

Immune cells: Learning from experience

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Immunologists have shown that our immune cells can learn on the job.

Even better, some [cells](#) remember what they have learnt, and can apply it in response to future challenges.

The research, published as the cover story of the first 2015 edition of the journal *Immunity*, focused on T-helper cells, a type of T cell that helps other [immune cells](#) by releasing messenger substances or cytokines.

Dr Andreas Kupz, a researcher from James Cook University in Cairns, Australia, is a co-author of the paper, 'Set Theory for Immune Cells'.

"We already knew that T cells could produce different quantities of a messenger substance, but until now it was assumed this was randomly determined," Dr Kupz said.

"What we have been able to establish is that when a T-helper cell is activated by an [infection](#), it 'learns' which cytokine it needs to produce, and in what quantity."

An international team of researchers found that if the infection is conquered, some of the T-helper cells are able to retain the information through the amount of a specific factor present in the nucleus of the cells.

"When they later face a new infection, these memory T cells are activated and they release that pre-determined quantity of cytokine," Dr

Kupz said.

"Cytokines are messenger substances that regulate our [immune](#) responses. Understanding how T-helper cells manage them opens the door to exciting possibilities.

"For example we might, in the future, be able to strengthen a specific immune reaction. Or, we could perhaps reduce the misdirected immune responses that cause inflammation."

The research was conducted by scientists from the Charité - Universitätsmedizin and the Max Planck Institute for Infection Biology, both in Berlin, the University of Heidelberg, the National Institutes of Health in Bethesda, USA, and James Cook University.

After studying at Humboldt University in Berlin and completing his PhD at The University of Melbourne, Andreas Kupz received a CJ Martin Fellowship from the National Health and Medical Research Council to work with Professor Nick Smith at James Cook University in Cairns.

He is spending two years of his Fellowship studying the immunology of tuberculosis with Professor Stefan Kaufmann at Berlin's Max Planck Institute for Infection Biology.

"Andreas is a highly valued member of our team at the Australian Institute of Tropical Health and Medicine at JCU in Cairns," Professor Smith said.

"After completing his projects in Berlin, including his contribution to this ground-breaking paper, he will return to Cairns with a wealth of experience to apply to our work on important tropical infectious diseases."

Provided by James Cook University

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