

# A high-salt diet could protect against invading microbes

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Most people consume more salt than they need and therefore have a higher risk of heart disease and stroke, which are the two leading causes of death worldwide. But a study published by Cell Press March 3rd in *Cell Metabolism* reveals that dietary salt could have a biological advantage: defending the body against invading microbes. A high-salt diet increased sodium accumulation in the skin of mice, thereby boosting their immune response to a skin-infecting parasite. The findings suggest that dietary salt could have therapeutic potential to promote host defense against microbial infections.

"Up to now, [salt](#) has been regarded as a detrimental dietary factor; it is

clearly known to be detrimental for cardiovascular diseases, and recent studies have implicated a role in worsening autoimmune diseases," says first study author Jonathan Jantsch, a microbiologist at Universitätsklinikum Regensburg and Universität Regensburg. "Our current study challenges this one-sided view and suggests that increasing salt accumulation at the site of infections might be an ancient strategy to ward off infections, long before antibiotics were invented."

Large amounts of sodium stored in the skin, especially in older individuals, can lead to [high blood pressure](#) and increase the risk for [heart disease](#) and stroke. A high-salt diet, which increases sodium storage in the skin, can also worsen autoimmune disease and even increase the risk of stomach cancer. "Despite the overwhelming evidence linking dietary salt to disease in humans, the potential evolutionary advantage of storing so much salt in the body has not been clear," says senior study author Jens Titze, who studies the link between sodium metabolism and disease at Vanderbilt University School of Medicine.

A clue to this mystery came when Titze and his collaborators noticed an unusually high amount of sodium in the infected skin of mice that had been bitten by cage mates. Intrigued by this observation, Titze teamed up with Jantsch to examine the link between infection and salt accumulation in the skin. They found that infected areas in patients with bacterial skin infections also showed remarkably high salt accumulation. Moreover, experiments in mice showed that a high-salt diet boosted the activity of immune cells called macrophages, thereby promoting the healing of feet that were infected with a protozoan parasite called *Leishmania major*.

Moving forward, the researchers will examine how salt accumulates in the skin and triggers immune responses, and why salt accumulates in the skin of aging adults. "A further understanding of the regulatory cascades might not only help to design drugs that specifically enhance local salt

deposition and help to combat infectious diseases, but also may lead to novel strategies to mobilize sodium stores in the aging population and prevent [cardiovascular disease](#)," Jantsch says. "We also think that local application of high-salt-containing wound dressings and the development of other salt-boosting antimicrobial therapies might bear therapeutic potential."

In the meantime, the researchers urge caution over the potential health benefits of a high-salt diet. "Due to the overwhelming clinical studies demonstrating that high dietary salt is detrimental to hypertension and cardiovascular diseases, we feel that at present our data does not justify recommendations on high [dietary salt](#) in the general population," Jantsch says. "Nevertheless, in situations where endogenous accumulation of salt to sites of infection is insufficient, supplementation of salt might be a therapeutic option. But this needs to be addressed in further studies."

**More information:** *Cell Metabolism*, Jantsch et al.: "Cutaneous Na<sup>+</sup> Storage Strengthens the Antimicrobial Barrier Function of the Skin and Boosts Macrophage-Driven Host Defense" [www.cell.com/cell-metabolism/a ... 1550-4131\(15\)00055-8](http://www.cell.com/cell-metabolism/a...1550-4131(15)00055-8)

Provided by Cell Press

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