Clinoptilolite-Zeolite as Sanogenetic Important for Human Health?

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Abstract

In den letzten 20 Jahren wurden zahlreiche wissenschaftliche Erkenntnisse über die Wirkmechanismen des Klinoptilolith-Zeoliths im menschlichen Körper gewonnen. Studien und Erfahrungsberichte bestätigen die Effektivität des Naturzeoliths als Prophylaktikum, Basistherapeutikum und als Mittel zur Detoxikation.

Die Versorgung der Menschen mit Natur-Klinoptilolith-Zeolith ist aus folgenden Gründen dringend erforderlich:

1. Das zunehmende Defizit an lebenswichtigen Mineralien in den Nahrungsmitteln und die sich daraus ergebende Dysmineralose als vielseitiges Krankheitsbild.
2. Die schleichende Vergiftung der Menschheit mit Unmengen von Schadstoffen der Umwelt, aus der Luft, aus dem Wasser, aus der Nahrung.
3. Die weltweite Kritik an den Arzneimitteln der Pharmaindustrie, die häufig wenig heilende Effekte ausweisen, dagegen eher krankmachend und sogar tödlich wirken können.

Klinoptilolith Zeolith ist bekanntlich reich an Siliziumdioxid. Silizium ist nach dem Sauerstoff das zweithäufigste Element auf unserem Planeten. Siliziumdioxid ist das älteste Heilmittel und Kosmetikum der Menschheit.

Abstract

Over the past 20 years, numerous scientific findings regarding the mechanism of action of cliniptilolith-zeolite in the human body were made. Both studies and anecdotal reports confirm the efficacy of natural zeolite as a basic therapeutic and prophylacitc agent and as a means of detoxification.

Providing people with natural clinoptilolith zeolite is urgently required for the following reasons:

1. The increasing deficit in essential minerals in our food and the resultant dysmineralosis as a clinical syndrome.
2. The gradual poisoning of humans with huge quantities of harmful substances from the environment, from air, from water, and from food.
3. The worldwide criticism of pharmaceutical drugs that frequently show only few curative effects, but may rather bring about diseases or may even be fatal.

Clinoptilolith zeolite is known to be rich in silica. After oxygen, silica is the second most common element on our planet. Silica is the oldest remedy and cosmetic known to humankind.

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1 The Patient is a “Black Box” to the Therapist

The therapist assumes knowledge of the input into this black box, namely the active ingredient, but what happens to this substance inside the body he or she may suspect but does not know with any certainty.

Numerous study results have shown that a pharmaceutical's effect may be strongly modified by numerous factors.

- Individuality
- Age
- Co-morbidity / multi-morbidity
- Sex
- Multi-medication (interactions)
- Nutro-pharmacological effects (interactions)
- Time of day (circadian rhythm)
- Environmental factors such as light, noise, harmful substances
- Body weight
- Dosing interval

[10; 6; 26; 27; 47; 55; 37; 18; 16, 17].

“Dosing by the book, ‘one pill three times a day,' is just as much a threat to patient safety as are contaminated physician's hands." [48]. It is not hard to agree with this statement. This results also from the issue of night-time supplies (during the sleeping hours) which is neglected in this approach. Other factors should be considered as well:

Our unnatural modern way of life:

- Lack of physical activity results in impaired circulation, and, therefore, in a reduction of the active ingredients’ absorbability, rate of absorption, and transportability.
- Changes in the gastro-intestinal tract caused by improper nutrition, by the use of alcohol, nicotine, recreational and pharmaceutical drugs, result in pH changes, in a reduction of the absorption area and in various interactions.

As a consequence of the neglect of these and similar factors medication errors occur, in particular in elderly patients. The Berlin study on pharmacotherapy in elderly patients [32] demonstrated this in a convincing manner, as shown in Table 1.

Table 1: Medication in elderly patients [modified, based on Köppel 2003]

Medication	70 to 84 year olds		85 years and older	
	Men	Women	Men	Women
Under medication	9.3 %	10.9 %	17.8 %	17.1 %
Over medication	15.5 %	12.4 %	20.9 %	15.5 %
Wrong medication	19.4 %	17.8 %	10.9 %	20.9 %
Correct medication	55.8 %	58.9 %	50.4 %	46.5 %
At least 5 findings of adverse effects in one patient	15.5 %	22.5 %	31.0 %	30.2 %
Multiple medication > 5 drugs	34.1 %	39.5 %	42.6 %	35.7 %

This is a sobering result.

Recently more and more papers have been published that take a critical look at the application of active ingredients, pointing out the many factors affecting it [e.g., 6; 26; 27; 32; 47; 55]. They are asking about active ingredient absorption, about their bioavailability and bioequivalence. Another question is that of "where" bioavailability is shown. In some cases, blood is considered an unrealistic compartment, and a determination of bioavailability in other tissues is recommended.

Therefore, the main unknowns for the therapist are:

- Active ingredient absorption (intestinal inflammation, changes in pH etc.)
- Distribution across tissues and bioavailability and bioequivalence inside the body's cells
- Metabolisation, which may be affected by many interactions. Non-use of the active ingredient, dysregulation (adverse side effects, no effect) may be a consequence (see diagram in Fig. 1)

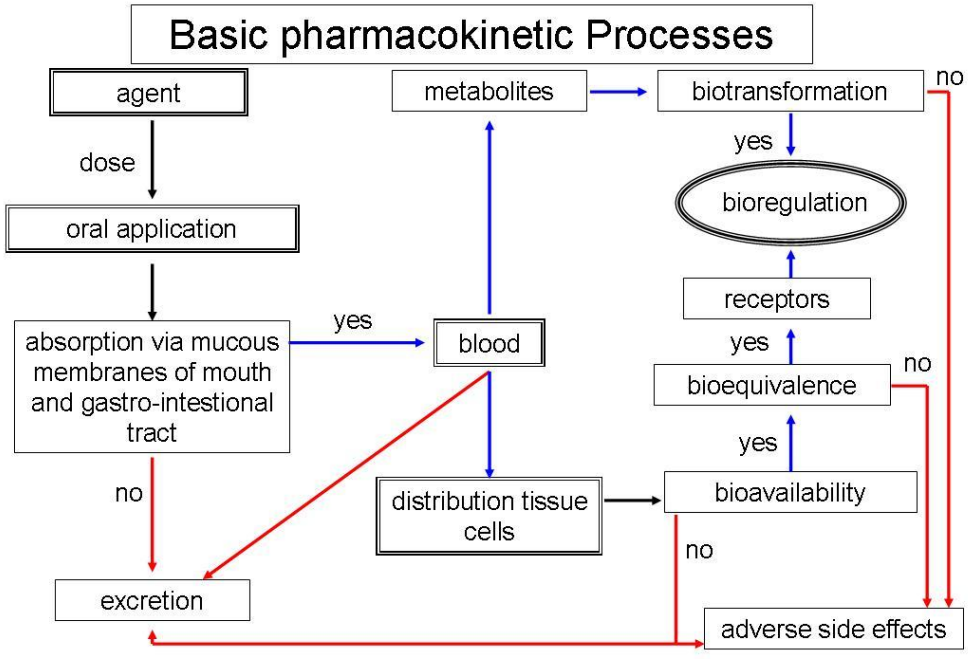


Figure 1: Diagram of the functional relationships of the basic pharmacokinetic processes

2 Where does Health End and Disease Begin?

Currently, there are attempts to express a healthy state in standard values and to consider deviations of these standard values as disease. These standard values are considered “hard data.” In hospitals and physician's offices they are treated as the “absolute truth” of medical diagnostics for distinguishing between a healthy and a diseased state. However, the limits set differ between countries or even between hospitals or change over time. As a student in medical school I was taught that the threshold value for hypertension was >160/90mmHg. Today, it has been lowered to 140/85mmHg or even lower.

These diagnostic parameters in medicine are statistic measures. They describe a non-existent average human organism. Declaring individual deviations of such values “abnormal" or “diseased,” therefore, is a matter of opinion, always open to erroneous diagnoses, for at least 5% of those examined.

Defining disease is associated with even more uncertainty than the confusing and conflict generating defining of health.

One would be hard pressed to find a generally valid and useful definition of 'disease' in relevant textbooks. The fragmentation of medicine into many subspecialties has lead to an inflation of definitions of disease. Weiner [54] critically wrote:

“*Diseases are terminological categories designed by man that are forced upon man*. *They may be appropriate in some cases, in others they are not*.”

Efforts to heal diseases, therefore, are abstract. A therapist will be able to heal the diseased only if he or she does not aim solely to eliminate symptoms. Back in his time, Rudolf Virchow [51] already had clear ideas about this when he pointed to the regulatory principle in the relationship between health and disease, postulating at a scientist convention at Innsbruck, Austria:

“*The known wonderful ability of the body to adapt, it is at the same time setting a measure of where the limit of the disease lies. Disease begins at the time at which the regulatory apparatus of the body no longer suffices to remove the disorder.* It is not life under abnormal conditions as such that generates disease, but instead disease begins with the onset of insufficiency of the regulatory apparatus.” [51]

Therefore, the existence of regulatory dynamics between being healthy and being sick has to be assume. Nobel prize winner I. P. Pavlov, a physiologist, had recognized this as early as 1885: At the conference of the Academy of Military Medicine in St. Petersburg in 1885 Pavlov stated that "*the unusual stimuli, that appear as pathogenic causes, at the same time also are triggers for the protective mechanisms of the organism that will take up the fight against these pathogens*.” He considered all noxae pathogens.

As Weiner [54], Hecht et al. [19], Pavlov [44], and Virchow [51] have already found, the border between health and disease is not an abrupt transitional function, but a instead a fluid transition that includes many “areas of gray.” This has been pointed out also by Ibn Sina, also known as Avicenna (980-1037). He classified six levels between health and disease.

In any case, one has to distinguish between the healthy state, a pre-morbid state, an early state and a disease state [19]. Following Avicenna’s model, Hecht [21] and Anske [3] classified six different levels utilizing objective measurements as commonly employed in chronopsychobiologic regulatory diagnostics [see 21, 22 for a review]:

Very healthy, healthy, still healthy (pre-morbid phase), no longer healthy (early state), sick and very sick.

Such a diagnostically relevant gradual distinction between health and disease allows for differentiated therapeutic and effective prophylactic strategies in the sense of primary and secondary prevention.

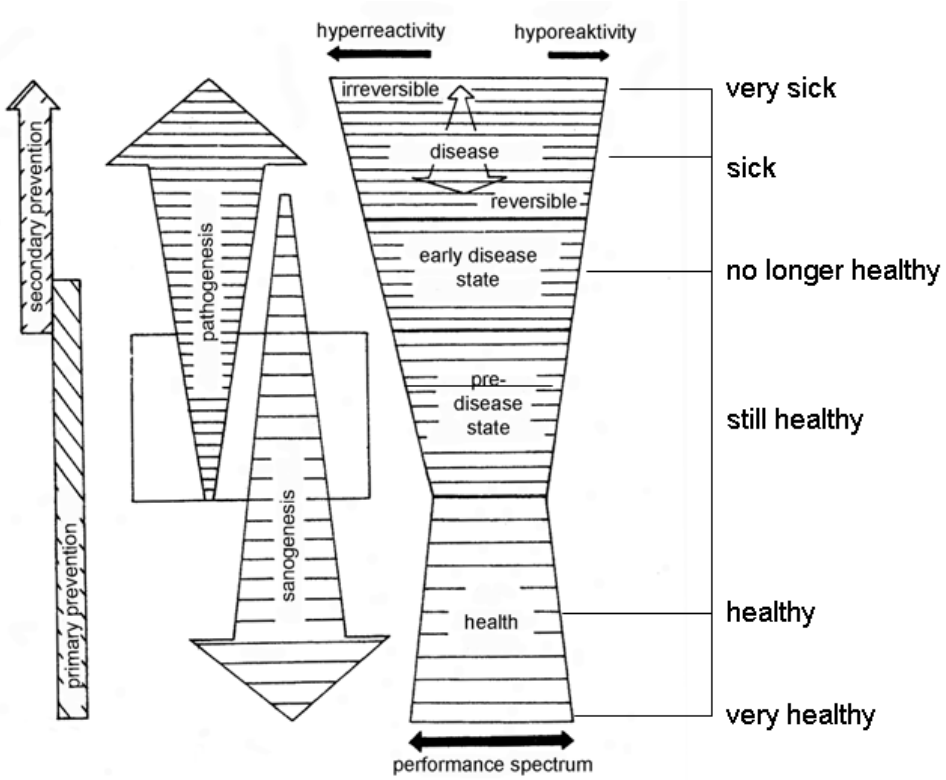


Figure 2: Model of the relation ship between health and disease [according to Hecht 1984]

Referring to the above mentioned hypotheses by I. P. Pavlov and R. Virchow, sanogenetic and pathogenetic processes are dynamically interacting in a regulatory manner. When interaction is dominated by sanogenetic processes, health states dominate; when the interaction is dominated by pathogenetic processes, diseased states of varying degrees occur.

Pathogenesis is a commonly used term in medicine; it is focused in a one-sided manner on the occurrence and development of diseases. The concept of today's medicine consists of reducing or eliminating pathologic symptoms. In order to do so, in most cases medication is used. These pharmaceutical drugs are non-physiologic and focused in a one-sided manner on specific effects, and, thus, are associated with many side effects. Lowering the blood pressure, e.g., by means of antihypertensives, a cure is not achieved, but instead a dubious elimination of one symptom that triggers new symptoms (e.g., sleeping disorders, dizziness, or fatigue) (see the packaging information for these drugs). In my opinion, this concept does not constitute an approach adequate for human physiology.

3 Treatment and Prophylaxis with Sanogenetic Stimulation

Sanogenesis is the entire process of self-regulation of becoming healthy (sanos = health).

Hecht and Baumann [19] described sanogenesis as a complex auto-regulatory process that is used to stimulate functions of adaptation, protection, and self-healing. Sanogenesis is to be viewed as a holistic process, in which primarily the nervous system, the hormone system, the immune system, and the metabolic system, as well as the regulation of extracellular matrix and the healing and growth system are involved in the self-regulatory process [23].

The concept of sanogenesis is based on an approach of stimulation self-regulation and self-healing (e.g., the immune system) in order to make sanogenetic processes dominant in the human body. Nobel prize winner and 'jungle doctor' Albert Schweitzer (1875-1965) also subscribed to this view of a physician's work. He put it as follows: "*We physicians do nothing but support and encourage the doctor who resides within the patient. Healing is self-healing*."

4 How Are Sanogenetic Effects Triggered?

Any healthy, natural way of living and any realistic attitude towards the laws of nature, including those that govern humans, will stimulate sanogenesis. According to my experience, this includes the following elements of a healthy way of life: Exercise, a regular sleep-wake cycle with good quality sleep, dominance of positive emotions, proper rhythmic breathing, a balanced regime of activity and relaxation, sufficient intake of fluids, physiological diet without excesses, and, which is lacking in modern humans, an adequate intake of micronutrients, (e.g., minerals, vitamins, amino acids).

Micronutrients may be counted among the sanogenetics, as long as they are applied in proper physiological relation to one another. This is emphasized in particular by Antonov et al. [4], who consider micronutrients, in particular minerals and vitamins, a main element of "nutrition hygiene."

According to them, "nutrition hygiene" is the individually oriented guarantee of physiological functions of the entire metabolism, forming the basis for healthiness and performance.

The value of micronutrients is also emphasized by Kuklinski [35], in particular in the context of the treatment of frequently occurring nitrosative stress, because they re-balance the metabolic imbalance (in the sense of a sanogenetic effect). As previously stated, pharmaceutical drugs posses not the least of such characteristics as do micronutrients.

A special group among the sanogenetically effective micronutrients is that of the minerals. These are practically ignored by current medicine. In contrast, supermarkets supply people in an unqualified manner with inferior products. The application of minerals, however, belongs in the domain of responsible therapists who have a thorough knowledge of this matter.

5 Quantum Physical Hypothesis for the Substitution of Minerals

Mineral substitution requires very particular knowledge of the physiology of mineral or electrolyte metabolism.

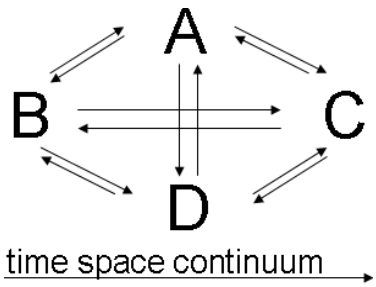
Assuming a linear causal chain of reactions for the regulation of electrolytes, as is the case with Newton's hypothesis that is applied by conventional medicine, is unrealistic and non-physiological.

Schematic of Newton's hypothesis:

$$A \rightarrow B \rightarrow C \rightarrow D$$

A highly organized multi-cellular organism can only function based on holistic systemic interactions, as shown in the quantum physical model:

Quantum physical hypothesis:



The processes of life take place throughout the space time continuum via the continuous formation and deconstruction of feedback loops. Our lives take place in a continuous functional transformation of creation and decay.

For example, if you thought that you could compensate for a lack of calcium in the organism by substituting calcium, you would be wrong, because due to the biological transmutation of minerals inside the human body there are entirely different processes involved [30]. I will comment on this in detail later.

Along the same lines, it is not fatty foods that cause obesity, but rather a surplus of carbohydrates [35; 25].

6 No Life Processes without Minerals

Minerals are integrated into all the processes of life as found in plants, animals, and humans. On the one hand, they form the basic substance of the structure, that is the skeleton of humans and animals, and on the other hand, they are involved in every regulatory process in the organism. There is not a single biochemical or biophysical process in an organism in which minerals are not involved. They practically form the inorganic substrate of life and are regulators of life.

Minerals are present in the human body both in dissolved and solid states and have many functions, e.g., in regulating the extracellular matrix, as part of the acid-base balance, in osmolarity and voluminarity of body fluids. They are involved in the building of structural and hard substances as well as connective tissues, and are part of many functions, e.g., in the hormonal system, the lymphatic system, the enzymatic system, and the blood system. They also maintain the electrical activity of the cells, of the extracellular matrix, and of the tissues, and are essential for energy metabolism.

Electrolytes are minerals that posses electrical conductivity because they dissociate into anions and cations. Electrolytes essentially are minerals in ion form. Cations are positively charged, anions are negatively charged. The electrolyte balance is understood to be the total metabolism of those ions dissolved in the body fluids. Examples of cations are Na^{+}, Ca^{++}, Mg^{++}. Examples of anions are Cl^{-}, HCO_3^{-}.

Ions are primarily found in the extracellular and intracellular fluids, where they may generate potential differences. It is in this electrolyte ion form that minerals fulfill the functions of electrophysiological regulation of the entire human organism.

Therefore, a lack of minerals may not only result in a mineral imbalance, but may affect the electrophysical processes in their entirety and, thus, the total body homeostasis, because they are involved in so many functions.

There are neither harmful nor beneficial minerals—there only are harmful and beneficial surpluses of them in the organism.

This opinion is shared today by all of those studying the field of mineral metabolism and trace elements [46].

Using minerals in treatment and prophylaxis requires a scientific and responsible approach.

Therefore, when applying minerals in humans and animals, the following are to be taken into consideration:

- Three levels have to be considered in the bioactive application of minerals:
- Deficiency
- Optimum
- Toxicity
  [2].
- As early as 1920 Bertrand pointed out, that in considering microelements and macroelements the following were important:
  - When there is an absolute deficiency, death will occur,
  - if the supply of an organism with minerals is limited, the organism may survive but will experience a borderline deficiency state,
  - if there is a surplus of one or more elements, a state of “marginal toxicity” will occur, which eventually may lead to “lethal toxicity."
  - The systemic regulatory principle in the processing of minerals applied to an organism is to be considered.
- **What is important is not to take large doses of one or another macroelement or trace element. Excessive intakes may even be harmful to one's health, causing shifts in the balance of one's mineral metabolism.**

7 Taking Regulatory Principles of Minerals into Account

It is important to ensure proper ratios of minerals in the organism. Thus, systemic thinking and action is required when handling minerals.

In addition, relevant knowledge of bio-regulatory mechanisms is necessary.

According to Shalmina and Novoselov [41] the systemic interactions of various macroelements and trace elements inside the organism occur at different regulatory levels and in flexible antagonistic and synergistic interactions.

It has been shown [46] that the co-enzyme function inherent in many minerals is subject to intersystemic and interaction-systemic principles.

In evaluating metabolic disorders, therefore, attention should primarily be paid to the systemic reactions of minerals.

Absorption of applied minerals may, e.g., be influenced by the systemic levels of macro elements and trace elements present in the organism at the time of mineral application [5]. Because of the complex character of the functional synergistic and antagonistic relationships within the mineral metabolism, testing only for individual microelements and macroelements is actually inadequate and in contrast to the regulatory processes of the organism [38].

Based on the knowledge obtained thus far, Shalima and Novoselov [41], referring to Enslinger [13] described the following schematic model of the relationships of different elements of the mineral metabolism of an organism.

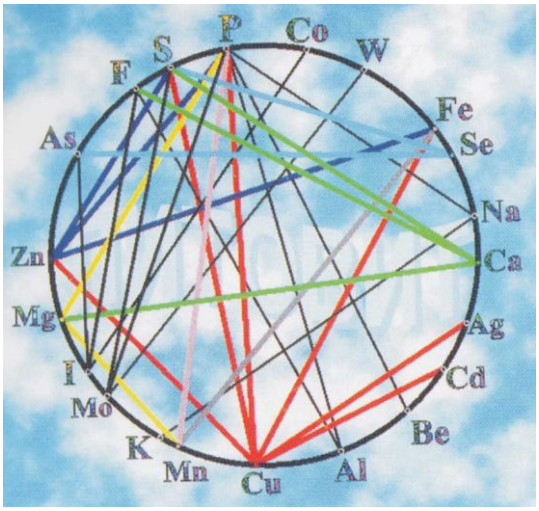


Figure 3: Simplified diagram of the functional interactions of some minerals in the organism [according to Enslinger 1986 and Shalmina and Novoselov 2002]

These interactions between individual elements show that if one of them is lacking or excessively present, a number of the others will be affected and the regulatory system may be "shaken."

8 The World's Population is Suffering from Dismineralosis due to Environmental Pollution

Current scientific opinion points to an alarming increase in the negative ecological burden of humankind. The natural metabolic cycles of the environment and of humans and animals continue to be impaired in a frightening manner, for example by

- pollutant burdens caused by environmental pollution, slow poisoning,
- manipulated food, in particular genetically engineered food,
- impairment of natural rhythms and the internal clock,
- increasing distress,
- abuse of pharmaceutical and recreational drugs,
- abuse of mineral intake,
- electronic smog, noise, and others.

The consequences: impaired health, immune deficiency, autoimmune disorder, tumor disorders, and other chronic disorders, depression, sleeping disorders, and others are on the rise [45].

Particularly affected is the elementary regulatory principle of the mineral metabolism, and, thus, the extracellular matrix.

It is not the climate change that is the main hazard, but the environmental toxins. They endanger health and life of humans. The following example demonstrates this hazard:

Urine and Blood Studies by the European section of the World Wildlife Fund (WWF)

In 2004, tests done in 39 members of the European parliament and of 14 health departments of different European countries (a total of 53 individuals) found

- 13 chemical residue products of phthalates and perfluor compounds
- 25 pure chemical substances, of which were

1 x flame retardant,

2 x pesticides

22 x PCB (polychlorinated biphenyls)

[58]

The production of synthetic chemicals, including pesticides, is an inflammation-stimulating novel phenomenon occurring increasingly since the middle of the 20th century [45].

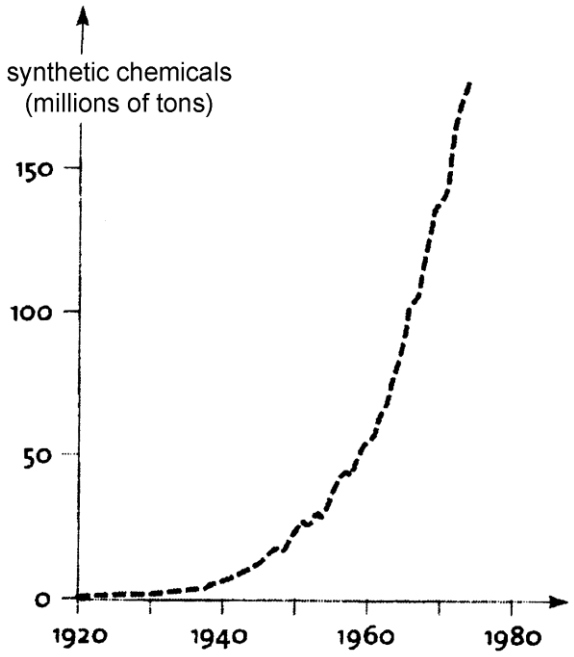


Figure 4: Worldwide production of synthetic chemicals [according to Servan-Schreiber 2008]

These toxins may enter the human body along with food, air, pharmaceutical drugs, and liquids. Kaussner [29] lists the following examples:

- In fruits and vegetables, pesticide residues are frequently found.
- Animal meat contains nine times the amount of pesticides found in fruits and vegetables.

- Worldwide, drinking water is burdened with nitrites, chlorine, herbicides, insecticides, fungicides, antibiotics, hormones from mass animal production, heavy metals etc., because if often is reprocessed from waste water. In the United States, this is supposed to be the case for 70% of all drinking water.

On the other hand, high-performance plant breeding results in a decrease of the mineral and vitamin content in fruits and vegetables of 50% every 25 years [29].

Novoselov [41] points out that the pollutant burden that almost all animals and humans experience today has not only made the systemic relationships within mineral homeostasis more complex, but also causes imbalances or systemic disregulation (that often is chronic).

The blocking of receptors with excess environmental toxins results in an impaired absorption of essential minerals

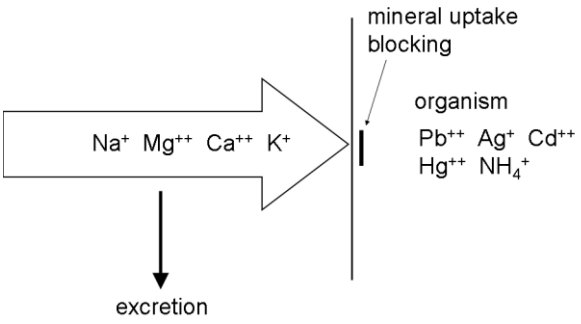


Figure 5: Dismineralosis schematic. The required minerals taken can not be absorbed by the organism and are excreted again [Hecht and Hecht-Savoley 2008]

If minerals are to be applied, this excess of “pollutants” needs to be eliminated first. Otherwise, the applied minerals will have no effect or simply will be excreted again. Today, this is true for almost everybody.

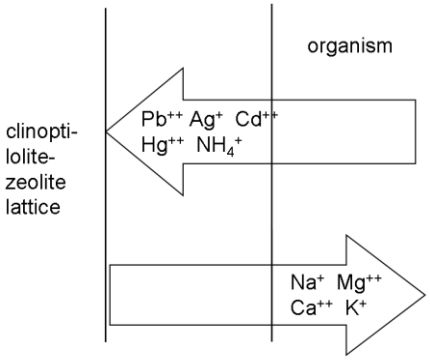


Figure 6: Function state of the pollutant burdened human organism as re-established by ion exchange after the intake of natural clinoptilolite-zeolite [Hecht and Hecht-Savoley 2008]

Pollutants will be attracted by the crystal lattice of the zeolite via physical forces. The ions released in the lattice can bind to the organism’s receptors and eliminate dismineralosis as well as oxidative stress. Zeolite also has radical scavenger capabilities. The crystal lattices fraught with pollutants are excreted with the stools.

9 Therapists Require Sanogenetics with Detoxification and Bioregulatory Functions

Therapists should be aware of SiO_2-based bio-regulators such as zeolite, silica (silicic acid), bentonite, montmorillonite, and clays at least as “pharmaceutical auxiliaries.” They have an “autopilot function” and are able, due to their specific characteristic, to balance to a certain degree the “usual” big unknowns of active ingredient effects.

What are the silicon rich natural minerals clinoptilolite-zeolite and montmorillonite capable of?

- **Selective ion exchange**: Export of pollutant ions of all kinds, including radionuclides, and import of essential minerals.
- **Adsorption**: In union with the ion exchange function the adsorption of pollutants, bacteria, and viruses, “detoxification of the body," 300-fold increase in uptake and bioavailability of minerals, vitamins, amino acids and other bio-regulators.
- **Molecular sieving function**: Stabilization of the molecular sieve as a protective shield for cells in the extracellular matrix, thus regulating the metabolism.
- **Hydration**: Due to the binding of water, a 400-fold increase in tissue function and tonus, in particular of the connective tissue, e.g. prevention of wrinkle formation.
- **Protein synthesis** for building proteins.
- Regulation of the acid-base balance (deacidification of the organism).
- **Growth, healing**: Cell and tissue growth, cell and tissue repair.
- Rhythm timing.
- Protection of the electrolytic and electrophysiological processes with the semiconductor feature of silica (e.g., ECG, EEG).
- Catalyst function for bio-molecular life processes [23].

What are clinoptilolite-zeolite and montmorillonite good for?

- Detoxification of the body, removal of pollutants, capture of free radicals
- Increasing the stability of the immune system and resistance against diseases
- Controlling mineral metabolism
- Regulating functions of blood circulation, nervous system, and digestion
- Increasing mental and physical performance
- Inflammation inhibition, acceleration of healing
- Skin care
- Inhibition of the aging process
- Anti-bacterial and anti-viral effects
- Stress reducing effect
- Soothing, positive effect on sleep
- Optimizing the processing of important life substances
- Anti-fungal effects inside the body and on the skin
- Attenuation of side-effects of pharmaceuticals and other substances
- Attenuation of the effects of recreational drugs such as alcohol and caffeine

Review by Hecht and Hecht-Savoley [23, 24].

10 SiO_2-containing Minerals are Biogenically Imprinted

The trail into the past leads us to silicon rich minerals and stones. They are holographically biogenically imprinted.

- SiO_2 (silicic acid)
- H_4SiO_4 (colloidal silicon)
- natural clinoptilolite-zeolite
- montmorillonite
- clays and others

The **bio-geo-physico-chemical properties of action** of these active ingredients are similar to those of **the extracellular matrix** of humans and animals, because they are part of **its** own evolution [53; 9].

In numerous other studies it has been shown that silicic acid that forms in the presence of a certain organic compound will have a specific adsorptive capacity after this organic compound has been removed, that is valid for this particular compound.

This means, that in silicic acid (SiO_2), other than in other natural inorganic substances, a memory has been formed [53; 1; 43].

This memory characteristic is assumed to be reflected by “imprints” or “matrices” that are left behind at the surface of the silicic acid (SiO_2) by the molecules of the organic "sample" in the shape of their geometric molecular shape [7; 43; 15].

The idea that silicon is involved in gene expression and significantly so in DNA synthesis is shared by many scientists [59; 28; 52; 11]. Volcani [52] states that there are silicon dependent genes and that silicon is essential for the system of AMP cycles, ensuring AMP cycle replication. In this context the work by Oschilewski et al. [42] is to be mentioned, who found that silicon particles are capable of stimulating gene transactions via signals.

The scientific findings on the evolutionary biogenic testing of SiO_2 and SiO_2-containing earths is also reflected in the teachings about the creation of man: *“And the LORD God formed man of the clay* of the ground, and breathed into his nostrils the breath of life; and man became a living soul.”* [1. Moses, Genesis 2, 7 Old Testament]

*: In some bibles it says dust.

SiO_2 is the only mineral on our planet possessing biogenic properties. As an aside, silicon in its various compounds is, after oxygen, the second most common element on our planet.

11 Silicon Containing Clays and Earths are Considered the Oldest Healing and Cosmetic Agents of Humankind

Beauty and health with clay since thousands of years

Clay minerals usually are hydrous aluminum silicates that may sorb water and ions. By sorbing water, clay may increase its volume by swelling. When clay is saturated with water it becomes impenetrable for water and air.

Therefore, clay layers form important aquifers. Therefore, clay is also used for below ground grout curtains, e.g., in barrages and dams. Water that is in contact with clay

layers usually contains mono silicic acid and colloidal silicic acid in solution (in varying amounts).

The role of silicon containing clay materials in the development of life on earth is postulated by numerous authors and also has been simulated in experiments. This scientific idea is also reflected in the teachings about creation of various religions (Christianity, Islam).

"*And the LORD God formed man of the clay* of the ground, and breathed into his nostrils the breath of life; and man became a living soul*." [1. Moses, Genesis 2, 7 Old Testament]

*: In some bibles it says dust.

Clay as a healing and cosmetic agent was already known in ancient Egypt, 3000 BC. The Egyptian queen Nefertiti (literally translated: The Beautiful One has arrived) is said to have maintained her beauty with facial masks made from clay. She washed her hair with basic clays and colored her lips with red clay [39]. In his book "Natural History", Pliny the Elder writes about the healing properties of clay. He also reports that the dead were embalmed with clay in order to mummify them. This ancient report agrees with media information from 2003, in which it is said that in Swiss cemeteries on clay containing soils the interred bodies did not decompose and were recovered intact even after 60 to 80 years.

Also from ancient Egypt originate reports on the antibacterial properties of clay that helped infected wounds heal faster and was used as a "natural sterilization agent" in the art of healing. According to the Apocrypha, Jesus of Nazareth is supposed to have used clay for healing, even helping blind people to see again.

In ancient Greece, clay was used and referred to as healing earth. In particular the healing earth from the island of Lemnos was so popular that at times it was worth its weight in gold. Hippocrates (460-370 BC) gave young mothers healing earth from the island of Samos for the purpose of "internal cleansing." Claudius Galenus (129 BC - 201 AD), the personal physician of Roman emperor Marc Aurel, mixed earth with water or wine and prescribed this mixture for the treatment of poisoning, fresh wounds, hemorrhoids, edema, diarrhea, and skin diseases.

In ancient times, antacids in the form of "finished earths" (Terra sigillata) played an important role. Of these, the "Lemnic earths" were particularly sought after. Back then, there was an Asclepian sacred place on the island of Lemnos. The priests there were at the same time healers who used "terra lemnica" as medicine, mainly to treat poisonings. It is said that Galen, guided by medical interests, even traveled to the island to learn more about its production and effects.

Ibn Sina/Avicenna (980-1037 AD) described in detail the treatment with gray-white clay in Canon Medicae, Vol. II (which dominated medical opinion for centuries) for the following conditions: wounds, ulcers, skin diseases, diarrhea, bladder conditions, "bloody cough," and burns. He also described that he had been able to stop hemorrhaging during birth using it. For some formulations he mixed the clay with vinegar. Apparently, Avicenna already knew that SiO_2 (silicic acid) works best in a slightly acidic environment.

In Arabia and Central Asia small cubes of clay, wrapped in walnut tree leaves, continue to be sold for chewing. They are said to be effective for various diseases, primarily skin diseases and digestive disorders. About Adolf G. von Strümpel (1853-

1925) it has been said that he stopped an outbreak of Asian cholera in East Prussia in 1903 by treating the disease with clay.

More recently, Julius Stumpf has described healing diarrhea, dysentery, and Asian cholera with Bolus alba (white clay), and the marine medical officer von Wilucki described the treatment of paratyphoid fever with Bolus alba in the journal Münchener Medizinische Wochenschrift (1914).

Treatment with blue clay and montmorillonite (gray-white clay) continues to play an important role in Russian popular medicine, e.g., for the treatment of osteoporosis and muscle pain. Prophylactic skin treatments with montmorillonite are used in conjunction with sauna or general grooming. In addition to increasing liveliness and tonus, these treatments are said to improve potency as well [39; 33, 34]. Nekrassova [39] reports about artists making sculptures from clay. They are supposed to live long and healthy lives.

She recommends giving clay to children as a kind of play dough, to make figures with, because this may, with prolonged use, lead to strengthening of the immune system (as montmorillonite enters the blood stream through the skin). According to her, this toy would be much better for today's allergy-sensitive children than the commercially available toys made from plastics and metal.

Sauna and spa centers of 5 star hotels in Berlin, Germany, offer facial masks and whole body treatments with clays from all five continents.

Today, silicon-containing clay types such as bentonite and montmorillonite continue to be used in naturopathy, as prophylactics and basic therapeutics. In addition, over the past 20 years, in alternative medicine the silicon-rich clinoptilolite-zeolite has proven a versatile active ingredient without side effects. Clay and clinoptilolite-zeolite currently are used for external treatments in compresses, but also in facial masks, mainly for chronic diseases, but also for beauty treatments.

[23]

12 Clinoptilolite-zeolite and its Principles of Function

Natural clinoptilolite-zeolite is a microporous tuff stone, an aluminum silicate with crystal lattice canals of 0.4 nm, filled with ions and crystal water.

The crystal lattice of zeolite originated millions of years ago in volcanic lava earth and lava ashes expelled during eruptions and falling into the sea, combining with the colloidal, boiling sea water. Zeolite may contain all of the elements of the periodic table.
Zeo is derived from the Greek 'zein' which means 'to boil.'
lite is derived from the Greek 'litho', meaning stone.

In 1756, zeolite was first described by the Swedish mineralogist Cronstedt.

There are three forms of zeolite: **Phase-like**, **layered (flaky)**, and **crystalline**. Clinoptilolite-zeolite is one of the crystalline forms. The basic structure of clinoptilolite-zeolites is a crystal lattice with hollow spaces of about 4 Ångström (1 Ångström = 10^{-10} m = 0,1 nm).

So far, in natural zeolites (clinoptilolites) at least 34 minerals have been detected. Frequently, they are present only in traces, as required by the living body of a highly evolved species. It is assumed that most elements of the periodic table are contained

in zeolites. Solely clinoptilolite-zeolite is suitable for the treatment of humans and animals.

Crystal Lattice of Zeolites

The lattice is formed by silicon (SiO_4) and aluminum (AlO_4) tetrahedrons. Inside these solid SiO_4-AlO_4, network-like lattices, there are cations such as calcium, magnesium, sodium, potassium, and others, together with crystal water (no free H_2O).

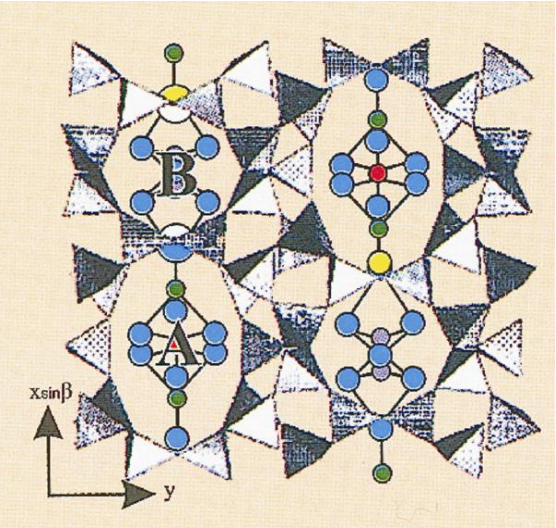


Figure 7: Zeolite lattice canals of various dimensions with different ions and labeled axes [according to Belitzkiy and Novoselov; Hecht and Hecht-Savoley 2008]

Natural clinoptilolite-zeolite is characterized by high thermal stability and resistance to aggressive substances, in particular to acids and ionizing radiation. No harmful effects have been found in humans and animals when given in tolerable doses over the long term.

Natural clinoptilolite-zeolite works as an auto-bio-regulator in human and animal organisms, with the hydrated SiO_2 playing the main role.

Chemical Composition of Clinoptilolite-Zeolite of Various Zeolite Deposits

The clinoptilolite-zeolite deposits on our planet do not all share an identical composition. A significant factor is the aluminum SiO_2 ratio. This should be at least a 1:4 ratio.

Table 2: Examples of the composition of various natural clinoptilolite-zeolites [Hecht and Hecht-Savoley 2008]

Kosiče **Slovakia**	**Aidag** **Caucasus** **[Khalilov and Bagirov 2002]**	**Kholinsk** **Siberia** **[Veretenina et al. 2003]**
SiO_2 = 65.0-71.3 %	SiO_2 = 64.16 %	SiO_2 = 64.7-72.8 %
Al_2O_3 = 11.5-13.1 %	Al_2O_3 = 10.74 %	TiO_2 = 0.08-0.3 %
MgO = 0.6-1.2 %	Fe_2O_3 = 1.26 %	Al_2O_3 = 12.2-14 %
Na_2O = 0.2-1.3 %	FeO_2 = 0.27 %	Fe_2O_3 = 1.4-2.7 %
CaO = 2.7-5.2 %	TiO_2 = 1.15 %	MnO = 0.03–0.4 %
TiO_2 = 0.1-0.3 %	CaO = 3.67 %	CaO = 1.5-3.8 %
K_2O = 2.2-3.4 %	MgO = 2.17 %	MgO = 0.2-1.9 %
Fe_2O_3 = 0.7-1.9 %	K_2O = 1.38 %	K_2O = 2.7-4.4 %
	Na_2O = 2.52 %	Na_2O = 0.8-3.0 %

Not every clinoptilolite-zeolite is suitable for medical purposes. Its suitability must be shown in corresponding data sheets.

On the Adsorption by SiO_2

SiO_2 is an adsorbent. Adsorbents are substances that are capable of binding dissolved, dispersed, or gaseous substances, and that may work inside the intestines by increasing their surfaces. This adsorption works to activate enzymes and their catalyst function. Bioactive substances such as SiO_2 or SiO_2-containing natural minerals, but also other bio-regulators, may increase their effects by means of adsorption because they get closer to their field of activity. That way, the bioavailability of the active ingredients is increased. In this manner, SiO_2 ensures a safe bioequivalence.

Adsorption (from the Latin verb adsorbere = to bind to oneself)

Adsorption = Shift in the concentration of a substance near the interface of two adjoining phases

Positive adsorption → enrichment

Negative adsorption → displacement

In this context the term **absorption** needs to be mentioned as well. Absorption means the uptake of substances through the skin or mucous membranes into the blood or lymphatic streams.

The terms absorption and adsorption must not be confused.
Physiologically, absorption is understood to describe the uptake of substances (nutrients, pharmaceuticals) through the skin or mucous membranes or from other tissues into the blood and lymphatic streams.

How Does the Adsorption Mechanism Work?

As stated above, ground up zeolite may significantly increase the adsorptive surface area inside an organism. Zeolite adsorption is tied to body fluids. It is an interaction process between adsorbent and adsorbate that is established at the interface between body fluids and the surface of the adsorbent. Ion exchange and adsorption constitute a functional unit of action inside an organism. In elimination processes, e.g.,

of heavy metals, by means of ion exchange and adsorption, **van der Waals attractions**, **physical adsorption (electrostatic interaction based on ion charges)** and **chemical adsorption (synthesis of chemical compounds,** e.g., between mineral ions and amino acids, peptides, and other molecules) play a role.

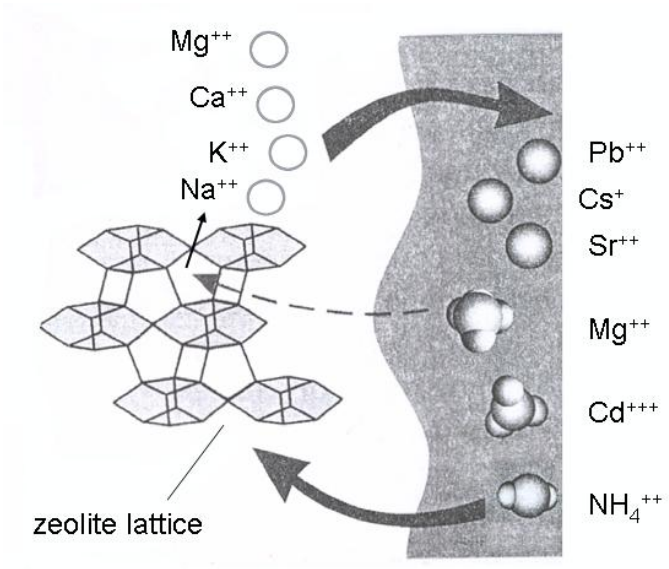


Figure 8: Selective ion exchange, schematic [Hecht and Hecht-Savoley 2005, 2008]

The ion exchange is happening in that pollutants have a strong affinity for the clinoptilolite-zeolite lattices and that the cations present in the lattice are strongly attracted by organic substances in the organism.

Detoxification Function of Clinoptilolite-Zeolite

Based on scientific studies, Shalmina and Novoselov [46] have described in a very differentiated manner the detoxification mechanisms of natural clinoptilolite-zeolite that depend on the size of the pores and the ion exchange function, as shown in Table 3.

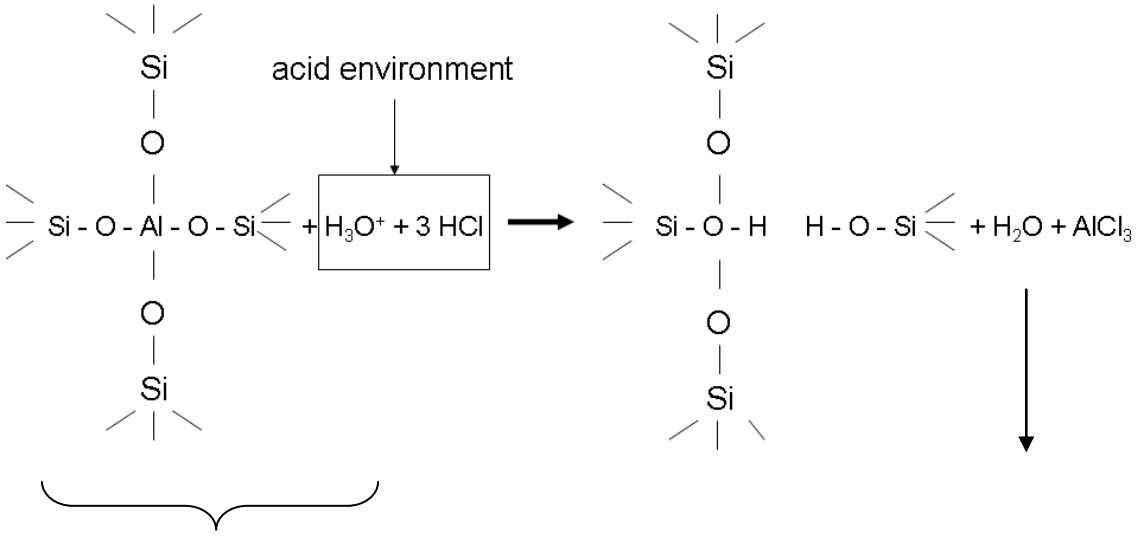
Table 3: Detoxification mechanisms of natural clinoptilolite-zeolite in various forms of endotoxicosis of humans and animals [according to Shalmina and Novoselov 2002]

Endotoxicosis by	**Mechanism of toxic substance elimination by natural clinoptilolite-zeolite**
Endotoxins, such as acidosis products, cytokines, bacterial endotoxins, free radicals, metabolic end products	Adsorption in the macropores and mesopores of natural clinoptilolite-zeolite
Exogenous toxins	Adsorption in the macropores and mesopores of natural clinoptilolite-zeolite
Lower molecular compounds such as NH_3, H_2O, Cd_4, Ch_4	Adsorption in the macropores and mesopores of natural clinoptilolite-zeolite
Surplus levels of biogenic macroelements and microelements	Ion exchange
Heavy metals	Ion exchange
Radionuclides	Ion exchange

Detoxification properties of natural clinoptilolite-zeolite are not only achieved by adsorption and ion exchange functions, but also by physical effects of the crystal surfaces of clinoptilolite-zeolite and SiO_2. (Crystal surface detoxification [40])

Release of Silica and Aluminum from the Natural Clinoptilolite-Zeolite Lattice in Human and Animal Bodies

Because of its high content of silicon tetrahedrons, natural clinoptilolite-zeolite is capable of participating in ion exchanges as well, namely of releasing SiO_2 and forming colloidal SiO_2. As its environment becomes more acidic, e.g., because of the low pH in the stomach, even the fixed aluminum and silicon cations from the lattice may become involved in the adsorption ion exchange process. In this process the AlO_4 tetrahedron of aluminum is removed (neutralized) and replaced by H_2O^+ ions in the hydrated form of the silicon tetrahedron. Gorokhov et al. [14] describe this process in a simplified manner by the following equation:



[according to 14; 23, 24]

Processing and effects of zeolites in the digestive tract

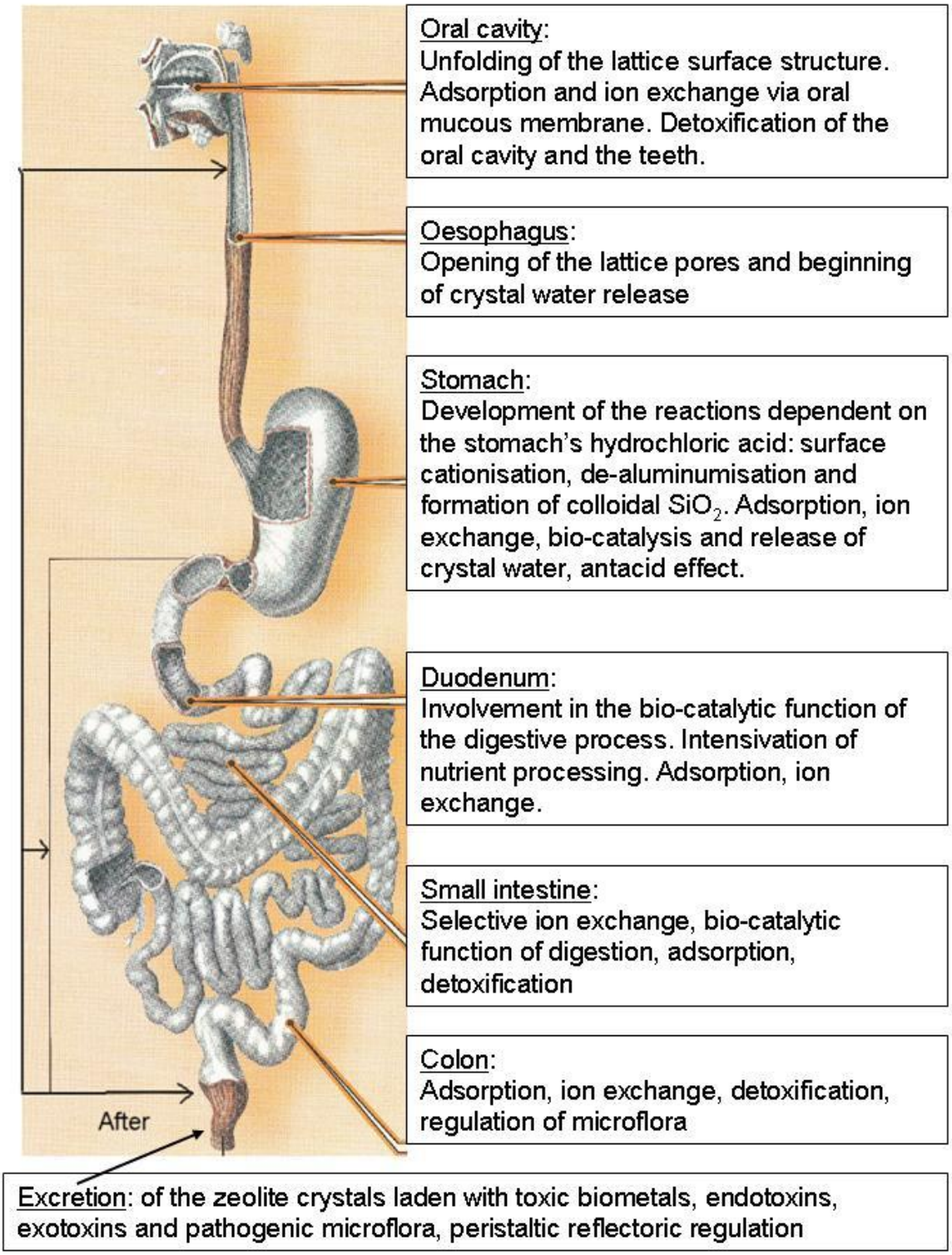


Figure 9: [modified according to Belizkiy and Novoselov 2006; Hecht and Hecht-Savoley 2008]

13 Principle of Function of Clinoptilolite-Zeolite in Human and Animal Bodies

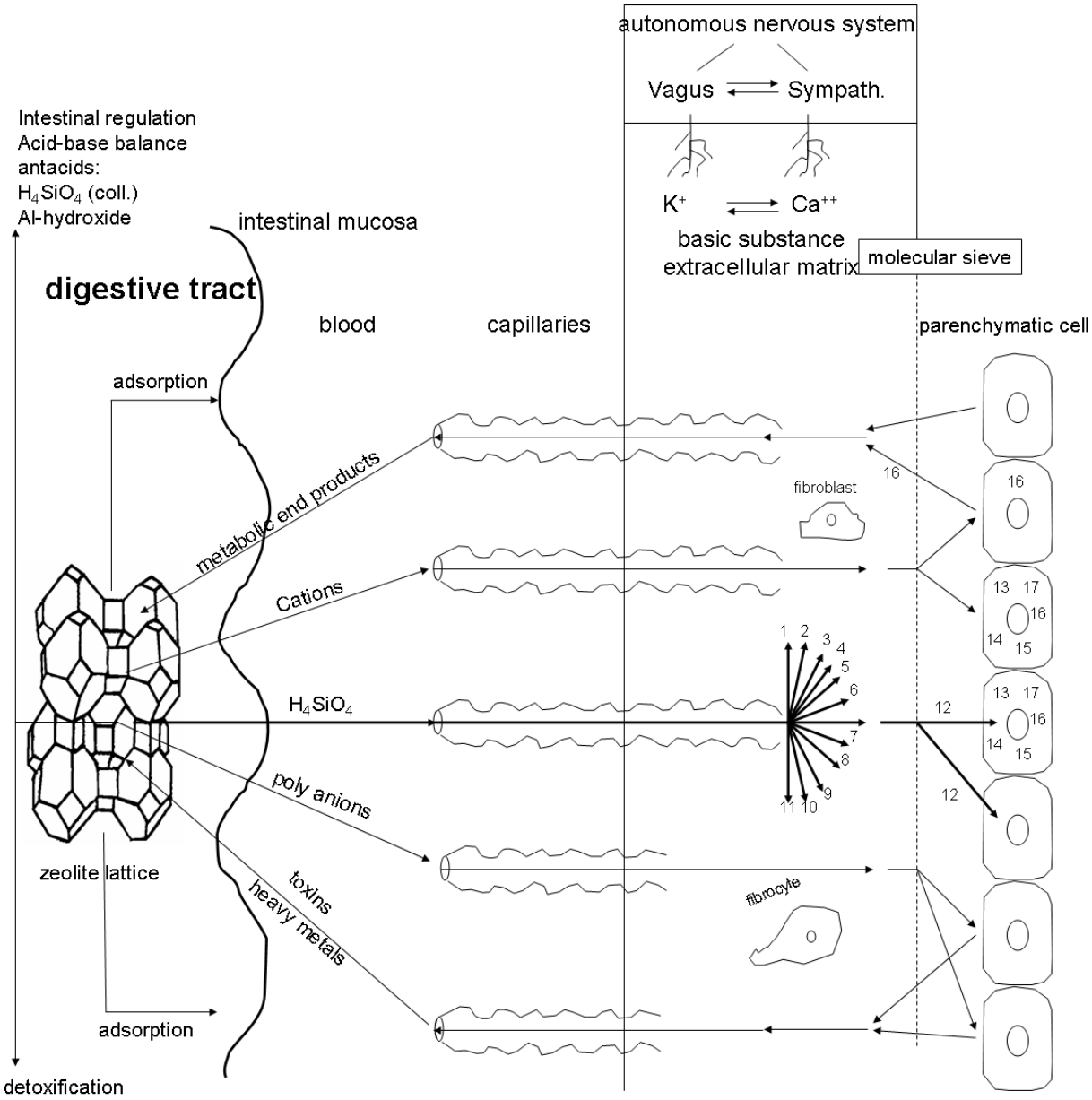


Figure 10: Simplified diagram: Processes inside the organism after oral application of clinoptilolite-zeolite and function of colloidal silicon (H_4SiO_4) within the extracellular matrix, cell membrane, cell, and mitochondria [Hecht and Hecht-Savoley 2005, 2008]

1 catalyst function
2 hydration
3 adsorption
4 rhythm timing
5 protein synthesis, synthesis of mucopolysaccharides, collagen, glucosaminoglycanes, fibronectines etc.
6 growth, healing
7 unspecific immune function
8 electrostatic binding
9 colloidal phase
10 mineral homeostasis
11 acid-base homeostasis
12 building, stabilizing, protection, and repair of cell membranes
13 intracellular matrix: respiratory chain → energy and information exchange
14 respiratory chain → mitochondrial matrix → information exchange → ATP mechanism
15 gene regulation
16 Na ↔ K: intra- ↔ extracellular matrix
17 gene transaction

Natural clinoptilolite-zeolite is a natural donator and applicator of SiO_2.

Taking clinoptilolite-zeolite and montmorillonite while also taking in sufficient amounts of fluids and exercising daily is sufficient to safely meet the SiO_2 demand of the human body. This is in particular true for seniors wishing to stay young.

Study of the absorption behavior of active clinoptilolite inside the human digestive tract by means of isotope labeling

Daskaloff [12] has confirmed by means of isotope labeling studies that clinoptilolite-zeolite is not absorbed in the human intestine, but rather is excreted.

“The study showed that activated clinoptilolite-zeolite (MAC) is not absorbed in the human intestines, but instead is excreted completely. The main residence time of MAC was measured in the gastro-intestinal tract, meaning that MAC is able to unfold its heavy metal and toxin adsorption potential here. In the study, the time between intake and excretion was about 24 hours. Neither in the thyroid nor in the lungs nor in the kidneys was any radioactivity detected which would have pointed to clinoptilolite-zeolite absorption."

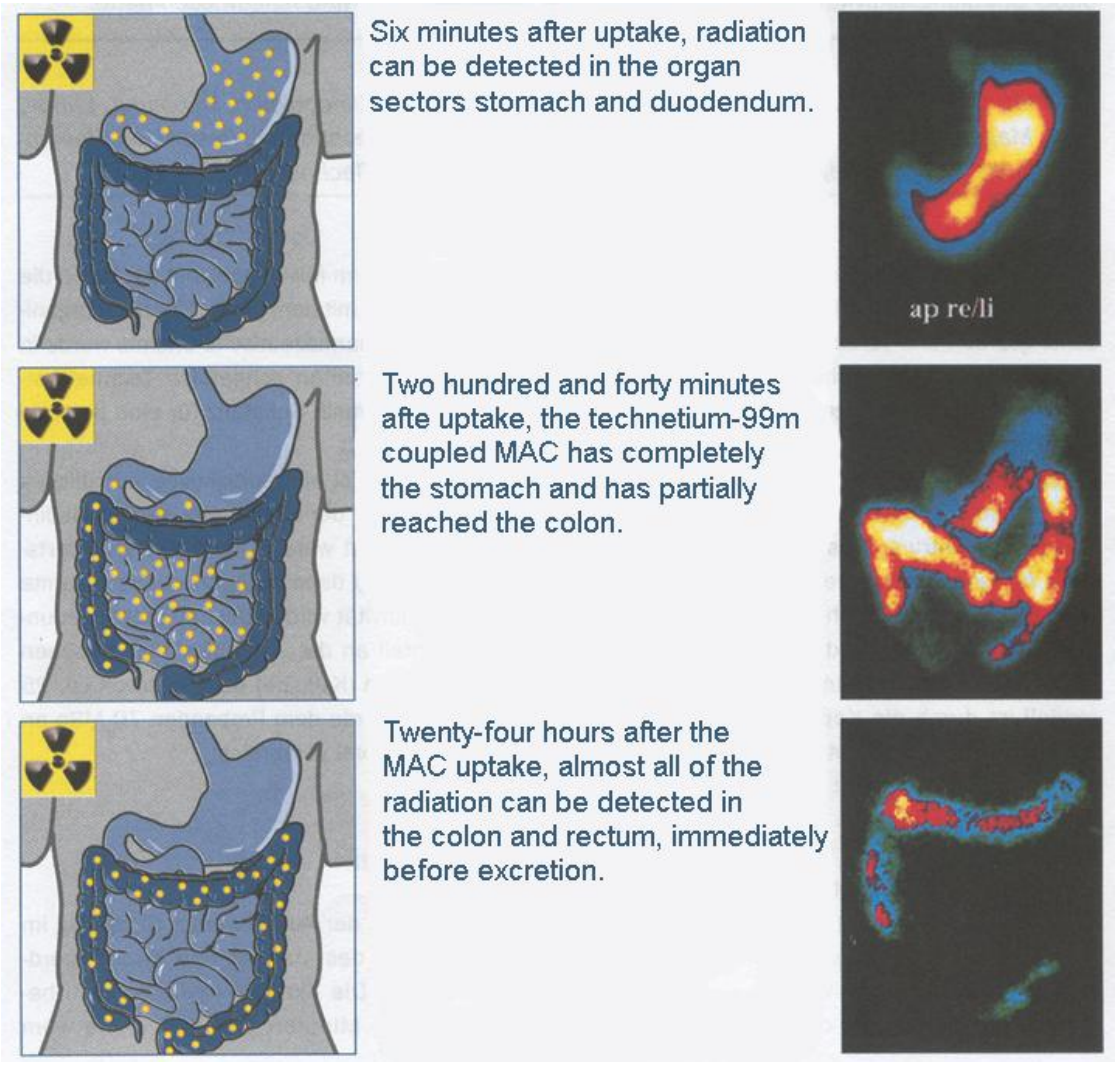


Figure 11: Behavior of isotope labeled activated clinoptilolite-zeolite while passing through the gastro-intestinal tract [Daskaloff 2005, source froximun: excerpts of available research results, November 2006, p. 41-42]

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