Nitrates in vegetables protect against gastric ulcers

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Fruits and vegetables that are rich in nitrates protect the stomach from damage. This takes place through conversion of nitrates into nitrites by the bacteria in the oral cavity and subsequent transformation into biologically active nitric oxide in the stomach. The Swedish researcher Joel Petersson has described the process, which also means that antibacterial mouthwashes can be harmful for the stomach.

"Nitrates in food have long been erroneously linked to an increased risk of cancer," says Joel Petersson of Uppsala University's Department of Medical Cell Biology.

He instead thinks that nitrate-rich vegetables such as spinach, lettuce, radishes and beetroot have a positive affect on the stomach by activating the mucous membranes' own protective mechanisms, thus reducing the risk of problems such as gastric ulcers.

In the body the blood circulation transports nitrates to the salivary glands, where they are concentrated. When we have eaten nitrate-rich food our saliva thus contains large amounts of nitrates, which the bacteria of the oral cavity partially convert into nitrites. When we swallow the nitrites they come into contact with acid gastric juice, and are then converted into the biologically active substance nitric oxide. This results in our developing high levels of nitric oxide in the stomach after eating vegetables.

It has long been known that nitric oxide is produced by various enzymes

in the human body, but the fact that nitric oxide can also be formed in the stomach from nitrites in the saliva, entirely without the involvement of enzymes, is a relatively new discovery. Researchers still have very little idea of how the stomach is affected by these high levels of nitric oxide. Joel Petersson's thesis shows that the nitric oxide that is formed in the stomach stimulates the protective mechanisms of the mucous membrane – because the stomach constantly has to protect itself so as not to be broken down together with the food ingested.

Two such important defence mechanisms are the stomach's constant renewal of the mucous layer that covers the mucous membrane and its maintenance of a stable blood flow in the mucous membrane. The nitric oxide widens the blood vessels in the mucous membrane, thus increasing the blood flow and regulating elimination of the important mucus. Together, these factors lead to a more resistant mucous membrane.

Using animal models Joel Petersson and his colleagues have shown that nitrate additives in food protect against both gastric ulcers and the minor damage that often occurs in the gastrointestinal tract as a result of ingestion of anti-inflammatory drugs.

"These sorts of drugs are very common in the event of pain and inflammation. They have the major disadvantage of causing a large number of serious side effects in the form of bleeding and ulcers in the gastrointestinal tract. With the aid of a nitrate-rich diet you can thus avoid such damage," he explains.

The thesis also shows that the bacteria in the oral cavity are very important to the process of nitrates in food protecting the stomach's mucous membrane. This has been examined in that rats have been given nitrate-rich feed, whereby some of them have also simultaneously received an antibacterial oral spray. When these rats were then given anti inflammatory drugs, damage to the mucous membrane only occurred in

the ones that had received the oral spray. In the latter the nitrates no longer had a protective effect on the mucous membrane, as the oral spray had killed the important bacteria that normally convert nitrates into nitrites.

"This shows how important our oral flora is. The fact that these bacteria are not just involved in our oral hygiene but also play an important role in the normal functions of the gastrointestinal tract is not entirely new. It is currently an important issue, as antibacterial mouthwashes have become more and more common. If a mouthwash eliminates the bacterial flora in the mouth this may be important to the normal functioning of the stomach, as the protective levels of nitric oxide greatly decrease," says Joel Petersson.

In his opinion the research results also provide a new approach to the importance of fruit and vegetables in our diet.

"If we followed the National Swedish Food Administration's recommendation and ate 500 g of fruit and vegetables per person per day it would definitely be better for our stomachs.

Source: Uppsala University

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