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Cardiac structure, function and energetics in type 2 diabetes and impaired glucose tolerance - A magnetic resonance study

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Aim: Type 2 diabetes (T2D) and impaired glucose tolerance (IGT; the pre-diabetic state) are associated with a significantly increased risk of developing cardiovascular disease and heart failure when compared to the healthy population. Despite this, there exists little discussion into the effect of T2D and IGT on cardiac torsion, the measure of "twist" during the cardiac cycle. This study will explore the effect of T2D and IGT on cardiac structure, function (including torsion) and metabolism using magnetic resonance methodologies.

Method: Seven adults diagnosed with IGT and T2D were age- and sex-matched to healthy controls without cardiac disease. Cardiac structure and function were assessed with high-resolution cardiac magnetic resonance imaging (MRI). High-energy phosphate metabolism was carried out with the use of ^{31}P-MR spectroscopy in order to obtain the phosphocreatine-to-ATP ratio (PCr / ATP); a measure of metabolic efficiency.

Result: Despite showing no significant changes in cardiac energetics (PCr / ATP), cardiac output or left ventricular mass, adults with T2D and IGT had significantly thicker left ventricular walls at diastole and systole than healthy controls and showed increased percentage thickening during contraction. The ratio of early to late ventricular filling (a measure of diastolic function) was significantly reduced (1.3 ± 0.5 vs. 2.0 ± 0.9 $p < 0.0005$) as well as an increased torsion (7.5 ± 1 vs. 6.2 ± 1 degrees $p = 0.039$) compared to controls.

Conclusion: Our findings suggest significant sub-clinical differences exist in cardiac structure and function in T2D and IGT. Studies are required to identify which specific differences are predictive of the excessive risk of cardiovascular disease associated with T2D and IGT.

Biography

Henry is in his final year of Medical school and has received a scholarship to undertake a Masters in research. He has produced the work in collaboration with Professor Mike Trenell.

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