supply of micronutrients needed for the effective processing of macronutrients.

For instance, *insulin resistance* follows an inadequate intake of potassium and magnesium that would otherwise be abundantly available through the plant-based diet of minimally processed foods. So, the nutrients backup aggravated by a micronutrients deficit increasingly overburdens metabolism and makes it ever more prone to disruption.

Frequent accidents from aggressive driving (comparable to *oxidative* and *nitrosative stress*) and ever mounting road damages along the metabolic highways will gradually bring about metabolic paralysis. This phenomenon is personally familiar to many who until the age of forty had been able to consume sizable numbers of calories without weight gain and are getting steadily fatter ever since despite curbed calories and stepped-up exercise. Whenever metabolic waste is not eliminated but adheres to the blood vessels' walls our life arteries necessarily become narrower and narrower.

Endothelial dysfunction and arteriosclerosis will impede the delivery of oxygen and nutrients and in that way slow down the flow of life. Although these easily seen vascular damages appear to be prominent enough, related but less conspicuous types of injuries to the cells and their mitochondria are no less problematic.

The solution employed by low-carb diets is to lower the number of (carbohydrate) passenger vehicles and then attempt to drive around the traffic jam.

At their most extreme such severely carbohydrate-poor diets choose a bioevolutionary back road or, more precisely, an emergency exit — *ketosis*. *Ketosis* is classic hunger metabolism. The relief this maneuver provides is, unfortunately, only short-lived.

Cranking up the supply of animal protein and fat eventually just leads to more severe road damages. In the long run, these make life not only harder but also tragically shorter.

The more prudent switching to a varied plant-based diet offers a physiologically appropriate and at the same time surprisingly palatable solution eminently capable of untangling the out-of-control metabolic traffic situation.

The uncomfortable bottleneck that we constantly have to endure on our freeways during holiday traveling is analogous to the very serious problems faced by today's metabolism.

We are simply consuming too many nutrients, and within too short a period of time.

Whenever our metabolism's optimal threshold gets crossed, the different metabolic processes cannot happen synergistically any longer as nature intended it. Instead, they are bound to obstruct one another.

This is also seen in stress research (*cf.* Figure 11). An optimal level of stress lies in the middle region.

Insufficient stress will not permit the body to learn to deal with it and thus weakens its performance capacity.

An insufficient degree of movement may, likewise, contribute to the occurrence of osteoporosis.

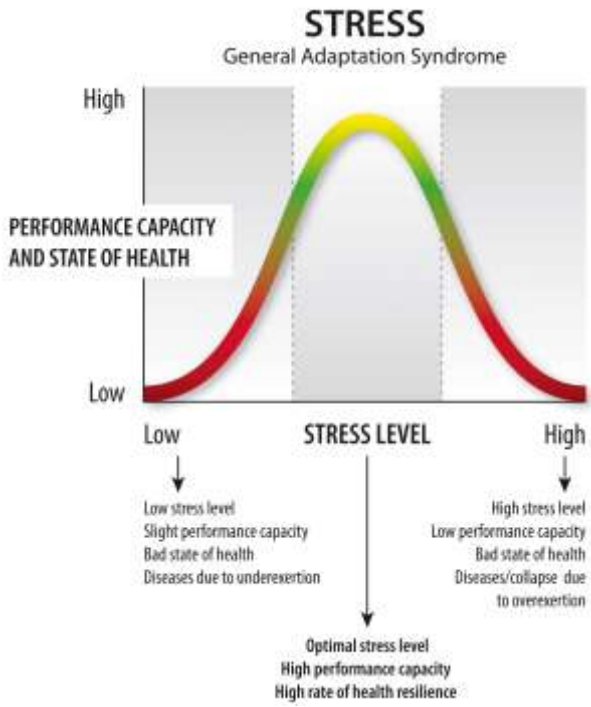


Figure 11: The *General Adaptation Syndrome* according to Hans Selye

At the opposite end of the spectrum, persons who constantly experience severe stress will become more susceptible to incurring disease and will likely also more often get involved in accidents.

Similar to the manner in which perpetual multitasking without any intervening rest period overstresses and burns out the human psyche, the incessant overfeeding with fast-uptake

nutrients causes jammed metabolic pathways, *oxidative* and *nitrosative stress*, and ultimate burn-out of the cells' power plants.

Metabolism is less an exchange of materials than a flow of equilibrium.

Human entities feel happiest when they are living "in the flow". Very similar to that, the well-functioning metabolism is characterized by a harmonic-flow equilibrium that is not too fast and not too slow.

Decisive in that regard are the quantity, energy-density, and frequency of food consumption, along with the absorbability-speed of the consumed nutrients. Our metabolism has only a fixed processing capacity within any given period of time.

Whereas a natural, predominantly plant-based diet compares to a nurturing country rain, processed foods heavy on meat, milk, sugar, and salt act like a nutrients-tsunami that devastates rather than replenishes the ground, our delicate body tissues.

That is, by the way, a good illustration for how fruit is healthful when eaten in moderation while the massive influx of isolated fructose and sucrose abundantly present in soft drinks is likely to eventually foster fatty liver.

Given that premise, the exact way in which metabolism gets overburdened does not matter. Macronutrients have to be in balanced proportion with the supply of oxygen and micronutrients essential to facilitating metabolic processes and meeting energy requirements.

Too many "empty" *i.e.* micronutrients-poor, fast-absorbing, and energy-dense carbohydrates such as sugar and refined flour, along with the overabundance of saturated fatty acids and animal protein delivered by meat and dairy products cause both *hyperinsulinemia* as well as *insulin resistance*.

The worst problems are the combinations corresponding with our Western dietary patterns.

Consider, for example, that the entire wheat kernel will supply sufficient magnesium and potassium, but white flower up to 99% less magnesium.

Other factors are at work as well.

Magnesium and potassium deficits are particularly pernicious promoters of *insulin resistance* because cells require these elements for efficient glucose metabolism.

Deep abdominal breathing can secure us a plentiful supply of oxygen and effectively discard carbon dioxide, but stressed, superficial breathing (all-too widespread today) supports these tasks too inadequately for the effective completion of metabolic burning processes.

That has to inevitably promote the retention of residues in the form of accumulated fat and sugar-protein complexes *(AGEs)* worsened by additional structural damages to cells, mitochondria, and enzymes of the respiratory chain.

The natural rhythm is to fully digest before eating again.

Ayurveda recommends eating only in the presence of real hunger and only after the previous meal has been thoroughly digested. It holds forth that bad digestion (*Agni* = fire) produces residual wastes (*malas* = contaminants) and toxic agents (*ama* = undigested food particles). Together, these clog up the body and hamper metabolism.

Our inordinate food and energy intake is not the only problem.

In addition to overloading our system with superfluous macronutrients and caloric energy we also no longer allow for the necessary pauses between meals.

Paralleling the fate of people who succumb to burnout syndrome from the demands for ever greater performance and speedier operations our metabolism is hit with the impossible order to constantly accomplish more and more in less and less time.

No longer just three meals a day but now an additional ten (energy-dense) snacks, bottles of soft drinks, and mugs of latte macchiato keep insulin and nutrient levels chronically high. Yes, the cells' power plants are mercilessly commanded to keep burning and delivering energy.

The mitochondria submissively do maximize output, but in the process they also incur progressively more *oxidative* and *nitrosative stress* wreaking damages upon the structures in the interior of the cells.

Insulin resistance

It is thus not the least bit surprising that cells react by engaging their emergency break, *insulin resistance*, to stem the avalanche of saturated fatty acids, amino acids, and glucose. By resorting to such a drastic measure the cells seek to protect themselves against being further inundated with superfluous nutrients.

The cells' essentially healthy self-protective *insulin resistance* is then, unfortunately, followed by the countermeasure of stepped-up insulin production meant to force the backed-up glucose into the cell against their desperate protests, a countermeasure that eventually culminates in *permanent hyperinsulinemia*. This radical stabilization does work for a while, but it ultimately fails with the total collapse of insulin manufacture in the pancreas.

From mitochondrial dysfunction develop mitochondrial cytopathies.

Mitochondrial dysfunction strikes endothelial cells as well. The result is that a now regularly occurring endothelial dysfunction advances the development of arteriosclerosis.

In keeping with the adage that *whoever uses much will get quickly used up* our bloated diet staggeringly quickens the natural aging process.

Whereas in younger years the consumption of 3,000 calories had no fattening effects, now merely glancing at a piece of cake is enough to pile on the weight.

Such a condition is best prevented altogether. Although there are methods for regenerating even after the problem has taken hold these are both difficult and require considerable time.

Assimilated food energy gets burned as long as someone keeps moving a great deal but will turn into surplus fat if physical activity is inadequate. A case in point is the high-performance athlete who typically encounters massive weight gain after the athletic career has ended.

For that reason a dietary concept can only remain valid and effective if it is based on normal rather than on maximal oxidation of nutrients.

A good thing to keep in mind is that it is the consumed quantity that determines whether a food will be good or bad **for one's health**.

On principle, no micro or macronutrient is in and of itself either healthy or unhealthy.

Any given food's positive or negative impact upon our health always depends primarily upon the quantity in which that food is consumed. Every vitally important substance can become unhealthy when taken in excess.

What is the proper diet for modern humans?

Nostalgics for the Stone Age advocate returning to that extreme dietary form as a practical solution to our modern health problems. But reenacting the problems of then (hunger due to a shortage of food) is not a viable solution for today.

Since in our day demands upon the brain and nervous system are distinctly higher than those upon muscles we require the type of nutrition that offers us a combination of high micronutrient-density and low energy-density.

The alkaline-forming compounds of potassium, magnesium, and calcium — coupled with a low intake of sodium chloride — are critically important in order for us chronically stressed humans of modern civilization to maintain optimal nervous system function, heart strength, and blood pressure.

In that connection, by the way, the natural magnesium/calcium ratio as found in vegetables and fruit is 2:3 and not the 1:10 found in milk.

Prior to the advent of agriculture our ancestors daily consumed merely about 1 gram of sodium but a full complement of 10 grams of potassium. The natural potassium/sodium ratio has been skewed between 12 and 50-fold in favor of sodium, depending upon what specific variant of the modern diet is taken under examination. That unfortunate shift has made humans the only mammals suffering from high blood pressure.

Too much salt will not only drive up blood pressure but also promote *insulin resistance* and carcinogenesis and raise the risk of strokes and heart attacks.

Germans pride themselves on building the world's best cars and often love and care for them more than for their bodies. Hence this analogy: As fuels, gasoline or diesel correspond with nutritional energy, but without a suitably high-grade engine oil (= micronutrients) one's driving pleasure will be of short duration.

Eating food filled with empty-calories but deficient in micronutrients is akin to driving a car without supplying it with the needed engine oil.

By the same token, consuming more calories than can be burned through physical exertion is like injecting too much fuel into a car's combustion chamber. The fuel-air mix can then no longer be efficiently burned and will leave corroding and gumming-up residues.

Minimally processed plant-based foods provide many micronutrients important for cellular operations but little energy and fewer noxious substances. The opposite is the case with processed and animal-based foods. These overtax metabolism.

Dr. Jacob's dietary plan strongly emphasizes food featuring low energy and high micronutrient-density. Such favorable ratios can be best achieved with a plant-based diet of minimally processed foods. It permits the physiologically correct influx of macronutrients together with their naturally occurring micronutrients. This optimal diet facilitates normalizing and optimizing the balances of insulin, *redox*, and pH respectively and thus supports all metabolic events.

Using our previous analogy, that would correspond with cruising in a relaxed way instead of battling mayhem on the interstate. Its import for our health is that we will with great probability attain a high old age in good health.

Metabolic syndrome can, by the way, be reversed and many additional lasting health benefits achieved by following the recommendations in *Dr. Jacob's Way*.

Dietary patterns developed as adaptations to environmental conditions.

Humans lived under widely divergent climatic conditions throughout history and ate whatever foods were available to them. Both normal as well as extreme dietary patterns developed in accord with climatic and environmental variances. A *ketogenic* diet rich in animal-based protein and fat but poor in carbohydrates is metabolically possible, but no population on earth has ever voluntarily fed itself on such an extreme diet unless it were for lack of a better alternative. That was the case with humans who lived during the plant-deprived Ice Age and is still the case with the Inuit of the Arctic Circle. True, their involuntarily restricted diet did not cause them to be overweight, but unlike diets emphasizing plant-based foods it also produced no longevity phenomena.

Modern approaches often pursue a monocausal, symptom-focused methodology.

Quick successes rank up front in that approach. Instead of remedying causes, symptoms get treated. Side effects and reactions are intentionally marginalized. The objective is not usually to live by nature's laws but to outwit her by using whatever secret has been newly pried from her grasp. That short-sighted methodology may work for the moment, but it cannot produce good results in the long run.

Both German and Asian original diets were rich in carbohydrates.

They also included little animal protein, fat, and sugar. At the same time only natural foods and no industrial products were consumed. Carbohydrate sources were whole foods that also provided micronutrients essential to optimal metabolic functioning. Modern Germans consume fewer carbohydrates, and those are for the most part rapidly absorbable ones like sugar (50% of carbohydrate intake) and white flour. These supply too much short-term energy and too few micronutrients to boot.

The consumption of animal fat in particular has tripled in Germany since the end of the 18th Century and in many Asian countries during the last decades. The use of sugar grew fourfold and that of animal protein about fivefold. The combination of too many saturated fatty acids, industrial sugar, excess animal protein, and movement deficit is primarily responsible for the occurrence of fatty liver, disorders of fat metabolism, and *insulin resistance* — all of which were unknown in the past. Studies prove that much animal protein does not slim but fattens. High levels of amino acids go hand in hand with surplus abdominal fat and serve as reliable indicator of future diabetes.

Pronounced longevity phenomena are well documented for Asia, and Germany's original rural diet, too, facilitated long life for those who overcame the obstacles of high infant mortality and infectious diseases. *Diseases of civilization* were next to unknown to our ancestors, and when they did occur they affected almost exclusively the moneyed upper class.

The problem of fat overage

In the therapeutic arena, dietary interventions pioneered by Esselstyn and Ornish respectively present very good clinical successes in cases of coronary heart disease. Both of these therapeutic diets bank on foods that are rich in carbohydrates and exceptionally poor in fat, permitting only 10% of the daily energy intake as fat. Interestingly, this recommended quantity parallels the original fat consumption in Germany and Asia. Today, however, only few people are in a position to adhere to such a diet. But that is also not necessary as long as metabolism functions well and no excess abdominal fat has as yet accumulated.

But in the cases of cardiovascular disease, prostate cancer, or breast cancer one should markedly reduce fat intake and vigorously strive for normal weight.

Today, surplus fat gets no longer broken down efficiently because the diet of civilization already meets all our energy requirements with its saturated fatty acids and fast carbohydrates.

On the contrary, saturated fatty acids are yet additionally generated from excess fructose and glucose. A blood increase of free fatty acids is known to be among the chief causes of *insulin resistance* and thus of diabetes. (Surplus fatty acids and carbohydrates are also being used for stepped-up cholesterol synthesis.) The liver restructures an overabundance of fast carbohydrates into saturated fatty acids and cholesterol. The subsequent fattening of the liver will eventually lead to *insulin resistance*.

The dangerous combination of sugar, animal protein, and salt

Isolated, rapidly absorbed sugars such as, for example, household sugar and fructose-glucose syrup are especially adverse in this regard because their fructose contents are metabolized exclusively in the liver. Whenever these sugars are combined with animal protein as is typically the case in the instance of the popular milk shake, it is followed by extraordinarily high insulin releases that cause fat to build up while simultaneously inhibiting its reduction.

Industrial sugar, meat, and milk products constitute the fattening trio. These are at their most destructive when consumed together, as is often the case in our classic diet of civilization. Through the addition of excessive table salt that fattening trio then readily turns into the deadly quartet of *metabolic syndrome*.

It is undoubtedly a remarkable notion to summarily replace carbohydrates with a great number of saturated fatty acids that boast twice the energy. It might even work — short-term — but only because a diet extremely poor in carbohydrates actually initiates a form of fasting metabolism known as *ketosis*. Admittedly, blood sugar and insulin levels do drop by comparison with those typical for the current form of nutrition but important micronutrients will be missing from such a diet.

The withholding of carbohydrates effects emptying of glycogen stores and, along with that, the discharge of a large volume of intracellular fluid. Due to that fluid loss it is not uncommon to note weight reductions of up to 3 kilograms within a short time span — without, however, having eliminated even a single gram of fat. Depleting glycogen stores trigger *ketosis*. That *catabolic* hunger metabolism results in greater fat and protein metabolization in the course of which great quantities of metabolic acids are freed up. Because these added proteins must, of course, be metabolized as well, the intensified protein *catabolism* gets usually compensated for with a higher protein intake which then unnecessarily burdens the liver and kidneys.

Protein, **the body's** main building material, does poorly as fuel for gluconeogenesis.

The potential health benefits of a fasting metabolism have been known for millennia, as have its potential side effects.

In the more recently popularized *ketogenic* diets, however, the traditionally emphasized alkaline-forming raw foods diet is no longer there to render this fasting-*ketosis* relatively harmless. Instead, the numerous detrimental consequences of its resulting *acidosis* are worsened yet by the unconscionably recommended outrageous overload of protein.

Dietary supplements

In an attempt to keep the inevitable health damages within bounds, such types of reduction diet frequently seek remedy in massive nutritional supplementation.

Taking supplements might be a sensible practice as long as the supplements are targeted to balance factual deficiencies, but the more closely the dietary plan in *Dr. Jacob's Way* is followed, the less need exist for manufactured nutrients. The exception to that involves vitamin B12 and vitamin D. The particular contingencies will be addressed later in this chapter.

12.2 The Three Pillars of Insulin, *Redox*, and Acid/Alkaline Balance

The characteristic flaws of today's diet are particularly problematic in that they foster dysbalances in the regulation of insulin and the body's acid/alkaline and antioxidant households. Insufficiencies in these areas will derail numerous regulating processes and, when perpetuated, bring on chronic diseases and premature aging.

The interventive thrust in Dr. Jacob's dietary approach is to restore and subsequently maintain optimal balances in all three of these crucial domains of physiological functioning. Figure 12 below encapsulates the health principles involved.

Figure 12: **Ensuring proper balance in the body's insulin,** acid/alkaline, and antioxidant households through the application of principles encompassed by ***Dr. Jacob's Way***

Redox and pH

The *redox* and pH interrelations form the basis for an efficient execution of the biochemical processes and enzymatic reactions upon which the human body depends for its health. These vital interrelations constitute the substratum of all life functions.

The modern diet, incessant stress, and insufficient movement in the lives of many Westerners throw these two critical modulators of the organism out of balance.

The barrage of *insulinogenic* meals forces nonstop *anabolism* upon the body and acts as a permanent generator of *insulin resistance* and an inflammatory metabolic state.

Insulin resistance:

While *insulin resistance* does facilitate the cells' protection against insulin's sugar-regulating measures in the face of sugar overage it also permits the compensatory *hyperinsulinemia* to render insulin's other actions even more potent.

Insulin is strongly *anabolic* and thereby furthers not only cardiovascular diseases, obesity, and disorders of fat metabolism but carcinogenesis as well. It causes *sympathicotonia* (elevation of pulse and blood pressure) and heightens brain levels of tryptophan, serotonin production, and the related synthesis of melatonin.

Insulin's addictive potential

It has now been established that insulin directly impacts the brain's dopaminergic (*i.e.* addictive) system. But — no happiness without its price. The dosage progression of all addiction disorders applies in this case too. Artificial elevation of the level results in downregulation or habituation of the receptors. The dosages must be steadily increased in order to successively achieve the same effect.

If Hippocrates were to coin the motto appropriate for today's diet he would most likely state:

— *Your addictive drugs are your food* —

Craving for insulin's *anabolic*, *sympathomimetic*, and *seratonergic* effects particularly asserts itself in a strong preference for foods that can be counted on to trigger a superfast, intensive, and soaring insulin release.

Every drop in the levels of blood sugar and insulin gets quickly countermanded by *insulinogenic* snacking or imbibing of sugary beverages.

Forfeiture of the metabolic resting period between meals will maximize *insulin resistance* and speed the development of *metabolic syndrome* and fatty liver.

As indicated by the *food-insulin index*, combining quick carbohydrates such as sugar and refined flour products with animal protein (as in, for example, fruit yogurt, sweetened or raisin-muesli and milk, cappuccinos, milk shakes, ham-and-cheese sandwiches, and hamburgers or similar fast foods) results in an *insulinogenically* super-active response.

Given the insulin effect's addiction potential, it is little wonder that these *insulinogenic* triggers count among the most popular foods.

Even just milk and steak can draw a surprisingly steep insulin release that is further escalated through the addition of any simple carbohydrate.

Cortisol

Glucose metabolism can be further harmed by high *cortisol* levels that are raised in the course of a life dominated by chronic stress. *Hypercortisolism* or excessive *cortisol* uptake engenders a more vigorous renewed production of glucose, steps up cholesterol synthesis in the liver, and invites the occurrence of *hyperinsulinemia*. Each one of these metabolic effects deposits more fat in the abdominal area and makes the cells more *insulin resistant*.

In addition, other symptoms of *metabolic syndrome* like, for instance, arterial *hypertonia* are connected to higher levels of *cortisol* and *aldosterone*, and this is responsible for the intensification of both salt retention and potassium elimination.

The above interdependent contexts shed light on why a dietary change-over in the face of *hyperinsulinemia* does reduce weight and positively increase our healthy life-years but is in its beginning phase a similarly hard undertaking as withdrawal from a drug addiction.

Neal Barnard, president of the *Physician's Committee for Responsible Medicine*, has well thematized these connections in his book titled "Breaking the Food Seduction".

The addictive aspects we discussed are the reason why practicing moderation is so hard for us today. Despite the possibility of a healthy diet we continue to eat unhealthily, unless that is, we decide with full awareness in favor of living a healthy life. The ubiquitous presence of unhealthy food with addiction potential does not exactly make this easy for us.

Oxidative stress

Oxidative stress springs from two main sources: Smoking and overeating. Alongside these, permanent stress and negative environmental influences play a role as well. And, the greater the consumption of energy, the higher will be the encumbrances through free radicals. *Oxidative stress* can also arise from an oversupply of fat that does not get burned through physical activity and directly interferes with the respiratory chain of the mitochondria.

Caloric restriction vs. *methionine* restriction

Caloric restriction, more correctly designated as energy restriction, is known to be the most effective measure for avoiding *oxidative stress* and premature aging. It also happens to be the least popular one. A consumer society for whom an enticing energy bomb waits at every corner experiences energy restriction as a formidable challenge. Fortuitously, animal tests have shown that restricting *methionine* is almost exactly as effective as energy restriction but far more pleasant for us to carry out. *Methionine*, an essential amino acid that gets reduced to toxic *homocysteine* in the body, is decidedly more prevalent in animal protein than in plant protein. But abstaining from animal-based foods turns out to be difficult as well. An extravagant, often careless consumption of animal protein is the optimal breeding ground for our *diseases of civilization*. The worldwide best scientifically documented example of healthy longevity comes from the people of Okinawa whose traditional diet is low in animal protein and fat. Moderation, an essential part of their basic philosophy, is voiced in the adage *Eat only till you are 80 percent full.*

A greater requirement of alkaline minerals can accrue from, among others, unrelenting stress, an unbalanced high-salt and high-protein diet, and diminished lung capacity evidenced by shallow breathing. At the same time, modern food offers only a fraction of the once abundant

alkaline-forming mineral compounds. The chief reason for this is the all-too common preference for heavily processed and predominantly animal-based food. Industrial processing, too, strips natural foods of their micronutrients to a large extent. Another problem is found in agribusiness. The loss of minerals and trace elements it inflicts upon the soil gets negligibly rectified by fertilization.

Sodium and potassium

The extremely altered sodium/potassium ratio in our diet also renders a major contribution to the pathogenesis of the *diseases of civilization*. It does that by promoting *hypertonia, insulin resistance,* kidney failure, and diabetes, to mention but a few. Chronic over-acidification cannot any longer be enduringly remedied *via* the various blood buffering systems. It consequently places deposits within connective tissue while robbing the bones of buffering materials such as calcium and magnesium. Some of the long-term ramifications are bone atrophy, muscle and joint pain, inflammatory processes, diminished kidney output, *hypertonia*, and cardiovascular disease. In addition, distorted pH and ion configurations disrupt the membrane potential and can thereby bring on arrhythmias in the heart.

Visceral and liver fat

The main goal of *Dr. Jacob's Way* is not a cosmetic improvement of body contours, a mere side effect, but breaking down and elimination of visceral and liver fat. This will bring under control both *hyperinsulinemia* and *insulin resistance*, the breeding ground for our *diseases of civilization*. It removes their principal causes — an overconsumption of salt and sugars (*e.g.* the sucrose, fructose, and concentrates of grape or apple juice often hidden in beverages), white flour, animal protein, and fat — all in combination with a lack of movement.

The big adventure: A culinary voyage of exploration into healthy food

What is particularly pleasant about *Dr. Jacob's Way* is that one counts no calories and can eat almost as much as is desired, just differently from how it has been until now. The dietary plan offers a culinary voyage of discovery, not morose suffering from hunger. The focus is on tasty, energy-poor, micronutrient-rich, plant-based foods that are satisfying and please the belly instead of on energy-rich, animal-based, and processed foods. Several familiar foods may disappear from your plate, but as a compensation you will get pampered with numerous new culinary delights. Physical movement, while both important and healthy, is not central to weight reduction. In fact, studies show that people who significantly increase their bodily activity correspondingly raise their energy intake and often simply replenish the burned energy.

To embark upon such a voyage of discovery does require some taste for adventure. Whoever though decides in favor of that complete lifestyle change will see great gains in vitality and quality of life, an appreciably younger look, a greater sense of well-being, improved health, and most likely additional good years of life. Following the motto *the goal is in the journey,* it is important to positively appreciate and consciously experience such a dietary and lifestyle make-over. With persistent application of the many practical suggestions for alternatives any cravings for meat, cold cuts, cheeses, and sweets will quickly let up. The exciting discovery of new diverse and healthy meals definitely will definitely raise your quality of life and, contrary to general expectation, your choice of foods will be greater than before.

He who wants to get old in good health will have to start with it early on.

— Prof. Leitzmann

12.3 Dr. Jacob's Food Pyramid

To make it easier to apply Dr. Jacob's dietary plan in everyday life, all foods are grouped into four categories. This makes possible a thorough examination of the diet at the beginning of the make-over and provides a clear view of optimal meal composition in *Dr. Jacob's Way*. The categorization of foods into four groups takes into consideration the degree of alkalinity, the proportion of antioxidants, the effects upon insulin regulation, and the relative density of energy and micronutrients. Intended to serve as an initial guideline, the food pyramid illustrated below depicts quantity ratios within the four categories and presents a quick overview of the dietary concept as a whole (cf. Figure 13 and Figure 14).

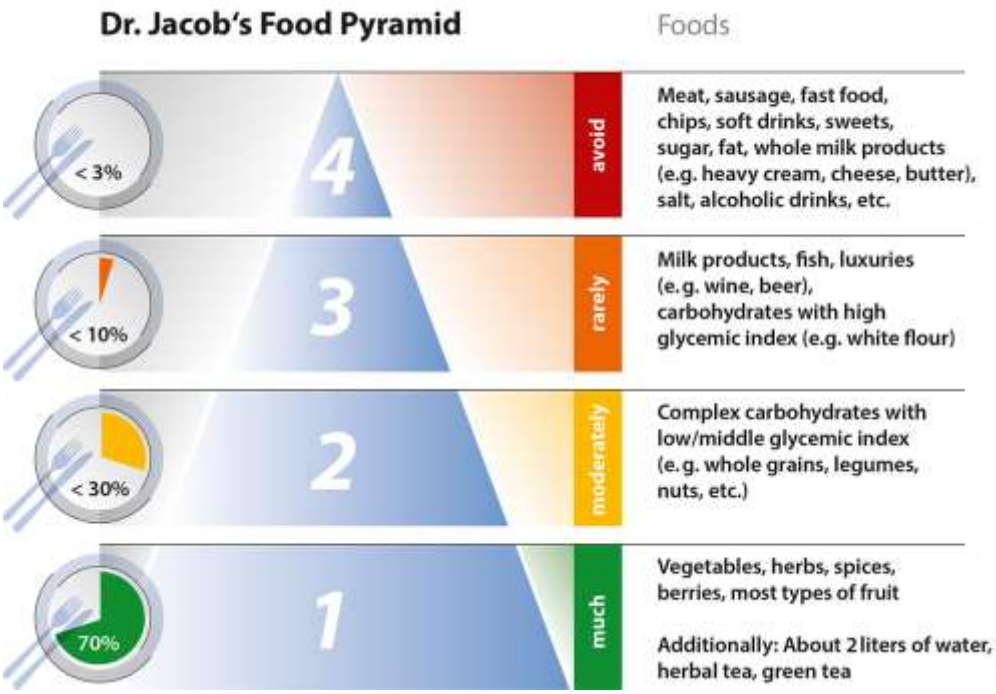


Figure 13: **Dr. Jacob's food pyramid**

Normal/overweight persons: 70% from category 1 and 30% from category 2.

Underweight persons: 70% from category 2, nuts, healthy oils, some eggs and dairy.

Slim persons: 50% each from category 1 and category 2.

Categories		Foods	Recommendations
4	avoid	**Meat, sausage, fast food, chips, soft drinks, sweets, sugar, fat, whole milk products (e.g. heavy cream, cheese, butter), salt, alcoholic drinks, etc.**	**Better not at all, because …** High energy density, salt, sugar, saturated/transfatty acids, cholesterol, arachidonic acid, purine, AGEs, animal protein, particularly insulinogenic combinations, toxins, additives, highly processed products ➡ **Maximally 3 % of meals**
3	rarely	**Milk products, fish, luxuries (e.g. wine, beer), carbohydrates with high glycemic index (e.g. white flour)**	**Little/rarely, because …** High energy density, saturated fats, cholesterol, sugar, AGEs, animal protein, toxins ➡ **Maximally 10 % of meals**
2	moderately	**Complex carbohydrates with low/middle glycemic index (e.g. whole grains, legumes, nuts, etc.)**	**Moderately, because …** ⊕ Essential fatty acids, amino acids, vitamins ⊕ Complex carbohydrates, fiber ⊖ Can have high energy density ➡ **Daily, but not too much**
1	much	**Vegetables, herbs, spices, berries, most types of fruit** **Additionally: About 2 liters of water, herbal tea, green tea**	**As much as possible, because …** ⊕ Rich in alkaline nutrients, minerals, vitamins, fiber, phytochemicals ⊕ Very low energy density ➡ **Basis for every meal**

Figure 14: Classification criteria for the **categories in Dr. Jacob's food pyramid**

Figure 15: Portion sizes from specific categories are dependent upon body weight.

Since we do not enjoy counting calories or weighing our food, the surface of the plate offers a practical approximation for the quantitative distribution of the various categories. Portion size has a measurable influence on energy intake. For that reason, the external diameter of

Dr. Jacob's adult-sized plate measures 24 centimeters and the inner volume's diameter 18 cm (cf. Figure 16). This is actually the original traditional dinner plate, which is, however, increasingly getting replaced by the optically "cooler" and, more importantly, larger varieties. Large plates represent a large temptation for consuming large portions.

Figure 16: **The ideal Dr. Jacob's plate**

Table 6 with Dr. Jacob's classification of foods is to be regarded as supplemental to this. The table provides a detailed description for all food (-components) in each segment of Dr. Jacob's food pyramid, as well a number of helpful tips and pointers. To make it easier getting one's bearings in these categories, the column "Foods" lists items by related groups. The listings are meant as examples and lay no claim to being exhaustive. All foods presented are available at food-retail and specialty shops in Germany. The table sums up the most significant contents in each food of the four categories. Additional advice and tips are offered that may prove useful for purchasing, preparing, and combining of these foods.

Category 1 comprises foods with very high micronutrient and low energy-density. All are of plant origin and represent the nutritional foundation of Dr. Jacob's dietary plan. On account of their low energy-density, they can and should be consumed **"as much as possible"**. While plants may well harbor contaminants, they are clearly less encumbered in that respect than foods derived from animals, in which the harmful substances tend to successively accumulate during their ascent up the food chain. A balanced plant-based diet supplies practically all essential organic compounds the human body requires. The notable exception is vitamin B12. Later in this chapter you will find recommendations for a targeted balancing of vitamin B12 using a purely plant-based diet.

Category 2, again, features plant foods only, in particular those rich in carbohydrates, protein, and oils. They include legumes, tubers, roots, nuts, and seeds. Grains and pseudo cereals are in that group as well. Foods in this category are of significance for long-lasting replenishment and supply many compounds vital to metabolism, including fatty acids and amino acids needed in building and preserving protein. Whole grains and pseudo cereals contain varied types of fiber. For adequate protein with a balanced amino acids composition, legumes combined with whole grains ought to be consumed on a daily basis. Legumes must be thoroughly cooked so that the antinutritive substances they contain can be eliminated.

For carbohydrates like pasta to raise blood sugar and insulin only moderately they should be cooked *al dente*, not soft boiled. These two cooking methods affect the release of blood sugar and insulin quite differently. Classification of carbohydrate-rich foods is linked to their respective *glycemic index (GI)*. Since it is not only the type of food (*e.g.* wheat) that has a bearing on the *glycemic index* but also the mode of preparation (*e.g.* hard-wheat pasta or semolina), any additional reference to cooking or preparation should be given attention. Having a higher energy-density than vegetables and fruit, foods in this category have to be consumed in **"moderate quantity"**. Within the context of daily diet this means that even though these *do*

represent a fixed part of it, they should only constitute about one third of any given meal. Protein-rich foods combined with easily available carbohydrates trigger a particularly strong insulin response. So, that combination is best avoided altogether. For dieters suffering from *metabolic disorders* and *insulin resistance*, the carbohydrate-rich foods drop out of category 2b and into category 3 ("little, rarely").

Category 3 represents, among others, foods of animal origin, such as fish and dairy products. Like the rest of the items in that third group they should be eaten only **"in small amounts and infrequently"**. It could be either a small portion of milk or yogurt on any given day or something like 100 g fish (as part of a main meal) once to twice a week. In the prevailing Western diet, milk products are the chief source of saturated fatty acids that negatively impact cholesterol levels. *Overweight persons* with high cholesterol ought to eat low-fat milk products only. *Slender persons* may use whole milk products. *Healthy persons of normal weight* may have up to 250 ml milk/natural yogurt each day (from category 3) or 10 g aged cheese (from category 4). Milk products need to be categorically avoided where there is cardiovascular disease, prostate cancer, or breast cancer.

Plant-based category 3 foods like sweetened canned or dried fruit have high energy-density and are also often filled with harmful additives! Consumption of alcoholic drinks (*e.g.* beer and wine) by men should not exceed two glasses (each with 0.33 liters beer or 0.150 l wine) and by women one glass of 0.33 l beer or 0,150 l wine. Best though for either of them would be to consume considerably less.

Category 4 holds foods and beverages with high energy/low micronutrient-density and/or with a marked *insulinogenic* effect and/or an effect known to be detrimental to health. These betray themselves through their high content of fat and sugar, heavy processing, industrial additives, and the presence of harmful *AGEs*. These foods disrupt or strain many aspects of metabolism, among them the critically important acid/alkaline and insulin balances. Therefore **"best not at all"** applies to them. Meat and meat derivatives from any animal belong in this group as well on account of their high content of unhealthy fats, animal protein, and toxic substances which the animals had taken up through the food chain.

Also in that category are sweets of any variation, high-energy beverages (above 25 Kcal per 100 ml), packaged convenience meals, deep-fried or fried preparations, milk products with high energy-density, as well as all fats and oils devoid of essential fatty acids. Unfortunately, the much-adored milk chocolate, too, is in category 4. It contains powdered milk and sugar, a detrimental combination that drives up blood sugar and insulin levels and lends its many saturated fatty acids (from cocoa butter) to the promotion of *insulin resistance*. More acceptable is a daily treat of bitter chocolate with 75-90% cocoa content. Look for assayed flavonoids proportions. In 2013, the value is not yet standard on labels but industry plans for it do exist already. The lengthy manufacturing process of conventional dark chocolate destroys a large portion of the healthy flavonoids, but even so it is still a lot better than milk chocolate.

Branched-chain amino acids and saturated fatty acids from meat and dairy provoke *insulin resistance*. Saturated fatty acids are demonstrably a primary cause of diet-dependent fatty liver disease, *insulin resistance*, *hyperinsulinemia*, *metabolic syndrome*, and *diabetes mellitus* type 2. When you select foods for your meals you should, therefore, give preference to low-

fat varieties and to those prepared using nutrient-preserving methods. Also in category 4, and conspicuous for its exceptionally high insulin effect, is the combination of animal protein and carbohydrates with high *glycemic index*. To prevent a reactive insulin surge, protein-rich foods should be eaten separately from fast carbohydrates like sugar and white flour. Eat only lean meat and limit it to a small once-weekly portion of no more than 100 g. Experience has shown that omitting meat completely is simpler than just reducing it. It is the quickest way to lose the taste and be rid for good of any cravings for it.

Clinical studies into the approaches pioneered by Barnard, Esselstyn, and Ornish have shown that the reduction to 10% of total energy from plant fat is indicated in cardiovascular disease, diabetes, *metabolic syndrome*, prostate cancer, or breast cancer. While obtaining 30% of their total energy intake from predominantly plant-based unsaturated fatty acids is preventively optimal, such an amount can already interrupt carbohydrate metabolism in persons suffering from metabolic disorders. Here, too, saturated fatty acids from animal-based foods, as well as transfatty acids prove clearly more harmful and should be cautioned against. Carbohydrate sources with low *glycemic index* and an overall energy-poor, micronutrient-rich plant diet are highly recommended for a thorough unburdening of metabolism.

A quick cosmetic weight-loss success is not the goal of this dietary change-over.

Instead, *Dr. Jacob's Way* is meant to facilitate an enduring improvement in diet and lifestyle that is conducive to a long, healthy, and happy life. This ultimately translates into thoroughly expelling all foods in category 4. It would be in the best interest of your own health to immediately renounce all foods in category 4, but if you currently subsist mainly on foods in categories 3 and 4 you may wish to begin by adding as many foods as possible from categories 1 and 2, and then gradually reduce foods from categories 3 and 4.

Everyone needs to personally decide whether a gradual dietary change or cold-turkey withdrawal will be the easiest way to eliminate the risky categories 3 and 4 foods.

Resolve to be resolute! As is the case with smokers, your change-over will be easier when it is done resolutely and with persistence. Only then will the sense of taste reform and the sweet tooth look for satisfaction in healthy alternatives like, for instance, fresh raspberries. If you decide that it is best to use the step-by-step method your first step into chocolate withdrawal might entail eating a slightly less harmful chocolate treat such as a semi-sweet chocolate soy pudding or a modest-size piece of dark chocolate.

Eliminating meat

During the change-over phase, meat products may be replaced by convenient vegetarian meat substitutes such as the soy hot dogs now seen on the shelves of most grocery stores. While such manufactured products are not exactly healthy, they are less harmful than meat. In the long run it is not advisable to one-sidedly replace your customary meat items with milk products or with great quantities of soy foods. This advice is not intended to discredit healthy foods like tofu but to alert you to various meat surrogates of questionable value like the aforementioned soy products. Fortunately, there is no pressing need for such an unbalanced approach because many more healthy and tasty things are to be discovered on this culinary exploration journey than you perhaps imagine at this point.

Table 7: Distribution of foods in four groups (percent = percent of weight)

Group Category	Foods
 Plentifully These are the foods that ought to be the basis for your daily menus (*i.e.* at *every* meal) Optimally 70% or above of daily nutrition	Beverages: Green tea, herb teas, spiced teas, pure water (low sodium), *etc.* All herbs and wild crafted herbs (fresh, deep-frozen, or dried): Basil, pimpernel, savory, borage, nettle, water cress, dill, gout weed, chervil, lovage, bay leaf, dandelion, marjoram, balm, oregano, parsley, mint, thyme-leaved sandwort, rosemary, sage, chives, celery leaves, thyme, hyssop, lemon balm, *etc.* Fruit (1): Fresh apples, black berries, strawberries, figs (fresh), grapefruit, pomegranates, guavas, blueberries, raspberries, currants, kiwis, limes, tangerines, yellow plums, nectarines, oranges, papaya, peaches, red plums, tomatillos, cranberries, quinces, rhubarb, sour cherries, gooseberries, star fruit, lemon, *etc.* (For dried fruit see category 2.) Vegetables: Artichokes, Jerusalem artichokes, eggplant, bamboo sprouts, cauliflower, broccoli, watercress, chicory, Chinese cabbage, edamame (green soy beans), fennel, spring onions, green beans, green/red cabbage, cucumbers, collard greens, carrots, garlic, kohlrabi, pumpkin, leeks, rutabaga, chard, fermented vegetables, okra, bok choy, peppers (of every color), parsnips, jalapeños, parsley root, radishes, romanesco cauliflower, brussels sprouts, beet root, red cabbage, shallots, black oyster plant, celery root, asparagus, spinach, pointed cabbage, celery stalks, turnips, sweet potatoes (not to be overcooked!), tomatoes, tomato paste, strained tomatoes (salt free), Jerusalem artichokes, grape leaves, white cabbage, savoy cabbage, zucchini, sugar snap peas, onions, *etc.* Salad: Batavia lettuce, red leaf or green leaf lettuce, iceberg lettuce, endive, lamb's lettuce, frisee lettuce, chicory, nasturtium, head lettuce, dandelion leaves, radicchio, arugula, romaine hearts, sorrel, *etc.* Sprouts: Alfalfa, broccoli, cress, lentil, mung bean, red radish, white radish, sunflower, wheat, *etc.* Mushrooms: Wood ear mushrooms, oyster mushrooms, chanterelles, bay bolete, king oyster mushrooms, porcini, pholiota, champignons, morels, shiitake, *etc.* Spices: Chilies, chili powder, curry powder, vinegar (all types but without added sugar), fennel, ginger, cardamom, garlic, coriander, cumin, caraway seeds, turmeric, nutmeg, cloves, pepper (various types), allspice, mustard seeds, vanilla beans, cinnamon, *etc.*

For eating your fill: Plants are rich in vitamins and minerals. As a rule, they also have low energy-density!

- Vegetables, herbs and varied fruit (best fresh, seasonal and locally grown, but in a pinch frozen will do.)
- Beverages without any nutritional content (unsweetened or sweetened with steviol glycosides; best is pure water (*cf.* Chapter 2.4).
- Energy-poor fruit (1) is to be preferred (<10 g sugar/100 g).
- Minimally processed; use ready-to-eat products only sparingly.
- Personal food tolerance must be considered, *e.g.* no fruit if you are fructose intolerant.
- Raw fruit is best not eaten after 4 p.m.
- Salad dressings without any milk/cream/yogurt; instead, sparingly use oil and vinegar vinaigrette with fresh herbs.
- Large quantities of raw foods are not wholesome for everybody; lightly steamed or stir-fried vegetables are often more easily tolerated. Especially during wintertime warm food does one better.
- Nutrients-preserving preparation — raw, lightly steamed or briefly sautéed in a ceramic pan using the least possible amount of heat-stable frying oil (e.g. sunflower oil with high oleic content) — nothing that is overcooked or heavily roasted.

Tip: Frozen raspberries make for an ideal snack and are available year-round.

Moderately

All these foods contain vitally necessary micronutrients. However, too much of any otherwise good thing is not good (for example, excess energy from otherwise valuable oils). With that in mind, such foods *should* be consumed each day but never in large quantity. Optimally only 30% of daily nutrition

Tubers, roots, grains, pseudo cereals:

a) Optimal: Amaranth, buckwheat, sweet corn, green spelt, oat groats, rolled oats, waxy potatoes with skin, potato salad (but with only little oil and no mayonnaise), crisp bread, muesli (with rolled oats and fresh fruit, not sugar or raisins), brown rice, wild rice, quinoa, porridge, pumpernickel bread, sour dough whole-grain bread, sweet potatoes (when soft boiled), pasta (using hard wheat cooked *al dente*), whole grain pastries (minimally 9 – 15% fiber), basmati rice (brown), whole bulgur wheat, whole millet, whole spelt, whole kamut, whole grain toast, rye, whole wheat, yams, *etc.*

b) Only if normal or underweight: Couscous, rice, grains or pseudo cereals, potatoes with skin (better than mashed), gnocchi, cornmeal, rye-wheat bread, muesli (dried fruit, not sugar), polenta, sticky rice (*e.g.* jasmine), rice noodles, pasta (soft wheat, well cooked), *etc.*

Fruit (2): All dried fruit without any added sugar (no candied fruit), pineapple, bananas, pears, honeydew melons, persimmons, mangoes, sweet cherries, water melons, grapes, avocadoes (15% fat), *etc.*

	Legumes and products from legumes: Beans (green, fava, lima, mung, kidney, great northern, red, white, black), peas, chickpeas, lentils, soybeans and soy products such as tofu and natto, sweet lupines, wax beans, *etc.* Nuts and seeds (unsalted only!): Cashews, chia seeds, peanuts, earth almonds, pumpkin seeds, freshly ground linseeds, almonds, olives (unsalted), Brazil nuts, pecans, sesame seeds, tahini, sunflower seeds, walnuts, hazelnuts, *etc.* Oils (to a maximal total of 30 ml/day): Cold-pressed oils with the essential omega-3 fatty acids: Linseed oil, hemp oil and canola oil (unheated, and always fresh — never use any oil that is even slightly rancid!) For salads and cooking: Oils like pumpkinseed oil and extra virgin cold-pressed olive oil. For light browning and stir-frying: Sunflower oil rich in oleic acid, frying oil with a minimum of 80% oleic acid content. Seasonings: Low-sodium and potassium-rich salt substitute, nutritional yeast, capers, mustard, Tabasco sauce, *etc.* Bread spreads: Plant-based pâtés or spreads with maximally 250 calories per 100 g, mustard, horse radish (without cream), tomato paste, almond or sesame butter (tahini) without salt or sugar (use sparingly if overweight), *etc.* Both fresh water algae and ocean algae are excellent sources of iodine. Do make sure that you take 150 – 200 µg iodine daily (*cf.* Chapter 12.5.4). Beverages and milk replacements: Fruit teas and fruit juices (Choose varieties that are unfiltered and rich in polyphenols and potassium. Use a daily maximum of 250 ml and dilute to 1/3 juice and 2/3 water (for instance, fermented pomegranate juice, elderberry juice), oat milk, almond milk, coffee, coconut water, soy milk, black tea, *etc.*

Because of their relatively high energy-density and proportion of carbohydrates and protein these foods are only healthy when consumed in moderate amounts. Do have them daily though. They supply vital nutrients such as essential fatty acids, trace elements, and amino acids.

- In case of *metabolic disorder* and *insulin resistance*: Treat carbohydrates from category 2b) like foods from category 3 (**"little, infrequently"**). Use oils sparingly.
- Roots, grains and pseudo cereals from group 2 a) are to be preferred over foods from group 2b) since they have a lower *glycemic index* and present a lighter *glycemic load*. Pastas should always be cooked *al dente*. Foods from group 2b) may be consumed by normal or underweight individuals.

- Select minimally processed whole grains and pseudo cereals that provide complex carbohydrates (no refined flour). Fiber-rich whole grain bread would be a good choice. Adding fiber can improve the metabolic effect of even group 2b foods.
- Low *glycemic* rice (brown rice, wild rice) that has a high proportion of *amylose* and a low proportion of *amylopectin* is preferable to sticky rice which drives up blood sugar. High *amylose* content causes rice to be grainy.
- Include fermented products in your menus: Sauerkraut, bread drink, fermented pomegranate juice, *etc.* Vinegar and lactic acid both benefit the bowels and metabolism.
- Legumes will not significantly raise your blood sugar and insulin. For a balanced amino acids spectrum combine the legumes with whole grains (legumes supply the essential amino acid lysine).
- In case of cardiovascular disease, diabetes, *metabolic syndrome*, prostate cancer: It is best to use neither fat nor oil and to satisfy one's Omega 3 fatty acid requirements with freshly ground linseeds, walnuts, or chia seeds.
- Plant oils and (unsalted) nuts and seeds are great providers of essential fatty acids and fat-soluble vitamins. Nuts are very healthy in prevention, but during weight reduction they must be eaten moderately. Underweight persons need not limit them.
- Dried fruit and fruit with high energy-density (2) (>10g sugar/100 g).
- Replace sugar or isolated fruit sweeteners with stevia, erythritol, or xylitol.
- Use only little oil (from a spray bottle) for brief stir-frying.
- Do not combine protein-rich foods with carbohydrates that have a high *glycemic index*. Such a combination triggers a strong insulin response.
- Frozen and glass-preserved food: No added sugar; make sure it has a low salt content.
- Don't use caffeinated beverages as thirst quenchers.

 Little/rarely Maximally 10% of daily nutrition	Animal-based foods: Eggs, fish, canned fish, shell fish, whole or low fat milk (cow, goat, mare, donkey, sheep), buttermilk, organic yogurt, sour cream, farmers' cheese, *etc.* (Maximally 200 g/day) For overweight persons: The higher a food's fat content, the lower the quantity that can be consumed. Fruit: Dried fruit with added sugar, sweetened canned fruit Fruit preserves: (Reduced sugar, stevia sweetened) Grains: All white flour baked goods (bread, rolls, pretzels and lye-dipped baked items), corn flakes, muesli with sugar, *etc.* Condiments: Chutneys, coconut milk (use sparingly), coconut (raw, grated), *etc.*

	Beverages: Beer and wine, filtered apple juice, orange juice, grape juice and similar high-sugar fruit juices with a relatively low polyphenols content, high-caloric drinks with more than 25 calories/100 ml, *etc.* Any sugary beverage drunk between meals interrupts the natural fasting phase. Sweets: Agave syrup (high fructose; must not be used in case there is any metabolic disease and visceral or hepatic fatty degeneration), maple syrup, dark chocolate (with >75% cocoa content), fruit spreads and preserves, honey, powdered malt extract, molasses, raw cane sugar, *etc.*

"Only little" because too much of these quickly becomes unhealthy. Processed animal-based foods and convenience foods often contain undesirable substances like saturated fats, transfatty acids, cholesterol, sodium, *AGEs*, flavor-enhancing agents (*e.g.* sodium glutamate) and sugar. But even plant-based foods that were heavily processed or have high energy-density should only be consumed in moderation.

- Few milk products (best with a low fat content). For healthy normal weight people: Up to 200 g biodynamic or organic milk/yogurt/kefir/buttermilk/whey *or* 10 g aged cheese on any given day.

  Intolerances occur more often with milk from cows than with goat milk.

  Milk products may be readily replaced with plant-based alternative beverages such as oat milk or soy milk.

  If there is advanced cardiovascular disease, prostate cancer or breast cancer (without cachexia) dairy products are best eliminated altogether. But in the presence of cachexia, underweight, leaky gut syndrome, or immunodeficiency whey protein (hydrolyzed) coupled with omega-3 fatty acids can be beneficial due to its *anabolic* effect.
- Eggs: 0 – 3 per week
- Fish: 0 – 2 portions per week
- Slender persons, pregnant women and children are able to utilize more eggs and milk products than normal or overweight adults. Yet even pregnant women should seek to avoid excessive milk consumption. Eggs, if desired, are better in pregnancy.

  Children prone to middle ear infections or acne often experience relief and even healing when they abstain from milk.
- Even more applicable in the case of animal-based products is the rule to choose as much as possible fresh, regionally and sustainably produced food with the smallest degree of processing (*e.g.* fish filet instead of fish sticks).
- Fruit juice has a different metabolic effect than the whole fruit because its sugar rapidly saturates the blood. For that reason, fruit juice should be diluted to 1/3 juice and 2/3 water and not used for in-between-meals snacking. Fruit juices are suitable for thirst quenching during sports if strongly diluted with water.

 Best not at all Maximally 3% of daily nutrition	Fast food and deep-fried food: French fries, burgers, *etc.* Solid fats and oils: Peanut oil, corn oil, commercial sunflower oil, sesame oil, soy oil, margarine, mayonnaise, *etc.* Even more harmful: Butter fat, palm kernel oil, cocoa butter, coconut oil, *etc.* Meat: From any kind of animal and prepared in any fashion, for instance roast meat, meat broth, baked fish, smoked meats or smoked fish, luncheon meat, innards, pâtés, roast beef, ham, bacon, sausage, *etc.* Broiled, fat and/or red meat, as well as sausage are worse than lean white meat that has not been broiled. Full fat milk products: Crème fraîche, double-crème cheeses, aged cheese, mascarpone, powdered milk, heavy cream, sour cream, *etc.* Salt and salty seasonings! Sweet and salty pastries: Butter cookies, croissants, donuts, sweet fritters, any pastries, breadsticks, pound cake, chocolate nibbles, *etc.* Sweets: Fruit gum, condensed milk, chocolate foam kiss, ice crème, milk chocolate, marshmallows, *etc.* Isolated sugar: Concentrated apple juice, brown sugar, white sugar, fructose, fructose syrup, glucose-fructose syrup, corn syrup, concentrated grape juice, *etc.* Beverages: Liquor, large quantities of beer or wine, liqueurs, soft drinks with sugar and phosphoric acid, iced tea, *etc.* If such beverages are consumed during a meal they strongly increase the insulin release. Exceptionally *insulinogenic* combinations: Quickly absorbed carbohydrates with protein — especially animal protein: Steak and potatoes, hamburger, fruit yogurt, chocolate milk, dairy, ice crème, pizza with cola, corn flakes and frosted breakfast cereals with milk, *etc.* Many saturated fatty acids mixed with sugar or fructose promote accumulation of abdominal and liver fat, and thus *insulin resistance*. Examples are chocolate, cookies, tiramisu, soft drinks with pizza or fries, *etc.*

"Better not at all" since these supply hardly any important, protective micronutrients but many toxins, energy from sugar or (saturated) fat, cholesterol, and animal protein. Heavily processed foods contain the most *AGEs*, purines, "hidden" fats, salt, and sugar. All deep-fried and breaded foods, fast food, salads with mayonnaise and the like belong here.

- Eat only small quantities of meat if at all. Vegetarian meat substitutes are allowed during the transition and fall between categories 2 and 3.
  Such products vary widely in quality, so be choosy.
  Look for the ones without flavor enhancers, palm kernel oil, and high salt content.
- Underweight persons should not restrict their fat intake.
  For them even saturated fatty acids are harmless because they get metabolized.
- People who sweat a great deal and take in plenty of potassium can handle a little more salt.
- Soft drinks contribute heavily to the development of fatty liver and overweight and are not the least bit useful for meeting the body's fluid needs.
- All sweets belong into this category as well. If you cannot summarily strike these off your menu then allow yourself small exceptions and enjoy them mindfully.

12.4 Dr. Jacob's Three Dietary Rules

The three dietary rules below are meant to serve as road signs for *Dr. Jacob's Way*. They embody three simple but effective practices for successfully and permanently implementing the proposed dietary concept.

Toward that end the dietary rules encompass:

— Rule 1: Adequately hydrate the body.
— Rule 2: Eat minimally processed, well-tolerated plant-based whole food.

Both drinking purified water, green and herbal teas, as well as plentifully taking in the vital nutrients available in plant foods are essential to maintaining proper balance of the body's acid/alkaline household.

The concept "plant-based food" comprises more than merely vegetables and fruit. Legumes, nuts, roots, herbs, and spices also play important roles as health-giving components of a varied, well-rounded diet.

Arranging quality food items in a colorful way will provide not only visual appetite stimulation and eating pleasure but also many interdependent phytonutrients, alkalinizing compounds, and vitamins.

— Rule 3: Low energy-density and high micronutrient-density, as well as the optimal sodium/potassium distribution of foods must also be given careful attention.

Energy-density frequently stands in inverse proportion to micronutrient-density.

That matters a lot for understanding that eating from Dr. Jacob's plate does not mean being left feeling hungry or having to sacrifice eating pleasure. Instead, it entails taking advantage of a much greater variety of flavors and eating ample satisfying portions of healthy food.

— The *insulinogenic* effect of nutrient combinations such as meat or milk protein with rapidly absorbable carbohydrates further figures into the menu composition.

— In sum, taking up ***Dr. Jacob's Way*** requires plentiful energy-poor drinking and a variegated diet of plant-based foods.

The Three Dietary Rules

1) Regularly drink plenty of pure water and energy-poor healthy fluids.
2) Eat your fill of plant foods from all five colors, always observing food sensitivities.
3) Choose low energy-density, high micronutrient-density foods that are low in sodium and high in potassium.

Simple practical application:

Optimally drink at least 2 liters of pure water and green or herbal tea each day.
Achieve satisfaction eating variable, minimally processed, and well-tolerated foods.
Do your best to stay away from animal-based foods, sugar, and salt!

The next section will better describe and explain the three dietary rules that are intended as guidelines for counseling and for providing support in implementing the dietary make-over. Special attention is given to details of practice and the previously discussed classification of foods into four groups.

1) Regularly drink plenty of pure water and energy-poor healthy fluids.
   a) Over the course of time, drinking-water is able to gunk up a body with considerable quantities of poisonous material like nitrate and chlorine, copper from fixed copper lines, and even lead leached from fossil water pipes. It is best to use water that had microbes and metals carbon-filtered out but minerals left intact.
   b) Drink at least 1.5 – 2 liters of water a day. If you perspire a lot you will need more.
   c) Use water and unsweetened or stevia sweetened herbal tea to quench your thirst.
   d) Drink juices diluted with two parts water. These should be unfiltered and rich in polyphenols. Avoid drinking large quantities of them (maximally 250 ml diluted to 750 ml per day).
   e) If possible, forego sweetening altogether or else use stevia, erythrol, or xylitol.
   f) The body can become re-accustomed to regular drinking of water. Well hydrated, it signals thirst more quickly when water gets low.

2) Eat your fill of plant foods from all five colors, always obeying food sensitivities.
   a) Eat your fill! A healthy diet is a long distance from going hungry and has nothing at all in common with asceticism. With the correct food choices and preparation methods you can feast without guilt or fear of expanding your girth. Foods should be chosen from **category 1 ("as much as possible")** in Dr. Jacob's food pyramid and lightly supplemented with foods from category 2 ("moderately").
   b) Plants are micronutrient-dense (vitamins, minerals, phytochemicals) as well as high in fiber. At the same time they usually have low energy-density. There are more than 50 common vegetables, 30 types of fruit, 10 known legumes, and a wealth of nuts, herbs, mushrooms, and spices to be discovered! In each case the nature of one's customary diet until now should determine the size and number of steps by which to

increase the proportion of plant-based foods, for the digestive tract must be allowed to adjust to the higher intake of fiber.

c) The tolerance for certain foods varies since each person is individually constituted. The section "Addenda" (12.4.1) discusses many frequently occurring intolerances toward such substances as gluten, histamine, lactose, and fructose, as well as common allergies and their symptoms. Pay attention to what does you good and what possibly causes you harm. Variety in your menu will help you recognize and subsequently avoid foods for which you have an intolerance.

d) Not everybody is equally equipped to handle raw foods although chewing well does improve the tolerance for them. Uncooked vegetables and fruit are generally healthier since vitamins and potassium are lost during cooking. Gentle stir-frying minimizes this. Asians rarely eat foods raw. Following their example you can briefly stir-fry vegetables in a ceramic-coated frying pan — using very little oil, or lightly steam them instead. In that way their nutrients are for the most part preserved while harmful microbes are neutralized and the food is warm, a welcome blessing during winter.

   Gentle preparation methods render food more digestible and safeguard most benefits. Raw fruit comes with its own entourage of bacteria, yeasts, and fungi, and these are not always good for your health. The consumption of raw fruit, smoothies, and juices should be curtailed in the evening because fermentation by yeasts may develop great quantities of fusel alcohols.

   Properly pickled, fermented, or lactic-acid preserved foods like brine pickles, miso, sauerkraut, fermented vegetables, tempeh, and real sourdough bread should be increasingly included in your menu.

e) Learn how to again pay attention to your body's signals and to correctly interpret them. This is not an encouragement to practice gluttony but to recognize real appetite and hunger. On particular days, for instance, your appetite for protein-rich meals might be greater than ordinarily. It simply means that your body requires more protein. In that regard, plant-sourced protein is of high quality, imposes a lesser metabolic burden, and has in tow many health-supporting micronutrients. Should a sudden desire for something sweet come up, remember that healthy choices (*e.g.* raspberries) are just as available as unhealthy ones (*e.g.* manufactured sweets).

f) In general, you would do well to choose foods having low to medium *glycemic index* (low: <55, medium: 55 – 70, high: >70). Whole grain products should thus be your predominant carbohydrate sources.

   If you have hitherto consumed little whole-grain food take notice: Increase its proportion incrementally so that the gastrointestinal tract has time to acclimatize. And do not permit manufacturers to fool you with mere color. Bread and baked goods can easily be darkened with caramel, malt extract, or other unhealthy sugars to give them the appearance of healthy whole grain products.

   Whole grain varieties are the far more desirable alternatives when it comes to selecting grains and grain products. They boast more minerals and fiber than light-colored refined products (*e.g.* white flour). Moreover, they deliver longer lasting satiety, have

a lower *glycemic index*, impose a lower *glycemic load*, and typically also have a lower *food-insulin-index (FII)* value than comparable refined products. Low *GL* and Low *FII* will allow for a slower rising and dropping of blood sugar and a lighter insulin release.

g) Food's *glycemic index* can be influenced by the methods of preparation and storage. With any given food the composition and quality of resistant starch (the ratio of *amylose* to *amylopectin*) determines its specific *glycemic index*. The higher the *amylopectin* proportion is, the higher will be the *glycemic index*. One way by which to recognize high *amylopectin* content is the food's stickiness. For example, sticky jasmine rice (*GI* 60), quick-cooking rice (*GI* 85), and rice flour (*GI* 90) all have a distinctly higher *GI* value than grainy wild rice (*GI* 35) or brown basmati rice (*GI* 45).

The more readily a starch molecule is accessible to digestive enzymes, the higher will be the *glycemic index* (*GI* flour > *GI* semolina). *Amylopectin* molecules gel in water during the cooking process, and this renders them more easily broken down through *alpha-amylase* within the digestive tract. Carbohydrates thus have a higher *glycemic index* value when cooked than they do in their raw state. The longer the cooking time, the greater will be the thoroughness of gelatinization. Whenever cooking is preceded by so-called pastification (extrusion under high pressure) the extent of gelatinization will be lower (*e.g.* spaghetti *al dente* has a relatively moderate *GI* 40).

Cooling down after cooking will, once again, change the interaction of *amylose* and *amylopectin*. That occurs *via* the process known as starch retrogradation that is enhanced by coldness and dryness and lowers the *glycemic index*. Old, hard bread has thus a lower *GI* value than that same bread would have had right after baking. Reheating a previously cooked and subsequently frozen meal lowers the *GI* as well. After defrosting bread its *GI* remains lower than it had been originally. Cold pasta or potato salad cause a lesser rise in blood sugar than they do newly cooked.

h) The blood sugar effect of high-*GI* carbohydrates can be partly evened out by combining them with fiber-rich foods or with low-*GI* carbohydrates.

i) Even though combining animal protein with fast-absorbing carbohydrates does not cause a steep blood sugar rise, consuming them together triggers a particularly intense insulin outpour (more about that in Chapter 3.2). A high insulin output impacts metabolism *anabolically* and will be evidenced by the accumulation of fat in tissues and by increased cell division. It causes blood sugar to drop shortly after eating a meal, and that is the most intense flare-up signal for feelings of ravenous hunger. Especially troublesome in that respect are frosted flakes with milk, fruit yogurt, white rolls with cheese or cold cuts, steak and potatoes, hamburgers, gummy bears, milk chocolate, and the like.

j) A colorful main meal should feature three or more types of plants. Pick several colors because the eyes eat too. Lunch could, for instance, be one part carbohydrate-rich and two parts varicolored vegetables along with a protein-rich vegetable dish. Here is a sample menu: Sweet potatoes with diced zucchini and crushed tomatoes en-

hanced with a few strips of herbed tofu. In some such way, different kinds of vegetables can be arranged into colorful, tasty, voluminous, and satisfying meals low in energy and brimming with micronutrients.

k) You should eat 1 – 2 servings (= a large fistful) of raw vegetables every day. One way to do that is to eat carrot sticks, cucumbers, kohlrabi, celery stalks, or sliced peppers for breakfast or during your lunch break.

l) Fiber bulks up and will support normal digestion. The daily minimum of 30 g is easily achieved with a colorful variegated plant-based diet.

m) Our body assesses its degree of satisfaction not just by a meal's energy content but also by the volume ingested.

A tip: Add foods with a high water content to your meals. Since their higher volume signals the body that it has taken up enough energy, satiety will occur more quickly.

In practice, simply put homemade vegetable soup and low-fat stew on your menu. *Do* salt as needed (using a sodium-reduced, potassium-rich surrogate) but at the table, not during cooking.

3) Choose low energy-density, high micronutrient-density foods that are low in sodium and high in potassium.

a) A food's energy-density is indicated by how much energy one gram of it yields. It is calculated on the basis of energy content, *i.e. kilocalories* (kcal) or *kilojoules* (kJ), and weight. Energy-density is thus described as either kcal/100 g or kJ/100 g.

Foods with high energy-density supply more energy per gram consumed than foods with low energy-density. Up to 1.5 kcal/g counts as low energy-density, 1.6 – 2.5 kcal/g as middle energy-density, and upward from 2.6 kcal/g as high energy-density (*cf.* Table 8). As an example, broccoli has low energy-density (0.35 kcal/g) whereas milk chocolate has high energy-density (5.3 kcal/g).

— By contrast with classic measure Dr. Jacob's food table defines energy-density very narrowly. Category 1 foods will therefore exhibit an energy-density of *ca.* 0.2 kcal/g to maximally 0.5 kcal/g.

Table 8: Classic distribution of food energy-density (This does not apply to beverages.)

Energy-density	kcal/g	kcal/100g	Examples	Recommendations
Low	up to 1.5	up to 150	Broccoli, apples, kiwi, cooked pasta (especially *al dente*)	Eat to satisfaction
Middle	1.6 – 2.5	160 – 250	Whole grain bread	Eat only moderate amounts
High	above 2.6	above 260	Rolls, cake, sweets, chips	Eat only small amounts

b) A practical rule for examining food labels: Is the kcal/100 g figure higher than 100 kcal/100 g or ml (>1:1)? When it is higher, the food should be consumed in only limited quantity. When it is lower, the product has low energy-density. The energy value of beverages should be less than 25 kcal/100 ml.

c) Carbohydrate-rich and protein-rich plants such as legumes have higher energy-density than other vegetables and many types of fruit. The low energy-density category 1 foods constitute the bulk of food volume in *Dr. Jacob's Way*. Foods from category 1 should thus be eaten **"as much as possible"**.

   A high water content usually indicates low energy-density/high micronutrient-density as well. Beverages are the exception, especially those sweetened with sucrose or fructose. Energy-density must be closely monitored when choosing a beverage. Water supplies no energy.

d) It is the total energy balance that ultimately matters. In the case of normally active women 2,000 calories per day are sufficient to maintain optimal energy balance, and men need about 2,300 calories per day.

e) Eat more AND weigh less! Watching calories does not automatically mean eating a lesser quantity or volume of food. Instead, it entails taking in less energy while at the same time eating an equal or greater volume of food.

f) To provide an example, the average daily energy need of 2,000 calories could be met through eating either 3.5 bars (350 g) of chocolate or 9,000 g of broccoli (!) The rule of thumb for this is that carbohydrates and protein deliver foods at approximately 4 kcal/g.

g) Fat takes credit for packing more than twice the energy content with 9 kcal/g. Good and lasting satiety can be obtained by eating a large volume of low-energy foods (= vegetables, whole grain products, and plant protein).

h) Avoid snacking and nibbling on energy-dense foods. These provoke an insulin surge that will make fat reduction impossible. You can nibble on foods from category 1to your heart's content without having to worry.

i) Eat fat-poor but not fat-free. Moderate amounts of fat and oil are an important medium for fat-soluble vitamins. They also decrease both blood sugar and the insulin response, supply essential fatty acids, and are the most important flavor mediator. Because fats have the highest energy-density (over 9 kcal/g) they must be used sparingly if the goal is to reduce or maintain weight.

j) Plant oils should be preferred and always used with discretion. Plant oils are rich in healthy monounsaturated (*e.g.* olive oil) and polyunsaturated (*e.g.* safflower oil) fatty acids. Oils naturally high in important omega-3 fatty acids (linseed, hemp, canola, chia, *etc.*) should be consumed regularly but not in excess of one tablespoon per day. Better yet are two table spoons a day of freshly ground linseeds or a handful of freshly shelled walnuts (watch out for rancidity).

   Unsaturated fatty acids are oxidation prone and sensitive to light and heat. Due to their carbon double bonds they not only will quickly turn rancid in bottles and capsules but must also be shielded against rapid oxidation within the body. For that reason they can carry out their protective function only when there is also a concurrent intake of sufficient antioxidants. That is true for *alpha-linolenic acid (ALA)* from seeds or meat, *eicosapentaenoic acid (EPA)* from sea weed/algae or fish/fish oil, and *docosahexaenoic acid (DHA)* from seaweed/algae or fish/fish oil.

   Rancidity in any of these oils can be easily detected by smell or taste, and the oil must not be consumed if that has occurred. Only non-oxidized omega-3 fatty acids will support health. Once oxidized, they inflict damage.

k) Low energy-density plant-based foods, among them lentils, beans, chickpeas, and soy beans, deliver much potassium, many additional minerals, trace minerals, and vitamins, as well as health-supporting protein that will satiate for a long period while burdening the kidneys considerably less than animal protein (which moreover also fosters *insulin resistance*).

l) Plant-sourced protein is preferable over animal-sourced protein. Begin with salad, vegetables, or soup and then eat the meal's most protein-rich component in order to obtain the greatest satiety effect.

   Nuts also are protein-rich and make for a good alternative to chips and other empty calories foods, as long as they are eaten *instead of* and not *in addition* to these. Combining protein-rich foods with fast-absorbing carbohydrates must be avoided because it provokes a massive insulin release.

m) Foodstuffs that contain acetic or lactic acid reduce both blood sugar and insulin responses and thereby support a healthy metabolism.

n) Heavily processed fats and greasy food products (deep-fried, fried, smoked, ready-to-eat, *etc.*) often carry large amounts of partially hydrogenated fats, saturated fatty acids, transfatty acids, and *AGEs*.

   These negatively affect blood-fat levels and should be shunned as much as possible (category 4 in the food pyramid). Saturated fats regularly appear in animal products (bacon, pâtés), coconut fat, palm kernel fat, shortening, margarine, deep-fried food, ready-to-eat meals, cocoa butter, and chocolate.

o) If you simply cannot live without meat or milk products you should choose low-fat varieties (reduced-fat milk, low-fat cottage cheese, low-fat kefir) and keep consumption of these foods at a minimum. Sheep and goat milk products are frequently better-tolerated than those made from cow's milk, by the way.

p) Cow's milk is best replaced with a plant-sourced and unsweetened alternative made from soy, oats, almonds, hazelnuts, *etc.*

q) Not only fatty foods have high energy-density, sugary desserts and sweets do as well. For this reason they are located in category 4 (**"better not at all"**) of Dr. Jacob's food pyramid. Avoid putting high energy-density foods on your menu every day, if at all. Counted among these are alcohol, nibbles, and chips of any variety.

r) Although sugar derives from plants, industrial sugar in connection with a fatty diet is eminently responsible for abdominal and liver fat accumulations. Forms of industrial sugar bear such fantasy-rich names as apple juice concentrate or grape juice concentrate. Nevertheless, they are properly categorized in the food pyramid.

12.4.1 Important Addenda

Know your **body's needs** and the difference between cravings and hunger.

Each human is different and has thus different preferences, but through targeted appetite the body signals what it needs and through hunger the ideal frequency of meals. It also communicates what it can tolerate and what should be avoided (*cf.* Intolerances).

But because most people of us have by now largely lost our natural instincts, we must first learn again to tell cravings for addictive foods from real hunger and restore our innate sense of what is good for us. In today's climate of deception we will be better off using common sense for this rather than obeying the dictates of our culinary whims that are being constantly reinforced by flavor enhancers, artificial flavors, sugar, and salt.

Three daily meals at regular times support health and optimal weight.

A regulated mealtime rhythm of three daily meals with maximally two lightly *insulinogenic* snacks from category 1 makes it easier for the body to sequence the metabolic phases of digestion, absorption, distribution, elimination, and rest, meet its energy requirements, and keep the complex feedback systems intact that control all breaking down and structuring processes. Even a cup of coffee with milk and sugar is a typical *insulinogenic* snack of the kind that will eventually bring on chronically elevated insulin levels and prevent any successful attempt at fat reduction.

Adapt meal composition to the body's actual needs.

Consider your body's changing diurnal needs when you configure your daily meals. Through most of the day it needs energy for carrying out its multitudinous functions. That energy is more effectively delivered through complex carbohydrates than through protein or fat. Oats are an ideal food in that respect. At night, cell construction and regeneration predominate. The evening meal is thus meant to supply the protein needed for these structuring activities.

The day's final meal should be the most protein-rich and contain the fewest carbohydrates and fats. Lightly stir-fried vegetables with tofu would be a good ensemble.

Good preparation methods ensure healthy meals.

— *Chewing is one half of digestion*. Good mastication is the first step in readying raw foods for metabolization, and nutrients-preserving preparation is equally important.

Creating varied plant-based meals is easy and not at all time consuming. A delectable dinner that can be put together in as little as 20 – 30 minutes will keep you filled and satisfied for a long time. Vegetables should be cooked (preferably steamed) for the shortest possible time in order to preserve their valuable micronutrients and pleasure-giving flavors. This will keep the food still chew-worthy at mealtime and its vital substances available for absorption.

Use different good ways of cooking food to create a varied cuisine.

- *Stew* it in its own juice or in just a little fluid.
- *Simmer* after bringing it to a boil; the hot plate ought to be (nearly) turned off and only residual heat used — for instance with rice, buckwheat, millet, or potatoes.
- *Bake* it in the oven.
- *Lively roast* it in an enamel or ceramic pan. Cut food into cooking-ready small pieces an briefly toss or stir-fry them in a hot pan; add ingredients approximately 30 seconds apart (*e.g.* first tofu strips, then vegetables, then spices/sprouts).
- *Briskly cook* it in a small amount of fluid and only to *al dente*.

Little or no fat need be used in these preparation methods, and vegetables must retain their crisp consistency. For light browning use a ceramic pan, never Teflon. Now there are double-coated ceramic pans that have stick-free properties comparable to Teflon. Use only 1 – 2 table spoons of oil when necessary.

Cooking oils such as high oleic sunflower oil are ideal for light frying. Oils rich in omega-3 fatty acids must not be heated because that will destroy their valuable contents and even render them harmful to health. It is best to use such types of oil for salad dressings or as a topping to be sprayed on after cooking.

The omega-3 oils include linseed, hemp, walnut, pumpkin seed, argan, and extra virgin olive.

Fat is the major flavor medium, but overweight persons should use it only sparingly. Keep the harmful saturated fatty acids found in animal-based foods out of your kitchen. Nuts and seeds make many flavor variations possible as well. Sprouts and minced fresh herbs sprinkled on a dish just before serving also offer surprisingly tasty and colorful additions.

Make enjoying your food a part of the dietary transformation.

To consciously savor your food with every sense entails deliberately taking the time to devote attention to your mealtime experience and foregoing such distractions as watching TV while eating. Mentally go through the checklist, "What is this food's aroma? Which colors, shapes, and textures can I recognize? How differently does each ingredient affect my sense of taste?" Know that food develops its full flavor only during chewing.

— Value your food for it will become part of your body. Conversely, before you consider eating a food item ask yourself whether you really want this to become a part of you.

Don't miss noticing when you have eaten enough.

Become aware of satiety in time. You should stop eating with the first sign of its arrival. Here is a tip from India's ancient healing science of *Ayurveda* and from the Okinawans' practical life philosophy: Eat only until the first burp. The stomach will then be about 80 percent full.

The diameter of your plate affects the size of portions and the caloric energy intake.

Rolls *et al.* (2002a, 2004a and b, 2006) conducted a series of experiments to investigate what effect portion sizes might have on the quantity of food that will be consumed.

One study served 51 men and women lunch entrées of macaroni and cheese. On alternate days study participants were served 500, 625, 750, or 1,000 g of the entrée. When the largest portion was offered to the subjects they consumed 30% more energy (676 kJ) than they did on days with the smallest portion size (Rolls *et al.*, 2002a). Subjects in another study could eat to their hearts' content from sandwiches alternately presented in 6, 8, 10, or 12 inch sizes. Women took in 74 kcal or 12% and men 186 kcal or 23% more energy when sandwiches were offered in 12-inch size than they did with the 8-inch size. The largest-to-smallest comparison saw a 665 kJ; 159 kcal or 31% higher energy intake when women ate sandwiches served in 12-inch size than what they took in when the 6-inch size was offered. In the same comparison men took in 1,485 kJ; 355 kcal or 56% more energy (Rolls et al., 2004a). The clincher was that despite the clearly different quantities of food eaten on alternating days, both studies' participants assessed their sense of satiety as equally satisfactory. In other words, subjects in the first study experienced the 500 g entrée as no less filling than the 1,000 g entrée with its 30% higher energy. And the subjects in the second study reported having felt just as satisfied with the 6-inch sandwiches as they had with the 12-inch even though the latter supplied 31% and 56% more energy respectively.

Larger package correlated with higher energy intake in a study using weight-differentiated bags. Participants could eat unlimited potato chips out of opaque, unlabeled bags alternately weighing 28, 42, 85, 128, or 170 g. Three hours later they ate dinner, again without limits. In both men and women the larger size bag induced more snack consumption and higher total energy intake from the snack/dinner combination. When participants had eaten potato chips in the largest size bag they took in 596 kJ; 143 kcal more total energy than they did when their potato chips had come in the smallest bag. In one specific contrast women ate 18% and men 37% more potato chips from 170 g bags than they did from 85 g bags (Rolls *et al.*, 2004b).

A restaurant study served pasta entrées varying on alternate days between the standard portion of 248 g and a larger portion of 377 g which included a 50% larger appetizer at the same price. Entrées were covertly weighed before and after each meal. Eating on days when the larger entrée was served resulted in a 719 kJ; 172 kcal or 43% higher energy intake by comparison with eating on days when the standard portion entrée was served. Counting the entire meal, the energy intake increase was 664 kJ; 159 kcal or 25%. But as with the two previous studies, customers reported no difference in their subjective experience of the meals. Despite the clear objective differences, they rated both the portion sizes and the quantities of the

food they had consumed as having been appropriate and commensurate with their expectations surrounding restaurant experiences (Diliberti *et al.*, 2004).

One way to turn the portion-size effect to one's advantage is to reduce food's energy-density. Various studies demonstrated that the consumption of low energy-density foods like vegetables, fruit, and soups results in the same level of satiety but at reduced energy intake. This strategy was successfully applied in a yearlong study into the treatment of obesity. Two groups of obese women were told to reduce their fat intake. One of the groups was additionally instructed to eat more water-rich foods of low energy-density such as vegetables, fruit, and soups. Six months into the trial that second group measured a 33% greater weight loss even though they had consumed 25% more food than the other.

Either strategy proved effective for maintaining stable weight during the second six months of the study, but it was concluded that adding water-rich foods further reduces energy-density and combats hunger more effectively (Ello-Martin *et al.*, 2007). Eating satisfying portions of foods with low energy- density can help produce satiety and control hunger while at the same time keeping the energy intake low and thus contribute to weight loss success (Ello-Martin *et al.*, 2005). Always serve normal-sized portions — neither too large nor too small — and choose primarily foods with low energy-density.

Here are some practical tips on making your meals both healthy and delicious:

Seasoning: Seasoning, seasoning, seasoning is the secret of a delectable meal. Let yourself discover the great variety of fresh or frozen herbs and spices that are especially healthy but little known in German cuisine.

Acetic or lactic acid: Foods containing these can also be recommended unless they are too sweet or too salty. A sodium-poor and potassium-rich mix of mineral salts is a healthy substitute for unhealthy common table salt.

Potatoes: These tubers are actually not vegetables but rather a carbohydrate source. In 1900, Germans consumed 750 g of potatoes daily. Unpeeled potatoes are fine to eat, as is potato salad with a little oil (but no mayonnaise). They both are low to medium on the *glycemic index*, contain much water, and are potassium-rich. Mealy potatoes are less suitable due to their higher *GI*. Really bad are fried potatoes, French fries, and potato chips.

Grain products: These should always be cooked *al dente*, meaning still firm-to-the-bite. Firm-to-the-bite Italian pasta made from durum wheat causes blood sugar and insulin to rise only mildly. Avoid egg-noodle products such as ravioli or spaetzle. Rice comes in a rich assortment. White rice and white basmati rice drive up blood sugar, brown rice less so. Wild rice is best and is comparable to quinoa.

Experiment: Try less common varieties of grains such as oat groats, quinoa, wild rice, millet, spelt, green spelt, and buckwheat. Oat groats and rolled oats are filling and are among the Germany's healthiest grains. Packaged muesli, on the other hand, contains too much sugar.

Bread: Choose genuine whole grain baked goods with a fiber content of at least 9 –15% like, for instance, linseed bread. The occasional piece of whole wheat toast is also acceptable. A good information source with regard to other foods as well is http://das-ist-drin.de.

Sweets: These should actually be regarded as delicacies rather than as food proper and must only be eaten as part of a main meal (dessert). Dark chocolate soy dessert is not the healthiest of foods, but it is a tasty and considerably less unhealthy alternative to a bar of chocolate.

Fruit: Organically grown fruit serves as a healthy replacement for sweets and is also good for snacking. Most types of fruit are in category 1. Exceptions are dried fruit, melons, grapes, bananas, and other particularly sugar-rich fruit. Liquefied fruit should always be diluted with 2/3 water because fruit's own sugar in smoothies or juices will quickly flood the blood.

Sauces: Red sauces are generally preferable since they are typically vegetable-based and are lower in energy than white or brown sauces that often contain cream, fat, or cheese. Enhance the flavor and appeal of your vegetables and tofu dishes with chutneys and home-made marinades. It will encourage you to experiment and also help you keep your meals' calorie count low. Being creative and enjoying your food preparation are an important aspect of a health-promoting diet and lifestyle.

Bread spreads: Replace spreadable fats with tomato paste, vegetable pastes, and herbs. Instead of cold cuts or cheese, serve vegetable pâtés (made with nutritional yeast) or almonds, mustard, sprouts, herbs, tomatoes, and cucumbers or other sliced/diced vegetables. Learn to enjoy stevia-sweetened fruit spreads in place of sugar-loaded jam.

Milk products: These unhealthy sources of animal protein and saturated fat may be readily replaced by plant-derived alternatives — for example milk and cream made with soy or oats.

Meat substitutes: Tofu, seitan (wheat), and sweet lupines appear in a variety of meat replacement preparations that can make the transition phase easier. You will find many products of this sort in well-inventoried supermarkets and health food stores. Tofu is available in pre-seasoned forms, for instance as wild garlic tofu. Do avoid smoked foods as well as products high in energy, saturated fatty acids, and salt.

When purchasing food stuffs, insist upon the highest possible quality.

Among the most important shopping criteria are premium quality, visible freshness, proper ripeness, local origin whenever possible, and minimal commercial processing. In that connection, the *EU-bio seal* is not able to assure freshness and quality to the same degree as recognized organic growers' cooperatives like *Naturland*, *Bioland*, or *Demeter* that must meet more stringent criteria. Giving uncut food items a thorough washing is always good since pollutants often adhere to the skin. Washing with hot water and vegetable-based soap can significantly reduce that problem. Soaking in vinegar water (1 Tsp. per cup of water) prior to washing will improves the solubility of some harmful residues so that they can subsequently be rinsed off more easily.

For the wax or grease often used on apples and cucumbers an emulsifying type of soap is needed. If, however, toxic petrochemicals have already diffused through the skin of fruit or vegetables these cleansing methods are not going to significantly help.

Choose organic foods whenever possible.

You should choose organically grown foods, but when cost is an issue it is better to buy conventionally grown produce than to restrict your consumption of fruit and vegetables in order

to avoid toxins. Animal-based foods are definitely not a better alternative since animal tissues accumulate all the toxic substances that have been moved up the food chain.

Overweight individuals with amalgam dental fillings must be careful.

Overweight people who have several amalgam fillings should reduce their weight more gradually since slimming releases mercury stores from fat tissues. Sweating helps with this if you allow yourself to sweat intensively for 10 – 15 minutes and thoroughly shower afterwards. You should also drink 2 – 3 liters of pure water, plus unsweetened green or herbal tea during weight reduction. In addition, increase your intake of plant protein *(cysteine)* or whey protein, omega-3 fatty acids, selenium, green-leafed vegetables, chlorella, alkaline-forming minerals, and sulfur sources such as garlic or wild garlic.

Dental amalgam should be manually removed only by experts in the procedure and with a strict safety protocol in place. Professionally supervised heavy metals detoxification as, for instance, with *DMPS* is a sensible and often necessary course of action (*cf.* appendix).

12.4.2 Intolerances and Allergies

An intolerance or allergy may exist if the consumption of a food is followed by problems like stomach pain, nausea, cramps, bloating, diarrhea, headaches, or rapid pulse. During the dietary change-over particular attention should be paid to intolerances and allergies. The following section briefly reviews the most frequently occurring food intolerances.

Fructose Malabsorption

Fructose is a monosaccharide with a per-day-absorbability limit of 35 – 50 g. Its absorption in the small intestine occurs through passive diffusion and *via* the *GLUT*5 transporter. It is estimated that every third grownup and two of three infants are affected by fructose malabsorption in varying degrees of severity. Fructose malabsorption is an intolerance reaction following consumption of fewer than 25 g per day marked by gastrointestinal complaints caused by faulty absorption in the small intestine (Schäfer *et al*., 2010). If shortly after ingesting fructose, apple juice, or fruit (*e.g.* pears) the gastrointestinal tract suffers discomforts like, for instance, bloating, irregular stool, soft stool, or diarrhea, fructose malabsorption may be present. Ingested fruit sugar is not absorbed fast enough by the small intestine and moves into the colon instead. Intestinal bacteria convert it with concomitant gas formation. Free fructose molecules go on to develop a hydration shell that subsequently liquefies the stool. If abstention from or reduction of fruit sugar is indicated, consideration must also be given to sugar alcohols like sorbitol and mannitol, along with oligofructose and inulin. When there is fructose malabsorption, sorbitol-containing types of fruit (*e.g.* stone fruit) should be avoided or strictly limited. Xylitol-sweetening is often well tolerated. Fructose absorption can be aided by concurrent glucose intake. (One instance would be to dust strawberries with a pinch of grape sugar.) But better than using this stopgap measure is to eliminate or reduce fructose.

The fructose/glucose ratio must be monitored.

Fructose malabsorption is strongly impacted by a given food's fructose-to-glucose ratio. Fruit and fruit juices that have a high sorbitol content or are distinguished by a greater proportion of fructose than of glucose are especially problematic in cases of fructose malabsorption. It presents a serious menace to public well-being that fructose is being ever more frequently used in packaged meals, diet products, and so-called fruit drinks. Sorbitol-compounded sweeteners and chewing gum with sorbitol should be avoided because sorbitol obstructs the *GLUT*5 transporter. After an initial moderate fructose reduction the individual fructose tolerance threshold must be established and then not exceeded in the diet.

Switching to a fructose-modified diet may improve the malabsorption problem.

In the official position statement paper (Schäfer *et al*., 2010) of the *Deutsche Gesellschaft für Allergologie und klinische Immunologie (German Society of Allergology and Clinical Immunology)* the explanation is given that the nutritional switch to a fructose-modified diet leads to improved fructose tolerance in fructose malabsorbers. . . . *Recommendations for a fructose-free diet that orient themselves primarily toward the fructose content of food are not expedient in the treatment of fructose malabsorption.* Put concretely, an apple is often still tolerated whereas a glass of apple juice with a sorbitol chewing gum is not. Fruit, by the way, tends to be better handled after a meal.

Histamine Intolerance

Histamine intolerance *(HIT)* is not an allergy but an imbalance characterized by excess histamine. Since histamine is normally released as a mediator in (genuine) allergies, *HIT* symptoms resemble those of an allergy. *HIT* has many causes and appears in various degrees of severity. One cause is malfunction or under-activity of *diamine oxidase (DAO)*, the enzyme that breaks down histamine. When *diamine oxidase* underfunctions, endogenic histamine levels will rise and cause allergy-like symptoms.

HIT symptoms also result from histamine liberators, foods whose consumption stimulates release of the body's own histamine. Among them are citrus fruit and foods containing glutamate, nitrate, and sulfite.

Alcohol and cocoa inhibit diamine oxidase and may provoke *HIT*. Consumed in combination they can induce headaches and gastrointestinal troubles, all the way to uticaria, cardiovascular disorders, and asthma. Aged cheese, preserved or smoked foods, red wine, and ocean fish can also cause *HIT* symptoms through the agency of their own high histamine content.

Lactose Intolerance

Whenever stomach ache, cramping flatulence, nausea, or spontaneous diarrhea follow the consumption of milk or milk products the cause frequently is lactose intolerance. This is not an allergic reaction but a lack of or dysfunction of the enzyme lactase in the small intestine.

Lactase splits the *disaccharide* lactose into the *monosaccharides* glucose and galactose that are then absorbed by the small intestine. When lactose enters the colon partially digested the colon flora eventually reduces it to, among others, lactate and the gases H_2, CO_2, and CH_4. The so liberated gases produce flatulence while the lactate molecules develop a hydration shell that can provoke osmotic diarrhea.

With milk sugar intolerance a small amount of lactose is often still tolerated, but dairy products should nevertheless be banned from the menu and replaced by lactose-free alternatives from plant sources. It is always advisable to look for "hidden" lactose in ready-to-eat meals, luncheon meat, dressings, and seasoning sauces. Cow's milk proteins are a potentially much larger problem because of the widespread prevalence of allergies to them. Lactose-free milk products present no solution to that problem.

Allergies

The increasing availability of soy-based meat substitutes makes their use tempting. Even so, animal-based foods should not be replaced exclusively by soy products. Like any unbalanced diet, one that overemphasizes soy products cannot be healthy. Susceptible persons, and particularly those shouldering a high stress burden run risk of developing a soy allergy from a one-sided dietary use of soy derivatives.

Perpetual stress and its metabolic repercussions increase the intestinal wall's permeability. The condition known as leaky gut syndrome permits undigested proteins to cross the intestinal wall and pass into the blood. The immune system then develops antibodies against the intruding allergenic food proteins, which results in an overkill immune reaction (= allergy) against protein, a necessary nutrient.

With stress levels and protein consumption both high, delicately constituted persons can easily develop allergies, for example to wheat gluten, cow's milk, eggs, and soy. To minimize the incurrence of intolerances or allergies it is wise to discontinue stockpiling proteins, diversify the spectrum of protein sources, and reduce the occurrence of stress. Since leaky gut syndrome is at the pathogenic center, successful restoration of the intestinal mucosa will likely resolve most food allergies.

12.5 Targeted Correction of a One-sided Diet

What the initial steps of adapting to *Dr. Jacob's Way* should be depends on a person's condition at the outset. In general, however, the return of health will occur more quickly and be evidenced more clearly, the more fully you adopt the plan's dietary and lifestyle principles. Your degree of compliance is subject to psychological and various physical constraints such as the presence of disease, food preferences/antipathies, relative balance of acids/bases and minerals, insulin regulation, and antioxidative status. If you enter *Dr. Jacob's Way* from a previously acid-forming, micronutrient-poor diet of foods from mainly categories 3 and 4, your need for specific nutritional substances may be greater. In such a case, deficits must be assessed on the basis of a dietary inventory and possibly a blood analysis, and then targeted for correction. Compensatory intervention is oriented on the theoretical optimum of Dr. Jacob's food pyramid. Figure 17 below reviews the likely consequences of a longstanding one-sided diet. It illumines the anti-metabolic deficits and surpluses resulting on one hand from excessive use of foods like those in categories 3 and 4, and on the other hand from giving foods like those in categories 1 and 2 insufficient consideration in the daily diet.

Categories		Foods	Possible Consequences of Permanently *Unbalanced* Consumption
4	avoid	Meat, sausage, fast food, chips, soft drinks, sweets, sugar, fat, whole milk products (e.g. heavy cream, cheese, butter), salt, alcoholic drinks, etc.	**Surplus** of energy, saturated and transfatty acids, cholesterol, purines, AGEs, animal protein, sugar, salt **Deficit** of antioxidants, fiber, phytonutrients, essential fatty acids, certain vitamins and minerals
3	rarely	Milk products, fish, luxuries (e.g. wine, beer), carbohydrates with high glycemic index (e.g. white flour)	**Surplus** of energy, saturated fatty acids, cholesterol, AGEs, animal protein, sugar **Deficit** of antioxidants, fiber, phytonutrients, certain vitamins and minerals
2	moderately	Complex carbohydrates with low/middle glycemic index (e.g. whole grains, legumes, nuts, etc.)	**Deficit** of vitamin B12 and, as the case may be, choline
1	much	Vegetables, herbs, spices, berries, most types of fruit Additionally: About 2 liters of water, herbal tea, green tea	**Deficit** of vitamin B12, choline and possibly iron and protein

Figure 17: **Nutrient and micronutrient supply according to Dr. Jacob's food pyramid (left) and possi**ble surpluses and deficits (right)

Individual requirements related to diseases, allergies, intolerances, or pregnancy are not addressed in this presentation. The arrows in the right column here stand for surpluses and/or deficits of the most important macro and micronutrients that may arise from a one-sided diet overemphasizing foods from the respective category in the pyramid. Our bodies can generally deal better with a deficit than a surplus. This means that any existing deficits are remedied more readily than overages. Nevertheless, deficits should be compensated for as soon as they are recognized and properly diagnosed. If the diet has thus far been dominated by foods from category 4 the surplus intake involves for the most part energy, saturated fats, animal protein, non-volatile acids, *AGEs*, purines, cholesterol, oxidants (iron, for instance), toxins accumulated during animal fattening, sugar, and excessive salt.

Conversely, the intake of alkaline substances such as fiber, vitamins, and antioxidants has likely fallen short. Given this unbalanced situation, the acid/alkaline, *redox*, and insulin households have fallen out of equilibrium and must therefore be restored to optimum.

Similar constraints apply to a diet overly focused on foods from category 3. Here though it is necessary to individually check which and how many areas are in need of balancing. In either instance healthier alternatives ought to be identified in categories 1 and 2 and increasingly added to replace foods that had up to now come from categories 4 and 3.

In order to counter the heavy taxation that overeating on the one hand and the undersupply of minerals, alkaline substances, and antioxidants on the other inflict upon metabolism it is advisable to correct existing imbalances by eating the right kinds of food or, if necessary, taking nutritional supplements.

Compensatory activity must be directly concerned with the restoration of individual dietary components in Dr. Jacob's concept of balance (cf. Figure 12).

The discussion below focuses upon a number of corrective measures by means of which targeted nutritional adjustments can resolve a disequilibrium affecting the *redox*, acid/alkaline, and insulin balances.

12.5.1 Correcting Insulin, Acid/Alkaline and *Redox* Imbalances

Correction — Insulin Balance

It is critically important to adhere to the natural fasting period between meals and to regularly engage in physical movement. Muscular activity disbands *insulin resistance* and boosts metabolism. Only lightly *insulinogenic* snacks from category 1 may be eaten. If good insulin balance is to be achieved consumption of rapidly absorbed carbohydrates like white flour and all types of isolated sugar must be restricted — especially in combination with animal protein. This will prevent the occurrence of strongly *anabolic* insulin peaks.

Food labels often obscure the presence of sugar with designations hard to recognize for lay persons. Even just pointing out that names of sugar compounds often end with the syllable *"ose"* is helpful in that regard. To dress glucose and fructose in a natural guise designations like "concentrated apple or grape juice" are used even though the substances are no longer related to actual fruit. Energy-poor natural sweeteners like stevia extract, xylitol, and erythritol can help to palatably reduce sugar consumption through beverages.

In order to curb insulin peaks or chronically elevated blood insulin levels it is not sufficient to merely avoid eating simple carbohydrates and animal protein. The proportion of dietary fiber must be raised as well, and that is only doable with plant-based foods. A fiber-rich meal gets digested more slowly, will gently stimulate peristalsis, and is prerequisite to maintaining a healthy intestinal flora. Soluble fibers required for regulating blood sugar and cholesterol levels following a meal are found in acacia *(arabinogalactan)*, linseeds, psyllium seed husks, oats *(beta glucan),* and such tubers as Jerusalem artichoke (inulin).

Unlike inulin and oligofructose, acacia fiber is also well-tolerated by fructose malabsorbers.

Correction — Balance of Base Compounds

A higher requirement of bases can result from increased stress, shallow breathing, one-sided diet, metabolic disease, competitive sports, smoking, or alcohol consumption. Chapter 12.7.4 addresses more closely the role of breathing and relaxation in maintaining pH balance.

Nutrition and *potential renal acid load*

Our food's mineral contents underwent great change during the course of industrialization. The original human diet emphasized plant-based foods and had many alkaline-forming minerals like potassium, calcium, and magnesium. It was also poor in sodium.

Potential renal acid load is expressed as positive or negative *PRAL*. The higher a food's *PRAL* value, the more acids the kidneys will have to process. On account of their sulfur-containing

amino acids, sulfates, phosphates, and corresponding lack of alkaline-forming minerals the positive *PRAL* foods in categories 3 and 4 are acid-forming and damage the kidneys whereas the negative *PRAL* foods in category 1 are alkaline-forming and benefit them.

The diagnostic of disorders in the acid/alkaline household is complex.

While one-time urine pH tests are of little use, those spread over a number of days (establishing a daily profile) may yield indications of the metabolic acid load and the acid elimination capacity of the kidneys. An experienced therapist can correctly interpret the day profile as an overview of dietary and lifestyle habits.

A natural alkaline balance is best achieved through dietary and lifestyle changes.

If during phases of a one-sided mineral-poor diet you resort to an alkalinizing preparation, it is advisable that it be modeled in accord with the mineral composition of vegetables and fruit: Little sodium, much potassium, calcium, and magnesium in a 3:2 ratio (such as in vegetables and fruit), vitamin D, and zinc. These support the acid/alkaline metabolism.

The natural sodium/potassium ratio

We use about 25% (with respect to the resting state) of our total physical energy to operate the sodium-potassium pump that pumps potassium into the cell and sodium out of it.

Achieving an optimal ratio of sodium and potassium is correspondingly important for proper cellular functioning. During the Stone Age, and among indigenous peoples even today, the diet contained 10.5 g potassium and only 0.8 g sodium. But in our time the potassium-to-sodium ratio has shifted toward sodium by a factor of 30 (Frassetto *et al*., 2001). The *American Heart Association*, the U.S. *Food and Nutrition Board*, and the Canadian *National Institute of Nutrition* consider 4,700 mg potassium per day necessary for adult health and counsel reduction of sodium to a maximum 1.5 g (= 3.75 g salt) per day. Over 75% of German men and 95% of women do not achieve this recommended dietary allowance of potassium. The recommended maximum for sodium gets, however, clearly overstepped by 95% of men and 90% of women. In light of the significance of keeping up normal blood pressure the EU's recommended daily dose of 2,000 mg potassium is far too low.

Potassium

Potassium is a very important mineral that is usually eliminated through the kidneys. It keeps these healthy by lowering renal ammonia formation. In persons with disorders of the potassium household, for instance due to kidney failure, long-standing *diabetes mellitus*, or use of certain medications, increasing potassium intake may cause too high a blood level of potassium (*cf.* Chapter 7.3.3).

Anyone who has heretofore lived potassium-poor and sodium-rich should first reduce salt consumption, then gradually — over the span of 2 weeks —increase potassium intake. That will give the kidneys time to adjust. Potassium is plentiful in vegetables, fruit, and nuts.

Sodium chloride gets eliminated *via* perspiration. If one sweats a lot, curtailing salt intake is thus less imperative.

When sodium-eliminating diuretics are taken they should strictly be dosed in consultation with a physician and in accord with one's blood pressure and degree of sodium reduction.

Diuretics will often become superfluous once the underlying imbalance of sodium and potassium is remedied.

The ***American Heart Association's*** tips on sodium reduction (AHA, 2013b):

- As per *AHA,* don't ingest more than 1.5 g, and as per *WHO*, more than 2 g sodium (*i. e.* 5g of salt). The main sources of sodium are seasoning mixes, sausage, bread, ready-to-eat meals, cheese, chips, and snacks.
- Pay attention to the sodium content featured on the Nutrition Facts label, and read the labels on all of your food items. Be alert to sodium aliases such as pickling salt, sodium nitrate, sodium chloride, monosodium glutamate, sodium benzoate, *etc.*
- No salting of food during cooking, only once the meal is on the table and then with a sodium-reduced, potassium-rich salt replacement. In that way you will be able to reduce your sodium intake by 80 percent without having to sacrifice flavor.
- Eat potassium-rich. Potassium is the antagonist of sodium and counteracts its negative effects. So, don't discard the potassium-rich water from cooking vegetables. Use it for sauces and the like, instead.
- Choose sodium-poor mineral water (less than 20 mg sodium/liter).
- Cut down on eating processed foods and ready-to-eat meals.
- Do your own cooking and baking as much as you can. Only then will you really know what is in the food you eat.
- At restaurants ask for salt-free dishes.
- Season your food using fresh and dried herbs. Careful with seasoning mixes! These often contain extra salt.
- Add fresh lemon juice rather than salt to vegetables and fish.
- Regularly work up a sweat. Perspiration-inducing physical activity and saunas promote the elimination of salt.

Correction — *Redox* Balance

Abstention from or at least cutting down on tobacco smoking is indispensable for a smooth *redox* balance. Daily movement and correct breathing provide the oxygen required for clean generation of energy in the mitochondria. Next to cigarette smoking, a hyperenergetic diet is the foremost source of *oxidative stress*. By contrast with this, the daily consumption of vegetables and fruit, herbs and spices — all with a great abundance of phytochemicals — is particularly beneficial in combatting *oxidative stress*.

Antioxidants

In case of only meager dietary inclusion of foods found in categories 1 and 2, or if there is a heightened need for antioxidants due to a disease, the phytonutrients supply is insufficient.

This means that eating foods from category 1 should be ramped up. With an inadequate dietary intake of antioxidants it makes sense to take antioxidants in the form of foodstuff concentrates or natural supplements as needed. The kinds of antioxidants and the best ways of obtaining and/or administering them must be guided by the particular necessities. It is best to take antioxidants not as isolates but rather in their original combination as a plant or an extract with a broad spectrum of phytonutrients. In this regard, and particularly when prevention is the objective, the dosage selected should approximate the supply made available through a balanced plant-based whole foods diet.

Phytonutrients, polyphenols

It is true for phytonutrients as well that overdosing does not necessarily accomplish more and could possibly be even harmful. That applies especially to overdosing with isolates like beta carotene and vitamin E both which may have negative repercussions. By the way, the term antioxidant is misleading as applied to numerous plant substances. A case in point is the anticarcinogenic effect of polyphenols which is mediated by their prooxidative action within cancer cells and by their beneficial stimulation of endogenous antioxidative protection systems within healthy cells. For that reason, polyphenols should be more accurately regarded as *redox* modulators.

Correction — Uncommon Needs

When practiced injudiciously even a purely plant-based diet of foods from mainly categories 1 and 2 may lead to deficiencies. True, too many harmful food constituents are hardly to be expected. What does however often occur in the long run is a deficiency of vitamin B12 and occasionally perhaps also of iron. Both of these will be discussed separately in their own contexts. The consequences could be iron-deficiency anemia, increased *homocysteine*, or neural damage from a protracted vitamin B12 deficiency. Deficiencies of vitamin B12 and iron can be determined *via* blood parameters and corrected by means of consuming foods that are rich in them or, if need be, by taking appropriate nutritional supplements.

When eating raw plant foods results in the absorption of too many antinutritive substances such as, among others, *cyanoglycoside*, *phytohemagglutinin*, *protease inhibitors*, and *phytic acid*, the availability of nutrients could be diminished and deficiencies may consequently result. As a rule though the antinutritive properties are minor and are far outweighed by the health-supporting action of plant foods. Vegans or vegetarians might absorb choline (once called vitamin B4) in inadequate quantity. Choline is a crucial component of both neural tissue (myelin sheaths) and the neurotransmitter *acetylcholine*. It further is important to healthy liver function and homocysteine metabolism. Athletes and pregnant women in particular should make sure that they take in an adequate supply of choline and the related betaine.

Taking medications can raise the need for certain vitamins and vitamin-like compounds.

For example, the use of statins can produce that effect because statins not only hamper the endogenic synthesis of cholesterol but also the synthesis of *ubiquinone*. Supplementation with *ubiquinone (Q10)* is thus indicated at the latest when muscle pains and elevated levels of *creatine kinase* have become apparent. The feared side effects of statins are to a large extent a consequence of their inhibiting *Q10* synthesis. Reduction of sodium is an indispensable

measure in nutritional therapy aimed at supporting normal blood pressure and maintaining a healthy cardiovascular system. The sodium-poor, potassium-rich diet that is a crucial feature of *Dr. Jacob's Way* can help keep blood pressure normal and thus benefit the health of kidneys, blood vessels, and heart, while also lowering the risks of myocardial infarction and stroke. When understood in the context of health-supporting practice this does not only mean to significantly reduce the proportion of salty foods in the daily diet and to plentifully consume potassium-rich vegetables but also to replace common table salt with a potassium-rich and sodium-poor salt alternative.

12.5.2 Vitamin B12 Deficiency

Vitamin B12 shortage is pervasive not only among the known risk groups of elderly persons, vegetarians, vegans, pregnant women, and patients with kidney disease or intestinal disorders. Vitamin B12 is among the stored vitamins, which is why specific clinical symptoms become only apparent when chronic deficiency is already manifest and pronounced. Chronic vitamin B12 deficiency can result in irreversible neurological disorders and hematological alterations like macrocytic anemia and pernicious anemia.

Beginning vitamin B12 deficiency yields only non-specific symptoms, which is why it is often not recognized and treated in time. To catch latent shortage, persons in the risk groups should have their vitamin B12 status tested every two to three years. *Nitrosative stress* is notorious in causing rapid vitamin B12 depletion. If vitamin B is known to be deficient it must be supplemented— initially also in high dosages. Monitoring vitamin B12 status often involves evaluation of total vitamin B12 in the serum, but that is a relatively late-reacting, non-specific marker. To diagnose latent deficiency, functional vitamin B12 markers like *holotranscobalamin (Holo-TC)* or active vitamin B12, *homocysteine*, and *methylmalonic acid* (*MMA*).

Lowered *Holo-TC* levels (<35 pmol/l) in blood point to a negative vitamin B12 balance. A rise in *MMA* (>300 nmol/l) and/or in *homocysteine* concentrations means that vitamin B12 stores are already depleted. A strictly hematological examination without regard for the above mentioned markers may lead to misdiagnosis since microcytic anemia resulting from iron deficiency can mask the macrocytic anemia caused by a vitamin B12 deficiency. High intake of folic acid may also cover-over the hematological consequences of vitamin B12 deficiency (Herrmann and Obeid, 2008).

Specifics of treating vitamin B12 deficiency are determined by **the deficiency's cause.**

With gastrointestinal tract impairment (atrophic gastritis, troubled secretion of the intrinsic factor in the stomach, resection of the terminal ileum) it must be checked whether a highly dosed oral supplementation (*e.g.* 1 – 5 mg per day as sublingual tablets) is sufficient to correct the deficiency or whether intramuscular administration will be required. A highly dosed oral substitution can in most instances achieve similarly good results as an intramuscular supply. The intervention's degree of success should be monitored by laboratory analysis. If the deficit originated in the insufficient intake through food sources and was successfully remedied by highly dosed vitamin B12 administration, a daily dose of 10 µg may already be adequate to subsequently maintain proper levels. A two-year study involving vegans (Rauma *et al*., 1995) proved good bioavailability of vitamin B12 *via* chlorella. Other researchers have confirmed

this, whereas spirulina was not found to be a suitable vitamin B12 source (Kittaka-Katsura *et al*., 2002; Watanabe *et al*., 2002). When the objective is to lower high homocysteine levels, vitamin B12 is not sufficient by itself. Folic acid, vitamin B6, and methyl group donors like choline or betaine will have to be supplemented as well.

12.5.3 Iron Deficiency

It is not very likely for an iron deficiency to occur in persons using a well-rounded plant diet. No conspicuous iron deficiency was detected among Okinawans and China Study subjects who lived on a predominantly plant-based diet. A plant-based whole foods diet rich in vitamin C can optimally meet the body's iron needs and do this in the healthiest manner. Consuming foods rich in vitamin C (e.g. peppers, citrus fruit, and berries) will supports the proper metabolization of iron.

Nonetheless, iron deficiency frequently does occur, even among non-vegetarians, because a one-sided diet with a high proportion of processed food will supply too little iron. When iron deficiency is manifest it has to be corrected, especially in the case of pregnant women. Dietary recommendations for optimizing someone's iron status generally emphasize animal sources since these contain haem iron as Fe^{2+} which is better absorbed in the gastrointestinal tract (resorption quota 10 – 25%) than Fe^{3+} (resorption quota 3 – 8%). Since vitamin C promotes the reaction of Fe^{3+} to Fe^{2+} it is recommended to add foods rich in vitamin C to plant-based meals in order to improve the absorption of plant foods' iron content. Mainstream dietary recommendations for meeting one's iron needs are for the most part to consume more meat, cold cuts, or liver. That kind of advice is not only outdated but was also shown to have detrimental repercussions for one's physical health. Recent research findings (Theil *et al*., 2012; Lönnerdal, 2007) proved that iron needs can be readily filled with a plant-based diet. Contrary to previous beliefs, haem iron, iron salts, and chelated iron are not the only forms of iron the body can utilize. *Ferritin* (stored iron), too, can be absorbed, albeit *via* the different mechanism of *ferritin* endocytosis. *Ferritin* is a protein complex that facilitates iron storage in animals and plants. Iron bound to that protein complex is non-reactive and harmless to the body. One human ferritin complex can bind up to 4,000 iron atoms. The greatest advantage of absorbing ferritin iron in place of other compounds is that it is the least harmful form of iron and the only one existing in the blood in large quantities. Hemoglobin also binds iron to a protein complex (haem iron), but that functional form is more reactive and capable of also binding oxygen. To ensure haem iron's reacting only under control it occurs mainly in erythrocytes endowed with appropriate protective systems, rather than as a free agent in blood.

Haphazard preventive use of iron supplements should be avoided because excess iron promotes arteriosclerosis and carcinogenesis. It is much better to guard against potential iron deficiency with a varied diet of iron-rich plant foods such as parsley and similar herbs, pumpkin seeds, millet, soy, amaranth, oats, chanterelles, sunflower seeds, white beans, peas and other legumes, apricots, and whole grain baked goods. These foods often as much as or even more iron than meat. Sesame seeds have 10 mg iron/100 g, amaranth has 9 mg/100g, and whole wheat (type 1700) has 5 mg/100 g. Pork, by contrast, has only 1.5 – 2 mg/100 g.

12.5.4 Thyroid Function, Hypothyroidism, and Iodine Intake

The very people who hold natural medicine in high esteem will frequently underestimate the significance of iodine and deliberately eschew the use of iodized salt. Regions characterized by iodine-poor soils, Germany among them, will predispose people toward having iodine deficient and sub-functioning thyroid glands.

Certainty with regard to an adequate iodine supply is practically impossible since iodine-enriched foods cannot be told apart from products without added iodine. Without iodized table salt, for instance, more than 95% of Germans do not reach the recommended daily quantity of 150 – 200 µg (*DGE*, 2012). Complying with the recommendation by this method is not advisable due to the already excessive intake of sodium. A more sensible alternative is to either consume naturally iodine-rich foods like ocean algae, or provide an adequate intake through iodine supplements.

Iodine inadequacy can be just as damaging as oversupply. Both lead in equal measure to thyroid diseases. Since much literature already exists on this topic the intent here is to only show the impact of thyroid hormone upon metabolism and psychological drive. The cardinal symptoms of *hypothyroidism* are fatigability, general debility, slow pulse, decreased body temperature, easily being cold, cold intolerance, inability to perspire, weight gain, indifference, concentration loss, angina pectoris, circulatory issues, headache, impotence, hair loss, and numb finger tips.

Hypothyroidism slows down metabolism and lowers the metabolic base rate. An even slightly higher intake of energy can then bring on insidious, unexplained weight gain, although this will become obvious only from the fortieth or fiftieth year of life onward. Weight reduction is nearly impossible in the presence of *hypothyroidism* due to inhibited metabolic functions and the associated lack of drive. *Hyperthyroidism* presents in precisely the contrary fashion: General unrest, racing heart, weight loss despite good appetite, caffeine intolerance, elevated body temperature, continual bowel movements (often with diarrhea), strong perspiration, menstrual cycle disorders, as well as hair loss.

More iodine is needed during pregnancy on account of the up to 50% increase in thyroid hormone production. If iodine deficiency occurs during pregnancy it raises the risks of miscarriage, fetal malformation, and mental retardation. While the placenta is permeable to the mother's thyroid hormone only to a limited extent, iodine can cross it unrestrictedly. From the tenth or twelfth week of pregnancy a child's thyroid is independently capable of taking up iodine and producing thyroid hormone. An adequate iodine supply and good status modulation of thyroid metabolism are indispensable to normal physical and mental development of the fetus. The additional iodine intake of 100 – 150 µg toward a total of 230 µg per day is suggested in pregnancy.

It was recently shown that German school children's iodine supply decreased over the past few years and is presumably no longer sufficient. One consequence could be inhibition of mental development that might *prevent children from attaining their full intellectual potential* (Johner *et al.* 2009). Supplementation must be individually adapted and is best not used as a compounded preparation. A physician should check the status and supplement only if and to the degree needed. Thyroid diseases are complex and require a medical evaluation. Selenium deficiency can, by the way, also provoke thyroid malfunction.

Iodine intolerance

The clinical landscape of iodine intolerance should not go unmentioned in that connection. People who incur an adverse reaction to oral or skin contact with iodine (Braunschweig-Pauli, 2012) often have difficulty locating iodine-free foods. Animal feed, and thus animal-based foods, along with processed foods contain iodized salt (Braunschweig-Pauli, 2012). Iodine intolerance can express itself in the following symptoms: Strongly itching reddish skin blotches, irritation in skin and mucosa, rashes, allergic rhinitis, conjunctivitis, impaired vision, bronchitis, shortness of breath, allergic asthma, headaches, anxiety, disturbed sleep, cardiac arrhythmias, gastroenteritis, gastrointestinal disorders, renal colic, as well as anaphylactic shock (R. E., 1999). Iodine is used in medications, disinfectants, cosmetics, and x-ray contrast medium. Serious symptoms like anaphylactic shock can follow an injection of the latter.

12.5.5 Macro and Micronutrients at a Glance

Everyone's preferences regarding various types of food are different. There is nothing intrinsically wrong with that and yet we must make sure to obtain both the right quantity and the right quality macronutrients. In that respect the diet's overall composition is of greater importance than the precise proportions of macronutrients. Nobody has to or ultimately even can eat in strict accordance with published guidelines for calories, carbohydrates, protein, and fat. We wish to *enjoy* our food instead of working it out to the last calorie. For that reason, choosing from foods grouped in Dr. Jacob's food pyramid is a more sensible and more practicable method than weighing, measuring, and evaluating every item of every meal. Instead of engaging in discussions of absolute values, *Dr. Jacob's Way* delineates a meaningful range with emphasis on adequately representing food sources for each of the macronutrients.

Table 9: Recommended quantities/sources Table 10: The lower part lists often deficient nutrients.

Carbohydrates	Predominantly in vegetables, herbs, fruit, legumes, whole grain products (especially oats)	50 – 80% of total energy intake
Protein	Entirely or for the most part plant-based as in, for instance, legumes, nuts, and oats	10 – 20% of total energy intake
Fat	In the form of plant-based solid foods like nuts and seeds Mostly mono and polyunsaturated fatty acids from plant sources Maximally 7% of energy from saturated fatty acids	10 – 30% of total energy intake In cardiovascular disease or prostate cancer (without cachexia), diabetes, *metabolic syndrome*: Reduce to 10% of daily energy, as suggested by Ornish precepts
Fiber	From whole grains, vegetables, fruit. Human original diet contained about 100 g fiber.	Minimally 30 g a day
Potassium		Minimally 4,700 mg a day
Sodium		Only 1,500 – 2,000 mg
Magnesium		Minimally 400 – 700 mg

Calcium	500 mg are sufficient only with a low-salt, protein-poor diet (*e.g.* Asian)	500 – 1,200 mg

Even though every micronutrient may be obtained through a whole foods diet, not many manage to take advantage of this in their everyday lives.

For that reason, the *Harvard School of Public Health*, Esselstyn, and Ornish all recommend that people take a daily multivitamin supplement with extra vitamin D.

Prooxidants like iron, copper, or other trace minerals must, however, not be supplemented in high doses without a previously diagnosed deficiency.

12.6 Sunlight Can Save Lives

Being a warm-blooded species we are naturally dependent upon the sun. Life on earth would not be possible without sunlight. When the sun is out we feel better, are in a better mood, and tend to engage in more activity. Yet, often too little sunlight reaches us, particularly during the dark winter months.

There is more to the sun than just filling our need for vitamin D.

Today we observe a general tendency to reduce the sun's multiplicity of positive effects to just facilitating vitamin D synthesis. Vitamin D is important, but the sun does much more than

Nutrient	Information	Quantity
Vitamin D	Deficiency is extremely widespread in winter and in situations of insufficient sun exposure. Determine the blood level.	0 – 4,000 I.U. per day, depending on sun exposure and color of skin
Vitamin B12	In the case of a vegan diet, always supplement. But even otherwise deficiency is very common and will, for instance, raise homocysteine levels.	3 – 500 µg per day, depending on the gastrointestinal tract's capacity for absorbing it
Folic acid	79% of men and 86% of women fall short of the recommendation for folic acid.	300 – 400 µg per day, and in the case of pregnant women 600 µg
Iodine	Too much is just as harmful as too little! In the absence of iodized salt, 96% of men and 97% of women do not meet the recommended daily supply of iodine.	150 – 200 µg per day Supplements or iodine-rich algae represent a far better source than iodized salt.
Selenium	Germany is a selenium-depleted region. No long-term supplementation of more than 100 µg per day without prior diagnosis! Supplement only when a deficiency has been diagnosed.	55 µg per day , more only when an actual deficiency is diagnosed

just supply us with the vitamin D we need. As will be shown later, it is also involved in the formation of *nitric oxide* within the skin. But let us focus for the moment on vitamin D.

12.6.1 Vitamin D Deficiency

Vitamin D deficiency is a widespread problem that affects all strata of the population. And, surprisingly, it has not much to do with diet.

Sufficient movement out in the sun can substantially improve one's vitamin D status.

Optimal vitamin D intake was shown to lower the mortality risk of cardiovascular disease for adults with *metabolic syndrome* by 69% (Thomas *et al*., 2012). Given the high prevalence of metabolic syndrome, it is good news that an adequate supply of vitamin D has great potential to significantly lower its mortality rate as well. Researchers even observed a 75% reduction in all-cause mortality among individuals with good vitamin D status by comparison with those who were severely deficient.

This can have additional positive implications for overweight persons suffering from metabolic syndrome. A poor vitamin D status evidently raises the risk of becoming overweight or obese in the first place.

Researchers at a Norwegian university showed in an 11-year cohort study that subjects with the low serum *25(OH)D* level of less than 50 nmol/l had a four times higher risk of becoming obese than those with a level of 75 nmol/l or above (Mai *et al*., 2012).

Another study said that improving vitamin D status can markedly reduce annual mortality rates among the general population. Only 7% of the study participants reached the threshold *25(OH)D* concentrations above 75 nmol/l associated with the lowest mortality risk. Mean serum concentrations were 41 nmol/l. Using calculation-based methodology it was found that 18,300 German lives could be saved annually if the population as a whole were to achieve at least a *25(OH)D* serum level of 75 nmol/l (Zittermann *et al*., 2009). Yet there are currently also doubts concerning the cardioprotective effect of vitamin D. Four months of daily treatment with 2,500 IU of vitamin D did not significantly affect endothelial function, arterial stiffness, or the inflammation marker *C-reactive protein* in healthy post-menopausal women (Gepner *et al*., 2012). Since cohort studies reveal only correlation but not causation it is quite possible that vitamin D is not the sole protective factor. In that connection, major importance could perhaps be attributed to *nitric oxide (NO)*. As is the case with vitamin D, *NO* gets released in the skin through the action of sunlight and also exhibits multifarious health benefits.

But regardless, an adequate supply of vitamin D is highly important in its own right since it demonstrably serves vital functions in the body, particularly relating to the immune system, bone metabolism, and cancer prevention. A pronounced vitamin D deficiency is indicated by serum levels below 50 nmol/l, but values of 50 – 75 nmol/l, too, are insufficient and cause a moderate shortage. Desirable serum levels to be aimed for lie between 75 and 150 nmol/l (Holick, 2007). Only 7% of Germans manage to achieve that (Zittermann *et al*., 2009). In this case as well, excessively high levels of vitamin D wreak more harm than they benefit.

The best available estimates indicate that the daily intake of 100 IU (1 IU = 0.025 µg) vitamin D raises the *25(OH)D* serum level by an average of 2.5 nmol/l.

If, for instance, the object is to raise the level from 55 to 75 nmol/l, 800 IU are needed daily. Insolation from being outdoors during the summer months may be enough for this, but it is my experience that winter makes it necessary for many people to supplement 2,000 and even as much as 3,000 IU vitamin D daily in the form of drops or tablets. According to *EFSA* (2012b) the daily tolerable upper intake level of vitamin D is 2,000 IU for children 1 – 10 years old and 4,000 IU for 11 – 17 year-olds, adults, pregnant women, and nursing mothers.

Blood levels should be monitored and checked again after supplementation. If need be, the vitamin D dosage must be raised. Since vitamin D is one of the storable vitamins it is possible to take high single doses, for instance one each week. A daily intake of more than 4,000 IU should only be attempted with medical supervision and close monitoring of serum levels. In this regard, overweight people with a high proportion of body fat require distinctly larger quantities of the fat-soluble vitamin than persons of normal weight.

12.6.2 Formation of *Nitric Oxide* within the Skin

The health benefits of sunlight include decreased cardiovascular mortality and are, according to prevalent understanding, mediated by melatonin and especially by vitamin D. Feelisch *et al.* (2010) surmise, however, that many further positive effects of sunlight exist independent of these two mediators, particularly in connection with cardiovascular health. Studies have shown that blood pressure tends to be lower in summer than in winter (Brennan *et al*., 1982). The prevalence of higher blood pressure correlates, moreover, with latitude and is greater in those populations that live at a farther distance from the equator (Rostand, 1997). Incidence and mortality of cardiovascular disease also vary with seasonal light intensity and are correspondingly higher in winter (Kloner *et al*., 1999). Reduced exposure to sunlight is not only due to fewer daylight hours during winter but also to the heavier and thus more opaque clothing that is worn in the cold season (Feelisch *et al*., 2010).

Among subjects of a Scottish study blood pressure sank notably after exposure to ultraviolet rays while vitamin D levels had remained unchanged (Cowie, 2013). UV rays lower blood pressure (Opländer *et al*., 2009) and reduce the risk of death from cardiovascular disease (Lewington *et al*., 2002). Sunlight may thus contribute to lowering the risk of heart attacks and strokes and consequently prolong life. In the UK, heart attacks and strokes related to high blood pressure cause about 80 times more fatalities than does skin cancer. The authors concluded that the advantages of sunlight *vis-a-vis* cardiovascular health outweigh any skin cancer risk.

Vitamin D supplementation is crucial to immune system health and bone metabolism but cannot compensate for insufficient sunlight. It was suggested that *nitric oxide* helps mediate sunlight's health effects.*NO* is particularly important for vascular health (*cf*. Chapters 4.3.7 and 6.5). All three forms of *NO* synthase take place in the dermis and epidermis (Bruch-Gerharz et al., 1998). Nitrite and *NO* develop on the skin surface from the reduction of nitrate in sweat (Weller et al., 1996). The skin is also essential to the storage of *NO*-related compounds.

Plasma-nitrite concentration can be markedly enhanced *via* sunlight's mobilization of the nitrite stores in the skin (Opländer et al., 2009). Any nitrite surge in the blood is accompanied by lower systolic blood pressure, which is why conversion to *NO* is presumed (Larsen et al., 2006; Webb et al., 2008). *NO* compounds in the skin are thus mobilized by sunlight and sub-

sequently enter blood circulation to carry out their vasodilative, antihypertensive, and cardioprotective functions (cf. Figure 18). The skin's *NO* stores accrue from local production as well as from the intake of nitrate-rich foods (primarily green-leafed vegetables and red beets) that also further support the release of *NO* from the skin through UV rays (Feelisch et al., 2010).

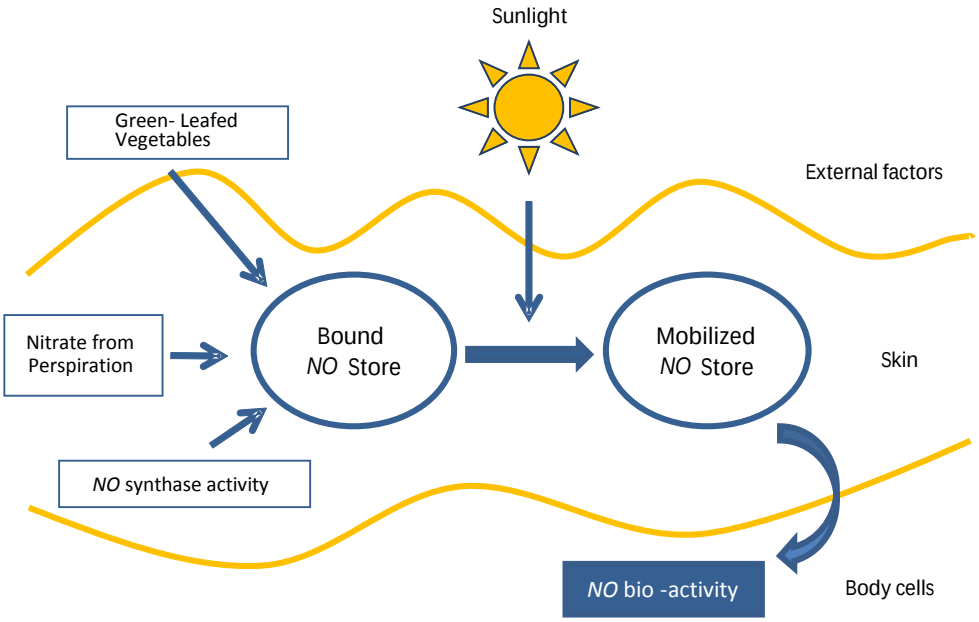


Figure 18: Skin *NO*-storage and mobilization of the store through sunlight (modified from Feelisch *et al*., 2010)

Since excessive exposure to *UV* radiation also damages the skin, hastens the appearance of wrinkles, and raises the risk of white and black skin cancers, your sunning should be regular but never overdone. How this works in practice depends on your skin type and the sun's *UV* intensity. Your head is most exposed to the sun and should be protected with a suitable head cover. Sun the normally less exposed areas of your body. Sunburns can impregnate the skin with the seeds of skin cancer and must be categorically avoided — especially by children.

12.6.3 Infrared Warmth Radiation

Not just the sun's *UV* light offers benefits, its warming infrared portion does too. Humans used warmth as a cure for thousands of years because it relaxes the vegetative nervous system, whereas heat causes stress by activating the sympathetic nervous system.

Short-wave *deep infrared-A* radiation (780 – 1400 nanometers) is particularly effective as a source of healing warmth. It penetrates the skin 40 – 50 times more deeply than the longer wavelength *infrared*-B or *infrared*-C regions of the radiation spectrum. This permits warming

of the deeper and well-perfused subcutaneous fatty tissues while sparing the more sensitive superficial layers of the skin.

The speeding up of both metabolism and biochemical processes that results from warming increases the body's regeneration capacity and activates more repair mechanisms within the tissues. Lipoids and colloidal sol/gel dispersions are rendered more fluid, and a higher rate of perspiration better facilitates the flushing of toxins and xenobiotic materials from the sphere of the viscera, dangerous accumulations of superfluous salt being quantitatively chief among them (*cf.* Chapter 7).

The chemical threats like pesticides, mercury, and other heavy metals that we were unable to eliminate were stored in fat cells from where they cannot be removed without the influx of thermal energy. By penetrating to the subcutaneous fatty tissues *infrared-A* radiation is able to provide the necessary temperature range without undue vascular taxation.

Regular use of an infrared radiation system is a good way to detoxify the body *via* the skin. Concomitant perspiration-inducing athletic activity can further aid this process. It is best to oil the body prior to the warmth treatment and to immediately afterwards shower off the poisons that are by then bound up in the oil and sweat.

12.7 Movement, Breathing, and Relaxation

A good natural diet is not the sole pillar of health. Movement and relaxation, too, are of great importance and must not be neglected. In reformation it is best to draw from all spheres.

Equable energy balance requires not only a sufficient supply of energy (= eating) but also its effective application (= physical activity). Regular movement should, therefore, be as much a fixture of daily life as is eating. Toward that end you should select the type of exercise that gives you the most pleasure and can be practiced daily from 30 – 60 minutes without incurring overexertion. Depending on your physical condition this could be stair climbing, bicycling, fast walking or even just taking the dog out on a stroll, jogging, hiking the countryside, swimming, or any of the multitude of other forms of physical exertion. Dancing and gardening are, by the way, said to be most effective because they optimally address the needs of both the psyche and physical health.

Movement will raise the body's energy need and in the long run make weight reduction or maintenance easier. The wished for effect will likely manifest with some delay however. This stems on the one hand from the greater weight of muscle by comparison with fat, and on the other from the muscles' use of glycogen for energy storage. Glycogen molecules trap water, which is why bodyweight may at the outset of the dietary and lifestyle make-over even rise and remain higher for a period of time.

You should thus not rely solely on the scale's display but also look at yourself in the mirror and derive some encouragement from noticing that your silhouette is gradually changing. If possible use a scale that also measures visceral fat, because that is the really dangerous fat.

12.7.1 The Advantages of Physical Activity

The advantages of physical activity have long been known and scientifically established. For example, the research team around Melov (2007) was able to prove that age-dependent mitochondrial insufficiency can be reversed by means of regularly engaging in light strength and stabilization training. That objective can be met with a time investment of as little as two hours per week over a period of about six months.

Movement raises not only the physical but also the cognitive achievement potential. Not all too long ago it was an accepted premise that a human being has the full quota of neurons already at birth. These would, so it was claimed, become fewer over the course of a lifetime and then be irretrievably lost to the known neurodegenerative diseases. But a recent study reported that, quite to the contrary, it is possible to regenerate brain cells even into advanced old age (Toni and Sultan, 2011). In aerobically active persons the brain continues to "grow" and is able to freshly generate synapses (Colcombe *et al*., 2006). That is the biological reason for the phenomenon that aerobically fit seniors boast better central nervous system health and better cognitive function than their non-athletic contemporaries. Physical exertion unfetters thoughts and promotes feeling happy. It lets one work out pent up anger and frustration. One's problem-solving capacity is higher both during and after exertion.

Engaging in regular physical activity offers a good opportunity to positively affect energy balance — both during weight reduction and during weight stabilization. It facilitates elimination of adipose tissue, accumulation of muscle mass and, correspondingly, increased basal metabolic rate. Through the stimulus bearing upon bones, muscles, ligaments, and tendons the body grows stronger, becomes more resistant, and obtains increased stamina. Sleep quality noticeably improves. Hemogram and blood pressure changes are identifiable as well. *LDL* cholesterol drops, *HDL* cholesterol rises, blood pressure drops along with blood sugar and its related diabetes risk. The risk of strokes and heart attacks lessens too. Strength training reinforces the bone structure and thereby contributes to lowering the risk of osteoporosis.

Yet another positive effect of exertive activities is the lower heart rate that comes as a result of metabolic economization. As a rule, the resting pulse in untrained persons stays between 60 and 80 beats per minute. By contrast with this, trained endurance athletes have a pulse between 35 and 50 (*cf*. Butz, 2012).

Several precautions are necessary to prevent physical activity's **positive effects** from turning into their opposites:

Arrange an examination by a sports doctor prior to beginning or resuming athletic workouts. The physician will determine your optimal training heart frequency by means of a stress *EKG* or a functional capacity assessment.

Heart rate is an easily read yet diagnostically conclusive parameter for avoiding overexertion.

When you take up or get back into some sport, your ideal training pulse should not be set too high. For basic training, a pulse range of 60 – 80% maximum heart rate *(MHR)* is suggested as the target zone.

Approximate age-specific peak pulse may be calculated using the formula 207 – (0.7 x age) (Gellish *et al*., 2007). Performance diagnosticians or sports doctors will be able to administer

a special test that will yield a more accurate reading by also taking into account the individual pulse properties into consideration as well.

12.7.2 Heal Sitting-Disease with Regular Movement

Sitting-disease sounds like *the* newest fashionable ailment. It is, and almost all of us have it.

How detrimental that may be has only recently become a research focus. Researchers discovered that sitting for protracted periods can cause a multitude of health problems, overweight and *metabolic syndrome* among them. Moreover, lengthy sitting can raise the mortality risk of cardiovascular disease as well as that of cancer (Stamatakis *et al*., 2011; Dunstan *et al*., 2010; Matthews *et al*., 2012).

A recent study focused on the disadvantages of spending one's leisure time in front of the TV. It compared physically active subjects who spent 4 or more hours of screen time per day with those doing so for less than two hours. The total mortality risk increased by nearly 50% with the longer screen-viewing time while the risk of a cardiovascular event rose by about 125%. The results controlled for characteristic *CVD* risk factors like smoking and high blood pressure (Stamatakis *et al*., 2011).

Not everyone sits constantly in front of the TV, but a computer monitor at the office has likely the same effect. Regular standing up and moving once each hour makes being at the office not only more pleasant but also prolongs the time of enjoying one's pension.

There are various possibilities for putting this into practice. Meetings with colleagues could, for instance, be held while out on a stroll instead of in the conference room. You could get yourself a standing desk or construct a working surface on top of a treadmill. In these ways you would be moving all day long.

Even easygoing movement can already produce a significantly beneficial effect. Muscular action involved in standing upright and in the performance of movements ameliorates *insulin resistance* and improves all metabolic processes.

It is not only the heart muscle but also the pumping action of larger muscles that keeps the blood moving and counteracts the *rouleaux* formation of erythrocytes.

Just as important as movement *per se* is its regularity. You should put yourself in some form of motion no later than once every hour!

12.7.3 Athletics alone is not enough

Germans keep working out more and more, but they still do not get any healthier — only fatter. More than anyone, athletic men believe that sports make them virtually immortal. It is not only professional soccer players that can pay for this fatal error with their lives.

The story of Jim Fixx

Most instructive in this regard is the personal history of the man who founded the jogging movement, James Fuller Fixx, more often referred to as Jim Fixx. He was one of the world's foremost fitness gurus. His "*The Complete Book of Running*" became an international mega bestseller, and the author's own career as a star in the fitness and jogging sky was anything

but ordinary. He weighed almost 110 kg at age 35 and smoked two packets of cigarettes every day. Ten years later, his book on running reached and stayed on the US bestseller list for eleven consecutive weeks while he himself weighed 27 kg less, was a committed nonsmoker, spent his days jogging all over his hometown, and was training for the New York Marathon.

Fixx was a permanent guest on America's leading TV talk shows extolling the benefits of athletics and body movement for health and increased life expectancy. Here is where his confidence overreached the limitations of his physical constitution. According to his philosophy, no-one practicing sufficient physical exertion would ever run danger of getting heart disease, let alone dying from it. All the more surprising was the news that on July 20, 1984 Jim Fixx had died of a heart attack during his daily jogging routine. The subsequent autopsy brought to light that one of his arteries had been 95% blocked, a second one 85%, and the third 70%. Further investigation revealed that Fixx had been genetically predisposed toward cardiovascular disease, which ultimately brought about his premature death through the combination of arterial blockages and heightened physical exertion.

Putting all his energy into athletic activity, he remained oblivious to his actual state of health. For years he went without any physical examination because he was convinced that he had found his own cure-all. In regard to diet, too, he neglected the very adjustment of his eating habits that would have prevented his hardening of the arteries and untimely death. Yes, Fixx believed rock-solidly that a healthy diet was unimportant because nonsmoking and physical activity would prove sufficient to protect him against heart disease. Even though both friends and experts advised him to eat more healthily Jim Fixx would have none of it. On the contrary, he heaped vehement criticism on those who suggested that he change his eating habits.

One of his friends, medical doctor and dietary author Nathan Pritikin, in his book *Diet for Runners* recalls a telephone conversation: *Jim Fixx phoned me and criticized the chapter "Run and Die on the American Diet" in my book "The Pritikin Promise". In that chapter I said that many runners on the average American diet have died and will continue to drop dead during or shortly after long-distance events or training sessions. Jim thought the chapter was hysterical in tone and would frighten a lot of runners. I told him that was my intention. I hoped it would frighten them into changing their diets. I explained that I think it is better to be hysterical before someone dies than after. Too many men, I told him, had already died because they believed that anyone who could run a marathon in under four hours and who was a nonsmoker had absolute immunity from having a heart attack.* Just six months after that talk, a motorcyclist found a dead man next to a road in northern Vermont. He wore only shorts and running shoes. That man was Jim Fixx (1932 – 1984).

The story of Jack LaLanne

Entirely different experiences and lifestyle habits are told of fitness icon Jack LaLanne who died in 2011 at the age of 96. Like Fixx, he had lived very unhealthily in his youth. As a teenager he was once too sick to go to school for over a year. He also suffered from a huge inferiority complex and avoided social contact. For years, terrible headaches had tormented young LaLanne. *My life seemed hopeless,* he once said recalling that period. These serious problems changed at once after he met nutritional scientist Paul Bragg. Bragg told him that he had to change his eating habits. *Jack,* Bragg said, *you are a walking garbage can.* In the evening after

that meeting Jack fervently prayed asking God to give him the strength for a new start. The very next day Jack began eating only healthy food and training his muscles with dumb bells.

Over the course of time Jack developed gym equipment for his own use which later became standard features in fitness centers all over the world. Jack's program made him develop extraordinary physical stamina and performance capabilities in sharp contrast to the weakness and susceptibility that had plagued his childhood and youth. At the age of 60 he swam from Alcatraz Island to San Francisco pulling a boat that weighed 500 kg. He repeated that feat at age 65, only this time with a 3,000 kg boat in tow on a lake in Japan. In subsequent years right into his old age he exhibited time and time again spectacular actions proving his credo that *a healthy lifestyle can work wonders.* Jack lived on a plant-based whole foods diet with just an occasional bit of wild-caught fish. He said that *if you regularly exercise and switch white flour, sugar, and denatured food with live organic, natural food, you will feel better immediately!* He declared over and over that both right nutrition and movement are needed. Jack's motto was, *Exercise is king, nutrition is queen, but together you have the entire kingdom.*

12.7.4 Relaxation and Deep Breathing

The highly relevant health study *DEGS* (Study on the Health of Adults in Germany) conducted by the *Robert Koch Institute* also shows that Germans are psychoemotionally not doing well. At the time of the study 8.1% of those queried suffered from depression. Counting 10%, the highest prevalence proportion was among the 18 – 29 age group. 6.6% of the 50 – 59 group suffered from burnout syndrome (Hapke *et al*., 2012). We can blow off steam by working out, but our mind and our nervous system require relaxation and vagus nerve activity for their regeneration. The vagus, the relaxing and regenerative part of our nervous system, can only operate well when its inhibitor, the sympathetic nervous system, allows it. In our time, relaxation often means watching TV, shopping, or other distractions. But this is not the relaxation that calms the vegetative nervous system. It is important to deliberately take time out for yourself — for pausing, letting go, and leisure. Here, conscious abdominal breathing is a simple and effective path toward inner centering.

Oxygen is by far our most important energy supplier. With its assistance the energy from our meals gets burned. Without the healthy provision of oxygen and exhalation of volatile acids like carbon dioxide our metabolism slackens and over-acidification occurs. So, breathing in is the primary means of oxygen delivery and breathing out the most important route for deacidification. While humans can live for weeks and even months without food they would not survive five minutes without breath. Metabolic acids such as sulfuric acid from sulfur-containing amino acids, cannot, however, be exhaled and must be dealt with by the kidneys. Stress changes the mechanics of respiration, shallow, short breathing being the norm. Modifying breathing technique can therefore have a significant effect. The healthiest form is deep abdominal breathing. It uses up less energy than chest breathing, lowers blood pressure, and promotes relaxation. Moreover, oxygen intake is drastically improved since lung volume expands two or threefold and the smallest places in the lung become fully aerated. The inner organs also benefit from deep abdominal breathing. The muscular action involved in it massages them and so boosts digestion. Stress can even alter eating characteristics. Under stress we eat decidedly unhealthier, too much, and without thorough mastication. For that reason,

stress relief is of special importance for healthy nutrition and/or for successful weight reduction. Deep abdominal breathing can be very helpful in this.

A five-minute breathing exercise:

In an afternoon, if you start feeling tired, and before falling asleep, try a breathing exercise for about five minutes. Lay your hands on the abdomen, concentrate on your navel, and breathe consciously, slowly deep into the abdomen, and then out again. You must see the abdomen protrude and feel it press against your hands. It will surprise you how much better you fall asleep, how much better and relaxed your body and mind feel from abdominal breathing, and how you fill up with new energy. In this connection, the books and experiences of the famous Japanese physician Nobuo Shioye could be enlightening and of great practical help. Shioye not only freed himself of several chronic diseases through applying his techniques of visualization and deep breathing but then went on to win his ninth golf tournament — after celebrating his hundredth birthday. Another practice that seems to work wonders on stress is laughing. Laugh till you have to hold your belly. Laugh-therapy is among the most effective therapies in the world. The challenge is to keep laughing even at times when life happens to be a little less mirthful. Laugh away life's seriousness! There are many good books on stress management and therapy, so it is not necessary to further elaborate on them here.

12.7.5 Deep Sleep Is Healing Sleep

Deep sleep is the most convenient method of relaxation. As far back as antiquity the salutary effect of sleep was understood and applied in the healing arts. Wholesome deep sleep provides deep relaxation. Babies still can and are permitted to enjoy a great amount of it. It keeps getting less, however, as life goes on. With regular practice you can quickly learn to enter into deep sleep phases by power napping. Sleep affects our genes and metabolism. Merely one week of sleep deficit in trial participants sleeping 6 hours every night affected 711 genes primarily responsible for inflammation, immune system, day-night rhythms, metabolism, and stress reactions (Möller-Levet *et al*., 2013). 711 genes make up only 3.1% of the approximately 23,000 genes present within the human genetic substance. Other studies had already linked insufficient sleep with overweight and impaired memory. Adequate sleep is certainly also prerequisite to keeping the immune system intact. *Siesta*, a well-known traditional feature of the original Mediterranean way of life, is generally deemed to be very healthy.

Sleep apnea can lead to Alzheimer's.

The human brain is highly sensitive to an insufficient supply of blood *(ischemia)*, oxygen *(hypoxia)* and glucose *(hypoglycemia)*. What happens in obstructive sleep apnea is that arterial blood flow is reduced by between 76% *(obstructive hypopnea)* and 80% *(obstructive apnea)*, which results in *cerebral ischemia* that compromises the oxygen supply and causes glucose depletion. Out of this develop *neuronal apoptosis* (loss of brain mass), upregulated *amyloid beta* peptide generation, and *tau phosphorylation*, all of which cause cognitive and memory impairment — and ultimately Alzheimer's or other forms of dementia (Daulatzai, 2012).

12.7.6 To avoid Overexertion, Begin with Rethinking Deep Conditionings

While excessive self-centeredness often ends in psychological disorders or destructive behavior and neurosis is a typical dysfunction of an egocentric age, extreme you-centeredness can result in helper syndrome, codependent behavior, and finally burnout or depression. The second mandate of Jesus incisively points toward the golden middle path: *Love your neighbor as yourself.* It is thus surely not just a matter of learning a few relaxation techniques, even though these do help. If you perpetually overtax yourself you will wind up depleted of energy in body and psyche, which manifests as burnout or depression. To recognize these grooves in our character is the start of healing; to draw them into awareness and transform them into beneficent patterns is the path toward recovery. In this, it is equally vital to set boundaries for one's own too-high expectations and sense of duty as it is to set them for others. Insight into our limitedness is painful but fruitful. The authorship of this wonderful prayer is unclear, but it is timeless in its relevance: *God, grant me the serenity to accept the things I cannot change, the courage to change the things I can, and the wisdom to know the difference.* How much energy do I waste on things I cannot change and then have no strength left for changing the things I could? Turning from compulsions of "having to" toward a fulfilling, self-determined life is an indispensable step in achieving a happier and far more relaxed lifestyle.

12.7.7 Shedding Light on the Causes of Overweight

These days, food articles have largely forfeited their true purpose as means for sustaining life and are for the most part thoughtlessly devoured or snacked for entirely different purposes. The modern human will thus automatically put on weight simply by eating the foods that are now offered. Dr. Jacob's dietary plan will facilitate the optimization of weight and metabolism for overweight persons, but eating is also meant to satisfy deep-seated psychological needs.

Unfulfilled human yearnings often hide behind pronounced overweight. Neither the person's will to reduce nor Dr. Jacob's dietary plan is sufficient for meeting these, for it is the underlying causes that must be illumined and remedied. Practically all people wish for but one thing, a happy life. Happiness is a perennial goal the futile seeking of which plunged many a philosopher into despair. Ubiquitous achievement-pressure to present oneself as a success and as feeling wonderful (in the American sense of the "happy" life) heavily bears down on everyone. For us, eating is the most readily obtainable surrogate satisfaction. Almost every place serves addiction-quenchers that, though marketed under the label "food", are but industrial products that have no longer anything to do with sustaining life. Yet, the effects of eating as substitute fulfillment are so short-lived that ever more is needed. The measure of good feeling a piece of chocolate triggered back in 1950 could today not be produced by a whole crate of the brown stuff, even if it were of the finest Swiss make. Mass advertising promises us a life of God in France but psychologically creates a *de facto* hell on earth since, with cunning misuse of depth psychology, it plants permanently unfulfillable needs in our psyche. The larger part of humanity living in developing countries is left only hunger, but it too is being garnished with movies projecting the glitter of Western superabundance right into the slums.

12.7.8 Enjoying Health on Every Plane of Existence

Health is a condition of complete physical, psychological, and social well-being, not only the absence of disease. As far back as 1946, the *World Health Organization* sought to disseminate a holistic understanding of health with this many-faceted definition. Alas, with advancing age that dream turns more and more into an illusion for most people. In his book *Blue Zones* Dan Buettner (2009) recounts his collaboration during 2004 with *National Geographic* and some of the world's foremost researchers in the area of longevity. The researchers discovered global regions whose inhabitants live decidedly better and achieve the age of 100 ten times more often than those of the USA or Germany. Buettner called these regions the *blue zones*. Lifestyle characteristics were examined in the hope of explaining the remarkable longevity of blue zones inhabitants. Nine characteristic features were isolated, and from them derive the following recommendations for a long and healthy life.

1. Natural movement: Instead of sweating through strength training, running marathons, or joining a fitness center, the world's most long-lived people worked and moved in their natural environment without giving it much thought. They would, for instance, simply carry out their gardening or housekeeping activities foregoing undue dependence on mechanical devices.

2. Life purpose: Just knowing why to get out of bed can add seven years of life expectancy.

3. Slowing down: Stress is connected with chronic inflammatory reactions and thus with the most frequently occurring age-dependent diseases. Although people in the blue zones are occasionally stressed too they have practical routines for managing it. Among Okinawans this was daily remembering the ancestors, among Adventists daily prayer, among inhabitants of the Greek island Ikarias short naps, and among Sardinians happy hour. Rest and relaxation are especially important and equally difficult to attain for men. Just like the rest of nature, we require sun and rain in order to thrive — activity and rest, sympathicus and parasympathicus.

4. 80 percent rule: The Okinawans' maxim *hara hachi bu* says they should only eat until 80 percent full. The other 20 percent can make the difference between weight gain and weight loss. The day's last meal in the blue zones is a small one in late afternoon or early evening.

5. Predominantly plant-based nutrition: Beans (fava, black, soy) and lentils represent the typical dietary corner stones among blue zones centenarians. Meat is eaten only rarely.

6. A small glass of wine in the evening: There is moderate alcohol use in the blue zones. One (women) up to maximally two (men) small glasses of polyphenols-rich red wine, best from an oaken barrel, in the company of friends or with a meal can serve both health and joy of life. By the way, Adventists do not use alcohol. Red wine is thus not a must for a long life.

7. Faith and fellowship: Faith (but not sectarianism) plays a large role. All but five of the 263 centenarians in the study were members of a faith community. Research indicates that it is possible to add between four and fourteen years to life expectancy by attending a religious service four times per month. Belief or denomination are of no great significance. Important are regular participation and the genuine sense of belonging to a community of living faith. To some this may be irritating because, while adherents of religions have in the past often flaunted their own teachings with acts of fanaticism, the Latin word *religio* signifies conscientiousness and consideration, not ruthlessness or blind belief. The Sanskrit word *yoga* indicates bonding/union, not gymnastics. It involves having a loving relationship with yourself,

your fellow humans, and the Supreme. Variations of the Golden Rule are found in all world religions: *Treat others as you wish to be treated by them*. Or, *what you don't want to be done to you, don't inflict on others*. Studies report that religion that advocates acquiring selfless love (Greek: *agape*; Latin: *caritas*; Sanskrit: *bhakti*) extends life while fundamentalist fervor darkens and shortens not only one's own life but in its extremes often also that of others.

8. Loved ones first: Family is the highest priority. Parents and grandparents live nearby or in the house. Faithfulness to a life partner and giving time to children are of further advantage to blue zones people. Children become sick more rarely and have a lower mortality rate.

9. The right "tribe": The social environment of the world's longest-lived people aids health-conscious behavior. As shown by the *Framingham Studies*, factors like smoking, adiposity, and contentment are contagious, and that joy is even more contagious than loneliness and sadness. Surrounding oneself with the right people can contribute to longer life. Although reaching hundred years takes an appropriate genetic predisposition most of us are equipped to reach ninety years without incurring chronic diseases. It was scientifically proven, and the Adventists' example demonstrates that life extension by ten to twelve years is possible.

Table 11: Enjoying health on every plane of existence — body, mind, and spirit

Body	Movement in the course of daily life Moderate, mostly plant-based diet (including legumes) Smoke-free living
Mind/emotions	Positive relationships — family, friends, work Unhurried life — balance, rest/activity
Spirit	Life purpose (*cf.* Frankl Chapter 12.7.9; Ikigai) Being bonded *(religio*, *yoga)* Selfless love *(agape*, *caritas, bhakti)*

12.7.9 The Search for Meaning

Awareness of one's life purpose, a core characteristic of exceptionally long-lived humans, has been thoroughly thematized in longevity research. But life purpose is not only important for living but also for contending with suffering. Even the healthiest of lifestyles does not offer reliable protection against disease, and most certainly not against inevitable death. Sooner or later we all will wind up in fateful life situations that force us to rise above ourselves, be it a serious illness or a blow of providence as, for instance, the death of a loved one. No book on psychology touched me like *Man's Search for Meaning* by the Viennese psychiatrist Viktor Frankl who established the Third School of Viennese Psychotherapy, *Logotherapy*. Although Frankl already had an exit visa for the USA when the mass persecution of Jews began he stayed in Vienna instead of abandoning patients. Prior to his deportation in 1942, while still a respected psychiatrist and neurologist, he mapped out the essentials of *Logotherapy*. Later, he existentially confirmed them during three years in concentration camps where he could

observe people dying as soon as they no longer had a sense of life purpose or hope. Whereas Freud on his green couch descended into the realm of drives and became a broken man in the process, Frankl lost his entire family in the concentration camp, encountered hell first-hand in four different camps, and rose above himself. Taking only nine days to write his now immortal book, he recorded what he experienced — without assigning the least bit of blame.

Frankl taught and practically exemplified that man can find meaning in suffering as well and achieve the highest degree of maturity. Under the extreme conditions of the concentration camp life purpose was purely existential and typically meant the difference between giving up and surviving. Frankl quoted as especially apt the saying by Nietzsche, *He who has a why to live can bear almost any how.* He ends his book with: *Our generation is realistic, for we have come to know man as he really is. After all, man is that being who invented the gas chambers of Auschwitz; however, his is also that being who entered those gas chambers upright, with the Lord's Prayer or the Shema Yisrael on his lips.* Viktor Frankl's writings evidence that he ascended to heights of the human soul never before reached by any psychiatrist — quite literally, too, for he was a mountain-climbing enthusiast and also obtained his pilot's license when he was already 67. In addition to a professorship in psychiatry and neurology at the *University of Vienna*, he held visiting professorships, including one at *Harvard*, and 29 honorary doctorates. The Library of Congress list *Man's Search for Meaning* as among the ten most influential books in the U.S. In English alone it sold 9,000,000 copies.

No psychiatrist has, like Frankl, so grasped in its significance and thematized morbidity stemming from a purposeless life, an essential characteristic of our time. His not merely therapeutic but also self-realized approach was to recognize and live the meaning contained in whatever life presents one with, and so to persist with "tragic optimism" in the face of unavoidable suffering, guilt, and death. That approach has aided millions the world over. But Frankl by no means holds an ideological worldview. Life-meaning is individualistic; religiosity is not institutional decree. He quotes Einstein: *To be religious is to have found an answer to the question: What is the meaning of life?* And Wittgenstein: *To believe in God means seeing that life has meaning* (Frankl, 2006). Finding and experiencing one's life purpose can be directly healing — on the plane of the body and on that of the soul. In this context Frankl sees conscience as the "sense organ" that can point the way for us in our search (Frankl, 2006).

In *The Doctor and the Soul* he writes, *Suffering and trouble belong to life as much as fate and death. To subtract trouble, death, fate and suffering from life would mean to deprive life of its form and shape. Only under the hammer blows of fate, in the white heat of suffering, does life gain shape and form.* When Viktor Frankl passed away at 92 years old in 1997 he also had incidentally come to serve as a remarkable example of longevity. In a certain sense, the most important guidance my book is able to offer, especially to those in fateful situations, is to look for wisdom in Frankl's writings. What alone begins to give meaning to every subsequent form of counsel is Frankl's admonition:

Find and live your life purpose!

12.8 Implementation in Medical Practice

The dietary intervention in this book is particularly well-suited to preventing and treating *diseases of civilization* and to lighting the path for people who wish to take responsibility for their own health.

The first step in in the dietary make-over for which therapeutic support is required is elucidation followed by self-monitoring (e.g. at hand of blood values).

12.8.1 Anamnesis — What Is the State of Health?

Anamnesis should be the basis for dietary recommendations. The therapist has to work this out together with the patient.

Among things to be addressed are types of food, quantities consumed, and concomitant factors like food preparation methods, frequency of meals, and characteristics of the eating environment. (Is the TV running during mealtime? Are family members eating separately? Are there only five minutes allotted for eating the meal?)

The respective answers, anthropometric measurements, self-reported details on movement, and (if applicable) current disorders should readily combine to produce a coherent impression of the patient.

Patient Questionnaire

The anamnesis questionnaire should prompt answers to the following particulars:

- Anthropometric data (weight, body measurements, age, gender)
- Blood pressure and pulse
- Dietary habits
- Intolerances, digestive complaints
- Aversion to certain foods
- Existing diseases
- Current medications

It is best to determine blood parameters (*cf.* Chapter 12.8.2). This makes it possible, for instance, to diagnose fatty liver in slender people or subclinical hypothyroidism. Both are easy to overlook.

National Consumption Study II (*MRI*, 2008b) data shows that 58.2% of Germans are too heavy, with 37.4% being overweight and 20.8% obese. About 20% of the citizenry has already scaled the next pathological step, *metabolic syndrome*.

A diagnosis is made when at least three of the following five criteria are met:

1. Abdominal overweight — in combination with a waist circumference of more than 102 cm in men and 88 cm in women
2. High blood pressure (130/85 mmHg or above)

3. Fasting blood glucose elevated to at least 5.6 mmol/l (100 mg/dl), and/or random blood glucose of minimally 11.1 mmol/l (200 mg/dl), and/or an existing diagnosis of *diabetes mellitus*
4. Hypertriglyceridemia of minimally 1.7 mmol/l (150 mg/dl)
5. *HDL* cholesterol levels lower than 1.03 mmol/l (40 mg/dl) in men and lower than 1.29 mmol/l (50 mg/dl) in women

But the *International Diabetes Federation* and the *WHO* say that men of European descent are already overweight at a waist measurement of 94 cm and women at one of 80 cm. By these more realistic criteria the prevalence of *metabolic syndrome* in Germany would be notably higher than is currently recorded.

Waist-to-Hip Ratio

Waist-to-hip ratio (*WHR*) describes relative proportions of waist and hip measurements.

Abdominal obesity (apple-shaped) expresses visceral fat accumulations.

The main cause of fatalities from obesity is cardiovascular disease. Visceral fat is metabolically very active and has a different composition than the fat in buttock, hip, and upper thigh. Excess intra-abdominal fat increases the risk of pathological sequelae such as *metabolic syndrome*, *diabetes mellitus*, *hypertonia*, and arteriosclerosis (*WHO*, 2011).

The *WHR* assesses visceral obesity most reliably.

A standardized case-control study of 27,000 participants from 52 countries substantiated this and was subsequently published in *Lancet* (Yusuf *et al*., 2005).

Gluteal-femoral overweight (pear-shaped) impacts health considerably less negatively than apple shaped abdominal obesity (*cf*. Figure19).

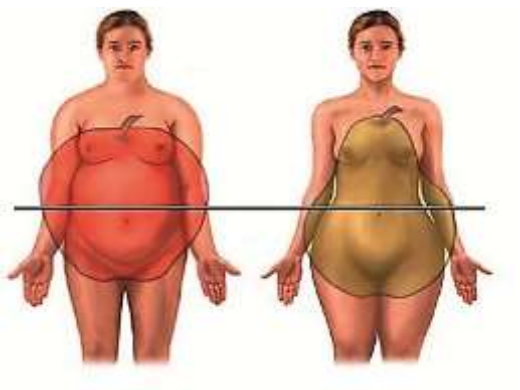


Figure 19: Comparison of apple-shaped and pear-shaped fat distribution patterns

If fat deposits are situated abdominally, they are connected with significantly raised mortality. Unlike *BMI*, *WHR* takes into consideration the location of accumulated fat. This allows better conclusions regarding the corresponding risks. The *WHR* should be below 1.0 in men and below 0.85 in women (see *Institut für Ernährungsinformation*).The higher the

WHR, the higher will be the risk of coronary heart disease (*cf.* Table 11; *Institut für Ernährungsinformation*).

Table 12: *Waist-to-hip-ratio* and the risk of heart disease

Risk Assessment for coronary heart disease *(CHD)*	Waist-to-Hip-Ratio	
	Men	Women
Risk Base Value 1.0	< 0.859	< 0.72
1.59-fold heightened risk	0.86 – 0.909	0.72 – 0.759
2.32-fold heightened risk	0.91 – 0.949	0.76 – 0.799
2.85-fold heightened risk	0.95 – 0.999	0.80 – 0.839
3.57-fold heightened risk	1.0 – 1.039	0.84 – 0.879
5.04-fold heightened risk	> 1.04	> 0.88

Practical procedure

In order to ensure comparability with subsequent measures, the same method of determining *WHR* should be used each time. It is also best to have all measuring done at the same time of day and by the same person.

The World Health Organization has specified several important points (*WHO*, 2011):

1. *WHR* is measured using a stretch-resistant tape that will provide a constant 100 g of tension *via* a special indicator buckle. This kind of tape reduces differences in tightness. It should be snug around the body, but not pulled so tight that it constricts.
2. Tape placement (*cf.* Figure 20): The tape is to be placed *parallel to the ground* between the lowest rib and the midpoint atop the iliac crest. This approximately corresponds to waist circumference. Hip measuring follows the same procedure, but with the tape placed around the widest portion of the buttocks.

Figure 20: Measuring waist and hip circumferences

3. The person being measured should stand, with arms at the sides, feet positioned close together, and weight evenly distributed across both feet.

4. Waist circumference should be measured at the end of a normal exhalation. The person must breathe normally, without pulling in the abdomen.
5. Calculating *WHR* = waist circumference in cm divided by hip circumference in cm.

The photo diary

Over the course of one week, the patient takes pictures of all meals. This includes both main meals and snacks. The diary can provide valuable insights into food category ratios, consumed quantities, meal-planning knowledge and food preparation skills.

12.8.2 Blood Values

Besides data from the questionnaire, the therapist should collect blood values. This allows a more accurate health evaluation and is useful for documenting therapeutic success.

- Complete blood count, albumin, total protein, total cholesterol, *HDL* and *LDL* cholesterol, serum triglycerides, *TSH* levels, *CK* (Checking *creatin kinase* is a must with statins use since statins hem endogenic *Q10* synthesis and so can cause muscular damage.)
- Liver values: *GPT* (*ALT*), *GOT* (*AST*), gamma-*GT*, total bilirubin
- Kidney values: Creatinine, urea, uric acid; only when kidney insufficiency is suspected: *Cystatin C* to estimate *GFR*
- Serum electrolytes: Magnesium, calcium, potassium, sodium, chloride, phosphate
- Additional electrolytes in whole blood: Hematocrit-corrected whole blood analysis for potassium, magnesium, calcium, sodium, phosphate, iron, copper, selenium, zinc (In serum, intracellular potassium is often veiled.)
- Low-normal iron and hemoglobin are not harmful, and probably beneficial, as long as they do not become symptomatic of an existing iron-deficiency anemia.
- Ferritin, when iron deficiency is suspected. Low-normal ferritin levels are protective, whereas high levels raise the diabetes risk.
- Fasting blood sugar and insulin for *HOMA* index evaluation of diabetes risk and *insulin resistance*
- Homocysteine (gets raised by a methionine-rich diet, deficiency of folic acid, and/or vitamin B12, choline or betaine; reduced kidney function). If homocysteine is normal, this evaluation is not necessary: Active vitamin B12 (holotranscobalamin). Vitamin B12 deficiency is very common among the elderly, vegetarians, vegans, the chronically stressed, with increased *nitrosative stress*, damaged stomach mucosa, resorption disorders, and use of proton pump inhibitors.
- Vitamin D as *25(OH)* cholecalciferol (when there is insufficient exposure to sun); normal values, rare in Germany, strongly lower total mortality.

Always in case of *metabolic syndrome*, otherwise still recommended as supplemental tests:

- *hs-CRP* (most important inflammation marker)
- *HbA1c* (for chronically high blood sugar)
- *HOMA* index (diabetes risk, *insulin resistance)*
- *Aldosterone*, vanillyl mandelic acid (activation of the sympathetic nervous system)
- *Cortisol* (stress hormone, raises blood sugar)

- If indicated, fatty acids profile, apolipoproteins
- *oxLDL* (to measure oxidized *LDL* levels in blood; this is distinctly more harmful than non-oxidized *LDL.*

Whenever *nitrosative stress* is suspected: Nitrotyrosine, tyrosine, Nitrotyrosine-tyrosine ratio.
Whenever *adrenaline deficiency* is suspected: Measure in second morning urine.

12.9 Less Is More

By contrast with modern medicine in which knowledge multiplies explosively and the supposed gold standard can, unfortunately, turn into malpractice within the space of ten years, there are ground rules that may serve as a compass to navigate the jungle of multifarious dietary recommendations and trends. There is much truth in principles that have stood the test of time by surviving the turbulence of millennia. In wisdom teachings and religions throughout history, moderation and right balance have counted as guideposts past challenges, extremes of life, and fashion trends.

The golden middle balance between too much and too little was long known as the key to happiness and health. Sure, the Romans have not found this balance but drowned in immoderation and decadence, but it is unparalleled that self-indulgence has come to count as the ideal that it does today. It is a unique experiment that the world now collectively strives for unabashed disinhibition.

The "American way of life" is being systematically globalized. With regard to diet and the *diseases of civilization* this is demonstrably an epidemiological catastrophe — never mind the extended impact upon environment, posterity and animals.

Asia, to this day, is molded by the instructions of the Buddha, Lao-tzu and Kung-Fu-tze. The Buddha taught the Middle Path as the ultimate ideal. In India's most eminent sacred text, the *Bhagavad Gita*, Krishna spoke: *He who is regulated in his habits of eating, sleeping, recreation, and work can mitigate all material pains by practicing the yoga systems.* And central to the monastic Rule of St. Benedict was the exhortation toward *discretio*, discernment, as the basis of a well-balanced life. Ancient wisdom also often reflects the conclusions of legitimate nutritional science and medicine. For, right balance is not only crucial for a healthy life, but also for the treatments the doctor administers to speed the patient's healing.

What seems to be most agreed upon is that *less is more*. Modern Western life philosophy is as a whole, however, characterized by the notion *the more the better.* This pervades all areas of life and is especially evident in the steady accumulation of body weight.

But Hippocrates said, *Let your food be your medicine, and let your medicine be your food.* Correct diet clearly plays a pivotal role in the achievement and maintenance of health. And, who exercises with moderation, whether deliberately or instinctually, has the best foundation for becoming old. This, too, was already understood by Hippocrates:

— *A natural diet, sufficient physical activity, and practicing moderation in all things of life are the best recipe for old age in good health.*

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