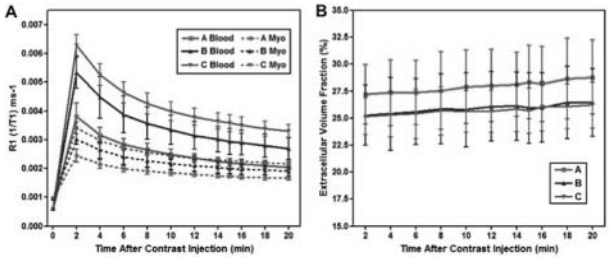


**Figure 2**

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## EFFECT OF CONTRAST DOSE, POST-CONTRAST ACQUISITION TIME, MYOCARDIAL REGIONALITY, CARDIAC CYCLE AND GENDER ON DYNAMIC-EQUILIBRIUM CONTRAST CMR MEASUREMENT OF MYOCARDIAL EXTRACELLULAR VOLUME

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**Introduction** CMR techniques are increasingly being used to evaluate myocardial extracellular volume (ECV). In the most commonly applied method, ECV is quantified using haematocrit-adjusted myocardial and blood T1 values measured before and after gadolinium bolus. The technique is based on a two-compartment model, which assumes contrast kinetic effects to be negligible due to a dynamic equilibrium between blood and myocardium (Dynamic-Equilibrium CMR; DynEq-CMR). This study assessed the effect of contrast dose, post-contrast acquisition time, myocardial regionality, cardiac cycle and gender on DynEq-CMR ECV measurement.

**Methods** 30 healthy volunteers (asymptomatic, no cardiovascular risk factors, normal examination and ECG) were prospectively split into 3 age and sex-matched groups (there were also no differences in mean eGFR, body surface area, heart rate, LV mass and volumetrics between groups): Group A received 0.10 mmol/kg Gd-DTPA, Group B 0.15 mmol/kg and Group C 0.20 mmol/kg. Mid-ventricular short-axis modified look locker inversion recovery (MOLLI) imaging was performed at 1.5T before, and at 2 min intervals between 2–20 min after, contrast administration, with same-day haematocrit measurement. MOLLI imaging was repeated in early systole (150 ms after R wave) pre- and at 10 min post-contrast. Resulting pixelwise T1 maps (figure 1; T1 maps at selected time-points are shown) were used to calculate ECV (Matlab). (Phantom studies performed prior to patient scanning determined T1 measurement accuracy and heart-rate correction algorithm).

**Results** Pre-contrast myocardial (A 1051±49 ms; B 1045±49 ms; C 1040±43 ms; p=0.87) and blood (A 1678±98 ms; B 1645 ±118 ms; C 1686±101 ms; p=0.66) T1 times did not differ significantly between groups. Mean myocardial (A 542±65 ms; B 465±69 ms; C 407±55 ms; p<0.001) and blood (A 407±73 ms; B 307±67 ms; C 252±48 ms; p<0.001) T1 averaged over all time points post-contrast shortened significantly as contrast dose increased (figure 2). Mean ECV was significantly higher in group A compared to groups B and C (A 27.7±3.7%; B 25.8±3.4%; C 25.8±2.8%; p<0.001). The difference between groups B and C was not significant. ECV increased linearly over time in each group; between 2 and 20 min post-contrast, ECV increased from 27.2±2.7% to 28.8±3.4%, p=0.020 in group A; 25.3±2.8% to 26.5±3.2%, p=0.004 in group B; and 25.2±1.7% to 26.2±2.1%, p=0.068 in group C. ECV varied significantly between myocardial regions, being highest in the septum and lowest in the lateral wall in each group. ECV did not differ significantly between diastole and systole. ECV was significantly higher in females in each group (A female 29.6±3.0%, male 25.4±3.0%, p<0.001; B female 27.4±2.7%, male 23.6±2.9%, p<0.001; C female 26.1±2.8%, male 24.7±2.5%, p=0.027).

**Conclusions** The small increase in ECV over time suggests that an incomplete dynamic equilibrium between blood and myocardium is achieved. DynEq-CMR-derived ECV varies according to contrast dose, myocardial region and gender.

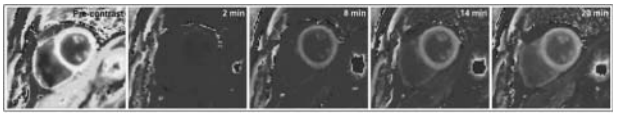

**Figure 1**