

Scientists film inner workings of the immune system

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Forget what's number one at the box office this week. The most exciting new film features the intricate workings of the body, filmed by scientists using ground-breaking technology.

For the first time in Australia, scientists at Sydney's Centenary Institute have filmed an immune cell becoming infected by a parasite and followed the infection as it begins to spread throughout the body.

Professor Wolfgang Weninger, head of the Immune Imaging program at the Centenary Institute, says the discovery (published in *PLoS Pathogens*) was made possible using high powered multi-photon microscopy which allows real cells to be viewed in real time.

"Using multi-photon microscopy, we studied dendritic cells in the skin. Under normal conditions we found the cells in the epidermis (top layer) were static, whereas in the dermis (second layer) they were very active, moving around as though seeking out pathogens," explains Professor Weninger. "Once we established this, it was fascinating to introduce the Leishmania infection and watch as the parasite was picked up by the cells and the process by which it began to spread throughout the body."

Leishmaniasis affects up to 12 million people in parts of Africa, the Middle East and South America. The disease causes skin sores and can affect internal organs such as the spleen, liver and bone marrow. If left untreated, it can be fatal.

The ability to visually follow a pathogen on its journey through the immune cells provides critical insight for future vaccine design and has potential to improve current vaccinations.

"We now have a general idea of how pathogens are recognised by the immune system and which cells are involved," Professor Weninger says. "This means we can look at identifying the molecules responsible for the uptake of Leishmania infection and these molecules could become vaccine targets. Additionally, we can investigate the immune responses of other infections which could lead to better vaccines."

"On the other side of the story, scientists can now visualise the pathway of current vaccines in the immune system, providing greater understanding and the potential for refining current interventions against disease."

Centenary Institute Executive Director, Professor Mathew Vadas, says the multi-photon microscope used to film this immune process is the Hubble telescope of medical research.

"The Hubble allowed the universe to be seen with absolute clarity, which wasn't before possible from earth," he explains. "This is exactly the same as multi-photon microscopy – it provides a unique and innovative view of cells, unveiling a whole new understanding of how immune processes work."

Source: Research Australia

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