

Viruses can turn harmless E. coli dangerous

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Viruses attacking E. coli, (electron microscopy picture) Photo: Dennis Kunkel Microscopy, Inc.

For her doctorate, Camilla Sekse studied how viral DNA can be transmitted from pathogenic to non-pathogenic E. coli. Viruses that infect bacteria in this way are called bacteriophages. Her findings reveal that such transmission of bacteriophage between bacteria can occur, and that in the case of E. coli it can transform a harmless bacterium into one capable of causing disease in man.

Escherichia coli is a complex group of gut [bacteria](#) that are found in all warm-blooded animals and are for the most part harmless. A few, however, cause disease in man and animals. The E. coli bacteria that produce a poison called Shiga [toxin](#) can produce a range of effects in

man. One common effect is bloody diarrhoea followed by complications such as kidney failure (haemolytic uraemic syndrome). The bacteria may be spread through [contaminated food](#) or water, or from contact with animals.

A combination of qualities necessary to produce disease

A sequence of favourable circumstances needs to exist before *E. coli* can produce disease. The most important of these is the ability to produce Shiga toxin. The gene that codes for Shiga toxin is not innate, but is contained within bacteriophages. In other words, the bacterium needs first to be infected by a bacteriophage coding for Shiga toxin in order to produce the toxin itself.

In her work, Camilla Sekse studied *E. coli* O103:H25 bacteria isolated both from foodstuffs and patients from the *E. coli* outbreak of 2006. She and her colleagues discovered special features of these *E. coli* bacteria that separate them from ordinary, benign forms. This discovery led to it being easier to demonstrate *E. coli* O103:H25 in suspect food products.

Dangerous bacteria in our environment

It seems that *E. coli* O103:H25 has existed in Norway for some time, since this bacterium was also found to be a cause of the kidney failure outbreaks both in 2003 and 2005. Studies of the entire genome of this bacterium have shown that it more closely resembles the enteropathogenic *E. coli* (bacteria that cause diarrhoea) than the more common, Shiga toxin-producing *E. coli*, namely *E. coli* O157:H7.

Escherichia coli bacteria that are not disease-causing can absorb and lose bacteriophages coding for Shiga toxin, and can be important in the

spread of these bacteriophages in the environment, even though they don't themselves cause disease. It appears that some E. coli bacteria can both more easily absorb and lose bacteriophages that contain the gene for Shiga [toxin](#), and this may well be the case for E. coli O103:H25.

Provided by Norwegian School of Veterinary Science ([news](#) : [web](#))

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