ABSTRACTS COLLECTION

Abstracts from the 2020 Annual Scientific Meeting of the British and Irish Hypertension Society (BIHS)

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All content was reviewed and approved by members of the British and Irish Hypertension Society, which held full responsibility for the abstract selections.

Presenting author names have asterisks in the contributor lists

O-01 RNA-sequencing of human kidneys highlights correlation in expression between uromodulin (UMOD) and medullary ion transporters

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Introduction: Our previous genome wide association study (GWAS) highlighted a locus on the promoter of the human uromodulin (UMOD) gene, associated with hypertension. In this study, we sought to identify potential pathways which facilitate the association of UMOD with blood pressure through effects on gene expression.

Methods: From our bank of 98 human renal biopsy samples, we assessed UMOD and NKCC2 expression by qRT-PCR. Individuals were stratified by UMOD expression and RNA-sequencing using the NextSeq-500 system performed on a subset of high and low UMOD expression ($n = 3$/ group). Differential expression was assessed by DESeq2 to detect significant differences (p [adjusted] < 0.05) in the transcriptome between high and low UMOD expressers and pathways visualised using Ingenuity Pathway Analysis (IPA).

Results: RNA-Seq identified 162 differentially expressed genes (138 protein coding genes, 18 long non-coding RNAs and 8 additional transcriptomic elements), of these, 123 genes increased in expression with high UMOD expression. Using IPA, we detected enrichment for pathways related to immune system function, cell to cell communication and molecular ion transport. Notably, we show that an increase in UMOD expression associates with an increase in expression of the Na–K–Cl cotransporter (NKCC2) (p [adjusted] = 2.58e−9, FC = 10.89), the renal outer medullary potassium channel (ROMK) (p [adjusted] = 3.69e−2, FC = 2.79) and the γ-subunit of the epithelial sodium channel (ENaC) (p [adjusted] = 1.83e−2, FC = 1.25). We further validated the relationship between UMOD and NKCC2, by Taqman qRT-PCR, showing a highly significant correlation of expression (p = 2.2e−16, R = 0.844) ($n = 86$).

Conclusions: Of several pathways identified by IPA, association of UMOD expression with expression of these three ion channels (NKCC2, ROMK and ENaC) may explain previously observed relationship between UMOD and blood pressure. These data suggest the UMOD: ion-transport pathway may be a drug target in the treatment of hypertension.

Disclosures: None.

O-02 Investigating the quality of longitudinal self-reported BP measurements in a large, online randomised trial in hypertension: the Treatment In Morning versus Evening (TIME) study

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Introduction: Self-monitoring with home blood pressure monitors (HBPMs) improves estimation of underlying blood pressure (BP), increases adherence and reduces need for clinic monitoring [1]. Longitudinal self-monitoring of BP in a real-world setting may not be as rigorous as in research settings [2, 3]. Factors influencing retention, compliance and types of HBPMs used are not known. This analysis aimed to elucidate factors associated with participant drop-out in a BP self-monitoring regime and investigate the impact of HBPM type on measurement quality.

Methods: The TIME study is a remote decentralised randomised trial investigating the effect of daytime versus night-time dosing of antihypertensive medication on cardiovascular outcomes in 21,103 patients with hypertension [4]. Participants were invited to submit BP readings at baseline and every 3 months. All types of HBPMs were allowed. Factors associated with participation and retention were analysed using multivariate regression. The impact of HBPM validation status on longitudinal BP measurements was also analysed.

Results: 11,059 participants agreed to supply home BP measurements, of whom 7646 (69.1%) submitted at least one set of readings. Drop-out was associated with younger age (adjusted odds ratio (AOR), 0.65; p < 0.001), obesity (AOR, 0.81; p < 0.001), smoking (AOR, 0.61; p < 0.001), milder hypertensive disease (AOR, 0.84; p < 0.001) and increased deprivation (AOR, 0.88; p = 0.006). Ownership of a validated HBPM did not influence retention. 48,920 BP measurement sets were submitted, of which 45,886 (93.8%) were in accordance with NICE guidelines (5). In the highest quartile of average systolic BP, validated devices exhibited better precision (standard deviation of BP readings: 10.6 vs 11.3 mmHg; p < 0.001) than non-validated devices.

Conclusions: This study provides insight into factors associated with attrition from home BP monitoring in the TIME study. Validated devices appeared to measure higher systolic pressures with less variance.

Clinical Trial Registry: ISRCTN18157641, https://doi.org/10.1186/ISRCTN18157641

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O-03 Mediation by blood pressure and other biomarkers of relationships between adiposity and left ventricular mass in early adulthood

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Introduction: Left ventricular mass (LVM) is a strong predictor of CV risk. Adiposity affects LVM but the extent to which other cardiovascular risk factors mediate this association is unclear and has not been studied in the transition from adolescence to emerging adulthood. We investigated mediation by blood pressure (BP) and other biomarkers in associations between fat mass and LVM in participants of the ALSPAC study.

Methods: Body composition was assessed using dual energy X-ray absorptiometry (DXA) in 912 individuals (61% female) at ages 17.7(SD 0.30) (weight 65(SD 12) kg) and 24.01 (SD 0.57) years (weight 71 (SD 14) kg). BP was measured and echocardiography and blood assays were performed. Structural equation modelling was used to assess possible mediation by individual biomarkers of the

association between fat mass and LVM. Height, physical activity, smoking and socioeconomic position were included as confounders.

Results: The roles of mean arterial pressure (MAP), pulse pressure (PP), heart rate (HR), C-reactive protein (CRP), acetylated glycoproteins (GP) and lean mass as mediators were investigated. %Mediation by each biomarker is shown below (%mediation = total effect − indirect (mediated) effect × 100) ($p < 0.001$ for all total effects), stratified by sex.

	% Mediation (Age 17)		% Mediation (Age 24)	
	Males	Females	Males	Females
MAP (mmHg)	9.37	6.01	21.31	14.80
PP (mmHg)	5.68	7.29	4.30	8.14
HR (bpm)	−4.48	−2.12	−28.51	−6.35
CRP (mg/L)	11.65	0.92	12.74	4.36
GP (mmol/L)	−0.48	7.60	−1.65	0.34
Total lean mass (kg)	21.89	28.75	50.55	45.25
MAP, CRP, GP	16.58	4.58	11.46	16.87

Lean mass has the largest mediating effect and accounts for more of the effect of fat mass on LVM at age 24 than 17. MAP and CRP account for a small part of the association, while HR attenuates the total effect. Mediation by GP is only marginal. Collectively, MAP, CRP and GP mediate only a small amount at ages 17 and 24.

Conclusions: Although the extent of mediation is usually greater in adulthood compared with adolescence, the majority of the association between fat mass and LVM appears to be a direct effect at both ages. These results serve as a reminder that adiposity should be monitored even from early adulthood.

Disclosures: None.

O-04 Skin-specific mechanisms of body fluid regulation in hypertension

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Introduction: While increasing evidence suggests excess skin Na^+ accumulation in hypertension, skin-specific mechanisms of local Na^+/water regulation have been largely ignored. We investigated the association between measures of sweat and transepidermal water loss (TEWL), skin Na^+ content (as a surrogate of total body Na^+) and clinical parameters in hypertensive patients.

Methods: An iontophoretic pilocarpine-induced sweat sample, measures of TEWL (Tewameter®, COURAGE +KHAZAKA electronic GmbH, Köln, Germany) and a skin punch biopsy were collected from adult, non-pregnant hypertensive patients at the Glasgow Blood Pressure Clinic (n = 90; age: 56 ± 16, range 21–86 years; females = 48.9%; BMI: median = 29.8, interquartile range 26.9–35.2 kg/m²). Sweat and skin Na^+ and K^+ content was assessed by flame photometry. Vascular Endothelial Growth Factor-c (VEGFc) was measured in serum (Quantikine ELISA, R&D).

Results: In the whole cohort, sweat Na^+ concentration ($[Na^+]_{SWEAT}$; 30.5 [24.4–42.3] mmol/l) was inversely correlated with $[K^+]_{SWEAT}$. Patients who took ACEIs/ARBs had higher $[Na^+]_{SWEAT}$ compared to those who did not (33 [26–46] vs 26 [18–40] mmol/l, $p < 0.05$), whereas sweat composition was independent of sex and BMI. We observed a positive association between $[Na^+]$ in epidermis/superficial dermis (ESD) and $[Na^+]_{SWEAT}$, independent of sex, BMI and use of ACEi/ARBs ($p_{adjusted} = 0.025$); both $[Na^+]_{ESD}$ and $[Na^+]_{SWEAT}$ closely correlated with age ($p < 0.01$). Office DBP but not SBP was inversely correlated with $[Na^+]_{SWEAT}$ ($r = −0.312$, $p = 0.006$), independent of age and other potential confounders ($p_{adjusted} = 0.02$). Total sweat volume and excreted Na^+, but not $[Na^+]_{SWEAT}$, were lower in patients with uncontrolled office BP ($p < 0.01$ for both; $p_{adjusted} < 0.005$); additionally, sweat volume positively correlated with TEWL and serum-VEGFc ($p < 0.05$ for both).

Conclusions: Sweat and TEWL appear to participate in the systemic regulation of total body Na^+ in hypertension. In light of potential therapeutic implications, the contribution of skin-specific mechanisms to Na^+ homoeostasis and their relationship with microvascular function deserve further research.

Disclosures: None.

O-05 Systolic inter-arm blood pressure difference and cognitive decline: findings from the INTERPRESS-IPD Collaboration

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Introduction: Systolic inter-arm differences (IAD) in blood pressure (BP) and cognitive decline are associated with

cardiovascular disease. We recently published initial evidence for associations of IAD with prospective cognitive decline and now present findings from the INTERPRESS-IPD Collaboration, examining associations of IAD with development of mild cognitive impairment (MCI) and dementia.

Methods: Individual participant data meta-analyses. We examined time-to-event data for new diagnoses of MCI and dementia, according to IAD status in univariable and multivariable regression models, stratified by study. Multivariable analyses were adjusted for systolic BP, age, sex and highest educational attainment. We also examined changes in Mental State Examination (MSE) scores, with adjustments as above, plus follow-up duration.

Results: Mean age was 66.2 years, 55% were female, 84% were of White ethnicity and mean systolic IAD was 7.0 mmHg. During 10-year follow-up, 5.9% of 4635 individuals, from 3 cohorts, had new diagnoses of MCI. In univariable analyses, MCI was associated with systolic IAD ≥ 5 mmHg [Hazard Ratio, 1.34 (95% CI 1.04–1.72); p = 0.022] and ≥ 10 mmHg [1.33 (1.03–1.73); p = 0.032]. After adjustment, associations with systolic IADs ≥ 5 mmHg (p = 0.036) and ≥ 10 mmHg (p = 0.056) remained. There were 95 new diagnoses of dementia during follow-up; no associations were observed between dementia diagnosis and IAD. MSE scores were recorded for 2709 participants; 15.5% showed clinically meaningful reductions (≥ 5 points) during follow-up. Decreases were associated with IADs ≥ 5 mmHg (p = 0.004) and ≥ 10 mmHg (p = 0.006) on univariable analyses. After adjustment, associations with IADs ≥ 5 mmHg remained (p = 0.033); age and educational attainment attenuated the association with IADs ≥ 10 mmHg (p = 0.11).

Conclusions: We present the first time-to-event analyses of MCI development with IAD and demonstrate that systolic IADs ≥ 5 mmHg and ≥ 10 mmHg are associated with MCI onset. If confirmed, these findings could inform individualised treatment decisions to minimise risk of future cognitive decline.

Disclosures: None.

O-06 Forearm vascular responses to mental stress and device guided breathing associate with plasma concentrations of normetadrenalines in subjects with essential hypertension

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Introduction: Forearm vasodilator responses to mental stress (MS) are impaired in hypertensive compared to normotensive individuals by a mechanism that may relate to peripheral $\alpha-$adrenergic activity antagonising that of neuronal nitric oxide [1]. We investigated whether the response to MS may be dependent on the level of basal sympathetic activity as measured by plasma concentrations of normetadrenaline (NM) and how responses to slowing respiratory rate by device guided breathing (DGB, which reduces sympathetic activity) vary according to NM concentrations.

Methods: Subjects with essential hypertension were stratified according to concentrations of plasma NM into those with low NM ($\leq$500 pmol/L) and high NM ($\geq$750 pmol/L). Forearm blood flow (FBF) was measured by venous occlusion plethysmography after 15 min of rest, during MS elicited by the Stroop word-colour test and during supervised DGB with breathing rate <10 breaths/min.

Results: Subjects with high NM (n = 30, 15 men) had greater body mass index than those with low NM (n = 30, 17 men): (mean ± SD) 31 ± 7 vs 27 ± 4 kg/m^2 (p < 0.05), but the two groups were similar with respect to age and brachial blood pressure (BP). During MS and DGB, changes in BP were similar in subjects in both low NM and high NM groups. MS increased FBF in both groups but the response in high NM was impaired as compared to subjects with low NM (34 ± 3 vs. 49 ± 3 %, p < 0.05). DGB increased forearm vascular resistance to a lesser extent in subjects with high compared to low NM (1.21 ± 7.95 vs 5.50 ± 6.32 mmHg.100 mL/mL, p < 0.05).

Conclusions: These results are consistent with greater sympathetic vascular tone in patients with higher NM that antagonises forearm vascular responses to MS. Circulating concentrations of NM may identify subjects with impaired neuronal nitric oxide signalling.

Disclosures: None.

Reference

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O-07 A novel blood test for salt-sensitivity may help in identifying a low-renin, volume expanded state

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Introduction: Most rare monogenic causes of hypertension and many hypertensive subjects with primary polygenic hypertension, particularly those of African ancestry, are characterised by low plasma renin thought to reflect sodium retention by the kidney. A novel "salt blood test" (SBT) measures a change in the erythrocyte glycocalyx that may

reflect sodium damage to the endothelium [1]. We compared values of the SBT in normotensive subjects and in hypertensive subjects with a distribution of renin across the physiological range.

Methods: We studied 90 hypertensive subjects and 10 normotensive healthy volunteers. The SBT was measured in freshly drawn venous blood using commercially available kits obtained from CARE Diagnostica, Voerde, Germany. Brachial blood pressure (BP), biochemistry (including renin and aldosterone) and 24 h urine collection for the estimation of dietary salt intake were performed in every subject.

Results: The average systolic blood pressure of the hypertensive subjects was (mean $\pm$ SD) 141.28 ± 15.4 mmHg. The SBT was greater in hypertensive subjects than in normotensive subjects ($129 \pm 39\%$ vs. $97 \pm 34\%$, mean $\pm$ SD, $p < 0.05$) and tended to be greater in those in the lowest quartile compared to the highest quartile of the distribution of renin ($140 \pm 44\%$ vs. $114 \pm 37\%$ for low vs. high renin hypertensives, $p = 0.024$). Values of the SBT were related to 24h urinary sodium excretion with subjects in the highest tertile of SBT% having higher 24h urinary sodium excretion (149.7 ± 73.6 mmol/24 h vs 110.1 ± 67.2 mmol/24 h, $p = 0.043$ for highest compared to lowest tertile) with no difference in plasma sodium and kidney function.

Conclusions: The SBT is elevated in hypertensive compared to normotensives subjects and may be a useful marker of damage to cell membranes by sodium.

Disclosures: None.

Reference

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O-08 Blood pressure control in patients with a previous stroke/transient ischaemic attack in primary care in Ireland: a cross sectional study

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Introduction: Uncontrolled blood pressure (BP) is an important modifiable risk factor for recurrent stroke. Secondary prevention measures when implemented can reduce stroke re-occurrence by 80%. However, hypertension control rates remain sub-optimal, and little data is available from primary care where most management occurs.

This study aimed to describe BP control in primary care-based patients with a previous stroke or transient ischaemic attack (TIA) in Ireland, and to concurrently examine antihypertensive medication-dosing.

Methods: To assess BP control, we extracted the most recent office-based reading from the individual health care records of patients with a previous stroke or TIA. We compared this with both the European Society of Hypertension (ESH) goal of BP < 140/90 mmHg, and the American Heart Association (AHA) goal of BP < 130/80 mmHg. Optimal anti-hypertensive medication dosing was determined by benchmarking prescribed doses with the World Health Organisation-Defined Daily Dosing (WHO-DDD) recommendations.

Results: We identified 328 patients. Blood pressure was controlled in almost two thirds of patients when measured against the ESH guidelines (63.2%, n = 207), but in only one third of patients according to the AHA guidelines (28.4%, n = 93). Of those with BP $\geq$ 140/90 (n = 116), 22 patients were not prescribed anti-hypertensive drugs, and 31 were prescribed a single agent only. Interestingly, 38% of all patients were inadequately dosed when compared with the WHO-DDD recommendations.

Conclusions: At a minimum, blood pressure control appears inadequate in at least one third of patients with a previous stroke or TIA, and 38% may respond to anti-hypertensive dose escalation. Further work is required to see how best to manage blood pressure in patients with a previous stroke or TIA in Primary Care.

O-09 A novel method for prescription of safe and effective cardiovascular exercise for hypertensive patients

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Introduction: NICE [1] guidelines recommend cardiovascular exercise for cardiovascular risk management. There is little guidance on how to identify appropriate cardiovascular exercise prescription and monitor adherence to the prescribed exercise. This study investigates the feasibility of CPET for safe and effective cardiovascular exercise prescription in hypertensive patients

Methods: 14 subjects (10 Male, 4 Female; aged 61.8 ± 10.8 years) with hypertension and undergoing medical therapy were recruited to the study. Each subject underwent a CPET to 80% heart rate reserve pre- and post-intervention as part of a wider health assessment process. Each subject was prescribed a steady state heart rate zone within the heavy intensity exercise domain (between first and second ventilatory thresholds [VT1 and VT2] with the RER below 1.00). Subjects were instructed to perform 2 sessions

per week over 12-weeks. The sessions were prescribed at 45 min length, including a 10-min warm up and cool down. Cardiovascular sessions were monitored remotely via heart rate monitoring devices and internet software.

Results: There were no adverse events during the study and no subjects withdrew from the intervention. The average adherence to cardiovascular sessions was 1.9±0.8/week. Systolic blood pressure reduced by 7.9 mmHg (135.0 ± 13.7 to 127.1 ± 17.7 mmHg; $p < 0.01$) after 12-weeks. Predicted maximal oxygen uptake did not increase significantly after 12 weeks. Body mass and body fat percentage remained stable post-intervention.

Conclusions: The current study shows a novel, safe and effective method of accurate cardiovascular prescription and monitoring. Since many hypertensive individuals undergoing functional stress tests using CPET this warrants further research for the utilisation of this data to be translated to exercise prescription advice. Future research should also focus on utilising CPET data to create an effective formula for cardiovascular exercise prescription based on heart rate data. Longer term studies to investigate impact on VO_2max should also be considered.

Disclosures: None.

Reference

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P-01 Utility of suppression index in patients who fail right sided cannulation in adrenal venous sampling in the work up of primary aldosteronism

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Introduction: Adrenal venous sampling (AVS) is considered the gold standard in determining unilaterality of primary aldosteronism (PA). Failed right adrenal vein (AV) cannulation poses a technical hurdle in a significant number of patients, necessitating repeat AVS. Recently, studies [1, 2] have suggested using the ratio of aldosterone/cortisol (A/C) levels between the left AV and inferior vena cava (IVC) with 100% positive predictive value in AVS under adrenocorticotrophic hormone (ACTH) stimulation. This study aims to validate those findings in unstimulated AVS.

Methods: A retrospective review was performed of 84 patients (51 male, 33 female, mean age 49.2 ± 10.1 years, range 26–73) with PA who underwent AVS. Datasets with successful cannulation, with selectivity index (A/C ratio of Adrenal vein/IVC) of >1.1 bilaterally, were analysed N = 84. Laterality was defined as a 4:1 ratio between side of adenoma and the non-adenoma side. AVS results were compared to left AV/IVC ratios utilising published criteria (Left >5.5; right <0.5).

Results: Inclusion criteria were met in 84 AVS datasets (left = 32, right = 24, bilateral = 28). Left AV/IVC index cut-off of >5.5 would have led to 1 inappropriate adrenalectomy and would have missed 40.6% of left-sided disease. Using a higher cut-off of >6.0 would have identified left-sided lesions with 100% positive predictive value (PPV), however, would have missed 43.8% of left-sided disease. Left AV/IVC index of <0.5 would have led to 1 inappropriate adrenalectomy and missed 37.5% of right-sided disease. Using a lower cut-off of <0.4 would have identified right-sided disease with 100% PPV, however, it would miss 45.8% of right-sided disease.

Conclusions: The suppression index (left AV/IVC A/C values) can be used with some degree of confidence in patients with failed RAV cannulation, without necessarily requiring another invasive procedure or ACTH use in centres who have high rates of success in the AVS procedure. Utility and cut-offs need to be validated in larger AVS datasets.

Disclosures: None.

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P-02 May measurement month: data from a national screening programme in Oman in 2017 and 2018

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Introduction: Hypertension is a major cardiovascular risk factor, yet many patients remain undiagnosed. The aim of the May Measurement Month (MMM) screening programme was to identify individuals with undiagnosed hypertension [1].

Methods: Screening centres set up in various hospitals and public areas in Muscat, Oman during the months of May 2017 and 2018 according to the MMM protocol with three BP readings taken along with a questionnaire of demographic, lifestyle and other risk factors. Hypertension was defined according to the European Society of Hypertension 2018 guidelines [2], (systolic BP(SBP) ≥ 140 mmHg and/or diastolic BP(DBP) ≥ 90 mmHg).

Results: A total of 13,621 individuals (age $40.8 + 12.6$ years, 30.1% male, 88.4% Arab ethnicity) were screened over the 2-month period. The mean of the first BP was $132.1 + 19.1/81.1 + 12.2$ mmHg. The average of the second and third readings, where available (n = 5934, age $41.5 + 14.3$ years, 64.4% male) was $128.5 + 17.7/79.1 + 11.1$ mmHg. This was significantly lower than the first BP reading alone ($p < 0.001$ for both SBP and DBP). Women were more likely to have only one reading. In those with 3 BP readings, 1438 individuals (of which 471 were on antihypertensive medication) had BP in the hypertensive range. This works out to 47.7% of patients on medications (n = 988) having uncontrolled BP. The remaining 967 were newly diagnosed hypertensive. The number of hypertensives in our sample therefore was 1955, giving a proportion of 32.9% of hypertensive individuals (of those with three BP readings) in our sample. Pregnant women had significantly lower BP readings than non-pregnant women. The factors predicting BP in the hypertensive range were age, sex, previous stroke, but not diabetes, previous MI or ethnicity.

Conclusions: In Oman, the proportion of individuals having hypertension is comparable to previous estimates and surveys [3]. More needs to be done to educate the public regarding BP checks and the need for better BP control.

Disclosures: The authors have no conflicts of interest or relevant disclosures.

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P-03 Serum and urine electrolytes in the diagnosis of primary hyperaldosteronism: a case control study

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Introduction: Identifying primary hyperaldosteronism (PH) is important; patients may benefit from specific surgical or drug therapy. However, measuring renin and aldosterone is unsuitable for screening large cohorts. Reports suggest that serum and urine electrolytes may be a useful indicator of PH. We compared serum and urine biochemistry in PH and control patients.

Methods: 12 patients with subsequent diagnosis of PH made by adrenal vein sampling or etomidate imaging, had their pre-diagnosis serum and urinary biochemistry recorded. Control patients (CTRL) comprised 24 age and gender-matched hypertensives in whom PH had been excluded. No patients were taking antihypertensives except diltiazem and/or doxazosin.

Results: PH patients had a significantly lower serum potassium than CTRL (3.45 IQR 3.3–4.2 vs 4.35 IQR 4.1–4.5 mmol/L, $p = 0.002$); it was a good discriminator between PH and CTRL (receiver operator characteristic (ROC) AUC = 0.8, $p = 0.003$).

There was no significant difference in the aldosterone (PH 680 IQR 470–1390 CTRL 380 IQR 289–1083 pmol, ns). However, the renin was lower in PH than CTRL (PH 0.3 IQR 0.3–0.48 vs CTRL 0.97 IQR 0.37–1.48 ng/mL/h), $p = 0.014$). There was no correlation between the serum potassium and renin in PH (R = 0.298, $p > 0.99$) or CTRL (R = −0.017, $p > 0.99$).

Further, there was no difference in the urinary potassium (PH 45.5 IQR 31.3–87.3 vs CTRL 57.5 IQR 37.5–70.8 mmol/L, ns), fractional excretion of potassium (FE_K) (PH 17.5 IQR 9–19.8 vs CTRL 10.9 IQR 9.7–16.3%, ns), FE_{Na} (PH 0.46 IQR 0.16–0.79 vs CTRL 0.54 IQR 0.44–0.67%, ns), nor the ratio of FE_K/FE_{Na} (PH 38.6 IQR 23.3–50.7 vs CTRL 28.3 IQR 23.3–50.7, ns).

Conclusions: The serum potassium discriminated between PH and hypertensive controls as well as renin.

There was no significant difference in either the FE_{Na} or FE_K. This implies that despite hyperkaliuria, urinary electrolytes are of no use in screening for PH. These data require further evaluation in larger, more defined cohorts.

Disclosures: None.

P-04 Comparing the discriminative ability of electrocardiographic criteria for left ventricular hypertrophy in predicting cardiovascular events in hypertensive patients: post-hoc analysis from the Anglo-Scandinavian cardiovascular outcome trial

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Introduction: Several ECG criteria are used clinically to define Left Ventricular Hypertrophy (LVH), but there is no consensus on which of these criteria is better at predicting cardiovascular (CV) events in hypertensive patients. In this post hoc analysis, our objective was to compare the discriminative ability and strength of association of different LVH criteria to predict the risk of CV-morbidity and mortality.

Methods: We used the database of the Anglo-Scandinavian Cardiac Outcomes Trial (ASCOT). Our primary outcome was composite of fatal and non-fatal CV event including: coronary heart disease, stroke and coronary re-vascularisation. We developed cox regression models separately for each LVH criterion (Modified Sokolov, Cornell, Framingham, Strain Pattern, Cornell-Strain, Cornell-Product), after adjusting for a-priori confounders (age, sex, smoking status, diabetes, pulse pressure, chronic kidney disease) and other confounders found using stepwise selection (number of anti-hypertensives, previous vascular disease, metabolic syndrome, atrial fibrillation). We compared discriminative ability using c-statistic, goodness of fit of the model using Bayesian information criterion (BIC), hazard ratios (HR) and z-statistics for strength of association of each one of these LVH criteria in respective models.

Results: 9.7–17.2% of 17959 patients had LVH at baseline as defined by one or more LVH criterion. During a median follow up of 5.6 years (IQR 5.2–6.1) there were 2736 CV events. Whilst c-statistics and accuracy of most criteria were similar, strain pattern and the Cornell strain were better in improving the prediction models and with a higher strength of association with the CV-outcomes (HR 1.52 [95% CI: 1.35–1.71], Z-statistic 6.88 and HR 1.37 [1.226–1.519], Z-statistic 5.70, respectively). Both criteria had excellent BIC too.

Conclusions: In hypertensive patients, compared to other ECG criteria of LVH, strain pattern and Cornell-train index are stronger and better predictor of the risk of CV-morbidity and mortality.

Clinical Trial Registry: ASCOT was conducted before trial registration was mandatory, however it did pre-specify the study design in a separate paper (https://doi.org/10.1097/00004872-200106000-00020), http://www.ascotstudy.org.uk/

Disclosures: None.

P-05 Collateral benefits of participation in clinical research: insights from a resistant hypertension trial screen out population

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Introduction: Benefits for patients randomised into research studies is well documented. But benefits for patients assessed for research has not been well demonstrated in the past.

Methods: Male or female patients 18–75 years old with resistant HTN were invited to participate. Post consent, clinic blood pressure (CBP) measurements were recorded. Patients also had 24-h ambulatory BP (ABP) to exclude pseudo-resistant HTN. All patients underwent screening for secondary causes of HTN. Antihypertensive medications were changed to a fixed dose combination pill (Sevikar/HCT). Ineligible patients had medication changes as per clinical judgement to improve BP control. Repeat CBP and ABP assessments were done at 4 weeks.

Results: 170 patients were assessed. The mean age was 59.6 ± 9.6 years, males (78%) and Caucasians (66%). The average number of anti-hypertensive medications was 4.1 ± 1.2. The mean CBP was 154/91 mmHg, mean daytime ABP was 150/85 mmHg. Following adjustments in medication after 4 weeks, the reduction in Clinic SBP was 14 ± 10 mmHg and DBP was 6.3 ± 6.2 mmHg (n = 145; p < 0.001 for both). The reduction in mean systolic daytime ABP was 8 ± 8.2 mmHg and DBP was 6 ± 7 mmHg (n = 91, p < 0.001 for both). The average number of anti-hypertensive medications reduced to 3.2 ± 1.3. Screening generated 74 new diagnoses and 34 newly detected cases of secondary hypertension (summarised below).

	Number of patients (N)
Secondary HTN	
Suspected Mineralocorticoid HTN	26
Raised Cortisol	2
Renal Artery Stenosis (RAS)	4
Fibromuscular Dysplasia (FMD)	2
New diagnoses	
Obstructive Sleep Apnoea (OSA)	27
Diabetes Mellitus (DM)	11
Renal Cancers (Ca)	4
Liver Hemangiomas	8
Aneurysms	6
New Atrial Fibrillation (AF)	2
Pancreatic mass	1
Hypercalcemia	1
Hyperthyroid	1
ECHO	10 Left Ventricular Hypertrophy (LVH); 2 Aortic stenosis (AS); 1 Effusion

Conclusions: High screen failure rate in studies could be considered a waste of time and resources. However, our findings demonstrate considerable collateral benefits for patients: 1. Accessing specialist care as part of the study 2. Frequent new diagnoses and newly detected secondary HTN 3. Medication optimisation resulting in clinically meaningful BP reduction and reduced medication burden

Disclosures: None for this study.

P-06 Factors affecting nonadherence to anti-hypertensive treatment in a specialist hypertension clinic

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Introduction: Prescription nonadherence represents a modifiable risk factor for patients with hypertension. We analysed the results of 174 urine compliance screens from patients referred to Addenbrooke's Hospital, Cambridge, for uncontrolled hypertension. The aim of study was to evaluate the burden of nonadherence and to identify factors associated with nonadherence

Methods: Cases of nonadherence were identified by liquid chromatography-tandem mass spectrometry of 174 urine samples from patients with uncontrolled hypertension (males: 91; females: 83; age range: 17–87). We performed a binary logistic regression for nonadherence using age, sex, body mass index (BMI), number of medications prescribed (both anti-hypertensives and non-anti-hypertensives separately), as independent predictors. Nonadherence percentages for individual medications were calculated for antihypertensive drugs prescribed to 10 or more patients

Results: The overall rate of nonadherence to one or more prescribed antihypertensive medications was 40.3%. 14.4% of patients were nonadherent to all prescribed antihypertensive medications (complete nonadherence), whereas 25.9% of patients were nonadherent to one or more, but not all prescribed antihypertensive medications (partial nonadherence). More than 60% of patients were on at least 3 medications for hypertension management and polypharmacy ($\geq$6 medications, all indications) was prevalent in 52%. Nonadherence was higher in women compared to men with adjusted odds ratio of 0.22 ($p = 0.005$, 95%CI $= 0.08$–0.633), and lowered with age with odds of 0.958 ($p = 0.02$, 95% CI $= 0.925$–0.993). For every increase in number of anti-hypertensive medication, nonadherence increased by odds of 3.7 ($p = 0.000$, 95% CI $= 2.2$–5.9) and every increase in prescription of non-antihypertensive medication, the odds increased by 1.1 ($p = 0.05$, 95% CI $= 0.9$–1.2). Furosemide and Chlortalidone demonstrated the highest and lowest nonadherences respectively (52.9 and 11.8%).

Conclusions: Rate of nonadherence in patients with uncontrolled hypertension is significantly impacted by factors such as sex, number of medications prescribed for hypertension and polypharmacy. Understanding factors which affect compliance is crucial in identifying and target interventions better.

P-07 Blood pressure drug adherence screening in an elderly primary care population—the BPD-Screen feasibility study

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Introduction: To assess the feasibility of collecting urine samples from elderly hypertensive patients to check for antihypertensive drug metabolites, and hence adherence to blood pressure (BP) lowering therapy.

Methods: A multicentre observational cohort study. Patients taking at least one antihypertensive medication were approached opportunistically by their primary care clinician at the end of a routine consultation over a 5 month period in 2019. A research nurse undertook the consenting process at each of the five general practice sites recruited.

The primary outcome was the proportion of patients approached who consented and provided a urine sample. Secondary outcomes were the proportion of patients

classified as adherent (with evidence of all prescribed antihypertensive medications in their urine), and to establish medication or demographic factors that may predict non-adherence.

Baseline medical and demographic details were captured from the patient's health records in both consenting and non-consenting cohorts (anonymously) in order to compare characteristics that may indicate non-adherence or non-participation in an adherence study.

Results: In total, we approached 351 patients across five primary care centres in England—216 patients consented to the study (61.5%), 196 of which were able to produce a urine sample at the time of recruitment. Mean patient age was 76.5 years (49% male) with a BP of 134.5/74.9 mmHg. Of the 369 BP lowering medications prescribed (mean of 1.9 medications per patient) 95.7% were detected in the patient's urine.

Conclusions: Opportunistic screening of antihypertensive medications was feasible in almost 2/3 of patients approached. Given the potential for non-adherence to antihypertensive medications to lead to costly secondary care referrals for so-called pseudo-resistant hypertension, the ability to objectively detect non-adherence using a routine urine sample has the potential to reduce this.

P-08 Harms of antihypertensive therapy for hypertension: a systematic review and meta-analysis

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Introduction: The benefits of prescribing antihypertensive therapy must be balanced against their potential harms. Currently there is no systematic review quantifying the extent to which antihypertensive therapy is associated with adverse events (AE). This study aimed to conduct such a review using data from previous trials.

Methods: A systematic review and meta-analysis of randomised controlled trials (RCTs) was conducted. A search strategy was run in five databases. Trials were included if they examined an antihypertensive vs placebo, more vs less-intense treatment or higher vs lower BP targets and reported 50 outcome events or ≥650 patient-years of follow-up. Data relating to study characteristics and outcomes including falls (primary outcome), hypotension, hypo/hyper kalemia, syncope, fractures, and acute kidney injury (AKI) were extracted. Study quality was determined using the Cochrane Risk of Bias tool. The association between treatment and outcomes was examined in a random effects meta-analysis.

Results: Sixty-one trials were identified and included in the analyses. Antihypertensive therapy was not associated with an increased risk of falls (OR 1.06, 95% CI 0.88–1.27). Treatment was associated with an increased risk of hyperkalemia (OR 1.69, 95% CI 1.35–2.11) as well as hypotension (OR 1.81, 95% CI 1.46–2.26). No significant association was observed between antihypertensive treatment and falls, hypokalaemia, AKI, or fractures.

Conclusions: While the benefits of antihypertensive treatment have been studied extensively and been shown to reduce the risk of stroke and cardiovascular disease, the findings of this review demonstrate that they are not without risk of harm. Our review provides useful evidence about the harms of therapy which will enable clinicians and patients to make better informed decisions regarding the use of anti-hypertensive therapies, particularly in older patients.

Disclosures: None.

P-09 Directly observed administration of anti-hypertensive medication prior to ambulatory blood pressure monitoring—a useful tool for investigating resistant hypertension

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Introduction: Resistant hypertension is frequently defined as a mean daytime blood pressure (BP) ≥135/85 despite the use of three or more anti-hypertensives. We investigated whether directly observed administration (DOA) of anti-hypertensive medications immediately before 24-h ambulatory blood pressure monitoring (ABPM) would help exclude 'treatment resistance' potentially caused by medication non-adherence.

Methods: Patients attending our nurse-led hypertension clinic were requested in advance to not take their prescribed anti-hypertensives before their morning appointment but instead to bring them with. Patients were then observed taking their anti-hypertensives before ABPM. Patients not following these instructions or who had ABPM organised from another clinic formed the control group. Proportions were compared with Chi-square tests and data analysis using Microsoft EXCEL 2010 [1].

Results: From November 2018 to October 2019, 53 patients had DOA before ABPM with 136 controls (Table 1). The DOA group average daytime BP was 138/83 (38% <135/85). The control group average daytime BP was 141/86 (27% <135/85).

Of the patients taking three or more anti-hypertensives (Table 2) 50% in the DOA group had a meantime daytime BP of <135/85 compared with 20% in the control group (p = 0.03)

Table 1 Baseline characteristics (all patients).

	DOA (n = 53)	Controls (n = 136)
Mean age	51	46
% Male	53	46
% on ≥ 3 agents	26 (n = 14)	29 (n = 40)

Table 2 Characteristics of patients on ≥3 anti-hypertensives.

	DOA (n = 14)	Controls (n = 40)
Mean age	57	58
% Male	43	55
% taking A,C and D*	57	53
Mean no. anti-hypertensives	3.9	3.7

A: Angiotensin-converting enzyme inhibitor or angiotensin-2-receptor blocker; C: Calcium channel antagonist; D: diuretic.

Conclusions: Eliminating any effect of medication non-adherence by DOA of prescribed anti-hypertensives immediately before ABPM leads to a lower rate of 'resistant hypertension' diagnoses. This strategy may therefore eliminate the need for further treatment and/or investigation in some patients.

Disclosures: None.

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P-10 A Review of antihypertensive medication discontinuation in In-patients

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Introduction: During medicine reconciliations on admission medications are often stopped or withheld for various reasons. This audit focussed on antihypertensives. The aim was to establish whether these medications were discontinued appropriately, whether they were restarted and if there was communication between primary and secondary care regarding changes.

Methods: Data was collected from 82 patients over the course of 2 weeks prospectively. Immediate discharge letters, medical notes and nursing notes were reviewed after discharge. The data collected included whether patients had known cardiovascular disease, if they were taking antihypertensives, if medications were stopped, the indication, and whether these changes were communicated to the patients' GP.

Results: Data was collected from 82 patients. From this cohort 43.9% (N = 36) had known cardiovascular disease and 47.56% (N = 39) were taking one or more anti-hypertensive agents on presentation to hospital. During admission 51.28% (N = 20/39) had one or more anti-hypertensive agents discontinued. Of the 20 patients who had antihypertensive agents discontinued 20% (N = 4/20) were restarted either before or on discharge. 85% (N = 17/20) of discontinuations were communicated to the patients' GP. 50% (N = 10/20) patients had medications discontinued due to acute kidney injury. 15% (N = 3/20) were discontinued as patients were either normotensive or hypotensive, and in 10% (N = 2/20) the indication was undocumented. The remaining 25% (N = 5/20) had their medications discontinued due to intentional overdose, poor therapeutic response, side effects or intolerance (N = 2/20), and system error respectively.

Conclusions: Medications were mostly discontinued appropriately. Only 20% of patients were documented to have restarted their medications and so cannot assess whether medications were restarted appropriately. A high proportion of medication amendments (85%) were communicated to the patient's GP via immediate discharge letters. However, 15% of patients did not and so there is a substantial proportion of patients going into the community with potential medication errors.

Disclosures: The authors declared no conflict of interest in completing this audit.

P-11 Patient-related FActors Influencing Blood Pressure Lowering Medication Prescribing after Index Stroke in Scotland: A National Database Study

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Introduction: Hypertension is an independent risk factor for both ischaemic and haemorrhagic strokes [1]. Adequate management of this condition with blood pressure-lowering medications (BPLM) is essential in preventing recurrent stroke events. This study aims to investigate the patient factors associated with the prescribing of blood

pressure lowering medications after any index stroke in Scotland.

Methods: Data collected within the Scottish Stroke Care Audit [2], Prescribing Information System and Scottish Morbidity Record were used to create a linked dataset with stroke survivors from 2010 to 2015. Patients on BPLM were identified and multivariate logistic regression analysis used to assess the prescribing trends based on selected patient factors

Results: Among the 42 900 stroke survivors, BPLM were prescribed to 15,804 (73.3%) males and 15 529 (72.8%) females (mean age 68.4 [±13.0] and 72.1 [±13.9] years respectively) within six months after stroke. Angiotensin-converting enzyme (ACE) inhibitors (39.8%), diuretics (32.1%) and betablockers (30.2%) were the most commonly prescribed BPLM, while angiotensin receptors blockers (ARBs) were the least prescribed (10.7%). Females were less likely to be prescribed ACE inhibitors (adjusted Odds Ratio, 0.70; 95% Confidence Interval, 0.67–0.73) and calcium-channel blockers (0.93; 0.89–0.98,) but more likely to be prescribed ARBs (1.27; 1.18–1.36). Increasing age was associated with more prescriptions for BPLM, except for ACE inhibitors. Independence in activities of daily living, orientated, ability to walk and lift arms at baseline stroke assessment all increased the likelihood of receiving a BPLM. Previous myocardial infarction (2.54; 2.25–2.86), heart failure (1.96; 1.70–2.01) and atrial fibrillation (1.85; 1.70–2.01) were associated with more BPLM prescriptions, while dementia was not (0.82; 0.70–0.88).

Conclusions: BPLM are commonly prescribed after stroke in both male and female survivors, with room for improvement. Increasing age, less severe strokes and cardiovascular-related comorbidities were all associated with more BPLM prescriptions.

Disclosures: None.

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P-12 Effect of diuretics on plasma renin activity and other markers of sodium and fluid homeostasis in essential hypertension: a systematic review and meta-analysis

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Introduction: Plasma renin activity (PRA) is regarded as a marker of sodium and fluid homoeostasis in patients with essential hypertension, with suppressed renin being indicative of a sodium retaining state particularly responsive to treatment by diuretics. Renin has therefore been proposed as a biomarker that might be used to guide diuretic treatment. However, whether (a) diuretics lead to a sustained increase in renin and (b) changes in renin relate to those in blood pressure is unknown. Here we perform a systematic review of trials of diuretic therapy in which PRA and/or other biomarkers of fluid homoeostasis were measured before and after treatment.

Methods: Three databases were searched: MEDLINE (1946 to 20th February 2018), EMBASE (1974–2018 week 12) and The Cochrane Central Register of Controlled Trials (CENTRAL) (up to 19th March 2018). Titles were firstly screened by title and abstract for relevancy before full-text articles were assessed for eligibility according to a pre-defined inclusion/exclusion criteria. Studies were eligible for inclusion if they were a randomised controlled trial performed in hypertensive human subjects ≥18 years old, examining antihypertensive effects of either a thiazide, thiazide-like, loop or potassium-sparing diuretic with a duration of at least one week.

Results: A total of 1684 articles were retrieved of which 61 met the pre-specified inclusion/exclusion criteria. PRA was measured in 45/61 studies. Diuretics lead to a sustained in increase in PRA. The increase in PRA was related to the decrease in blood pressure ($\beta = -0.363$, $p < 0.05$) and did not differ according to class of diuretic.

Conclusions: These results are consistent with the reduction in blood pressure being related to that in body sodium and volume and support the use of PRA to guide diuretic therapy.

Disclosures: None.

P-13 Sustainability of blood pressure reductions at interventions led at barbershops: systematic review and meta-analysis of randomised controlled trials

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Introduction: Barbershops as a contact platform to engage with patients on a regular basis is a unique approach. to manage hypertension. We explored evidence for contemporary role of barbershop led interventions to manage hypertension in community setting, by only including randomised controlled clinical trials (RCCTs)

Methods: We searched Cochrane Library, pubmed-MEDLINE, IndMED online databases to conduct a systematic review of published RCCTs. Studies with non-barbershop led, generalised community-based setting approaches were excluded by using Boolean operators

Results: The results yielded four clinical trials of which three met inclusion criteria, published over last 10 years (2011–2019). The parameters were analysed for study design, patient characteristics, impact factor of journals, duration, and outcomes. Cumulatively, 1826 subjects (mean 609 subjects, SD ± 367, SEM ± 212, minimum 319, maximum 1022, 95% CI −304 to 1521, p = 0.103 NS) have been evaluated across three RCCTs. Cumulative duration of the trials was 32 months (mean 11 months, SD ± 1.2, SEM ± 0.67, minimum 10, maximum 12, 95% CI 7.8 to 13.5, p = 0.0039). The baseline systolic BP of ≥140 mmHg has been uniform enrolment criteria. Based on impact factor of the journals (mean 31, SD ± 35, SEM ± 20, minimum 2.8, maximum 71, 95% CI −56 to 119; p = 0.26 NS), we formulated an indexed weightage score (mean 100, minimum 9, maximum 225, SD ± 112, SEM ± 65, 95% CI −178 to 378, p = 0.26 NS). Patients who were treated with specialists, received more BP medication and different classes of medication than those treated by primary care physicians and BP reduction was 21 mmHg (p < 0.0001)

Conclusions: Barber based intervention model have demonstrated to be a feasible connect between the patients and healthcare providers resulting in sustained BP reductions in the community, especially when care linkage to hypertension specialists can be achieved.

Disclosures: None.

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P-14 Visit-to-visit systolic blood pressure variability and worsening renal allograft outcomes

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Introduction: Hypertension after successful kidney transplantation (KT) is associated with poor renal allograft outcomes. Although, Association visit-to-visit variability of cholesterol and blood pressure (BP) is associated with cardiovascular risk [1–3]. Association between visit-to-visit BP variability (VVBPV) and renal allograft outcomes is unknown.

Methods: VVBPV from BP measurements at 4, 12, 24, 36, and 48 weeks post-KT was assessed with 3 methods: 1. Standard deviation (SD) of BP 2. Coefficient of variation (CV = SD/Mean × 100%) 3. Average successive variability (ASV = the average absolute difference between successive values. Multi-variable Cox proportional hazard regression analysis was used to examine association between VVBPV of systolic BP (SBP) as well as diastolic BP (DBP) and progression of renal allograft function, which was defined by a decrease in estimated glomerular filtration rate (eGFR) after the established baseline eGFR at 12-week post-KT.

Results: Of 102 renal transplant recipients (RTR) for a single KT centre, mean age±SD was 54.16 ± 11.73 years and 63 patients (62%) was female. Sixty-three patients had decreased eGFR after 12-week post-KT with an incidence rate of 0.017 person-weeks and median time to event was 36 weeks. After adjusted for induction immunosuppressive medications, pretransplant weight, posttransplant eGFR at 4 and 12 weeks, every 1-SD, 1% CV, and 1-ASV increase in

SBP was significantly associated with 5.54%, 7.81%, and 3.53% increase in risk of worsening renal allograft function, respectively. The association between all 3 methods of VVBPV for DBP and worsening renal allograft function were the same direction as SBP, but all were not significant (Table 1).

Conclusions: VVBPV for SBP, but not DBP, is an independent predictor of worsening renal allograft function.

Disclosures: None.

Table 1 Association between visit-to-visit blood pressure variability (VVBPV) and a decrease in estimated glomerular filtration rate after 12-week post-kidney transplantation. VVBPV were assessed by standard deviation (SD) of BP, coefficient of variation (CV), and average successive variability (ASV).

| | HR (95%CI) | | |
	SD	CV	ASV
SBP	1.055426 (1.015555, 1.096863)	1.07809 (1.020565, 1.138858)	1.035322 (1.008506, 1.06285)
DBP	1.024814 (0.9450581, 1.111302)	1.019853 (0.9623498, 1.080793)	1.039855 (0.9863995, 1.096208)

ASV average successive variability, *CI* confident interval, *CV* coefficient of variation, *DBP* diastolic blood pressure, *HR* hazard ratio, *SBP* systolic blood pressure, *SD* standard deviation, *VVBPV* visit-to-visit blood pressure variability.

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P-15 Nurse and psychologist led pilot for shared decision-making tool for nurses and pharmacists with patients with diagnosed hypertension patients in the UK and Ireland

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Introduction: Nurse and psychologist led pilot for shared decision-making tool for nurses and pharmacists with diagnosed hypertensive patients in the UK and Ireland. Featuring the motivating CVD risk concept 'Heart Age', patient perceptions of CVD risk and benefits of different intervention strategies. Patients and clinicians can explore different options for management framed, physical activity and medication, as a way of taking 'years off' their Heart Age through blood pressure control. Heart Age has been shown to be effective in motivating risk factor reduction [1] and align perceived and measured risk [2].

Methods: We will recruit patients, nurses and pharmacists through established relationships within the third sector, charities, societies and social media. Using focus groups and surveys, we will gain insight into hypertensive patient preferences for CVD risk framing, quantification of intervention benefits (and side effects) and processes to facilitate shared decision making. Using this knowledge, we will co-design and deliver a training programme. Novel adaptations of the Heart Age tool will be created to provide (years off) benefits for different aspects of blood pressure lowering, with a focus on the independent and joint benefits of medication management and lifestyle. Clinicians using their skills and knowledge and the modified Heart Age in the clinical setting to arrive at joint decisions on blood pressure control with patients.

Results: By May 2020 we will have results from the patient insight and initial findings from nurses and pharmacists. These will be presented with the full pilot plan.

Conclusions: We believe that shared decision making can only be achieved if patients understand the benefit of personal cardiovascular risk and risk reduction in order to balance against other preferences.

Disclosures: European Grant from Pfizer.

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P-16 Knowledge and attitudes among the general public towards salt consumption in Oman

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Introduction: Increased dietary salt intake is a major health concern [1]. The aim of our study was to assess the

knowledge and attitudes of the general public in Oman regarding the dangers of high salt intake.

Methods: This was a cross sectional questionnaire-based survey, based on the validated WHO questionnaire [2]. It was translated into Arabic by local professionals and translated back to English to check the accuracy of the translation. All individuals aged 18 and above were invited to fill in the questionnaire.

Results: A total of 1214 respondents (age $34 + 10$ years, 65.8% male, 69.4% employed,14.2% hypertensive) answered the questionnaire. Most felt that they were consuming the right amount of salt (69.4%) while only 6.7% thought that they were consuming more than they should. Most of the respondents always add salt while cooking (80%), and sometimes or always add salt at the table (61.4%). Most (90.7%) were aware that excess salt can cause diseases such as hypertension and that it is either somewhat important (51.2%) or very important (43.2%) to reduce salt in the diet. However only 42% said that they actively try to reduce salt in their diet. Only around a quarter check the label of the food for salt content before they buy. Only 54 (4.4%) said they knew what the recommended limit of salt intake is, but only 5 got it correct. The factors that determine whether or not a person tries to reduce salt in diet were age, sex, educational level and occupation (all $p < 0.001$). However, being hypertensive was not a predictor.

Conclusions: Although most people in Oman in our sample appear to be aware of the dangers of high salt intake, only a few are actively trying to reduce it. More educational activities are required to improve awareness especially among the hypertensive patients.

Disclosures: The authors have no disclosures.

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P-17 Sodium and potassium intake, and knowledge attitudes and behaviour towards salt consumption: a national survey of adults in the Sultanate of Oman

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Introduction: High sodium (Na) and inadequate potassium (K) intake are important determinants of high blood pressure (BP) and cardiovascular diseases (CVDs). In Oman, CVD represents a common cause of population morbidity and mortality, accounting for 33.0% of all deaths. The aim of the present survey was to establish baseline average consumption of Na and K, and explore knowledge, attitudes and behaviour (KAB) towards the use of salt, in a nationally representative random sample of men and women.

Methods: The study was a national cross-sectional population-based survey of proportional random samples, representative of Omani adults (18 years and older), obtained from all Governorates of Oman. Of the 999 who agreed to participate, after a robust protocol to ascertain good quality of data, five hundred and sixty-nine (193 men, 376 women; response rate 57%; mean age 39.4 years [SD 13.1]) were included in the final analysis. The characteristics of those excluded were comparable to those included. Participants attended a screening including demographic, anthropometric and physical measurements by standardised methods. Dietary Na (salt) and K intakes were assessed by 24 h urinary Na (UNa) and K (UK) excretions. Urinary creatinine was also measured. KAB were assessed by questionnaire.

Results: Mean UNa was 144.3 (78.8) mmoL/day, equivalent to 9.0 g of salt/day and potassium excretion 52.6 (32.6) mmoL/day, equivalent to 2.36 g/day. Men ate more sodium and potassium than women. Only 22% of the sample had a salt intake below the World Health Organization (WHO) recommended target of 5 g/day and less than a quarter met WHO targets for potassium excretion (>90 mmoL/day). Whilst 89.1% of those interviewed knew that consuming too much salt could cause serious health problems and only 6.9% felt they were using too much added salt, 1 in 2 participants use always or often salt, salty seasonings or salty sauces in cooking or when preparing food at home.

Conclusions: In Oman, salt consumption is higher, and potassium consumption lower, than recommended by the World Health Organization, both in men and in women.

P-18 Salt Swap: a feasibility randomised controlled trial of a behavioural intervention to reduce salt intake among people with raised blood pressure

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Introduction: High salt intake is a risk factor for hypertension. We examined the feasibility of a novel intervention to encourage individuals with raised blood pressure to reduce their salt intake by purchasing lower-salt products when grocery shopping.

Methods: Forty-seven adults with a record of high blood pressure were recruited from GP practices and randomised to receive the intervention (n = 31); or a generic salt-reduction advice leaflet (control, n = 16). The intervention comprised a 30-min behavioural support session with a healthcare practitioner in primary care and use of a theoretically-informed smartphone app (Salt-Swap) to help participants choose lower-salt foods when grocery shopping. Primary outcomes were progression criteria for a larger trial: follow-up attendance, use of the Salt-Swap app and fidelity of intervention delivery. Secondary outcomes included change in salt intake (24-h urinary sodium) and blood pressure after six weeks. A qualitative assessment was conducted in a subgroup, using the think-aloud method and semi-structured interviews.

Results: Progression criteria were met, with 96% (45/47) follow-up, 87% (27/31) of intervention participants using the app more than once in month one, and 81% fidelity of intervention delivery. Salt intake decreased in both groups, (intervention −0.2g/d, 95% CI −1.4 to 0.9; control −1.0 g/d, 95% CI −2.4 to 0.4) as did systolic blood pressure (intervention −1.0 mmHg, 95% CI −5.5 to 3.6; control −1.1 mmHg, 95% CI −6.7 to 4.4). There was no significant difference between groups. Seventeen participants completed a think-aloud shop and interview. Salt-Swap increased participants' knowledge of the sources of dietary salt, their use product nutrition labels for salt, and changed purchasing behaviours that could help to reduce salt intake.

Conclusions: It would be feasible to conduct a definitive trial to assess effects on blood pressure. The app was popular among participants, but the usefulness could be increased by improving product coverage of the Salt-Swap app.

P-19 Effect of dietary salt reduction on blood pressure in kidney transplant patients: a randomised controlled trial

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Introduction: Cardiovascular morbidity and mortality are increased in kidney transplant (KT) patients. High blood pressure (BP) contributes significantly to this risk and is associated with shortened allograft survival. Dietary salt reduction is widely recommended as a strategy to lower BP in the general population and in chronic kidney disease. Due to a lack of evidence there is currently no consensus on dietary salt restriction in KT patients.

Methods: Sixty stable KT patients, ≥6-months post-transplantation, with BP ≥120/80 mmHg, and sodium intake ≥80 mmol/24 h, were randomised in this parallel-designed study to receive either a regular-salt diet (target 150 mmol/24 h) or low-salt diet (target 80 mmol/24 h) for 8-weeks. The primary outcome measure was systolic and diastolic BP. Secondary outcome measures included 24-h ambulatory BP (ABP) and proteinuria. Dietary salt intake was assessed by 48-h urinary sodium excretion.

Results: At baseline, patients (72% men) were 56 ± 11 years with estimated glomerular filtration rate (eGFR) 53 ± 18 mL/min/1.73 m^2. Mean urinary sodium, 128 ± 42 mmol/24 h, mean systolic BP, 132 ± 12 mmHg, and mean diastolic BP, 77 ± 10 mmHg. At the end of the intervention period sodium excretion was significantly lower in the low-salt group compared with the regular-salt group (90 ± 37 vs. 132 ± 51 mmol/24 h; adjusted mean difference, −36 [95% CI, −59 to −14] mmol/24 h; P = 0.002). We found no difference in systolic BP (adjusted mean difference, −2 [95% CI, −12 to 9] mmHg; P = 0.750), diastolic BP (adjusted mean difference, 0 [95% CI, −4 to 4] mmHg; P = 0.887), 24-h systolic ABP (adjusted mean difference, −3 [95% CI, −9 to 2] mmHg; P = 0.213) or 24-h diastolic ABP (adjusted mean difference, −2 [95% CI, −5 to 1] mmHg; P = 0.267). There was no significant effect on proteinuria or eGFR.

Conclusions: In this study baseline urinary sodium was lower than expected and baseline BP was well-controlled. Reducing dietary salt by 2g/day did not have a significant effect on office BP readings.

Clinical Trial Registry: NCT03373500, https://ClinicalTrials.gov

P-20 The effect of plant-based diets on blood pressure: a systematic review and meta-analysis of controlled clinical trials

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Introduction: Strict vegetarian diets with no animal products are associated with low blood pressure (BP). (1) It is not clear whether less strict plant-based diets (PBD) exert similar effects. We assessed whether less strict PBDs reduce BP in controlled clinical trials.

Methods: We carried out a systematic review and a meta-analysis of all published intervention trials assessing the effects of PBDs on BP. On 14 June 2019 we performed a systematic search of publications using MEDLINE (1966–2019), EMBASE (from 1980), CINHAL, WoS and manual searches without language restrictions. Inclusion criteria were age ≥ 18 years, PBD as an intervention, defined as dietary patterns that support high consumption of fruits, vegetables, whole grains, legumes, nuts and seeds, and avoid the consumption of most or all animal products, mean differences in systolic/diastolic BP between PBD and control diet, controlled clinical trial. Standardised mean differences in BP and 95% C.I. were pooled using a random effect model. Quality, sensitivity, heterogeneity and publication bias were assessed.

Results: Thirty-nine studies met the inclusion criteria. They included 8203 participants (4333 in intervention; 3870 control groups). Median sample size was $n = 65$ (range 11–4717) and mean age of the participants 50.5 yrs (range 25.6–71.0). All were controlled trials (duration 1.4–208 weeks, median 12 wks). Of the 39 trials, 36 were randomised. Seven were crossover. Two were single-blinded. Three had controlled feeding and all were in free living individuals. The interventions were DASH diet ($n = 11$), Mediterranean diet (MD, $n = 8$), vegan diet (VD, $n = 8$), lacto-ovo vegetarian diet (LOVD, $n = 5$), healthy Nordic diet (ND, $n = 3$), high fibre diet (HFD, $n = 3$), and high fruit and vegetables diet (FVD, $n = 2$). In the pooled analysis, PBDs were associated with lower systolic BP (DASH −5.53 mmHg [−7.95, −3.12], MD −0.95 mmHg [−1.70, −0.20], VD −1.61 mmHg [−4.53, 1.31], LOVD −5.47 mmHg [−7.60, −3.34], ND −4.47 mmHg [−7.14, −1.81], HFD −0.65 mmHg [−1.83, 053], FVD −0.57 mmHg [−7.45, 6.32]. Similar effects were seen on diastolic BP. There was no evidence of publication bias and some heterogeneity was detected.

Conclusions: PBDs with limited or no animal products lower both systolic and diastolic BP, across sex, age and body mass index.

Disclosures: None.

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P-21 Quality of life in elderly hypertensive patients and the influence of selected sociodemographic and clinical variables on its evaluation

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Introduction: Hypertension is one of the most common public health problems and the morbidity increases with age. The main aim of treatment with hypotension is to reduce the long-term total risk of cardiovascular diseases and improve quality of life (QoL). The components of QoL in old age include subjective health assessment covering physical, social, emotional and health condition [1]. The aim of the study was to evaluate the quality of life of patients with hypertension in the elderly and the influence of selected sociodemographic factors and clinical variables on its evaluation.

Methods: 102 patients were examined, including 44 men and 58 women. The average age of respondents was 69.71 (SD = 2.92). The WHOQoL-BREF standardised questionnaire was used to assess quality of life and medical records were analysed.

Results: The mean score for quality of life was 3.28 points (SD = 0.69), while the mean score for own health was 2.61 points (SD = 0.73).Patients with hypertension rated their QoL best in the psychological field (mean 2.4; SD = 0.64) and worst in the physical field (mean 3.4; SD = 1.19).Men showed significantly better quality of life than women (p < 0.005) in such areas as: perception of quality of life (mean 3.48; SD = 0.7 vs mean 3.14; SD = 0.66), physical domain (mean 12.68; SD = 2.04 vs mean 11.36; SD = 2.36) and environmental domain (mean 14.82; SD = 1.99 vs mean 13.5; SD = 2.22). Age correlated significantly and negatively with the quality of life in each field (p < 0.05).Persons with higher education and married had higher QoL rating (p < 0.05).

Conclusions: Patients with hypertension have a reduced quality of life, especially with regard to physical functioning. Higher QoL scores were observed in the group of men, persons with higher education and married. Moreover, the older the age of the respondents, the worse the quality of life in all areas of QoL.

Disclosures: None.

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P-22 Early hypertension: exploring the vascular phenotype

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Introduction: Despite well-established risk factors for hypertension, the early phenotypic features remain elusive. Understanding these characteristics could allow for identification of disease subtypes.

Methods: Newly diagnosed primary hypertension in treatment-naïve patients without co-morbidities (n = 25) were compared to age-matched normotensive controls (n = 36). Blood pressure (BP) was analysed using ambulatory monitoring. Vascular phenotyping included flow mediated dilatation (FMD), pulse wave velocity (PWV), heart-rate adjusted augmentation index (AI75) and estimated central BP by pulse wave analysis (PWA); and peripheral arterial tonometry (EndoPAT-2000)-generated logarithmic reactive hyperaemia index (LnRH) and AI75. Data were entered into Principal Component Analysis (PCA) and heatmap generation identified phenotypic clusters.

Results: Hypertensive participants were aged 36 ± 9.1, 79% were male, 24 h SBP was 140 ± 8 (vs 113 ± 9 mmHg [p < 0.01] in control participants), and BMI was 28.6 ± 4.0 kg/m^2. When vascular techniques were studied individually, only PWV was significantly different between hypertensive and normotensive subjects (7.2 ± 0.9 vs 6.5 ± 1.0 m/s, p = 0.004). However global analysis of vascular phenotypes using clustering revealed 3 distinct phenotypic subgroups:

Group A, n = 8: 24 h BP 131/81 ± 12/6 mmHg, with loss of nocturnal dip in 5 of 7 (1 no data), older age (42 years), higher BMI (31.8 kg/m^2), and higher PWV (7.7 m/s) but normal AI75 by either measure (−3.5% by EndoPAT-2000).

Group B, n = 7: 24 h BP 141/91 ± 9/6 mmHg, with borderline nocturnal dip (0.3/12.7%), relatively low PWV (mean 6.9 m/s) but elevated AI75 by either measure (e.g. mean PWA 20%), and elevated estimates of central pressures (135/95 mmHg).

Group C, n = 11: Diurnal variant, with daytime BP 143/90 mmHg, but pronounced nocturnal dip (14.6/21.1%) and greater SD in daytime BP (12/9 mmHg); younger age (35 years), lower BMI (26 kg/m^2), with intermediate PWV (7.3 m/s) and AI75 (−6.4%), and uniformly normal LnRH.

Conclusions: We identify phenotypic clusters in incident patients with primary hypertension, with different vascular techniques associated and potentially differing pathophysiology. This warrants further examination in a larger population.

Disclosures: None.

P-23 Ethnic disparities in hypertension-mediated organ damage and its usefulness for the clinical management of subjects with grade I hypertension

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Background: Ethnic disparities in the prevalence of hypertension (HT) exist but data on target organ damage (TOD) are conflicting [1]. Here we explore the ethnic differences in TOD in a dual ethnic cohort of subject with grade I HT and we test if the evaluation of TOD provides additional information for the clinical management of untreated patients compared to the estimation of 10-year cardiovascular risk (CVR).

Methods: In subjects with grade I HT and self-described ethnicity as "Black" or "White" TOD was assess with albumin/creatinine ratio (ACR, urine spot), left ventricular mass index (LVMI, cardiac ultrasound) and carotid-femoral pulse wave velocity (cfPWV, Sphygmocor) alongside with brachial blood pressure (BP) measurements. In untreated subjects, 10-years CVR was estimated using QRISK3 calculator.

Results: 58 Black (26 female) and 61 White (17 female) subjects were recruited. White subjects were older compared to Black ones (49 vs 43 years) but there were no difference in their duration of hypertension (~4.5 years) and BP ((mean ± standard error) 146.3 ± 0.8 mmHg vs 146.8 ± 0.9 mmHg for systolic BP and 89.2 ± 0.9 mmHg vs 89.2 ± 0.7 mmHg for diastolic BP respectively). LVMI (101.4 ± 3.6 vs 81.6 ± 3.2)g/m^2, ACR (7.5 ± 2.9 vs 1.9 ± 2.8)mmol/mol and cfPWV (10.6 ± 0.4 vs 9.2 ± 0.4)m/s were higher in Black subjects compared to White after adjustment for confounders (BP, age, gender, body mass index, creatinine, diabetes and dyslipidaemia); all p < 0.05. In untreated subjects (n = 59), 14 had evidence of TOD including microalbuminuria, left ventricular hypertrophy and/or cfPWV > 10 m/s. Of those, 4 had CVR > 10%.

Conclusions: For a similar level of BP, TOD is more prevalent in Black compared to White subjects with grade I HT. Evaluation of TOD is superior compared to CVR estimation in identifying subjects who may be started on medical treatment.

Disclosures: None.

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P-24 Dietary nitrate influences vascular remodelling through BP-independent mechanisms in patients with or at risk of type 2 diabetes mellitus: results from the double-blind, randomized-controlled, factorial VaSera trial

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Introduction: Dietary nitrate has several beneficial actions on the cardiovascular system [1, 2]; however, its effect on atherogenesis has not been studied. We tested if long-term intervention with dietary nitrate (NO3-) and spironolactone could affect carotid structure and stiffness compared to placebo/doxazosin, used as control for blood pressure (BP) [3, 4].

Methods: Participants in our double-blind, randomised-controlled, factorial VaSera trial, were randomised to spironolactone or doxazosin and NO3- as active nitrate-containing beetroot juice or placebo nitrate-depleted juice. Vascular ultrasound for carotid diameter (CD, mm) and intima-media thickness (IMT, mm) was performed at baseline and repeated at 3- and 6-months follow-up. Carotid local stiffness (CS, m/s) was estimated from aortic pulse pressure (Arteriograph) and carotid lumen area. Data was analysed by modified intention to treat and using mixed-model effect, adjusted for confounders.

Results: 93 subjects had a baseline evaluation and 86% had follow-up data. No statistical interactions occurred between the juice and drug arms. IMT was significantly lower on nitrate-containing compared with placebo juice [−0.06 (95% Confidence Interval −0.12, −0.01), p = 0.022], with no effect on CD. CS reduction was similar between juices [−0.38 (−0.67, −0.10) with placebo, −0.13 (−0.42, 0.16) with active juice] and the drugs [−0.30 (−0.58, −0.02) with doxazosin, −0.21 (−0.51, 0.09), with spironolactone]. No differences were detected between spironolactone or doxazosin on IMT and CD. BP did not differ between the juices or between the drugs.

Conclusions: Our exploratory results show that long-term intervention with dietary nitrate influences vascular remodelling, but not carotid stiffness or diameters. Neither spironolactone nor doxazosin had a BP-independent effect on carotid structure and function.

Clinical Trial Registry: ISRCTN25003627, https://doi.org/10.1186/ISRCTN25003627

Disclosures: None.

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P-25 Validation of the SphygmoCor device for assessment of autonomic nervous system function

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Introduction: Heart rate variability (HRV) is a non-invasive tool to assess autonomic nervous system activity, with reduced HRV reflecting poor health. We aimed to evaluate HRV measures obtained with the SphygmoCor device (AtCor Medical, Australia), and provide robust normative data across the adult age span.

Methods: We conducted 3 separate studies: (1) Effect of ganglion blockade with pentolinium (5mg/5ml bolus) on HRV was studied in 9 healthy volunteers, (4 females, 28 ± 6 years). (2) Repeatability and effect of postural change (supine, seated and standing, measured on two occasions) were investigated in 15 healthy volunteers (8 females, 32 ± 11 years). (3) Influence of age and sex on HRV indices were observed in 1858 healthy individuals (971 females, 37 ± 19 years, range 16–84 years). All measurements for all studies were made for a minimum of 5 min, while resting.

Results: Study 1) 25 min after ganglion blockade we saw a decrease from baseline in HF power (1345 ± 956 vs. 116 ± 216 ms^2, p = 0.001), LF power (1094 ± 825 vs. 316 ± 613 ms^2, p = 0.01) and total power (3327 ± 2345 vs. 1024 ± 1711 ms^2, p = 0.001). Study 2) When normalised to total power, there was a significant effect of posture on LF power (Supine: 44.6 ± 21.1, Seated: 55.5 ± 24.2, Standing: 73.3 ± 19.1) and HF power (Supine: 55.6 ± 21.4, Seated: 44.5 ± 24.2, Standing: 26.7 ± 19.1) (p < 0.001 for both). All effects were reproducible across study visits. Study 3) Total power, LF power and HF power all

decreased with age in both males and females (p < 0.001 for all). However, the LF/HF ratio increased by decade of life, ranging from <20years (1.14 ± 1.0) to ≥70years (2.09 ± 2.30), p < 0.01, indicating an increase in sympathetic dominance, and this was greater in males (p < 0.001).

Conclusions: The SphygmoCor device provides reproducible estimates of HRV indices which are sensitive to the effects of ganglion blockade, postural change and ageing. Assessment of ANS may provide useful insights into the cardiovascular effects of ageing and hypertension.

Disclosures: None.

P-26 Over-expression of Osteopontin Implicates Exosomes in H9c2 Cell size

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Introduction: Osteopontin (*Spp1*) plays an important role in cardiac remodelling in cardiovascular disease (CVD). Patients and animal models with acute and chronic CVD have increased *Spp1* expression in the heart predominantly within cardiomyocytes resulting in cardiac hypertrophy. To date, extracellular vesicles (EV) transport has been shown to facilitate physiological processes, such as tissue repair, as well as pathological processes and may represent a mechanism contributing to cardiomyocyte hypertrophy. Our aim was to measure cell size after overexpression of *Spp1* in H9c2 cells. Furthermore, we aimed to assess functional role of EVs isolated from *Spp1* transfected H9c2 and HeLa conditioned media on H9c2 cells.

Methods: H9c2 cells were transfected with plasmid control and *Spp1*. 48 h post-transfection, cells were fixed and stained with 4% PFA and 2% crystal violet stain. Cell size was measured using ImageJ. EVs were isolated from H9c2 and HeLa cells transfected with plasmid control and *Spp1* by ultracentrifugation technique. Isolated EVs from H9c2 and HeLa cells were then placed onto fresh H9c2 cells and incubated for 48 hours. Post-incubation cell size was measured using ImageJ.

Results: H9c2 cells transfected with Spp1 showed significant increase in cell size compared to their control (pcDNA 48.3 ± 0.5 vs Spp1 112.0 ± 1.1, p < 0.05). EVs isolated from Spp1 transfected H9c2 cells showed an increase in cell size compared to their control (pcDNA 74.4 ± 1.4 vs Spp1 90.6 ± 1.6, p < 0.05). Similarly, EVs isolated from Spp1 transfected HeLa cells also showed an increase in H9c2 cell size compared to their control (pcDNA 81.4 ± 0.9 vs Spp1 121.4 ± 2.0, p < 0.05).

Conclusions: Over-expressing *Spp1* in H9c2 cells results in significant increase in cell size, suggesting that it likely contributes to cardiac hypertrophy in models of CVD. This study also implicates the role of EVs in cardiac disease and further studies will characterise their content to further elucidate downstream mechanisms leading to cardiac hypertrophy.

Disclosures: The author declares that there are no competing interests associated with the abstract.