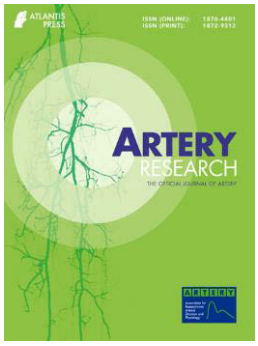

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P78: LONGITUDINAL MICRO-ULTRASOUND ASSESSMENT OF THE OB/OB MOUSE MODEL: EVALUATION OF CARDIOVASCULAR, RENAL AND HEPATIC PARAMETERS

Nicole Di Lascio, Claudia Kusmic, Francesco Stea, Francesca Lenzarini, Cristina Barsanti, Arthur Leloup, Francesco Faita

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P75
SIGNS OF ACCELERATED CAROTID ATHEROSCLEROSIS IN EARLY TYPE 2 DIABETES ASSESSED BY MAGNETIC RESONANCE IMAGING

Esben Laugesen [1], Pernille Høyem [1], Samuel Thrysøe [2], Esben Hansen [2], Anders Mikkelsen [2,3], Bill Kerwin [4], L. Poulsen Per [1], K. Hansen Troels [1], Y. Kim Won [2,5]
[1]*Department of Endocrinology and Internal Medicine, Aarhus University Hospital, Aarhus, Denmark*
[2]*The MR Research Centre and Department of Clinical Medicine, Aarhus University Hospital, Aarhus, Denmark*
[3]*Department of Procurement and Clinical Engineering, Central Denmark Region, Denmark*
[4]*University of Washington, Seattle, WA, USA*
[5]*Department of Cardiology, Aarhus University Hospital, Aarhus, Denmark*

Background: Ischemic stroke from carotid plaque embolism remains a major cause of morbidity and mortality in patients with type 2 diabetes (T2DM). However, the effect of T2DM on early carotid plaque burden and composition is sparsely elucidated. We assessed carotid plaque composition by carotid magnetic resonance imaging (MRI) in short duration T2DM patients compared to a sex- and age-matched control group.
Methods: 100 patients with T2DM (duration <5 years) and 100 sex- and age-matched control subjects underwent MRI of the carotid arteries bilaterally in a 1.5 T MRI scanner. Plaque burden was measured as normalized wall index, maximum wall thickness, maximum wall area, and minimum lumen size. Plaque characteristics were quantified by calcified plaque volume, necrotic core volume, and loose matrix volume.
Results: MRI data were available for 149 and 177 carotid arteries from T2DM patients and control subjects, respectively. T2DM was associated with a higher normalized wall index (ratio 1.03 (1.002; 1.06), $p = 0.03$), a lower minimum lumen area (ratio 0.81(0.74; 0.89), $p < 0.001$), and lower maximum wall area (ratio 0.94 (0.88; 1.00), $p = 0.048$) compared to controls. Body mass index (BMI) was associated with maximum wall area and all plaque characteristics independently of diabetes status. BMI $\geq 30\,kg/m^2$ was associated with an 80% increase in total volume of calcified plaque, and a 44% increase in necrotic core volume compared to BMI $< 25\,kg/m^2$.
Conclusions: T2DM patients had increased carotid plaque burden and negative remodeling. Obesity was associated with increased carotid artery necrotic core volume and calcification independently of diabetes status.

P76
PERIPHERAL BLOOD PRESSURE AND STIFFNESS INDEX ESTIMATION USING THE PPG SIGNAL MEASURED WITH THE pOpmètre DEVICE: CALIBRATION WITH THE CUFF BLOOD PRESSURE

Hasan Obeid [1], Hakim Khettab [1], Magid Hallab [2], Stephane Laurent [1], Pierre Boutouyrie [1]
[1]*Hôpital Européen Georges-Pompidou, Inserm U970, Paris, France*
[2]*Axelife and University Hospital Nantes, Nantes, France*

Arterial stiffness may influence the contour of the peripheral pulse, suggesting that contour analysis of the digital volume pulse (DVP) might be used to estimate peripheral blood pressure and a stiffness index (SI).
The objective is to establish a transfer function that estimates the peripheral blood pressure using the PPG pulse, calibrated with a brachial pressure cuff, and then to deduce a stiffness index using the established parameters.
We positioned the photodiode sensor on the finger. Brachial blood pressure measurement was performed with a cuff adapted to the arm circumference and an oscillometric device (Omron M10 -IT). Pulse wave velocity (PWV) measurements were performed with the pOpmètre® system. DVP waveforms were recorded over a 10 s period and ensemble-averaged to obtain a single waveform from which DT (DVP) was determined as the time between the first systolic peak and the early diastolic peak/inflection point in the waveform. The SI is the ratio of the subject's height to the DT (DVP).
69 subjects were included: 24 healthy subjects and 45 patients with essential hypertension. The correlation between the estimated peripheral diastolic pressure and the brachial one was good and significant ($r^2 = 0.51$; $p < 0.001$). A better correlation was found in terms of peripheral systolic pressure ($r^2 = 0.56$; $p < 0.001$). The correlation between the SI and the ft-PWV was significant ($r = 0.5$; $p < 0.001$) classifying the estimation as good agreement.
The estimation of the peripheral blood pressure and a stiffness index with the PPG signal qualifies as good agreement with the reference technique.

P77
NEAR INFRARED SPECTROSCOPY (NIRS) CAN DETECT DIFFERENCES IN MICROVASCULAR REACTIVE HYPERAEMIA IN THE PRESENCE OF HYPERTENSION

Siana Jones, Chloe Park, Nish Chaturvedi, Alun Hughes
University College London, UK

Background: Hypertension has adverse effects on microvascular function but there are limited methods that permit non-invasive assessment of the microcirculation in man in vivo. We used Near Infrared Spectroscopy (NIRS) to assess microvascular reactive hyperaemia in skeletal muscle following a short period of ischemia. We tested if differences between normotensive and hypertensive individuals could be detected.
Methods: Older adults enrolled in a population-based cohort study underwent measurements of oxy-Hb changes during a 30-second arterial occlusion and hyperaemic response using NIRS (Portamon, Artinis). Time-to-peak hyperaemic response was calculated. Hypertension diagnosis was determined by questionnaire and clinic blood pressure (BP) (diastolic BP > 90 mmHg or systolic BP > 140 mmHg). Diabetes diagnosis and information about medication were determined by questionnaire. Data are mean (SD) or adjusted mean ± SEM. Multivariable linear regression was used. Associations with hypertension were adjusted for age, gender, ethnicity and presence of diabetes.
Results: 129 participants (99 = male, 72(6) years old, 74(57%) hypertensive participated). Time-to-peak hyperaemic response was significantly longer in hypertensive than normotensive participants after adjustment for age and gender (12.5 ± 0.49 versus 10.5 ± 0.57seconds, $p = 0.06$). This association persisted after adjustment for ethnicity and the presence of diabetes (12.6 ± 0.50 versus 10.5 ± 0.57, $p = 0.03$).
Conclusion: Hypertension is associated with impairment of post-ischemic reactive hyperaemia in skeletal muscle microvasculature. Differences between hypertensive and normotensive older adults can be detected non-invasively using NIRS.

P78
LONGITUDINAL MICRO-ULTRASOUND ASSESSMENT OF THE ob/ob MOUSE MODEL: EVALUATION OF CARDIOVASCULAR, RENAL AND HEPATIC PARAMETERS

Nicole Di Lascio [1,2], Claudia Kusmic [1], Francesco Stea [3], Francesca Lenzarini [1], Cristina Barsanti [1], Arthur Leloup [4], Francesco Faita [1]
[1]*Institute of Clinical Physiology, CNR, Pisa, Italy*
[2]*Institute of Life Sciences, Scuola Superiore Sant'Anna, Pisa, Italy*
[3]*Department of Clinical and Experimental Medicine, University of Pisa, Pisa, Italy*
[4]*Department of Pharmaceutical Sciences, University of Antwerp, Antwerp, Belgium*

Purpose/Background/Objectives: Obesity is associated with increased risk factors for cardiovascular disease (CVD). Leptin-deficient mice (*ob/ob*) are widely employed to investigate obesity. This study is aimed at providing a micro-ultrasound (mUS) longitudinal evaluation of the *ob/ob* mouse in terms of cardiovascular effects, consequences for renal microcirculation and liver fat accumulation.
Methods: Sixteen wild-type (*wt*) and eleven *ob/ob* male mice were studied at 8 (T_0) and 25 (T_1) weeks of age with a mUS system (Vevo2100). Cardiac output (CO), ejection fraction (EF), stroke volume (SV), fractional shortening (FS) and E/A ratio were measured from cardiac images. Mean diameter (Dm_{abd}, Dm_{car}), relative distension ($relD_{abd}$, $relD_{car}$) and pulse wave velocity (PWV_{abd}, PWV_{car}) were obtained for both abdominal aorta and common carotid. Renal resistivity and pulsatility index (RI, PI) were assessed. The ratio between grey-levels related to liver and kidney (Steato-Score) was used as index of hepatic steatosis.
Results: At T_0, *ob/ob* mice showed reduced SV, EF, CO and $relD_{abd}$ values and increased LVmass, PWV_{abd}, RI, PI and Steato-score. Similar results for SV, EF, CO, RI, PI and Steato-Score were found at T_1; furthermore, obese mice showed reduced Dm_{abd} and Dm_{car} measurements in comparison with lean controls. The longitudinal analysis showed an increase in LVmass and Dm_{abd} and a reduction of FS, EF, CO, $relD_{abd}$ and $relD_{car}$ for *wt* animals and no differences for the *ob/ob* one.

Conclusions: *ob/ob* mice presented a premature cardiac dysfunction without a further age-related deterioration and a reduction in the abdominal aorta and carotid artery mean diameter in adult age.

P79
ULTRASONOGRAPHIC CHARACTERIZATION OF THE db/db MOUSE, AN ANIMAL MODEL OF METABOLIC ABNORMALITIES

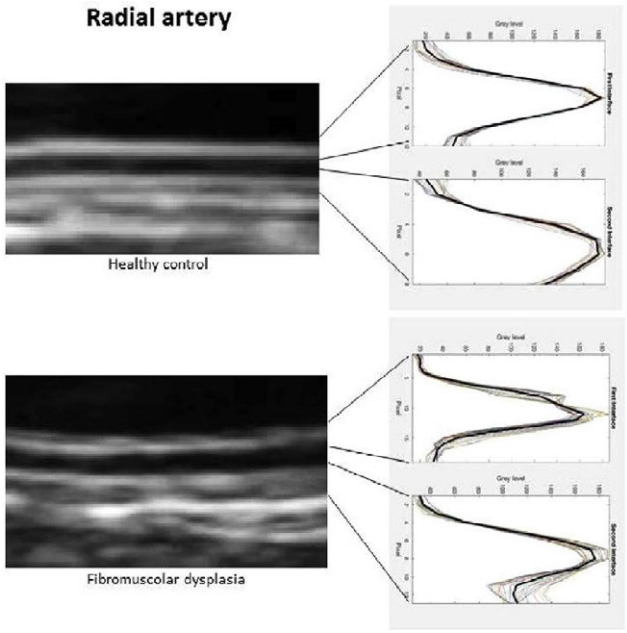
Nicole Di Lascio [2], Chiara Rossi [1], Claudia Kusmic [2], Anna Solini [3], Francesco Faita [2]
[1]*Department of Clinical and Experimental Medicine, Italy*
[2]*Institute of Clinical Physiology, CNR, Pisa, Italy*
[3]*Department of Surgical, Medical, Molecular and Critical Area Pathology, University of Pisa, Pisa, Italy*

Purpose/Background/Objectives: The availability of an animal model that, beside common blood parameters like hyperglycemia or high lipid levels, reliably mirrors organ damage occurring in metabolic diseases, is an urgent need. These animals have not been fully characterized in terms of cardiovascular, renal and hepatic ultrasound parameters, and only sparse and discordant values can be found in literature. Aim of this paper is to provide a detailed, non invasive description of heart, vessels, liver and kidneys of the *db/db* mouse by ultrasound imaging.
Methods: 16 wild type and 34 *db/db* 11 week-old male mice were studied. State of the art ultrasound technology was used to acquire images of cardiovascular, renal and hepatic districts. A full set of parameters describing function of the selected organs was evaluated.
Results: *db/db* mice are characterized by systolic and diastolic dysfunction, confirmed by strain analysis. On the contrary, abdominal aortic and carotid stiffness seem to be not increased in these diabetic rodents; furthermore, they are characterized by a smaller mean diameter for both vessels. Renal microcirculation is significantly compromised, while liver steatosis is only borderline higher in *db/db* mice than in control animals.
Conclusions: We offer here for the first time an *in vivo* detailed ultrasonographic characterization of the *db/db* mouse model, providing a useful tool for a thoughtful choice of the right rodent model for any experimental design.

P80
IDENTIFICATION OF RADIAL VASCULAR WALL ABNORMALITIES BY VERY-HIGH FREQUENCY ULTRASOUND IN PATIENTS WITH FIBROMUSCULAR DYSPLASIA: THE FUCHSIA STUDY

Rosa Maria Bruno [1], Nicole Di Lascio [2], Daniela Guarino [1], Saverio Vitali [1], Piercarlo Rossi [1], Davide Caramella [1], Stephane Laurent [3], Pierre Boutouryie [3], Stefano Taddei [1], Lorenzo Ghiadoni [1], Francesco Faita [2]
[1]*University of Pisa, Pisa, Italy*
[2]*Institute of Clinical Physiology — CNR, Pisa, Italy*
[3]*Hôpital Européen Georges Pompidou, INSERM, Paris, France*

Aim: This case-control study is aimed at identifying radial vascular wall abnormalities in patients with fibromuscular dysplasia (FMD).
Methods: High-frequency ultrasound scans of radial arteries were obtained by VevoMD (70 MHz probe, FUJIFILM, VisualSonics). Radial wall showed two echogenic interfaces: the 1st (lumen-media) and the 2nd (media-adventitia). Intima-media (IMT), adventitia (AT), and global thickness (IMAT) and wall cross-sectional area (WCSA) Measured. Vascular wall disarray was assessed calculating the root mean square error (RMSE) between 20 gray-level profiles crossing the two interfaces and the profile obtained averaging them, normalized for the maximum value of the corresponding mean profile (RMSE/mean).
Results: 11 treated hypertensive female FMD patients and 8 healthy controls (C) were enrolled (age 52 ± 5 vs 45 ± 13years, $p = 0.51$; BMI 26 ± 3 vs 23 ± 3kg/mg, $p = 0.12$; mean BP 97 ± 7 vs 85 ± 10 mmHg, $p = 0.01$). Radial lumen was similar; IMT (0.166 ± 0.037 vs 0.128 ± 0.022mm, $p = 0.03$), AT (0.114 ± 0.029 vs 0.083 ± 0.019mm, $p = 0.008$) and IMAT (0.281 ± 0.042 vs 0.211 ± 0.027mm, $p = 0.003$) were higher in FMD. Wall/lumen ratio was similar and WCSA increased in FMD.
The maximum values of 1st (121 ± 43 vs 157 ± 22, $p = 0.09$) and 2nd interface 109 ± 44 vs133 ± 18, $p = 0.09$) tended to be lower, whereas RMSE/mean was higher in FMD (1st 1.31 ± 0.24 vs 0.83 ± 0.32, $p = 0.006$; 2nd 1.37 ± 0.38 vs 0.94 ± 0.32, $p = 0.03$). The difference was attenuated for the 1st but not for the 2nd interface when considering age and mean BP as covariates ($p = 0.054$ and $p = 0.016$ respectively).



Conclusions: The radial artery wall of hypertensive FMD patients shows increased thickness and its ultrastructure is characterized of loss of echogenicity and inhomogeneity of the two echogenic layers.

P81
DISARRAY AND REMODELING OF THE RADIAL ARTERY IN WOMEN WITH SPONTANEOUS CORONARY ARTERY DISSECTION: THE FUCHSIA STUDY

Rosa Maria Bruno [1], Nicole Di Lascio [2], Abtehale Al Hussaini [3], Daniela Guarino [1], Saverio Vitali [1], Piercarlo Rossi [1], Davide Caramella [1], Bernardo Cortese [4], Francesco Faita [2], Stefano Taddei [1], Lorenzo Ghiadoni [1], David Adlam [3]
[1]*University of Pisa, Pisa, Italy*
[2]*Institute of Clinical Physiology — CNR, Pisa, Italy*
[3]*University of Leicester, Leicester, UK*
[4]*ASST Fatebenefratelli-Sacco, Milano, Italy*

Background: Spontaneous coronary dissection (SCAD) may represent a manifestation of fibromuscular dysplasia (FMD); thus, preclinical lesions might be found in extracoronary vessels with similar size and wall ultrastructure, such as the radial artery.
Methods: Two 5'-clips from the left radial artery were obtained by Vevo MD (70 MHz probe, FUJIFILM, VisualSonics). Radial wall showed two echogenic interfaces: the 1st (lumen-media) and the 2nd (media-adventitia). Intima-media (IMT), adventitia (AT), and global thickness (IMAT) and wall cross-sectional area (WCSA) Measured.
Vascular wall disarray was assessed calculating the root mean square error (RMSE) between 20 gray-level profiles crossing the two interfaces and the profile obtained averaging them, normalized for the maximum value of the corresponding mean profile (RMSE/mean).