predicted one-year mortality. However, there was no difference in LVEF, serum Creatinine, NTproBNP, cardiac index or predicted one-year mortality by MAGGIC score. Previous studies have found that an ST2 level of >35 ng/ml is indicative of adverse prognosis. At this cut-off, there was frequent disagreement between ST2 level and other markers of adverse prognosis. Patients identified as high risk by ST2 level were identified as low risk by peak VO_2 (n=5) and six minute walk distance (n=6). In addition, eight patients identified as low risk by ST2 level were identified as high risk by NTproBNP (figure 1).
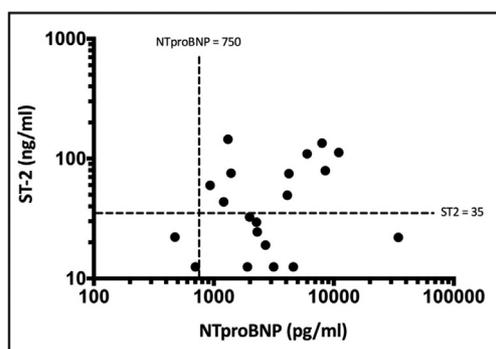
Abstract 14 Figure 1

Conclusions ST2 levels are higher in patients who are sufficiently unwell to be listed for heart transplantation, compared with those who are too well to be listed for heart transplantation. However, there is frequent disagreement between ST2 levels and other markers of adverse prognosis such as six minute walk distance, peak VO_2 and NTproBNP. Larger studies with assessment of real world outcomes, such as death, urgent heart transplantation or MCS, are required to determine whether ST2 measurement can improve assessment of prognosis in patients with advanced heart failure.

15 METAL-ON-METAL HIP REPLACEMENTS AND SUBCLINICAL EVIDENCE OF MYOCARDIAL DYSFUNCTION

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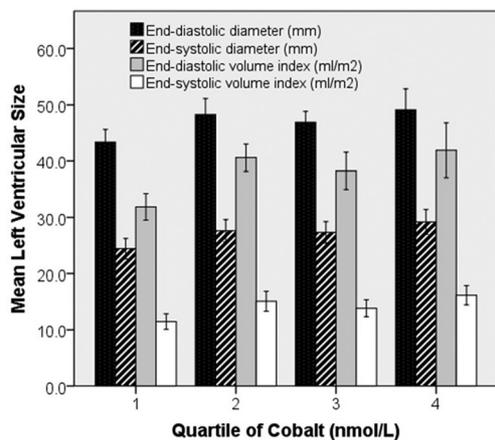
Introduction Over 1 million metal-on-metal (MOM) hip replacements were performed between 2003 and 2010. These prostheses were intended to be more durable than previous models, but have been associated with a higher failure rate. There have also been isolated cases of fulminant cardiomyopathy in patients with very high serum cobalt levels. We screened a cohort of asymptomatic patients with these prostheses for subclinical cardiac abnormalities.

Methods All patients with MOM hip replacements at our centre undergo regular follow-up in the orthopaedic clinic with serum cobalt and chromium levels, and periodic magnetic resonance scanning of the affected joint. We recruited consecutive asymptomatic patients to receive echocardiography and recorded demographic data including age, height, weight, serum cobalt and chromium levels, and date of prosthesis implantation. Echocardiographers were blinded to medical history and laboratory results. The cohort was split into quartiles of serum cobalt. ANOVA, Kruksall-Wallis H test and Chi-

Abstract 15 Table 1

	Quartile of Serum Chromium				All Patients	p-value
	Q1	Q2	Q3	Q4		
N	27	28	28	27	110	
Serum Cobalt (Mean ± SD, nmol/L)	10.4 ± 5.3	49.0 ± 25.4	160.2 ± 32.1	410.6 ± 370	156.6 ± 239.4	<0.001
Serum Chromium (Mean ± SD, nmol/L)	17.0 ± 7.2	55.9 ± 43.0	95.5 ± 57.9	213.0 ± 252.4	95.0 ± 147.8	<0.001
Age (Mean ± SD , yrs)	71.3 ± 8.7	70.9 ± 9.6	72.5 ± 9.0	72.6 ± 8.2	71.8 ± 8.8	NS
Males (N, %)	10 (37)	20 (71)	13 (46)	13 (48)	56 (51)	NS
Duration of Implant (Median ± IQR, yrs)	4.4 ± 5.5	7.4 ± 1.4 p=0.001 vs. Q1	7.2 ± 1.6 p=0.033 vs. Q1	7.2 ± 4.6 p=NS	7.1 ± 1.7	0.002
Hypertension (N, %)	13 (48)	16 (57)	13 (46)	15 (56)	57 (52)	NS
Diabetes Mellitus (N, %)	4 (15)	3 (11)	1 (4)	5 (19)	13 (12)	NS
Coronary Artery Disease (N, %)	3 (11)	6 (21)	0 (0)	4 (15)	13 (12)	NS
Atrial fibrillation (N, %)	0 (0)	0 (0)	3 (11)	3 (11)	6 (5)	NS

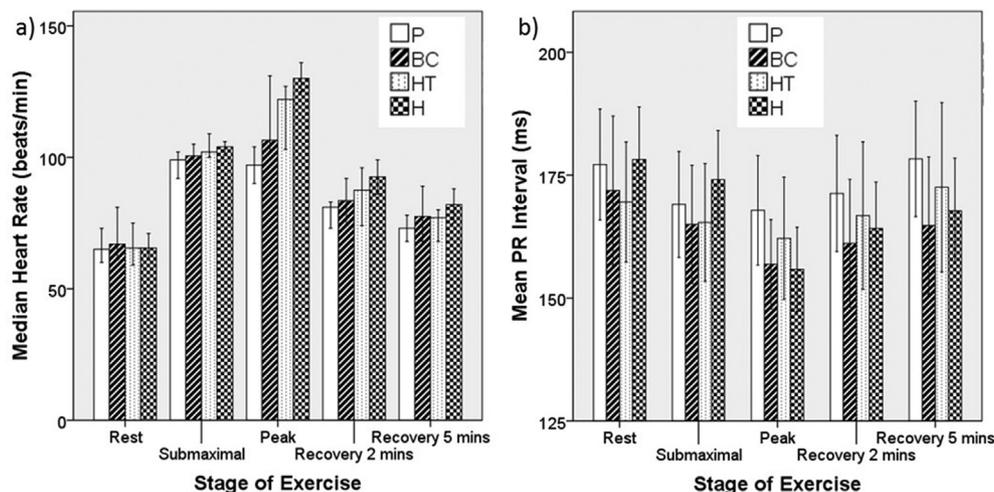**Abstract 15 Figure 1** Mean left ventricular chamber size by quartile of serum cobalt levels. Bars represent standard error.

Left ventricular measurements are part of a range and therefore it is not possible to specify a cut-off for abnormality in these people. Whilst our findings do not suggest a clear relationship between serum ion levels and basic echocardiographic parameters of left ventricular systolic and diastolic dysfunction, we cannot exclude an idiosyncratic response as described in isolated case reports. We therefore advise that patients with MOM hip replacements undergo serial cardiology follow up.

| 16 | CHRONOTROPIC AND DROMOTROPIC RESPONSES TO EXERCISE IN HEART FAILURE WITH PRESERVED EJECTION FRACTION (HFPEF) PATIENTS AND CONTROLS |

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Introduction The hallmark of Heart Failure with Preserved Ejection Fraction (HFpEF) is exercise intolerance. The mechanisms for this are numerous, but chronotropic incompetence, defined as a failure to reach at least 70% of the age-predicted maximum heart rate (HR) on maximal exercise, has been reported to contribute. Impaired Heart Rate Reserve, a measure of HR achieved on maximal exercise compared with age-predicted maximum heart rate, is correlated with negative cardiovascular outcomes.

In normal subjects, the PR interval shortens during exercise as parasympathetic tone reduces. This is known as dromotropy and is reduced in subjects with coronary artery disease. We formed the hypothesis that HFpEF patients may also have impaired PR shortening and that this may contribute to exercise intolerance.

Methods and results HFpEF patients and controls (healthy (H), hypertensive (HT) and breathless controls (BC)) from the MEDIA (Metabolic Road to Diastolic Heart Failure, EU FP7) trial at our centre underwent maximal semi-supine bicycle stress tests whilst on standard treatment. Electrocardiograms were examined by a single, blinded investigator for PR-interval and heart rate (HR) at: rest; submaximal exercise (HR 100 min-1); peak exercise; and 2 and 5 min after exercise.

squared tests were used to evaluate the differences between groups.

Results Baseline characteristics between each quartile were similar (table 1). Mean duration of implant increased with quartile, but serum cobalt was not correlated with duration of prosthesis (r=0.135, p=0.162). Patients in the highest quartile of serum cobalt levels had larger left ventricular end-diastolic and end-systolic dimensions (50.8 vs. 44.7 mm, p=0.018; 31.6 vs. 25.8 mm, p=0.014 respectively) and indexed end-diastolic and end-systolic volumes by Simpsons method (42.0 vs. 32.8 ml/m^2, p<0.001; 16.4 vs. 11.7 ml/m^2, p<0.001 respectively) compared with those in the lowest quartile (Figure). They also had larger indexed left atrial volumes (Ln volume 3.2 vs. 2.9, p=0.006). However, there was no difference in wall thickness, ejection fraction, left ventricular outflow tract velocity time integral, mitral valve E and A waves, medial and lateral tissue Doppler magnitude, peak longitudinal strain or strain rate, or time to peak strain.

Conclusions Subjects with the highest serum cobalt levels have larger left ventricular and left atrial chamber sizes than those with the lowest serum levels. However, no difference in even sensitive markers of systolic or diastolic function were found.

Abstract 16 Figure 1 a) Median heart rate and b) Mean PR interval by stage of exercise for each patient group. Bars represent 95% Confidence Interval. P = Patients, BC = Breathless Controls, HT = Hypertensive Subjects, H = Healthy Controls.