powered trial to detect any meaningful superiority of spinal cord stimulation for RA patients.

92 THE ASSOCIATION OF NIGHT-TIME SYSTOLIC BLOOD PRESSURE WITH ULTRASOUND MARKERS OF SUBCLINICAL CARDIAC AND VASCULAR DAMAGE

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Background Ambulatory blood pressure monitoring (ABPM) measures blood pressure (BP) over a prolonged period and has been shown to be superior to office BP for the prediction of clinical events. In particular, night-time systolic BP is a stronger predictor than systolic daytime BP. It is not yet clear if night-time BP should be a specific therapeutic target although some studies have demonstrated promising results. Subclinical cardiovascular disease is a prognostic marker for future cardiovascular events. Our aim is to examine the association of night-time systolic BP with subclinical cardiac dysfunction measured by global longitudinal strain (GLS) and subclinical vascular damage measured by carotid intima media thickness (CIMT) and carotid plaques.

Methods In 2014 a random sample of 80 individuals, stratified by BP status at baseline recruitment to the Mitchelstown Cohort Study, were invited to undergo repeat ABPM, echocardiogram and carotid ultrasound. ABPM was performed using the Spacelabs 90217 monitor. GLS was measured by speckle-tracking analysis of echocardiogram images carried out on a Philips iE33 ultrasound machine. Mean CIMT was measured at the distal 1 cm of the common carotid artery. Still images were taken from 3 angles on both sides of the neck using a Philips Cx50 ultrasound machine. The presence of carotid plaques was recorded. Philips QLAB cardiac and vascular ultrasound quantification software was used for analysis. The association of night-time systolic BP with GLS, CIMT and carotid plaques was assessed using linear and logistic regression.

Results Fifty (response rate 63%) individuals took part in this study. In univariable models night-time systolic BP was significantly associated with GLS (Beta coefficient 0.85 for every 10 mmHg rise, 95% CI 0.3–1.4) and carotid plaques (OR 1.9 for every 10 mmHg rise, 95% CI 1.1–3.2). Univariable analysis of daytime systolic BP did not demonstrate any statistically significant associations. In age and sex adjusted models, the association for night-time systolic BP and GLS remained significant (Beta coefficient 0.7 for every 10 mmHg rise, 95% CI 0.1–1.3). The association for carotid plaques was no longer statistically significant. In multivariable models findings were diminished.

Discussion Our results support an association between night-time systolic BP and subclinical cardiac and vascular disease. However this is a small study which limits generalisability and the sample size may have provided insufficient power to detect true associations between night-time systolic BP and target organ damage in multivariable models and CIMT in particular. The use of ABPM and ultrasound technology may help guide therapeutic decisions in those with hypertension. When assessing ABPM results the absolute night-time BP seems to be the most important parameter but ultimately a large randomised controlled trial involving chronotherapy is necessary to fully address this.

93 A DOUBLE-BLIND PLACEBO-CONTROLLED RANDOMISED STUDY OF THE EFFECTS OF CANDESARTAN VERSUS AMLODIPINE ON CAPILLARY RAREFACTION IN ESSENTIAL HYPERTENSION

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Background A reduction in the density of capillaries (rarefaction) is known to occur in many tissues in patients with essential hypertension (HTN) and plays a crucial role in increasing peripheral resistance and blood pressure (BP). The aim of this clinical trial was to assess in a controlled, double blind, placebo-controlled design the effects of treatment of HTN with candesartan or amlodipine on microvascular rarefaction and other indices of vascular function in individuals with mild-to-moderate essential HTN.

Methods The capillary microcirculation was studied using the well-validated intravascular microscopy technique. After a 2-week single-blind placebo run-in period, patients who remained hypertensive (systolic BP 140–180 mmHg and/or diastolic BP 90 –110 mmHg) were randomised to 8-weeks treatment with either candesartan 8 mg daily (with forced titration to 16mg after 2 weeks) or amlodipine 5 mg orally daily (with forced titration to 10 mg after 2 weeks). Other vascular measurements included pulse wave velocity with Complior machine, central BP and Aortic Augmentation Index measurements with Omron HEM-9000AI machine.

Results Treatment with candesartan and amlodipine significantly reduced both brachial and central BP at 4 and 8 weeks (mean change -19.0 mmHg; 95% CI -−11.1 to -−26.9, $p < 0.0001$), and to 8 weeks active treatment (mean change -26.3 mmHg; 95% CI −17.5 to −35.0, $p < 0.0001$) but had no significant effect on basal (functional) or maximal (structural) capillary densities. Both drugs also reduced central BP and Aortic augmentation index significantly after 4 and 8 weeks but there was no significant changes in PWV.

Conclusions The study confirms that 8 weeks treatment with either candesartan or amlodipine significantly reduces radial and central BP in essential HTN but may not be a sufficient circumstance for inducing a regression in microvascular abnormalities.

94 FLOW-CONTRACTION MATCHING IN THE HUMAN HEART: A NOVEL INVASIVE STUDY OF THE COMPLEX CARDIAC-CORONARY INTERACTION IN ISCHAEMIC HEART DISEASE

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Background A first-in-human study of simultaneous invasive real-time left ventricular (LV) and coronary haemodynamics in the cardiac catheter lab enabling accurate delineation of the complex cardiac-coronary interaction and influence of antianginal therapy in coronary artery disease (CAD).

Method 15 patients completed the protocol (Figure;A&B). Coronary measurements (baseline and 1 mg isosorbide

dinitrate, ISDN) were performed with dual sensor pressure-flow wire (ComboWire®) advanced down coronary artery (C) and were electronically routed into the intracardiac analyser (CD Leycom, Netherlands) via which LV haemodynamics – using pressure-volume (PV) loop catheter in LV apex – were measured, thus enabling simultaneous recordings. Coronary blood flow (CBF), wave intensity analysis and LV pressure volume loops were analysed with specially developed in-house software (MatLab R2014b) (E); (paired t-test; linear regression).

Results Accurate delineation and timings of the backward and forward waves were described relative to cardiac contraction and relaxation (F). Backward expansion wave (BEW) occurred during isovolumic relaxation and correlated for the first time with peak dpdt- ($r^2$0.4 p = 0.0015) and found to be load dependent (F); forward compression wave (FCW) occurred immediately following peak dpdt+; ISDN drove leftward, downward shift of PV loop (D) accompanied by two-step cardiovascular response 1) significant afterload reduction (endsystolic pressure 127+/-±23;98±22 mmHg; p < 0.01) associated with reduction in cardiac work (pressure volume area 1.4±0.4;1.1±0.4J) total peripheral resistance and arterial elastance representing systemic vasodilation and significant improvement in mechanical efficiency (68 to 74%) 2) Reduction in preload (14±5;10±5 mmHg; p < 0.01) was associated with improved passive (EDPVR B) and active (Tau) diastolic relaxation (38±4;36±4 ms; p < 0.01). Despite a reduction in perfusion pressure, coronary flow was maintained.

Conclusion For the first time in humans we relate coronary flow to cardiac contraction-relaxation and describe how ISDN exerts an anti-anginal effect by reduction in afterload and preload, therefore cardiac work and improved cardiac efficiency, maintaining coronary flow despite reduction in perfusion pressure, thus vastly increasing our understanding of the integrated cardiovascular response.

95 A SYSTEMATIC REVIEW OF THE CLINICAL APPLICATIONS OF CARDIOGONIOMETRY IN CARDIOVASCULAR DISEASE

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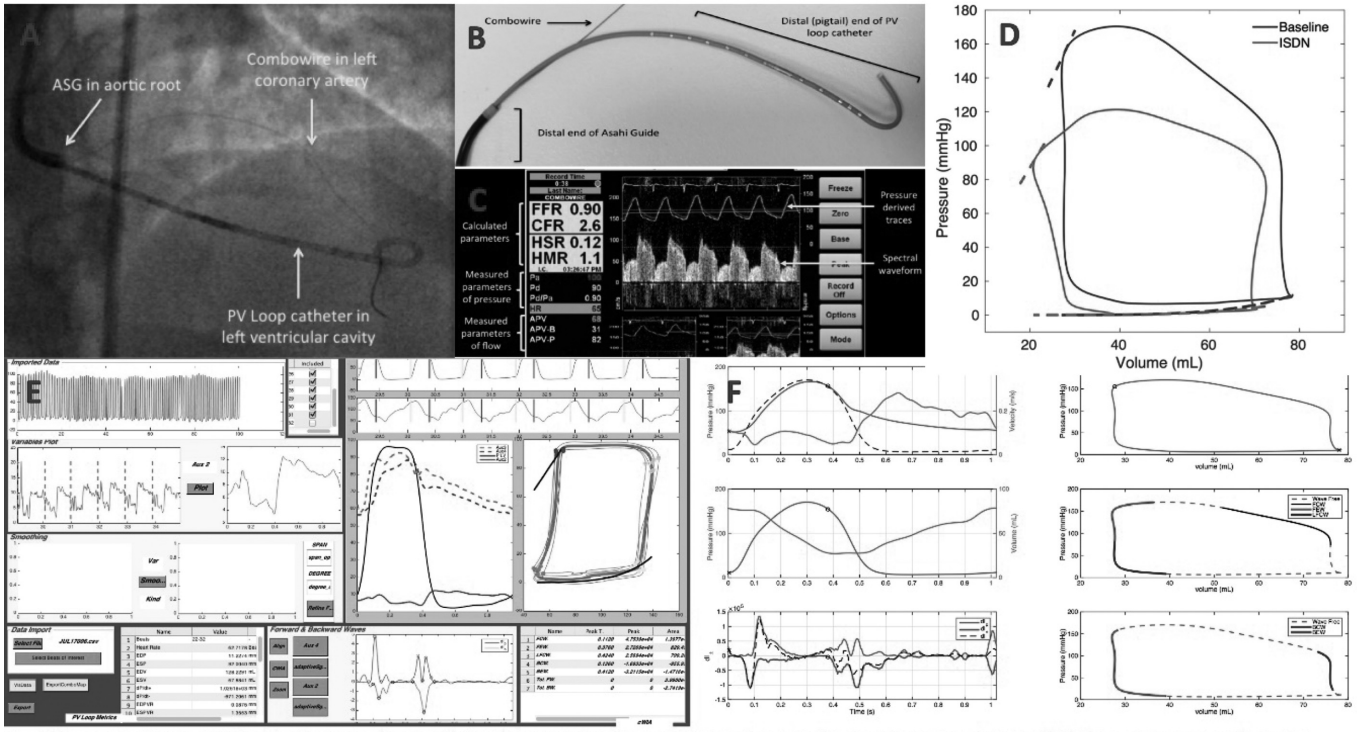
Introduction Cardiogoniometry (CGM) is a novel method of 3-D electrocardiographic (ECG) assessment, which has previously been shown to have significant diagnostic accuracy at identifying patients with stable coronary artery disease (CAD) and acute coronary syndromes (ACS). However, there is considerable variation of reported diagnostic accuracy of CGM depending on the gold standard test used to compare it to. The aim of our review is to identify what is diagnostic



Abstract 94 Figure 1 A. Flouroscopic image of PV loop in the catheter in the LV with combowire in the coronary artery; B. Externalisation of guide catheter with PV loop and pressure-flow wire; C. Coronary flow data obtained on the Combomap console (Volcano Corp); D. LV PV loop at rest (blue) and following administration of nitrates (red) with a reduction in cardiac work; E. In-house softwere developed on MatLab R2014b – snapshot delineating LEFT coronary blood flow, MIDDLE. LV (black), aortic (red) and distal coronary pressure (blue) and RIGHT PV loop. F. Left upper and depicting distal coronary pressure and flow, left middle: LV pressure and volume plotted against time and left lower: wave intensity analysis, right middle forward going waves in coronary circulation depicted in relation to cardiac contraction, right lower: backward travelling (suction) waves in relation to cardiac cycle