Multi-layered armor protects body against immune failure

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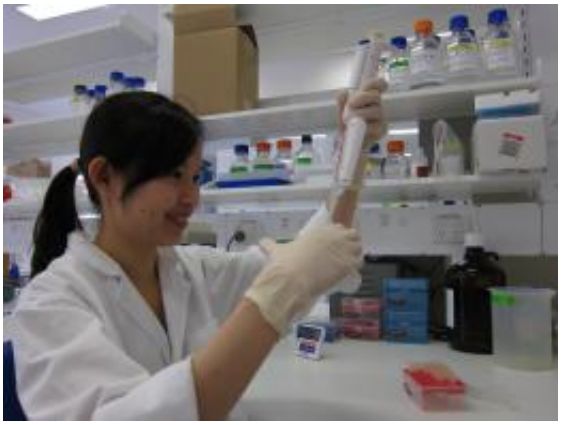

The human body incorporates multiple fail-safe mechanisms to protect it against the "friendly fire" from its immune system known as autoimmune disease, Charis Teh and colleagues at the John Curtin School of Medical Research (JCSMR) at the Australian National University have found.

The work should lead to a better understanding of autoimmune conditions, such as diabetes and rheumatoid arthritis, she says, and may even provide new ways to target treatments.

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autoimmune disease, Charis Teh and colleagues at the John Curtin School of Medical Research (JCSMR) at the Australian National University have found.

“Why the immune system sometimes attacks different parts of our body is still poorly understood,” Charis says. “Consequently, no specific prevention or treatment is yet available.”

Autoimmmune diseases collectively affect more than one in 20 Australians. As well as diabetes, they include multiple sclerosis, thyroid disease, and lupus.

The JCSMR researchers, led by Charis’ supervisors, Professor Chris Goodnow and Dr. Anselm Enders, have focused their work on understanding the progress of a condition caused by a single genetic defect, Autoimmune Polyendocrine Syndrome 1. People with this disease often seem perfectly healthy before the first vital organ is attacked, usually in childhood. Then come attacks on additional organs. Different organs are affected in different people, and the age when problems begin varies.

By studying a mouse strain incorporating an equivalent gene defect, the researchers discovered that the immune system is engineered with a series of back-up systems against such friendly fire, like multiple layers of armor.

Normally, any immune cells that could attack organs in the body are eliminated within the thymus gland where they develop, before they are released into the bloodstream. In the mice with the Autoimmune Polyendocrine Syndrome 1 gene defect, this does not happen. Despite this, the mice remain healthy, because a backup mechanism steps in to disable the ability of the rogue cells to launch an attack on the body’s tissue.

But when this backup mechanism is crippled by introducing a second genetic change, the mice succumb to a disastrous immune attack. Even then, many organs are still not attacked, suggesting they are protected by additional backup systems.

The work was published recently in the US journal, *Proceedings of the National Academy of Science*.

Charis Teh is one of 16 early-career scientists unveiling their research to the public for the first time thanks to Fresh Science, a national program sponsored by the Australian Government. Her challenges included presenting her discoveries in verse at a Melbourne pub.

Provided by Fresh Science