# How our immune system targets tuberculosis

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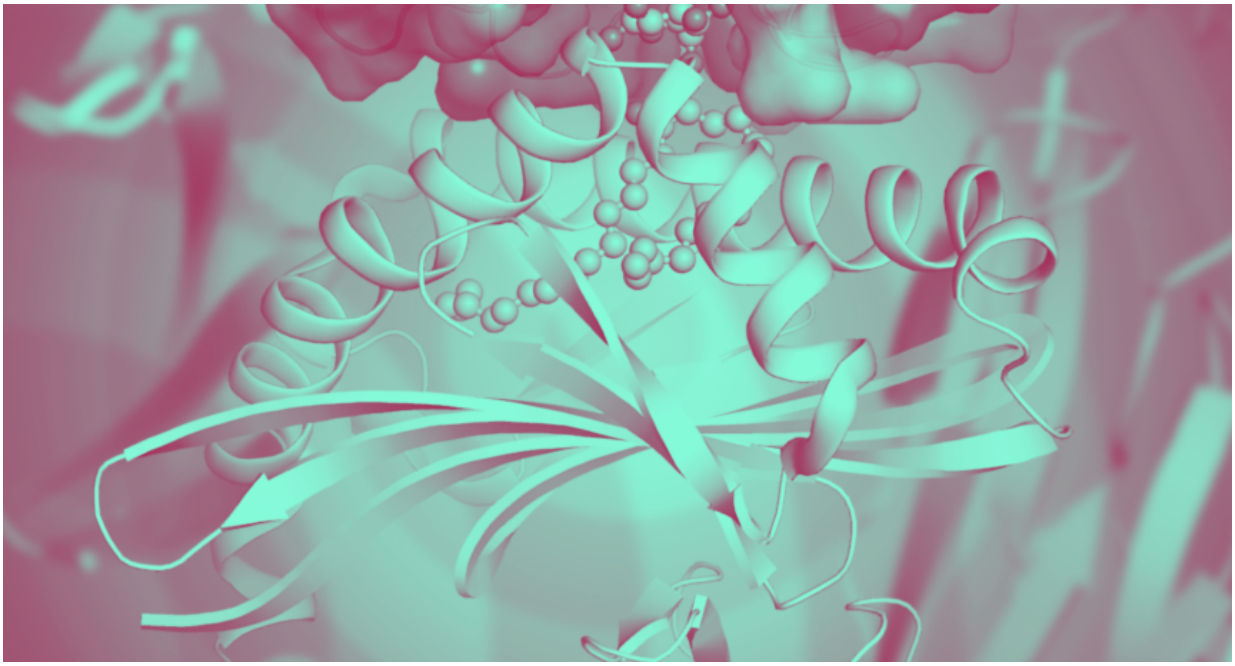

Stylized image of the CD1 protein presenting microbial lipids to T cells. Credit: Imaging CoE

Every 18 seconds someone dies from tuberculosis (TB). It is the world's most deadly infectious disease.

*Mycobacterium tuberculosis*, the causative agent of TB, has infected over one-third of the entire human population with an annual death toll of approximately 1.5 million people.

For the first time, an international team of scientists from Monash and Harvard Universities have seen how, at a molecular level, the human immune system recognises TB infected cells and initiates an immune response. Their findings, published in *Nature Communications*, are the first step toward developing new diagnostic tools and novel immunotherapies.

Lead author, Professor Jamie Rossjohn says one of the main reasons for our current lack of knowledge comes down to the complexity of the bacterium itself. Working with Professor Branch Moody's team at Harvard, they have begun to gain key insight into how the immune system can recognise this bacterium.

Crucial to the success of *M. tuberculosis* as a pathogen is its highly unusual cell wall that not only serves as a barrier against therapeutic attack, but also modulates the host immune system. Conversely, its cell wall may also be the "Achilles' heel" of mycobacteria as it is essential for the growth and survival of these organisms. This unique cell wall is comprised of multiple layers that form a rich waxy barrier, and many of these lipid—also known as fatty acids—components represent potential targets for T-cell surveillance.

Specifically, using the Australian Synchrotron, the team of scientists have shown how the immune system recognises components of the waxy barrier from the *M. tuberculosis* cell wall.

"With so many people dying from TB every year, any improvements in diagnosis, therapeutic design and vaccination will have major impacts," Professor Moody says.

"Our research is focussed on gaining a basic mechanistic understanding of an important biomedical question. And may ultimately provide a platform for designing novel therapeutics for TB and treat this

devastating disease," Professor Rossjohn concludes.

**More information:** Stephanie Gras et al, T cell receptor recognition of CD1b presenting a mycobacterial glycolipid, *Nature Communications* (2016). DOI: 10.1038/ncomms13257

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