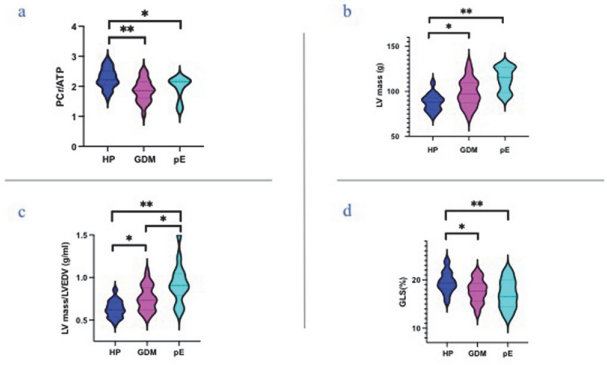
Purpose We sought to assess if women with GDM and women with pE in the third trimester of pregnancy exhibit adverse cardiac alterations in myocardial energetics, function or tissue characteristics.Methods- Thirty-eight healthy pregnant (HP) women, thirty women with GDM and fifteen women with pE were recruited, matched for age and ethnicity. Participants underwent phosphorus magnetic resonance spectroscopy and cardiovascular magnetic resonance for assessment of myocardial energetics (phosphocreatine to ATP ratio (PCr/ATP)), tissue characteristics, biventricular volumes and ejection fractions, left ventricular (LV) mass, global longitudinal strain (GLS) and mitral in-flow E/A ratio.

Results The biochemical characteristics and multiparametric MR results are given in Table-1. The women in the GDM and the pE groups had higher body-mass index. There was a stepwise increase in the systolic and diastolic BP from the HP to the GDM to the pE group. There was no difference in NTproBNP concentrations between the groups. The gestational weight gain was higher in women with GDM and pE compared to the HP group.The women in the GDM and the pE groups showed similar reductions in myocardial PCr/ATP ratios compared to HP group (Figure 1A), accompanied by lower LV end-diastolic volumes and higher LV mass (Figure 1B) and enhanced LV concentricity in both groups (Figure 1C). While LV ejection fractions were similar across the groups, the GLS was reduced in women with GDM and in women with pE (Figure 1D).



Violin plots demonstrating the differences in a) Myocardial PCr to ATP ratio; b) Left ventricular mass; c) Left ventrcular end-diastolic volumes indexed for the body surface area, and d) Left ventricular mass over left ventricular end diastolic volume ratio as a measure of concentricity index between the participants with gestational diabetes mellitus, pre-eclampsia and participants with healthy pregnancies**Abstract 137 Figure 1**

Conclusions We show here for the first time that despite no prior diagnosis of diabetes or hypertension, women with GDM or pE manifest impaired myocardial contractility and higher LV mass, associated with reductions in myocardial energetics. These findings may aid our understanding of the long-term cardiovascular risks associated with these conditions.

Conflict of Interest No conflict of interest

138 QUANTITATIVE MYOCARDIAL BLOOD FLOW AS A PROGNOSTIC MARKER FOR CARDIOVASCULAR OUTCOMES IN PATIENTS WITH TYPE 2 DIABETES MELLITUS: A MULTICENTRE STUDY

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Introduction Patients with Type 2 Diabetes Mellitus (T2DM) are at increased risk of cardiovascular disease, including epicardial coronary heart disease, silent myocardial infarction (MI), and coronary microvascular dysfunction (CMD). [1] All of these can be assessed and quantified using cardiac magnetic resonance (CMR), including most recently quantitative myocardial blood flow (MBF). We aimed to determine the prognostic relevance of MBF in patients with T2DM and test the hypothesis that impaired stress MBF and myocardial perfusion reserve (MPR) have independent prognostic value over standard clinical and imaging parameters.

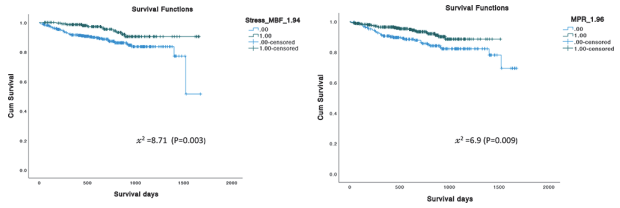
Methods A 4-centre study of patients with T2DM who underwent quantitative perfusion assessment using CMR. Diagnosis of T2DM was based on Hba1c 48 mmol/l or a known diagnosis of T2DM. Image analysis was performed automatically using an artificial intelligence approach deriving global MBF and MPR. [2] Cox proportional hazard models adjusting for comorbidities and CMR parameters sought associations between stress MBF and MPR with death and major adverse cardiovascular events (MACE), including MI, non-fatal stroke, heart failure hospitalisation and death.

Abstract 138 Table 1 Patient characteristics divided into groups based on stress myocardial blood flow (MBF) thresholds (more than or less than 1.94ml/g/min). Groups are then compared with one another using the appropriate test (independent t test or chi squared). P value is considered significant at the <0.05. Continuous variables are presented as mean+/- SD. Dichotomous variables are presented as number (%)

	All patients (n=630)	Stress MBF>1.94 (n=214)	Stress MBF<1.94 (n=416)	P value
Age (years)	64+/- 10	62+/- 10	66+/- 10	<0.001
Male gender	418 (66%)	127 (59%)	291 (70%)	0.008
Ethnicity (White)	388 (62%)	126 (59%)	262 (63%)	0.350
Ethnicity (other)	240 (38%)	87 (41%)	153 (37%)	0.390
BSA (m^2)	1.98 +/- 0.26	2.00+/- 0.24	1.97+/- 0.27	0.223
Previous PCI/CABG/MI	147 (23%)	37 (17%)	110 (26%)	0.01
HTN	346 (55%)	110 (49%)	236 (57%)	0.17
HbA1C (mmol/mol)	58+/- 16	57+/- 15	59+/-16	0.148
Cholesterol (mmol/l)	4.57+/- 1.44	4.54+/- 1.43	4.58+/- 1.46	0.895

Abstract 138 Table 2 CMR parameters based on stress myocardial blood flow (MBF) thresholds (more than or less than 1.94ml/g/min). Groups are compared using the appropriate test (independent t test or chi squared). P value is considered significant at the <0.05. Continuous variables are presented as mean+/- SD. Dichotomous variables are presented as number (%). MBF-Myocardial blood flow; MPR-Myocardial perfusion reserve; LV- Left ventricle; LVEF- Left ventricular ejection fraction; LVEDV- Left ventricular end-diastolic volume; LGE-Late gadolinium enhancement.

CMR Parameter	All patients (n=630)	Stress MBF>1.94 (n=214)	Stress MBF<1.94 (n=416)	P value
LVEF (%)	57 +/- 15	61+/- 13	56+/- 16	<0.001
LVEDV (ml)	157+/- 58	146+/- 51	162+/- 61	0.002
LV Mass (g)	120 +/- 35	113+/- 33	123+/- 36	0.001
Global Stress MBF (ml/g/min)	1.71+/- 0.58	2.39+/- 0.45	1.42+/- 0.33	<0.001
MPR	2.19+/- 0.91	2.53+/- 1.05	2.04+/- 0.79	<0.001
LGE ischaemic	169 (27%)	28 (13%)	141 (34%)	<0.001
LGE non-ischaemic	154 (25%)	43 (21%)	111 (27%)	<0.001
No LGE	301 (48%)	139 (66%)	162 (39%)	<0.001



Abstract 138 Figure 1 Kaplan-Meier survival estimate curves for MACE events using stress myocardial blood flow (MBF) and myocardial perfusion reserve (MPR). Survival curves are represented as <1.94ml/g/min or 1.96 MPR in the blue line and >1.94ml/g/min or 1.96 in the green line. P value is considered significant at <0.05

Results A total of 630 patients with T2DM were included with a median follow-up of 722 days (interquartile range 493) days. There were 27 (4.3%) deaths and 76 MACE events in 62 (12.1%) patients. Patient data was represented into groups depending on threshold stress MBF values of 1.94 ml/g/min and MPR thresholds of 1.96 using validated data from invasive coronary physiology [3]. Patient demographics are seen in table 1 and CMR data in table 2. Kaplan-Meier curves are seen in figure 1. Stress MBF was associated with mortality and MACE after adjusting for age, LV ejection fraction and HbA1c. The stress MBF adjusted hazard ratios for all cause death and death and MACE were 0.35 (95% CI, 0.13–0.95, P=0.04) and 0.54 (95% CI, 0.30–0.96, P=0.04), respectively. MPR was not significantly associated with death and MACE after adjusting for age, LV ejection fraction and HbA1c; hazard ratio for all cause death and death and MACE was 0.83 (95% CI, 0.41–1.69, P=0.60) and 0.81(95% CI, 0.53–1.23, p=0.32) respectively. DiscussionIn patients with T2DM, reduced stress MBF measured automatically inline using artificial intelligence quantification of cardiovascular magnetic resonance perfusion mapping provides a strong, independent predictor of adverse cardiovascular outcome.

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Conflict of Interest Nil

139 AUTOMATED DEEP LEARNING QUANTIFICATION OF EPICARDIAL ADIPOSITY ON CARDIAC CT PREDICTS ATRIAL FIBRILLATION RISK IMMEDIATELY FOLLOWING CARDIAC SURGERY AND LONG-TERM

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Introduction Epicardial adipose tissue (EAT) is a visceral fat deposit within the pericardial sac which surrounds the heart myocardium and coronary arteries. The automated quantification of EAT volume is possible from routine CCTA scans via a deep-learning approach. The use of automated EAT quantification for the assessment of atrial fibrillation (AF) risk in the post-operative period, and longer-term, has not been previously investigated.

Purpose To apply a deep-learning approach for automated segmentation of EAT from routine CCTA scans to assess the immediate post-operative and long-term risk of AF conveyed by EAT.

Methods A deep-learning automated EAT segmentation tool using a 3D Residual-U-Net neural network architecture for 3D volumetric segmentation of CCTA data was created and trained on over 2800 consecutive CCTA performed as part of clinical care in patients with stable chest pain from 2015 onwards within the European arm of the Oxford Risk Factors And Non Invasive Imaging (ORFAN) Study. External validation in 817 patients demonstrated excellent correlation between machine and human expert (CCC = 0.972). The prognostic value of deep-learning derived EAT volume was assessed in the AdipoRedOx Study (n=253; UK patients undergoing cardiac surgery) against both immediate in-hospital outcomes and longer-term outcomes from UK-wide NHS data, with adjustment for AF risk factors.

Results There were 97 cases of new-onset AF in the immediate post-operative period (38.3%). EAT volume was found to be an independent predictor of post-operative AF regardless of body mass index. Utilising the median EAT volume as the cut point, the adjusted hazard ratio (HR[95%CI]) for risk of new-onset post-operative AF in-hospital was 1.56[1.09–3.85],