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Title of project: Glucose fluctuations and cardiovascular disease in diabetes

ABSTRACT

Diabetes is responsible for approximately five million deaths per year with cardiovascular disease (CVD) being the leading cause. With the present proposal, we aim to delineate important pathophysiological mechanisms in development of CVD in diabetes, which may help target CVD in future diabetes treatment. In patients with type 2 diabetes (T2D), the predominant cause of death is coronary artery disease (CAD), which is diagnosed with coronary angiography (CAG) and mainly treated with subsequent percutaneous coronary intervention (PCI). However, patients with T2D treated with PCI, have more complications and increased mortality following acute coronary syndrome compared to non-diabetic PCI-patients. Furthermore in 1991, Tattersall et al. described a serial of cases of young, otherwise healthy patients with type 1 diabetes (T1D) who were found dead in the morning in an undisturbed bed, without any explanation. This "dead-in-bed" syndrome is suspected to be caused by hypoglycaemia-induced cardiac arrhythmias. However, since cardiac arrhythmias are relatively rare and may be clinically asymptomatic, especially during sleep, it has proved difficult to demonstrate a direct causal relationship. In order to overcome this obstacle, we plan to employ continuous glucose monitoring (CGM) in combination with implantable looprecorders (LR) which will provide extensive monitoring of cardiac rhythm and glycaemic excursions. The proposal consists of two studies focusing on: 1) investigating the link between hypoglycaemia and cardiac arrhythmias in T1D, and 2) exploring the significance of glycaemic control during acute ischaemia and percutaneous coronary intervention for stable angina pectoris in type 2 diabetes (T2D). The studies will contribute to our understanding of CVD in patients with diabetes and are expected to have implications on future treatment, morbidity and mortality. Identifying patients at risk of cardiac arrhythmias as results of hypoglycaemia may help guide therapeutic goals for patients with diabetes. Furthermore, an improved understanding of the effect of glycaemic control in the setting of coronary revascularisation and acute ischaemia may reduce complications and mortality after percutaneous coronary intervention.