P.075: TISSUE CHARACTERIZATION OF CAROTID WALL IN MILDLY DISEASED ARTERIES: COMPARISON OF VIDEODENSITOMETRIC ANALYSIS AND INTEGRATED BACKSCATTER

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the effect of smoking on arterial stiffness in white coat hypertensive (WCH) patients has not been investigated yet.

Methods: The study comprised 375 WCH patients (mean age 52 years, 149 male). The diagnosis of WCH was confirmed by a 24h Ambulatory Blood Pressure Monitoring (ABPM) into normal range. The augmentation index (AIx), a measure of arterial wave reflections, was measured by applanation tonometry (SphygmoCor), while carotid-brachial Pulse Wave Velocity (PWVc-r) and carotid-femoral PWV (PWVc-f) were measured with Complior. AIx was corrected for heart rate (AIx_{75}). Current smoking status was assessed with a standardized questionnaire.

Results: The study cohort was divided in 129 smokers and 246 non-smokers, who did not differ in SBP, BMI, heart rate and total cholesterol (p=NS). In multivariate analysis after adjusting for age and gender, AIx_{75} was higher in smokers compared to non-smokers (26.8 vs 22.5, p<0.001). PWVc-r was also higher in smokers compared to non-smokers (8.3 ± 0.9 vs 8.0 ± 1.2, p<0.05), while no significant difference was noticed in PWVc-f. When we examined the correlation of smoking with the arterial stiffness indices, we noticed a significant correlation of AIx_{75} with pack-years (r=0.278, p<0.001), while the stronger correlation was noticed in years of smoking with PWVc-f (r=0.425, p<0.001) and with AIx_{75} (r=0.649, p<0.001). After adjusting for age and gender, the correlation of years of smoking with AIx_{75} remained significant (r=0.355, p<0.0001).

Conclusion: Smoking affects wave reflections and arterial stiffness in WCH patients. Specifically, intensity/duration of smoking affects both wave reflections and arterial stiffness whereas smoking duration is a burden only to wave reflections.

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TISSUE CHARACTERIZATION OF CAROTID WALL IN MILDLY DISEASED ARTERIES: COMPARISON OF VIDEODENSITOMETRIC ANALYSIS AND INTEGRATED BACKSCATTER

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Background: Integrated backscatter analysis (IBS) is the reference technique for tissue characterization by ultrasound. However, this approach is equipment-dependent, so that its practical use on wide-scale basis is limited. By contrast, videodensitometric analysis (VDA) on 2D images can be performed on standard recordings.

Aim of the study: To compare results of VDA against IBS on common carotid artery wall (CCA) in a study population including normal subjects and patients with cardiovascular risk factors.

Methods: Sixty subjects (fifty males, age 49 ± 11) referred for diagnostic carotid scan, were studied by high resolution system (7.5 MHz linear probe) implemented with acoustic densitometry package for IBS assessment. Diastolic CCA images were acquired bilaterally in 2D mode and IBS. IBS and VDA were performed in regions of interest including the intima-media (IMT), one cm before the flow divider.

Results: On 120 arteries (average IMT 0.71 ± 0.29 mm), mean IBS value (dB) was directly related to mean gray levels (r = 0.357, p< 0.001). Mean gray levels and their standard deviation correlated each other (r =0.71, p<0.0001). A significant relation (p<0.05) with age was found for IMT (direct, r = 0.25) and mean IBS (inverse, r = -0.22), but not for mean gray levels.

Conclusion: VDA of CCA IMT may represent an acceptable surrogate estimate for tissue characterization, of possible interest for multicentre studies. The inverse relation of mean IBS value with age is in keeping with the hypothesis of an age-related atheromasic deposition. IBS may have higher sensitivity in differentiating early atherosclerosis from ''healthy'' arterial aging.

P.076
EFFECTS OF REGULAR TRAINING ON PERIPHERAL ARTERIAL COMPLIANCE IN YOUNG HEALTHY MALES

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Physical activity is known to have beneficial effects on prevention of cardiovascular disease. The regular aerobic exercise is associated with higher central arterial compliance, but its effect on peripheral arterial compliance is controversial. The aim of our study was to measure the small artery compliance and its changes provoked by 0.1Hz breathing and mental stress in young healthy males.

Experiments were performed on 21 healthy adults, 19-24 years old (12 physically trained - group A, 11 sedentary controls - group B). We measured ECG, arterial blood pressure and finger artery compliance at rest, 3 minutes during 0.1Hz breathing and 3 min during mental stress. A noninvasive method was used to measure finger artery compliance, compliance index (CI) was calculated. Baroreflex sensitivity (BRS) was determined using the sequential method.

Our results revealed elevated CI in group A compared to group B (3.42 ± 0.30 and 1.28 ± 0.31, p=0.004) at rest, but no significant differences in CI between groups during both physiological stimuli. CI decreased during 0.1Hz breathing (1.53 ± 0.20, p=0.003) and mental stress (0.87 ± 0.13, p=0.002) in group A, but only during mental stress in group B (0.59 ± 0.12, p=0.03). BRS did not differ between groups, but was significantly reduced in both groups during mental stress. There were no differences in heart rate, systolic and diastolic blood pressure between groups, neither at rest nor during stimuli.

We conclude that regular aerobic exercise increases peripheral arterial compliance. Surprisingly the increase was not associated with a greater BRS indicating that peripheral mechanisms govern peripheral arterial properties.

P.077
IN VIVO VALIDATION OF A NON-INVASIVELY MEASURED LOCAL PULSE WAVE VELOCITY: IMPROVED PERFORMANCE USING AORTIC VALVE CLOSURE IN STEAD OF AORTIC VALVE OPENING

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Introduction: High resolution multiple M-line ultrasound can be used to obtain local pulse wave velocity, by tracking the propagation of characteristic time-points of the distension waveform over an arterial segment. Local PWV provides a direct estimate of the local arterial stiffness.

Method: The left and right CCA of 12 young subjects was measured with multiple M-line ultrasound, resulting in 14 diameter waveforms spaced over 16.4mm. The second derivative of the distension waveforms was calculated to identify aortic valve opening and closure (AVO and AVC). By performing linear regression on M-line positions versus time-points, the local PWV was estimated. Beats were accepted for further analysis if the regression coefficient exceeded 0.9. The DC was measured using brachial-PP and carotid-distension, giving a reference estimate of the PWV using the Bramwell-Hill equation: $PWV_{DC} = 1 / \sqrt{\rho DC}$

Results: PWV_{AVC} (mean=4.91m/s) showed a better intra-subject precision (0.46m/s) than PWV_{AVO} (mean=5.21m/s, precision=1.66m/s). The range of PWV_{DC} (2.8-7.9m/s) is comparable to PWV_{AVC} (3.5-7.3m/s) but not to PWV_{AVO} (2.4-13.2m/s). The correlation between PWV_{DC} and PWV_{AVC} was weak but significant (r=0.69, p<0.001). No correlation between PWV_{DC} and PWV_{AVO} exists.

Discussion: In contrast to PWV_{AVO}, PWV_{AVC} has an acceptable precision (coefficient of variation less than 10%) and correlates with PWV_{DC}. The poor correlation between PWV_{AVO} and PWV_{DC} estimates may be caused by interference of early arterial wave-reflections leading to a biased estimate of PWV_{AVO}. The correlation between PWV_{DC} and PWV_{AVC} is weak, although carotid-PP may improve DC calculation.

P.078
VALIDATION OF A NEW AUTOMATED REAL-TIME MEASURING SYSTEM FOR CAROTID INTIMA−MEDIA THICKNESS ASSESSMENT

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Increased carotid intima-media thickness (C-IMT) is a non-invasive marker of early arterial alterations which is associated with increased cardiovascular risk. The aim of this study is to validate a new real-time automatic system to measure C-IMT. Results are compared with the manual measurements, which are still largely accepted as the gold standard.