

Vitamin B3 may offer new tool in fight against 'superbugs'

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A new study suggests that nicotinamide, more commonly known as vitamin B3, may be able to combat some of the antibiotic-resistance staph infections that are increasingly common around the world, have killed thousands and can pose a significant threat to public health.

The research found that high doses of this vitamin increased by 1,000 times the ability of immune cells to kill [staph bacteria](#). The work was done both in laboratory animals and with human blood.

The findings were published today in the [Journal of Clinical Investigation](#) by researchers from Cedars-Sinai Medical Center, the Linus Pauling Institute at Oregon State University, UCLA, and other institutions. The research was supported by several grants from the National Institutes of Health.

The work may offer a new avenue of attack against the growing number of "superbugs."

"This is potentially very significant, although we still need to do human studies," said Adrian Gombart, an associate professor in OSU's Linus Pauling Institute. "Antibiotics are wonder drugs, but they face increasing problems with resistance by various types of bacteria, especially [Staphylococcus aureus](#)."

"This could give us a new way to treat staph infections that can be deadly, and might be used in combination with current antibiotics,"

Gombart said. "It's a way to tap into the power of the [innate immune system](#) and stimulate it to provide a more powerful and natural immune response."

The scientists found that clinical doses of nicotinamide increased the numbers and efficacy of "neutrophils," a specialized type of white blood cell that can kill and eat [harmful bacteria](#).

The nicotinamide was given at megadose, or therapeutic levels, far beyond what any normal diet would provide - but nonetheless in amounts that have already been used safely in humans, as a drug, for other medical purposes.

However, there is no evidence yet that normal diets or conventional-strength supplements of vitamin B3 would have any beneficial effect in preventing or treating bacterial infection, Gombart said, and people should not start taking high doses of the vitamin.

Gombart has been studying some of these issues for more than a decade, and discovered 10 years ago a human genetic mutation that makes people more vulnerable to bacterial infections. In continued work on the genetic underpinnings of this problem, researchers found that nicotinamide had the ability to "turn on" certain antimicrobial genes that greatly increase the ability of [immune cells](#) to kill bacteria.

One of the most common and serious of the staph infections, called methicillin-resistant *S. aureus*, or MRSA, was part of this study. It can cause serious and life-threatening illness, and researchers say the widespread use of antibiotics has helped increase the emergence and spread of this bacterial pathogen.

Dr. George Liu, an infectious disease expert at Cedars-Sinai and co-senior author on the study, said that "this vitamin is surprisingly effective

in fighting off and protecting against one of today's most concerning public health threats." Such approaches could help reduce dependence on antibiotics, he said.

Co-first authors Pierre Kyme and Nils Thoennissen found that when used in human blood, clinical doses of [vitamin B3](#) appeared to wipe out the staph infection in only a few hours.

Serious [staph infections](#), such as those caused by MRSA, are increasingly prevalent in hospitals and nursing homes, but are also on the rise in prisons, the military, among athletes, and in other settings where many people come into close contact.

Provided by Oregon State University

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