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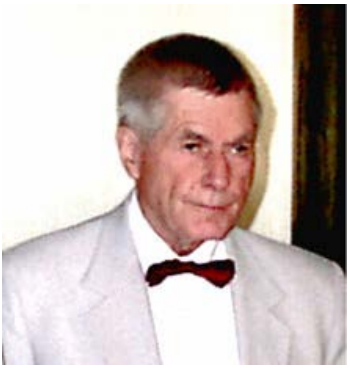

Karl Hecht

Academician of IAS and RAMS, Professor, Doctor of medical science, Head of Scientific Commission of WOSCO on medicine (Berlin, Germany)

Born 15th February 1924 in Wohlmirstedt/Unstruttal Büxensteinallee 24, 12527 Berlin – Grünau Academic career.

1950-1955 – Studied at the Medical Faculty of the Humboldt-University in Berlin.

1956 – Qualified as a medical doctor (Dr. Med.).

1970 – Post-graduate qualification with chronobiological specialty.

1971 – Appointed Professor of the Physiology Section at the Academy of Sciences in the German Democratic Republic.

1977 – Appointed Professor of Physiology at the Charité der Humboldt-University in Berlin, Executive Functions in scientific medical organizations.

1957-1977 – Scientific Director of the Department of Stress and Hypertension in the Central Institute for Heart and Circulation Research at the Academy of Sciences in Berlin-Buch .

1964-1977 – Deputy Director of the Central Institute for Heart-Circulation Research, Berlin-Buch.

1972-1990 – Coordinator “Chronobiology and Chronomedicine” of the Space Medicine and Biological Work Group “Interkosmo”.

1977-1988 – Establishment and directorship of the independent Department of Neuropathophysiology at the Charitÿ der Humboldt-University in Berlin.

1977-1991 – Establishment and directorship of the Space Medicine and Biological Centres at the Berliner Charitÿ.

1983– Establishment and directorship of the Sleep Laboratory at the Charité (3 Chairs).

1988-1991 – Foundation and Directorship of the Institute for Pathophysiology at the Charité der Humboldt-University in Berlin .

1990 – Foundation of the Sleep Medicine Centre and Leadership of the Charité der Humboldt-University in Berlin.

1991 – Awarded the title of Professor Emeritus.

1992 – Co-founder of the Russian Section of the International Academy of Sciences.

1995-2000 – Co-founder and Medical Director of the I.S.F. Institute for Stress Research GmbH, Be.

2000 – Founder of the Institute for Psychosocial Health.

2001 – Co-founder of the Azerbaijan Section of the International Section of Sciences.

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CLINOPTILOLITE-ZEOLITE AND MONTMORILLONITE MINERALS RICH IN SIO_2: WHAT ARE THEY? WHAT CAN THEY ACHIEVE? WHY ARE THEY SO IMPORTANT FOR HUMAN HEALTH?

A Survey of the Sanogenetic, Bioregulatory, Preventive, and Therapeutic Functions of these Original Minerals

Karl Hecht

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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).

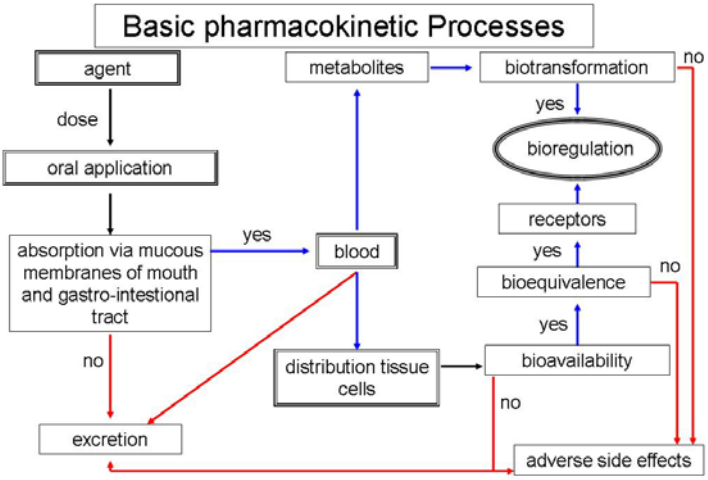


Fig. 1. Diagram of the functional relationships of the basic pharmacokinetic processes

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 dis-*

ease 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.

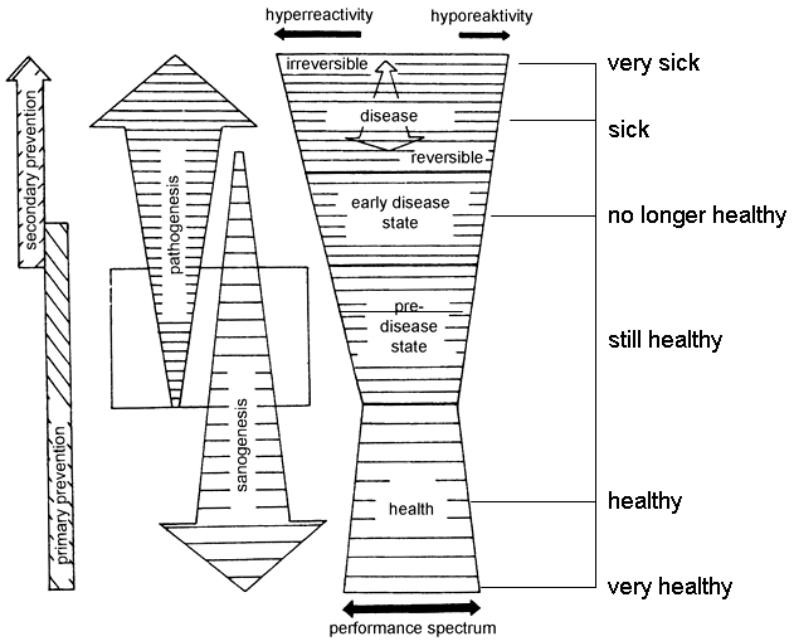


Fig. 2. Model of the relation ship between health and disease [according to Hecht 1984]

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.

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*".

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.

Quantum Physical Hypothesis for the Substitution of Minerals

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

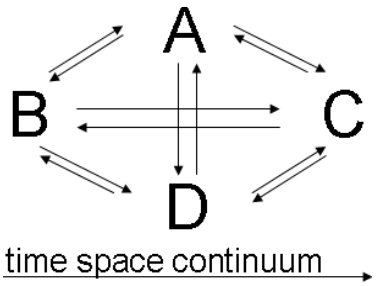
Assuming a linear causal chain of reactions for the regulation of electrolytes, as is the case with Newton's hypothesis that is applied by conventional medicine, is unrealistic and non-physiological.

Schematic of Newton's hypothesis:

A → B → C → 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].

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.**

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].

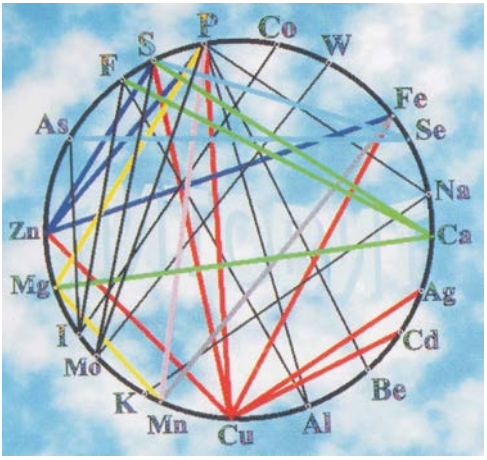


Fig. 3. Simplified diagram of the functional interactions of some minerals in the organism [according to Enslinger 1986 and Shalmina and Novoselov 2002]

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.

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».

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].

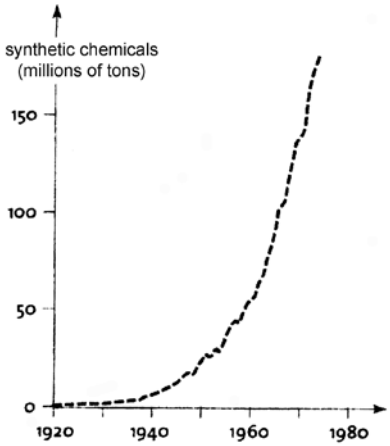


Fig. 4. Worldwide production of synthetic chemicals [according to Servan-Schreiber 2008]

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.

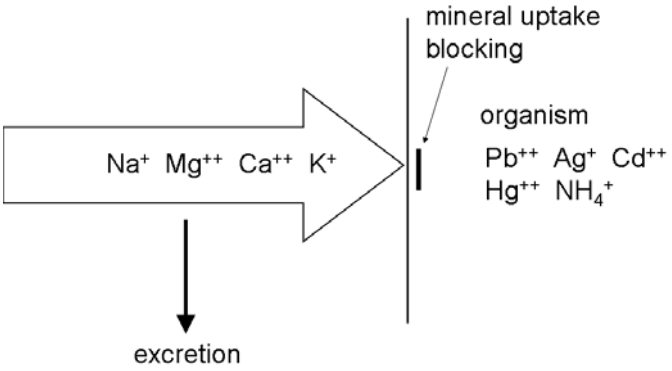


Fig. 5. Dismineralosis schematic. The required minerals taken can not be absorbed by the organism and are excreted again [Hecht and Hecht-Savoley 2008]

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

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.

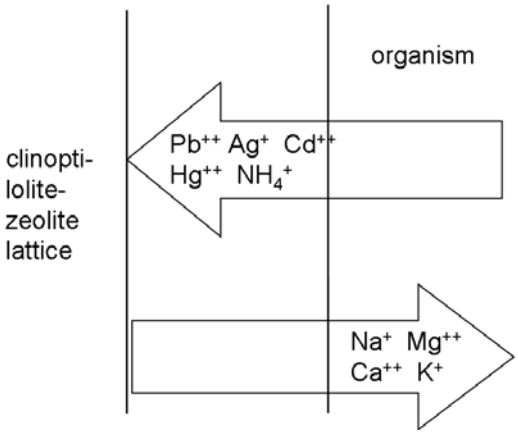


Fig. 6. Function state of the pollutant burdened human organism as re-established by ion exchange after the intake of natural clinoptilolite-zeolite [Hecht and Hecht-Savoley 2008]

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.

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].

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 com-

pound 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*[1] *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].

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.

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

Beauty and health with clay since thousands of years

[1] In some bibles it says dust.

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*[1] *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].

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

[1] In some bibles it says dust.

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 ex-

ternal treatments in compresses, but also in facial masks, mainly for chronic diseases, but also for beauty treatments.

[23]

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).

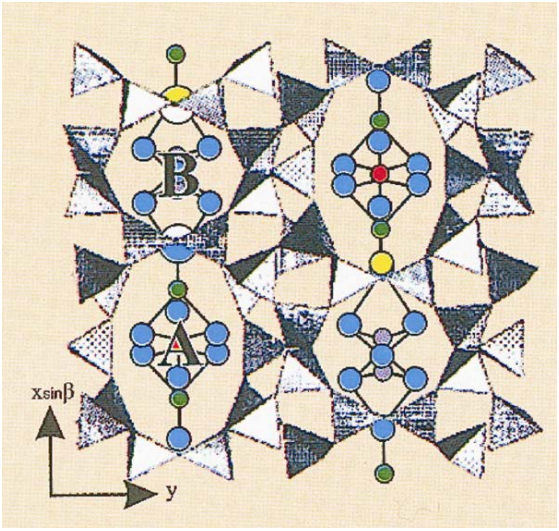


Fig. 7. Zeolite lattice canals of various dimensions with different ions and labeled axes [according to Belitzkiy and Novoselov; Hecht and Hecht-Savoley 2008]

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

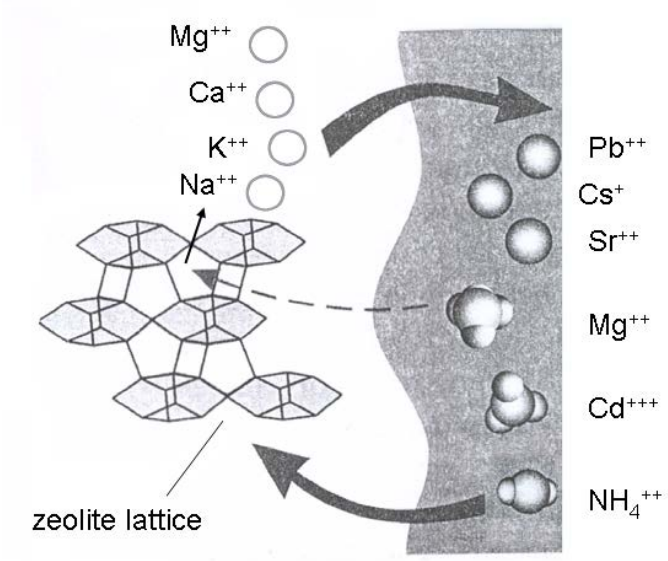
In this context the term **absorption** needs to be mentioned as well. Absorption means the uptake of substances through the skin or mucous membranes into the blood or lymphatic streams.

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 be-



tween 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.

Fig. 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]

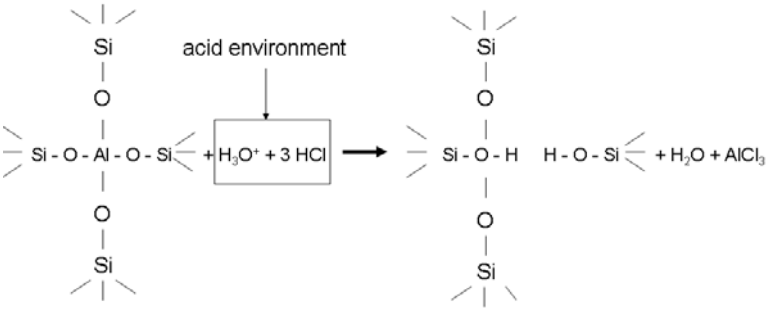
Endotoxicosis by	Mechanism of toxic substance elimination by natural clinoptilolite-zeolite
Endotoxins, such as acidosis products, cytokines, bacterial endotoxins, free radicals, metabolic end products	Adsorption in the macropores and mesopores of natural clinoptilolite-zeolite
Exogenous toxins	Adsorption 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 colloi-

dal 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:



SiO_4 AlO_4 lattice

Hydration

colloidal SiO_2

Excretion

or formation of antacids

[according to 14; 23, 24]

Processing and effects of zeolites in the digestive tract

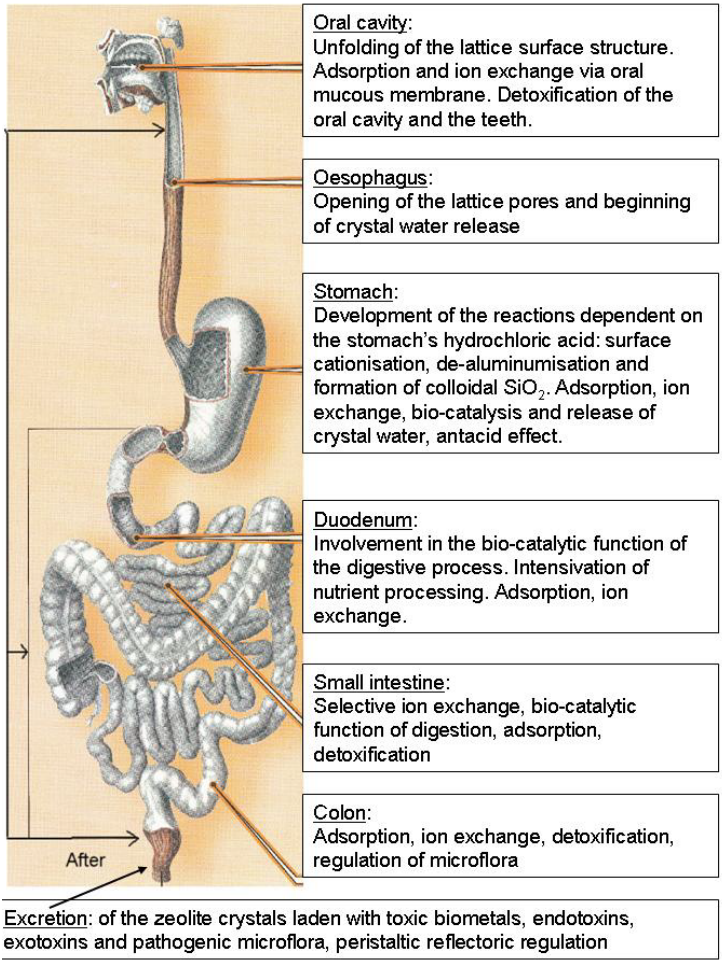


Fig. 9. [modified according to Belizkiy and Novoselov 2006; Hecht and Hecht-Savoley 2008]

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

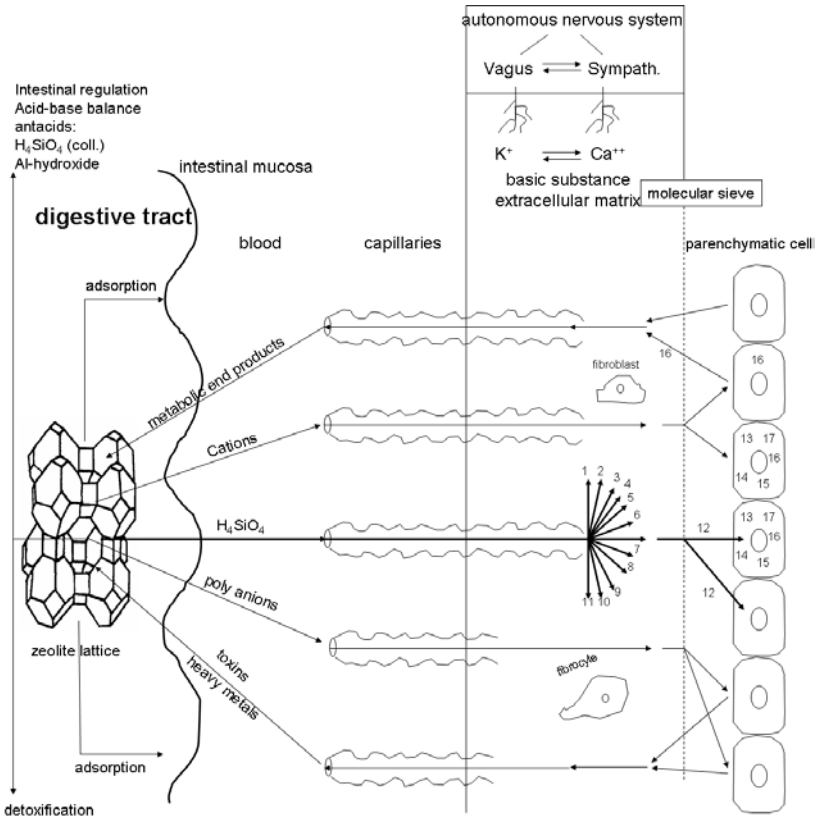


Fig. 10. Simplified diagram: Processes inside the organism after oral application of clinoptilolite-zeolite and function of colloidal silicon (H_4SiO_4) within the extracellular matrix, cell membrane, cell, and mitochondria [Hecht and Hecht-Savoley 2005, 2008]

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».

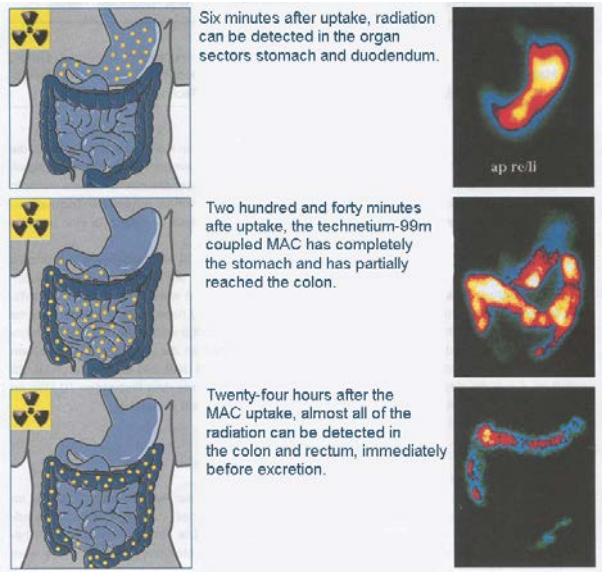


Fig. 11. Behavior of isotope labeled activated clinoptilolite-zeolite while passing through the gastro-intestinal tract [Daskaloff 2005, source froximun: excerpts of available research results, November 2006, p. 41-42]

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SURVEILLANCE OF POLIOMYELITIS INFECTION – TOPICAL PROBLEM OF MODERN HEALTH

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The problem of poliomyelitis associated with the possibility of making wild poliovirus in the post-liquidation period, is a serious problem for health in general.

Given the fact that in some states for some reason, still have the circulation of "wild" polioviruses in relation to the risk of skidding marked "wild" strains in a region free from polio, which applies to our republic, issue regular epidemiological monitoring of acute flaccid paralysis (AFP) remains valid.

In connection with the investigation to determine the spectrum of viruses circulating among the population and establish the etiology of acute flaccid paralysis in the Republic of continuing under the auspices of the World Health Organization (WHO).

Since 1977, functioning in Azerbaijan orderly system of epidemiological surveillance of AFP, provided for in the Programme of the Global Polio Eradication WHO.

In a distinguished program involving experts in various fields of specialization: virologists, neurologists, epidemiologists.

The Programme of WHO in the implementation of surveillance has been proposed a method for determining the spectrum of viruses circulating among the population – the method of indication of enteroviruses from sewage as a method of cost-effective and informative.

The method lies in the concentration of virus at 48 – Mi layer gauze followed by centrifugation quadruple test liquid after squeezing a tampon, treatment with ether and antibiotics. (1)

In connection with the marked in Azerbaijan since 1999, in conjunction with conventional research material from AFP cases and contacts with individuals extracted and examination of samples of wastewater from a dozen sites of districts and towns of the Republic of Azerbaijan.

In order to improve the efficiency of isolation of enteroviruses from sewage with the least expenditure of time for indicating virus, we studied the adsorption capacity of zeolites Aydag domestic deposits.

In the experience have been taken:

• Viral culture: the polio virus types 1,3 (vaccine strains);

• Culture of transplantable cell lines L – 20 B (mouse embryo fibroblasts, derived from transgenic mice)

Studied the sorption properties of zeolites:

1. mineral complex (MC) "AZEOMED. MC "AZEOMED" is derived from natural clinoptilolite Aydag field. The structure of the MC is activated zeolite species and further purified dolomite.

2. natural zeolites, modified with cations:

Ag-clinoptilolite

Cu – clinoptilolite

Zn – clinoptilolite

NH4 – clinoptilolite

The experiment used conventional methods of virology studies (2, 3).

In the experience of zeolites were taken in 500 mg by identifying non-toxic dose (zeolite) in tissue culture, L – 20 B in the amount of 0.0005 mg / ml (the fifth non-toxic dose).

Identification of the sorption properties of natural zeolites, modified cations and MC "AZEOMED" on viral flora was layering 1 ml of virus-containing fluid in 100 TTSD50 (the dose of virus was determined by titration model of poliomyelitis virus (vaccine strain) in tissue culture L – 20 B) on the zeolite, taken in 500 mg.

After exposure at 2 o'clock in infected tissue culture supernatant fluid in the amount of 0,2 ml vial, incubated at 370S and sensitive for several days, the results of the cytopathogenic effect (CPP) of the virus, possibly left over after the "exhaustion" of the studied zeolites,

The results of the CPA to take into account the 4-cross system with a view taken in the experience of control: the model of viruses in 100 TTSD50 (10-3), tissue culture L – 20 B (mouse fibroblasts – genetically engineered by the line of mouse cells that have receptors for poliovirus).

Analysis of the results of the study revealed a high sorption properties of all investigated zeolites on poliomyelitis virus types 1,3.

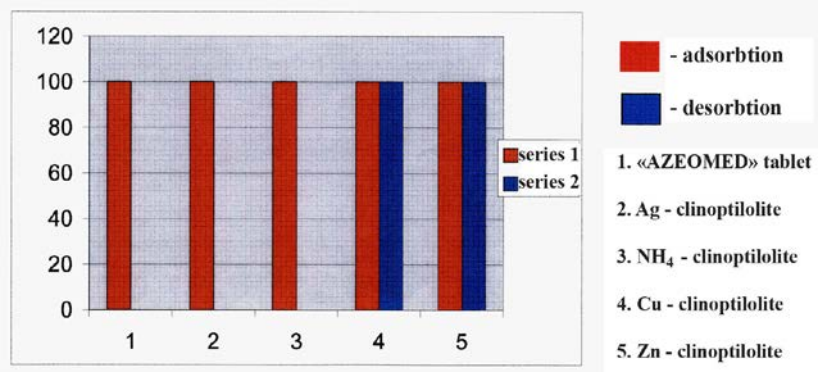
This is due, apparently well-known fact that the most active is the adsorption of low molecular weight compounds. The molecular weight virion polio – 8h106-9h106, sedimenttation coefficient – 140 -165 S.

Experience of desorbed virus revealed a complete absence of desorption from MK "AZEOMED», NH4 – clinoptilolite, Ag-clinoptilolite, which indicates the possibility of using them for agregation viral flora and their removal from the body.

The fact of the desorption (100%) of viruses with Cu -, Zn – clinoptilolite, which can be used for display of enteroviruses from different waters, including waste water used in epidemiological research (Figure 1).

Adsorption and desorption of poliomyelitis virus

1, 3 types (vaccine strain) on the modified cations of clinoptilolite and tablets «AZEOMED.



Given we have identified high adsorption capacity of zeolites listed above were used as sorbents for the concentration of viral flora of viruses from wastewater for their display (4).

It should be noted that the invention relates to display viral flora in the effluent, namely the concentration of viruses on mineral sorbents.

A method of ultracentrifugation of viral flora of the large volumes of water (6). The disadvantage of this method is the technical complexity for the general health practices.

A method of concentrating virus flora by ultrafiltration (6).

The disadvantage of this method include the incomplete elution of viruses from the filter surface, the extreme fragility of lanthanum rapid clogging of filters and filter suspended particles, despite the pre-cleaning water.

The closest is the way to the concentration of viral flora – enteroviruses from slightly polluted water, drinking water, swimming pools with the use of ion exchange resins – anion exchangers, which are an inorganic or organic high molecular substances, containing active groups to easily exchange ions.

We know that many of the virions (intact viruses) are negatively charged particles and therefore can be adsorbed by anion exchangers strong-type (7). The disadvantage of this method is the complexity of the pre-treatment of ion exchange resins before use. The complete elution runs for one hour, and ion-exchange resins can be used only once.

The proposed method we considered ways to simplify the concentration of viral flora, reducing the time of elution of the virus and its ability to re-use of mineral sorbent.

In our proposed method for concentrating viral flora of little duty water adsorption on klinoptilolite aluminosilicate sorbent followed by elution of the virus used as a sorbent modified cations Cu^{2+}, Zn^{2+} at the same time, the complete adsorption followed by elution of 30-45 minutes, which is much less when using the method of Riordan (from 3 to 7 days in a stream of water).

In addition, marked the sorbent can be reused, with the same activity.

The presence of cations Cu^{2+}, Zn^{2+} allows the extraction of viruses in the alleged conditions of up to 100%.

If you reduce the time of adsorption followed by elution not reached 100% as adsorption and elution, and the increase of time is impractical because the alleged enough for a complete adsorption and elution.

Method requests do not require prior activation of the mineral sorbent provides a high coefficient of concentration of viruses (1000 – 100000TTSD50) not only standing, but in flowing waters with 100% elution.

The method of concentration was tested on natural aluminosilicate sorbents – zeolites klinoptilolite breed Aydag origin, modified by cations Cu^{2+}, Zn^{2+}.

In carrying out monitoring of the circulation of enteroviruses, including polio virus among the population of

Azerbaijan using 2 methods of concentrating virus to ensure that the wider range of enteroviruses studied wastewater.

Method of concentrating viruses from wastewater on the modified cations Cu^{2+}, Zn^{2+} zeolite (clinoptilolite) is quite acceptable for a wider surveillance to detect circulating among the population of viruses.

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MINERALS AND MICROELEMENTS IN MEDICINE

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Swift entry of the 21st century is marked with its efficient introduction to the medicine and to all of its levels. Preventive trends are also a big part of interest. Most of the important things are researches of the physiological role of micro and macro elements in the ability to strengthen intensity of energy processes in a living organism and to increase its defense reactions.

It is known since long ago that microelements are taking part in all of the biochemical processes in the living organism. And a small doses peculiar to the quantities of the organism have a very high biological activeness and more important thing is that there are no any toxic properties which are so specific to common pharmaceutical products. This become especially important with a new trends – optimization of the health, treatment of healthy people, tendency of the human organism to resist against infections and another environmental influence. The main goal is to find out the way and release people from suffering.

Looking for a new harmless, accessible and efficient methods of influence to the sick organism is now become very actual along with enormous achievements in cloning, transplantation and microsurgery, which are putting a lot of questions regarding economically inaccessibility of treatment and with a quite high level of risk to overcome the resistance of organism to introduction of the foreign body, substance, preparation. Self-regulation. principle is very urgent for saving of life processes and for resistance to the powers destroying it. Microelements are playing the significant role in a cells growth and in a metabolism processes. None of the biochemical

reactions in the organism can progress without combination of micro and macro elements. One of the element's lacks can cause a lot of diseases, following one by one. So deficit of iron in hemoglobin composition, cytochrome can lead to abnormalities of erythrogenesis, anemia, growth disturbances, and exhaustion. Iodine is a most important component of thyroid body hormones, lack of this component can cause the adenoma of thyroid in its different forms. Deficit of Chromium breaking carbohydrate metabolism and as a result – pancreatic diabetes, which's popularity is threateningly increasing.

Deficit of Calcium participating in the processes of born tissue and teeth formation, neuromuscular conduction, blood coagulation processes as a result osteoporosis, convulsive states etc.

From ancient times humans got necessary quantities of these elements from animals and vegetables i.e. from environmental nature. But nowadays besides of enormous success achieved in the medicine we also achieved a very big success of its destroying. Ecology all over the world (earth and mountains) in the water (rivers, lakes, seas and oceans) in the air (there is an impenetrable smoke above the mountains, results in mud rains, ozone holes in ozonosphere). It is still remained some places in the world which civilization didn't touch yet and one of them is Aydag deposit in Tovuz region of Azerbaijan Republic. This deposit has unique by its composition and cleanness native mineral, on the base of this mineral and by using modern nanotechnologies the "AZEOMED" preparation's production has been established.

"AZEOMED" consist of 25 different micro and macro elements and theirs combination. This is harmless and hontoxic preparation. Beside its ability to restore its mineral balance i.e. provides organism with necessary micro, macro, ultra micro, nano and picoelements and it also has a powerful sorption abilities.

Taking into consideration all of these opportunities as general practitioner I have non limited abilities to use this preparation in my own and in my colleagues practice. At the earliest stage of microelement deficit overcoming only food correction is not enough even if the products from another regions used where the soils already enriched with necessary microelements as the micro elemental composition of food products is directly depends from the following link: soil-plants – animals – human.

Optimal way is a reasonable combination of micro elemental status correction with mineral complex like "AZEOMED" and food dieting which should be followed after finishing of micro elemental treatment course. More than 500 different ages people from newborn to old ones, sportsmen, pregnant women, sick and healthy people who was taking "AZEOMED" achieved the positive results. Duration of prescription was different from 2 weeks to 3-5 years periodically or constantly.

In a practice with a babies we used "AZEOMED" for prevention and treatment of rachitis and rickets-like diseases. We achieved very good clinical results and these children more smoothly passed the eruption period, theirs neurologic-and-behavioral development was according to theirs age. Especially those children who has a tendency for early closure of fontanel and there was a risk of microcephaly development achieved positive results by using "AZEOMED".

For the purpose of increasing of work efficiency, enduance to physical activities and quick recreation, improvement of effectiveness of sport trainings and competitions this preparation was used by sportsmen of taekwondo and wrestlers.

Taking into consideration of quick absorption of this prearation in the oral cavity I have recommended "AZEOMED" to the patients with the problems of oral cavity: gum and teeth. They chewed and spread this pill at the surface of the gum and

teeth, preliminarily rinsing the oral cavity and cleaning teeth and gum with the Ultrashine Radians toothpaste. Quite quick results gives us the base to use “AZEOMED” as a treatment and preventive measures in dentistry for parodontosis, caries and other pathologies.

During the period of viral infections patients who was taking “AZEOMED” practically didn't fall ill and carried the infections easily. The quick recovery took place and there were no complications with minimum fmancial costs. Those patients were recommended to take “AZEOMED” in a small doses and more frequently by Tibet medicine principle: 1 pill should be diluted with 1 liter of raw melt water, then well shook none less than 60 times and then should be taken during daylight hours by 1-2 gulps and with an interval of 5-10-15 minutes and no more that 30 minutes or *Vı* of pill each 2 hours during daylight hours.

Very good results was achieved with a pregnant women, with the increased needs in minerals, vitamins and in other substances. They more easily carried toxicosis of first and second stages of the pregnancy or didn't have toxicosis at all. There were no caries, anemia and they felt very good. Physiological childbirth – without complications. Children in the newborn period were in a satisfactory state with good adaptation and enough mother's milk. Children had a breast feeding till 6 mpnths and then had a mixed one. Mother and a child had a preventive treatment periodically when mother was taking this preparation child wasn't only in a free months. Neurologic-and-behavioral development was satisfactory.

In practice of treatment of people with musculoskeletal system prescription of “AZEOMED” showed the effective dynamics against the general treatment.

The appearance of changes, decreasing of metabolism processes intensity and defense reaction of organism is a specifıc feature for old ages. Prescription of mineral additives

helps to regulate and stimulate its metabolism processes and defense mechanisms. It is obvious that recommendations of taking “AZEOMED” will facilitate the extension of life duration and in a considerable degree will simplify treatment of age-related diseases or suspend the untimely aging processes. Controlling of organism aging processes is closely connected with a problem of health optimization. Our goal is to support organism's renovation processes and its regenerative abilities on the highest level.

Unfortunately nıost of the age related deceases are not reversible for example atherosclerosis. For the old uged 'people longevity matter is based on the treatment of the chronic diseases. Stoppage or delay of their's further development could extend lives, but this only indirectly affects to the longevity. That is why struggling for the longevity should be started from the young ages and should be carried out systematically trying to improve or in a some manner to support the activity of internals approximately in the prime of life's level. But there is one more thing during long term intake the organism is adapting and the reaction goes down. Microbes and viruses with which humans struggling during the whole life also adapting to them and in that case it become more difficulty to effect to the organism.

Thus from one side the longevity already planned, it is inherited however in the future depending of life conditions and humans behavior people's life is getting shorter or longer, but again till the definite limit.

“AZEOMED” is positively affects to all organs and systems and its prescription should be done individually. If prescription done right: blood supply to the brain is improving, intracranial and ocular pressures normalizing, bronchopulonary system's condition and cardiovascular dynamic are also. improving. Especially quick effect observed in cardiovascular system: infections, disbacteriosis and ffungous pathologies. In

an urino-genital system there are some improvements during infjammatory, metabolic and autoimmune pathologies. Very good results also achieved in endocrine system pathology: pancreatic diabetes, thyroid glands deceases. The emotional condition is also improving, claims decreasing in a chronic tiredness syndrome. Functional condition of the backbone and blood circulation of whole organism are also restoring.

In a conclusion I would like to mention that our work in this direction is continuing and there is a light future in front as the "AZEOMED" is a zeolite and zeolite is a main component of the World. The earth has a quality to autopurificate and renew itself so "AZEOMED" is very necessary for health and longevity. Doses to be prescript are strictly individual from *Vı* to 1 pill x 2-3 times a day or 2 pills x 2-3 times a day and 10 pills in one intake. It could be taken before and after meal. The goal is proved.

"PRE-CLINICAL AND CLINICAL STUDIES OF "LITOVIT" BIOLOGICALLY ACTIVE FOOD SUPPLEMENT (BAFS)"

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"LITOVIT" series of products (the name being a combination of Latin words "lithos" – stone and "vita" – life, that is "stone of life"), which were developed by the specialists of Research-and-Development Company "NOV" located in Russia and are based on the standard constituent of the natural zeolite from the Kholinskoe deposit area – the active component clinoptilolite, have been produced for 15 years.

Today we witness the progressing introduction of natural zeolites to many spheres of national production industry. Nowadays the Kholinskoe deposit area zeolite standard constituent, which went through all stages of geological and chemical assessment [1] as well as the full cycle of pre-clinical and clinical studies of using it in food and medical industry, is used as a reference model when predicting and seeking the deposits of zeolite.

Systematic work aimed at studying the properties of natural zeolites (including Kholinskoe deposit area zeolites) started as part of the state program "Zeolites of Russia". The department that conducted medical and biological studies of natural zeolites was headed up by academician of Russian Academy of Medical Sciences Boris Tikhonovich Velichkovkiy. Large amount of biochemical studies were conducted under the supervision of Igor Abramovich Belitskiy, the participant of the "Zeolites of Russia" program. In order to enable using the standard-composition natural zeolite in food and medical industry the team of specialists from Research-and-

Development Company ”NOV” performed a large series of studies devoted to determining the safety of the product as well as its medical and biological value. **The studies have confirmed that it is necessary and possible to use the properties of the Kholinskoe deposit area natural zeolite standard constituent in the new spheres of medical care: sorption therapy and threpsology. These spheres are getting more and more relevant to solving the global problem of medical geology and human ecology.** According to the requirements of the Ministry of Health and Social Development of Russia in 1996 we were granted a permission for commercial manufacture of the Kholinskoe deposit area natural zeolite standard constituent as raw material for medical and food products and the biologically active food supplement of Litovit series. Hygienic certificate for test batch of products was issued to "NOV" Company by the Regional Center of the State Sanitary and Epidemiological Supervision Agency (Gossanepidnadzor) for the Novosibirsk Region: hygienic certificate No. N-6-3-1026 dated August 1, 1996.

ASSESSING CARCINOGENIC ACTIVITY OF BAFS “LITOVIT-M”

After natural fibrous mineral was proven to be carcinogenic for humans and included in group I according to classification of International Agency for Research on Cancer and after the “epidemic” of pleura malignant tumors – mesothelioma and lung cancer – was discovered in several provinces of Turkey, which, according to the conducted studies, was connected to pollution of the environment with needlelike fibrous zeolite – erionite, the necessity of studying the carcinogenic activity of all natural minerals became obvious since other zeolites, such as mordenite, might have the same needlelike shape of crystals or contain some amount of such crystals.

Commission on Carcinogenic Factors in Russia presided over by Lev Nikolaevich Pylyov conducted several studies of zeolites, some of which have shown certain carcinogenic activity.

Starting from 1996 the *Commission on Carcinogenic Factors formed by Health Ministry of Russia studied the materials of the natural carcinogenic agent laboratory of Carcinogenesis Research Institute at Oncologic Scientific Center of the Russian Academy of Medical Sciences* devoted to studying carcinogenic activity of the Kholinskoe deposit area zeolite (including "Litovit-M"). "The specified zeolite type did not show any signs of carcinogenic activity, which makes it possible to allow using the zeolite in food and medical industry" (Statement No. K-9a/96 dated June 15, 1996). It did not show carcinogenic activity in rats who received it intrapleurally and intragastrically. "A tendency towards the decrease in the amount of spontaneous tumors among experimental groups of animals as compared to reference animals was registered" (Statement No. K-3a/02 dated March 26, 2002).

The conducted experiment clearly shows the absence of carcinogenic activity in BAFS "Litovit-M", which is the Kholinskoe deposit area zeolite standard constituent, that is, powder containing clinoptolite. This fact allows using it as a biologically active food supplement as well as in the field of medical and pharmaceutical industry.

Pre-clinical studies of BAFS "Litovit-M" were conducted by the specialists of: Pharmacology Research Institute of the Russian Academy of Medical Sciences Siberian Department, Clinical and Experimental Lymphology Research Institute of the Russian Academy of Medical Sciences Siberian Department (NIIKiEL SO RAMN), Novosibirsk State Medical University (NGMU), Carcinogenesis Research Institute of the Russian Academy of Medical Sciences, Experimental Cardiology Research Institute (IEK RKNPK MZ RF). The program of pre-

clinical studies met the requirements of the Russian Federation Health Ministry Pharmacological Committee including the studies on carcinogenicity, toxicity, embryotoxicity, teratogenicity, mutagenicity, tolerability, resorption, cytogenetic activity, and adsorptive capacity.

TOXICIOLOGICAL STUDIES

Toxicological studies were conducted by the specialists of the *RF Ministry of Health Russian Cardiology Research and Development Complex at the Experimental Cardiology Research Institute* (*IEK RKNPK MZ RF)* medicinal toxicology laboratory headed up by Doctor of Medical Science, Professor Evgeniy Vladimirovich Arzamastsev.

According to data obtained from biochemical tests and ECG the studies have shown that "Litovit-M" is well tolerated by animals used for chronic experiment, it does not affect the hematological values and function of the organs and systems of organism.

The absence of negative influence of ”Litovit-M” on the functional status of vital organs and systems of Wistar rats and dogs who received the agent intragastrically for a long period of time was confirmed by the results of pathomorphological studies that showed no toxic damage of internal organs or general and local toxic and toxico-allergic reactions related to the effects of BAFS "Litovit-M" administered in test doses.

During the conducted studies of "Litovit-M" mutagenic properties devoted to determining the ability of the agent to cause gene mutations in indicator strains during the Ames test and chromosome aberrations in the marrow cells of mammals as well as influence the number of dominant lethals in murine embryo cells it was ascertained that "Litovit-M" does not have mutagenic properties.

Studies of embryotoxicity and teratogenicity of "Litovit-M" showed that the agent does not affect the body weight dy-

namic of the test animals, length of pregnancy, amount of living embryos, their weight and craniocaudal size of body and does not cause the increase in pre- and post-implantation death of fetuses when administered to pregnant rats intragastrically on the 1st to 19th day of pregnancy. "Litovit-M" does not cause arrested development of skeletal system in embryos, teratosis and congenital anomalies.

When "Litovit-M" was administered intragastrically to male rats during 10 weeks and female rats during 2 weeks no influence of "Litovit-M" on reproductive function was registered.

When studying allergenic properties of "Litovit-M" it was determined that the agent has no allergenic effects within the range of test doses and sensitization patterns. Using the method of skin application and the reaction of specific lysis of leucocytes showed that the test doses of agent do not induce allergic reactions and are not potentially allergic.

The test doses of "Litovit-M" equal to 70 and 700 mg/g (1- and 10-fold daily doses recommended for humans) when using the chosen administering patterns for "Litovit-M" do not affect the weight and cellularity of murine lymphoid organs, delayed-type hypersensitivity reaction and the amount of antibody forming cells but stimulate phagocytic activity of neutrophils.

Conclusion: "**the agent is almost non-toxic** when administered once or for a longer period and in larger doses to laboratory animals, **no reasons to avoid using it in clinical studies as enterosorbent in its recommended daily dose 70 mg/kg (2.5 g a day: 1.25 g twice a day) were discovered.**

POSSIBLE RESORPTION STUDIES

Studies of possible resorption of "Litovit-M" during which it was injected in a rat's stomach, conducted in the *RF Ministry of Health Novosibirsk State Medical Academy* under

the supervision of Honored Scientist, Doctor of Medical Science, Professor Anatoliy Vasilyevich Efremov showed that BAFS "Litovit-M" **is not resorbed or accumulated in the animal's organism in case of single or repeated injection of the agent into the animal's gastrointestinal tract.**

Results of "Litovit-M" possible resorption studies.

Amount of injections	Total amount of agent injected in10 animals, g	Total amount of agent that left the organisms of 10 animals, g	% of agent that left organisms of animals
Single injection	1251.0 ± 39.2	1202.0 ± 33.0*	96.1
5-fold injection	6477.0 ± 41.5	6199.0 ± 39.1*	95.7
Note: * – $p < 0.05$			

SORPTION ACTIVITY STUDIES

In vitro and in vivo sorption activity studies of BAFS "Litovit-M" were conducted *at the Russian Academy of Medical Sciences, Pharmacology Research Institute of the Tomsk Scientific Center being part of the Russian Academy of Medical Sciences Siberian Department.* On the basis of the conducted studies it may be concluded that **BAFS "Litovit-M",** which underwent in vivo tests, **is effective in relation to alcaloids (atropine), barbiturates (ethaminal-sodium), tricyclic antidepressants (amitriptyline), in case of poisoning with arsenic, toxic metals (copper, barium, lead).**

In order to confirm the obtained results "Litovit-M" was studied during in vitro tests with the help of rats. The conducted studies confirmed the effectiveness of BAFS "Litovit-M" as enterosorbent in relation to: atropine, amitriptyline, digitoxin and organophosphorus compounds.

The data obtained from experimental studies allow us to conclude that BAFS "Litovit-M" effectively reduces the

level of endogenic intoxication in relation to the above-mentioned poisons, which confirms its sorption properties.

Work related to the studies of BAFS properties, particularly studying the effectiveness of the agent in removing radioactive elements from living organisms, was conducted in *the Russian Academy of Medical Sciences Siberian Department Experimental and Clinical Cardiology Institute* in collaboration with the specialists from the *ecological endocrinology laboratory of the Russian Academy of Medical Sciences Siberian Department Scientific Center of Clinical and Experimental Medicine, specialists of the Novosibirsk State Medical Academy and the staff of the Siberian Federal Center of Healthy Nutrition.*

The studies have shown that:

1. BAFS “Litovit-M” has the most effective radioprotective properties in comparison with other sorbents enabled by stimulating washout of incorporated cesium, which decreases specific radioactivity of liver and the development of the organ destructive changes.

2. Using BAFS “Litovit-M” in cases of radiation damage decreases the activity of destructive processes in liver and ensures better liver condition as compared to other used sorbents.

3. BAFS “Litovit-M” stimulates pH-plastic potential of liver cells in case of radiation damage and ensures faster rehabilitation of this organ.

4. Using BAFS “Litovit-M” allows effective reduction of endogenic intoxication level in case of radiation damage, which confirms the necessity of receiving the agent in accordance with recommended dosage if radionuclides penetrated the organism.

The experiment of injecting radioactive cesium into the organisms of rats confirmed that the animals receiving "Litovit-M" demonstrated more significant decrease in radioactivity of all organs in comparison with the animals that did not receive

the test agent. Radioactivity of their seminal glands was 40% lower; their brain radioactivity was 28% lower compared to the animals that were on a standard diet. **Experimental data clearly demonstrate that adding BAFS "Litovit-M" to meals stimulates the removal of radioactive cesium most effectively in comparison with other sorbents.**

CLINICAL STUDIES

Effectiveness of BAFS "Litovit-M" as enterosorbent was confirmed with materials contained in the report "On Clinical Testing of "Litovit-M" Enterosorbent Used in Cases of Severe Poisoning". The studies were carried out in the *N.V. Sklifosofskiy Moscow First Aid Research Institute (MNII SP) under the supervision of the Russian Academy of Medical Science Correspondent Member, Professor A.S. Ermolov.*

Clinical studies have shown that **"Litovit-M" can be used for treatment of poisonings of any severity degree including poisoning with psychotropic medications.** Applying "Litovit–M" caused reduction of amitriptyline amount in stomach by 91%; leponex amount – by 89%, and phinlepsin amount – by 77%, which testified to incomplete "capture" of toxicants and indicated the necessity of increasing the sorbent dose by 9.11 and 23.0% respectively. In case of poisoning with a mixture of toxic agents the calculated single dose of enterosorbent must be maximum, i.e. 100 g, which corresponds to information found in literature.

The primary criterion for determining the effectiveness of enterosorbents is the intensity of poison capturing. **Significant difference between the amounts of toxic agents present in stomach characterizes "Litovit-M" as a highly effective enterosorbent.** Other indirect criteria (decrease in poison concentrations in blood, improvement of endotoxicosis parameters) used in these studies also confirmed the therapeutic effects of the test agent. During the testing period of using "Litovit-M" as enterosorbent in the specified doses, any com-

plications threatening human life and health, were not discovered, the agent is well tolerated by patients.

When compared to “Microsorb-P”, "Litovit-M" showed identical values in many cases, several values were better than those of “Microsorb-P”. It must be noted that “Litovit-M” is well mixed with water thus forming suspension that easily passes through the stomach probe channel, which facilitates using it for treatment of patients in severe conditions. Unlike activated carbons “Litovit-M” does not leave smears. This advantage will allow using the agent more widely compared to activated carbons.

Conclusion: clinical testing of BAFS “Litovit-M”, which was used for treatment of severe poisonings carried out in the N.V. Sklifosofskiy MNII, have shown that:

1. BAFS “Litovit-M” is an effective enterosorbent that ensures 77%-91% decrease in concentration of psychotropic toxicants in the contents of stomach in case of severe oral poisoning, when it is used in combination with the “basic” therapy the decrease in concentrations of toxicants in blood is 65-90%.

2. BAFS “Litovit-M” is safe and well tolerated by patients with acute poisoning.

3. BAFS “Litovit-M” showed results identical to enterosorbent “Microsorb-P”, some of the results were more effective than those of “Microsorb-P”.

Studying effectiveness, tolerability and safety of BAFS “Litovit -M” among patients with occupational poisoning undergoing treatment with “Litovit-M” combined with standard (basic) therapy used for such conditions was conducted at the *Occupational Pathology Clinic of the Russian Ministry of Health Hygiene Research Institute used as clinical base of department of human ecology related to occupational diseases at the Novosibirsk State Medical Academy of the RF Ministry of Health.*

Conclusion: the conducted clinical studies allow us to confirm the effectiveness of enterosorbent "Litovit-M" as pathogenically sound component of etiotropic non-specific therapy for treatment of occupational intoxications. **Adding BAFS "Litovit-M" as enterosorbent to the standard therapy course contributes to the improvement of functional condition of main barrier and detoxicating organs and systems, correction of basic pathogenic mechanisms of toxicity in industrial poisons.**

Clinical studies of BAFS "Litovit-M" effectiveness in removing heavy metals from the organism were carried out at the *RF Ministry of Health Chelyabinsk State Medical Academy.*

The results of studying the concentration of toxic elements in blood of test patients on the 1st and 30th day of receiving BAFS "Litovit-M".

	Cadmium (Cd)	**Lead (Pb)**	**Copper (Cu)**	**Chrome (Cr)**	**Nickel (Ni)**
1st day	0.42 ± 0.06	9.4 ± 2.1	16.0 ± 1.1	8.9 ± 0.15	3.2 ± 0.08
30th day	0.2 ± 0.08	0.61 ± 0.12	7.65 ± 0.2	0.4 ± 0.02	0.62 ± 0.07
Effectiveness of BAFS "Litovit-M" as enterosorbent in relation to various elements was:					
	52.4%	93.5%	52.2%	95.5%	80.6%

Conclusion: Litovit-M acted as an effective enterosorbent for removal of toxic elements from the organism.

ASSESSMENT OF "LITOVIT" series BAFSs MEDICAL AND BIOLOGICAL VALUE

Biologically active food supplements are subject to state registration and declaration. Alongside safety, confirmation of the product's MEDICAL AND BIOLOGICAL VALUE is extremely important for consumers. In order to provide reliable information on the properties and quality of products (not only safety) for customers the unified national system of monitoring the quality of food products "Healthy Nutrition Is Health of the

Nation", which checks the compliance of products with the set requirements, has been created in Russia.

BAFS "Litovit-M" has undergone the voluntary certification procedure. The product received confirmation of the stated medical and biological value (BAFS "Litovit -M" compliance certificate CC No. OS 001.R.0069.09.06 dated September 20, 2006). Each individual package of the product that underwent voluntary certification has a special marking of the "Healthy Nutrition Is Health of the Nation" System.

Inspection procedure includes three-level control (control of raw materials, factory control of ready products and independent control of ready products) of quality and medical and biological value of products in order to:

1. exclude the possibility of negative influence on the safety and quality of technological procedures confirm the effectiveness of methods applied when using the product for treatment of various health conditions including the confirmation of COMBINABILITY (i.e. compatibility) of components.

Due to the results of assessing the medical and biological value and voluntary certification the products manufactured by R&D Company "NOV" (including BAFS of "Litovit" series) are mentioned in Methodic Recommendations in the field of healthy (functional) nutrition developed and approved in accordance with the requirements of Scientific Council on the Medical Nutrition Issues of the Russian Academy of Medical Science and the RF Ministry of Health and Social Development. One of the most important conditions of forming the Methodic recommendations is the compliance of the provided materials and product with the concept of "Achieving good health

through hygiene." The Methodic Recommendations contain standardization of the main nutritional principles for various pathological conditions and a list of measures aimed at preventing the risk of developing possible diseases connected with nutrition disorders based on modern views on the Internal hygiene of the organism.

Multiple studies and observations allow us to say that "Litovit-M" series is the only eternally living crystal (K. Herblatt, K. Klein, 1982) and a primary catalyst of biochemical processes (I.A. Brlitskiy, 1990), as well as the basic product that can help overcome the INSUFFICIENT ADAPTATION SYNDROME in the modern life conditions.

Many experimental studies have shown that using sorbents with the largest sorption surface that is made up by fine pores is able to instantly and unpredictably shift all the balance found in the organism. This is why **other sorbents with a large sorption surface that do not have selective sorption properties** do not meet the modern requirements. BAFS “Litovit-M” does not have any side effects.

The manufacturing process patented by “NOV” Company was certified in the quality management system in compliance with the requirements of Russian and international standard ISO 9001:2008.

Features of BAFS “Litovit-M”:

1. Product has no pharmacokinetics i.e. any concentrations of the product cannot be found in biological fluids of the organism. “Litovit-M” is not sucked in the gastro-intestinal tract and does not get in blood as crystal but rather passes through interacting on the level of selective sorption.

2. The possibility of overdosing is excluded: various clinical and pre-clinical studies demonstrate it clearly. Recommended dosage is shown on the retail package of the product.

3. Using the product not only as part of complex therapy for treatment of occupational intoxications, deliberate and accidental poisoning with medications, including psychotropic agents etc. but also as food supplement to prevent insufficient adaptation syndrome (prevent the risk of negative effects of the environment on the organism) is allowed.

Pre-clinical and clinical studies conducted by various medical research and clinical institutions confirm that BAFS "Litovit-M" is not only safe but effective, it is recommended for use as enterosorbent by various groups of people having various health conditions.

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THE ADSORPTION OF Y. ENTEROCOLITICA ON NATURAL ZEOLITE

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AzSIID named after A. Aliyev,
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Yersiniosis (syn.: intestinal yersiniosis) is a disease of the group of zoophilous sapronoses caused by Yersinia enterocolitica. It is characterized mainly by the fecal-oral mechanism of transmission of the causative agent, intoxication, exanthema, lesion of the gastrointestinal tract and joints, susceptibility to protracted and chronic course and the formation of immunopathologic syndromes.

The genus Yersinia belongs to the family Enterobacteriaceae. Three of the eleven species are pathogenic to humans: Y.pestis, Y.enterocolitica, and Y.pseudotuberculosis. Y.enteocoitica is an oxidase-negative, nonlactose-fermenting, aerobic, gram-negative coccobacillus. It ferments glucose, galactose, and mannose; reduces nitrates, and does not produce hydrogen peroxide. The organism is motile at 22°C to 25°C but not at 37°C, These properties help to differentiate it from Y.pestis and other Enterobacteriaceae. Y.enterocolitica grows well on ordinary media, such as blood, MacConkey medium, heart infusion, and Salmonella-Shigella agars, although a selective agar medium has been developed specifically for its isolation. Y.enterocolitica strains have been differentiated into approximately 70 serogroups (based on somatic O antigens) and six biotypes. Eleven of the serogroups of Y.enterocolitica commonly cause human disease. Most animal and environmental isolates.

Serogically, the most frequent serogroups associated with human infection are 0:3; 0:5, 27; 0:8; 0:9.

Y.enterocolitica is widespread in nature. It is present in the gastrointestinal tract of wild and domestic mammals, in the environment (surface water, sewage) and in certain foods (meats, dairy products, sea food, and vegetables). Most of the know pathogenic biogroups are associated with definitive animal hosts, especially the pig. In case-control studies, a correlation has been demonstrated between infection and the consumption or handling of raw or undercooked pork products such as chitterlings.

Gastrointestinal infection with Y.enterocolitica appears to be most common in developed countries within the temerate zones. The organism is cold-adapted and capable of multiplication at low temperatures. Water-and food-borne infections have been documented, as has person-to-person transmission in family and community outbreaks. The significance of food product contamination during processing is underscored by the organism's ability to grow in properly refrigerated food, including raw and cooked meat and milk.

Y.enterocolitica has emerged as a significant cause of transfusion-associated sepsis. Factors contributing to this are the ability of the bacterium to multiply at 4°C and to utilize iron liberated from aging erythrocytes.

The incubation period for intestinal infection is typically 4 to 6 days, varying from 1 to 14 days. The exretion of the bacteria in stools continues for a few weeks after cessation of the symptoms.

Y.enterocolitica usually causes diffuse inflammation at the ileum and colon, with infiltrates in the lamina propria and superficial ulcerations in terminal ileum and colon. Mesenteric lymphadenitis, with reactive germinal centers and sometimes microabscess formation, often is associated. In most cases, the

appendix is grossly and histologically normal or shows only mild in flammation.

The usual route of acquisition of Y.enterocolitica is through the ingestion of food or water contaminated with the bacteria. Prior to the initiation of an infectious process, this microorganism undergoes a temperature adaptation in the human host, making use of both chromosomal and plasmid-associated virulence determinates that are temperature regulated. Y.enterocolitica is primarily a gastrointestinal tract pathogen, with a propensity for extarintestinal spread under appropriate host conditions (immunosuppression, iron overload). Gastrointestinal infection may present as an enterocolitis in young children or as an acute mesenteric lymphadenitis and terminal ileitis mimicking appendicitis in older children. Acute gastroenteritis is the most common presentation in young children (under 3 years of age). Symptoms include diarrhea, usually accompanied by fever, vomiting, and abdominal pain. Stools usually is mucoid or bloody. The abdominal pain usually is colicky, diffuse, or localized to the right lower abdomen. Y.enterocolitica can be recovered from stools, mesenteric lymph nodes, throat swabs, peritoneal fluid, or blood. Isolation from otherwide uncontaminated material, such as blood or lymph nodes, is not difficult because Y.enterocolitica grows on ordinary media. Serology can aid diagnosis, especially during outbreaks. Infection can be confirmed by demonstrating increases in serum antibody titer after infection. Antibodies usually are detected from 8 to 10 days after onset of clinical symptoms and persist for several months. Serologic response often is absent in infants. Y.enterocolitica can cross-react with Y.pseudotuberculosis and with other organism. A common antigen is shared by Y.enterocolitica serotype 0:9 and species of Brucella. This cross-reaction has caused great concern because of the confusion it can create in the serological detection of Brucellosis in cattle, pig, and other animals, and in

the serological diagnosis of both Brucellosis and Yersiniosis in humans.

The essence of the solving task is in the spreading of assortment of enterosorbents relative to Y. Enterocolitica.

In the experience have been taken:

– Bacterial culture of Y. Enterocolitica (model: diagnostic erythrocyte enteric Yersinia antigen (09) for diagnostic purposes);

– Culture of transplantable cell lines L-20B (mouse embryo fibroblasts, derived from transgenic mice), used for identifying of non-toxic dose of the proposed enterosorbent based on zeolite-clinoptilolite and dolomite.

For the experiment was taken the enterosorbent of 500 mg on basis of the revealed non-toxic dose of preparation (zeolite + dolomite) on tissue culture L-20B in the amount of 0.0005 mg/ml (5^{th} non-toxic dose) (1).

For diagnosis of yersiniosis was applied macromethod setting of IHT (Indirect hemagglutination test) in polystyrene plates.

Before the formulation of the reaction the macromethod each lunula of the polystyrene plate is wiped with 70% ethanol, then is washed 5-6 times with the purified (distilled) water, then each lunula is wiped dry.

In formulating the contents the IHT the content of the ampoule with erythrocytic diagnostics is diluted in 10 ml of 0.9% sodium chloride solution to obtain 1% of suspension.

The content of the ampoule with serum coli-Yersinia 09 (1:5) is diluted in 5 ml of 0.9% of sodium chloride solution, is received the dilution 1:25.

Preparation is diluted in accordance with the rules of asepsis.

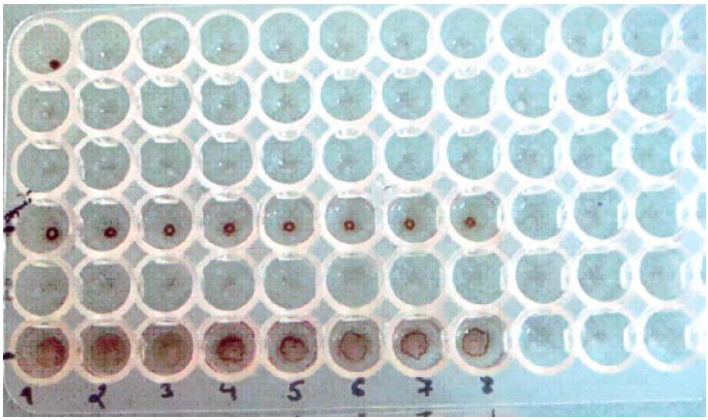
In each of 10 lunules is brought in 0, 5 ml 0.9% sodium chloride solution. Then, in the first lunula is brought 0.5 ml of the studied serum, diluted 1:25 and is made a double dilution of

1:50 to 1:6400 by moving out from one lunula into the other at 0, 5 ml and mix their contents of at least 3-4 times.

After that, into each lunula is added 0.2 ml of 1% suspension of diagnosticum.

At the same time there are made the provided controls: serum diagnostic and antigen: (diagnosticum – in 0,5 ml of 0,9% of sodium chloride solution 0.2 ml of 1% suspension diagnosticum; 2 – the studied serum – 0.5 ml in a dilution of 1:50 and 0,2 ml of 1% suspension of the Control erythrocytes; and 3-control serum – 0.5 ml serum of enteric Yersinia 0.9 ml in a dilution from 1:50 to the titer shown on the ampoule and 0.2 ml of 1% suspension of diagnosticum.

Plates are lightly shaken, holding with both hands in a horizontal position, and is left it for 1,5-2 hours at a temperature of 37 ± 1°C, then at temperature 20± 2°C for 14-18 hours, after which the reaction is taken into account.



Accounting of the reaction is carried out according to the four-cross system:

4 + – all erythrocytes are agglutinated and evenly is covered the bottom of the lunula;

3 + – are agglutinated almost erythrocytes, in their background there is a little-noticed ring of settled nonagglutinated erythrocytes

2 + – along with the even agglutination at the bottom of the lunula there is sediment from nonagglutinated erythrocytes in a small ring or "buttons"

1 + – the majority of erythrocytes are not agglutinated and settled as a small ring with irregular edges in the center of the bottom of lunula

--- no signs of agglutination.

Diagnostic titer of antibodies of the tested serum is considered the last dilution, which gives a clear agglutination of erythrocytes and can be rated no less than 3 +.

The reaction of Indirect Hemagglutination Test with the tested serum is considered the positive if with the control serum in the dilution equal to the titer, listed on the ampoule, there is a positive reaction, and in the control lunula with the tested serum and non-sensitized erythrocytes the reaction was negative.

This method has been checked on the proposed enterosorbent.

On the surface of the tested enterosorbent (500 mg) was layered the dissolved in 10 ml 0 9% sodium chloride solution (1% suspension), erythrocyte diagnosticum.

15 minutes after the contact there was joined the dissolved antigen and the eluate after adsorption of the antigen with the titred control intestinal Yersinia serum 09 (1, 2 rows on the panel – Figure 1).

Thus was established the full adsorption of antigen on the proposed enterosorbent:

1 row – positive hemagglutination (4 +),

2 row – complete absence of erythrocyte diagnosticum

3 row – additional control of the absence of antigen (negative hemagglutination).

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ZEOLITES IN DERMATOLOGY

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Zeolites are natural aluminum silicates of volcanic origin.

Recent researches showed that zeolite supresses the biological activity of many pathogenic microorganisms and adsorbs them, accelerating the process of recovery from infectious diseases.

Aim of the research is to study the clinical effectiveness of 20% ointment and it's versions in the therapy of patients with different dermatoses.

Materials and methods of the research. In the process of preliminary experimental researches on laboratory animals (horses) was revealed the effectiveness of 20% zeolitic ointment based on vaseline. While the following researches we have developed the following structures of zeolitic ointment:

– the zeolitic ointment riched in zinc (zeolite – 17%, zeolite, riched in metal zinc (2p) – 3%). Zinc participates in immunogenesis, different metabolic processes of the organism;

– the zeolitic ointment riched in copper (zeolit – 17%>, zeolite riched in metal of copper (Si) – 3%). Copper takes important part in antioxidant protection of the organism, because copper together with zinc enters the structure of antioxidant ferment – superoxide dismutase and antioxidant protein of blood plasma – cerruloplazmina which is the carrier of this metal. Copper possesses antiinflammatory and antiseptic characteristics.

– the zeolitic ointment riched in zinc and copper (zeolite – 17%, zeolite riched in metal of zinc) – 1,5% zeolite riched in metal of copper (Si) – 1,5% – "mixed ointment".

Also there was developed a cosmetic clearing mask for the care of skin, including the foundation (60-75%) – fine dispersed mineral sorbates from zeolite contaimimg tufa from Aydag and biologically active substances (25-40%) – the crushed medicinal vegetational raw materials, containing in identical proportions dried flowers of camomile, grass of beggar-ticks, grass of field horsetail, leaves of nettle, grass of origan, petals of violet, thyme, root of bare licorice.

82 patients with various dermatoses at the age from 8 months till 76 years old, who have been casually selected during RDVD and volunteers who agreed to have treatment with 20 % zeolitic ointment and its various variants, participated in clinical researches. Among patients at 28 ones (34,1 %) the psoriasis was diagnosed, at 26 ones (31,7 %) – purigo, at 20 (24,4 %) – atopic dermatitis, at 8 ones (9,8 %) – acrodermatitis enteropathica.

Analysis of the effectiveness of using zeolite ointment while topical therapy showed rather quicker approach of clinical effect while using mixt ointments – variant of zeolite ointment together with Zn and Ci. Analysis of the katamnestic data revealed the lack of syndrome of cancelling and more firm remission for 4-9 monthes in the patients diseased of dermatitis, prurigo and psoriasis.

So zeolitic ointment is a preparation of choice at heavy skin pathologies as a exfoliating, regenerating, antipruritic, sedative, resrtoring the trophism topic means increasing the effectiveness of the cure of skin diseases. Dimensioned use of the zeolitic ointment in dermatology needs further biochemical and clinical-immunological researches at the level of cellular and humoral immunity.

THE RESEARCHING RESULTS OF ADSORPTION OPPORTUNITIES OF NATURAL ZEOLITES FOR THE BACILLUS ANTHRACIS

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In the report are presented the results of a study of the adsorption capacity of natural zeolite on the causative agent of anthrax. The selected doses of antigen (200 and 400 mg) respectively gave the results from 120-200 plaques. The results of an experiment show that these studies can be used as a sorbent in the skin form of anthrax.

Key words: zeolite, Bacillus anthracis, vaccine strains, the adsorption capacity.

RELEVANCE RESEARCH

Despite the significant impact of economic decline because of the influence of anthrax disease in recent decades and dispute of large-scale preventive measures, the disease continues to be registered in many countries, as well as in our country, where the main activity of population in rural areas is cattle breeding. Under the natural conditions, because of the anthrax disease suffer primarily herbivores, mainly large and small cattle, horses, pigs and others animals who have usually demon anthrax symptoms. However, a well-known fact should be noted, during the overcoming of the causative specie barrier by humans, the anthrax disease can be manifested by complex of fairly clinical appearances [1, 2 and 6].

Despite the relatively small percentage of incidence of the anthrax infection marked by the people, mentioned above infection is very difficult from the pathogenetic point of view, and can cause very serious pathologies. The causative agent of anthrax, along with the variola virus and Yersinia pestis is one

of the most effective agents that can be used as a biological weapon [2, 4].

Anthrax manifests itself in three main clinical forms: cutaneous, pulmonary and intestinal. In debilitated and malnourished people as a complication of clinical form can develope anthrax septicemia.

In modern conditions the search for new effective methods of diagnosis and treatment of anthrax is relevant. Healing properties of natural minerals are known from ancient times and are widely used to treat various ailments in the form of various drugs used as inward, ointments, applications, and as powders. One of the most visible, but little-known examples of use of therapeutic action of minerals, is a phenomenon of litofagy. In connection with this problem the purpose of the study was to identify possible adsorption capacity of domestic zeolite – natural sorbent on Bacillus anthracis – spore and vegetative of its forms.

MATERIAL AND METHODS

As an antigen STI vaccine was obtained from non capsule anthrax bacillus, which consists of living spores of avirulentngh vaccine strains. (Anthrax is a live vaccine; lyophilisates of which is for the preparation of a suspension for subcutaneous and cutaneous sponge application).

Manufacturing of vaccine is conducted by Central Research Institute of the Ministry of Health and Defence of the Russian Federation, (Russia, Kirov, FSI, 48 Central Research Institute of the Russian Defense Ministry). Anthrax is a live vaccine consisted of 10 cutaneous or subcutaneous doses of 100 – 1 ml.)

Bacteriological studies have been conducted by standard methods of Bacteriology [3].

In the conducted experiment the antigen was inoculated on Petri dishes with meat-peptone agar in test tubes with meat-peptone broth.

There are 4 billion microbial cells in 1 ml of vaccine for cutaneous method, the vaccine for subcutaneous use contents of 100 million of 1 mg of 100 million microbial bodies which were dissolved in 1 ml of saline, inoculated in test tubes with meat-peptone broth.

After 24 hours of incubation at 37°C from the broth suspension cultured grown loops have been inoculated on Petri dishes with meat-peptone agar.

RESULTS AND DISCUSSION

There are combined minerals under the name of Zeolite, in family of which are included about 50 species. The most common among them are: thomsonite, natrolite, heulandite, stilbene, phillipsit and laumoniet. There can be white zeolites, as well as light green, pink, yellow, occasionally brown, golden-orange and red.

During the experiment has been used a dose of zeolite in 400 mg. Applied enterosorbent is the basis of clinoptilolite containing additional dolomite in the following ratio components of mass: clinoptilolite – 70%-80%; dolomite – 20%-25%.

In the experiment of adsorption of culture have been used enterosorbent spore forms of the antigen, another word, from the ampule with the antigen, dissolved in 1 ml. saline. During the experiment has been also used a dose of antigen 200: (another word, a dose of 0, 5 million microbial bodies, which gave 120 plaques in meat-peptone agar (see Table).

On the expedient zeolite has been superimposed with a bacteria consisted fluid in the mentioned above doses. After 2 hours of adsorption eluate has been sown into Petri dishes with meat-peptone agar. At the same time the culture of Bacillus

anthracis has been sowing in the mentioned above doses without the expedient zeolite as a control over the antigen.

Table 1

The formation of plaques in the experimental and control variant of sowing

The dose of antigen in dilutions (In millions of microbial cells)	Plaque formation in the IPA (number)
0,5	120
1	200
Control (no zeolite)	0

As can be seen from the table, selected doses of antigen respectively yielded 200 and 120 plaques in meat-peptone agar.

In experimented cups with sown eluate of the antigenic culture, another words, Bacillus anthracis has not grown up, another words, the plaques has not been observed.

Known studies in the literature mention about the components of vaccine adsorbed in aluminum hydroxide, used as an adjuvant, efficiency and safety of which is confirmed by the Food Drug Control Administration, USA (FDCA). The obtained result allows us to conclude the high adsorption capacity of the studied sorbent – zeolite which has at its turn little inferior to aluminum hydroxide.

CONCLUSION:

These results indicate an identified opportunity of study the adsorption enterosorbent, which can be used in intestinal form of anthrax, and possibly with septicemia.

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MECHANISM FIXING VITAMINE E ON CLINOPTILOLITE TUFF

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Zeolite tuffs are the most important representatives of the natural ion-exchangers. The general feature for all zeolites is the presence of the three-dimensional alluminosilicates skeleton, forming systems of cavities and channels in which alkaline, earth cations and molecules of water are located [1]. The important properties of zeolite tuffs is their ability for sorption of biologically active substances, such as amino acids, vitamins and minerals [2]. One of a zeolite tuff is the clinoptilolite which can be applied as the carrier of medicinal substance at the enteral introduction as powders or tablets. It prevents the premature excretion of a medical product and increases its duration of the action. Fat-soluble vitamin E is a powerful antioxidant and essential part in the diet of a live organism [3]. According to the literary datas, vitamin E adsorped on silica matrix is the component of vitamin-mineral matrixes and mixed fodders [4]. The vitamin E, fixed on zeolite tuff matrix, can be used for the nutrition of animals. In this connection the purpose of the present work is the investigation of sorption vitamin E on clinoptilolite tuff from the ethanol solution.

The vitamin E produced by Sigma-Aldrich, Germany was used. The structural formula of α-tocopherol is presented in figure 1.

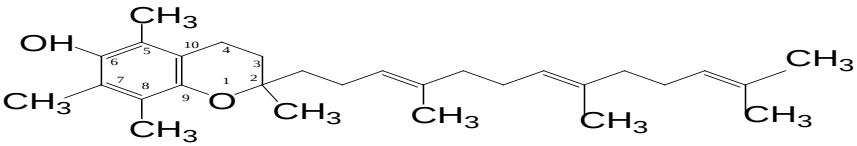
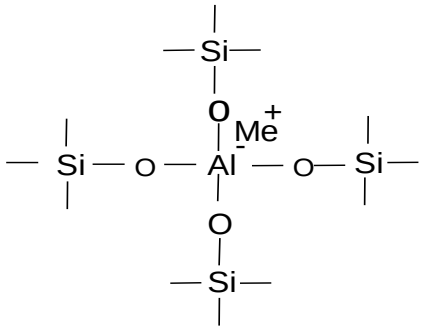


Fig. 1. The chemical formula α-tocopherol

The sorption of vitamin E was studied on the zeolite tuff located in Ugra, Russian Federation. This type of zeolite represents a multiphase mixture. The main rock-forming mineral is clinoptilolite – $KNa_2Ca_2(Si_{29}Al_7O_{79})\cdot 12H_2O$ (68%) [5].

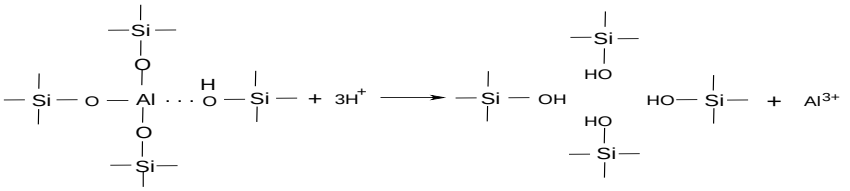


$Me^+=Ca^{2+}, Na^+, K^+$

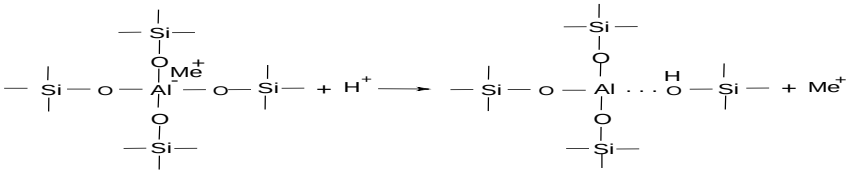
It has been established that the sorption of vitamin E on the initial clinoptilolite tuff from the ethanol solution has not occurred. It is known that acid activation of sorbents increases the sorption ability of natural minerals due to the change of the chemical nature of sorption centres and porous structure of a sorbent [6]. The clinoptilolite tuff was treated by 5,0 M solution of HCl. The kinetics sorption was studied on the activated sample. Following the treatment of clinoptilolite tuff

by 5,0 M HCl it is observed the decationation and dealuminizing (fig. 2).

a)



b)



Me^+: Na^+, K^+, Ca^{2+},Mg^{2+} , NH^{4+} ...

Fig. 2. Scheme of reactions the decationation and dealuminizing

The acid treatment leads to increasing the pore size and channels that become apparent in increasing of a sorption ability.

The main types of interactions providing the adsorption of vitamin E on the clinoptilolite tuff are Van der Waals forces and hydrogen bonds. The Van der Waals forces are caused by dispersive, oriented and inductive interactions of molecules of vitamin E with the sorbent and among themselves. Hydrogen bonds are formed thanks to interaction between hydrogen phenolic hydroxyl and oxygen of the matrix of the sorbent.

The kinetics sorbtion of vitamin E on the clinoptilolite tuff (fraction of 0,02-0,06 mm), investigated by the statistical

method of the limited volume. On fig. 3 the dependence of the quantity of the adsorbed vitamin E on time is shown.

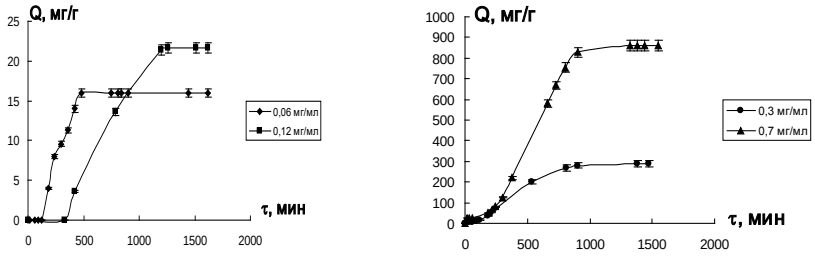


Fig. 3. Kinetic curve of dependence of quantity sorbtion vitamin E on time

On fig. 4 the curve of dependence of the degree of the completeness of the process on time for different concentrations is shown.

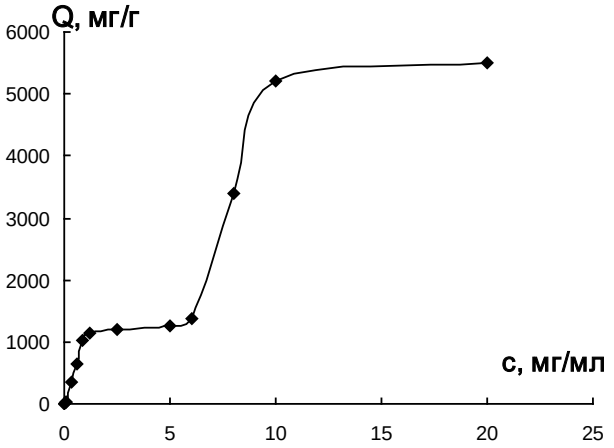


Fig. 4. The kinetic curve of the dependence of the degree of completeness of process on time

According to the received data, time of the achievement of the balance is in direct proportionality from the concentration of external solutions. At the initial stage of sorption process the interaction between the sorbent and the sorbate takes place, i.e. attachment of vitamin E on sorbent surface and its penetration into pores and channels, owing to the speed of the process on the given part of the kinetic curve is maximum. In the process of increasing the degree of filling the surface by the α- tocopherol molecules the speed of sorption is decreased.

Interphase distribution of vitamin E in sorption process on clinoptilolite tuff estimated with the help of the sorption isotherm, received at 295 K. The mechanism of sorption vitamin E on the clinoptilolite tuff investigated in a range of concentration of 0,025-20 mg/l. The received isotherm is presented on fig. 5.

The isotherm of sorption vitamin E on clinoptilolite tuff has S-shape. Such type of the isotherm can be caused by changes in the mechanism of interaction not only in the sorbent phase, but also in a phase of the external solution. There are some zones on the isotherm of sorption of vitamin E on the clinoptilolite tuff (fig. 5).

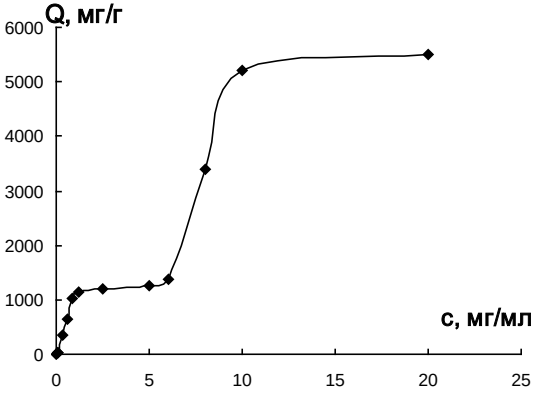


Fig. 5. Isotherm of sorption vitamin E on clinoptilolite tuff

According to the received experimental data on an initial part of the isotherm the capacity of clinoptilolite tuff for vitamin E linearly increases with the growth of the concentration of the external solution of vitamin E. On the following part of the isotherm the sorption parameters for vitamin E are not changed with the increasing the concentration of α- tocopherol. The isotherm on the given part of the curve is characterised by the presence of plateau that corresponds to the formation of a monomolecular layer. The isotherm in this part of concentrations can be described by the Langmuir's equation [7]:

in a linear type

$$Q = Q_{\infty} \frac{Kc}{1 + Kc}$$

$$\frac{c}{Q} = \frac{1}{KQ_{\infty}} + \frac{c}{Q_{\infty}}$$

Q – sorption capacity at the given range of concentrations, mg/g; Q_{∞} – maximum sorption capacity which according to the received data makes 1377 mg/g; c – concentration of vitamin E in the equilibrium solution, mg/ml; K – coefficient sorption balance which is calculated from isotherm sorption in a linear type (fig. 6).

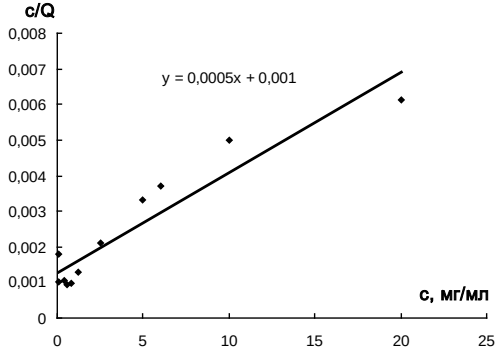


Fig. 6. Isotherm of sorption vitamin E on the clinoptilolite tuff in a linear type

The obtained isotherm is described by the following mathematical expression:

$$Q = 1377 \cdot \frac{0{,}0005c}{1 + 0{,}0005c}$$

Presence of the plateau in the range of concentration 1,2-6,0 mg/ml and the increasing the sorption parameter at 6,0 mg/ml (fig. 5) allows to assume the formation of vitamin E associates owing to the sorption gets polymolecular character.

It is established that the sorption of vitamin E on initial clinoptilolite tuff from the ethanol solution is not occured. Dependence of quantity of adsorped substance on time of the achievement of the balance is in directly proportional dependence on concentration of external solutions. The isotherm of sorption vitamin E on clinoptilolite tuff has a S-shape. The maximum sorption capacity according to the obtained data is 1377 mg/g.

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EXAMINATION OF NAKHCHIVAN ZEOLITE AND PROSPECTS FOR ITS APPLICATION

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The Nakhchivan Autonomous Republic of Azerbaijan is situated in the southwestern part of Lesser Caucasus and lies between 38°31'–39°47' NL and 44°46'–46°10' EL. The Aras river in the Nakhchivan AR south and south-west flows along the state border between Azerbaijan Republic and Islamic Republic of Iran while bordering the Republic of Turkey for a short distance in the west. In the north and east, Zangezur and Daralagez mountain ranges separate the autonomous republic from Armenia. The entire republic is divided into 7 administrative districts (rayons): Ordubad, Julfa, Babek, Shakhbuz, Sharur, Kangarli and Sadarak.

For its geological structure, continental climate and vegetation, the Nakhchivan Autonomous Republic is very different from other regions of Azerbaijan.

Within the territory of Nakhchivan AR, there have been discovered rich deposits of natural zeolite which is widely utilized in the modern industry and agriculture; zeolite is also used for environmental protection.

Zeolite rocks are found in Middle Eocene volcanogenic deposits – tuffs, tuff conglomerates, tuff gravelites and argillites. Morphologically zeolite is characterized by a typical layered form and clearly differs from other surrounding rock. The thickness of the zeolite stratum is variable, ranging between 5

and 25 m. and lies towards the north and north-east of the region at an angle of 10-20 degrees.

Zeolite-containing rocks run as strips from Ordubad's Mazra village towards Shakhbuz's Guney Gishlaq. According to geological research findings, the length of Mazra (Ordubad rayon) – Shurud (Julfa) zeolite strata is 17,5 km while that of Daylakli-Guney Gishlaq (Shakhbuz rayon) is 20 km long. Zeolite minerals are mainly represented by mordenites.

Zeolites are natural microporous siliceous minerals. Their natural place of origin is volcanic lava and rock crushed with gas and steam. This mineral is absolutely harmless for human consumption, as demonstrated by chemical analysis and toxicological researches conducted by scientists all over the world.

We are currently carrying out search and valuation works in the "Goycheler" area (Gilanchay-Qaradere territory of the Ordubad rayon) for usefulness of raw zeolite. Based on the primary data, zeolites of the first and second grades can be singled out. The mordenite content in the first-grade zeolite material is over 60% (62-75%) while it is up to 45% in the second grade. The thickness of the 1500 m long zeolite stratum is 22 m on average, traced down as deep as 100 m. According to category R, the reserve of the first-grade raw zeolite is about 8 million tons.

The general formula of zeolite is $KNa_2Ca_2(Si_{29}Al_7)O_{72}\cdot 32H_2O$. The Nakhchivan zeolite's chemical composition consists of CaO – 2,71%, $Al_2\ 0_3$ – 12,77%, SiO_2 – 71,62%, $Fe_2\ O_3$ – 1,35%, TiO_2 – 0,09%, $K_2\ O$ – 1,01%, $Na_2\ O$ – 0,76%, MgO – 1,04%, CO_3 – 0,02%, MnO – 0,11%, P_2O_5 – 0,12%. Zeolite's density is 2,31 g/cm^3; adsorption capacity (mmol/g) is 4,10 - 4,50; volume weight is 1,04 g/cm^3 (when sized 0,25 – 1 mm), porosity is 0,075 g/cm^3.

The Nakhchivan AR locals living in the vicinity of the zeolite deposits when suffering from intense sweating and unpleasant odors as well as severe itching of feet used to stuff

stockings with powder-like zeolite and wear them until morning. Even after one instance of such treatment leg ailments were eliminated for a long while. In addition, the fact of rapid and complete removal of various fungal diseases has also been established.

For 4 years, we have performed numerous experiments with the local zeolite on various agricultural crops and poultry (1, 2, 5).

Using zeolite as an additive in feeding animals improves the nutritional value of feed, has a positive effect on digestive processes in animals, enhances the efficiency of nutrient digestion, improves the physiological state, and increases animals' viability. It also helps prevent certain diseases, increase productivity of adults, absorb and excrete radionuclides, ammonia, carbon oxide and dioxide, hydrogen sulfide and heavy metal salts from the animal body (4, 6, 7).

Adding 5% of zeolite to compound feed has proved to have a positive effect on poultry. It has been established that the average mass of an egg in the control group turned out to be 4.3 g. less as compared with the experimental groups. Egg production in the experimental group was 18-27 pieces more as compared with the control group. Zeolite's positive action on the viability of young birds and incubatory qualities of eggs has also been detected. It was found out that the highest yield of hatching eggs was in the White Leghorn, the Caucasian black and the New Hampshire White Leghorn X breeds. The used zeolite contributes to weight gain in the experimental birds (1).

Only in recent decades have people in many countries of the world started utilizing zeolites in certain branches of science. Today, given the unique properties of the natural minerals, their use in medicine and agriculture is rapidly growing all over the world (3).

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ZEOLITE – CLINOPTILOLITE – "AZEOMED"

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[3]International Academy of Sciences

It has been quite a long time that people have been aware of being influenced by various external ecotoxicants. As years pass by, their number increases, aided by stress factors adversely affecting the human body as protective functions of organs and their systems from external influences decreases from year to year (2).

The most optimal way to get over all of the negative factors listed above is preventive use of medicines which remove toxins from the body and restore functions of organs and body as a whole. There are a number of conditions, apart from standard ones, to be met for those medicines, including environmental purity, content of natural components thanks to which the preparation is assimilated at the cellular level, not only without causing any harm to the body but also adding more positive qualities (1, 2, 5).

The remedy has been found. "AZEOMED" mineral complex produced by Azerbaijani "YENITEX" company has the properties mentioned above.

To obtain it, components of natural origin, namely zeolite and dolomite are used. It is known that not all types of zeolites are suitable to be medically used inside the human body (5). What is important here is application of high-silicon plastic zeolite – clinoptilolite identified by X-ray diffractometry which allows to determine phase (mineralogical) composition of rocks and quantitative relationship among their components (3, 4). Their physical properties such as thermal stability, water content in zeolite structure, etc. are established similarly. An

electron microscopy research has found that the Aydag deposit located on the western outskirts of Tovuz, Azerbaijan contains the basic mass of zeolite composed of clinoptilolite. The oxide formula for clinoptilolite is $(Na_2K_2)OAl_2O_3 \bullet 10SiO_2 \bullet 8H_2O$ and the probable crystal-chemical formula is $Ca_{4,5}Al_9Si_{24}O_{72}$ (5).

It has been found that clinoptilolite's crystal structure is characterized by the presence of sufficiently open channels formed by 10 and 8-link tetrahedral rings, and empty space inside the crystal lattice occupied by cations. It can be cations of various metals as well as microelements responsible for ion exchange with body cells.

The amount of water in intracrystalline cavities, which can reach as much 50% of the crystal, is clinoptilolite's key sorptive characteristic.

According to chemical analysis of zeolite and dolomite carried out at M. Nagiev Institute of Chemical Problems we have:

Color, odor, granularity and moisture indicators (Table 1).

Table 1

Physical parameters

№	Parameter	Standard	Actual
1	**Appearance**	Light gray - white	Conforms
2	**Odor**	Odorless	Odorless
3	**Clinoptilolite content in zeolite**	73% – 75%	73,5%
4	**Granularity** **Fraction 00** **Fraction 01**	 90–95 5–10	 91,0 8,0

and chemical analysis as well (Table 2).

Table 2

Chemical analysis of zeolite and dolomite

N	Na_2O	MgO	Al_20_3	$Si0_2$	P_2O_5	K_20	$S0_3$	CaO	$Ti0_2$	MnO	Fe_20_3
Zeolite	2,69	0,47	12,65	64,38	0,12	2,25	0,035	3,30	0,085	0,10	1,27
Dolomite	0,047	20,11	0,79	4,77	0,017	0,045	0,16	29,40	0,032	0,034	0,55

In our study, we examined the spectra of electron spin resonance (ESR) of mineral food supplements «AZEOMED». As a starting material was used powdered «AZEOMED». The results were obtained in radiospectrometer X – ranging from high-frequency modulation of 100 kHz.The values of g – factor was determined by simultaneously measuring the frequency of the microwave and the magnetic field. Simulation of EPR spectra and calculation of normalized double integrals to evaluate the concentration of paramagnetic centers was performed using programs SYMFONIA and WINERP firm "Bruker"(6).

The experimental spectrum is shown in Fig. 1 and Fig. 2.

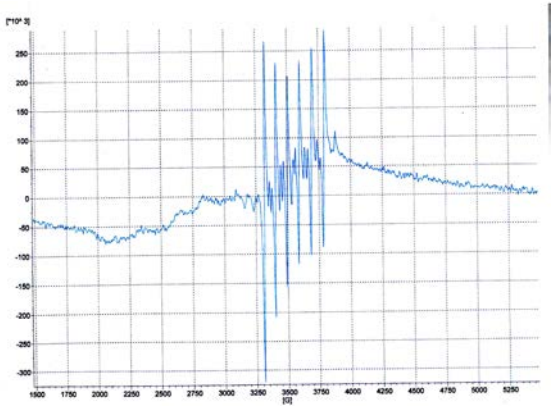

Fig. 1.

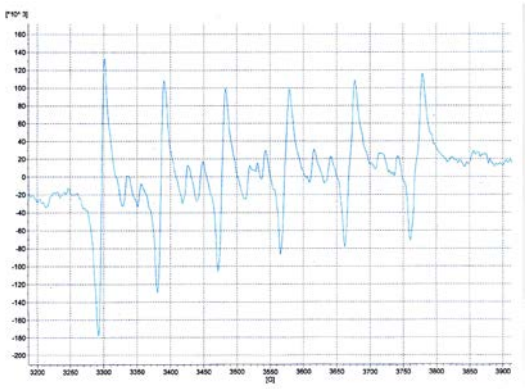

Fig.2.

The figures show that the powder presents EPR signals – manganese (six-component) (7).

Known that manganese (Mn) has a significant impact on the livelihoods of living organisms. Manganese is among the most important bio (micronutrients), and is a component of multiple enzymes, performing numerous functions in the body. Manganese actively influences the exchange of proteins, carbohydrates and fats. It is also important is the ability of manganese to strengthen the action of insulin and to maintain a certain level of cholesterol in the blood. In the presence of manganese the body better use of fats.

The main biological functions of manganese:

– Manganese is involved in the synthesis and exchange of neurotransmitters in the nervous system.
– Manganese prevents free-radical oxidation, ensures the stability of the structure of cell membranes.
– Manganese ensures the normal functioning of muscle tissue.
– Manganese is involved in the exchange of thyroid hormone (thyroxine).

– Manganese ensures the development of connective tissue, cartilage and bone.
– Manganese increases the hypoglycemic effect of insulin.
– Manganese increases glycolytic activity.
– Manganese increases the intensity of utilization of fats.
– Manganese reduces the level of lipids in the body.
– Manganese prevents fatty degeneration of the liver.
– Manganese is involved in the regulation of metabolism of vitamins C, E, group B, choline, copper.
– Manganese is involved in ensuring full reproductive function.
– Manganese is necessary for normal growth and development of the organism.

Daily demand in manganese:

The daily demand for manganese for adults 2-5 mg. Level, leading to a shortfall estimated at 1 mg / day.

Toxic dose: 40 mg of manganese per day

Causes of deficiency of manganese in the body

– Insufficient intake of manganese from the outside (inadequate nutrition, reduction of consumption of products rich in manganese, in particular, plant food).
– Excessive intake of phosphates (carbonated drinks, canned food).
– The increased excretion of manganese under the influence of redundant content in the body of calcium, copper and iron.
– The increased consumption of manganese as a result of psycho-emotional overload, women in pre-menopausal and menopause.
– Contamination of the body by various toxins (cesium, vanadium).
– Violation of the regulation of metabolism of manganese in the body.

The main manifestations of manganese deficiency

– Fatigue, weakness, dizziness, bad mood.
– The deterioration processes of thinking, the ability to take quick decisions, memory decline.
– Violations of the contractile function of muscles, a tendency to spasms and cramps, muscle pain, movement disorders.
– Degenerative changes of joints, prone to stretching and dislocation, osteoporosis, menopause.
– Disorders of pigmentation of the skin, the appearance of fine scaly rash, vitiligo.
– Stunting nails and hair.
– Reducing the level of "good" cholesterol in the blood, impaired glucose tolerance, the increase of overweight and obesity.
– Infertility.
– Dysfunction of the ovaries, early menopause, premature aging.
– Disorders of immunity, allergic reactions.
– The risk of cancer.
– Delayed development in children.
– Signs of zinc deficiency in laboratory animals include: slower growth, a violation of the skeleton, suppression of reproductive function, ataxia and defects in newborns metabolism of carbohydrates and lipids.

Correction of the imbalance of manganese in the body

With insufficient intake of manganese in the body must increase the number of products in the diet with high content of it. There may be appointed manganese biologically active additives to food.

Thus, after conducting all those analyses we have a confirmation that this zeolite (clinoptilolite) is suitable to be used for prophylactic and therapeutic purposes.

Based on the aforesaid, we can conclude that "AZEOMED" mineral complex is a body supporting medicine to be applied both for restoration of the body's microelement (Si, Mn and others)composition and for absorption and excretion of toxic substances.

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TO THE QUESTION OF EPIDEMIOLOGY AND TREATMENT OF PAPOVAVIRUS INFECTION IN AZERBAIJAN

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The name was given in combination with the first syllabus of domination of three oncogenic viruses: the virus of papilloma of people, hares, dogs and cows – pa, the virus of polioma of mice – po and vacuolating virus of apes (SV-40) – va.

Besides, identification is referred to this family at the end of the 70s.

Three viruses are close for their oncogenic properties to virus of apes SV-40.

Two of them – the virus of SV 40 – TML and JC were excreted from the brain of the people sick with progressive multicentric leukoencephalopathy (PML). The third virus – VK – was excreted from people's urine with damaged kidneys which received immunosuppressive agents.

The main peculiarity of papovaviruses is that whether they transform the cells without reproduction, or challenge productive infection ended with the ruin of cells forming adequate virus posterity.

Productive infection is often observed in permissive (sensitive) cells, but oncogenic transformation in non-permissive cells. With that they are different from oncornaviruses challenging in permissive cells oncogenic transformation of theirs. In productive infection there is observed replication of viral DNA formation of RNA which translates the information in

ribosome where ferments and structural proteins of capsid are synthesized.

In the final result there occurs the formation of virions leaving the cells of the host.

In oncogenic transformation the viral DNA embedded in DNA sensitive cells of animals, which was shown by the method of hybridizing nucleus acids. (1)

Wide spread of papovaviruses in human population (2) in aggregate with their tumorlike properties (3) arouse an actual problem demanding the further study of infection in the plan of screening antiviral agents of the therapy.

Proceeding from the above mentioned by us there were analyzed the cases of papovaviruses infection among the people in the territory of Azerbaijan.

In the period from 1995 to 2010 were examined 1750 patients with clinical diagnoses of papillomas, poliomas, candilomas from different regions of Azerbaijan.

The age of the patients was from 18 to 80. Among the examined and treated were 900 women at the age of 18-50, 650 men at the age of 20-80 and 200 children at the age of 3 to 18.

Localization of nodes in researched patients was displayed in usual flat verruga, pointed condylomas, papillomas of mucous tunic of the mouth cavity.

Papillomas of the skin and mucous tunic were characterized by the growth of integument epithelium in the shape of a small nipple protruded on the surface of the skin. They were also noted on the mucous tunic of the mouth cavity, breathing passages and urogenital paths.

Epidemiological anamnesis detected that in 1750 examined patients in case of 250 in the family there was observed papovaviruses pathology of different location.

All above mentioned confirm that the known fact is a quite easy transfer and emergence of the infection.

Papovaviruses infection is a registered illness only for appealability and therefore it is difficult to judge the spread of noted infection in Azerbaijan from the epidemiological point of view.

But in terms of above mentioned fact detected contamination in the family and the number of the ill people who consulted a doctor concerning surgical procedure it should be concluded about considerable number of infected population.

Diagnosis of infection was clinical and by the method of TCP (PCR).

The treatment of the examined ill people concluded in surgical procedure and medical therapy by medicinal preparation: “Aciklovir”, “Supran”, etc.

But it should be noted that the results of follow-up of treated patients detected quite frequent cases of recidivation of the illness which indicate periodical occurrence of the infection.

In the purpose of development of the methods treatment is such a complex integrative viral infection which includes papovaviruses infection that absorption method of viral population in the period of productive infection was applied by us.

The ill people with identical clinic illnesses were divided into 2 groups:

The first group consisted of 60 patients who were treated in a usual way, i.e. combination of surgical procedure with antiviral preparations: “Aciklovir”, “Supran”, etc.

The second group consisted of 60 patients who were treated in an above mentioned way in combination of taking tablets “Azeomed”.

Mineral complex “Azeomed” was obtained on the bases of natural clinoptilolit Aydagh deposit. “Azeomed” composed of zeolite retarded activated species and supplemental refined dolomite.

The tablet "Azeomed" 500 mg was assigned for daily intake in twos tablets a day for 2 months.

Intake of tablets combined with management of wound after operation with zeolite powder.

Assignment of tablet "Azeomed" was based on early detection of adsorption ability of the preparation regarding viruses of poliomielit of I, III type of vaccinated variant (4).

It should be noted that the suggested mineral complex-tablet "Azeomed" received "Hygienic Certificate".

The results of the research detected the absence of recidivation (hour of observation is 2 months), shortening the term of wound healing after operation in experimental group rather than in controlled group.

Preliminary results about taking tablet "Azeomed" in papovaviruses infection forward the opportunity of their usage in the treatment of the mentioned infection.

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EXPERIENCE OF TREATMENT WITH AZEOMED IN PATIENTS ON ONCOLOGICAL PATHOLOGY

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As is known, Zeolite is a crystalline aqueous aluminosilicate containing as cations the elements of periodic table groups I and II, namely sodium, calcium, potassium, magnesium. The main skeleton of crystalline lattice of zeolite consists, first of all, of tetrahedron. This skeleton discovers cavities, where are located ions of, for example, sodium, potassium, calcium, which easily exchange to each other and surrounding substrate. This specific crystalline mineral structure of zeolite is perfectly represented in organism, connecting to itself such toxic substances as ammonia and other compositions of nitrogen as well as heavy metals, and extracting them from intestine through exchange processes. Removed toxic substances are replaced by minerals, which organism strongly needs. Thus, homeostasis of organism, especially mineral metabolism is maintained or restored. Thanks to this, most vulnerable systems of organs, |such as brain, nervous, hormonal, immune systems, liver not only obtain protection from toxins, but their endurance to toxic pathogenic influences. Zeolites possess unique detoxic and absorbent qualities, which causes suspension of development, capsulation and decrease of different tumors. In all patients with oncology pathology there are deep metabolic dysfunctions such overproduction of lactates, charging of tumor detrit etc. which needs in metabolic correction.

There is my own modest experience of application of zeolite «Azeomed» at patients with the diagnosed oncological and pretumoral pathology.

Case 1. Patient K.Elbrus, 1957.

The diagnosis: Peripheral бластома in the bottom share of the right lung. T3NX MTS hepar. IV st. IV clinical qroup.

In view of neglect of process symptomatic treatment was spent only.

Complaints: respiration 20 in a minute; pains in the right l/2 of a thorax, limfostasis in the right top extremity, strong general weakness, absence of appetite.

The general analysis of blood:

HB – 50 q/l

leykoc – 4,9 • 10 g/l

Eritros – 3,8 • 10 g/l

ESR – 48 mm/h

«Azeomed» have been prescribed to the patient 2 times a day 2 capsules. Within a week there has come subjective improvement at the patient – there was an appetite, pains in a breast have decreased, the general weakness has decreased, ESR has gone down to 34 mm/h, the respiration rate has decreased to 18 per minute.

The patient has accepted 1 packing «Azeomed» on a course with positive subjective and some objective dynamics.

Case 2. Patient I.Egor, 1937.

The diagnosis: a cancer of duodenum MTS in a liver. IV cl. gr. IV stage.

Complaints: severe pains in the field of a navel and right hypochondrium, absence of appetite, sharp general weakness. The patient accepts narcotic analgetic.

AlAT and AsAT more than in 2 times exceeded norm.

It is appointed «Azeomed» 2 t. × 3 times a day after meal.

After 9 days the pain have decreased, the dose of narcotic managed to be reduced to 50% (Promedol from 4 to 2 ampoules in day), with additions of non-narcotic preparations (Baralgin 1 ampoule 2 times a day). The general weakness has decreased. AlAt and AsAt have decreased on 25%. After the

course termination considerable improvement of the general condition was marked approximately within a month. For example – patient which could not get up independently, has started to cook food. Up to death of the patient increase of a dose of a drug was not required.

Case 3. G.Ellada, (23.06.07) 1966 of a birth.

The diagnosis: fibroadenomatosis of both mammary glands. A condition after 2 sectoral resections of mammary glands (2003)

Complaints: pains in both mammary glands, presence of small formations in both mammary glands, undue fatigability.

Ultrasound investigation of both mammary glands:

«A condition after a sectoral resection (2 parties), fibrozis – cystosis mastopathy (number of cystis 7-10, the size to 1,3 sm». Thyroid gland hormones – norm. Data of gynecologic ultrasonic: a uterus Fibromatosis.

The patient accepted «Azeomed» 2 t. × 2 times a day on a course 1 packing.

The size of cysts has decreased to 0,7 sm the greatest (45%). Pains in mammary glands became significantly rarere). The patient marks improvement of the general condition. Palpation shows the reduction of the fibrous centres, mammary glands soft, painless was marked.

Taking into consideration a small amount of patients. I wish to underline, that at the minimum duration of treatment wih «Azeomed» has shown appreciable clinical activity, especially considering severity of pathology. At all patients considerable subjective improvement was marked. As in palliative therapy improvement of quality of a life and removal of a tumoral intoxication plays a main role, it is possible to tell, that «Azeomed» will be actual at oncological patients in quality of detoxic the agent.

ZEOLITE IS A BIOACTIVE MINERAL

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The first report on natural zeolite was published in 1756 by Swedish scientist Kronsted. Crystals of zeolite-stilbite were swelled when heated, and Kronsted called them "boiling stones" [1].

Later there already have been discovered the properties of natural zeolites, due to their unique crystal lattice.

Swedish scientist K.V.Scheele and the French scientist A.F.Fontana in the seventies of the XVII century found that zeolite crystals can be reversibly dehydrate without a significant violation of their crystal structure and morphology. In further researches by scientists from different countries were established the adsorption capacity of zeolites to various molecules.

In the 70-80 years of last century, natural zeolites have been used extensively in various areas of the economy mainly as an adsorbent for the purification of gases from water, the separation of a mixture of gases, the wastewater treatment as filters for the afterpurification of drinking water, as well as catalysts. In further studies it was found that the zeolites have unique adsorption and ion exchange properties. So the study of adsorption activity compared with activated carbon for tricyclic antidepressants (amitriptyline), trichlorfon, digitoxin, sodium arsenate, mercuric chloride, phosphorus compounds, arsenic, heavy metals showed that the absorbing activity of the investigated zeolite does not concede, and in some cases exceeds 1,5-2 times the adsorbing activity of the activated charcoal. But perhaps the most interesting possibilities of zeolites, natural aluminosilicates have been discovered in the medical field.

What was the interest due to this side of the application of zeolites?

Some authors consider that the correction of the imbalance elemental composition of the human body by enriching the diet by one or another product containing the necessary mineral elements is erroneous [2].

Deficiency or excess of certain elements in the human body usually is the result of deficiency or excess of these elements that run through the food chain: from the soil – to the plants and animals – to a man. In the developing shortage of any element the food correction is not enough, even if for this purpose are used the products from other regions, soils of which are enriched with essential trace mineral. Only the individual selection of mineral and other products aimed at normalization of the microelement balance of the body will do a real and effective assistance in a pathological state.

In different corners of the globe in food are often used the clay-sedimentary rocks that have plasticity. Indigenous Siberians gladly ate delicacies prepared from kaolin and milk. Kaolin Clay is named after the Chinese province of Kaolin, which was first found and where the first local residents discovered its medicinal properties.

There are folk remedies from clay which, together with the addition of vinegar and the juice of plantain, horsetail decoction is used as an ointment in the treatment of completely open wounds and ulcers. Medicinal properties of this ointment are explained with the tonic effect of clay on the living cell, preventing the emergence of certain types of cancer [3]. The matter is that the micro and macro elements in natural minerals, clays and zeolites are the most accessible forms for the living organism of both man and animal, not in vain the animals with the full natural diet (moose, elk, deer, even bears, grouse, capercaillie) consume large enough quantities of zeolites for the restoration of mineral homeostasis and maintaining

it at a proper level of health. For example, elk, and deer do not come into the marriage games, unless they restore the composition of the internal environment of their organism, "eating" 10-20 kg of mineral rocks. Varnish for them is the flooded sour-cream rocks – cudurites, consisting of almost entirely of zeolites, montmorillonites, opalites, hydromica, chlorites and many others. Perhaps this is a manifestation of an instinct of conservation of genus, the condition for the emergence of a viable healthy offspring. Comparative analysis of rocks from the places of eating by animals and passed their digestive tract (washed from excrement), it was found that the animals consume the soil for mineral homeostasis of their body. Chemical elements entering into the body of animals with plant foods are inadequate for the normal functional activities, as supplemented by natural resins; the excess is removed from it by using the same ion exchanger.

It is with stone-eating by animals there began the study of biological properties of natural zeolites led by Academician of RANS V.I.Bgatov [4].

Zeolite is a crystalline aqueous aluminosilicate, containing as cations the elements of groups I and II of the periodic system, in particular sodium, calcium, potassium, magnesium, infinite aluminosilicate framework which is formed at the junction through the common vertices of tetrahedra AlO_4 and SiO_4. In the nature there are more than 30 types of zeolites, differing in crystal-structure and composition (5). Skeletal framework of zeolites is varied. Natural zeolites are divided into 7 groups, differed by a modification of the framework (Fig.1). There are needle types zeolites which are not authorized for using in medical and food practices. Only clinoptilolite which has an oval structure, was approved for using in food and medical practice. Zeolites of even one species, but from different fields may also have different properties. In Azerbaijan, large Aydag

clinoptilolite deposit is located in the Tovuz region, reserves of which are about 28 million tons.

In the structure of clinoptilolite there are three types of channels, forming a two-dimensional system.

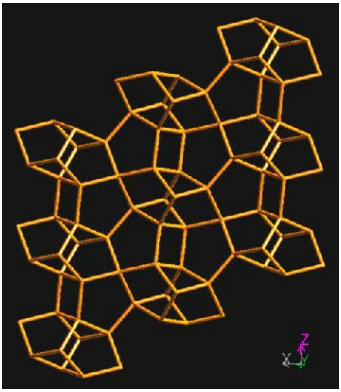

Fig. 1. *Crystal structure of zeolite-clinoptilolite*

Sizes of windows in the zeolite, formed by 5, 8 and 10-membered rings – 4,0-5,6 angstrom in 8-membered rings parallel to the horizontal axis; 4,4-7.2 angstroms, in the 10-membered rings and 4.1-4,7 angstrom – in 8-memberedrings 50^{o} to horizontal axis.

Cations are localized in three types of places – two on the walls of the channels and one at the intersection of 8-membered rings. Water molecules in the channels are coordinated with cations. Because of such sizes of pores, clinoptilolite exhibits sorption properties not only in relation to ions of macro-and micronutrients, but also to compounds with small sizes (methane, hydrogen sulfide, water, ammonia, carbon monoxide and dioxide, nitrogen oxides, etc.), not engaging in direct interaction with vitamins, amino acids, proteins and other complex organic compounds.

The presence of trace elements, unusual exchange properties, sorption properties of zeolites have resulted in demand in different fields of science, including medicine, and in completely different fields of medicine ranging from dietary supplements and ending with the means to treat diseases of various organs. Food interest in zeolites, clay or mineral sorbents is not so much fashion as call of the time. There are two main reasons: environmental pollution and changes in quality of food. Today, this balance is undergone a monstrous aggression. Changing of production technology and food processing brings to decreasing of the content of many essential elements and increasing of other dangerous heavy metals.

Many samples of supplements – Russian "Litovit", Croatian "Megamin", Azeri-German "Azeomed" were multilaterally studied and investigated on the safety on requirements for the pharmacological committee, studies to explore the mechanism of their action on the human body. Only on "Litovit" were successfully defended 15 Ph.D. and 3 doctoral dissertations. Elements, necessary for the body to build and functioning of cells and organs, are called biogenic elements. Content of 70 elements in the body is relatively constant. There was established biogenesis of 30 elements [6].

Table 1.

Chemical composition

Component	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	CaO	MgO	P_2O_5	K_2O+ Na_2O	As	Pb	Cu	F
Quantity	71,5	13,1	0,9	0,2	2,1	1,07	0,033	5,03	0,0015	0,002	0,02	0,025

Table 2.

Microelement composition mg/g

Compo-nent	Mn	Zn	Ga	Th	Rb	Y	Zr	Nb	Ba	Ce	Mn
Quan-tity	242	45	20	12	110	22	235	22	232	52	242

Biogenic elements, which exceed 0.01% of body mass are referred to the macroelements.

These 12 items classified 99% of all living tissues contain only six elements: C, N, O, N, P, Ca. The elements of K, Na, Mg, Fe, Cl, S refer to oligobiogenic elements. Their content ranges from 0.1 to 1%. Biogenic elements, total content of which amounts about 0,01% are referred to the trace elements. The content of each of them is 0,001% (10^{-3} – 10^{-6} %). Elements whose content is less than 10^{-5}% refer to ultramicroelements. In the organism of a man and animals there are: Ga, Ti, Al, As, Cr, Ni, Se, Ge, Sn, as well as the impurity elements (Te, Sc, In, W, Re, and others), but data about their number and biogenic role are not clear.

Lack of the following metals can cause various diseases:
Co-slowing down of growth of the skeleton;
Mg – muscle cramps;
Fe – anemia;
Zn– damaging of skin;
Cu – weakness;
Mn – sterility, the deterioration of growth;
Mo – slowing down of cell growth;
Co – pernicious anemia;
Ni – quickening of depression, dermatitis;
Cr – symptoms of diabetes.

Si – atherosclerosis, growth disorder of the skeleton, the weakness of the blood vessels;

F – caries;

I – disruption of the thyroid gland;

Se – muscle, cardiac weakness.

In the synthesis of proteins are involved Mg, Mn, Fe, Co, Cu, Ni, Cr;

in hematotis – Co, Ti, Cu, Mn, Ni, Zn;

in the breath – Mg, Fe, Cu, Zn, Mn, Co.

About a third part of enzymes (and there are about 2000) are activated, for example, transition metals. Positive metal ions are grouped around themselves with negatively charged parts of molecules (ligands).

In the composition of inorganic substances in the body there are more than 22 chemicals. So if a man's weight is 70 kg, then the share of Ca is – 1700 g, K – 250 g, Na – 70 g, Mg – 42 g, Fe – 5 g, Zn – 3 g, etc. The overall percentage of metals in the body is about 2,1 kg. Elements, whose content is no more than 10^{-3}, are parts of enzymes, vitamins, hormones and other important substances.

So for protein, carbohydrate and fat metabolism is required Fe, Co, Mn, Zn, Mo, V, B, W.

To date, the use of natural zeolite is defined as the optimal non-specific method for complex rehabilitation of mineral homeostasis. Objective data of researches show the effective regulation of intake and distribution of biometals with highly standardized natural zeolites, regardless of source status and egochemical conditions.

Natural zeolite can not, as crystal structure, directly interact with the myocardium and other organs and tissues, excluding the intestinal wall, since it is proved that the described structure is not able to penetrate into the internal environment of the body through the intestinal wall [7].

Zeolites, as enzymatic catalysts (biocatalysts) help to normalize the activity of enzymes depending on the needs of the organism, guiding and regulating metabolism in cells. Effect of selective ion exchange is stipulated by the interaction of active centers of transport proteins and loosely coupled zeolites of micro- and macro-elements in the cavity system. In this case is realized a seizure of mainly those biometals, due to a deficiency of which the body synthesizes the largest number of transport proteins.

The ability of metal ion to perform its role in the active center of the corresponding enzyme depends on the ability of metal ions to form complexes, the geometry and stability of the complex formed.

Biocomplexes differ in stability, and some of them are so strong that it is difficult to divide the metal and the ligands. Such enzymes are called prosteic

Replacement of metal in them leads to a complete loss of physiological activity. To these compounds refer the chlorophyll (Mg), polyphenil oxidase, vitamin B_{12} (Co), hemoglobin (Fe). In some cases, enzymes are activated by only one metal (the latter only accelerate the reaction and dissociate easily) and some enzymes can be activated by various metals. So carboxylase is activated – Co, Cu, Fe, Ca, Zn:

– Polypeptidase – Co, Zn;

– Lecithinase – Zn, Mg, Co, Zn, Mn;

– Arginase – Co, Mn, Ni, Fe.

More often these are elements with the same degree of valence.

In the composition of the zeolite there are more than 25 different elements, which were possible to determine by atomic absorption method. Hence it appears these amazing, sometimes unexpected properties of zeolites in the treatment of various diseases. Being safe and non-toxic, it eliminated from the body within 5-7 hours. With its unique properties of selective ion

exchange, zeolite supplies body with the missing macro-, micro-, ultramicro-, nano-, and picoelements [4], if they are not enough, and removes them from the body if they are in abundance, i.e. falling into the human body, trace elements of the zeolite will only work if there is lack of them in the body.

If in the body there is enough of this microelement, it will not leave the zeolite and never will be somewhere laid. Ion exchange properties of zeolite are good because of the fact that they regulate the balance of trace elements in the body. Zeolite promotes the normalization of all biochemical processes in the body, which can not properly take their course without macro-, microelements.

And in the cells there are hundreds and thousands of different biochemical reactions, which are essential not only for health but also for life of a living creature.

The main element the supplier of which is the zeolite is silicon.

Silicon is contained in zeolite as in the very structure of the zeolite, and as an admixture of quartz (crystalline silica) in the tuff.

Silicon is a key element in prolonging the life and performance of workability of practically all body systems [8]. Therapeutic effect of oxides of silicon and silicon-containing herbs and plants has been known long before our era in ancient India and China, then in the Arabian East. It is well known that the clay and talc promote healing of wounds, ulcers, and the potters, for example, don't have rheumatism.

Researches in this area belong to the beginning of last century, when it was shown that silicon compounds may perform protective and medicinal functions in the fight against tuberculosis and atherosclerosis.

In 1912 German doctor Kun determined that silicon compounds can prevent from the atherosclerosis. In 1957 French scientists M.Lepger and J.Lager described the facts

which are evidence of the fact that during atherosclerosis in patients there is usually very low content of silicon in the body, compared with the healthy ones. Stroke and heart attacks occur in those with silicon content of 1.2% versus 4.7%. Diabetes comes in many etiological factors, if the silicon is 1.4%, hepatitis C virus can grow, if the silicon content has dropped to 1.6%, and cancer in the content of 1.3%.

Violation of the silicon balance in children leads to a softening of their bones leading to anemia, hair loss, joint disease, tuberculosis, diabetes, erysipelas of the skin, the stones in the liver and kidneys – all this is against the background of dysbacteriosis too.

During life the human body loses silicon because of parasitic infestations, poor ecology (poisoning by aluminum, lead, cadmium and other metals), oxidation processes, leading to the formation of free radicals, poor nutrition, stress, etc. In 1978, the Nobel committee in Stockholm recognized silicon as an element of life.

Silicon, as a piezoelectric element, transforms one form of energy into another: mechanical one to electrical one, light one to heat one.

It is silicon which is the basis of energy-information exchange in space and on the Earth, for a man – a product of terrestrial and space-based elements – is unique. With lack of silicon in the human body the balance of energy is disturbed and metabolism too, as more than 70 chemical elements simply do not assimilate. The composition of liquid media is changed, their properties electrolytes do not meet requirements of normal existence of the biosystem "man", the diseases begin. According to spectral analysis, in daily products of the healthy human there are 4.7% silicon. According to scientists, in the body of a man the silicon is octuple involved in the processes of life support ($4.7 \times 8 = 37.6$), i.e. about 38% of our health is provided by silicon.

If the silicon content in the body is not made up, the life dies.

In such organism the silicon deficiency diseases are developed – atherosclerosis, stroke, heart attack, cardiosclerosis, arrhythmia, metabolic diseases, mental disorders, Alzheimer's disease, hypertension, atherosclerosis, osteoporosis, etc. Silicon is an element of life for any living organism and it manifests itself as a serious biotic (vital) factor in the livelihood.

It was also found out that silicon stimulates the biosynthesis of DNA too.

Silicon, due to its chemical properties, creates an electrically charged system.

They have the ability to "stick" to themselves a virus, pathogenic microorganisms non-symbasis with the human body, not peculiar to man. The selective "agglutinant" ability of colloidal systems of silicon is unique.

The viruses of influenza, hepatitis, arthritis, rheumatism, dysbacteriosis, candida, conidia, yeast and other microorganisms that cause pathological situations in the body, are sucked into colloidal silicon formations by force of electrostatic attraction both in the blood and in the bowels [9].

Silicon forms long, complex molecules and plays an important role in the construction of connective tissues of the body, bones, cartilages and blood vessels. Silicon is necessary for the formation of collagen, required for bone and connective tissues to maintain the health of nails, skin and hair, for absorption of calcium in the early stages of bone formation. Silicon is extremely important for biosynthesis of keratin, connective tissues and cartilage. It is also necessary to maintain the elasticity of arteries and plays a major role in the prevention of cardiovascular diseases. Silicon prevents the harmful effects of aluminum on the body and is of importance in the prevention of Alzheimer's disease and osteoporosis.

When machining the zeolite and silicon oxide SiO_2 (silica, quartz) there are various structural defects such as steps, ledges and corners, practically absent in single crystals. The number of structural defects can be very large in the polycrystalline powder. These centers increase the reactivity of the surface of quartz, zeolite because of high coordination unsaturation of ions. So, on the surface of quartz it is connected with strong deformation of covalent bonds. Thermal and mechanical treatment brings to appearing on the surface of crystals the reactive hydroxylated amorphous layer. Difference in geometry and chemical status of surface OH groups, forming on the surface of quartz in mechanical destruction of the surface can be one of main factors determining their high biological activity [10]. Silica with hydroxylated surface specifically adsorbs various molecules [11].

Calcium (Ca) is the antagonist of silicon. With a lack of silicon Ca^{2+} replaces it, the walls of blood vessels become fragile, and between the surface roughnesses the parasites-trichomonads are placed. During migration the bloodstream becomes hydrotransport on relocation of seedlings the parasites throughout the body. The larvae of parasites do not tolerate sharp condiments (horseradish, mustard and garlic), aromatic substances, valerian. When one takes it, the larvae migrate trying to penetrate the walls of blood vessels. As a result, there are holes that bleed; there can be a stroke, heart attack and lumbago.

The above-mentioned properties of zeolites were a prerequisite for their use in various fields of medicine. On the basis of natural zeolite clinoptilolite in various European countries-Germany, Austria, Britain, Switzerland, Italy, the USA there were made BAS-s (Panaceo, Meganutrin, Seolife, Nanoproim, Nanosilisio, Formula 3, etc.). Litovit with various herbal additives is very popular in Russia [12]. Thus, Russia's BAS "Litovit" is marked with the highest award of the Second International Exhibition "Ecologically safe products" (certifi-

cate № 17, 7 June 1999 Moscow), and production association "Nov", producing such products was included into the Register of manufacturers of natural and safe products (with the number 55, dated 7 June 1999, Moscow). Supplements to the food of "Litovit" series in 1997, is the only Russian dietary supplement, in which trademark is allowed to use the logo of Russian Red Cross. In the product of "Litovit" series there are minerals and herbal supplements to correct health in various states. A drug “Seosorb” based on zeolites of Siberian fields, developed in Scientific Research Institute of Biochemistry SB RAMS, and can be used as radioprotector, immunostimulants, means for removal of radionuclides from the organism, and treatment of allergic diseases, reduction of toxicity in the body in renal and hepatic failure [4].

There were carried out pre-clinical trials and was received the permission of Farmcommittee of RF to carry out the clinical trials.

It should be noted that the effect of "dietary supplement" to the food, including those based on natural clinoptilolite is aimed at restoring the "health capital", which makes it possible to pay for overcoming the ailments.

"Megamin" was made in Slovakia. It is consisted of tribomechanically treated natural clinoptilolite and dolomite. First researches on the project "TMAZ" were held in 1997 in Zagreb. First scientific conclusions were made on basis of a clinical study of more than 200 cases of unusual effect of TMAZ in cancer patients [13, 14]. Below are mentioned the medical reports and results of physical-chemical studies of "Megamin".

Results of some studies can be sorted into the following groups.

1. Research of toxicity of TMAZ. The received results allowed to recommend TMAZ for use in medicine.

2. Influence of TMAZ on microbiological activity (ongoing in several countries of Europe and the CIS). Was also determined a stabilization of the autochthonous intestinal bacteria in the presence of TMAZ and inhibition of development of pathogenic and parasitic bacteria. Was also determined TMAZ antiviral effect on human adenovirus 5, herpes simplex virus of type 1 (HSV_1), human enteroviruses (Coxsackie virus B_5 and ehovirus$_7$). The authors suppose that the antiviral effects of TMAZ occur, obviously, non-specifically and more likely, are based on the adsorption of viruses on the external surface and pores of the zeolite, than the ion-exchange properties [15].

3. Investigation of physical-chemical properties of TMAZ (investigations have been completed).

Physical-chemical researches were carried out at faculty of the Department of Biochemistry and Pharmacology of the University of Zagreb and was found, that TMAZ

– adsorbs different proteins;

– prevents the growth of cancer cells in vitro in vivo.

– interferes with DNA synthesis in fibrosarcoma cells;

– induces apoptosis (programmed cell death) of all tumor cells;

– adsorbs cations of carbon in arid environments. This blockade enhances the resistance of tumors in the body;

– interferes with the absorption of free radicals, as they react to the microparticles of TMAZ significantly faster than the other receptors;

– improves the transport of bioactive molecules (such as silybin, ascorbate).

Unusual effect of TMAZ and first scientific conclusions were made on basis of clinical study of more than 200 cases of cancer patients on the project of TMAZ back in 1997 in Zagreb.

In the recently published material [16] are shown the results on use of zeolites in treatment of cancer patients in the last 4^{th} stage in the biochemical laboratory in Ohio. 78% of 68

patients were completely recovered. Although the authors do not make overarching conclusions, nevertheless the results are impressionable. Anti-cancer effect, as the authors suppose, is probably connected with the ability of zeolite to enhance the gene p21, which does not only stop the growth of cancerous cells, but in fact destroys the tumor.

It should be noted that the impact of natural aluminosilicates (clay, zeolite, silica) on oncological diseases have been observed repeatedly at different time. So during researching of adsorption of cells of ovarian tumors on amino-organo-montmorillonite, it was established that amino-organo-montmorillonite adsorbs a significant number of cells ($1.3389991.\ 10^{10}$) (17). The number of adsorbed cells was determined by derived-graphical analysis.

The specific activity of Transcarpathian clinoptilolite has been investigated in the study of anti-ulcer activity. Researches were carried out on white rats weighing 180-200 g. During 12 hours the animals were kept without food with free access to water. Canker of the stomach caused a one-time intragastric administration of prednisolone 20 mg/kg, pre-dissolved in ethyl alcohol 80%, the rate of 0.8 ml per 100 g of weight. As a comparison drug there was used a high-performance ulcer medicine "Cimetidine". Zeolite with the dosage of 200 and 500 mg/kg and the comparison drug were injected 1 hour before simulation of ulcerative lesions of the stomach. 24 hours later all animals were pickled and was calculated the area of ulcers in points (S_u) the percentage of animals with ulcers (A_u) and ulcerative index (UI).

As it seen on the table, under the influence of zeolite, the ulcer index values are decreasing in 4-4,5 times compared with the control, and zeolite in 1,5 times exceeds the antiulcer activity of "Cimetidine" [18].

Table 3.

Conditions of the experiment	Dosage mg/kg	Condition		
		S_u ,$S_x \pm S_u$	A_u	UI
Control	–	32.33 ± 2.03	100	32.33
Zeolite	200	11.57 ± 4.11	50	6.92
Zeolite	500	13.83 ± 8.59	71	8.26
“Cimetidine”	200	13.70 ± 5.10	78	10.6

In the work [19] was studied the mechanism of development of experimental gastric ulcers of test rabbits, as well as therapeutic efficiency and zeolite-containing tripoli (rock) on models of acute and chronic ulcers. It is supposed that the zeolite, causing enterosorption of toxicants and detoxicating the organism has anti-ulcerogenic action.

For prophylaxis and therapy of psoriasis and neurodermatitis in the work [20] was suggested a means containing natural zeolites clinoptilolite and natrolite with the size of particles of less than 5 microns, as well as calcium salt and / or magnesium (dolomite, sulphates, and / or chlorides).

Anti-mycotic property of zeolite was used in the antifungal means for legs [21]. In the proposed invention and as zeolite is used sivirtuine, composed of clinoptilolite, montmorillonite with minor amounts of quartz, feldspar, biotite, and clay materials. Anti-mycotic activity of clinoptilolite, confirmed by many studies, is increased by adding to it various active additives as antifungal agent.

Biostimulating composite, containing zeolite and the biologically active material – wheat bran – normalizes the level of minerals in the body, has a high therapeutic effect in purification of the gastric tract, arteriosclerosis, urological diseases and has immuno-mobilizing property. The composite in the form of tablets has montmorillonite 0,5, Japanese kelp 0-4 and water 0,05.

The intake of 2.3 tablets per day for 45 days reduces the cholesterol level for 9-13%, the total weight for 10-15%, constipation for 84% and fatigue for 92% [20].

For rapid removal of toxic substances and for preventing the lesions of mucous membrane of stomach and intestines, there are suggested preparations that contain in its structure as active ingredients the calculated numbers of synthetic and natural zeolite or siliceous clay, crushed on sieve 500-1000 sacks. After taking 5 g of the drug the effect will come 15-20 min later [22].

In the complex of antiparasitic drugs, along with fenbendazol there are used sulfadimine, sublimed sulfur and zeolite. The preparation provides 100% therapeutic efficacy in mixed invasions [23].

Analysis of the used materials indicates the necessity of substantiated addition of methods for correction of mineral homeostasis, as the leading etiopathogenetic factor in the modern structure of health disorders by natural minerals, along with organic compounds (amino acids, vitamins, polyunsaturated fatty acids, etc.) as non-pharmacological methods of prevention and rehabilitation of health.

In Azerbaijan, on the basis of natural clinoptilolite of Aydag field with German scientists (Germany) was performed the mineral complex "AZEOMED" which includes zeolite-containing (clinoptilolite-containing) activated rocks and additionally purified dolomite [24].

Pre-activation of the rock is carried out with triple decanting and drying for 2 hours at 200°C. Our challenge is to understand the basic mechanisms of action and to find ways of their correct and effective use. Medical and biological properties of native mineral complex "AZEOMED" were studied and are being studied in scientific laboratories and patient care institutions of Azerbaijan. Antitoxic, immunomodulatory, radioprotective properties of zeolites has led many researchers,

as it is shown in [12, 14, 25, 26] to study its potential in anti-cancer therapy, observed in naturally occurring antioxidants. The matter is that a part of the deaths in cancer patients is not caused by the fact that the tumor disturbs functioning of some organ, but by poisoning the body by decay products of the tumor after radiation or chemotherapy, when the liver and kidneys are unable to cope with their work. Taking into account the above-mentioned, to study experimentally the mechanism of cleansing the body from decay products in the neoplastic transformation of tissues was of interest [27]. From a scientific point of view it was of interest to examine the influence of nature of exchange cations of the zeolite on the adsorption of malignant cells. For this purpose, were explored the capabilities of both tablets "AZEOMED" and natural clinoptilolite, modified with various cations.

There were prepared the samples, modified by cations of silver, zinc, copper, ammonium, which have, as it is known, the bactericidal and physiologically active properties, as well as samples treated with Naphtalan oil, in which were found the physiologically active micro-elements (copper, molybdenum, zinc, manganese, lithium, rubidium, cobalt, boron, iodine), and with thiourea. Method of sample preparation is described in [28].

It is noted that zeolites also show anti-mycotic activity, due to binding of fungal filaments with alumino-silicate framework. Zeolites promote the treatment of dysbacteriosis better than other means (Laktabakterin, Bifidumbacterin). There was revealed the local effect of zeolites, which have a local anti-toxic, anti-inflammatory, sorbing, regenerative effects, manifested in dermatitis, furunculosis, lichen of various kinds, burns, frostbite, sores, long time non-healing wounds, ulcers, wounds, acnes, erysipelas, eczemas, herpes infection, phlegmons [29].

Such activity of zeolites as described above is explained by both the effect of cations with complexing properties, and the influence of silicon. Due to its chemical properties, silicon creates the electrically charged system, which can "stick" on itself the viruses, pathogen microorganisms which are not symbiotic with the human body. [30]

Thus, the main factors, due to which the zeolites can be added to natural minerals with curative properties, are:

1. Ion-exchange properties of zeolites, promoting the normalization of salt metabolism and the content of cations in the human body.

2. Presence of ions of transition elements with redox properties and which are able to form complexes, where the toxins extracted by various bacteria and microorganisms can be as ligands.

3. The presence of silicon, which, as it was mentioned above, not only provides the body with this element, but is involved in the metabolism of about 70 elements, the assimilation of which is impossible without the silicon and promotes the leakage of the majority of biochemical reactions.

4. Creation of a weakly alkaline medium-destructive for many bacteria and pathogen microorganisms.

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RESULTS OF PSYCHO-PHYSIOLOGICAL AND NEUROPHYSIOLOGICAL STUDIES OF THE EFFICIENCY OF MINERAL COMPOSITION "AZEOMED"

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To study the influence of mineral mineral complex "AZEOMED", which includes the natural zeolite and dolomite on the functional state of the brain and the characteristics of emotional-affective sphere and the state of higher mental functions, were carried out the physiological studies including a comprehensive analysis of electro-biological activity of brain, and a variety of psychological testing.

The study involved 34 volunteers, divided into 2 groups:

1. The group, taking the tablets.
2. The group is a control one, not taking the tablets.

To exclude the influence of sex factor, into the research was drawn an equal number of men and women. Those of group 1, taking the tablets, were, in turn, divided into 2 subgroups:

1. Subgroup took 1 tablet 2 times.
2. Subgroup – 2 tablets 2 times.

The examinations were conducted before taking, after 4 weeks of regularly taking the tablets and after 6 weeks of taking.

Psychological testing.

Almost in all tested people were identified high personal anxiety caused by genetic and social conditions of life and low or moderate level of reactive anxiety, reflecting the anxiety at this time.

At the same time taking of "AZEOMED" changed the depressive background of a person.

In 3 persons with pronounced depressive background while taking the tablets the depression completely disappeared. In others on the scale of depression, the rates were reducing, reflecting the improvement in the background of depressive direction.

The positive effect did not depend on the number of tablets per day (1 tab 2 times, or 2 tabs 2 times), but depended on the duration of the intake (Table № 1, 2).

Polygraph registration of EEG and ECG.

Of the 45 examined people, EEG changes were noted in 40 ones. And, in most of them there were identified the various functional changes. In 7 examined people, there were slight organic disorders with local paroxysmal changes and elements of reducing the threshold of convulsive readiness of the brain. Intake of tablets in 35 examined people caused an improvement in the EEG pattern, evidenced by the leveling of the functional changes, in the normalization of functioning of different areas of the cerebral hemispheres and the improvement of the rostral – caudal index. At the same time it should be noted that the paroxysmal disorders, with the exception of one examined man, were removed, and the structure of the EEG throughout the organization was close to the healthy ones.

In one examined man while taking tablets was noted deterioration of the EEG pattern and the appearance of paroxys-

mal phenomena, probably connected with some negative endo- and extreme factors.

Improvement of the EEG pattern did not depend on the number of tablets a day, and depended on the duration of their intake.

In the control group (15 people) in all of them have been identified the functional disturbances in brain activity. Improving of the structure and the normalization of the EEG pattern were observed after 6 weeks only in one of them. For others these changes were quite persistent.

In the analysis of ECG other changes (tachycardia, bradycardia of different degrees, changes of amplitude and shapes of individual components of the wave, etc.) have been identified in almost all examined people. Against the background of taking tablets in 90% of cases and more was a noticeable improvement in pattern and normalization of ECG. Also the positive effect was correlated not with the dose of supplement, but the duration of intake (Table № 3, 4).

Conclusions:

1. Mineral complex “AZEOMED” has unique properties which positively effect on the activity of functional systems of the human body.

2. Intake of mineral complex “AZEOMED” improves the functional status of the cerebral cortex, normalizes the balance of activating and inhibitory mechanisms of nonspecific systems, restores an appropriate level of cortico-subcortical psycho – somatic relationships and improves the adaptive capacities of the organism.

3. By means of tablets “AZEOMED” the depressive

background is improved, and in the presence of depression its level is reduced.

4. In the process of taking the tablets, the cardiac activity is improved, the rhythm is formalized, and performance of the heart is improved.

The positive effect does not so much depend on the daily dose of reception, as depends on the duration of intake. Recommended dosage: 1 tab 2 times a day no less than 4-6 weeks.

THE RELEVANCE OF AZEOMED IN MEDICINE

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Zeolites are natural microporous silicon crystals. There are about 200 zeolite species in nature.

Natural zeolites are a product of volcanic activity when stones, ash and aqueous solutions of salts are fused and crystallized.

Zeolites are natural microporous silicon crystals with a property to absorb and retain firmly within its structure.

Zeolite's uniqueness is that it selectively absorbs harmful substances without directly interacting with vitamins and amino acids.

Thus, unlike many sorbents with the classic usage time not exceeding 2 weeks, zeolites can be used for a long time because they do not absorb nutrients (vitamins, amino acids, fatty acids) from the human body. Zeolite just cannot absorb them because of the small size of its pores.

AZEOMED is capable of selective exchange of particles; while taking away harmful substances, AZEOMED simultaneously supplies the body with missing micro- and macroelements.

This mineral is completely harmless for human use as demonstrated by chemical analysis and toxicological studies verified by scientists around the world.

The main difficulty in application of zeolites in medical practice was the technological processing of natural zeolites. Although the first zeolite studies were conducted early in the past century (1913), no one in the world until 1966 could secure their purification and enrichment for utilization in food industry and medical practice. Of course, they had been long applied in agriculture and water purification but non-

standardized, unenriched zeolites are dangerous to use in medicine. In the United States and other countries they even learned how to synthesize zeolite. But it turned out to have completely different properties because unlike the natural one, it lacks selective ion exchange and the characteristic structure.

Natural zeolite is not absorbed in the gastrointestinal tract neither does it enter blood but rather passes through, interacting only at the selective exchange and sorption level while in contact with blood vessels and lymphatic vessels of the intestinal wall, giving or taking away micro- and macroelements and catalyzing biochemical reactions.

The Institute of Clinical Pharmacology of the Russian Academy of Sciences, Moscow Department polyclinic #4 and other medical institutions have carried out clinical tests on zeolites within the complex treatment of cirrhosis, hepatitis and hypercholesteremia. The medics compared a zeolite-based preparation with “Smecta”, its closest analogue, in treatment of acute intestinal infections and intoxications. Using zeolite can reduce the length of hospital stay while its cost-effectiveness as compared to “Smecta” within the northern autonomy only produces 100 million ruble economic effect annually.

The preparations developed on the basis of this wonderful mineral have anti-stress, immunomodulatory, radioprotective properties as well as a pronounced effect at diabetes mellitus, viral hepatitis, cancer intoxication, intestinal infections, and skin lesions. It also improves regenerative function.

The studies have shown that taking the “AZEOMED” preparation leads to patients’ recovery and tolerance to chemotherapy and radiation therapy without side effects at all or with less severe side effects.

The "AZEOMED" powder for local application on skin surface has a pronounced healing effect with the majority of patients suffering from slow-healing injuries, mycotic lesions of feet, moist gangrene, herpes, and facial skin problems.

The latest clinical trial prior to writing of this article was conducted on a patient with the following diagnosis: diabetes mellitus, insulin-dependent, moist gangrene of the left foot, the condition after amputation of the right lower limb. The patient was given "AZEOMED" in a dose of 4 to 8 tablets per day. The gangrenous foot was sprinkled with "AZEOMED" powder 2-3 times a day. As a result of the therapy, moist gangrene passed into dry one, there were neither symptoms of intoxication nor a characteristic smell in the patent's room. This was of great importance for the patient as he rejected limb amputation.

We have an extensive clinical experience of using "AZEOMED" bio-additive among both patients and healthy population.

Healthy people who were taking "AZEOMED" indicated improvement of their general condition, burst of energy, and normalized sleep. Many of them also mentioned improvement of the nail condition and reduction of hair loss. Some had the condition of their facial skin improved, especially if the pills were taken while applying the powder on the problematic facial skin. They also indicated the increased resistance to colds.

From September 2008 to September 2010 I was conducting observations over patients with various nosologies.

In view of the fact that I work in septic surgery and we have cancer beds, the main research was done on this group of patients.

Some good results were obtained in patients with ulcerative colitis complicated by diarrhea.

1. Imanova Lamiya, 38. Diagnosis: enterocolitis, diarrhea.

Conventional therapy did not yield the desired effect. Within 5 days after prescribing "AZEOMED" diarrhea symptoms were gone. To fix the effect, she took "AZEOMED" for a month: 4 pills a day for 15 days followed by 2 pills a day.

2. Kerimova Irada, 42. Diagnosis: Chronic ulcerative colitis, irritable bowel syndrome, swelling of the splenic angle.

The patient had a severe diarrhea and was being prepared for surgery. Prior to the operation, she had been prescribed “AZEOMED” in a dose of 8 pills per day along with conventional therapy; diarrhea symptoms were gone, the patient received postoperative chemotherapy. In addition to chemotherapy, she was given a dose of 4 to 10 “AZEOMED” pills a day.

Currently, the patient is preparing for the second phase of the operation, taking "AZEOMED in a dose of 2 pills a day.

3. Ragimova Valida, 75. Diagnosis: Rectal cancer. Intoxication.

The patient was prescribed "AZEOMED” in a dose of 10 pills a day during the preparatory period for the operation. Symptoms of intoxication decreased. The operation was successful. The patient refused chemotherapy. Postoperatively, the patient was prescribed 8 pills a day. 3 years have passed since the surgery, the patient is feeling well and periodically takes “AZEOMED” in a dose of 4 pills a day.

4. Huseynov Vahid, 35. Diagnosis: Post-injection gluteal abscess. Sepsis.

Following the incision of the abscess, the wound was washed with "AZEOMED" powder. In addition to conventional therapy, he was given "AZEOMED": 12 pills a day for the first 3 days followed by a gradually reduced dose. The wound was cleared within 5 days as compared with the conventional treatment.

5. Tahirov Rufat, 50. Diagnosis: Erysipelatous inflammation of the left lower limb, phlegmonous form.

Body temperature 38.5 on arrival.

Along with taking antibiotics (Ceftriaxone 2 g daily), he was taking “AZEOMED” in a dose of 8 pills a day.

He had his leg sprinkled with "AZEOMED" powder. The patient's recovery time was cut in half.

The second group of patients with different types of allergies

1. Aliev Rovshan, 18. Diagnosis: allergic dermatitis caused by long-term use of antibiotics.

He was treated with sodium thiosulfate, claritin, polyphypam, with a little improvement. Polyphypam was canceled and replaced with "AZEOMED".

1 pill every hour on the first day, 6 pills a day on the second day. Allergy symptoms began to fade away on the second day. Subsequently he was given 4 pills a day until complete recovery.

2. Madatova Valida, 51. Diagnosis: Bronchial asthma. Allergy to house dust and pollen.

Has been suffering from bronchial asthma for about 25 years.

Increased frequency of bouts up to 18-20 attacks a day upon arrival in Baku. She uses "Servent" preparation to stop the bouts. When she started taking "AZEOMED", the number of attacks dropped to 5-6 times a day.

Good result has been obtained in treatment of patients with toxic infections. In such cases, patients were prescribed a one-time dose of 15 "AZEOMED" pills after gastric lavage.

The third group is cancer patients receiving chemotherapy and radiation therapy.

1. Aliyeva Tarana, 48. Diagnosis: post-mastectomy state.

She underwent 3 courses of chemotherapy, felt bad after the second course, had nausea, vomiting, weakness. Started taking 4 "AZEOMED" pills a day, then on her own initiative increased the dosage to 15 pills a day. The third course of chemotherapy went without complications.

2. Hasanov Eldar, 67. Diagnosis: Stomach cancer, third stage.

Refused to be operated upon. Underwent a course of radiotherapy. Felt weakness, lethargy, loss of appetite, fatigue.

He was given 1 pill of "AZEOMED" every 40-45 minutes per day with subsequent dose reduction.

Got up an appetite a week later, started taking walks. He died 10 months later from the metastases.

A unique case in my practice: patient **Fatullayeva Kenul Zahir gizi, 28**, case history 1851

Diagnosis: condition after postpartum rupture of the rectal sphincter, sphincter insufficiency of the 2-3 degrees.

On the 3rd day after the plastic surgery on the rectum, the patient got diarrhea threatening the freshly performed difficult operation. The patient was prescribed a relevant treatment; however, the stool failed to normalize. I prescribed "AZEOMED" by 1 pill - times a day; literally on the second day the stool became normal and we managed to avoid a re-operation.

3. Isaeva Indira, 28. Diagnosis: Fibroadenoma of the right mammary gland.

She took "AZEOMED" by 2 pills 3 times a day for 3 months. The tumor size decreased by 7 mm. After a break, she has recently begun the 2nd course of taking “AZEOMED”.

Good results were obtained in patients with anemia. Following literally a week of taking "AZEOMED", hemoglobin returned to normal. There are results of laboratory analyses available.

It should be noted that all patients I have observed had positive dynamics while taking "AZEOMED" preparation. This preparation caused no complications when taken for a long time and in large doses. Only a few patients had constipation.

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ADSORPTIVE PROPERTIES OF NATURAL ZEOLITES CONCERNING CELL POPULATION INFECTED BY CYTOMEGALOVIRUS

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Studying viral infections which account for more than 80% of human infectious pathology is one of the topical issues of medicine.

Human cytomegaly virus (HCV, Cytomegalovirus hominis) was first singled out in 1956 in children who died from a generalized infection.

Cytomegaly is an opportunistic infection. The virus can exist in the human body for a long time, neither revealing itself at all nor causing any pathologic symptoms. It can be found in healthy children's tonsillar tissue, urine and salivary glands. It is only when the balance between the human body and the virus is disturbed as a result of weakened defense factors that the virus begins to multiply intensively and can lead to lesions of various organs (1).

Although the majority of women of reproductive age are infected with the cytomegalovirus (2,3), the infection is mostly latent. However, the cytomegalovirus can be reactivated during pregnancy. The reactivation course may be symptomless, but in pregnant women the virus can be transmitted vertically with subsequent miscarriage, premature birth, maldevelopment, and fetal death caused by congenital defects (4,5).

Special attention should be paid to women of reproductive age with compromised obstetric history (spontaneous miscarriage, stillbirth, congenital diseases etc.) (1).

The problem of detecting the active cytomegalovirus infection (ACVI) in women belonging to this category as well as reducing or even eliminating ACVI activity prior to planned pregnancy is considered a topical issue.

From this point of view, it is possible to use natural absorbents as a sorbent of an infected person's contaminated cells.

Materials and methods

Natural zeolites are a new sort of mineral raw materials. The wide range of use of high-silicon zeolites is conditioned by their unique adsorptive and ion exchange properties, chemical and mechanical stability, high acid and radiation resistance.

It has been established that utilizing zeolites as medioprophylactic food additives yields a number of positive clinical effects.

Considering the above-stated, it was of interest to investigate experimentally the possibility of relieving the body of desquamated virus-containing cell population and possibly of cytomegalic viruses circulating in blood and lymph and found in urine, saliva, breast milk etc.

For that purpose, some research was done on the absorption potential of natural zeolites; the tested silica-containing raw material consisted of zeolite-clinoptilolite with additional introduction of dolomite with the following ratio of the components, mass %: clinoptilolite 70-80, dolomite 20-30; the enterosorbent was made in the form of a pill with copper in the amount equal to or less then 10% of the total mass, introduced for binding purposes.

In our studies on the adsorption potential of the above-mentioned sorbent, we applied conventional virologic methods of research along with identifying non-toxic doses of preparations (6).

On the basis of the previously identified non-toxic dose of the preparation (zeolite) on RD tissue culture (cell line obtained from human rhabdomyosarcoma), a zeolite dose of 500 mg (0,0005 mg/ml – 5^{th} non-toxic dose MND) was used during the experiment.

The experiment involved examination of pregnant women who underwent a preventive check-up. Two methods were employed to detect the presence of the infection in pregnant women:

1. The enzyme immunoassay (EIA) method using "Cytomegalovirus JgG-Elisa" test system (7) (Enzyme immunoassay for the qualitative determination of the JgG-class antibodies against the Cytomegalovirus (CMV) in human serum). Only for in vitro diagnostic use. Product number CMVGO115 (48 Determination).

2. The cytological method of detecting CMV among desquamated cells in urine sediment (owl's eye test) (8).

Essence of the experiment:

Cell suspension from urine sediment was centrifuged at 2500 rpm for 30 min, then the supernatant fluid (urine) was exfoliated and poured off. The cells remaining in the residue were dissolved in the "Igla MEM" growth medium with double quantity of amino acids and vitamins. The cells were counted in a Goryaev chamber (9). On calculating the number of cells in the obtained suspension, those cells were layered in the amount of 1 ml over the tested sorbent.

Following a 30-minute contact, the cells were counted in the eluate, thus identifying the adsorption potential of the tested zeolite specimen.

At the same time, the pregnant women were examined for being infected with CIV using the immune-enzyme method "Elisa".

The data obtained by conducting EIA and "owl's eye" test together with the calculation of infected cells before and after urine adsorption on the tested zeolite were analyzed in a comparative aspect (Table 1).

Table 1.

The result of adsorption of cell suspension from urinary sediment of pregnant women infected with CIV, on natural zeolite as compared with EIA and "owl's eye" test indications

No	Number of cells in urine sediment, per ml			EIA indexes and "Owl's eye" markers		
	Before adsorption on zeolite	After adsorp-tion in eluate	Desorp-tion in-dexes	Diagnosis	EIA index	"Owl's eye" marker
1.	7375000	30	2	CMV Jg G	36,8	+
2.	6250000	20	2	CMV Jg G	40,0	+
3.	5900302	20	3	CMV Jg G	32,9	+
4.	3500450	10	2	CMV Jg G	15,5	+
5.	3903330	10	1	CMV Jg G	5,6	-

Of interest is a question of possible cell desorption from the surface of the tested zeolite specimen after adsorption.

For that purpose, a desorbent – saline solution in the amount of 1 ml was added to the zeolite with the cells settled on it; after a two-hour contact, the researchers counted the number of cells in the eluate, which were desorbed from the surface of the tested zeolite following the desorbent's action.

As a result, high adsorption capacity of the tested sorbent's specimen, that is, 100% cell adsorption has been re-

vealed; the absence of cell desorption from zeolite is a positive factor.

The revealed adsorption potential of the examined zeolite specimen is a good recommendation for the mineral to be taken as a food additive to remove infected cells from the body.

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USE OF THE DRUG "AZEOMED" IN COMPLEX TREATMENT OF PULMONARY TUBERCULOSIS

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We conducted a clinical study on the drug, based on natural zeolite «AZEOMED» in the treatment of destructive forms of pulmonary tuberculosis in patients who were hospitalized in the Institute of pulmonary diseases. For this purpose, were taken two groups of patients with newly diagnosed pulmonary tuberculosis in the phase of destruction, have not received prior TB treatment. The core group included 20 male and female patients receiving the drug «AZEOMED» in a dose of 500 mg. 3 times a day on a background of standard antituberculosis chemotherapy with five drugs (“isoniazid”, “rifampicin”, “pyrazinamide”, “ethambutol”, “streptomycin”).The control group consisted of 17 male and female patients with similar forms of tuberculosis, receiving only standard antituberculous chemotherapy without the use of zeolite. Among patients with prevalent patients with infiltrative and disseminated tuberculosis.

Dynamic observation based on data from clinical and radiological picture, sputum smear microscopy, and immunologic parameters of peripheral blood. Thus, data microscopy showed that abatsilirous in the main group in two months occurred in 16 (80%) patients, whereas in the control group abatsilirous was only 10 (58,8%) patients. In the course of treatment after 2 months in patients of groups according to radiographic closure of cavities was observed in 3 (15%) patients, a significant decrease in infiltrative changes and cavities in 16 (80%) and only 1 (5%) patients lacked dynamics. A control group of patients with X-ray pattern showed that the clo-

sure of cavities at the end of the second month of antibiotic therapy occurred in only 1 (5,9%), and infiltrative changes and reduction in cavities in 13 (76,5%) patients, whereas no response was observed in 3 (17,%) patients.

The immune status of patients and control group before treatment did not differ. In patients receiving the drug «AZEOMED», noted positive changes in immunological parameters. Thus, the level of T lymphocytes returned to normal in 9 (45%) patients, all patients had increased percentages of subpopulations of B-lymphocytes, T-helper. Before treatment immunnoregulatory index in 9 (45%) patients of the group was below 1.6, and 7 (35%) was higher than that. The treatment with study drug in 5 patients (25%) and 10 (50%) patients immunnoregulatory index was below and above 1.6. There were also changes in humoral immunity: in 19 (95%) patients there was normalization of the IGA, and in 13 (65%) IGG level was below normal (800-1800 mg/dL). Also, change the value of the CEC: 16 (80%) patients with CEC index was below normal (40-50 o/c), and 4 (20%) patients, the rate returned to normal. In the control group was observed slow dynamics of immunological indices of blood in comparison with the main group.

Thus, the results of the use of natural zeolite «AZEOMED» allow speaking about the effectiveness of this drug in the treatment of newly diagnosed patients with destructive forms of pulmonary tuberculosis.

THE WOUND HEALING MEDICAL-COSMETOLOGY MEAN AT THE BASIS OF NATURAL ZEOLITE AND LICORICE

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All of the cosmetology means are classified by two commodity groups:

1. production for mass demands which coverage in all markets;

2. curative cosmetology is being used for prophylactic and treatment purposes which is realizable through pharmacological network.

In curative cosmetology practice are often used high-performance biologically active substances of nature origin in order to rendering wonderful pharmacological effect.

That is why; the high demands of elaboration, creation and production of curative and prophylactic cosmetology means are present.

The first of all, it is necessary to classify the curative cosmetology refer to functions, actions, sexual signs, skin type, aesthetic correction, and so on.

Then, it is necessary to pay attention for structure of curative cosmetology mean taking into account pharmaceutical technology properties of basic substances.

In case of elaboration of that group the safety of curative cosmetology means is important and to pay attention for grade of auxiliary substances is vital.

Having been summarized above mentioned, should be stressed the creation of curative cosmetology means are based on careful scientific study of curative form and included basic and auxiliary ingredients in that presented composition.

Refer to said above, the purpose of elaboration of anti-inflammatory cosmetology mean on the basis of zeolite, licorice with inclusion of auxiliary substances of an amber acid and chitosan was accepted.

MATERIAL AND INVESTIGATION METHODS:

As a basis for active ingredients: zeolite, glycyrizinic acid were taken, as for auxiliary ingredients: chitosan, an amber acid and forming, stabilized components: propilenglycol, USP TVIN-80, dimetylsulfoksid (dimexid), nipagin.

Zeolites – are natural minerals, allumosilicates by volcanic rocks origin with constructional structure, they have all chemical elements and interstice banded occupation by ions, the ions are mobile, that is why zeolites have unique property of ion exchange and are able to exchange from different cations.

The dice of stilbite – the one of kinds of natural scare away during heating. That mineral was called by zeolite from Greek language the “Boiled stone”.

Zeolites possess by a lot of properties: adsorptive, ion-exchange, molecular-screen, catalytic which can be used these cutaneous clean ability property from pollution. There are 106 kinds of zeolites divided into 3 groups, but zeolite of audeic origin taken by us for investigation.

Glycyrrizinic acid – is triterpen saponin extracted from medicinal plant Licorice seu Glycyrrhiza Glabra. Molecular formula 822,94 g/mol has very sweet test, the temperature of melting – 220°C , good solved in water and ethanol.

Above mentioned components have anti-inflammatory, anti-allergic, antiviral, antibacterial, wound-healing properties.

Auxiliary components: Chitosan is a natural polysaccharide obtained from shell of sea produce. Polymer which has in structure D-glucosamine, and N-acetyl-d-glucosamine. During acetelizing resulted by 80-90% of chitosan. It can be solved in vinegar, citric, oxalic, amber acids.

The changing of structure can be observed in temperature 170°C, destroying – 230°C that is good gel creator.

The **amber acid** – Ethan 1, 2 dicarbonic acid ($HOOC–CH_2–CH_2–COOH$). Colorless crystals, molecular formula 118,09 g/mol. good solved in water and organic solvents, melting – 185°C.

The above mentioned components have antioxidant properties, widely used as regenerative wound-healing substances.

As a surface active substances were used propilenglycol USP, TVIN – 80; as a stabilizator, nipagyn, and dimexid as conservator.

The gel foundation was prepared according to known rules, but every time beforehand structures were elaborated and the results of qualities were inspected.

The results of quality structure were estimated by qualitative characteristics refer to commonly accepted by Governmental Pharmacopeia estimation XI (1991).

Pharmacological investigations were held refer to exposure of antioxidant properties, which can be observed by "HECh" method with usage on oxidation-reduction potential. The antioxidative activity is understandable as biologically active substances, reduction disposition which is equal to 1 gr. of preparation. The investigation was held by antioxidant device.

For the purpose of investigation 5 rabbits were taken, and the chemical burning was created by 37% solution of Hydrogen chloride and 50% solution of NaOH. As an anesthetic, 2% – Novocain solution applied for rabbits.

The estimation of biopharmacological activity was discovered by method of "in vitro" with exposure of motional speed, realization and solubility by dialysis method with the usage of membranous membrane taken from cellophane and chicken skin.

The estimation of antibacterial activity were held by method of microbiological diffusion in agar according to GP XI –edition.

In case of exposure of technological properties of gel were paid attention to physical, chemical, structural, mechanical and biopharmaceutical parameters.

The obtained gels were estimated from the point of view of organoleptic evaluation: the presence or absence of flacks, limpidity, odor, tenacity, ability of extraction from tubes and smearing.

The important criteria of estimation of elaboration composition were realization of active substance from gel.

The estimation ability of gel realization of active substance was held by method of diffusion in agar gel.

As an indicator was used iron chloride which gives intensive brown color. About degree of diffusion of preparation from gel was estimated by zone of coloration.

Experimental part

According to materials and method of held investigations by creation of anti-inflammatory gels from natural products for curative cosmetological purposes , were elaborated and approved by us the structure of investigation refer to offer algorithm.

The structure of investigation and creation of curative - cosmetological gel with anti-inflammatory activity is presented in table N1.

Traits of organization and investigation refer to held algorithm is step-wise studding of choice compositions “active substance -rack”.

Foresee, beforehand analysis of information of properties of external application of curative preparation from different pharmacological groups, paid attention for pathogenesis of dermatological diseases advisability of usage of gels.

Table 1

The structure of investigation refer to creation of curative - cosmetological gels

Investigations	Tasks
1.Introduction with object	Collection and analysis of information about analogs of external curative-cosmetological means; ingredient sources and properties for curative preparation forms; technological equipments; facility of test; quality of beforehand experiments refer to pharmaceutical compatibility of components of future curative gel ; mutual solubility and dispersantion.
2. The choice of pharmaceutical factors.	The choice of factors: active substances, basis; surface –active substances (SAS); gel-forming , and other auxiliary substances; technology methods; principles of investigation.
3. The investigation of pharmaceutical availability.	Definition of dynamics of exposure of active substances from elaboration composition comparatively with analogs, composition proper-

	ties, differs in kinds of pharmaceutical variables. Definition of kinetic levels and calculation of constant speed of exposure and time of half- dismissing of active substances from curative compositions. Corrections of composition structure refer to pharmaceutical availability.
4. The investigation of biological availability. (experiments in vitro)	Definition in kinetics of entering active substance to biologically active liquid (blood, urine, excrements) in animal experiments. Correlation of analysis results. The correction of analysis results. The corrections of compositions structure refer to obtained results in pharmacokinetic and exposure of curative – cosmetological gels.
5. Microbiological investigations.	Comparative definition of microbiological activity refers to antimicrobial activity of elaborated substance.
6. Pharmacological investigations.	The definition of innocence results of curative -cosmetological gel in experiment and its wound-healing activity.
7. Definition of storage, packaging. Definition of stability of physical-chemical and biopharmacological results.	Taking into account of several prepared means in dates of preparing with account of “ageing” defined the time of storage. Correction of pharmaceutically variable kinds of package, refer to information sources. That should be taken into account

	the choice of package of curative mean with anatomical properties of body of medical, pharmaceutical, deontology and ethics.
8. Working up the normative-technical documentation.	Getting the patent. Getting the technical rules. Working up the project of technology regulations.
9. Organization and holding the clinical investigations.	Making an agreement with hospitals due to approbation of curative gels and preparing the protocols.

Refer to held algorithms with taking into account the information defined precise objects of investigations and was being searched optimal pharmaceutical factors.

But to define rheological, chemical, boiopharmacological properties of elaborated compositions of future curative – cosmetological forms were taking into account.

The last results of microbiological, pharmaceutical, pharmacological investigations permit us to estimate biological meaning of appointed factors in case of elaboration curative forms with comparison of analogs.

The following gel-colloid compositions were being prepared by us as curative cosmetology mean:

1. Zeolite – 0,5
2. Glycyrizinic acid – 1,5
3. Chitosan – 12,8
4. Amber acid – 5, 0
5. Nipagyn – 0,1
6. Propienglycol – 5,0
7. Purified water – 100ml (control).

1. Zeolite – 1, 0
2. Glycyrizinic acid – 1, 0

3. Chitosan – 12, 8
4. Nipagyn – 0,1
5. Amber acid – 5,0
6. TVIN-8 0 – 2,0
7. Propilinglycol – 5,0
8. Purified water – 100 ml (control).

1. Zeolite – 1,5
2. Glycyrizinic acid – 0,5
3. Chitosan – 12,8
4. Nipagyn – 0,1
5. Amber acid – 5,0
6. Propilenglycol – 5,0
7. Purified water – 100 ml (control).

1. Zeolite – 1,2
2. Glycyrizinic acid – 0,8
3. Chitosan – 12,8
4. Nipagyn – 0,1
5. Amber acid – 5,0
6. Dimexid – 5,0
7. Propilenglycol – 5,0
8. Purified water – 100 ml (control).

1. Zeolite – 0,8
2. Glycyrizinic acid – 1,2
3. Chitosan – 12,8
4. Nipagyn – 0,1
5. Amber acid – 5,0
6. Propienglycol – 5,0
7. dimexid – 10,0
8. Purified water – 100 ml (control).

The technology for gel preparing:

12,8 gr of Chitosan transfer to porcelain scarb, mixed with 5,0 gr of amber acid , 0,1 gr of Nipagyne and 50 ml of purified water are being mixed . In another glass 0,8 g of zeolite with 1,2 g of glycyrrhizinic acid , 5 g of propilenglycol and 10g of dimexid with adding 32,1 ml of water is mixed.

Then, obtained liquids connected, mixed and heating on water bath till obtaining the gel composition. After homogenization obtained gel admit through double sterile gauze till air drops.

The gel mass included to sterile hermetic package. The following gel compositions are being prepared by the same way.

The studding of antimicrobial activity of gel compositions.

Antimicrobial activity of gel compositions were observed by microbiological method of diffusion in agar. As a test culture were being used several models of microorganisms: Staphylococcus aureus 209 P; Pseudomonas auruginosa NCTC 2134; Escheria coli TCC 1257; Candida utilis LIA-01. The degree of antimicrobial activity of gel compositions estimated by the degree of stagnation of microorganisms .

Table 2

Antimicrobial activity of elaborated gel compositions.

Gels	***Microorganisms test/ the degrees of stagnation mm***			
	St. Aureus	***Ps. auriginosa***	***E. Coli***	***Candida Utilis***
N1	12,0±0,42	18,0±0,36	16,0±0,26	14,4±0,36
N2	14,0±0,38	14,2±0,45	12,0±0,32	14,8±0,38

N3	26,0±0,36	18,6±0,32	18,0±0,56	16,8±0,52
N4	22,0±0,45	19,2±0,38	20,0±0,45	16,4±0,42
N5	20,0±0,30	20±0,32	22,0±0,44	15,8±0,36

The studding of biopharmaceutical properties of gels.

As it is known, definition of high pharmaceutical activity of gels defined on the basis of degree of exposure active auxiliary substances refer to these structure.

Taking into account of technological properties of elaborated compositions were held comparative biopharmaceutical investigations with usage of dialysis method for definition of degree of active substances exposure: zeolite and glycyrizinic acid. With that purpose we prepared chicken skin as a membrane. The chicken skin is being cleaned from fat. Then cutted to many pieces from 3-5 sm. Then pieces divided into 2 parts: the first part handled by 5% of citric acid, then cleaned by water till neutral reaction; the second part handled only by citric acid. Having been used these membranes for dialysis of different gel concentrations, were being proved bioavailability of active substances: zeolite and glycyrrhizinic acid during the t = 37°C through 30; 60; 90; 120; 150; 180; 210 minutes. In gels were successed to determine the speed of exposure of basic components from 90-97% in 270 minutes, that is proved these bioavailability.

The studding of pharmacological properties of gel colloid curative – cosmetological composition.

The wound-healing activity of gel composition on a basis of zeolite, glycyrrhizinic acid, chitosan and an amber acid

was defined on created chemical and thermal wounds in 6 rabbits of "shinshilla": in the first group 6 rabbits: it was created chemical burning with anesthesia (t=100C and more) on a surface of right by 3×3 sm and left leg was for control; In the second 5 rabbits with local anesthesia was created chemical burning by 37% solution of HCL on the right leg and left leg was for control; The third group – 5 rabbits: it was created with NaOH solution on the right and left leg was for control. Local anesthesia was created with the 2% solution of novocaine hydrochloride. During the day one time the rectal temperature was measured in rabbits. For studing of wound-healing activities of gel compositions it was being created application on the wound appointed gel composition. Also the right eye was being involved in application process but left one was free in order to prove anti-allergic property of gel.

In intact places of affection in rabbits it was being observed hyperemia, arrhythmia, vesicules, and liquids, erythematic sign. After a day the wounds were being full of pus, the rectal temperature became higher till 38,5-39,5°C, and observed intoxication of rabbits organism.

The appointed model of rabbits affection also gave to us the differing of clinical picture the places of burning were more hyperemic, the liquids empted with high speed, the pus was being observed sooner.

The clinical picture of chemical burning with application of NaOH solution was clearer. The rectal temperature in rabbits was till 42°C, intoxication was more prolonged, exudates more infected.

On created affected wounds were being applied gels during 7-10 days. On the 5-th day was observed granulation process, the rectal temperature became lower till normal degree. The wounds were fully recovered till 7-th day.

In rabbits with chemical burning by affection of HCL - solution were observed rather different clinical picture. The

temperature did not became lower, however the wounds became less in size. During 7-10 days fully were being recovered. The chemical burning by affection of NaOH solution became acute, on the 2-nd of experiments it was created the pus wound. The good results were not achieved by application of gel, on the 5-th day were being observed bleeding from wounds. Recovering process were being observed on the 15-16 th day, however, on the 10-th day the affected wounds were being recovered, hyperemia became less, and low exudation observed.

So above appointed gel compositions proved curative and have a wound –healing activity property. Above mentioned experiments prove that appointed gel compositions have not additive allergic reactions. Application on right eye in rabbits also proved anti-inflamatory activity.

Conclutions:

1. It was elaborated the soft medicinal form on a basis of zeolite, glycyrrhizinic acid, chitosan, and an amber acid.
2. It was being studied pharmaco-technicological properties of elaborated gel-colloid composition with observing of availability of preparation.
3. It were being discovered antimicrobial properties of gels with estimation of antibacterial activity refer to degree of stagnation of microorganism development.
4. It were being discovered the wound-healing properties of curative cosmetological gel which permits us to use as anti-inflammatory mean.

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