

New front opens in war on superbugs: experts

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Escherichia coli. Credit: Rocky Mountain Laboratories, NIAID, NIH

A newly-discovered antibiotic-resistant gene is threatening to open a new front in the war against superbugs by rendering a last-resort drug impotent, experts warn.

The gene's resistance to colistin, a life-saving medication which has been around for 60 years, is the latest frustration for physicians battling disease with a shrinking arsenal of antibiotics to treat a wide variety of ailments, many once easily curable.

Dubbed *mcr-1*, the resistance-conferring gene easily transfers between bacteria, benign or otherwise, found in humans, animals or the environment.

First identified in China last November, the gene has since been discovered in livestock, water, meat and vegetables for human consumption in several countries, and in humans infected with *E.coli*—one of the disease-causing bacteria it targets.

For the first time, *mcr-1* has now also been found living in the gut of healthy humans, a conference of the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) heard in Amsterdam this weekend.

'Antibiotic crisis'

"(A) key element for the emergence of superpathogens (superbugs, or drug-resistant germ strains) has made its way to our bodies," researcher Aycan Gundogdu of Turkey's Erciyes University told delegates.

"It is (only) a matter of time (before) the dissemination of *mcr-1* gene will be prevalent in the clinic, bringing the world closer to an antibiotic crisis."

Colistin has been available since 1959 to treat infections caused by Gram-negative bacteria—a category including the food-poisoning germs *E.coli* and *Salmonella*, as well as *Acinetobacter* which can cause pneumonia or serious blood and wound infections.

It was abandoned for human use in the 1980s due to high kidney toxicity, but is widely used in livestock farming, especially in China.

As bacteria have started to develop resistance to other, more modern drugs, colistin had to be brought back as a treatment of last resort in hospitals and clinics.

Now resistance to that too is becoming a problem.

Gundogdu and a team analysed DNA in faecal samples of individuals from China, Europe and Turkey.

Of the 344 Chinese study subjects, six harboured the gene in their gut—a known major reservoir of drug resistance, the team found.

Humans as hosts

"They are healthy people. They are hosts, they are carrying this gene," Gundogdu told AFP.

Why is it scary? Because water treatment "can't eliminate these bacteria or these [genes](#) perfectly," he said.

"After treatment, this water directly goes to the environmental water. And then we, the people, use this water for fishing, for many things, which means there is a circulation."

Another research team, which retrospectively tested stored E.coli and Salmonella samples from food-producing animals, said the gene has already been around in Europe for more than a decade.

Resistance to drugs can emerge through changes in the bacterium's genetic code—altering the target on its surface to which antibiotics

would normally bind, making the germ impenetrable

These supergerms spread easily with human help. The wrong antibiotics, taken for too short a period or in too low a dose, help them proliferate—also in animals given antibiotics to fatten them up.

Experts at the conference lamented that not enough new drugs were being developed.

"We have to fight all these microorganisms," said ESCMID president Murat Akova. "They are emerging, and we are defenceless, we are losing patients.

The World Health Organisation (WHO) has warned that drug resistance "threatens a return to the pre-antibiotic era".

A large-scale study commissioned by the British government and released last year, said between \$16 billion (14 billion euros) and \$37 billion would have to be spent over a ten-year period to bring vital new antibiotics to the market.

This paled in comparison, it said, to the estimated cost of \$20 billion per year to treat drug resistant illnesses in the United States alone.

The AMR report said 700,000 people died every year as a result of [drug resistance](#)—a number expected to rise to 10 million by 2050.

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