



Silicon (Si) – Body & Health Importance + Top 20 Sources

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Abstract. The article discusses the main properties of silicon (Si) and its effect on the human body. A systematic review of modern specialized literature and relevant scientific data was carried out. The best natural sources of silicon are indicated . The use of the mineral in various types of medicine and the effectiveness of its use in various diseases are considered. The potentially adverse effects of silicon on the human body under certain medical conditions and diseases are analyzed separately.

Key words: silicon , Si , silicon, useful properties, contraindications, sources

Silicon dioxide (Si) is rarely talked about as an important micronutrient for health. There is some controversy over whether the body needs it, but evidence is mounting in its favor. New research makes it clear that the mineral cannot be ignored - science has revealed seven of its benefits. The supplement has already proven its usefulness for weak bones (osteoporosis), gastrointestinal diseases and is successfully used to improve the quality of hair and skin.

Silicon in the body

The human body contains 7 g of silicon, which is not concentrated in any particular organ of the body - it is found mainly in connective tissues and skin. It is found in high concentrations in the connective tissues of tendons, bones, skin, hair, throat, and in large blood vessels such as the aorta. In lower concentrations, it is found in the liver, heart, and muscles.

The component is necessary for the synthesis of collagen and elastin. Collagen acts as a scaffold and provides support to the tissues, while elastin gives the tissues elasticity. Bone is a special type of connective tissue in which silicon regulates the accumulation of calcium and phosphorus. ^[12]

The main route of excretion of the absorbed trace element is through the kidneys with urine. Therefore, with impaired renal function, its concentration in blood plasma increases significantly.

Silicon in food: availability and absorption

The electrolyte is non-toxic as an element and in all its natural forms. It almost never occurs in nature in a free form, but rather is associated with oxygen and is present in the form of silica, silicates. It

comes from plant sources – plants use the mineral for strength and flexibility. They contain it in bioavailable forms that our body knows, recognizes and uses. [3]

However, our diet often lacks the micronutrient - we remove it from most foods and avoid many fresh fruits and vegetables. Processed foods, which are rich in the diet of modern people, do not contain it.

Processed food uses silicon dioxide as an additive. It is a natural chemical mixture of silicon and oxygen, which prevents products from caking or sticking together into lumps - protects against moisture, prevents powdered ingredients from sticking together.

Silicon in food - foods with a useful mineral

Plants absorb OSA from the soil and convert it into polymerized silica for support. This is why foods such as cereals, oats and vegetables are high in silicon.

Orthosilicic acid is the main component of silica found in drinking water and other liquids and is the most readily available source of silicon. It is easily absorbed and excreted from the body. More of the element is found in hard water than in soft water.

20 Foods and Drinks High in Silicon

No.	Products	mg per 100 g
one	Cereals	18.89±2.62
2	Dried fruits	10.54±5.44
3	Millet	7.96±0.71
four	breakfast cereal	7.79±6.31
5	Wheat	6.8±2.19
6	Barley	6.64±3.73
7	Khlebtsy	3.97±3.62
eight	Flour	2.87±1.60
9	Couscous	2.35±0.78
ten	Cornflakes	2.12±0.46
eleven	White bread	1.88±0.83
12	Rice	1.54±1.00
13	Wine	1.35±0.85
fourteen	Raw and canned fruits	1.34±1.30
fifteen	Buckwheat	1.17±0.59

16	Pasta	1.11±0.47
17	basmati rice	0.94±0.3
eighteen	tap water	0.37±0.13
19	Mineral and spring waters	0.55±0.33
twenty	fruit juices	0.38±0.53

The most important sources of silicon remain unrefined cereals. ^[4, 5, 6]

Silicon Consumption Norms

There is no strictly established recommended dietary allowance for silicon, as its primary biological role has not been established. Many nutritionists and nutritionists recommend that adults aged 19 to 50 consume 9–14 mg/day per day. In osteoporosis, the dosage may be increased to 40 mg.

For most Westerners, dietary silicon intake is often 20–50 mg/day. The highest intakes of 140–204 mg/day are found in China and India, where plant foods make up the majority of the diet. ^[7]

Benefits of Silicon Proven by Scientific Research

1. Strengthens bones

Men and women who get more silicon from food have higher bone mineral density and a lower risk of osteoporosis. However, the higher intake of silicon by older women after menopause does not bring the expected benefits - the mineral does not stop the destructive process. ^[8, 9]

2. Supports the health and beauty of the skin

Silicon increases the elasticity, strength of the skin and slows down their aging. It restores natural radiance and prevents wrinkles by increasing collagen formation. ^[ten]

3. Prevents brittle nails

The mineral plays an important role in maintaining nail health. It strengthens them, preventing the problem of brittleness, protects against infections, and provides nutrients to the nail bed. ^[eleven]

4. Prevents atherosclerosis

Silicon additives reduce the occurrence of atherosclerotic vascular lesions, reduce the formation of cholesterol plaques. The latter are responsible for the hardening of the arteries in atherosclerosis, which leads to a heart attack, stroke. The compound further increases calcium utilization by preventing calcium buildup in arteries such as the aorta. ^[12]

5. Restores the mucous membrane

The mineral plays a key role in protecting against many diseases associated with mucous membranes. It effectively restores the mucous membrane of the respiratory tract, if the body suffers from dehydration - it is found mainly in the connective tissue, where it acts as a "cross-linking" agent. ^[13]

6. Helps Alzheimer's

There is evidence that aluminum accumulation contributes to Alzheimer's disease, and silica contributes to its elimination. The trace element helps to get rid of the metal, which is too common in the environment, cosmetic products, food. ^[fourteen]

7. Flush out toxins and help cleanse the body

Silica gel effectively removes toxins, heavy metals and other waste from the body. This property allows it to be used in detoxification programs. To maximize the benefits for the digestive tract, it is important to eat a healthy diet and take vitamin supplements.

Interaction of silicon with minerals and vitamins

The mineral helps to get rid of excess aluminum in the body. It should also be borne in mind that its bioavailability decreases with the use of large amounts of calcium, magnesium. Scientists suggest that they compete for the same absorption pathway, or form insoluble compounds that reduce its absorption. There are also suggestions that silicon dioxide controls the metabolism of calcium and magnesium. ^[15, 16, 17]

Silicon in medicine: where and what is it used for

The two main applications of silica-based materials in medicine and biotechnology are bone repair and drug delivery systems. They take micronutrient supplements for two reasons:

- with age, the level in the body decreases significantly, and deficiency leads to degenerative diseases of the gastrointestinal tract
- oats, barley, wheat, millet, potatoes and other foods contain adequate amounts of silicon, but they are refined to such an extent that they lose most of the beneficial compound.

Keep in mind that when taking dietary supplements, dosage is important. Before use, it is advisable to consult a nutritionist, nutritionist, and not blindly follow the recommendations on the label.

Scientific research on the benefits of silicon

- Higher amounts of aluminum are found in the affected areas of the brain in patients suffering from Alzheimer's disease. Silicon, binding to aluminum, prevents the absorption of the latter in the gastrointestinal tract and reduces its negative impact on the body. ^[eighteen]
- Silicon helps repair and maintain the tissues of the digestive tract. Studies have shown that collagen is produced in the smooth muscles of the intestine. Fibrillar protein is involved in the construction of new muscle cells for the healing of the gastric mucosa and intestinal walls. This prevents most gastrointestinal problems that develop due to mucosal degradation. Silicon also absorbs large amounts of toxins that slow down the digestive system, reverse food intolerances, and reduce flatulence. ^[19]
- Scientists have studied the intake of the mineral with food and found that it decreases with age. The mean silicon intake for men was 30–33 mg/day and 24–25 mg/day for women. The main sources of silicon for men were beer and bananas, for women - bananas, green beans. ^[twenty]
- Soluble orthosilicic acid may be important for growth, bone and connective tissue development. The substance is found in large quantities in beer. Its content was evaluated in 76 different beers, but no significant difference was found. In beer, silicon is present mainly in monomeric form, bioavailable. ^[21]

- Scientists confirm the role of silica in bone formation. The study involved 136 women who took supplements with calcium, vitamin D, silicon dioxide. After 12 months, the combination therapy had a beneficial effect on bone collagen compared with calcium and vitamin D alone. This suggests that silica, in combination with calcium and vitamin D, is potentially beneficial in osteoporosis. It can also be taken for broken bones to speed up their recovery. ^[22]
- A 2005 study confirmed that silica helps repair sun-damaged women's skin and slows down aging. In the women who participated in the experiment, the texture of the skin improved after a daily intake of 10 mg of silica. The positive effect of the substance is easy to explain - collagen production decreases with age, and silica is the key to creating collagen. Collagen maintains firmness, elasticity and reduces the appearance of fine lines and wrinkles. ^[23]

Silicon Contraindications

Silicon is safe in dietary quantities and no serious side effects have been identified by scientists. People who take silica-containing antacids for a long period of time sometimes develop kidney stones. The component is not recommended for pregnant and lactating women, as well as for those who have undergone an operation to remove the stomach (gastrectomy).

Silicon Deficiency Symptoms

Deficiency symptoms are obvious because they are closely related to connective tissues:

- weak bones;
- fragility of nails;
- thinning hair;
- early formation of wrinkles.

Lower stomach acid due to disease or aging reduces the ability to metabolize electrolyte from dietary sources, leading to electrolyte deficiency.

Symptoms of excess silicon

Adverse effects may be associated with crystalline silica - quartz dust. It can be inhaled for a long time by people who work in quarries and factories for its processing. This threatens with serious lung diseases - from COPD to cancer. ^[24, 25]

Interaction with drugs

Silicon does not interact with any medications. It is important for health, like other minerals - magnesium, potassium, calcium and iron.

Expert comment

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The best way to get the required amount of the mineral is to eat grains and vegetables. In some cases, when there are problems with its absorption, supplementation may be required. In such situations, it is important to seek the advice of a doctor - a dietitian or nutritionist - in order to prevent any unwanted complications.

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Received 02.05.2022

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