



Assistant Professor Yusuf Ali and his team aim to conduct deeper research to spur better-targeted drugs and treatments that could potentially help pre-diabetic patients reverse their condition. ST PHOTO: ALPHONSUS CHERN

# NTU-led team discovers key to pre-diabetes insulin production

**Timothy Goh**

A team of researchers, which includes scientists from Nanyang Technological University (NTU), has discovered that a type of immune cell can be harnessed through targeted treatment to help prevent Type 2 pre-diabetic patients from turning fully diabetic.

Led by Assistant Professor Yusuf Ali from NTU's Lee Kong Chian School of Medicine, the team learnt in their five-year study that a previously overlooked group of cells, known as pancreatic islet macrophages, is capable of promoting insulin production during the pre-diabetes phase.

Pre-diabetes refers to the period

before one turns diabetic, when a patient's insulin resistance is high but the body is still attempting to produce more insulin in order to match the increased resistance, said Prof Yusuf last Friday.

Macrophages are large, specialised cells that identify, envelop and even destroy certain cells. Pancreatic islet macrophages reside closely to "beta cells" in the pancreas – key cells responsible for the synthesis and secretion of the hormone insulin, which regulates blood sugar levels.

The team of nine local researchers and one each from Sweden and Germany experimented on mice that had diabetes artificially induced in them, as well as organs from human donors.

The team observed that the number of macrophages surrounding the beta cells increased in tandem with insulin production. When macrophages were removed, insulin levels fell and the mice transitioned from a pre-diabetic phase into full-on Type 2 diabetes. A similar fall in insulin levels was observed in the human organs.

The team believes that this is because the macrophages allow blood vessels to carry nutrients to the beta cells and carry insulin out to the rest of the body.

"For years, people were wondering what these macrophages were there for. We believe that they do confer an advantage early on (in pre-diabetes)," said Prof Yusuf.

He added that this is the first

time in the world such a discovery has been made in human organs. The study was published in the *American Journal Of Physiology – Endocrinology And Metabolism*.

Prof Yusuf said that one in nine people here has diabetes, but a larger proportion – one in three – either has undiagnosed diabetes or pre-diabetes.

He said current treatments tend to focus on patients who already have full-on diabetes, and not those with pre-diabetes.

"We are fighting diabetes at the wrong end... All (we're) doing in the hospitals is just fighting fires, instead of preventing the start of the fires," he said, adding that the drugs that diabetics take for their condition do not substitute the natural way in which the body produces insulin.

"What you need is a closed-loop system, where... the appropriate amount of insulin gets secreted and produced."

If the beta cells, as well as the islet macrophages surrounding them, can keep functioning for a longer period of time, patients should be much better off, he explained.

The next step is to keep them functioning optimally.

Noting the study, Dr Daniel Chew, head and senior consultant at Tan Tock Seng Hospital's Department of Endocrinology, said that the team had explored a "novel mechanism" and added that further research could lead to new therapies to prevent and treat Type 2 diabetes. He was not involved in the research.

Prof Yusuf said his team aims to conduct deeper research to spur better-targeted drugs and treatments that could potentially help pre-diabetic patients reverse their condition.

He said: "If you're in a pre-diabetes stage, it's better than being in a diabetes stage because your body is still producing enough insulin."

"So what we're trying to work on is to understand some of the factors behind pre-diabetes and keep people in this stage for as long as possible."

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