

## Table of Contents

# Part I\_\_\_\_\_

•	A life full of "substantial" challenges	9
•	Toxic loads come from "within" and the environment	13
•	Not all toxins are the same	17
•	How toxins work - an Overview	
•	Insidious attack on the nerves, the hormonal system and the intestinal flora	25
•	Bacteria and viruses as indicators of increased pollution	28
•	How detoxification processes work in the body	29
•	Connective tissue as a landfill	33
•	Not everyone detoxifies equally well	35
•	A lack of digestive capacity – root of many problems!	
•	Adaptation mechanisms to an increasing toxic load	40
•	The importance of peristalsis and intestinal flora for intoxication and detoxification	41
•	Digestive weakness - completely underestimated!	45
•	Stomach acid deficiency, heartburn and small intestinal bacterial overgrowth	47
•	Is a "leaky gut" making you sick?	50
•	The key role of nutrients in our detoxification performance	54

# **P**art 2\_\_\_\_\_

•	Detoxification done correctly - an Introduction	59
•	Pros and cons of Chelation Therapy	60
•	Pros and cons of fasting	65
•	The advantages of intermittent fasting	67
•	How to reduce the intake of toxins in everyday life	69
•	Ways of strengthening your digestive power	72
•	The school of digestibility and what humans are meant to eat	73
•	Carbohydrates - quantity and quality matter!	83
•	The blessing of effective digestive aids	90
•	Digestion needs relaxation	93
•	Chew your way to health!	94
•	You are when you eat! Eating according to our biological clock	95
•	The "second meal" effect	100
•	Fibers and prebiotics - food for healthy gut microbes	102
•	Probiotics and postbiotics – can microorganisms change our microbiome?	104
•	Use and benefit of natural antibiotics ("antimicrobials")	107
•	Effective defecation - the be-all-and-end-all in detoxification	108
•	How to bind toxins until excretion	
•	Secondary plant products – your multitalented body guards	
•	Aromatic bitters and pungent components – herbal medicine at its best	120
•	Eat alkaline – have a better detox!	124

•	Veggies ad libitum!	127
•	Potatoes versus cereals	129
•	Foods with high acid loads	131
•	Pros and cons of alkaline powder	133
•	Green juices - packed with nutrients and an alkaline bath for cells	134
•	Why hydration is important during detoxification	138
•	Coffee - a double-edged sword	141
•	Choose sun instead of coffee!	146
•	Salt – is less better?	146
•	Nutrients and supplements for better health and detoxification	149
•	The correct use and handling of fats and oils	170
•	Omega-3 fatty acids - time for a worthwhile oil change!	173
•	Eggs – good or bad?	176
•	Finding the sore point - paying attention to food intolerances	180
•	Main features of the healing elimination diet	183
•	How to cover protein needs during elimination diets	186
•	When and why cereals, nuts & seeds can become problematic	187
•	The milk controversy	192
•	Histamine and co "noble drops" that make the barrel overflow	196

# Part 3\_\_\_\_\_

•	Enemas – a powerful detox tool	
•	Coffee enemas - this is how they work!	
•	Additional support methods for the liver	
•	Pros and cons of liver cleanses	
•	The important and correct care of the kidneys	
•	Benefits of oil-pulling and tongue scraping	
•	Instruction for oil-pulling	
•	Sweating out toxins	
•	Detoxify while sleeping!	
•	A word on homeopathy	

# Part 4\_\_\_\_\_

<ul> <li>Implementation</li> </ul>	, i tips for everyday life	220
Conclusion		225

# Appendix\_\_\_\_\_

•	"FODMAP" - Table	
•	References	229
•	Image Sources	229

# Introduction

As the saying goes: "A healthy person has many desires, a sick person only one" or "Health is not everything, but everything is nothing without it". Anyone who has ever been ill or suffers from an acute or chronic illness knows these words ring true. Unfortunately, in our modern lives, there are ever more things that can endanger our health, cause chronic diseases, and require our vigilance. These include a lack of sunlight, exercise and the impressions of nature, the increasing consumption of processed foods, stress, inadequate sleep and - as this book aims to make clear - especially the increase in toxins to which we are all increasingly exposed and which also arise in our bodies.

It is my concern to present in this book a path to recovery that can be applied to a variety of chronic diseases. The focus is on detoxification through diet and the restoration of digestive and intestinal health. It is a path that anyone with the appropriate knowledge can go, and a path that aims to increase and re-establish your quality of life. I myself have also walked it and would like to share it because it has proven to be extremely effective in practice.

Personally, I have completed a long healing journey. I have tried, researched, and questioned everything thinkable in terms of nutrition and nutrition therapy. My journey began with severe neurodermatitis and extensive food allergies. I had to deal with intolerances that were accompanied by digestive problems and also led to desperate extremes within my diet. But now my hard-won result is the longed-for freedom to be able to eat or tolerate everything again today - should I still want to with all the knowledge I have since attained. From these experiences I have developed an extensive expertise, which consists of many puzzle pieces and which I would like to pass on with this book, as a guide for self-help in case of illness and above all for prevention. It is intended to provide a shortcut through the jungle of nutritional recommendations and save you - the reader - time, effort, and also money.

I have compiled what I consider to be the most important aspects of the very extensive, incredibly complex, and near to limitless topic of "detoxification", without claiming to be complete or exhaustive. The knowledge about nutrition, the metabolic processes in our body, and the effects nutrients and foreign substances have on our body and its microflora increase daily. Yes, one could say there is a lot of knowledge, but unfortunately in different minds. Anyone who deals with these topics in more detail becomes humbled over time and becomes aware that we only ever have partial knowledge or pieces of a big puzzle at our disposal. As the great Isaac Newton once wisely put it:

"What we know is a drop - what we do not know is an ocean".

"In science, we all resemble only children who pick up a pebble here and there at the edge of knowledge, while the vast ocean of the unknown stretches before our eyes."

Sir Isaac Newton (1643-1727), English mathematician, physicist and astronomer

Unfortunately, one human life is not enough to get anywhere near the ocean - but fortunately, this is not necessary for whether you want to get or stay healthy. Nevertheless, I hope that the information I have gathered here will enrich your life and benefit your health.

For a deeper understanding of the subject matter, I have used scientific theories, findings from human and animal studies as well as various models when writing this book. I am well aware of their significance, limitations, and applicability to the individual human being. The fact is: "All models are wrong, but some are useful" (George E. P. Box, statistician). The same applies: "Nothing is as practical as a good theory" (Kurt Lewin, psychologist). In this sense, I have used explanatory models to describe mechanisms and to explain and

understand observable phenomena in more detail. When composing this book, it was challenging to strike the right balance between depth of material on the one hand, and reader accessibility on the other. Great explanations walk a constant tightrope - the content should not be too difficult to follow, yet not oversimplified to the point of inaccuracy either! I hope that I have succeeded in creating a good mixture that you as readers can profit and follow easily at the same time. The nutritional recommendations I give in this book are not based on theoretical models and studies alone. Above all, I refer to my personal experience and many years of work as a nutritional scientist in nutritional consulting with those affected.

The fact is that the number of substances currently considered toxic and their potential for damage are immense and can understandably be frightening. It is also a fact that we are all, consciously or unconsciously, involved in their increase. With my initial remarks about pollutants and their effects, however, I do not wish to cause fear. Nevertheless, I will begin by discussing various pollutants, explaining their currently known mechanisms of action, and citing the sources of many toxins. Experience shows that people have a natural need for causality and are usually more willing to change the things in their lives that they know more about and that they have understood. With this book, I would like to raise your awareness of the main causes of illness and provide you with the knowledge you need to restore your health on your own or take it into your own hands. I would like to show what is possible with nutrition as a form of therapy and what potential it holds for everyone who uses it.

"There is no shame in not knowing anything, but there is in not wanting to learn anything."

#### Socrates (469-399 BC), Greek philosopher

Let the following chapters be a source of inspiration, information and motivation to support your body in its ability to detoxify and heal itself, and to try out the unusual and sometimes even the unknown. I firmly believe that your body will thank you for your dedication, courage, and willingness to think outside the box and explore new paths. All it needs is the right means, a good portion of determination and time.

## Part I

"It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness..."

Charles Dickens (1812-1870), English author

### A life full of "substantial" challenges

Whether we deal with it or not, whether we want to admit it or not - our organism is confronted daily with a new multitude of harmful substances and excretions that it has to deal with if it wants to stay healthy. Some people claim that the body reliably and sufficiently processes burdening metabolic products and absorbed pollutants on its own. Here, however, I have to reply that this is unfortunately no longer true in the majority of cases today. This does not mean, however, that we should be helplessly exposed to the pollutants and fall into resignation and rigor mortis. Rather, we should be aware that each and every one of us can do something to help our bodies excrete in order to survive in this world with all its current material challenges, both physically and mentally. Not the fear of illness, but the desire to live should be our drive to change what we are used to!

The main reasons for the increased exposure of our bodies to pollutants are that the quantities of pollutants, the sources of exposure, and the number of toxic substances newly created by man have increased exponentially and none of us can escape them today, no matter how privileged we are. Even the most remote of all dream islands can no longer escape this - we are all globally connected through the air, groundwater, oceans, and above all through international trade in goods alone. In the end, it does matter whether or not a sack of rice falls over or a barrel of chromium lye leaks in China, and whether or not banned pesticides continue to be used in other countries and reach us via imported goods. We import a remarkable 64% of our food in Germany and thus also immense amounts of poison.

Ultimately, what we release into the environment falls back on us, and we as consumers all play our part. It is not without reason that we find glyphosate in unsprayed organic vegetables today because the groundwater used for irrigation is polluted. Especially edible fish and seafood already contain traces of microplastics washed into the sea, which is a consequence of our consumer behavior and modern lifestyle. Microplastics are plastics that have reached a particle size of less than 5 millimeters in diameter and does not decompose. The amount in the sea is estimated to be already 6 times the number of marine planktons. Microplastics have the "creepy" property of attracting enormous amounts of toxins like a magnet; starting with PCBs (polychlorinated biphenyls), PAHs (polycyclic aromatic hydrocarbons), and pesticides. Microplastics contain three to four times more pollutants and toxins than sediment without plastics. It is no longer found only in seafood and fish, but even in our drinking water and in the air we breathe. Tap water is affected, and water from plastic bottles even more so.

The extent to which we are exposed to pollutants also depends on numerous factors that promote the body's own formation of toxins or impair our ability to break down and excrete toxins. These include, first and foremost, completely underestimated digestive weakness, sluggishness of the bowels, and inadequate liver and kidney function.

In my opinion, the body's own production of toxins and the insufficient ability to excrete them via the detoxification organs play the greatest role in the prevailing stresses. The decreasing ability of the intestines and kidneys to excrete has many causes and is often caused by pollutants. For example, heavy metals as well

as bacterial or viral neurotoxins can paralyze the nervous system in the intestine and promote constipation. An extreme example is the famous "lead colic" in acute lead poisoning, which leads to paralysis of the intestinal muscles. Other examples are changes in peristalsis (gastrointestinal movement) caused by salmonella infections or through overpopulation of the small intestine by bacteria that produce muscle paralyzing gases such as hydrogen sulfide or methane. In addition, pollutants can damage the sensitive kidney tissue, which also impairs excretion via a loss of muscle contractility.

As harsh as it sounds: we accumulate such a considerable amount of toxins in the course of our lives that they turn us into hazardous waste on the day of our physical death. One may justifiably ask oneself how many people, including their highly developed and sensitive nervous systems, have even mastered life and survival. Hats off! Often, at the end of a lifetime, one can only speculate about the contribution of toxins and a limited ability to eliminate them to the development of emerging diseases - probably more than we can guess or prove today. In any case, toxicologists with the appropriate background knowledge are not surprised about the increase in environmentally related diseases, especially cancer and autoimmune diseases. These findings make the reduction of external and internal pollutants all the more urgent.

The topic of detoxification as well as procedures for the elimination of exogenous and endogenous pollutants has become firmly established in the field of naturopathy. Nevertheless, this topic is unfortunately still being ridiculed by many conventional medical practitioners. The reason for this is usually ignorance or lack of time to deal with the topic intensively and to further educate oneself. The majority of physicians as well as official bodies and offices still do not see a truly serious danger in the pollutants surrounding us and even less in the exposure to endogenously formed metabolic residues. The layman likes to refer to the latter in a less concrete way as "slag". Their existence is usually simply denied by the conventional medical practitioner.

One of the explanations for these conflicting views is certainly the fact that the amount of the individual pollutant is often within the legal limits. Thus, it is classified as sub-toxic and harmless. This causes the industry above all to trivialize the issue of pollution and explains why the industry rejects the necessity of massive toxin minimization and also shuns the associated costs. Sadly, however, this is being ignored or concealed: the combination of several pollutants, which are absorbed in small amounts from the outside via the lungs, skin and digestive tract, results in poison cocktails in our bodies that are difficult to assess. These are "more toxic" than the sum of the individual substances and can lead to the potentiation of their effects ("cocktail effect"). Consequently, combination effects are not considered at all. Thus, the all-clear is often given so that people can continue to be lulled into a false sense of security. The intestines as the largest organ of our body with a length of approx. 7.5 meters and an enormous surface area of 300-400 square meters is the main entry gate for toxins into our body. Furthermore, the mucous membrane – in comparison to our outer skin – is much thinner, consists of only one cell layer and is therefore much more permeable for toxins.



IBS = Irritable Bowel Syndrome

Today it is no longer a secret that the toxicity of several individual substances can increase and potentiate not only additively but also synergistically. For example, the toxicity of mercury increases 100-fold with simultaneous exposure to lead or nine-fold with simultaneous absorption of aluminum. The latter makes vaccines, to which both mercury (in form of thiomersal as a preservative) and aluminum compounds (as a potentiator/adjuvant) are often added, particularly harmful to health - especially because they are administered several times over the course of a lifetime. It is also worth mentioning here that 4 heavy metals (arsenic, lead, mercury and cadmium) rank among the 10 most toxic substances on our planet. The herbicide "roundup" with its main active ingredient glyphosate also becomes all the more toxic if it is accompanied by other potentiating substances contained in its formulation. It can also potentiate the effect of the neurotoxic aluminum by binding aluminum and releasing it in an acidic environment within the body, e.g., at the pineal gland. This encourages disturbances in hormone production, especially melatonin production, which in turn severely disrupts our sleep and our physical daily rhythms. Another example of negative potentiation is smoking. Its carcinogenic effect is all the more evident when the person is simultaneously exposed to other toxins such as asbestos. In such cases, the cancer risk from smoking, which is initially 5 times higher, increases to about 50 times.

I would also like to mention: the toxicity of many a substance is completely underestimated (or not sufficiently researched or not tested long enough for its safety) before the substance is introduced to the marketplace to generate a profit. For example, aluminum is underestimated in food and in most vaccines, which can do more harm than was long believed. Aluminum likes to combine with glutamate (=amino acid) and citrates (=organic acids) in food and is therefore increasingly absorbed by the intestine. Aluminum is considered a major contributor to neurological dysfunctions, such as Alzheimer's, Parkinson's and ALS (amyotrophic lateral sclerosis) as well as chronic kidney insufficiency. Aluminum is able to cross the blood-brain-barrier effortlessly and rapidly. The insecticide DDT, which was widely used until the 1970s, and glyphosate, which is widely used today, were similarly underestimated as well as many so-called safe drugs. DDT later proved to be highly toxic, and its degradation products can still be detected in almost all people today. Glyphosate is still officially said to be safe for humans because no health effects have been shown in animal studies conducted over much too short a period of time. However, the consequences of prolonged and real exposure to glyphosate - such as several years or an entire lifetime - are not considered and claimed. Alternatively, studies with glyphosate are

blamed for methodological flaws and are not accepted as evidence. The truth is that there is sufficient evidence of the toxicity of glyphosate, mainly based on its toxic degradation products such as aminomethylphosphonic acid (AMDA). AMDA remains in the body longer than glyphosate itself (900 days vs. 30 days). We also know from animal studies that, for example, dairy cows fed glyphosate-containing feed show significantly altered blood and liver values. The chelating properties of glyphosate cause deficiencies in the trace elements manganese, cobalt, zinc and selenium, as well as massive inflammation and dysbiosis. Inflammations, especially in the area of the stomach mucous membranes, and dysbiosis in the stomach and intestinal tract are of particular significance for ruminants, since these animals obtain their energy from the fermentation of plant material and disturbances of this bacterial population also mean an increased risk of infection (especially botulism). Monika Krüger, Professor emeritus, is one of the most important scientists who has specifically studied and documented the toxic effects of glyphosate on dairy cows and fattening animals. The effects of glyphosate thus range from antibiotic to cell-toxic and detoxification-inhibiting properties (through disorders of the immune system) to damage within the endocrine system, which in turn causes malformations in the young.

In addition, official limit values are constantly being raised at the expense of our health in order to accommodate industry and not to endanger economic growth. Officially established limit values for individual substances become less important to me once we are aware of how they were established. Limit values are usually determined on the basis of studies in rats, which are then transferred to humans or converted in relation to their body weight. To transfer study results with rodents to humans is always questionable. They basically only give a rough orientation with regard to toxicity.

In my opinion, reference values for concentrations of harmful substances in blood and urine are similarly difficult to transfer - because they are based on measurement series carried out on people living today. Just because my blood values, e.g., for mercury or lead, are within the social norm, this is far from being classified as healthy or harmless to health. Rarely is the norm equal to "healthy" or "desirable". This also applies to blood values of important vital substances, such as the consistently low vitamin D values in the population. The fact is that none of us can say which concentration of a pollutant is actually to be classified as unproblematic or safe in terms of health. Furthermore, we must not ignore the fact that the sensitivity of each individual to a pollutant can be highly personalized. It depends, among other things, on the constitution and the state of health of the respective person. The affinity of an individual for a harmful substance can vary greatly, and not everyone accumulates the same amount of a toxic substance at the same level of exposure.

To make matters worse, there is usually no way to compare the determined levels of harmful substances with people of earlier decades or even past centuries - quite simply because there are no measured data from this period. Only a few bone and hair finds can be used to determine past pollution levels. They show that 400 years ago, for example, humans accumulated about 500 to 1000 times less lead in their bodies than today –leaded gasoline, wall paints mixed with lead and industrial combustion practices up to the 1980s send their gretetings.

The fact is that many toxins are difficult to break down in nature and we cannot perceive them with our senses. We can neither see or smell them nor hear or taste them. Their toxicity is also underestimated and we often do not even know the origin and occurrence of many substances. Who thinks of bisphenol A and hormone-active substances when touching a receipt made of thermal paper? Bisphenol A can be detected in the blood of over 90% of the western population today. Who thinks of increased oxidative stress, due to cosmic radiation when travelling by plane, and protects themselves accordingly by taking antioxidants in advance? Who is aware of the omnipresence of nanoparticles and heavy metals in the fine dust laden air we breathe in our cities? Who thinks of poisonous fluorine vapors when heating non-stick pans and black spatulas or suspects that the use of phosphate fertilizers will lead to the release of radioactive uranium into our

groundwater and that mold spores will be released into the air through potted plants? And who seriously deals with the dangerous substances in vaccines and most cosmetics?

As you can see, there are many things that should make us think and encourage us to act. Understandably, however, nobody likes to address the shadowy topic of "pollution". Nor do I believe that we all have to become experts on pollutants before we can change anything in our favor. It is much more important that we know the main sources of pollutants, focus on solutions and make ourselves good detoxifiers if we want to survive in this world and stay as healthy as possible. We can empower ourselves to excrete sufficient quantities of endogenously formed and exogenously absorbed toxins every day, or at least get rid of those quantities that enter the body anew every day. In this way, we can prevent toxins from accumulating, potentiating and endangering ourselves up to a critical point. We can also do a lot to prevent substances from entering our body unhindered and easily, for example through our mucous membranes.

## **T**oxic loads come from "within" and the environment

There are many substances that can become problematic for our health. Those that enter our body from the outside and those that are produced daily in our body and become a burden if they are produced in excess and/or cannot be sufficiently broken down and excreted. The endogenous toxins together with our decreasing ability to excrete them via the intestines and kidneys are often the underestimated bigger health problem. These toxins, which are produced inside the body, can already stress our detoxification systems and exhaust our detoxification capacity to such an extent that the tolerance for additional toxins absorbed from the outside is significantly reduced – the ability to compensate is overcome. In this case, a much lower level of exposure to external pollutants is sufficient enough to make our barrel overflow. This explains why people are becoming increasingly "environmentally ill". Home-made "environmental pollution" is in this respect just as important as our environmental pollution.

Among the endogenously formed pollutants or environmental pollutants is a multitude of microbial decomposition products from the intestine (intestinal toxins or endotoxins). These are formed due to insufficient digestive power and the subsequent changes in the composition of the intestinal flora, which is now also known as intestinal microbiota. However, metabolic products from the breakdown of protein or the incomplete breakdown of carbohydrates can also put a strain on the body from within and are additionally aggravated by over-nutrition, over-eating and vitamin shortages.

Another, often little-noticed source of stress is inherited toxins, i.e., those substances that are given to us in the womb. Many environmental toxins are placental and enter the body of the fetus, so that the mother unintentionally "detoxifies" via the baby. In the meantime, countless environmental toxins are already detectable in the umbilical cord. I consider the metals (especially dental metals) to be particularly dubious and serious. In addition, substances absorbed from the outside diffuse into the mother's milk after birth, with which we then also absorb the substances. But this should not stop any mother from breastfeeding. The benefits of breastfeeding with breast milk over bottle feeding still outweigh the harm. Breast milk is so highly complex in its composition that bottled milk will never be able to hold its own.

The toxins supplied from outside differ not only in their origin but also in their toxicity. This in turn is strongly dependent on the concentration, the frequency of exposure (acute or chronic), the type of compound in which they are absorbed and how they enter the body. For example, a big difference is whether I take something once, acutely in higher amounts, or over a longer period of time, daily in small amounts. It also makes a difference whether I take something orally, inhale it, inject it into my veins or - even worse - inject it directly intramuscularly (as is the case with many vaccinations). Inhaling mercury vapors, for example, is much more dangerous than swallowing elemental mercury. Organic ethyl mercury in vaccines or methyl mercury - as



For an alcoholic, such increased activity of phase I enzymes can also be problematic. If someone chronically consumes a lot of alcohol, an additional detoxification system for alcohol is activated - the so-called Microsomal Ethanol Oxidizing System (MEOS). It ensures that the alcohol, which is toxic and floods into the alcoholic's bloodstream, is broken down as quickly as possible. However, activation of the MEOS leads to the inhibition of phase I enzymes, which normally break down alcohol at low concentrations and are also responsible for the breakdown of many drugs. As a result, alcoholics also metabolize drugs and prodrugs more slowly by inhibiting the phase I enzymes. When taking prodrugs (drug precursors) there is therefore less activation of the drug. When taking drugs that are already effective as such, there is a delayed loss of efficacy. Accordingly, the effect of drugs on alcoholics changes considerably: prodrugs, on the other hand, lasts longer because they are not partially inactivated by phase I enzymes. These changes in the effect of drugs must be considered when prescribing drugs to alcoholics to avoid toxic side effects. By the way, MEOS has a reminder function: when alcoholics drink again (after withdrawal and break), MEOS is automatically generated and the alcohol is thus broken down again very quickly. The rapid loss of alcohol's effectiveness increases the pressure to continue drinking; a relapse with even larger amounts of alcohol is therefore almost pre-programmed.

### The importance of peristalsis and intestinal flora for intoxication and detoxification

Besides genetics and epigenetics, i.e., the influence of lifestyle (including nutrition) and environmental factors on gene activity, numerous other factors play a major role in our ability to detoxify. Of particular importance are functioning peristalsis, a healthy intestinal flora and an intact intestinal mucosal barrier.

A well-functioning peristalsis is important: it ensures that undigested food components and inactivated toxins that have been excreted into the intestines via the bile ducts can be eliminated promptly. This prevents them from becoming problematic substances if they remain in the intestines for an extensive and are thus increasingly broken down by microorganisms. In addition, an appropriate intestinal emptying ensures that toxins coming in are not excessively absorbed or that toxins that have been modified and released via the gallbladder are reabsorbed. Therefore, they do not burden the liver, which is directly connected to the intestines via the portal vein system. When elimination works well, there is less of a so called "intestinal autointoxication" (self-poisoning via the intestines). Moreover, it very important that toxins are primarily excreted via the intestines; they should not be diverted for excretion via the kidneys due to delayed defecation, where they can damage the kidney cells. The kidneys are much more sensitive than the liver and since the kidneys are nowadays increasingly becoming a weak point in the organism (especially due to environmental toxins, diabetes and arteriosclerosis), an additional burden on this elementary paired excretory organ must be avoided at all costs.

Microorganisms that contribute to particularly strong endogenous toxin production include mainly putrefying bacteria (e.g., Clostridia, E. Coli, proteobacteria) and yeast fungi (e.g., Candida albicans). If, for example, the intestinal flora is shifted in favor of the putrefying germs due to undigested proteins and fats, this leads to the permanent formation of very toxic and mostly foul-smelling putrefactive products. These can damage not only the mucous membrane but also the nervous system in the intestinal wall. The latter is the second largest accumulation of nerve cells in the body after the brain and covers it like two nylon stockings. In the case of extreme putrefaction, damage to the nervous system can go so far that a kind of toxic megacolon is formed. In this case, the colon loses its ability to contract, becomes flabby and thus widens considerably. It rarely empties itself, which leads to enormous amounts of feces accumulating in it and to even more intense microbial decomposition and reproduction processes.



Cross section of the intestinal wall<sup>4</sup>

Putrefaction in the intestines due to digestive weakness causes problems, especially with large amounts of protein - whether in the form of meat and cheese or eggs and legumes. Any form of concentrated protein becomes a problem if it is not sufficiently digested. The easier a protein is to digest and the better its breakdown products can be absorbed, the fewer problems generally arise in the intestines. Red meat (pork, beef, lamb, game) currently enjoys a particularly bad reputation for intestinal health. The reason for this is that not only does it contain a lot of protein, but also iron-rich heme (Heme-Fe<sup>2+</sup>), which gives the meat its red color and makes iron in this form so easily absorbed. Unfortunately, iron is also a nutrient that is particularly sought after by bacteria, which is why it can significantly stimulate their growth. In addition, iron stimulates oxidation processes in the intestines, which produce undesirable amounts of free radicals that can damage the intestinal mucosa.

In addition to iron, the coloring agent heme and substances such as choline (a component of lecithin) and L-carnitine are other independent problem substances in red meat. The decomposition of heme by bacteria produces various metabolic products, above all N-nitroso compounds, which have a particularly toxic effect on the mucous membrane. Similarly, choline and L-carnitine are broken down by microorganisms to form a compound called TMA (trimethylamine). Both the N-nitroso compounds as well as the TMA can cause degeneration of the mucosa and promote colon cancer if they do not leave the intestines quickly enough or are accompanied by chlorophyll, calcium and antioxidants. Moreover, TMA is converted into TMAO (trimethylamine oxide) in the liver after absorption and this is associated with inflammatory processes on the vessel walls (arteriosclerosis) and is supposed to increase the risk of cardiovascular and kidney disease.

Whether meat really damages the intestines in the end or whether its nutritional benefits outweigh its value depends primarily on the individual composition of the intestinal flora and the individual digestive capacity, which in turn affects the composition of the intestinal flora and the permeability of the intestinal mucosa. Accordingly, the consumption of red meat does not increase the risk of intestinal cancer and cardiovascular disease in humans to the same extent. Only individuals with a high concentration of certain intestinal microbes appear to promote the formation of TMAOs, such as Clostridia, Escherichia, Enterobacter, Acinetobacter,

Proteus, Firmicutes and Proteobacteria, which are predominantly associated with putrefying bacteria. The amount and variety of vegetables, fruits and herbs consumed also play an important role because they can counter affect many negative effects displayed by red meat and the preparation-method of meat (cooked, grilled, marinated) makes a difference as well.

The greater the variety of plants that a person consumes each week, the greater the variety of microorganisms in his or her intestines. A large diversity of the intestinal flora, in turn, is associated with a better state of health - presumably because a greater diversity of bacteria makes an ecosystem more stable against external disturbance factors. Responsible for the protective effect of plant material is above all its high content of polyphenols as well as the proportion of various dietary fibers, both of which favor health-promoting germs as food and promote their growth.

During preparation, the high heating (e.g., grilling, roasting) of meat proves to be particularly disadvantageous, as this cooking process produces harmful heterocyclic aromatic amines (HAA) and polycyclic aromatic hydrocarbons (PAH). Even more problematic, however, is the further processing or consumption of sausage. In this case, it is not the protein but the pickling salt added to it together with the high fat content that poses the problem. Pickling salt additionally causes nitrolysed heme to form, which not only increases the formation of N-nitroso compounds, but also promotes the formation of abundant fat oxidation products. These in turn increase the oxidative stress in the intestinal tissue.

In addition to putrefying germs, which decompose proteins and fats in food, an increased number of yeast fungi may have settled in the intestines. These can also produce toxic substances - including an excess of fermentation acids as well as fusel alcohols and many gases that can manifest themselves symptomatically in the form of digestive disorders, such as flatulence, a distended stomach, loose stool or heartburn. The toxic decomposition products of alcohol (e.g., acetaldehyde and formaldehyde) can also enter the bloodstream and strain our central nervous system. If the intestinal flora is disturbed in such a way, not only the intestines but especially the liver is put under enormous strain, because microbially produced putrefactive and fermentation toxins are absorbed via the intestinal wall into the portal vein blood and this blood reaches the liver first. Some of the gaseous toxins can also reach the lungs via the blood. There the toxins are breathed out and can lead to bad breath when putrefied.

Another problem of a disturbed intestinal flora: The soluble pollutants that have entered the intestines via the bile can be split or deconjugated back into their toxic precursors. The bacterial enzyme ß-glucuronidase is primarily responsible for this reactivation of toxins. It releases the conjugated toxins from their complexes, e.g., with glucuronic acid. As a result, toxins can be reabsorbed by the intestines and must be detoxified by the liver once again. In such cases, one also speaks of a recirculation of the toxins via the so-called enterohepatic circulation. This cycle enables substances to be transported from the intestines via the portal vein to the liver, where they are again metabolized and released back into the intestines via the bile. Normally, the enterohepatic circulation serves primarily to reabsorb the bile acids that have previously been transported from the liver via the bile into the intestines for fat digestion; they are therefore not lost via the stool but are recycled. In the case of toxins, such recycling is anything but desirable; instead, prompt elimination is desired.



effect on all preceding detoxification phases via negative feedback. This means that phase II enzymes are throttled and highly reactive metabolic products from phase I can accumulate. Damage to the intestinal mucosa thus deprives the body of an important detoxification option upstream of the liver.

Since a large part of the histamine is also broken down by specific enzymes (diamino oxidase = DAO) in the intestinal mucosa, a leaky gut (besides e.g., vitamin C deficiency) can explain an increase in histamine intolerance in the population. However, a deficiency of B-vitamins can also lead to histamine degradation disorders because they provide methyl groups for a second histamine degradation pathway (via the enzyme N-methyltransferase). Histamine is a biogenic amine, which is produced when the amino acid histidine is broken down in the body and in many foods. In the body, it plays a central role in many physiological, but also many pathophysiological processes; among other things, it is an important messenger substance in inflammatory reactions.

Histamine triggers an expansion of small blood vessels and an increase in vascular permeability via receptors on the blood vessels. Vascular dilatation leads to reddening of the skin and mucous membranes, a reduction in arterial blood pressure and increased production of adrenaline (pulse rate and heart performance increase). In addition, oedema of the skin and mucous membranes is formed due to the leakage of blood water/serum into the surrounding tissue. Typical changes in the skin and mucous membranes caused by histamine include swelling (blisters, wheals), redness and itching.

The vasodilating effect of histamine also plays a role in migraines or other headaches, and histamine causes narrowing of the bronchial tubes. Histamine is therefore of particular importance in the pathophysiology of allergic bronchial asthma. Histamine also acts as a messenger substance (neurotransmitter) in the nervous system of the digestive system, where it increases peristalsis and stomach acid formation. Thus, too much histamine can also trigger intestinal cramps and diarrhea as well as stomach complaints and ravenous appetite caused by too much stomach acid.

In the nervous system (CNS) histamine is also involved in triggering vomiting and regulating the sleep-wake rhythm. If histamine is not broken down well by histamine N-methyltransferase, serotonin and melatonin formation is also impaired, which is why sleep disorders occur more frequently in cases of histamine breakdown and intolerance. For more information about histamine intolerance, its symptoms and treatment, see the chapter "Finding the sore point - paying attention to food intolerances".

### The key role of nutrients in our detoxification performance

Nutrition and thus the supply of sufficient nutrients play a central role in our health. And sufficient nutrients are required for a smooth course of detoxification reactions. These nutrients include calorie-supplying macronutrients (carbohydrates, proteins, fats) and calorie-free micronutrients (vitamins and minerals). Both a deficiency of macronutrients - above all of special amino acids and fatty acids - and a deficit of various micronutrients can considerably reduce the detoxification performance; a good supply, however, can significantly increase and improve the detoxification. We also need numerous nutrients to maintain the integrity of the inner mucosa. As one of the most cell division-active and therefore fastest renewing tissues, the mucous membrane consumes a lot of energy, building materials and micronutrients. Their condition is decisive for the entry of toxins into our body.

A good supply of nutrients can also help to reduce the toxicity of a substance or make it difficult for it to be absorbed into the body. We now know, for example, about the protective effect of selenium against mercury poisoning, which explains why the particularly heavily polluted predatory fish (tuna, swordfish, sharks) survive the high intake of marine heavy metals by eating other fish. Furthermore, it is known from animal studies that mold toxins (aflatoxins) become all the more toxic or lead to death earlier if there is a protein deficiency. The reason for this is that amino acids are essential for the function of the immune and endocrine system and provide essential building blocks for the synthesis of detoxification enzymes and various detoxifying compounds. In addition, proteins made from amino acids in the body can directly bind heavy metals (e.g., the proteins ceruloplasmin and metallothionein) and thus prevent metals from causing oxidative damage in the body.

Unfortunately, many environmental toxins are able to displace essential minerals from the body, and stress can greatly increase our need and loss of several nutrients. This weakens our detoxification performance and further aggravates the situation. For example, iodine can be displaced by other halogens (e.g., chlorine, fluorine and bromine), calcium by lead and aluminum, magnesium by aluminum, zinc by cadmium, manganese by nickel and potassium by ammonium. Potassium - as the quantitatively most important mineral in the human diet - plays a key role in detoxification; it is lost by the body especially in cases of hyperacidity, stress and high salt intake. Stress is a strong diuretic, i.e., it has a diuretic effect and explains why we constantly have to go to the toilet before exciting situations (lecture, travel, exams etc.). Unfortunately, every time we urinate, we also lose minerals.

If there is a reduced supply of many of these minerals, the same amount of toxins can lead to higher levels of stress and functional disorders. For example, those who take up too little iodine and vitamin K2, their thyroid and pineal glands will store more fluorine and calcium. The consequences are calcification processes and functional disorders, which in the case of the pineal gland can manifest themselves in disturbances of the sleep-wake rhythm through insufficient melatonin production, premature onset of puberty or dementia. On the other hand, if we lack potassium, metabolic products from protein breakdown (such as ammonium) can damage us more severely, over-acidify us and massively impair cell metabolism. If, on the other hand, we lack calcium because we lack vitamin D (promotes the absorption of this mineral) increased exposure to lead can more easily lead to osteoporosis.

Nutrients also play an important role in the transport of oxygen in the blood (e.g., iron) and the activity of our detoxification enzymes. They are often an integral part of detoxification enzymes (e.g., iron as a member of the cytochrome P450 enzyme family) or act as essential cofactors of detoxification enzymes or enzymes that are indirectly involved in detoxification. Cofactors are substances which must be present in an enzymatic reaction for an enzyme to work and are important in the enzyme catalyzed reaction. Cofactors are primarily vitamins and minerals, which are also called regulatory substances. For example, vitamin B2, vitamin B3, selenium, iron, magnesium or zinc are needed for the function of numerous phase I enzymes. Glutathione, in turn, is needed for coupling / conjugation reactions of phase II enzymes, in which toxins are made water-soluble and excretable.

In addition, micronutrients play an essential role in energy production, i.e., they are essential for the breakdown of carbohydrates, fats and proteins in the cells. Without sufficient B vitamins, magnesium or iron, the smooth oxidative breakdown (aerobic metabolism) of these macronutrients no longer takes place. In consequence we start to lack energy and acidic metabolic intermediates begin to accumulate within the cells.



#### Nutrients and their influence on different detoxification phases

Co-factors are comparable to taxi drivers who transport passengers from A to B - a taxi without a driver would make little sense. If these nutrients are missing or if they are increasingly depleted due to a high toxic load and the resulting increased detoxification reactions, the activity of the detoxification enzymes decreases. Detoxification processes are incomplete or reduced. This can lead to the accumulation of toxins or their toxic intermediate products from the detoxification phase I (e.g., reactive oxygen compounds, free radicals etc.). The work of digestive enzymes is also impaired by a lack of cofactors (e.g., calcium needed by lipase); this can lead to insufficient digestion of the food as well as to dysbiosis and resulting increased endogenous pollutant loads via the intestine.

Nutrients not only act as cofactors of detoxification and digestive enzymes, but also provide the necessary building blocks for these cofactors to be formed. For the formation of glutathione, which serves as a coupling molecule in the liver cells during phase II of the detoxification and is also the most important antioxidant in the body, we need sufficient sulfurous amino acids (cysteine, methionine), the amino acids glycine and glutamic acid, the minerals selenium and magnesium as well as vitamins (above all vitamin B6, B1, B2 and vitamin C). The amino acid derivative L-carnitine and the substance alpha-lipoic acid are also needed, but can thankfully be produced by the body itself if it is sufficiently supplied with their building blocks and needed co-factors.



Y-Glutamylcysteinylglycin

#### Glutathione

Most important antioxidant in the body, consisting of 3 amino acids (glutamic acid, cysteine and glycine)



### **D**etoxification done correctly - an Introduction

We can all lower our pollution load and improve our detoxification performance enormously (detox), both with small changes in everyday life and with repeated intensified detoxification phases, in which we apply detoxification measures more consistently: on a weekly or monthly basis. In addition, we can significantly counteract a daily renewed poisoning (retox) by knowing the sources of the pollutants. And we should try to do so if we want to survive in this increasingly toxic world and maintain or regain our health.

Fortunately, as awareness of the problem is growing, there is now a lot that is offered and recommended on the subject of detoxification. It is not uncommon to come across so-called detoxification protocols, which can sometimes differ considerably from one another. However, this should by no means make you feel insecure or discourage you from your intentions - because just like a healthy diet, there is no such thing as the ultimate detoxification protocol. Every person responds differently to certain measures and foods. In addition, every therapist has his or her own philosophy and personal experience, which he or she rightly draws on and which have shaped his or her treatment concept. In the end, what remains decisive is what actually changes your state of health and becomes visible. That is why I think it is important that everyone informs themselves as comprehensively as possible so that they can ask the right questions: to the therapist, the distributor of food supplements or even the retailer when buying food.

Particularly when it comes to the topic of nutrition, it has been shown that knowledge gained from experience over a long period of time is often more valuable than a wealth of scientific theories or the results of largescale studies. Everyone, who has experience working within the field of nutrition consultation or the therapeutic domain, knows: "Trying beats studying." Due to our biochemical individuality and our different composition of the intestinal flora, nobody can predict how the respective measure or nutritional intervention will actually affect the individual. Therefore, you should feel encouraged by this book to curiously try out different things that I will introduce to you - also and especially regarding your nutrition. Often, we have not even tried enough to know what is really good for our body. Instead, we rashly hand over the responsibility to so-called experts who are supposed to relieve us from listening inside and observing ourselves. Over time, it will become clear what is good for your health and what is not. Those of you who are ill often show a high degree of sensitivity anyway; they sense more quickly and clearly what is good for them and what is not. Basically, I simply want to encourage you to take new paths and to experiment more. In the end, every step in the right direction counts, not perfection. In this process, I consider the help of a holistic nutrition therapist/coach, alternative practitioner or doctor to be recommendable and valuable. They can help you to adapt detoxification measures even more individually, to find useful laboratory tests or to carry them out. Above all, nutrition therapists can support you in optimizing your nutrient supply in the best possible way and assist you with concrete nutrition plans and recipes.

If you have made the decision to detoxify, I do not think it makes sense to undergo a one-off "hack detoxification" in the form of a short detox treatment. Rather, we should all strive for the continuous detoxification of our body and see it as part of our lifestyle in everyday life. Measures to support our ability to excrete and strengthen our resistance should be in the foreground; because life is inevitably connected with the absorption and self-production of substances to be detoxified. If we manage to remain permeable and excrete at least as many harmful substances as we absorb or produce again every day, the barrel will not overflow - and we will remain healthy. I am convinced that such supportive measures can become a harmonious part of our lives and daily routines. The more we integrate them into our daily lives bit by bit and make them

a new habit, the better. If we are already ill, it is worthwhile to implement many of the measures presented quite consistently over a longer period of time in order to finally overcome illness. The body needs its' time to heal and recover!

I hope that my remarks provide you with many suggestions for change and also help you to adequately compensate for the one or other burden that we sometimes consciously take on - be it the glass of wine and the bag of chips for pleasure or the long-haul flight on holiday or for professional reasons. True to the motto: "Have a smoothie with your cigarette or chlorella with your tuna steak."

## **P**ros and cons of Chelation Therapy

When it comes to acute poisoning or the reduction of chronic heavy metal exposure (especially after amalgam removal or tattoo removal), sooner or later the term "chelation therapy" comes up. This is why I would like to take a closer look at the potential vs. the possible drawbacks of this detoxification methodology.

Chelation therapy dates back to the times of World War I and World War 2, when it was used to help those who were poisoned by the use of chemical warfare agents, for example, arsenic. Back then, the first chelate called BAL (British-Anti-Lewisite = Dimercaprol or 2,3-Dimercaptopropanol) was developed, which was able to release the arsenic-rich combat gas Lewisite from bonds in the body again and make it excretable. Today, chelation therapy is used primarily for metal detoxification and partly also for the treatment of arteriosclerosis. In the case of arteriosclerosis chelates can help reduce the formation of free radicals that are favored by heavy metals, and thus counteract the formation of deposits in the blood vessels in which oxidative stress plays a major role. Moreover, chelates help to draw calcium from the plaques in the walls of blood vessels and gives them more flexibility.

But what exactly are chelates and how exactly do they work? Chelates are compounds that can dissolve toxic metals that bind tightly to proteins or amino acids in our body by grabbing the metal from two sides like pincers, binding it and leaving the body as a complex through the kidneys. The name "chelate" refers to this ability and is derived from the Greek word " $X\eta\lambda\eta$ " (chele). The effect is largely based on thiol groups (sulfur-hydrogen groups = SH) within the chelating molecule. These thiol groups bind the metal, which thereby becomes oxidized while the thiol groups lose their hydrogen atom (H). As a result, so-called sulfur-metal bridges (SX) are formed within the chelate.



Synthetic chelates frequently used for detoxification are:

- DMSA (dimercaptosuccinic acid)
- DMPS (dimercaptopropanesulfonic acid)
- Zn- or Ca-DTPA (diethylene triamine pentaacetic acid)
- CaNa<sub>2</sub>EDTA oder MgNa<sub>2</sub>EDTA (ethylenediaminetetraacetate)
- Penicillamine
- Deferoxamine mesylates



The chelates work like a kind of super magnet that can tear the tightly bound toxic metals out of the protein compounds, which no other natural substance is able to do. Chelates differ in various properties, such as their solubility in water and fat. DMSA, EDTA and DMPS, for example, are both water-soluble, while alpha lipoic acid has both water- and fat-soluble properties. There are also differences in half-lives in the body, and DMPS decays much later in the body than DMPA (8-10 vs. 3-3.5 hr.). In addition, there is a difference in the way the chelates can be administered. They are either taken orally (DMSA) as tablets/capsules, introduced rectally as suppositories (CaNa<sub>2</sub>EDTA), or infused/injected (DMPS, MgNa<sub>2</sub>EDTA) into the vein or directly into the affected tissue, including ganglia (nerve nodes) or muscles. How quickly, the individual chelates can be administered and how many applications are required for detoxification also varies depending on the substance. EDTA, for example, is said to go in more slowly by infusion and requires more frequent applications than DMPS.

Each of these chelates also has different affinities for individual metals, meaning they prefer or bind different metals to different degrees. For example, EDTA binds the light metal aluminum very well, as well as arsenic, cadmium, lead and calcium, but in return does not bind copper, mercury or tin. DMPS, on the other hand, binds mercury, copper and tin very effectively. It is considered one of the most aggressive chelates because, unfortunately, it also binds more strongly to essential trace elements such as the heavy metals zinc and selenium, thus removing them from the body. DMSA, which in contrast to DMPS can also be taken orally, has a particularly broad binding spectrum and is considered the chelate with the fewest side effects because it binds hardly any relevant quantities of minerals in the body, thus less are lost. The combined administration of various chelates is also considered effective; for example, DMSA orally with CaNa<sub>2</sub>-EDTA suppositories. Suppositories are a good way to bypass the stomach and upper digestive tract, preventing interactions with acids present there (e.g., stomach acid). In addition, suppositories are usually better tolerated and are thought to help combat heavy metal exposure in the abdomen and associated fungal infections in the intestines. Another well tolerated and interesting chelate is NBMI (Irminix), formerly known as OSR#1, which was also available as a dietary supplement/antioxidant in the US until 2011. It is fat soluble and binds mercury better and more stable than other chelates. Unfortunately, it is not currently commercially available because it is under official drug review. Anyone wishing to detoxify with NBMI today must find a physician who is participating in the clinical trial of this substance. Only such physicians are currently allowed to prescribe NBMI.



antagonist, the parasympathetic nervous system. This explains why sauna visits or sports are so relaxing and often help us sleep well the following night.

In addition to sports, sauna and massages, yoga, dry brushing of the skin and alternating showers are also suitable for better detoxification: they activate the energy channels (meridians) in the body and also stimulate the blood circulation. Equally effective are full baths and foot baths with alkaline salts or magnesium sulfate ("Epsom salt"). With these additives we facilitate the release of dead skin cells and acids; at the same time, we promote a slight absorption of magnesium and sulfur through the skin, which additionally supports the detoxification. If you don't like bathing, you can try ascending foot baths to which you add hot water again and again. These can last from 30 minutes to an hour.

Such sweat-inducing, blood circulation-promoting and lymph-moving measures should always be accompanied by the subsequent intake of absorbing substances, such as medicinal activated carbon, zeolite and drinking plenty of water, possibly with some alkaline additives (e.g., ½ teaspoon magnesium citrate or green alkaline vegetable powders). These substances safely bind the toxins that are increasingly released into the intestine; drinking the alkaline water stimulates urine excretion and bowel emptying in the best possible way. Drinking isotonic coconut water, rich in minerals and fresh green juices, is also highly recommended afterwards. In this way, the minerals lost through sweat can be replaced and the consumption of antioxidants can be balanced. At least 250 ml of water should be drunk per sauna session, or always 1.5 times the amount of weight lost that occurs through sweating. It is also important to take a cold shower after the sauna and possibly wipe the sauna and sauna walls to remove toxins.

### **D**etoxify while sleeping!

In addition to activities which promote blood circulation and sweating, sleep in particular plays an important role in detoxification. Those who do not sleep enough or sleep well produce more stress hormones and the body has to break them down additionally. Already one night with too little sleep shows measurable and often also noticeable effects on the body. Sleep deficit leads, among other things, to increased blood sugar levels, which are favored by an additional decrease in insulin sensitivity of the cells (problems with blood sugar control). Furthermore, sleep deficit increases our desire and consumption of sugar, fat and stimulants such as caffeine, which further aggravate the blood sugar problem and promote oxidative stress. All these are factors that put additional strain on our digestive system, intestinal flora and detoxification system. Even more fatal are chronic sleep deficit and insufficient deep sleep. Not only do they increase our risk of obesity, premature skin aging, diabetes, cardiovascular disease and Alzheimer's, but they also impair the function of the important blood-brain barrier (= walls of the blood vessels that supply the brain). As a result, harmful substances, bacterial endotoxins from the intestines and inflammatory immune messengers (cytokines) can now seep more easily through the permeable blood vessel walls into the brain and endanger it.

On the other hand, we know that good and sufficient sleep has exactly the opposite effect. Sleep puts us in parasympathetic mode, which promotes the activity of all detoxification-relevant internal organs, especially the liver. The liver as our main detoxification and main metabolic organ is supplied with approximately 40% more blood when lying down. According to the organ clock of TCM, the liver is particularly active between I and 3 a.m.; this period is therefore extremely important for regeneration and detoxification.



The organ clock of traditional Chinese medicine<sup>15</sup>

Sleep - especially deep sleep - is not only important for liver function and regeneration, but also for the detoxification of our brain. Studies on mice have shown during sleep, a fluid similar to lymph, cerebrospinal fluid, washes around the brain. This becomes possible by a shrinking of the brain by up to 60%, which results in an expansion of the extracellular space and gives room for the fluid. This enables the brain to cleanse itself, and to wash out defective proteins and deposits, such as ß-amyloid plaques or tau proteins into the blood.

That is one of the reasons why sleep plays a major role in the prevention of neurodegenerative processes such as Alzheimer's, in which these deposits accumulate more in the brain. This cleansing system of the brain was only recently discovered. It is also known as the "glymphatic system" because it is controlled by neighbor/supporting cells of the nerve cells - the so-called glial cells - and works similar to the lymph, which enables metabolic residues to flow through lymph vessels in all other organs of the body. Since the brain does not have such lymphatic channels due to lack of space, it uses instead the spaces created by shrinking, which form mainly around the blood vessels. Interestingly, the best possible cleaning of the brain takes place in a lateral position - a sleeping position that most people and animals prefer.

I especially recommend lying on the left side of the body, because it has other advantages as well. For example, it facilitates the natural outflow of bile from the gallbladder into the intestines and the outflow of lymph into the upper vena cava (vena caca) on the right side above the heart. As a result, the lymphatic system and liver are decongested and detoxified more easily. In addition, in this position the pancreas, which extends from left to right across the upper abdomen, is not so strongly compressed by the stomach, or: the gland can "hang" together with the stomach in its natural position. This promotes the production of digestive juices and their digestive work.

It is also important to breathe through the nose when sleeping; this promotes the body's own production of the important signal molecule nitrogen monoxide in the paranasal sinuses. Nasal breathing improves, among other things, the quality of sleep, supplies the brain with more oxygen, optimizes the function of the immune system and reduces inflammation in the body. One sign of insufficient nasal breathing at night is dry mouth in the morning and sometimes stress-related teeth grinding.



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Nadia Beyer, born in 1974, has studied Ecotrophology/nutritional Science and is the head of the Academy for Applied Nutrition (Carrots and Coffee College, Hannover). Motivated by her own personal health issues, she has dedicated much of her life to the passionate pursuit and study of the connections between nutrition and health. Through her own nutrition and detoxification regime, she has cured herself of neurodermatitis, extensive food intolerances and several allergies. Today she passes on her extensive knowledge to others with enthusiasm and enormous commitment to her roles as an author, a lecturer, and above all,



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