

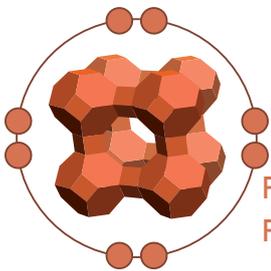


STUDIES

on the USE of ZEOLITE
to relieve the detoxification organs,
specifically the liver and the gastrointestinal tract

Informations for medical professionals

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I Description and significance of zeolite

Volcanic rock material belonging to the group of zeolites proved to be a viable bioregulator for many medical purposes. The mineral is known for its cleansing effect since ancient times and has been used for body relief and remineralization in the medical sector.

Under normal conditions the small canals which the mineral is streaked with(?) are filled with water molecules and alkaline ions (fig. 1).

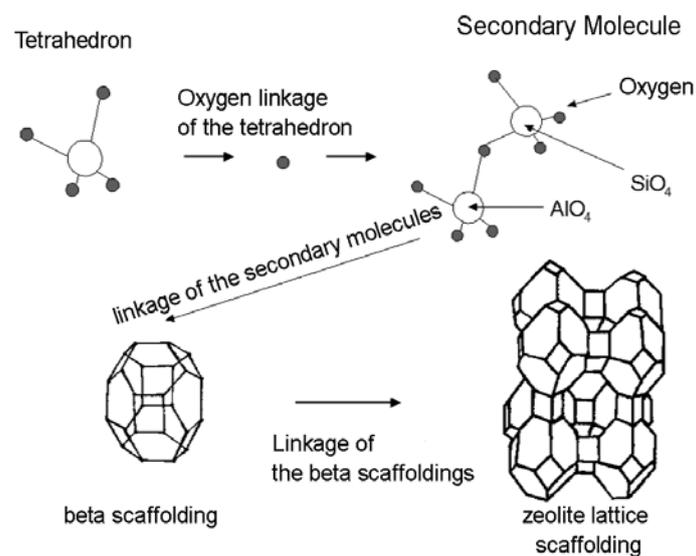


Fig. 1: Structure of the zeolite's crystal lattice made of SiO₄ and AlO₄. The microporous volcanic material zeolite is streaked with fine canals in its crystal lattice (approx.. 0.4 nm in diameter)¹.

Natural zeolite is characterized by its high thermic stability and resistance to aggressive substances (acids, ionizing radiation) in comparison to synthetic zeolite². By charging natural zeolite with the above-mentioned ions, it does not act as an "ion thief" in the organism's digestive tract, as its artificially synthesized replicas do (order: unlike its artificially synthesized replicas). Natural zeolite only binds heavy metal and ammonium ions from the environment, while alkaline ions (Mg²⁺, Ca²⁺, K⁺, Na⁺) are being released from inside the crystalline lattice. Thus, the toxin-laden zeolite is discharged through the gastrointestinal tract without interacting with the organism's metabolism.

¹ Hecht K

² Tsitsishvili GV

These aluminium silicates, which are activated by special micro ionizing procedures, have excellent contaminant binding and health enhancing qualities, as studies show. Chapter 2 will provide more details on zeolite's activation process.

The following functions of zeolite are of special significance for medical purposes:³:

- **Molecular sieve function:** the pore diameter of the zeolite structure is approximately 0.4 nm, which results in the separation of certain molecules, depending on their size and form.
- **Selective ion exchange:** zeolite's specific mineral crystalline structure binds (adsorbs) toxins like ammoniac, heavy metals, free radicals, radionuclides etc. inside an organism and discharges them via the gastrointestinal tract.
- **Adsorbent function:** adsorption of bioactive substances causes enzyme activation and thereby acts a catalyst. Adsorbents are able to increase the positive effect and bioavailability of supplied minerals and thus help to ensure bio-equivalence.

Chapter 3 will show more modes of action, which will be examined with the help of numerous studies in chapter 5. The results of those studies will be presented and discussed in the same chapter.

³ Hecht K

Overview of modes of action of Globalium Zeolite:

- Globalium Zeolite binds toxins (e.g. free radicals, ammonium ions and heavy metals) in the gastrointestinal tract and discharges them via defecation. This way, approximately 400m² of surface is cleared of harmful substances. Toxins that were stored in fat tissue follow via blood circulation and lymphatic system.
- It provides active cell protection through reduced new formation of reactive oxygen species (ROS) in the gastrointestinal tract via the neutralization of transition metals.
- Activated zeolite physically operates by binding free radicals, heavy metals, ammonium ions (cation exchange) and toxins (molecular sieve).
- It primarily effects the gastrointestinal tract and there acts as an active filter.
- The organism's metabolic network is not affected since zeolite is not systematically adsorbed. Thus, zeolite is a medical product and not a pharmaceutical.
- Zeolite is not toxic and does not provoke collateral effects, which was confirmed by extensive toxicological surveys according to OECD standards⁴.
- Zeolite does not interact with other medicaments (including immunosuppressives).

⁴ Pavelic K

II The invention – mineral activation process

The zeolite used for Globalium Zeolite is grinded using a process that is unique worldwide. It became clear that the biophysical properties of this natural active substance can be multiplied using a special micronizing procedure, based on controlled self-collision of zeolite particles.

The necessary micronizing machinery, so-called activators, has been researched, designed and produced by a working group. Counter-rotating mills served as a model, as they lead to a highly effective micronization of zeolite.

Activation is achieved by acceleration of zeolite particles, which collide at high speed. Micronization causes a significant increase in the particles' contact surface and their negative surface charge. Thus, the activated zeolite's surface is enlarged from 3 m²/g to approximately 1000 m²/g.

This implies an improved ion exchange effect and a more effective molecular sieve when working with natural activated zeolite rather than unprocessed zeolite. The positively charged toxins can be bound even more effectively because of the zeolites amplified negative charge. The activated particle's bigger surface causes the molecular sieve's higher efficiency, as a better effect can be achieved with the same amount of zeolite.

III Overview of mechanisms and applications of activated zeolite

- 1. Hydrophilicity:** Zeolite's high water-binding capacity (ca. 39%) allows application on severe burns, herpes labialis, herpes zoster, swellings caused by distortions, fistulae, oozing ulcers, paradontitis, mucosal swelling in the mouth region, inflammation and acne pustulosa. One gram of zeolite powder corresponds to a surface of approx. 1000 m². This high binding capacity allows the use of zeolite in the treatment of diarrhea.
- 2. Ion exchange and adsorption capacity of zeolite:** ammonium ions (resulting from protein digestion), heavy metals, transition metal ions and potentially present radionuclides, which zeolite has a greater affinity for, are exchanged for the zeolite's free cations (Ca²⁺, Mg²⁺, Na⁺, K⁺) in the gastrointestinal tract. Furthermore, zeolites act as molecular sieves and adsorb low-molecular compounds (e.g. hydrocarbons, sulfur dioxide and nitrous gases) and mycotoxins.
- 3. Absorption of gases and odours:** zeolite can be used for absorption of odours and secretions in cases of breast cancer, ulcerating cutaneous metastases and flatulence caused by chemotherapy.
- 4. Cell stress reduction (zeolite's primary antioxidant activity):** Zeolite is used for cancer therapy support (preventing gene mutation) because of its non-enzymatic and antioxidant effect. Other fields of application the radical scavenger can be used for are neurodegenerative diseases, arteriosclerosis, diabetes and damaged joints, because massive cell membrane damage (through lipidperoxidation) can be reduced.
- 5. Positive impact on the formation of bones and cartilage:** silicates play a major role in the formation of bones and cartilage. Overacidification, reactive oxygen species (ROS, cause protein oxidation and lipidperoxidation) and liver overload contribute significantly to the development of osteoporosis. Preliminary studies show that zeolite is highly effective as a bioregulator in building up bone tissue and that it could induce a decrease of an already distinct osteoporosis.

- 6. Positive effect on chemo-induced polyneuropathy:** based on observations of 40 documented cases, pain was relieved or even disappeared totally after giving zeolite (especially during chemotherapy using platinum derivates, epirubicin and taxanes).

- 7. Positive effect on liver function:** by absorbing endo- and exotoxins, zeolite has a positive effect on the treatment of “fatty liver” and cirrhosis, binds ammonium bases and accelerates liver regeneration after chemotherapy.

- 8. Positive effect on blood lipids, cholesterol/LDL:** detoxification by the liver through disposal of ammonium is closely linked to the activation of the lipid metabolism. As studies showed, the intake of zeolite leads to lower blood concentrations of triglycerides, cholesterol and LDL. In a wider sense, this would imply prevention of an impending angiopathy.

- 9. Hemostasis:** is reached through the mineral’s high water binding capacity and its ability to release calcium ions in excellent bioavailable state.

- 10. Wound healing:** to support wound healing, zeolite stimulates the growth of macrophages. Thereby the development of new capillaries during wound healing can be improved.

- 11. Positive impact on the acid-base-balance:** malnutrition, overtraining or serious illness can cause overacidification of the organism. The use of zeolite can restore the cell-milieu, the basic regulatory system and thereby the acid-base-balance. Activated zeolite counteracts overacidification through ion exchange. However, one should be aware that the damaging noxa has to be eliminated.

IV The Medical Device - Globalium Zeolith (medical substance)

The natural zeolite clinoptilolite has the extraordinary ability to reduce the neoformation of free radicals in the gastrointestinal tract by up to 50%, even before the organism's cells are attacked. This makes Globalium Zeolite a highly effective primary antioxidant.

Lead, mercury, cadmium, cesium and certain fungi are absorbed in the gastrointestinal tract and removed from the body. At the same time, zeolite supplies the body with essential minerals such as magnesium, calcium and potassium. In addition, effective binding of ammonium relieves the liver. These effects can be traced back to zeolite's ability to adsorb and to exchange ions.

Globalium Zeolite's relieving and cleansing effects have been proven to cause faster regeneration, supports cells through reduction of oxidative stress and detoxifies the body after medication over a long period or radiotherapy.

Globalium Zeolite works purely physical and is not metabolized. The Zeolite is completely discharged from the body within 24 hours, loaded with toxins.

Natural zeolite's detoxification mechanisms for various forms of intoxication are presented in the following table.⁵

⁵ Shalmina G

TYPES OF INTOXICATION	INDICATIONS	ZEOLITE'S DETOXIFICATION MECHANISMS
Bacterial endotoxins	Food poisoning	Adsorption in the zeolite's macro- and mesopores
Free radicals	Oxidative stress	
Metabolic products	Excretion via: <ul style="list-style-type: none"> • Urea: final product of proteins • Uric acid: final product of purines • Creatinin: final product of musculature (evtl andersherum?) 	
Cytokines: growth factors		
Products of acidosis: lactates, ketone bodies		
Exogenous toxins	Imbalanced acid-base-levels	
Low-molecular compounds (NH ₃ , CH ₄)		
Biogenous macro- and microelements in excess concentration	Imbalanced acid-base-levels	Ion exchange

V Studies on detoxification

Detoxification of the entire organism can be reached through a combination of the zeolite's mechanisms of action mentioned in chapter 3 (especially through adsorption, ion exchange and surface enlargement). Detoxification is significantly more effective with zeolites that have been micronized and therefore activated according to the PMA process than it is with unprocessed zeolite.

Zeolite's detoxifying effect is based, among other things, on relieving the detoxifying organs, especially the liver and the gastrointestinal tract. Those effect range from binding afla- and mycotoxins, ammonium and heavy metals to the removal of radionuclides. Zeolite can also bring relief to the skin, the human body's largest organ, responsible for removing toxins and waste products as well as absorbing oxygen.

The following studies provide an insight into zeolite's detoxifying effect and its application in therapy.

5.1 Effects of zeolite on microorganisms

In vitro studies on zeolite's antibacterial and antimycotic effect proved its detoxifying potential. The research included the mineral's effect on the most common pathogenic microorganisms⁶:

- **gram-negative bacteria:** *Pseudomonas aeruginosa* (Germany's most common hospital germ, causes purulent infections) and *Escherichia coli* (causes enteropathies)
- **gram-positive bacteria:** *Streptococcus* and *Enterococcus faecalis* (both cause nosocomial infections and endocarditis as well as bladder, prostate and epididymal infections)
- **fungi:** *Candida albicans* (causes endogenous infections on the mucous membranes)

Zeolite's high efficiency caused by its antibacterial and antimycotic cations can help to reduce medicaments that negatively affect the organism during therapy.

⁶ Colella C

5.2 Acne treatment with zeolite

Classical acne treatment frequently faces resistant propioni bacteria strains that cause acne inflammations through excessive spread. Zeolite, having a zinc-releasing effect, has been tested as a carrier for the antibiotic erythromycin on external application. It turned out that a combination of zeolite and erythromycin is very effective against resistant propioni bacteria strains.⁷ Zeolite also proved to be effective when used on its own.⁸

As an application study showed, activated zeolite caused acne to heal when applied orally or locally (as a face mask or powder).⁹

5.3 Ammonium exchange and detoxification through zeolite

After a protein-rich meal, the blood amino acid concentration rises significantly. The majority of these amino acids that have been reabsorbed in the intestines, but not been broken down, is taken up by the liver, which is the central organ in the metabolism of amino acids.

The liver enables the organism to release neurotoxic ammonium ions (NH_4^+) from the amino acids glutamine and alanine, and to convert them into significantly less toxic urea for excretion. Ammonium ions are able to permanently block synapses because of their chemical resemblance to potassium. Therefore ammonium is neurotoxic to all organisms with potassium-operated synapses, if the body's own detoxification mechanisms don't work properly.

In the liver, the released ammonium ions are transformed into urea for excretion and remaining amounts of NH_4^+ , which escaped the urea cycle, are intercepted by perivenous hepatocytes and released back into the blood circle in the form of glutamine.

⁷ Cerri G

⁸ Araki H

⁹ Triebnig I

The main aim of urea production is to keep ammonium concentrations low in the body fluids and especially in the brain, because increased $\text{NH}_3/\text{NH}_4^+$ levels cause severe cerebral damage.¹⁰

Ammoniac (NH_3) is removed through blood and released in the kidneys with the help of glutamine. Ammoniac is then bound to a proton and excreted, thus saving bicarbonates and helping to regulate the pH value.

Intestines, kidneys and musculature also play an important role in the excretion of $\text{NH}_3/\text{NH}_4^+$ (see Fig. 2).

Zeolite with its versatile mechanisms addresses exactly those detoxification organs and thereby relieves burden on the organism.

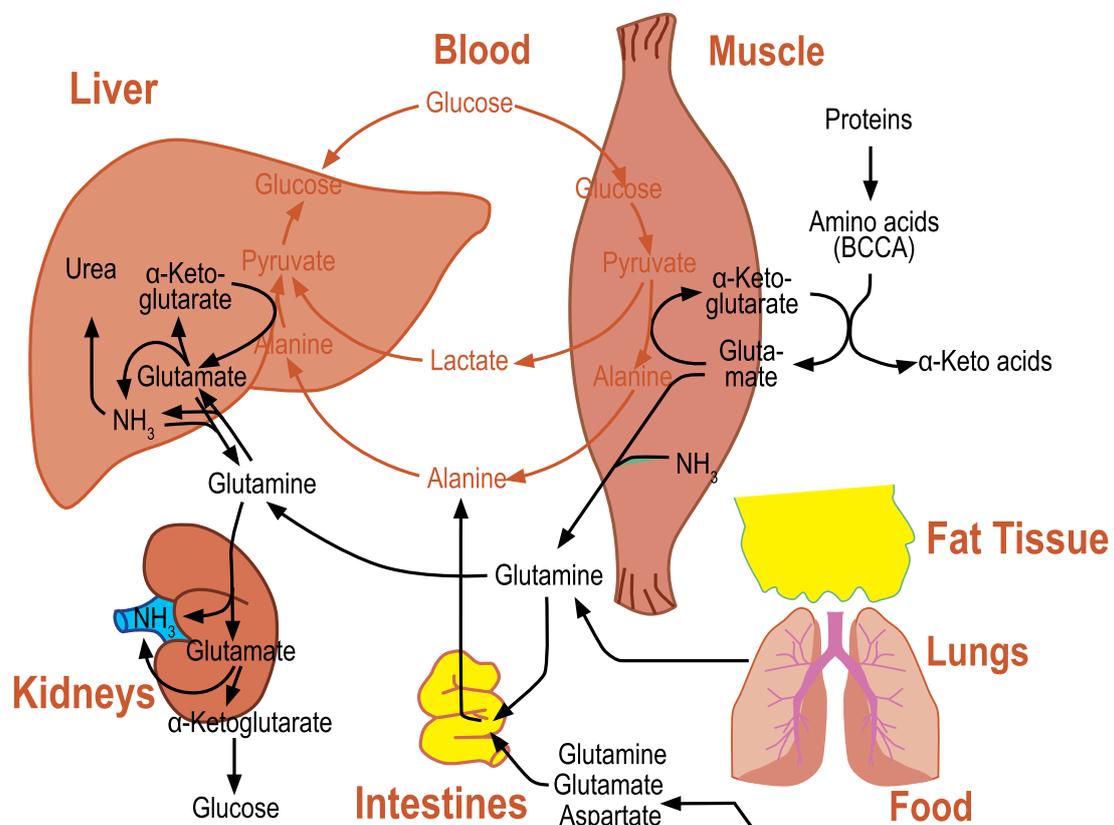


Fig. 2: Detoxification of the entire organism through the liver: using activated zeolite can support and thereby relieve the body's natural detoxification processes e.g. after a protein-rich meal.¹¹

¹⁰ Löffler G

¹¹ Löffler G

5.3.1 Ammonium exchange and detoxification through zeolite

Ammonium ion exchange in an aqueous solution has been tested on zeolite under different conditions, including varying pH value, zeolite dosage, contact time, temperature and ammonium concentration.¹² High initial concentration of ammonium and long contact time proved to result in the ideal binding capacity. A pH value of 6 turned out to be ideal for ion uptake, while temperature alteration showed no impact. Further studies could show zeolite's exceptional sorption abilities.¹³

5.3.2 Activated zeolite for liver cirrhosis regeneration

The liver is not only the main hub for our metabolism, but also shows exceptional regenerative capacities. The liver's main functions are to ensure the functional capability of all extrahepatic organs, the removal of NH_4^+ and the regulation of the lipoprotein and cholesterol metabolism. If the body is overloaded with toxins to such an amount that the liver's detoxifying mechanisms cannot keep up, the formation of a fatty liver, the first stage of a pathogenic development, will be the result. A fatty liver is treatable with the appropriate therapy.

Even in case of cirrhosis, regeneration of liver cells is possible.

Long-term observational studies helped Dr. Triebnig¹⁴ and Prof. Greilberger prove that a combination of activated zeolite with α -ketoglutaric acid rapidly impacts on the liver in a positive way. The activated zeolite binding toxins already in the gastrointestinal tract and improved cellular respiration seem to be the keys to success.

Monthly laboratory tests with the patients soon showed the positive effect of activated zeolite on their liver function readings.

¹² Karadag D

¹³ Sprynskyy

¹⁴ Triebnig I

5.4 Extraction of heavy metals through zeolite

A clinical study with 22 participants tested the effect of zeolite treatment on chronic diseases caused by heavy metal poisoning. During the treatment with zeolite, lasting 7 to 30 days, urine samples as well as blood serum were taken and analyzed for heavy metals and electrolytes. The study showed that a daily intake of an activated zeolite suspension safely and effectively removes toxic heavy metals from the body via urinary excretion.

While classical removal bears the danger of also removing physiologically important electrolytes from the serum, this did not occur in zeolite therapy.¹⁵

Another clinical study showed the detoxifying effect of zeolite. 102 heavy metal-contaminated males have been examined before and after a 30-day natural zeolite application. Mass spectrometric analysis showed a significant decrease of toxins (Cd, Pb, Cu, Cr, Ni)(see Fig. 3) that can be traced back to the cleansing function of zeolite and also to the optimized homeostasis of the entire organism's mineral metabolism.¹⁶

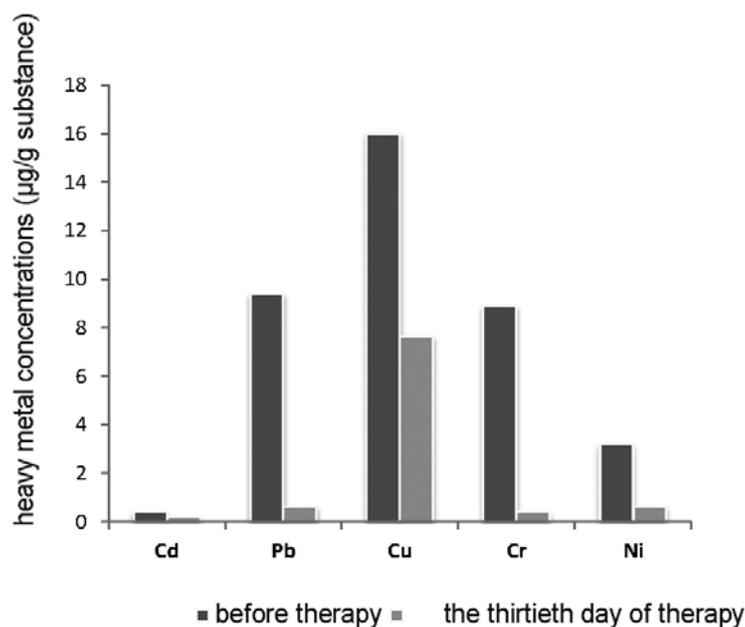


Fig. 3: heavy metal reduction through detoxification treatment with zeolite. After a daily intake of 2 x 1.25 grams of zeolite over the period of 30 days, a significant reduction of heavy metals can be seen.

¹⁵ Flowers J

¹⁶ Djaikov J; Hecht K

Zeolite has also been characterized regarding its adsorption of certain heavy metals such as cobalt¹⁷, copper¹⁸ and fluorine¹⁹. Selectivity series, which play an important role for the body's detoxification, were analyzed.^{20,21}

Another study tested the adsorption capacity of zeolite with the help of a gastro intestinal model under real-time conditions. It could prove that zeolite maintains its excellent binding ability and stays stable even when exposed to the gastric pH value of 1.5.²²

5.5 Adsorption of aflatoxins and enterotoxins

The use of zeolite in poisoned rats has already been tested successfully, both preventive and after the addition of toxic organophosphates.²³

Further experiments tested zeolite's effective adsorption of cholera toxins and enterotoxins from enteropathogenic *Escherichia coli* strains, which attack the intestines and often cause food poisoning followed by gastroenteritis. Especially children with diarrhea could be treated effectively with activated zeolite, as this method was able to reduce enterotoxigenic activity.^{24,25}

Furthermore, zeolite's detoxifying effect has been tested at different pH values (1, 7 and 10) and the effective adsorption of aflatoxin B1, zearalenone, ochratoxin A and peptide alkaloid could be proven.²⁶

5.6 Removal of radionuclides

Being a cation exchanger, zeolite is capable of binding radioactive substances/nuclides and removing them from the organism. Especially cesium and strontium, ranking high in zeolite's sorption sequence, show high binding capacities.^{27,28} In the age of nuclear energy, the removal of radioactive substances, which can cause serious long-term damage like testicle or bone cancer, becomes more and more important.

¹⁷ Chmieleska-Horvathova E

¹⁸ Ecaterina D

¹⁹ Gaidash A

²⁰ Lucia Z

²¹ Sen S

²² Martin

²³ Mojzis J

²⁴ Herrera P

²⁵ Ramu

²⁶ Tomašević-Canovic M

²⁷ Akhalbedashvili L

²⁸ Jablonski JM

5.7 Acid-base Balance

Nowadays, human blood being in perfect acid-base balance can basically only be found in newborns. If acid-base levels are in strong imbalance, for example through increased metabolic acid concentrations, caused by lactate, or ketone bodies, there is a growing danger of developing acidosis in the long term.

The constant rise of acid concentrations leads to local acidosis damage in the tissue and thereby causes numerous organ damages in the long run.²⁹ The activated zeolite's detoxifying effect and its interference with the metabolism's oxidation processes has a harmonizing effect on the acid-base balance and thus protects the entire organism from consequential damages of acidosis.

5.7.1 Lactic acid reduction through zeolite

Lactate is a metabolite that regulates adaptations of the body's energy supply. It directly influences the distribution of energy carriers and improves the organism's oxidative energy supply. Lactate production and -breakdown enable the body to adjust to physical stress for a certain time.³⁰ During high and peak stress the adaption system gets off balance, the reaction equilibrium is shifted and lactic acid accumulates inside the active musculature. Fat as an energy carrier recedes into the background and the lactate utilisation system is overburdened.

Activated zeolite particles with their enlarged surface have a detoxifying effect. Given prophylactically, they counteract the acidification process as described by the following study. Using UV spectroscopy, it could be shown that zeolite influences neither the concentration nor the stability of the digestive enzyme pepsin in the stomach.³¹

A randomized double-blind study, conducted by Dr. Knapitsch and Mag. Schmölder and evaluated by Prof. Dr. Bachl, tested the effects of activated zeolite on the physical performance of runners.³² The focus was on the effect of activated zeolite in connection with blood lactate concentrations.

²⁹ Worlitschek M

³⁰ Brooks GA

³¹ Rivera A

³² Knapitsch, Schmölder

The lactate study, after treating 24 test persons with zeolite, showed a decrease in lactate concentrations between 6.55% and 25.95% (18,12% on average) after one week and between 2.80% and 47.95% (28.37% on average) after two weeks. Furthermore, the lactate/heart rate curve was shifted to the right, which meant that stamina improvement could be observed. This is accompanied by a decrease in blood catecholamine concentrations, which implies reduced sympathetic activity and thereby moderate stress situations.

To provide a more accurate view of zeolite's effect on metabolic processes, clinical studies are conducted on rats at the moment. The aim is to find out more about zeolite's detoxifying effect, under controlled laboratory conditions and with the help of RNA microarrays.

5.7.2 Diarrhea

Diarrhea occurs when the intestinal villi refuse to take up acids and deactivate after acidic meals. In most cases diarrhea is the body's emergency program to protect itself from severe systemic disease, or even death. The reason for the deactivation of the intestinal villi is to prevent the uptake of toxins or germs.³³ To reduce this intestinal reaction to acute overacidification, it is recommended to ingest adsorbing substances such as activated zeolite with its enormously enlarged surface.

In the course of a comparative study with general immune and nutrition stimulation to increase the disease resistance of pigs, activated zeolite was given to a group of the animals. With the help of several methods like flow cytometry, immunohistology and morphometry, it was observed that the group of animals that had been given zeolite was less susceptible to diarrhea.³⁴

A longitudinal application study (conducted by Dr. Triebnig) on the effect of activated zeolite with documented medicinal cases and over 2000 patients over the period of ten years showed zeolite's effect on digestion³⁵:

³³ Worlitschek M

³⁴ Valpotic I

³⁵ Triebnig I

Some patients suffer from diarrhea attacks after chemotherapy and thus lose too much liquid and electrolytes, which weakens and exsiccates them. This especially affects patients with an ileostomy. This is where not only the hydrophilic component, but also the activated natural zeolite's ability to release ions into the body comes in. Ion exchange happens in the intestines, toxins are bound by activated zeolite crystals and vital ions like Mg, Ca, K and Na are released into the body.

In case of diarrhea or other bowel diseases, activated zeolite is not given with meals but with additional doses of probiotics. The resulting detoxification supports liver cells by partially doing their job or making it significantly easier. This results in less nausea, less fatigue and less lack of appetite in patients.

Activated zeolite is also able to bind ammonium bases, which also provides support for the liver. Too much NH_4 causes dizziness, vertigo, general symptoms of intoxication and lack of concentration.

The use of activated zeolite as add-on therapy improves the patient's ability to take walks, work out, get some fresh air, eat and drink normally, have a stable digestion, in short, to recover in between chemotherapy cycles and to fight the disease with body, mind and soul. To enjoy life! It is known that exercise in the fresh air is especially important for tumor patients.

5.8 Improved treatment of irritable bowel syndrome through zeolite

Irritable bowel syndrome's symptomatology shows a great diversity, which is also true for the search for the disease's causes. A glance at the available preparation list makes it clear the disease can only be treated with a holistic medicinal approach. Typical medications don't solve the problem but cause further problems through severe side effects.³⁶

Valuable reports on zeolite's supporting effect on the treatment of irritable bowel syndrome could be collected within a F.X. Mayr detoxification cure. In addition to the cure's holistic therapy concept, which relieves and cleanses the digestive tract, faster healing could be reached by combining it with PMA-activated zeolite.

³⁶ Shah E

Dr. Norbert Schulz uses this combination therapy (detoxification cure with additional zeolite) on many of his more than one thousand patients. He could both subjectively and objectively observe a positive effect on the intestines.³⁷ In comparison to similar cases that have earlier been treated without the use of activated zeolite, patients with irritable bowel syndrome were cured considerably faster.

5.9 Supportive therapy of eating disorders with zeolite

Recent surveys indicate that in Austria, 8% of young females between the ages of 18 and 35 suffer from eating disorders.

An application study with activated zeolite has been conducted by Dr. Gustav Raimann and clinical psychologist Dr. Dieter Weber within a stationary therapy of various forms of eating disorders (anorexia nervosa and bulimia nervosa).³⁸ In the course of the study, several blood values (characteristic markers for immune defense, liver, kidneys, digestion and lipid metabolism) as well as body measurements and stool had been protocolled.

The results showed a significant improvement of the body mass index (see Fig. 5) as well as significantly better liver and kidney function readings (GPT, GOT, yGT, creatinine, see Fig. 4). This indicates that the zeolite given supports the liver and also leads to a faster normalization of intestinal functions.

³⁷ Schulz N

³⁸ Weber D

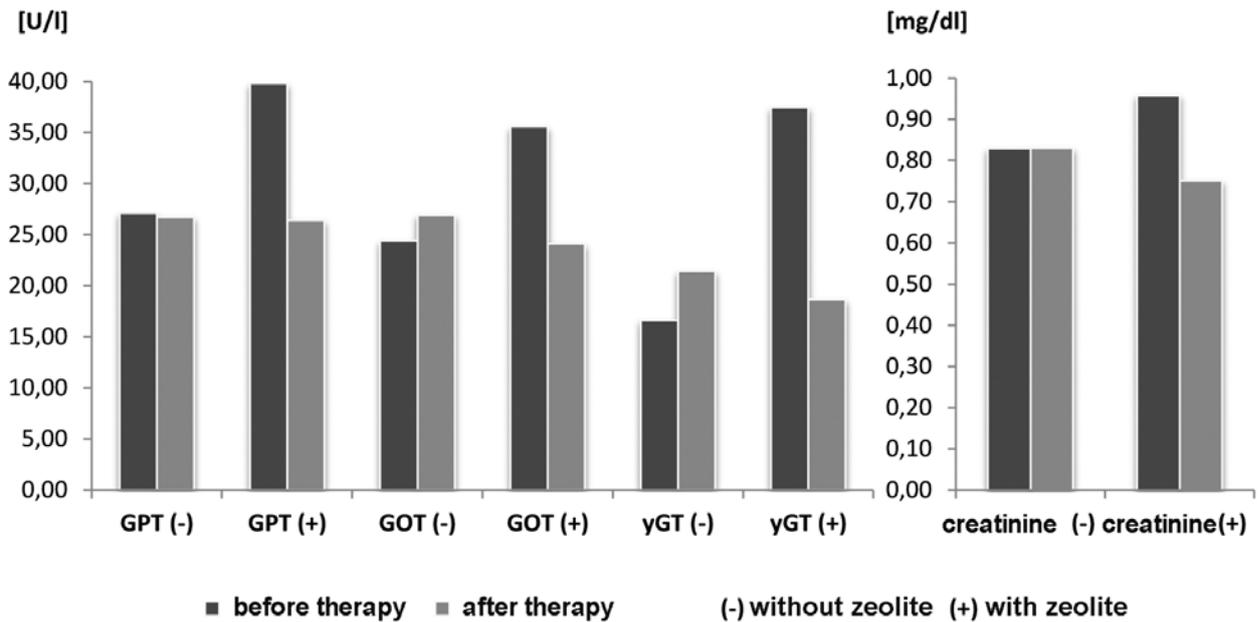


Fig. 4: Summary of liver and kidney function readings. This data indicates that treatment with zeolite induces a significant decrease of markers.

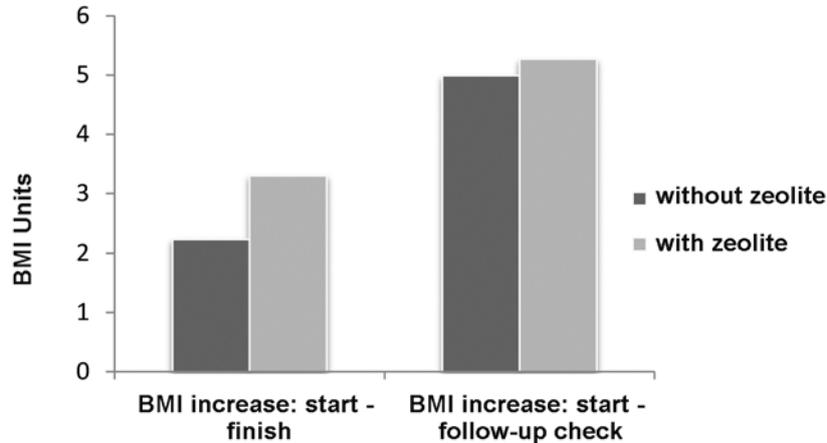


Fig. 5: In comparison to the control group, the study group had an additional increase of 32.3% in the BMI during the stationary treatment with supporting doses of zeolite. After the patients were released (and the intake of zeolite thereby stopped), follow-up appointments indicated only 5.38% increase in the BMI.

5.10 Oxidative stress – intoxication by free radicals

A certain degree of oxidative stress is normal and vital. But with our environment being increasingly polluted, too many free radicals (ROS) are produced, which cannot be adequately broken down by our organism. To a certain amount, free radicals are produced in every human organism. An increase in the release of ROS is caused by environmental pollutants (air pollutants, heavy metals, pesticides), UV radiation, high fat diets, tobacco, alcohol, inadequate exercise and through the metabolization of certain drugs (e.g. oral contraceptives, “the pill”).

Zeolite acts in the gastrointestinal tract because it is not resorbed. It is here where zeolite physically prevents oxidative damage by free radicals through its microporous structure and its ion exchange capacity (e.g. reducing lipid peroxidation).

Activated zeolite is a highly potent, non-enzymatic, primary antioxidant, which significantly reduces the formation of free radicals through absorption (neutralization) of stress-inducing catalysts (transition metals, causing the formation of free radicals) and thus protects the organism from the complications of oxidative chain reactions.

The formation of free radicals can cause damages in biomolecules, such as:

- gene mutations that cause tumorigenesis
- premature aging
- Alzheimer´s disease
- Parkinson´s disease
- Pulmonary emphysema, especially in smokers (increased NO-levels)
- Massive cell membrane damage through lipid peroxidation, as is the case with arteriosclerosis
- Joint damages through negative impact on synovial fluids, and many more.

Oxidative stress in the organism is measurable in the laboratory as well as through heart rate variability. People with high stress levels suffer from insomnia, lack of concentration, feel exhausted and harried and are constantly overwrought, which indicates a massive malfunction in the balance between the sympathetic and the parasympathetic nervous system. Eventually this may lead to total exhaustion and breakdown, as can be seen in long-term chemotherapy patients or badly trained athletes.

The sympathetic tone is then dominant while the body lacks recovery periods. Taking activated zeolite can help in this situation.

Oxidative stress indicates disbalance between free radicals and protection by antioxidant mechanisms. It is also a cofactor in the development of diseases like arteriosclerosis (and ultimately heart attacks and apoplectic seizures), diabetes mellitus, cataract, rheumatic diseases, premature senility, neurodegenerative diseases and malignant tumors.

The antioxidant effects of PMA-processed zeolite could be tested in vitro in the course of a study.³⁹ After adding a radical generator (azo compound DPPH), zeolites ability to bind cationic peroxide radicals was tested (see Fig. 6). The lag phase's duration depends on the concentration of antioxidants and the intensity of oxidative stress. Therefore additional antioxidants can prolong the lag phase or reduce the oxidation rate.

As you can see in Fig. 6, an increasing concentration of zeolite can prolong the lag phase, which demonstrates the activated zeolite's direct antioxidant effect.⁴⁰

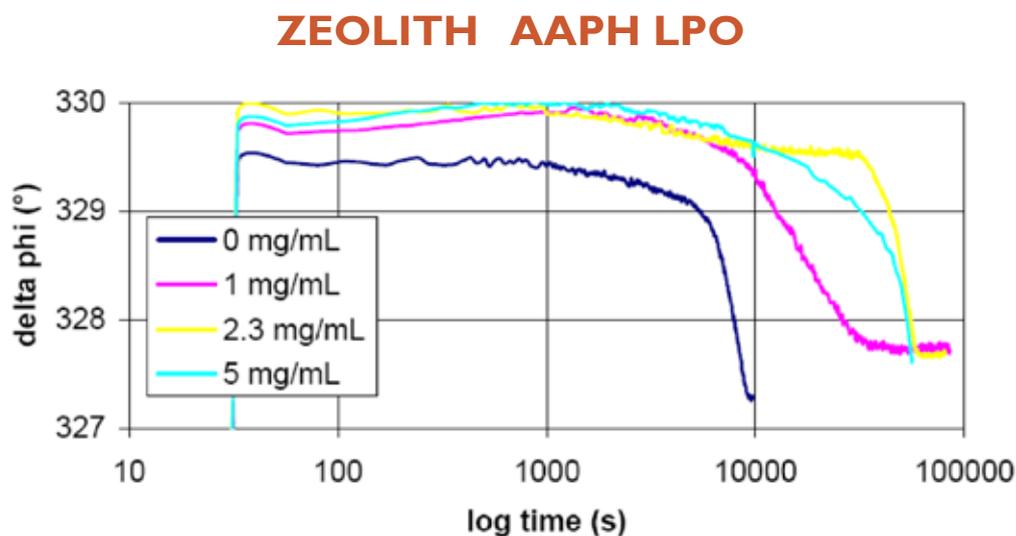


Fig. 6: Experiments with the radical generator AAPH indicate prolonged lag phases after adding zeolite. This can be explained by zeolites antioxidant effect.

As Dr. Peter M. Abuja explains in his study on the antioxidant activity of PMA zeolite⁴¹, lipid peroxidation through free radicals is probably the main factor leading to oxidative stress.

³⁹ Abuja PM

⁴⁰ Cuvelier ME

Lipid hydro peroxides, which are increasingly formed postprandially, are resorbed in the small intestine and enter the bloodstream. Activated zeolite reduces the formation of lipid peroxidation products in the intestinal tract.

Even if details of zeolite's effects or its exact point of action vary in different scientist's analyses, they all come to the conclusion that the use of zeolite results in a decrease in the development of free radicals, and that this decrease is not caused by a chemical reaction with the radical but by a physical mechanism. User benefits were precisely determined with the reduction of free radicals.

With free radicals being very unstable and not or not easily responsive to quantitative measurement, damage caused by free radicals is measured via lipid peroxidation analysis.

5.1 I Effects of zeolite on the lipometabolism

Lipid metabolism malfunctions cause diseases that are closely linked to our lifestyle habits and that are some of the most common diseases of civilization: adiposity, diabetes mellitus, fatty liver, arteriosclerosis, which may cause heart attacks and strokes.

Animal experiments proved zeolites ability to bring high cholesterol levels, triglyceride and LDL back to normal. The same results can be observed in humans.⁴²

An exception are patients who inherited hypercholesterinaemia genetically, and who suffer from advancing arteriosclerosis despite healthy diet and sports. The purpose of taking activated zeolite is to prevent and delay atherosclerosis. Arteriosclerosis that has already developed cannot be reversed.

5.1 I.1 Metabolic activation in diabetes treatment

Hyper-caloric diet and lack of exercise cause many metabolic malfunctions in people, especially in the western world, such as the metabolic syndrome (conjoint occurrence of overweight, increased blood fat levels, increased blood pressure and type 2 diabetes).

The resulting diabetes may cause neuronal and vascular damage, such as arteriosclerosis, polyneuropathy or kidney diseases. Furthermore, overacidification of the organism is frequently diagnosed in diabetes patients.

^{41,42} Abuja PM

Except in cases of inherited metabolic malfunction, zeolite has a positive effect on the cell environment and supports the diabetes patient's organism regulation.

A long-term application study, conducted by Dr. Triebnig, could show improved blood fat levels following the intake of activated zeolite in combination with the grape seed extract OPC and turmeric extract.⁴³ In the long run, regular intake of zeolite leads to significantly reduced damaging of the inner vascular walls by reducing blood fat levels. Zeolite can prevent or at least delay further atherosclerosis.

Zeolites great effect on diabetes can be explained by its support for the liver, especially in eliminating toxic ammonium. Vascular changes in the kidneys (diabetic nephropathy) cause substantial damage in the kidneys, so the body is no longer fully capable of detoxification.

Diabetics also run a higher risk of getting osteoporosis. The reason for that are low concentrations of insulin and some growth factors that stimulate bone growth.

With zeolite's ability to exchange ions, vital minerals such as magnesium, potassium, sodium and calcium are released into the intestinal mucosa. The lack of these minerals, which is often diagnosed in diabetics, can thus be easily compensated.

5.11.2 Relief for dialysis patients

Zeolite eliminates toxins in the intestines and thus supports the organism's detoxification. Zeolite also relieves the kidneys, which are essential for discharging the metabolism's end products.

This effect has been observed in many diabetics, who may become dialysis patients if the disease advances. To test their kidney functions, serum creatinine levels have been examined. Creatinine is used as an important kidney retention parameter in laboratory medicine.

During application studies on diabetics, occurring high creatinine levels could be reduced to normal by taking activated zeolite. Hereby the kidneys' filtration rate could be increased, which improved the patients' general condition.⁴⁴

⁴³ Triebnig I

5.11.3 Support of micro/macroangiopathy

Diabetes can also have a negative effect on the neuronal system (diabetic neuropathy) – initially on the lower extremities.

The neuronal system can be irreparably damaged by constant hyperglycemia in the surrounding tissue, patients may develop a painful neuropathy. Zeolite is effective with diabetic diseases of the small vessels (microangiopathy) as well as the big vessels (macroangiopathy). Applying zeolite powder and the intake of capsules reduces swellings. Long-term application experience proves that in cases of lower leg and pressure ulcers caused by diabetes, zeolite in the form of powder or balm has very good healing results.⁴⁵ The mineral absorbs the secretion from oozing, moist wounds, has an antiphlogistic effect and enhances the development of mast cells, which kill off dangerous bacteria. Furthermore, it counteracts overacidification of the tissue.

Reduced blood flow and neuronal damage combined with dysesthesia in the feet (diabetic foot) often cause open, slow-healing wounds and ulcers. In addition to its detoxifying effect, zeolite stimulates angiogenesis and thus improves wound healing. This effect can be reached either by oral intake of zeolite or through direct application of the powder on the wound.

5.12 Liver protection in chemotherapy

It is recommended for chemotherapy patients to start the application of activated zeolite immediately after the substances used in chemotherapy have decayed, in order to accelerate the discharge of toxic waste products and relieve the liver. In summary, after ten years of application observations during cancer treatment of more than 2000 patients, and with respective evaluation of the collected data, the supporting effect of zeolite can be confirmed. General condition as well as laboratory findings, the sonographic documentation of the liver and the Karnofsky Index (a scale helping to evaluate symptom-related limitations of activity, self supply and self-determination) show a significant difference between patients with and without zeolite application.^{46, 47} In all cases the application of activated zeolite led to an improved quality of living, an increased tolerability of medicines and to a reduction of complications and side effects of chemo- and radiotherapy through the detoxifying effect of activated zeolite.

⁴⁴ Triebnig I

⁴⁵ Triebnig I

⁴⁶ Karnofsky DA

⁴⁷ Triebnig I

VI Dosage recommendations

Application of the medical product Globalium Zeolite:

- stir one teaspoon (approx. 3 grams) of Globalium Zeolite in some water and drink before meals 1-3 times a day.

Alternatively:

- put one teaspoon (approx. 3 grams) of Globalium Zeolite in your mouth and swallow with some water 1-3 times a day.

Please note:

- during the time of application you should drink at least 1.5 liters (water, juice, tea etc.) a day. This supports the discharge of bound substances and prevents constipation.

⁴⁶ Karnofsky DA

⁴⁷ Triebnig I

7. Conclusion

Long-term medical application observations and numerous studies confirm the positive effects of the natural active substance zeolite-clinoptilolite. The intake of PMA-activated zeolite supports the organism without burdening the metabolism and can thus be ideally used for detoxification especially through the liver or directly in the gastrointestinal tract.

The listed studies show the positive effects of treatments with zeolite. PMA-activated zeolite offers a wide array of mechanisms of action (antioxidant, ion exchanger, molecular sieve) and can thereby be used against various forms of intoxication and slugging.

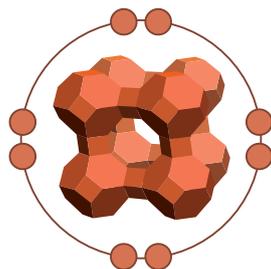
The listed studies show the advantages of zeolite application to heavy metal exposure, internal toxins and free radicals. Application studies on the use of activated zeolite in humans could show its antacid effect through the regulation of the acid-base balance as well as an improved general condition and quality of life. In addition, the effect of zeolite on the lipid metabolism causes relief for diabetics and dialysis patients.

In summary it can be said that the advantages of this natural product, including its gentle supporting role in the discharge of toxins and metabolic waste material and their damaging effects could be proven, and that zeolite is an important alternative to conventional products. With the zeolites mechanisms of action having no side effects, there is no additional burden on the organism's detoxification system, it is instead relieved and positively supported.

Contributing physicians and institutes

The following physicians and institutes contributed to the studies on activated zeolite:

- Peter Abuja, Institute for Molecular Biosciences, University of Graz
- Prof. Dr. Norbert Bachl, Head of the Institute for Sports and Performance Physiology, University of Vienna
- Center for Sports Science and University Sports, University of Vienna
- Prof. Karl Hecht, Experimental and Clinical Physiology, Charité / Humboldt University Berlin
- Christian Knapisch, medical director and Siegfried Schmölder, sports scientist of the sports medical and sports scientific ordinarate, Klagenfurt
- Lutz-Michael Lautenbacher, expert office, analytics and consulting, Munich
- Pavelic Krecimir, School of Medicine, University of Rijeka
- Norbert Schulz, Haus der Gesundheit, Reifnitz
- Wolfgang Thoma, chief physician and medical director, specialist for internal medicine at the private clinic of Villach
- Ilse Triebnig, consultant surgeon in Villach
- Kurt Vymazal, certified expert, pharmacist, metaplus, Vienna
- Dieter Weber, private clinic "Kurheim Paracelsus", Warmbad-Villach



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