

Safe clearance of salmonella

September 14 2010



Nasty affair: salmonella (red) penetrating cells in a cell culture. Photo: Wikipedia / Rocky Mountain Laboratories, NIAID)

Individuals with an intact complex gut flora are more likely to clear Salmonella after an infection than individuals with an altered, less complex gut flora. This is suggested by results from a mouse model for Salmonella diarrhea asking why certain people become chronic carriers after a salmonella infection.

Salmonella is troublesome - and can become even more so: even long after an infection has been overcome, certain people can become chronic carriers. They feel healthy, no longer notice any signs of the infection and don't have diarrhoea. However, they still excrete a large number of the [pathogens](#) in their faeces even weeks after recovery and, unintentionally, can thus pass on the intestinal disease.

Wolf-Dietrich Hardt, a professor of microbiology at ETH Zurich, and his team have now discovered the circumstances under which an individual can become a chronic carrier of [salmonella](#) in a [mouse model](#).

Immune response not enough by itself

In the case of a first infection with a pathogenic salmonella strain, the mouse (and person) affected develops so-called secretory [antibodies](#) to fight the germ. In the case of a second infection with the same bacteria strain, these antibodies help rendering the intruders innocuous in the gut lumen.

This standard immune response, however, doesn't explain why single individuals become chronic carriers. For instance, the experiments showed that genetically modified mice without the corresponding antibodies cleared the pathogen once and for all.

Intestinal bacteria dispose of the competition

The microbiologists only discovered the clearance mechanism at second glance. Like in the human gut, tens of billions of various types of bacteria also live in mouse intestines - commensal bacteria that grow densely in the gut.

The experiments have now revealed the advantage of mice that are well-equipped with [gut flora](#): if it's diverse and complex, salmonella has little chance of settling permanently in the gut, becoming dislodged and disposed of in the faeces.

Hardt and his team have created a mouse whose gut flora is extremely simple and species-poor. In these mice, the pathogen can implant itself, regardless of the remaining [immune response](#). Whilst the carrier no

longer feels any effects of the infection, traces of the pathogens remain in the faeces even weeks after the infection.

One percent of patients affected

Humans, Hardt suspects, should have a similar mechanism to mice. However, chronic carriers are rare in humans: only one percent of patients have salmonella in their faeces long after overcoming the disease. “In Germany, only 500 in every 50,000 patients would be affected”, says the ETH-Zurich professor.

For people who work in the food industry, especially meat processing, this is serious; they can’t work until all traces of salmonella have disappeared. Treatment methods can be quite crude. Patients are sent into quarantine and given antibiotics. If that doesn’t contain the disease, the gall bladder might be removed. “That’s where the salmonella seems to settle more long-term if it can’t be eliminated altogether”, says Hardt.

If a way could be found to supplement and stabilise the patients’ gut flora permanently with a greater variety of bacteria, persistent Salmonella infections might subside without drastic intervention. However, that is still a long way off. For the time being, we still know far too little about how the commensal bacteria work to manipulate or use them specifically for therapeutic purposes.

More information: Endt K, Stecher B, Chaffron S, Slack E, Tchitchek N, et al. 2010 The Microbiota Mediates Pathogen Clearance from the Gut Lumen after Non-Typhoidal Salmonella Diarrhea. PLoS Pathog 6(9): e1001097. [doi:10.1371/journal.ppat.1001097](https://doi.org/10.1371/journal.ppat.1001097)

Provided by ETH Zurich

Citation: Safe clearance of salmonella (2010, September 14) retrieved 10 April 2024 from <https://phys.org/news/2010-09-safe-clearance-salmonella.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.