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Multimodality imaging in metabolic heart disease

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STELLINGEN

Behorend bij het proefschrift

Multimodality Imaging in Metabolic Heart Disease

1. Diabesity describes the combined detrimental health effects of obesity and diabetes mellitus (Ng, *Nat Rev Cardiol* 2020; doi: 10.1038/s41569-020-00465-5).
2. Patients with obesity and diabetes can develop cardiac structural and functional changes independent of coronary heart disease. Known as metabolic heart disease, it is characterized by altered myocardial energetics with mitochondrial dysfunction, abnormal substrate usage with steatosis, cardiac autonomic neuropathy, increased interstitial collagen deposition, and subclinical myocardial dysfunction (*Curr Probl Cardiol.* 2011;36(1):9-47; *this thesis*).
3. 2-dimensional speckle tracking echocardiographic strain analysis can detect subclinical myocardial systolic and diastolic dysfunction in patients with uncomplicated type 2 diabetes (*Am J Cardiol.* 2009;104(10):1398-401; *this thesis*).
4. Both diabetes and increasing body mass index have an additive detrimental effect on LV myocardial systolic and diastolic functions (*J Am Soc Echocardiogr.* 2018;31(8):916-925; *this thesis*).
5. Patients with type 2 diabetes stores excess free fatty acid as triglycerides within the cellular cytoplasm resulting in myocardial steatosis. Myocardial triglyceride content can be quantified by using either the gold standard proton magnetic resonance spectroscopy, or a Dixon multi-echo gradient variable projection sequence with fat–water separation imaging (*Circ Cardiovasc Imaging.* 2018;11(8):e007372; *this thesis*).
6. Patients with higher myocardial triglyceride content have more impaired myocardial strain (*Circulation.* 2010;122(24):2538-44; *this thesis*).
7. Cardiac magnetic resonance T1 mapping does not directly measure the extracellular matrix but is a surrogate biomarker for the space that the extracellular matrix occupies. In myocardial diseases where collagen occupies

this extracellular space, T1 mapping extracellular volume imaging provides a non-invasive measurement of myocardial fibrosis (*Circ Cardiovasc Imaging*. 2012 Jan;5(1):51-9; *this thesis*).

8. Patients with type 2 diabetes and increased myocardial fibrosis on T1 mapping have more impaired myocardial strain despite preserved left ventricular ejection fraction (*Circ Cardiovasc Imaging*. 2012 Jan;5(1):51-9; *this thesis*).
9. Increased epicardial adipose tissue volume is independently associated with both increased myocardial steatosis and interstitial fibrosis. Increased epicardial adipose tissue volume is associated with detrimental effects on myocardial contractile function (*Circ Cardiovasc Imaging*. 2018;11(8):e007372; *this thesis*).
10. Subclinical myocardial dysfunction is independently associated with increased all-cause mortality in patients with type 2 diabetes. Decision curve analysis suggested that identifying subclinical myocardial dysfunction is clinically useful and provided incremental net clinical benefit (*Am J Cardiol*. 2019;124(6):892-898; *this thesis*).
11. The spectre of doubt for things that would be, the black dog of depression for things that should be, and the ghost of regret for things that could be. “It is during our darkest moments that we must focus to see the light” (*Aristotle*, 384BC – 322BC).
12. The quest for knowledge can be long, the road taken can be lonely, and the outcome can be in doubt. However, “success is not final, failure is not fatal: it is the courage to continue that counts” (*Winston Churchill*, 1874 - 1965).