How meningitis bacteria 'slip under the radar'

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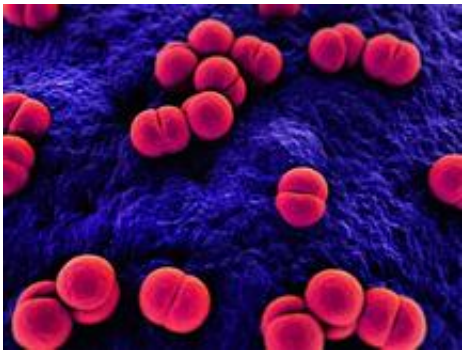

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(Phys.org) —Scientists have discovered a natural temperature sensor in a type of bacteria that causes meningitis and blood poisoning. The sensor allows the bacteria to evade the body's immune response, leading to life-threatening infections.

Professor Christoph Tang, who led the research at the Sir William Dunn School of Pathology, University of Oxford, said: 'These infections are extremely dangerous to vulnerable groups, particularly young children, and can cause blindness, brain damage and limb loss. We hope that this research will help us understand how the bacteria cause disease, and might one day help us prevent serious infection.'

Professor Tang's team found that increasing temperature causes the

bacteria to make more of a protective layer, or capsule, that surrounds the bacterium like an 'invisibility cloak' and helps it evade detection by the immune system.

Their research suggests that people may be more susceptible to infection by the bacteria when they have a high temperature, and could explain why outbreaks of flu (which causes fever) are often followed by an increase in cases of sepsis and meningitis.

The findings also shed light on how these bacteria evolved into dangerous killers and might help scientists develop new vaccines against the bacteria in future.

The study was funded by the Medical Research Council and the Wellcome Trust, and is published in the journal *Nature*.

Meningococcus bacteria are found naturally in up to a third of the population. In most cases they are completely harmless, but in certain circumstances they can invade the bloodstream and brain, causing serious 'meningococcal' illness. One of these illnesses, sepsis (more commonly known as blood poisoning), is extremely serious and is fatal in around one in 10 cases. Meningococcal illness is also the leading infectious cause of death in early childhood.

Understanding bacterial defence mechanisms has been important in developing existing vaccines, so researchers at the University of Oxford and Imperial College London wanted to investigate these mechanisms further.

They studied the bacteria in the laboratory to see how they behave at different temperatures, and they found that capsule production is controlled by tiny temperature sensors in the bacteria's genetic code.

A rising temperature acts as a 'danger signal' for the bacteria, causing them to produce more protective capsule and other molecules essential for resistance against an immune response.

This suggests that the bacteria can evolve over time to survive more hostile attacks from the body. Those that do survive will be conditioned to respond to the body's heat, making them more virulent and allowing them to move to warmer areas below the surface of the throat, where they can cause infection.

Professor Doreen Cantrell, Chair of the MRC Infections and Immunity Board, which funded the study, said: 'Understanding how bacteria work and interact with the immune system is critical for developing new treatment strategies for infectious diseases. This research gives us some fascinating new insights into how the bacteria that cause meningitis evolved into such a dangerous killer and could help inform future strategies to prevent this disease.'

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