

# Silicon in drinking water caused irreversible lung pathologies in rodents

July 15 2021

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Bone density, skin and hair health, and the mobility of joints all depend, to a great extent, on the microelement silicon. We mostly get it with food, but the element can also be found in drinking water of a natural

origin: usually, it is included in the compound of sodium salt and metasilicic acid. However, in the case of microelements, one should be extremely careful: a deficiency could lead to diseases, but an overdose could also cause negative effects.

Together with colleagues from the Chuvash State University and the Hamburg Medical University, scientists of Immanuel Kant Baltic Federal University studied the effect of prolonged silicon consumption in relatively small doses. They experimented on laboratory rats and mice. For several months the animals were given water with sodium metasilicate, one of the most common compounds of silicon. The concentration was ten milligrams per liter.

In the first phase of their experiment, the researchers took rats and mice pulmonary tissue samples two and three months after the introduction of silicon-contaminated water and didn't find any pathological changes. Then, they decided to triple the time of influence. Nine months later, the results were very different—the animals' health deteriorated significantly. Their weight reduced by half, and the animals showed signs of lung fibrosis (the transformation of functional tissues into non-functional connective tissues) with varying severity, as well as deformation of the bronchial tree. The epithelial walls between their alveoli were so depleted that in some cases they conjoined, and the total number and diameter of the alveoli decreased. Histological studies showed the presence of giant multinuclear Pirogov-Langhans cells that are common in tuberculosis and other severe lung diseases.

Remarkably, the [negative impact](#) on animals from the first phase of the experiment occurred six months after they were transferred from silicon-contaminated water to clean water. Zones of increased density developed inside their lungs and along the bronchial tree areas. High concentrations of lymphocytes (the main cells of the immune system) in these zones was indicative of inflammation.

"What we've seen during our experiment with rats and mice was very similar to silicosis, a chronic occupational disease that mostly affects miners and foundry workers. The constant use of silicon, whether in water or dietary supplements, may at first appear safe, although the damage increases unnoticeably. Research like this has been going on for years and is aimed to form an evidence base. The results are already included in the guidelines on microelement additives, which means we are actively changing the minds of the scientific community. Perhaps, lovers of 'miracle pills' would be next", noted the head of research Valentina Gordova, a Candidate of Medical Sciences, and an Assistant Professor at the Department of Fundamental Medicine of the Immanuel Kant Medical Institute.

**More information:** Valentina Gordova et al, The influence of silicon consumption with drinking water on morphological changes in the lungs of rodents, *The FASEB Journal* (2021). DOI: [10.1096/fasebj.2021.35.S1.01634](https://doi.org/10.1096/fasebj.2021.35.S1.01634)

Provided by Immanuel Kant Baltic Federal University

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