

**Methods** Fifty-one participants (37 non-obstructive HCM and 14 age, sex & BMI-matched controls) underwent 4D-flow CMR. Left ventricular (LV) end-diastolic volume was separated into four components: direct flow (blood transiting the ventricle within one cycle), retained inflow (blood entering the ventricle and retained for one cycle), delayed ejection flow (retained ventricular blood ejected during systole), and residual volume (ventricular blood retained for over two cycles).

**Results** HCM patients demonstrated greater direct flow compared to controls ( $47.5 \pm 9\%$  vs  $39.4 \pm 6\%$ ,  $p=0.003$ ), and reduction in other components. In contrast to controls, HCM exhibited a paradoxical reduction in stroke volume ( $r=-0.31$ ) with increasing direct flow suggesting diminished cardiac reserve. This direct flow component proportion correlated with LV mass index ( $r=0.38$ ), end-diastolic volume index ( $r=-0.42$ ), and SCD risk ( $r=0.38$ ). Neither LV ejection fraction, nor stroke volume correlated with markers of phenotypic severity.

**Conclusion** HCM possesses a distinctive pattern of flow component distribution typified by direct flow-stroke volume decoupling, and in keeping with a diminished cardiac reserve. The correlation of direct flow proportion with phenotypic severity and SCD risk highlights its potential as a novel and sensitive haemodynamic measure of cardiovascular risk in patients.

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#### HIV ASSOCIATED CARDIOVASCULAR DISEASE BASED ON ADVANCED CARDIAC IMAGING: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Objective** To systematically review and meta-analyse data from advanced cardiovascular imaging studies evaluating computed tomography coronary angiography (CTCA), positron emission tomography (PET), and cardiac magnetic resonance (CMR), in people living with HIV (PLHIV) compared to uninfected individuals.

**Methods** Three databases were searched for studies investigating the association between cardiovascular pathology and HIV using CTCA, CMR and PET in PLHIV from inception to February 11th 2022. Primary outcomes moderate to severe (>50%) coronary stenosis (CTCA), vascular and myocardial target-to-background ratio (PET), late gadolinium enhancement prevalence (CMR). Prevalence and risk ratios (RR) (comparing PLHIV to uninfected individuals) were pooled for using a random effects model.

**Results** Forty-five studies including 5218 PLHIV (mean age 48.5 years) and 2414 uninfected individuals (mean age 49.1

years) met the inclusion criteria. Sixteen studies ( $n=5107$  participants) evaluated CTCA, 10 ( $n=681$ ) vascular PET, 3 ( $n=146$ ) both CTCA and vascular PET, and 16 ( $n=1698$ ) CMR. No studies originated from low-income countries. The prevalence of moderate/severe coronary disease in 17.3% in PLHIV and 13.8% in controls (RR 1.33, 95%CI 0.96–1.82,  $I^2=62\%$ ). The prevalence of myocardial fibrosis was 47.5% in PLHIV and 31.7% in controls (RR 2.34, 95% confidence interval [CI] 1.34–4.08,  $I^2=88\%$ ). PET studies indicated that PLHIV have an increase in vascular inflammation however these findings are derived from populations with well controlled HIV in middle age.

**Conclusion** Significant associations were observed between HIV and risk of myocardial fibrosis but not moderate to severe coronary disease. These findings were derived largely from populations in regions of low HIV endemicity.

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#### EPICARDIAL ADIPOSE TISSUE VOLUME AND CHARACTERISTICS ARE ASSOCIATED WITH STAGE B HEART FAILURE IN TYPE 2 DIABETES

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**Objective** To assess whether epicardial adipose tissue (EAT) is associated with early cardiac dysfunction in type 2 diabetes (T2D).

**Methods** Prospective case-control study. Participants with T2D and no known cardiovascular disease underwent comprehensive multimodality phenotyping. CT derived EAT volume was measured using a deep learning method and indexed to body surface area. Total EAT was quantified using CT adipose tissue attenuation range of -30 to -190 Hounsfield Units (HU) and low attenuation EAT as -90 to -190 HU. Left ventricular (LV) volumes, strain and diastolic function were assessed using cardiac MRI and echocardiography.

**Results** Two hundred and fifteen T2Ds (median age 63 years, 60% male) and 39 controls (median age 59 years, 62% male) were included. T2Ds had higher LV mass/volume ratio (median 0.89 (0.82, 0.99) vs 0.79 (0.75, 0.89)), reduced global longitudinal strain (GLS; mean  $16.13 \pm 2.33\%$  vs  $17.18 \pm 2.16\%$ ) and worse diastolic function (lower circumferential peak early diastolic strain rate and average  $E/e'$ ). Total and low attenuation indexed EAT volumes were 1.6-fold and 2-fold higher, respectively, in subjects with T2D. After adjustment for age, sex, ethnicity, systolic blood pressure and waist/hip ratio, low attenuation indexed EAT volume was independently associated with LV mass/volume ratio ( $\beta=0.002$ ,  $p=0.03$ ) and GLS ( $\beta=-0.03$ ,  $p=0.03$ ) and total indexed EAT volume with GLS ( $\beta=-0.02$ ,  $p=0.02$ ), but neither were independently associated with indices of diastolic dysfunction in T2D.

**Conclusion** EAT volumes are higher in T2D, and excess EAT accumulation is independently associated with early markers of cardiac dysfunction.