

Catching the blood cell bus gives fatal yeast infection a clean getaway

September 9 2008

Yeast fungus cells that kill thousands of AIDS patients every year escape detection by our bodies' defences by hiding inside our own defence cells, and hitch a ride through our systems before attacking and spreading, scientists heard today (Tuesday 9 September 2008) at the Society for General Microbiology's Autumn meeting being held this week at Trinity College, Dublin.

Cells of the *Cryptococcus* yeast responsible for one of the three most life-threatening infections that commonly attack HIV infected patients, causing cryptococcal meningitis, are using a previously unknown way to avoid detection, according to scientists from the University of Birmingham, UK.

"We have shown that these airborne yeast cells can hide inside our bodies' own white blood cells, called macrophages, and then use them as vehicles to travel around inside our bodies, using them just like a bus," said Miss Hansong Ma of the University of Birmingham. "The yeast cells then escape from inside the macrophages when they arrive at the right destination – but importantly, they do this without killing the macrophage, which would trigger alarm bells."

When a host's cells are invaded by bacteria, fungi or viruses the invaders usually use the opportunity to multiply inside the cells and escape by bursting out, killing the host and releasing thousands of copies of the pathogen to attack other cells. The death of the host cell releases debris and by-products which usually triggers our bodies into mounting an

immune response, causing inflammation.

"This new method of remaining inside the host cells means that the pathogen can spread more efficiently round our bodies and is protected from the natural defences in our bloodstream that would normally kill the yeast or other invader," said Hansong Ma. "Yeast cells avoid killing or damaging the macrophages. They leave by a method that we call 'vomocytosis'; the yeast cells are acting like spies rather than terrorists, and go unnoticed, giving them more time to establish an infection."

Although the use of antiretroviral drugs is cutting the number of AIDS patients with Cryptococcus infections there is still a major epidemic in Southeast Asia and Africa. Up to 30% of AIDS patients there are infected, and up to 44% will die from the disease within 8 weeks. Even in the USA or European countries like France where antiretroviral drug treatments are readily available, one in ten infected patients will die.

"We badly need to better understand the interaction between hosts, viruses and attacking pathogens like the yeast fungus to help us find new drug targets and so design new ways to treat these patients," said Hansong Ma.

"We used time-lapse microscope photography to identify this new escape mechanism, and watched the yeast cells escaping into the fluid surrounding cells or, remarkably, directly into other host cells through cell-to-cell transmission, continuing to avoid detection by using this extremely rapid vomocytosis," said Hansong Ma. "Worryingly, this enables the cryptococci to avoid antifungal drugs and other treatments as well as our normal immune system, and may allow the yeast to become latent, achieving a long-term infectious state which could then be spread even further, to other individuals, without anyone realising."

Source: Society for General Microbiology

Citation: Catching the blood cell bus gives fatal yeast infection a clean getaway (2008, September 9) retrieved 19 April 2024 from <https://phys.org/news/2008-09-blood-cell-bus-fatal-yeast.html>

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