

Threat of 'nightmare bacteria' with resistance to last-resort antibiotic colistin

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- The study revealed a surprisingly high dissemination of MDR colistin-resistant *E. coli* harboring *mcr* in fecal microbiota of residents of a rural community in Vietnam.
- In particular, it was remarkable from the public health viewpoint that most participating households had colistin-resistant bacteria carriers.

Dissemination of colistin-resistant *E. coli* with *mcr* in local community residents of Vietnam. Credit: Osaka University

A team of researchers led by Osaka University examined the dissemination of colistin-resistant bacteria among residents of rural communities in Vietnam to find that the prevalence of colistin-resistant *Escherichia coli* (CR-E) in the intestines was extremely high, at about 70 percent. This *Escherichia coli* (*E. coli*) is a non-pathogenic bacterium, so the residents have no symptoms, but the detection of this type of *E. coli* in developed countries has been infrequently reported. It was revealed that the prevalence of colistin-resistant bacteria in residents in Vietnam was extremely high and that colistin-resistant bacteria, whose clinical impact is a great concern in hospital settings, were spread in local communities in the developing country faster than expected.

The team's research results were published in the *Journal of Antimicrobial Chemotherapy*.

Colistin, an old antibiotic discovered in 1950, kills or inhibits the growth of Gram-negative [bacteria](#), such as *E. coli* and *Pseudomonas aeruginosa*. It is one of the few critical antibacterial drugs for treating multidrug-resistant bacteria and is listed on the WHO Essential Medicines List (EML) as a last-resort antibiotic.

Colistin-resistance is mostly related to chromosomal mutations. Although its frequency was low, a certain level of colistin-resistance was observed. However, since colistin-resistance caused by mutations was not transferred to other bacterial species, it was not considered problematic. However, a transmissible colistin resistance gene (*mcr*) was discovered in China in 2015 and the possibility of the transfer of [colistin-resistance](#) to other bacterial species was shown, becoming a global concern. This presents the potential danger that carriage of *mcr1* gene in pathogens with other resistance genes will produce super drug-resistant bacteria called "Nightmare bacteria." This bacteria exhibits resistance to all antibiotics, even to the last-resort antibiotic colistin, posing a great threat in infectious disease treatment.

Drug-resistant strains are spread in livestock and livestock products in developing countries. This group has pointed out that meat contains colistin-resistant bacteria because a large amount of colistin has been added to livestock food in Vietnam.

Thus, the group investigated the prevalence of colistin-resistant bacteria in Vietnam and revealed that the dissemination of colistin-resistant *Escherichia coli* (CR-E) in the faecal microbiota of residents was extremely high (70.4% of residents) and that CR-E had the transmissible colistin resistance gene (*mcr*).

First author Yoshimasa Yamamoto says, "CR-E carriers don't cause [health problems](#) immediately, but it's clear that the number of refractory infections for which [antibiotics](#) don't work will increase, which will become a great menace to clinical practice. In this borderless society, drug-resistant bacteria quickly spread beyond national and regional borders, so it is necessary to strengthen international surveillance systems and promptly take preventative measures."

More information: Yoshimasa Yamamoto et al. Wide dissemination of colistin-resistant *Escherichia coli* with the mobile resistance gene *mcr* in healthy residents in Vietnam, *Journal of Antimicrobial Chemotherapy* (2018). [DOI: 10.1093/jac/dky435](https://doi.org/10.1093/jac/dky435)

Provided by Osaka University

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