Bacteria are hard-wired for survival, E. coli study suggests

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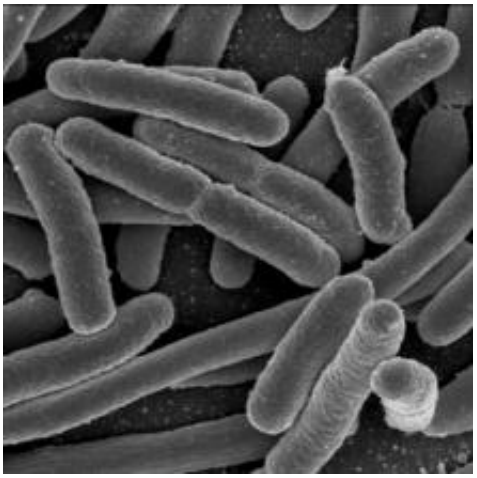

A scanning electron micrograph of E. coli. Credit: NIH

Some bacteria are able to thrive even when under continued attack, scientists have found, in a development that may help explain how our immune systems can't always prevent infections.

Studies of the common bug *E. coli* have shown that it is able to recover continually from potentially fatal harm to its genetic material, without slowing down the rate at which it grows.

Researchers from the University of Edinburgh, who led the study, say their discovery helps explain why bacteria are so hard to kill and why they are so widespread.

The team studied how *E. coli* responded when its DNA strands were deliberately broken as it tried to carry out its everyday function of dividing and reproducing.

They were surprised to find that *E. coli* was able to use a combination of methods to survive repeated DNA damage. It has an in-built emergency response to ensure that DNA damage is quickly repaired. In addition, it carries out overlapping rounds of DNA replication, which enables its cells to continue to divide and reproduce. This ensures *E. coli* keeps multiplying as it recovers.

In experiments, the bacteria were able to thrive indefinitely and grow at similar rates, even when repeated DNA breaks took place.

DNA damage occurs in most organisms, for example from exposure to UV radiation or harmful chemicals. Disease-causing bacteria have to survive attacks from our immune system, which can lead to DNA damage. If not repaired, this can be fatal to bacteria.

The study was published in the journal *PLOS ONE*.

Dr Elise Darmon of the University of Edinburgh's School of Biological Sciences, who led the study, said: "*E. coli* has a robust approach to recover from DNA damage, which ensures an excellent survival rate. This study shows how tough bacteria are and why they are the most populous independent life form on Earth. More work is needed to determine whether their appetite for recovery is linked to bacteria's ability to get the better of our immune systems."

Provided by University of Edinburgh