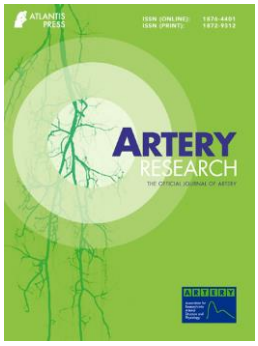

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P2.2: ULTRASOUND SPECKLE TRACKING HELPS IDENTIFY VULNERABLE CAROTID PLAQUES

A. Kaloshina, O. Kerbikov, E. Borskaya, S. Voynov, T. Krutova, A. Averyanov

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≥ 1m/s from baseline(G3). The groups were similar by age and all risk factors. The baseline (154,8±7,3/91,7±10,2, 152,7±12,1/92,3±8,3 and 149,3±8,1/91,7±6,04mmHg) and achieved CBP (128,4±7,26/80,1±4,55, 125,6±11,4/79,2±6,5 and 126,6±8,4/78,5±5,97 mmHg) were similar. There was significant difference in baseline PWV (G1 15,9±2,5 vsG2 13,6±1,9 vsG3 10,9±1,7 m/s,$p<0.05$), but at the end of the study PWV was similar: respectively,13,0±2,1,13,6±1,9 and 13,4±1,9m/s. 72,7% pts in G1 and 66,7% in G2 received the highest recommended doses of RAAS-inhibitors and A10mg vs 28,6% in G3 (Pearson$\chi^2=9,0;p<0,05$). Indapamide SR 1,5mg was added in 36,4%, 20% and 9,5%, respectively. Correlation and multiple regression analysis revealed the association between PWV decrease and doses of RAAS-inhibitors and amlodipine ($r=-0,5,\beta=-0,45,p<0,05$)
Conclusion: There is modulating effect of target pressure achievement on PWV in hypertensive subjects. PWV reduction is associated with higher doses of RAAS inhibitors and amlodipine.

P2.1
CAROTID PLAQUE MICROVASCULATURE ASSESSED USING DYNAMIC CONTRAST-ENHANCED MRI: COMPARING DIFFERENT REGIONS OF THE VASCULAR WALL

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Background: Pharmacokinetic modeling in Dynamic Contrast-Enhanced (DCE-)MRI has been introduced to non-invasively assess microvasculature in carotid atherosclerotic plaques, a marker for plaque vulnerability. The main model-parameter, K^{trans}, can be assessed in the outer region of the vessel (adventitia) or in the entire vessel wall (including plaque and adventitia) and already showed association with histology and features of plaque vulnerability, respectively. We investigated systematically the correlation between K^{trans} of these various regions of the vascular wall and their individual correlation with histology as gold standard.
Methods: 45 symptomatic patients with 30-99% carotid stenosis underwent 3T DCE-MRI (0.1mmol/kg Gadobutrol, 0.5ml/sec). Quantitative modeling was performed to determine K^{trans} of the entire vessel wall, adventitia, and plaque region, separately. For 10 patients, CD31 immunohistochemistry was performed on specimens (containing mainly plaque) removed during carotid endarterectomy to quantify the endothelial microvessel area.
Results: Adventitial K^{trans} showed weak correlation with plaque K^{trans} ($r=0.64$, $p<0.001$) and was 17.3% higher ($p<0.001$), coinciding with decreased uncertainty in parameter estimation ($p=0.015$). Significant positive correlation between the endothelial microvessel area and adventitial K^{trans} ($r=0.854$, $p=0.002$), but not from the plaque ($r=0.438$, $p=0.2$) was observed. Entire vessel wall K^{trans} showed intermediate results for the various analyses.
Discussion: Although K^{trans} assessed over various regions within the vascular wall are correlated, absolute values differ significantly. Adventitial K^{trans} seems to be a better measure for plaque microvasculature compared to other vascular regions, coinciding with a lower uncertainty in parameter estimation. Comparison with histology in a larger number of patients is recommended for definitive conclusions.

P2.2
ULTRASOUND SPECKLE TRACKING HELPS IDENTIFY VULNERABLE CAROTID PLAQUES

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Ultrasound Speckle Tracking, a novel technique used to assess regional mechanics of carotid wall and plaques. We hypothesized that vulnerable carotid plaques have higher intraplaque stretch which resulted in an increased difference in deformation between cap and core
Methods: Study population consisted of 39 patients with carotid atherosclerosis: 11 with acute atherothrombotic stroke and 28 asymptomatic patients with similar demographics and risk factors. For each plaque, maximum circumferential and longitudinal strain (Sc_Sl) and strain rate (SRc_SRl) were measured for cap, core and base. Plaque characteristics (echogenicity, degree of stenosis, surface, etc) were assessed. All plaques were divided into hyperechogenic(19) and echolucent(20) ones.
Results: Echolucent plaques underwent significantly higher deformations than hyperechogenic ones (Sc=4.06 vs 3.25, $p<0.05$) and they had significant difference in deformation between cap and core($p<0.05$) whereas hyperechogenic plaques had no difference in deformation between segments (Sc=5.2_4.2_2.8 and 3.5_3.1_3.2 for cap, core and base of echolucent and hyperechogenic plaques, respectively). Moderate negative correlations were observed between echogenicity and deformations ($r=-0.35$_$p<0.001$ for cap_Sc). Symptomatic plaques had higher difference between cap and core Sl. Plaque internal deformation coefficient, Cpid=[(cap_Sl-core_Sl)/(core_Sl+base_Sl)]x100 was developed to quantify the relative deformation of different plaque segments. Based on ROC-analysis, plaques with Cpid>22.2 were associated with an ischemic event (sensitivity-55%, specificity-87%, AUC=0.693, p=0.0485). Logistic regression confirmed that Cpid>22.2 is an independent predictor of plaque vulnerability, OR=3.7, 95%_CI=0.8-22.8, controlling for age, gender, plaque length, degree of stenosis, echogenicity.
Conclusions: Mobility of echolucent plaques exceeds those of hyperechogenic ones. Difference in mobility between plaque segments may help identify plaque vulnerability.

P2.3
SUBCLINICAL ATHEROSCLEROSIS AND CARDIOVASCULAR RISK FACTORS: TEN YEARS OF EXPERIENCE WITH IMT PLUS® IN THE NETHERLANDS

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Purpose: Atherosclerosis has become a global disease and risk factor mitigation has been a priority in counties like the Netherlands.We assessed the impact of this new approach on cardiovascular subclinical atherosclerosis and cardiovascular risk factors.
Methods: A quantitative standardized sonographic carotid intima media thickness and plaque formation(IMTplus®). IMT plus® distribution was done in accordance with the previously published protocol. (A, being a value lower than the P50, <0.700 mm; B, being a value between P50 and P90, 0,700 and 0,850 mm; C, being a value between P90 and P125, 0,851-0,948 mm ;D, being P125 and P200 with values between 0,948 -1,300 mm and an E, value above P200 >1,300 mm; P means percentile). (Prevention Concepts® Database)
Results: Distribution of IMT Plus® categories in the Netherlands and VS
The Netherlands (mean age 53 years, 60 % men) Total number of cases per category:
Total:N=18.703(100%);A:N=2685(14,4%);B:N=6425(34.4%);C:N=6600(35.3%);D:N=2372(12,7%);E:N=571(3.0%).
US (mean age 50 years 49% men) Total number of cases per category: Total:N=29.894 (100%);A:N=6001(15%);B:N=10403(26%);C:N=13199(34%);D:N=7888(19%);E:N=2403 (3%).
Conclusions: The benchmark of ten years of IMT Plus® results in the Netherlands with the US shows a different picture category A (normal risk), but a greater number of category B (25% increased risk) and a smaller amount of category D (100% increased risk) and category E (200% increased risk) in the Netherlands. The US still leads in the extent and severity of Subclinical Carotid Atherosclerosis but the Netherlands is rapidly catching up. Carotid IMTplus® remains a reliable surrogate to assess atherosclerosis development.

P2.4
FEASIBILITY OF AORTIC ARCH MECHANICS - A STUDY IN NORMAL SUBJECTS

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There are no data in the literature regarding aortic arch mechanics assessed with 2D speckle tracking (2D-ST) echocardiography.
Purpose: To study the feasibility of measuring vascular mechanics in the aortic arch with 2D-ST echocardiography and to define normal values.