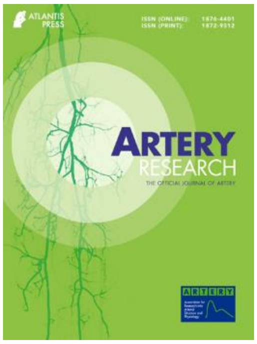

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P5.14: THIGH-CUFF BASED MEASUREMENT OF AORTIC PULSE WAVE VELOCITY: INITIAL TESTING OF A NOVEL VASERA PROTOTYPE DEVICE

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characteristic impedance, pulse wave velocity, and steady afterload were kept constant. In one set of experiments, the magnitude of C(P) was decreased while retaining its pressure-dependence, thus preserving compliance variations within any given cycle. In a second set, both the magnitude and pressure-dependence were progressively decreased, such that compliance became increasingly constant; mean compliance and reflection magnitude were pairwise matched to each case of the first set of experiments.
Results: When stiffening was accompanied by retained pressure-dependence, there was marked delaying of wave reflections compared to more constant compliance cases. Pressures and myocardial wall stress at end-systole were elevated, while stroke volume and ejection period were decreased.
Conclusion: The dynamic loading effects of pressure-dependent compliance can have complex effects on LV-AS coupling. Characterization of the complex changes of C(P) with age and disease deserves further investigation.

P5.13

ESTIMATION OF CENTRAL SYSTOLIC PRESSURE: ARE PERIPHERAL WAVEFORMS AND TRANSFER FUNCTION NECESSARY?

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Background and aim: The degree of systolic pressure amplification (SPamp) from aorta to brachial artery depends on a number of variables including age, gender, heart rate and arterial stiffness. It is admitted that central systolic blood pressure (cSBP) cannot be predicted with sufficient accuracy from brachial blood pressure and thus needs to be estimated using peripheral waveform analysis and transfer functions. We have developed a proprietary method for direct central blood pressure (DCBP) estimation, which challenges this paradigm. In the present preliminary study, our DCBP method was applied to a meta-analysis of published studies with invasive, high-fidelity pressure tip data of both aortic and brachial artery pressures.
Methods and results: Five studies were found fulfilling our criteria. There were 282 subjects (77.3% male), with known or suspected coronary artery diseases. Mean age was 63.3±13.2years and heart rate was 67.1±11.3bpm. Invasive brachial systolic, diastolic and mean BP were 137.9±19.9mmHg, 70.9±10.2mmHg and 97.1±11.7mmHg, respectively. The measured invasive cSBP was 131.1±19.9mmHg and the mean SPamp was 6.8mmHg. The cSBP estimated with DCBP method was 132.9mmHg and the mean difference with invasive measures was 1.8mmHg.
Conclusion: The meta-analysis of studies documenting invasive high-fidelity pressure at aortic and brachial artery level indicates that our DCBP method can predict cSBP from brachial blood pressures with good accuracy in relatively old subjects with established or suspected coronary diseases. Further studies are needed to document the precision of the DCBP method in healthier and younger subjects as well as its sensibility to peripheral BP measuring method.

P5.14

THIGH-CUFF BASED MEASUREMENT OF AORTIC PULSE WAVE VELOCITY: INITIAL TESTING OF A NOVEL VASERA PROTOTYPE DEVICE

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Introduction: Fully automated cuff-based devices have been developed for the assessment of arterial stiffness via pulse wave velocity (PWV) measurement, such as the VaSera device (Fukuda Denshi). To date, measurements were confined to the heart-to-ankle segment, yielding PWV and stiffness indices that are not easily inked to carotid-femoral PWV (cf-PWV), the presumed reference for measurement of aortic PWV.
Methods: We performed initial tests (N=14, 9 males, mean age 27.4±3.3, BMI 23.8±3.4) using a novel thigh-cuff prototype that can be used as a substitute for the ankle cuffs in the VaSera device. Extracted data included heart-thigh (ht-PWV) and heart-ankle (ha-PWV). cf-PWV was obtained using ultrasound (GE Vivid 7) on the right side.
Results: Measurements were successfully obtained for all subjects. cf-PWV was 5.32 ± 0.43 m/s. ha-PWV was 6.35±0.49 m/s, and was significantly higher than cf-PWV (paired t-test; $P<0.001$). ht-PWV, on the other hand, was 5.51±0.50 m/s and was not significantly different from cf-PWV. Bland-Altman analysis demonstrated a non-significant bias of 0.19±0.54 m/s of ht-PWV with respect to cf-PWV.
Conclusion: We conclude that, in this small-sized young and healthy population, fully automated measurement of heart-thigh PWV is straightforward and easy. Measured values were not different from carotid-femoral PWV. Further research is warranted to confirm these findings in a larger population spanning a large age range and cardiovascular risk profiles.

P5.15

EVALUATION OF AORTIC ^{18}F-NAF TRACER UPTAKE DETECTED USING PET/CT IN PREDICTING AORTIC CALCIFICATION OVER A 4-YEAR FOLLOW-UP PERIOD

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Background: Uptake of ^{18}F-sodium fluoride (^{18}F-NaF) in the aortic wall may reflect metabolically active areas of calcification, an important predictor of cardiovascular morbidity and mortality when detected by computed tomography (CT). The aim of this project was to determine if ^{18}F-NaF uptake in the aorta can predict development of calcification as detected by CT.
Method and results: Twenty one postmenopausal women (mean age 62±6 years, range 52-74), underwent assessment of aortic ^{18}F-NaF uptake using positron emission tomography/computer tomography (PET/CT) at baseline and after a mean follow-up of 3.7±1.3 years. Tracer uptake was quantified by calculating the target-to-background ratios (TBR). At baseline, there was a trend to a positive correlation between CT calcium volume score and tracer uptake ($r=0.33$, $P=0.15$). Over the follow-up period aortic CT calcium volume increased from 0.45±0.62 to 0.71±0.93 cm^3 ($P<0.04$). However, the change in calcium volume did not significantly correlate with baseline TBR values ($r=0.18$, $P=0.52$). TBR at baseline did not differ between participants with (n=16) compared to those without (n=5) progression in calcium volume progression (2.43±0.46 vs. 2.31±0.38, $P=0.58$). In aortic segments identified to have highest tracer uptake at baseline, calcium volume did not significantly change over the follow-up period (from 0.08±0.15 to 0.12±0.26 cm^3, $P=0.42$). In multivariate regression analysis baseline TBR did not associate with progression in calcium volume.
Conclusion: In a cohort of postmenopausal women ^{18}F-NaF uptake as measured by TBR was not a predictor of progression of aortic calcification as detected by CT over a 4-year follow-up period.

P5.17

CAROTID PULSE PRESSURE ASSESSMENT BY MEANS OF AN ACCELEROMETRIC SENSOR

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Central pulse pressure (cPP) is increasingly investigated as possible independent predictor of cardiovascular risk and carotid pulse pressure (carPP) can be used as a surrogate marker of cPP. Despite its importance, carPP measurement remains challenging in clinical practice. The aim of this study was to introduce a new easier-to-use method for non-invasive carPP evaluation based on an accelerometric sensor.
Accelerometric signals were recorded in 22 subjects (males: 45.5%, 47.4±17 years, hypertension: 50%; smoking: 18%; diabetes: 23%; hypercholesterolemia: 27%). Under the hypothesis that these signals represent the acceleration linked to the displacement of the carotid near wall, $carPP_{acc}$ values were achieved double integrating the accelerometric waveforms and calibrating the obtained diameter curves with brachial pressure measurements. $carPP_{acc}$ measurements were compared with tonometric assessments ($carPP_{ton}$). Moreover, accelerometric carotid pressure waveforms (P_{acc}) were contrasted in terms of shape to those obtained by tonometry (P_{ton}), calculating the root mean square error ($RMSE_{ton}$) and the regression coefficients (r_{ton}).
$carPP_{acc}$ values (46±10.55 mmHg) were significantly correlated with $carPP_{ton}$ (47.5±11.2 mmHg) assessments ($R=0.93$, $p<0.001$). The Bland-Altman analysis provided a non-significant bias of -1.54 mmHg. The validity of the accelerometric approach was confirmed by morphological parameters ($RMSE_{ton}=5\pm1.95$ mmHg; $r_{ton}=0.94\pm0.04$).