Appendix

Karl Hecht

Dr. med. Dr. med. habil.
Professor of Neurophysiology and
emeritus professor of Experimental and Clinical Pathological Physiology
the Humboldt- University (Charité) of Berlin
Stress medicine, sleep medicine, chronomedicine, environmental-, space medicine

Büxensteinallee 25, 12527 Berlin, Phone + Fax: 0049-30-674 89 325

A brief comment on the effect of natural clinoptilolite zeolite in the human body

Information material for

doctors, naturopaths, therapists, pharmacists, chemists, and scientists

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1 Current status of scientific knowledge

1.1 What is zeolite?

Zeolite

= Microporous basalt tuff

= Aluminium silicate with crystal lattice tubules of 0.4 nm, which are filled with ions and crystal water

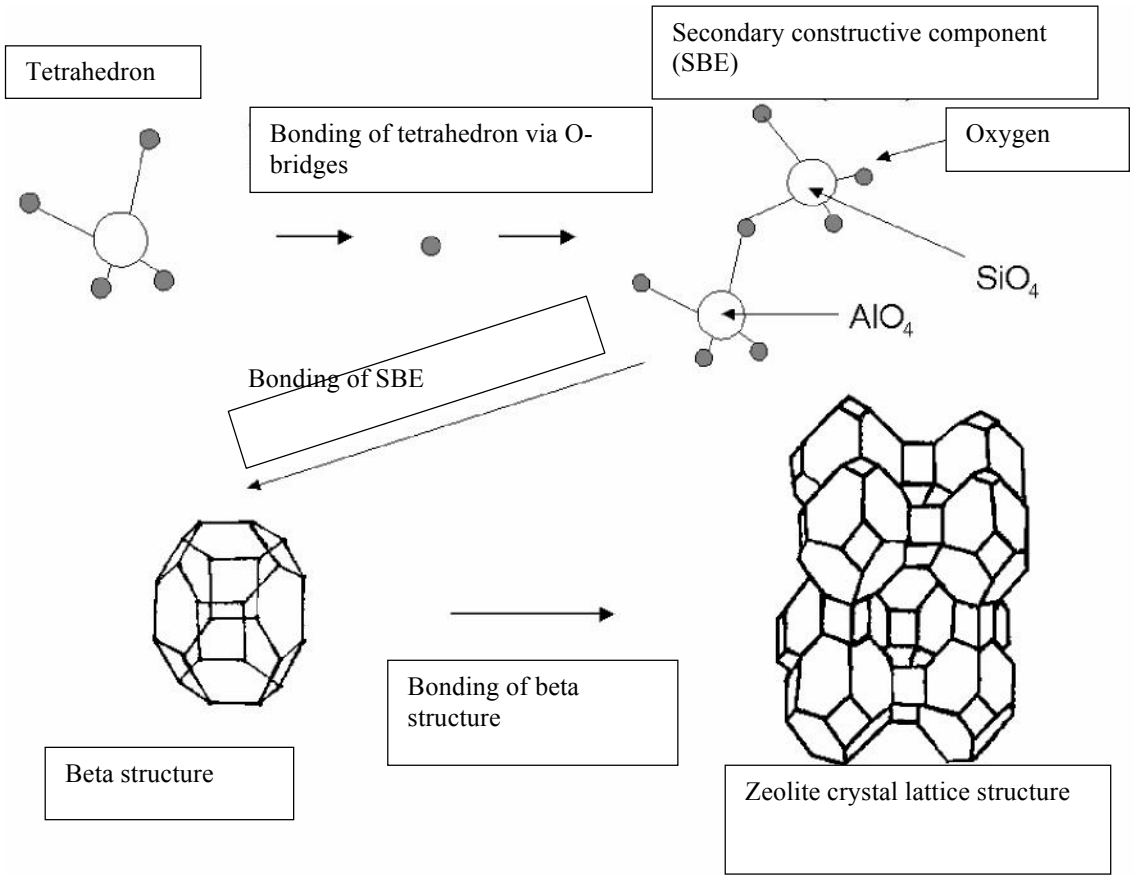
The crystal lattice structure of zeolite originated millions of years ago due to ejected volcanic rock and ash eruptions, which fell into the sea in a pure state, and combined with the primordial sea water, which had been brought to a boil.

Zeolite can contain all elements of the periodic table.

Zeo from zein (Greek) = boiling, lith from litho (Greek) = rock, stone

The Swedish mineralogist Cronstedt described zeolite for the first time in 1756.

Crystal lattice structure of the zeolite lattice



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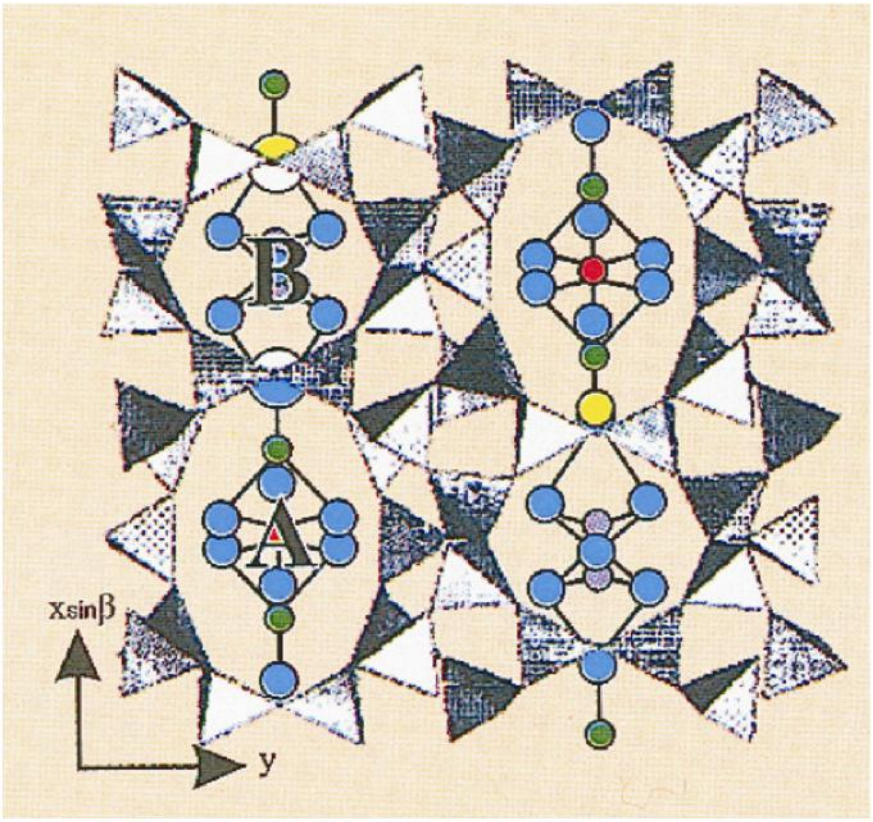
Zeolite crystal lattice tubules of various dimensions (A = 4.0-5.6; B = 4.4-7.2; C = 4.1-4.7 angstrom) with different ion occupations and axis designations [according to Belizkij and Novoselov]



2 What active properties does natural clinoptilolite zeolite have?

Properties of natural clinoptilolite zeolite in the human organism:

1. Absorption
2. Ion exchange
3. Catalyst function
4. Supply of colloidal SiO_2
5. Control of electrolyte balance
6. Molecular sieve function
7. Autoregulation in the organism
8. Biogenically shaped

For ion exchange via natural zeolite clinoptilolite in the organism [modified in accordance with Veretenina et al. 2003]. Ion exchange is pH-dependent and is caused by biophysical mechanisms (van-der-Waals forces).

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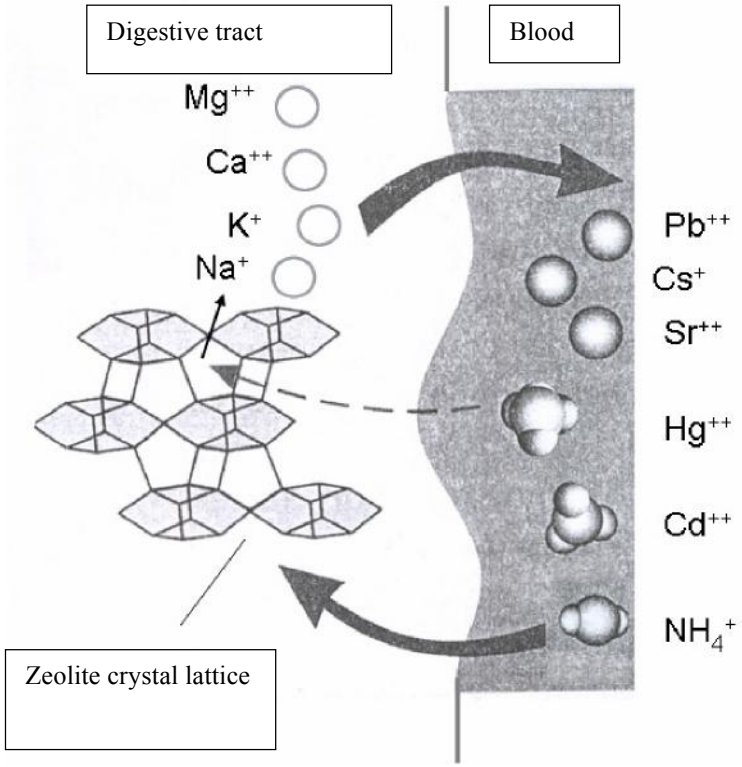

Ion exchange diagram

3 What does SiO_2 mean for human beings?

SiO^2, the biogenically shaped primordial mineral in all living beings

The primary function of natural clinoptilolite zeolite is exercised by SiO2, also known as silicic acid, which is supplied to the human body in a colloidal form. Silicium is known to be the second most abundant element on our planet after oxygen. SiO_2 constitutes a major portion.

SiO2, which doesn't just occur as natural clinoptilolite zeolite, but also in clay and montmorillonite, as well as in many plants (e.g. horsetail, bamboo, nettle, conifers), is humanity's oldest medicinal and cosmetic product.

Although a vast amount of scientific literature exists to date, few doctors or other healthcare professionals in Germany know the effect of SiO2.

In 1975 the Russian research group, led by M. G. Voronkov, published a book in German, 'Silizium und Leben/Silicium and Life'. This book alone contains over 5,000 scientific literature sources. The American silicium researcher E. M. Carlisle published many scientific results in the years 1970-1986. In 1986 a silicium symposium was held by the Ciba Foundation; a conference volume was published out of this.

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Silicon dioxide is the basic element of life. Without SiO_2 no life process, no growth, no bioelectricity is possible. Living beings low in silicium rapidly age and become sick.

4 What are the main physiological functions of SiO_2?

- Mineral metabolism regulation (autopilot function)
- Elimination of contaminants from the body (detoxification)
- Regulation of intestinal activity, and thus the absorption of active agents
- Strengthening of the innate immune system in the extracellular matrix
- Elimination of free radicals = antioxidant effect
- Acceleration of wound healing
- Anti-inflammatory effect
- Regeneration of the cell and mitochondrial membranes
- Tissue hydration
- Disinfection
- Deodorization
- Anti-ageing Effect
- Regulation of the hemolytic function
- Works against destruction of the pancreatic islets via aggressive macrophages
- Antibacterial and antiviral effect
- Antimycotic effects
- Interactions
- Control function with other minerals in the body

Since time immemorial SiO_2 has been designated as a healing, rejuvenation, and beauty mineral, because it limits the biological ageing process, and can keep the skin and hair smooth.

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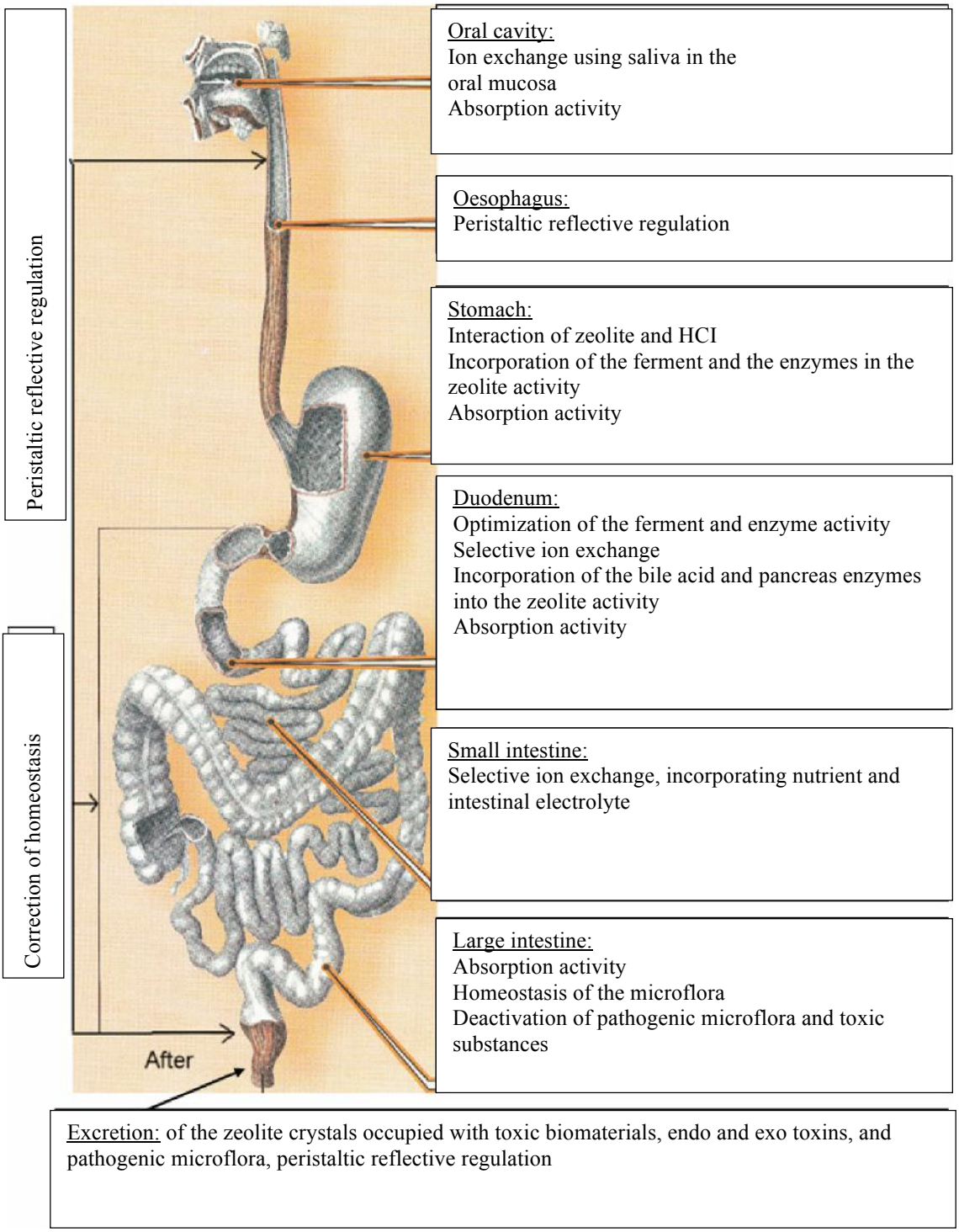
5 What happens after ingestion of natural clinoptilolite zeolite?



Zeolite processing and effect in the digestive tract [modified in accordance with Belizkij and Novoselov 2005]

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6 How do the minerals contained in the zeolite enter the cell?

If the zeolite enters the digestive tract, it roughly undergoes the following biological regulation processes:

- **Cation exchange** over and against heavy metals, toxins, etc.
- General increase in absorption via the hydrated SiO2 (H4SiO4) in the crystal lattice
- **General detoxification** via the natural clinoptilolite zeolite and SiO2's physical surface processes
- **Offer of polyanions**
- Through increased readiness to absorb → improved absorption of substances in the digestive tract, especially the micro and macro elements (trace and major elements)
- **Supply of crystal fluid** from the hydration shell of the natural clinoptilolite zeolite crystal lattice
- **Splitting of the AlO_4-SiO_4 tetrahedron** using the respectively dominant pH environment, such as the stomach's HCl.
- **Release of hydrated SiO_2** (= colloidal $H4SiO_4$) and release into the extracellular matrix
- The associated further **release of cations**

- **Reconditioning of aluminium**
  - As a salt, e.g. for excretion
  - As needed, transfer into the extracellular matrix
  - The formation of aluminium hydroxide and aluminium magnesium silicate, for use as antacids for the regulation of the acid-base balance in the intestine
- As needed, hydrated SiO_2 will also be used as antacid, particularly in the intestines
- The absorption function can also remove intestinal gas and obtain better resorption.

Unneeded natural clinoptilolite zeolite will eliminated from the organism in the faeces.

Via the blood, the active agents contained in natural clinoptilolite zeolite enter into the basic substance of the extracellular matrix (liquid cellular connective tissue) and from there to the cell. The following diagram represents this process in a simplified manner.

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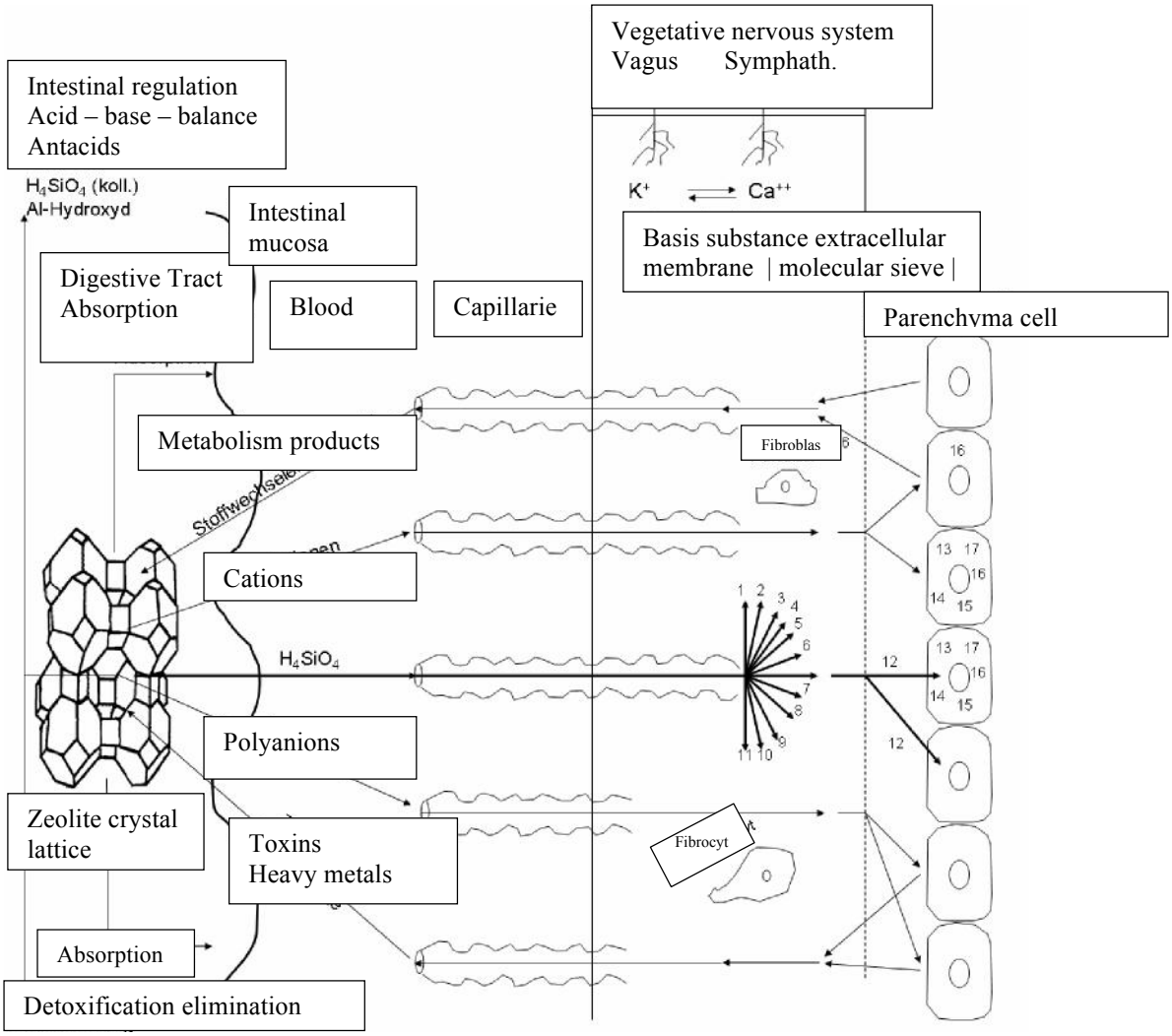

Simplified overview diagram for the function of natural clinoptilolite zeolite in the human body

Processes in the body after peroral administration of nature clinoptilolite zeolite, and the function of colloidal silicon (H_4SiO4) in the extracellular matrix, cell membrane, cell, and mitochondria

1 Catalyst function
2 Hydration
3 Adsorption
4 Rhythm clocking
5 protein synthesis, synthesis of mucopolysaccharides, collagen, glycosaminoglycans, fibronectins, etc.
6 Growth, healing
7 nonspecific immune function
8 Electrostatic binding
9 Colloidal phase
10 Mineral homeostasis
11 Acid-base homeostasis
12 cell membrane structure, stabilization, protection, and repair
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 ↔ extra

Source: Karl Hecht, Elena Hecht-Savoley (2005): 'Naturmineralien Regulation Gesundheit/Natural mineral health regulation', Schibri-Verlag, Berlin – Milow

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