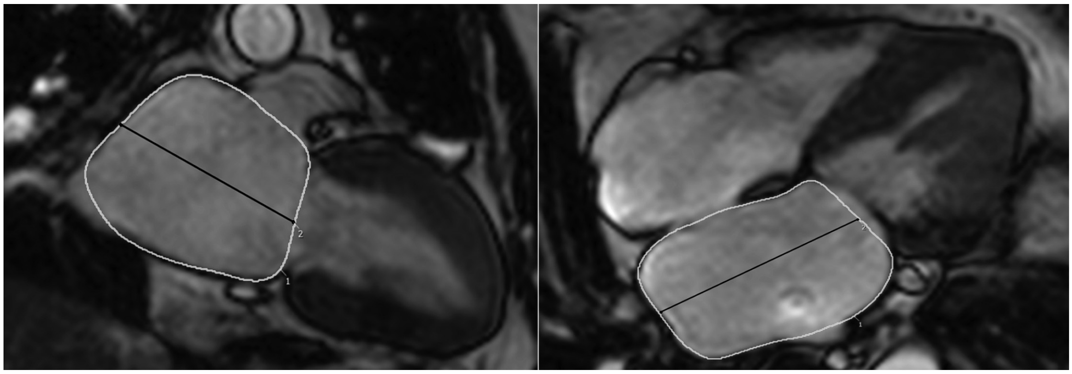

Abstract 21 Figure 1 Measurement of left atrial (LA) volume by the biplane area–length method where A2Ch and A4Ch refer to the LA area in the two-chamber and four-chamber views, respectively, and L is the shorter of the two LA length measurements (L2Ch, L4Ch) from these views.

$$LAV = 8(A2Ch)\ (A4Ch)/3\pi L$$

Results 53 SAVR patients (age 72.7 ± 7.4 years, 72% male, mean EuroSCORE II 1.52 ± 0.95%) were studied. Six received a metallic prosthesis and the remaining 47 (89%) a tissue bioprosthesis. Fourteen (26%) received concomitant coronary bypass grafting, of which 6 involved use of the left internal mammary artery. For the group as a whole, the average bypass time was 105 ± 48 min and average cross clamp time 77 ± 41 min. The average length of stay in intensive care was 3.4 ± 2.4 days. SAVR was associated with a significant decrease in RV ejection fraction and concomitant increase in indexed RVESV at 6 months, with no change in RV mass (Table 1). However, in subgroup analysis of patients without LGE of the left ventricle at baseline, no significant change in RV function was seen following SAVR (p = 0.06).

Abstract 22 Table 1 RV changes following SAVR

RV	Baseline	6 months	p Value
EDVI (ml/m^2)	78 ± 17	78 ± 16	0.90
ESVI (ml/m^2)	33 ± 10	37 ± 10	<0.01
EF (%)	58 ± 8	53 ± 9	<0.01
Mass Index (g/m^2)	16 ± 4	15 ± 4	0.15

Conclusions SAVR is associated with a significant reduction in right ventricular ejection fraction at 6 months mediated through an increase in end systolic volume. The presence of LGE may have the potential to identify patients at risk of post-operative RV dysfunction.

23 LONGITUDINAL BUT NOT CIRCUMFERENTIAL STRAIN IS ASSOCIATED WITH HEALTHY AGEING: A STRAIN-ENCODED CARDIAC MAGNETIC RESONANCE IMAGING STUDY AT 3.0TESLA

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Background Displacement encoding with stimulated echoes (DENSE) encodes myocardial tissue displacement into the phase of the MRI image permitting direct quantification of myocardial displacement at multiple cardiac phases. Strain-encoded CMR with DENSE has high spatial (3.2 mm × 3.2 mm × 8 mm) and temporal resolution (TR= 27.34 ms). We aimed to measure myocardial strain values with DENSE in healthy adults across a broad age range at 3.0Tesla.

Methods Healthy volunteers with no prior medical history or treatment were enrolled and underwent CMR at 3.0T (Magnetom Verio, Siemens, Erlangen, Germany). Mid-left ventricular short axis and horizontal long axis DENSE sequences were obtained, and analysed using CIM_DENSE2D software (University of Auckland, New Zealand and Siemens Healthcare). Segmental and global myocardial circumferential (Ecc) and longitudinal (Ell) strain were obtained with DENSE.

Results 77 participants (mean (SD) age 43.0(16.9) years; range 18–78 years; 40 (52%) males;) were grouped into 3 tertiles according to age. Longitudinal strain differed according to age tertile with strain being greatest in individuals 35–55 years compared to younger or older subjects. There were no differences in Ecc according to age per tertile (Table 1).

Abstract 23 Table 1 Age differences in peak circumferential (Ecc) and peak longitudinal (Ell) strain in healthy volunteers at 3.0T

	<35 years	35–55 years	>55 years	ANOVA P-value
Ecc**	N = 32	N = 25	N = 20	
Mean	18.63 ± 2.2	19.51 ± 2.3	18.23 ± 2.6	0.165
Anterior	19.35 ± 3.9	21.01 ± 3.6	20.31 ± 2.8	0.216
Antero-septal	17.25 ± 3.0	18.20 ± 2.6	18.18 ± 3.7	0.506
Infero-septal	16.30 ± 3.0	16.75 ± 3.4	14.83 ± 3.9	0.170
Inferior	20.46 ± 3.7	20.93 ± 3.5	19.29 ± 3.7	0.353
Infero-lateral	21.29 ± 3.4	21.58 ± 3.6	20.97 ± 4.6	0.877
Antero-lateral	19.83 ± 3.9	21.89 ± 3.7	20.18 ± 2.8	0.105
Ell (ms)**	N = 28	N = 26	N = 23	
Mean	11.12 ± 2.3§	12.50 ± 2.0*	9.54 ± 2.6^	<0.001
Basal-septal	9.60 ± 5.3	11.10 ± 3.8	8.25 ± 3.6	0.079
Mid-septal	12.35 ± 3.6	13.20 ± 2.9*	10.23 ± 5.1	0.028
Apico-septal	15.15 ± 3.9§	17.91 ± 3.6*	14.23 ± 6.0	0.015
Basal-lateral	13.93 ± 4.9	13.18 ± 4.9	14.67 ± 4.5	0.796
Mid-lateral	12.75 ± 4.0	14.13 ± 4.2*	10.52 ± 4.6	0.008
Apico-lateral	13.86 ± 3.7	13.82 ± 4.2	12.44 ± 5.2	0.437

**expressed as mean, standard deviation
§significant difference ($p < 0.05$) between 1st and 2nd tertile
*significant difference ($p < 0.05$) between 2nd and 3rd tertile
^significant difference ($p < 0.05$) between 3rd and 1st tertile

Conclusion Longitudinal myocardial strain, as revealed by strain-encoded CMR, is associated with chronological age in healthy adults.

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24 PEAK CIRCUMFERENTIAL STRAIN ASSESSED USING STRAIN-ENCODED CARDIAC MAGNETIC RESONANCE (DENSE) IN HEALTHY VOLUNTEERS AT 1.5- AND 3.0 TESLA

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Background Displacement Encoding with Stimulated Echoes (DENSE) is a strain-encoded cardiac magnetic resonance (CMR) method that directly quantifies left ventricular (LV) mechanics within myocardial regions. Strain values might vary according to CMR field strength. In order to assess this possibility, we implemented strain-encoded CMR at 1.5 Tesla and 3.0 Tesla with DENSE in healthy adults.

Methods Healthy volunteers without any medical history or treatment gave informed consent and underwent CMR at 1.5T (Magnetom Avanto, Siemens Healthcare) and 3.0T (Magnetom Verio; Siemens Healthcare) within 24 h. The imaging protocol included balanced steady state free precession (b-SSFP) sequences for cardiac anatomy and function and strain-encoded CMR with DENSE. (CIM_DENSE2D software (University of Auckland, New Zealand; Siemens Healthcare). Global- and segmental circumferential strain was measured at the mid-ventricular level.

Results Sixty five participants (31 (48%) male, mean age 44 ± 18) were included (Table 1). Mean global and regional strain values differed slightly between 1.5T and 3.0T, and these differences were mainly related to strain values in the anterior and anterolateral LV segments were LV displacement is greatest.

Conclusion Strain-encoded CMR with DENSE provides regionally localised measurements of circumferential strain. Subtle field-strength differences were apparent for anterior/anterolateral LV strain.

Funding Medical Research Scotland project grant. Professor Berry was supported by a Senior Clinical Fellowship from the Scottish Funding Council.

Abstract 24 Table 1 Global Circumferential Strain in 65 Healthy Volunteers

Circumferential Strain (mid LV level) *	1.5 T	3.0 T	p-value
Mean value	19.62 ± 2.6	18.78 ± 2.4	0.011
Anterior	21.32 ± 3.7	20.00 ± 3.5	0.014
Antero-septal	18.39 ± 3.5	17.70 ± 3.3	0.200
Infero-septal	16.69 ± 3.5	15.87 ± 3.5	0.118
Inferior	19.98 ± 3.5	20.26 ± 3.6	0.580
Infero-lateral	21.84 ± 3.4	21.17 ± 3.8	0.165
Antero-lateral	21.66 ± 3.5	20.42 ± 3.6	0.006

*Expressed as mean, standard deviation

25 THE USE OF CARDIOVASCULAR MAGNETIC RESONANCE (CMR) IMAGING IN THE ASSESSMENT OF PERSONNEL IN THE UK ARMED FORCES

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Introduction The Armed Forces places considerable occupational demands on its workforce. Cardiovascular disease (CVD) remains a common cause of death and premature discharge. Simple CVD screening is performed periodically throughout the careers of service personnel, particularly in those in high risk roles such as aircrew. Abnormalities commonly require investigation with advanced cardiovascular imaging.

Methods A retrospective cohort analysis of all military CMR requests to two military cardiologists was undertaken to determine demographics, reason for referral, results of investigation and occupational outcome.

Results Between 2011 and 2015, fifty-six patients (95% male, median age 44 years) were referred for CMR. The commonest indications were abnormal echocardiography (21%), ventricular ectopy (16%), suspicion of cardiomyopathy (13%) and other asymptomatic ECG abnormalities (T wave inversion (11%) and bundle branch block (7%)).

Of the CMR scans performed, 25% demonstrated features confirming cardiomyopathy (25% dilated and 12.5% hypertrophic phenotype). CMR features of athletic heart were seen in 11% of scans, and considered potentially suggestive of early cardiomyopathy. A quarter of patients had significant late gadolinium enhancement, in a variety of pathological patterns. Adenosine stress imaging was performed in 21% of patients, a quarter of which demonstrated perfusion abnormalities.

Whilst 30% of patients were able to return to unrestricted duties following CMR, 70% required occupational restriction, mostly in aircrew. Of these 18% were unable to fly pending further review, 36% were deemed unfit to fly solo, and 7% had restrictions placed on their ability to deploy on overseas operations.

Conclusion CMR is a valuable tool in the investigation of military personnel, and a useful adjunct to determine occupational, as well as clinical, risk. With the recent introduction of more rigorous CVD screening to join the Army, and the importance of comprehensive risk assessment in aircrew, the use of CMR in this population is likely to increase.

26 CARDIOVASCULAR MAGNETIC RESONANCE ACTIVITY IN THE UNITED KINGDOM: RESULTS OF THE 2014 BSCMR SURVEY

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