

Salmonella survives better in stomach due to altered DNA

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Since 1995 there has been a considerable increase in the number of infections with a specific type of Salmonella bacteria transmitted via food. This type, Salmonella serovar Typhimurium DT104, is resistant to at least five different antibiotics. Dutch researcher Armand Hermans found new genetic information in DNA of DT104 that might be involved in its survival and infection mechanism. This genetic information might also be involved in the increase in the number of infections caused by this pathogen.

By comparing the DNA of Salmonella serovar Typhimurium DT104 with the known DNA code of another Salmonella strain, Hermans found new DNA fragments in DT104. These pieces of DNA were found to contain genetic information that might play a role in the survival and infectiousness of this pathogen. The presence of such extra genetic characteristics can make the pathogen stronger and more infectious.

To examine how DT104 behaves to survive various "extreme" conditions, the switching on and off of 500 genetic characteristics was studied. This happened under different conditions such as in a hot, acid or oxygen-free environment. Almost all of the survival characteristics were found to be active under all conditions, whereas the pathogenic characteristics were only active under a few of the conditions. Therefore this pathogen always does everything it can to survive under all conditions, for example, during food conservation or in gastric acid. The pathogenic characteristics of DT104 on the other hand are only active in the intestines where the infection takes place.

The DNA of the pathogen says something about how it survives and is transmitted. When a pathogen reproduces, the DNA can change a bit and this can lead to changes in the genetic characteristics. This can, for example, lead to antibiotic resistance but also heat or acid resistance. The pathogens with the best genetic characteristics can spread and survive better and are therefore more infectious: the evolution of a pathogen. Examining which genetic characteristics are present in an infectious Salmonella (in this case the DT104 type) can reveal how this pathogen has become stronger and caused more outbreaks. This information can also be used to make a less dangerous variant of this infectious Salmonella. Such a harmless variant can be used as a vaccine.

Salmonella serovar Typhimurium DT104 is an antibiotic-resistant pathogen that is transmitted via food and is considered to be dangerous for humans. In recent decades the number of infections with this variant has increased in many parts of the world. This research was funded by NWO and contributes to knowledge about the characteristics and behaviour of this dangerous Salmonella.

Source: NWO

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