Conclusion: Synthesis of endothelial nitric oxide is severely depressed in the coronary arteries of heart transplant patients. This abnormality may be secondary to high plasma levels of the circulating NOS inhibitor, ADMA. CMV infection exacerbates this abnormality.

Coronary Endothelial Dysfunction footprint of vasa vasaorum perfusion territories: micro-computed tomography analysis of porcine coronary arteries with and without microembolization

Mario Goessl, Nasser M. Malayar, Patricia E. Lund, Erik L. Ritman, Mayo Clinic, Rochester, MN

Background: As removal or ligation of vasa vasaorum (VV) has been shown to cause ath erosclerotic lesions, it seems likely that microembolization (ME) of coronary artery VV affects coronary arteries. This study starts to examine the question as to whether individual VV perfusion defects in the coronary artery wall due to ME occur in plaque-like distributions. Methods: Non-radioactive microspheres (μs) 300 or 100 μm in diameter were injected in 3 porcine LADs each. After harvesting the heart, the LADs were injected with radiopaque Microfil®. Up to 10 μm-long segments of the LADs were removed and scanned intact with micro-CT (20 μm cubic voxels). The spatial density (×10^6/mm³ or VV) was measured in 20 μm-thick cross-sections (spaced at 0.8 mm intervals, distal to the injection site and in corresponding segments of 3 control LADs). These cross-sections were subdivided into 2 epicardial (epi) and 2 myocardial (myo) quadrants.

Results ME reduced VV densities (3.75±2.03 in controls vs. 3.06±1.26 in 100 and 2.50±1.44 in 0 μm μe; all P<0.001) and resulted in patchy distribution of longitudinal and circumferential VV densities (Fig.). Epi VV densities were consistently higher than myo densities (4.18±3.27 vs. 2.86±2.56 in controls; 3.57±2.22 vs. 2.45±2.10 in 100 and 3.71±2.76 vs. 2.75±1.67 in 100 μm μ; all P<0.001)

Conclusion: Microembolisation could be a proatherogenic factor by locally impairing coronary artery wall perfusion. Our data are also consistent with preferential plaque formation at the myocaridal side of coronary arteries.
Postprandial Endothelial Dysfunction Is Not Apparent in Young Healthy Individuals

Svendrup, Knud, Rasmussen, Monique, Ilaro, K.K. Rose, Vokalit, Kompanitest, Nitsche, Exadaktylos, Chris, Pizatariu, Ioan, Lekakis, Evangelismos Hospital, Athens, Greece, Alexandria Hospital Medical School, University of Athens, Athens, Greece

Objectives: The intake of a fatty meal acutely impairs endothelial function and this mechanism may partially explain the atherogenic role of postprandial lipaemia (PL). Since age is another important determinant of endothelial function, we assessed postprandial endothelial dysfunction in late age groups of healthy volunteers.

Methods: We measured serum lipoproteins and brachial artery flow-mediated dilation (FMD) (an index of endothelial dysfunction) in 2 groups of healthy individuals before and 2 and 4 hours after a single 50-g saturated fat meal. Group A consisted of 14 middle-aged volunteers (45.4±2.7±21 years old, 11 men and 3 women) and group B consisted of 14 young persons (25.7±1.5±4 years old, 11 men and 3 women). Brachial artery FMD was assessed at the use of a 7.5MHz vascular ultrasound transducer. Statistical analysis was done with Friedman two-way analysis of variance.

Results: Lipid profile, baseline brachial artery diameter and baseline FMD were similar in both groups. In both groups, the fatty meal increased triglycerides (119.2±6.3 to 160.5±9.2 to 179.0±10.6 mg/dl; p<0.0005 for group B and A 82.9±27 to 114.6±16 to 136.6±56 mg/dl; p=0.0001 in group B). LDL-cholesterol was significantly decreased only in group B 120.4±33 to 104.0±27 to 101.4±27 mg/dl; p=0.013 in group B vs 133.4±36.3 to 125.7±35 to 124.3±36.7 mg/dl; p=0.2 in group A). The rest of the lipoproteins did not change postprandially in either group. Brachial artery FMD was significantly reduced only in group A individuals (15±8% to 11±7% to 10±3%; p=0.012) while in group B it remained relatively unchanged (14±12% to 15±7% to 14±9%; p=0.1).

Conclusions: Our findings further support the hypothesis that a meal with high content in saturated fat acutely impairs endothelial function of peripheral fat vessels in healthy subjects. However, this effect is not apparent in young persons. Other regulatory mechanisms, possibly associated with a more favorable postprandial lipid profile in the young persons, may account for this phenomenon.

Are Endothelial Dysfunction and Inflammation Independently Related to Sleep Apnea Severity?

Michael D. Foulis, Emma K. Larkin, Jean E. Aylor, Andrew T. Wright, Nancy S. Jenny, Richard D. Flapan, David E. Newby, Brian D. Hobbs, Alexander R. Ellis, Brian D. Hobbs, Case Western Reserve University, Cleveland, OH, University of Vermont, Burlington, VT

Background Obstructive sleep apnea (OSA) is associated with cardiovascular disease (CVD), but the nature of this association is incompletely understood. Endothelial dysfunction and inflammation are recently recognized risk factors for the development of CVD. We tested the hypothesis that indices of endothelial dysfunction (flow mediated vasodilation peak hyperemic flow) and systemic inflammation (high-sensitivity C-reactive protein, hs-CRP) are increased in proportion to OSA severity.

Methods 130 subjects from the Cleveland Family Study (OSA patients and family members) were prospectively studied. In addition, overnight sleep was assessed using polsomnography. Brachial artery ultrasonography (10 MHz, Acuson Aspen TM), and hs-CRP in a clinical research facility. OSA was characterized by the apnea/hypopnea index (AHI). Outcome measures included percent changes in flow mediated dilation (FMD) and peak hyperemic flow (PHF), and plasma hs-CRP. Relationships between the AHI and outcome measures were assessed with univariate and multivariate analyzes adjusting for age, race, sex, and obesity.

Results: The study population was diverse (81% African American, 5% female), young (48±18 yrs), and obese (body mass index 34±11 kg/m2). Univariate analyses showed that increased AHI was associated with lower levels of FMD (r=0.46 and r&=0.05). The relationship between AHI and hs-CRP, while significant after adjustment for age, race, and sex (r=0.05), was attenuated after adjustment for obesity (r=0.03). Further subjects taking medications from the analysis and considering hypertension and diabetes as covariates did not materially alter the results.

Conclusions: Hyperemic brachial artery flow, but not flow-mediated vasodilation, is reduced in OSA in a dose-dependent fashion. Elevated hs-CRP levels occur in OSA but this is partly explained by obesity. These findings suggest that systemic inflammation and resistance vessel endothelial dysfunction may contribute to OSA-related CVD.

Pulse Wave Intensity: A New Parameter for Understanding Dynamic Ventriculo-Articular Interaction

Eleftheoros Nicolaides, Larry Dodge, Alan Fraser, Michael Frenneaux, Christopher Jones, Wales Heart Research Institute, Cardiff, United Kingdom

Wave intensity (WI) is calculated as the product of the derivative of velocity and pressure (or diameter in non-invasive studies). It measures the instantaneous balance between forward and backward waves travelling from the heart and reflected from the periphery. To determine if WI can provide a new clinical tool for assessing ventriculo-arterial interaction, a central dynamic process in heart failure, we determined the ability of recording WI and measured its inter-rater and inter-observer and temporal variability.

Methods: The right common carotid artery was imaged (7.5MHz linear array probe). In non-invasive studies). It measures the instantaneous balance between forward and backward waves travelling from the heart and reflected from the periphery. To determine if WI can provide a new clinical tool for assessing ventriculo-arterial interaction, a central dynamic process in heart failure, we determined the ability of recording WI and measured its inter-rater and inter-observer and temporal variability.

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