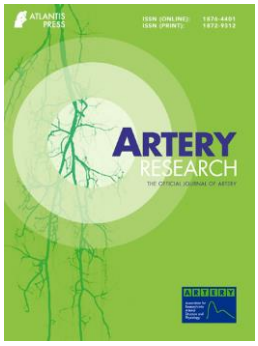

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PO-26: BILATERAL SYMMETRY OF BRACHIAL PULSE WAVEFORM ANALYSIS IN A CLINICAL POPULATION

Jumana Dakka, Timothy S. Phan, Izzah Vasim, Swapna Varakantam, Uzma Kewan, Ali Tariq, Harry G. Oldland, Amer Ahmed Syed, Zeba Hashmath, Scott R. Akers, Julio A. Chirinos

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risk factors. To address this gap, we aimed to assess the relationship between pedometer-derived step counts and carotid-femoral pulse wave velocity (cfPWV), a summative measure of arterial health.
Methods: 369 adults (46% men, 60% White, mean age 59.6±11.2 years, BMI 31.3±4.5 kg/m^2) with hypertension and/or type 2 diabetes were recruited in Montreal, Canada (2011-2015). Step counts (Yamax SW-701 pedometer), moderate-to-vigorous physical activity (MVPA) (ActiGraph GT3x+), arterial stiffness (applanation tonometry; SphygmoCor), and cardiometabolic risk factors including blood pressure, haemoglobin AIc, and lipids were assessed.
Results: Blood pressure was well-controlled (mean 125/77±15/9 mmHg), low-density lipoprotein cholesterol (LDL-C) was close to target (mean 2.5±1.0 mmol/L), and A1c in diabetes was acceptable (mean 7.7±1.3%). Participants averaged 5,125±2,722 steps/day (low active) and mean cfPWV was 9.8±2.2 m/s. Step counts correlated with cfPWV, but not with any other cardiometabolic risk factors. A 1,000 step/day increment was associated with a 0.1m/s (95% CI -0.19, -0.02) decrement in cfPWV in a model adjusted for age, sex, BMI, ethnicity, immigration status, employment, education, diabetes, hypertension, medication classes, and MVPA.
Conclusion: In patients with hypertension and/or diabetes who were well-controlled on cardioprotective medications, cfPWV is responsive to step counts and may emerge as a useful health indicator to track the arterial health impact of physical activity strategies in clinical practice.

PO-25
HIGHER CENTRAL AND BRACHIAL SYSTOLIC BLOOD PRESSURE IS SELECTIVELY ASSOCIATED WITH WEAKER COGNTIVE PERFORMANCE IN POSTMENOPAUSAL WOMEN BUT NOT OLDER MEN

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Introduction: Higher aortic stiffness and central blood pressure (BP) are associated with reduced cognitive performance in older adults. Cognitive performance tends to be higher in older women compared with older men, unexplained by differences in years of formal education and/or presence of atherosclerotic vascular disease (AVD). However, whether gender-related differences in cognitive function are explained by alterations in aortic stiffness or central blood pressure (BP) is unclear. We hypothesized that higher aortic stiffness and central systolic BP would be associated with weaker cognitive performance in middle-aged/older (MA/O) men but not postmenopausal women.
Methods/Results: A total of 135 MA/O men and postmenopausal women (age 55-85 yrs) were recruited. Brachial systolic BP was higher in men, however, there were no differences in aortic stiffness (carotid-femoral pulse wave velocity, cfPWV), central systolic BP or pulse pressure (PP) (Table 1). Women scored higher than men on the RBANS Total Scale Score and Delayed Memory Index (both $P<0.05$) (Table 1). In the entire cohort, higher central and brachial systolic BP were associated with weaker Stroop Color Naming ($r=-0.24$, $P<0.05$, $r=-0.25$, $P<0.05$) and Stroop Interference ($r=-0.30$, $P<0.01$, $r=-0.32$, $P<0.01$) performance. Interestingly, years of education was associated with RBANS Total Scale Score ($r=0.64$, $P<0.001$) and WRAT-3 Reading ($r=0.63$, $P<0.001$) scores in men but not women ($P>0.05$). Adjusting for age, AVD status, BMI, insulin, estrogen therapy and medications, higher Stroop Interference scores were associated with lower central systolic ($r=-0.52$, $P=0.001$), brachial systolic ($r=-0.50$, $P=0.001$) BPs and central PP ($r=-0.31$, $P=0.05$) in women but not men. Lower WRAT-3 Reading scores were associated with higher central ($r=-0.44$, $P<0.01$) and brachial PP ($r=-0.50$, $P<0.01$) in women only.
Conclusion: Higher central and brachial systolic BP and PP is selectively associated with weaker cognitive performance in postmenopausal women but not MA/O men independent of aortic stiffness and AVD.

Table 1 Displays demographic, vascular rand cognitive performance data.

Mean ± SE	Men (n=68)	Women (n=67)	*p-value*
Demographics:			
Age (yrs)	66.3 ± 1.0	68.3 ± 1.0	0.14
Atherosclerosis Vascular Disease, no. (%)	46 (67.6)	27 (40.3)	**0.001**
Education (yrs)	15.1 ± 0.3	14.3 ± 0.3	0.08
Body Mass Index (kg/m^2)	29.9 ± 0.7	28.7 ± 0.8	0.25
Total cholesterol (mg/dL)	145 ± 3.8	177 ± 4.4	**<0.001**
HDL cholesterol (mg/dL)	47.5 ± 1.6	57.3 ± 2.2	**<0.001**
Triglycerides (mg/dL)	100 ± 5.7	117 ± 8.0	0.09
Glucose (mg/dL)	109 ± 3.3	95 ± 2.8	**0.002**
Total insulin uU/mL	10.9 ± 1.2	8.9 ± 1.0	0.22
Statins, no. (%)	38 (55.9)	29 (43.3)	0.15
Anti-hypertensives, no. (%)	48 (70.6)	38 (56.7)	0.10
Aspirin, no. (%)	46 (67.6)	39 (58.2)	0.12
Estrogen therapy at baseline, no (%)	-	7 (10.4)	**<0.001**
Vascular:			
Brachial systolic blood pressure (mmHg)	140 ± 2.1	133 ± 2.4	**0.032**
Brachial diastolic blood pressure (mmHg)	78 ± 1.2	68 ±1.4	**<0.001**
Brachial pulse pressure (mmHg)	62 ± 2.4	65 ± 2.1	0.37
Mean arterial pressure (mmHg)	98 ± 1.1	89 ± 1.5	**<0.001**
Aortic systolic blood pressure (mmHg)	129 ± 2.2	125 ± 2.3	0.16
Aortic pulse pressure (mmHg)	51 ± 2	56 ± 2	0.13
cfPWV (m/sec)	10.5 ± 0.3	10.3 ± 0.24	0.54
Cognitive:			
Global Cognitive Function:			
RBANS Total Scale Score	98.6 ± 1.6	104.7 ± 1.5	**0.007**
WRAT-3 Reading Standard Score	103.6 ± 9.5	110.8 ± 4.1	0.09
Memory:			
RBANS Immediate Memory	96.6 ± 1.7	101.6 ± 1.9	0.06
RBANS Delayed Memory	99.3 ± 1.6	106.0 ± 1.4	**0.002**
Processing speed:			
Stroop Color Naming	67.0 ± 1.3	69.5 ± 1.8	
Stroop Word Reading	87.4 ± 1.7	91.1 ± 2.1	0.26
Executive function/working memory:			
Stroop Interference	33.1 ± 0.9	35.2 ± 0.9	0.11

All data are presented as mean ± SE. HDL, High-density lipoprotein, cfPWV, carotid femoral pulse wave velocity; RBANS, Repeatable Battery for the Assessment of Neuropsychological Status; WRAT, Wide Range Achievement Test.

PO-26
BILATERAL SYMMETRY OF BRACHIAL PULSE WAVEFORM ANALYSIS IN A CLINICAL POPULATION

Jumana Dakka [1], Timothy S. Phan [1], Izzah Vasim [1,2], Swapna Varakantam [1,2], Uzma Kewan [1,2], Ali Tariq [1,2], Harry G. Oldland [1,2], Amer Ahmed Syed [1], Zeba Hashmath [1], Scott R. Akers [1,2], Julio A. Chirinos [1,2]
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Background: Pulse waveforms are modified as they propagate along the arterial tree. Small differences in the arterial pathways from the heart to the left and right brachial artery may impact pulse waveform analysis (PWA) for the purpose of hemodynamic assessment. The VaSera VS-1500AU (Fukuda Denshi) is a cuff-based device that permits simultaneous acquisition of bilateral brachial pulse volume recordings. To determine if interchangeability between left and right brachial pulse waveforms is possible, we assessed whether there are significant differences in pulse waveform analysis variables between each arm.
Methods: In 20 subjects (mean age=67±11 years) from a clinical population, simultaneous pulse waveforms were acquired at both the left and right brachial

arteries. Following an initial recording, the cuffs were switched and a second series of continuous waveforms were acquired. Phonocardiograms were continuously acquired to determine timing of aortic valve closure. All PWA variables were averaged across the standard- and switched-cuff configurations to minimize the impact that slight variations in cuffs may impart on recordings. Extracted PWA variables include (1) brachial form factors (bFF), (2) heart-brachial transit time (hb-TT), and (3) brachial augmentation index (bAIx).
Results: Paired t-test revealed no statistically significant differences in left and right pulse waveform features ($P>0.05$ for BFF, hb-TT, bAIx). Bland-Altman analysis revealed no significant bias in extracted waveform features between each arm (mean bias [limits of agreement]=0.3 [-3.2, 2.7]%, -2.65[-1571.1, 1041.1] msec, 0.3[-1.15, 1.21]% for bFF, hb-TT, and bAIx, respectively).
Conclusion: No significant systematic differences exist between left and right pulse waveforms. Despite minor differences in arterial pathways between left and right brachial arteries, we found agreement in PWA variables between both arms. The side of measurement did not influence pulse waveform analysis results in this clinical sample.

PO-27
A NEW SOFTWARE FOR DETERMINING CHANGES IN ARTERIAL DIAMETER OVER TIME

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Objectives: The purpose was to investigate the ability of a new software, developed by our group, to provide continuous measures of arterial diameter from recorded ultrasound video.
Methods: Software (MAUI) was developed to assess arterial diameter using active contours to accurately detect the vessel walls in recorded ultrasound video. Ultrasound imaging was used to acquire longitudinal, B-Mode images of the common carotid artery (CCA) with videos recorded for later analysis. A single recorded 10s video was used to gain an indication of the reproducibility and repeatability of MAUI. For this assessment, two investigators (E1 and E2) each performed 10 measurements of the test video using the MAUI software. MAUI was then used to process several longer videos ($\sim$5min) to assess the ability of the software to continuously process data over longer periods of time.
Results: MAUI provided a measurement of vessel diameter (media to media border) for each frame of the recorded video. The ten assessments of the test video resulted in average standard deviation of 0.002$\pm$0.003cm for E1 and 0.003$\pm$0.003cm for E2 for each frame measurement. Overall analysis of the test video resulted in an average diameter, measured across eight cardiac cycles, of 0.781$\pm$0.0005cm and 0.780$\pm$0.0007cm for E1 and E2 respectively. Measures by E1 and E2 ranged from 0.781 to 0.782cm and 0.779 to 0.781cm respectively. When processing the 5min videos, MAUI was able to continuously track the vessel walls throughout the entire video.
Conclusions: Preliminary assessments suggest that MAUI software represents a viable method for the continuous assessment of arterial diameter over time with high repeatability and low interrater variability. Use of this software may be especially applicable for studies investigating acute changes in vessel dimensions as well as the study of vascular properties in health and disease.
Supported by the Canadian Space Agency and NSERC

PO-30
EFFECT OF LOW-DOSE ACETYLSALICYLIC ACID ON ARTERIAL STIFFNESS IN HIGH-RISK PREGNANCIES: AN OBSERVATIONAL LONGITUDINAL STUDY

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Objectives: Low-dose acetylsalicylic acid (ASA) has been shown to reduce the risk for pre-eclampsia in high-risk pregnancies when prescribed before 16 weeks of gestation. It remains unknown whether this anti-inflammatory agent has effects on arterial stiffness. Our objective was to characterize arterial stiffness indices throughout pregnancy in women with high-risk pregnancies who were and were not prescribed low-dose ASA.
Methods: In this prospective longitudinal study, women with high-risk singleton pregnancies were recruited from obstetrical clinics in Montreal, Canada. Arterial stiffness was measured using applanation tonometry (SphygmoCor; AtCor) in the 1st trimester, every 4 weeks thereafter until delivery, and at 6 weeks' post-partum. Arterial stiffness was compared between women who were prescribed low-dose ASA (81 mg) before 16 weeks' gestation and women who were not prescribed any prophylactic medication for pre-eclampsia.
Results: Of the 152 participants who delivered in this ongoing study, 26 women were prescribed ASA. Longitudinal analyses adjusted for family history of pre-eclampsia, past history of pre-eclampsia, and development of an outcome showed no significant differences in carotid-femoral pulse wave velocity (cfPWV), carotid-radial PWV, augmentation index adjusted for a heart rate of 75 beats per minute, or start time of wave reflection (T1R) throughout pregnancy in women who were taking low-dose ASA (all $p > 0.05$). Additionally, 13 women developed pre-eclampsia and ASA did not confer any significant change in adjusted odds for the complication (OR: 4.85 95% CI: 0.5 $-$ 41; p $=$ 0.15).
Conclusion: In this high-risk pregnant population, ASA before 16 weeks' gestation was not associated with differences in arterial stiffness or wave reflection throughout pregnancy and did not have an effect on the odds for developing pre-eclampsia. Our ongoing study will provide definite evidence on the association between ASA use and arterial stiffness.

PO-31
EFFECT OF POOR GLYCEMIC CONTROL ON ARTERIAL STIFFNESS IN PREGNANCY

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Objectives: Poor glycemic control during pregnancy is associated with increased adverse perinatal outcomes. Our objective was to characterize the association between glycemic control and arterial stiffness in pregnancy.
Methods: In this prospective longitudinal study, women with high-risk singleton pregnancies were recruited from obstetrical clinics in Montreal, Canada. Arterial stiffness was measured in women with gestational diabetes (GDM) or pre-existing diabetes mellitus (DM) using applanation tonometry (SphygmoCor; AtCor) starting at 24 weeks' gestation (the period at which GDM screening is performed for all women according to standard clinical practice) and every 4 weeks thereafter until delivery. Arterial stiffness indices were compared between women with poor glycemic control and women with adequate glycemic control. Poor glycemic control was defined as average HbA1C $>$ 7%, average fasting glucose $>$ 5.3 mmol/L, average 1h post-prandial glucose $>$ 7.8 mmol/L, insulin dosage $>$ 30 units, large for gestational age fetus, or maximal vertical pocket $>$ 8 cm.
Results: Of the 35 women who delivered in this ongoing study and had GDM (n=18) or DM (n=17), 12 had poor glycemic control throughout their pregnancy. Longitudinal analyses adjusted for maternal age, body mass index, and medical history, showed women with poor glycemic control had significantly increased carotid-radial pulse wave velocity (PWV) at each timepoint: 26-30 weeks: 8.4 vs. 8.0 m/s, p $=$ 0.04; 30-34 weeks: 8.4 vs. 8.1 m/s, p $<$0.01; 34-38 weeks: 8.5 vs. 8.1 m/s, p $=$ 0.02. No differences were found in carotid-femoral PWV, augmentation index adjusted for a heart rate of 75 beats per minute, or start time of wave reflection between these 2 cohorts.
Conclusion: Women who had poor glycemic control throughout pregnancy showed increased peripheral arterial stiffness from the late 2nd trimester until delivery. Our ongoing study will provide more definite conclusions with increased population size.

PO-32
DIETARY CALCIUM INTAKE AND CARDIOVASCULAR HEALTH: IS THERE ANY RELATIONSHIP?

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