

How the body uses vitamin B to recognize bacterial infection

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An Australian research team has discovered how specialised immune cells recognise products of vitamin B synthesis that are unique to bacteria and yeast, triggering the body to fight infection.

The finding opens up potential targets to improve treatments or to develop a vaccine for tuberculosis.

The study, jointly led by the University of Melbourne and Monash University and published today in the journal *Nature*, has revealed for the first time that the highly abundant mucosal associated invariant [T cells](#) (MAIT cells), recognise products of [vitamin B](#) synthesis from bacteria and yeast in an early step to activating the immune system.

The research revealed how by-products of bacterial vitamin synthesis, including some derived from Folic acid or [vitamin B9](#) and [Riboflavin](#) or vitamin B2, could be captured by the immune receptor MR1 thus fine-tuning the activity of MAIT cells.

Dr Lars Kjer-Nielsen from the University of Melbourne led the five year study.

"Humans are unable to make vitamin B and obtain it mostly from diet. Because bacteria can synthesise vitamin B, our immune system uses this as a point of difference to recognise infection," he said.

"Given the relative abundance of the MAIT cells lining mucosal and

other surfaces, such as the [intestine](#), the mouth, lungs, it is quite probable that they play a protective role in many infections from thrush to tuberculosis.

"This is a significant discovery that unravels the long sought target of MAIT cells and their role in immunity to infection."

Professor James McCluskey of the Department of Microbiology and Immunology at the University of Melbourne said the discovery opened up opportunities for [vaccine development](#) and other potential therapeutics.

"This is a major breakthrough in which Australian researchers have beaten many strong research teams around the world, becoming the first to unlock the mystery of what drives a key component of our immune system," he said.

Monash University's Professor Jamie Rossjohn said the findings had major implications for understanding the interplay between gut bacteria and the immune system.

"Some [vitamin](#) by-products appear to drive immunity while others dampen it," Professor Rossjohn said.

The next step is to explore whether MAIT cells might also be involved in intestinal or mucosal disorders such as inflammatory bowel disease and irritable bowel syndrome.

"This discovery now cracks open a new field in immunology and we can expect many research groups to focus their attention on this system," Professor Rossjohn said.

"The discovery also involved collaborators at Melbourne's Bio21

Molecular Science and Biotechnology Institute, Metabolomics Australia and the University of Queensland, reflecting the importance of collaboration between researchers to be globally competitive," Professor McCluskey said.

Provided by University of Melbourne

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