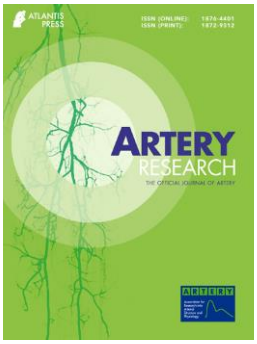


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# P8.04: CAROTID INTIMA-MEDIA THICKNESS: COMPARISONS BETWEEN SEMI-AUTOMATIC EDGE DETECTION METHOD VERSUS A NEW AUTOMATIC ECHO TRACKING SYSTEM

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**Results:** All four cSBP estimates were highly correlated (R>0.97).
**Conclusion:** When using both devices as advocated by their manufacturers, the mean difference in cSBP is 18.6 (4.5) mmHg. Carotid SBP is in the middle between the Omron and SphygmoCor estimates, indicating that the 'true' central cSBP should be sought between the Omron and SphygmoCor estimates.

**P8.03**
**ASSESSMENT OF CAROTID ELASTICITY IN EXERCISE: A REPRODUCIBILITY STUDY**

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Arterial stiffness may vary with physiological stimulus and therefore, its quantification in dynamic conditions could enhance the characterization of vascular elastic properties. The aim of this study was to evaluate the feasibility of the assessment of carotid artery's elasticity during exercise in terms of reproducibility.
Eighteen healthy volunteers (9 men, 34±3 years) underwent a maximal exercise testing on a graded semi-supine cycle ergometer. Ultrasound B-mode image sequences (DICOM format, high frame-rate) of right common carotid arteries were acquired at different steps (60%, 70%, 80% and 85% of maximal heart rate), and analysed by an automatic system (Carotid Studio, IFC-CNR) for the measurement of arterial diastolic diameter (D) and distension (ΔD). In addition, central pulse pressure (PPa) was estimated by tonometry (radial-aortic transfer function, Sphygmocor, AtcorMedical). Cross-sectional compliance (CC) and distensibility (DC) coefficients were then obtained for each step of the examination. Subjects were analysed in two different sessions 7 days apart, in order to evaluate intersession reproducibility of the measurements; variability was expressed as coefficient of variation (CV) for each step of the examination. At rest CVs were 3%±3% for D, 8%±6% for ΔD, 8%±6% for PPa, 9%±8% for CC and 10%±6% for DC.
During exercise maximal variability was found at peak: 7%±5% for D, 12%±8% for ΔD, 11%±7% for PPa, 19%±6% for CC and 24%±15% DC.
The reproducibility of carotid parameters, which is excellent at rest, remains more than satisfactory during exercise. Hence, the proposed approach might be used for investigating the dynamic behaviour of arterial elasticity.

**P8.04**
**CAROTID INTIMA-MEDIA THICKNESS: COMPARISONS BETWEEN SEMI-AUTOMATIC EDGE DETECTION METHOD VERSUS A NEW AUTOMATIC ECHO TRACKING SYSTEM**

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**Rationale:** The intima-media thickness (IMT) of the common carotid artery is a widely used clinical marker of cardiovascular diseases. To date, IMT is measured from longitudinal B-mode ultrasound images using manual or imaging analysis methods. Real-time automatic tracking of the lumen-intima and media-adventitia echoes using multi-echotracking technology could overcome some limits of manual and imaging analysis methods.
**Material and methods:** Common carotid intima-media thickness measured with a new multi-echotracking system (QIMT — Esaote - Italy) was compared to a semi-automatic edge detection imaging analysis method (IMT@televasc, www.televasc.fr, France) from B-mode ultrasound images.
**Results:** 93 scans were analyzed with both techniques on the same scans and from both carotids in 57 patients (age 55 +/- 17, 34 males). Mean QIMT was higher than IMT@televasc (690+/-173 vs 662+/-135, p<0.0001). Coefficient of variability for QIMT was 5% and 16 % for the IMT@televasc without significant inter-observer differences. Correlation coefficient were r= 0.657 (p<0.001, QIMT = IMT@televasc . 0.84 (+/-0.09) + 134+/-66 μm). Bland Altman plot did not showed systematic bias.
**Discussion:** QMIT gives more reproducible values of IMT than IMT@televasc with a significant correlation between the 2 methods. There was a systematic difference in absolute value between both techniques, values provided being higher with QIMT than with IMT@televasc. Conversion tables are needed for comparisons between echotracking technology and edge detection imaging analysis method for the routine use and follow up of the patients.

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**P8.05**
**INFLUENCE OF CENTRAL AND PERIPHERAL ARTERIAL STIFFNESS ON THE TIMING AND AMPLITUDE OF REFLECTED PRESSURE WAVE**

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**Background:** Central stiffness is associated with increased pressure wave reflection. It is lower than peripheral in most subjects, but the reversal of central to peripheral stiffness gradient may occur at higher age and it may influence the mechanisms of wave reflection.
**Objective:** To evaluate the relationships of central and peripheral arterial stiffness to the parameters of wave reflection.
**Methods:** 528 untreated subjects, aged 25 to 74 years, selcted from general population, were examined. Pulse wave velocity on aorta (aoPWV) and on lower extremity (periphPWV) were measured by Sphygmocor. Wave reflections were assessed using carotid pulse waveform analysis.
**Results:** 46 subjects with the reversal of stiffness gradient (aoPWV > periphPWV). They had longer effective reflection distance (ERD; p<0.001 in both sexes); their carotid augmentation pressure (CAP) was higher in males (p<0.01), but not in females. We further studied the simultaneous influence of central and peripheral stiffness on parameters of wave reflection in the whole population in multiple linear regression. AoPWV predicted highly significantly (p<0.001) the parameters of wave reflection in both sexes, while periphPWV was only weakly positively associated with CAP in females (p<0.01) and ERD in males (p<0.05).
**Conclusions:** Reversal of stiffness gradient was uncommon in our sample. It was associated with prolongation of ERD, but the augmentation pressure was not decreased. These results do not confirm the previously published hypothesis that the reversal results in lower reflected wave and is therefore beneficial in older patients. The contribution of muscular-type artery stiffness to the timing and amplitude of reflected wave was small.

**P8.06**
**DISCREPANCIES IN ESTIMATES OF LV ELASTANCE OBTAINED BY NON-INVASIVE METHODS**

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LV elastance (Elv) denotes the slope of a line connecting a series of end-systolic pressure-volume relations during a load intervention. Non-invasive estimation is often done as LVESP/LVESV (simplified method, SM; smElv) which assumes that (A) intra-LV systolic blood pressure (smSBP) = 0.9 x brachial BP and (B) the Elv line intersects the volume axis ($V_0$) at zero. A more robust method exists which does not make assumption B (gold standard (GS) Elv: gsElv) but requires complex computation. We evaluated SM against GS in 22 consecutive patients (7 with heart failure, 32%; mean LVEF 43 ± 19%) attending our laboratory for echocardiography. Central pressure waveforms were obtained (radial artery tonometry; SphygmoCor, AtCor Medical, Sydney, Australia) and GS intra-LV SBP (gsSBP) was computed (aortic SBP + trans-aortic gradient; continuous-wave Doppler). gsElv was calculated as described previously.[1] smSBP and smElv were calculated as above. We found that intra-LV SBP was underestimated by SM (smSBP 117 ± 17 vs. gsSBP 126 ± 20 mmHg; p=0.002). The mean between-method difference was -8.4 ± 6.7 mmHg, range +6.5 to -17 mmHg). Nonetheless, SM overestimated Elv (smElv 3.4 ± 0.5 vs. gsElv 1.9 ± 0.8 mmHg/mL; p<0.001. The mean between-method difference (1.5 ± 0.7 mmHg/mL; range 0.6 to 2.7 mmHg/mL) was larger the more $V_0$ differed from zero (0.06 ± 0.03 mmHg/mL per 10 mL change in $V_0$; r=0.71, p<0.01). In conclusion, Elv obtained by SM differs markedly vs. GS, as a result of assumptions A and B.
Reference
1. Chen et al. JACC 2001;38:2028-34.

**P8.07**
**CUTANEOUS LASER-DOPPLER FLUX RESPONSE TO PHYSIOLOGICAL STIMULI**

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There is a predominance of sympathetic over parasympathetic activity in patients with developed essential hypertension. We were interested in