

Is this the beginning of the end of the antibiotic era?

NDM, a gene that makes germs impervious to many antibiotics, is spreading worldwide among bacteria in the gut that most commonly cause infections. The gene lives on a DNA strand called a plasmid that is easily swapped among different species of harmful gut bacteria.

The gene evolved in India -- NDM stands for New Delhi metallo-beta-lactamase -- but is widespread in Pakistan and Bangladesh as well. It's been isolated all across the U.K., prompting a national alert. It's also popped up in the U.S., Canada, Sweden, Australia, and the Netherlands.

The bad news comes from a sobering report by Timothy R. Walsh, PhD, professor of infection, immunity, and biochemistry at Wales' Cardiff University, and colleagues.

"This heralds a new and darker dawn in infections," Walsh tells WebMD. "If we looked in India a few years ago we would not have seen this. But in three or four years it has gone into 1% to 4% of the [gut] bacteria population in India. That is incredible. It came from nowhere."

NDM Superbugs Spreading Fast?

There's even worse news. Nearly all highly resistant bugs pop up only in hospitals. But gut bacteria carrying the NDM gene are spreading throughout affected communities.

"There are lots of people carrying this resistance," Walsh says. "The crux of the matter is that when bugs ... acquire this type of gene they become resistant to all beta-lactams. And beta-lactams like penicillin are the main therapies to treat these infections with."

You don't have to be a microbiologist to know the bugs Walsh is talking about. One is *E. coli*. Another is *Klebsiella pneumoniae*, a common cause of pneumonia. Both kinds of infection can be deadly.

There could be "serious consequences," says Johann D.D. Pitout, MD, professor of pathology and laboratory medicine at Canada's University of Calgary, in an editorial accompanying the Walsh report in the Aug. 11 online issue of *The Lancet*.

"The potential is there for a major issue: that we would have common infections, like urinary tract infections, caused by drug-resistant organisms," Pitout tells WebMD. "It is a huge surprise to see it spread all over the subcontinent. It looks like it is a really rapid spread. It is too early to tell. But it sure as hell is widespread and that is very worrying."

In the U.S., the CDC last June reported three cases of NDM bacteria isolated from U.S. patients. All of the patients were of Indian descent, and all had undergone medical procedures while visiting India for other reasons.

Are there more U.S. cases? Nobody knows, because nobody has looked very hard, says Brandi Limbago, PhD, the CDC team leader for antimicrobial resistance and characterization.

"In this country we do not have a sense of the prevalence at all. That is a concern to me, at least," Limbago tells WebMD. "The rate it is spreading in the U.K. is concerning. We don't have info on the U.S. I don't know if we should be terrified or moderately worried."

No New Drugs in Pipeline for NDM Superbugs

Walsh and colleagues isolated NDM-carrying bacteria from a Swedish patient of Indian origin who got a urinary tract infection while visiting New Delhi. They dubbed the new bug NDM-1.

To find out whether it was a freak occurrence, they collected bacteria isolated from sites in India, Bangladesh, Pakistan, and the U.K.

Now they report that from 1% to 4% of Gram-negative bacteria from South Asia carried the NDM gene. In the U.K., the researchers identified 37 NDM isolates from 29 patients, at least 17 of whom recently had traveled to India or Pakistan for medical procedures.

In the U.S., none of the three known NDM-bacteria-infected patients were "medical tourists" -- people who seek less expensive or more readily available medical procedures abroad. But the practice is becoming common. And Walsh, Pitout, and Limbago question the wisdom of the practice.

"This is a risk associated with medical tourism not appreciated before," Limbago says.

Pitout agrees.

"This medical tourism is a major issue. People picking up a drug-resistant bug and bringing it back is a worrying issue for me," he says. "These bugs can spread easily, especially *E. coli*. We are worrying that they might be spreading in the community."

Why are these experts so worried? It's because when Gram-negative bacteria become resistant to older drugs, there are no new drugs in the pipeline. And that leaves doctors with almost nothing to do for patients with serious infections.

"The only possible thing to do is to treat patients with an antibiotic cocktail and hope it might have an effect. But that is very difficult to do," Walsh says. "You can use high-level dosing, but the danger is you run into toxicity issues."

Is it the end of the antibiotic era? Perhaps not quite yet. Walsh, Pitout, and Limbago say the first thing to do is to get a firm sense of how prevalent NDM resistance really is. Then there must be a major research effort -- perhaps, as Walsh suggests, a global government/industry collaboration -- to find new drugs to kill the bugs.

"We must, must, must consider antibiotic resistance as a global problem," Walsh says. "It is not just in India. This is a prime example how if it starts in one country, it can spread massively throughout the globe."

SOURCES:

Kumarasamy, K.K. *The Lancet*, published online Aug. 11, 2010.

Pitout, J.D.D. *The Lancet*, published online Aug. 11, 2010.

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