

# Life-saving in the bacterial world: How *Campylobacter* rely on *Pseudomonas* to infect humans

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Many a holiday is ruined by food poisoning, frequently caused by the bacterium *Campylobacter jejuni*. Although *Campylobacter* infections are rarely life-threatening they are extremely debilitating and have been linked with the development of Guillain-Barré syndrome, one of the leading causes of non-trauma-induced paralysis worldwide.

*Campylobacter jejuni* is well adapted to life in the guts of animals and birds, where it is often found in very high levels. However, to infect humans it also needs to be able to survive outside the gut, on the surface of meat that will be eaten by humans. It is known that *C. jejuni* cannot grow under normal atmospheric conditions – the levels of oxygen are too high for it – so how it survives was until recently unknown. The mystery has now been solved by Friederike Hilbert and colleagues at the Institute of Meat Hygiene, Meat Technology and Food Science of the University of Veterinary Medicine, Vienna.

The surface of meat harbours a number of species of bacteria that – fortunately – are rarely harmful to humans, although they are associated with spoilage. It seems possible that the various species interact and Hilbert hypothesized that such interactions might help bacteria such as *Campylobacter jejuni* survive under hostile, oxygen-rich conditions. She thus tested the survival of *C. jejuni* in the presence of various meat-spoiling bacteria. When incubated alone or together with bacteria such as *Proteus mirabilis* or *Enterococcus faecalis*, *Campylobacter* survived

atmospheric oxygen levels for no longer than 18 hours. However, when incubated together with various strains of *Pseudomonas*, *Campylobacter* were found to survive for much longer, in some cases over 48 hours, which would be easily long enough to cause infection.

There were differences in the extent of prolonged survival depending on the sources of the *Campylobacter* analysed but all isolates of all strains clearly survived significantly longer in the presence of *Pseudomonas* bacteria than when cultured alone. And the *Campylobacter* cells did not change shape when cultured together with *Pseudomonas* under oxygen-rich conditions, unlike when they were cultured alone, providing further indications of an interaction between the species. Interestingly, there is no evidence that the *Pseudomonas* benefit at all from the interaction, although they effectively save the lives of the *Campylobacter*.

Hilbert's findings show clearly that the presence of *Pseudomonas* bacteria is responsible for significantly enhanced survival of the disease-causing *Campylobacter* bacteria on the surface of meat. The results have implications for the control of meat, especially poultry, destined for human consumption. As Hilbert says, "On the basis of this study it should be possible to elucidate new mechanisms for limiting the level of *Campylobacter* on chicken meat and thus the incidence of [food poisoning](#) could be much reduced."

**More information:** The paper Survival of *Campylobacter jejuni* under Conditions of Atmospheric Oxygen Tension with the Support of *Pseudomonas* spp. by Friederike Hilbert, Manuela Scherwitzel, Peter Paulsen and Michael P. Szostak is published in the September issue of the *Journal Applied and Environmental Microbiology* (Vol. 76, 5911-5917).

Provided by University of Veterinary Medicine -- Vienna

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