Breakthrough in diabetic heart disease

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Associate Professor Rajesh Katare and first author Ingrid Fomison-Nurse of the University of Otago. Credit: University of Otago

The molecule responsible for heart disease in diabetics has been identified by University of Otago researchers, greatly improving chances of survival.

Associate Professor Rajesh Katare, of the Department of Physiology,

says diabetes is an epidemic in New Zealand with more than 110,000 people diagnosed with type-2 diabetes, while 100,000 remain undiagnosed.

The leading cause of death in diabetics is cardiovascular disease.

"Diabetes leads to the progressive loss of heart muscle cells, accelerating ageing of the heart and increasing the risk of heart attack.

"However, the reason for this increased risk is not known. Understanding the reason will help in designing targeted therapies to reduce the risk of heart disease in diabetic individuals," he says.

The results of the world-leading study, just published in journal *Cell Death & Differentiation*, identified the molecule (microRNA-34a) responsible for accelerating the ageing of the heart.

Researchers studied blood samples of type-2 diabetics who were otherwise completely healthy, and heart tissue from both diabetics and non-diabetics.

Their results showed significant elevation of the molecule levels in the blood samples. Importantly, this elevation was observed even in the early stages of the disease.

Its presence in heart muscle cells confirmed the increased levels of the molecule as coming from the heart.

By therapeutically reducing the microRNA-34a levels in the heart muscle cells, they found diabetes induced ageing was significantly reduced, thereby improving chances of survival.

As heart disease in diabetics has such an insidious onset, there is often

very little time to diagnose and treat the disease.

"Cardiologists have, until now, not been able to diagnose diabetic heart disease before it has developed," Associate Professor Katare says.

This discovery has shown that, by monitoring the level of microRNA-34a in diabetic individuals, doctors can help identify those who are at risk of developing heart disease.

"This will allow GPs to either prescribe lifestyle modification, or closely monitor those individuals who show changes. Importantly, this can be done without the need for sophisticated equipment."

Another key finding of the study was, for the first time, increased microRNA-34a was identified in stem cells isolated from diabetic heart tissue.

Stem cell therapy is considered the next generation drug therapy for those resistant to conventional treatment, but it is ineffective in diabetic individuals due to defective stem cells.

"In this context, our finding sheds light on the reason behind the poor efficacy of diabetic stem cells," Associate Professor Katare says.

More information: Ingrid Fomison-Nurse et al. Diabetes induces the activation of pro-ageing miR-34a in the heart, but has differential effects on cardiomyocytes and cardiac progenitor cells, *Cell Death & Differentiation* (2018). DOI: 10.1038/s41418-017-0047-6

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