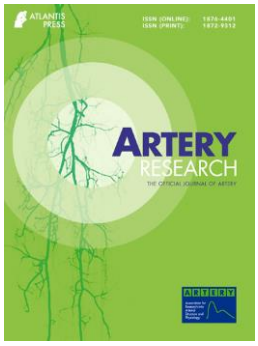

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P8.8: APELIN/APJ RECEPTOR SYSTEM INVOLVEMENT IN OBESITY-RELATED VASCULAR REACTIVITY CHANGES

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P8.7
PRESERVATION OF BIOMECHANICAL PROPERTIES OF ARTERIES IN EMBALMED BODIES

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Minimally invasive surgery techniques such as laparoscopic, endoscopic and thoracoscopic procedures became current practice and recently have revolutionized the specialty of vascular surgery. However, the practice and skills of surgeons are crucial to perform correctly the numerous highly sophisticated and delicate procedures of this surgical specialty. Normally for training are used simulators, which have a known limitations. Sometimes, there are also using very expensive and not always available fresh cadavers, due to the importance of biomechanical properties of arteries for the training.
The use of embalmed cadavers assumes the better results in the surgeon comprehension of complex anatomic and vascular exposures and can improves their operative confidence. However, a traditional formaldehyde-embalming method cannot preserve the structure and properties of the vascular system.
In order to remove these limitations we have developed a new embalming perfusion method aiming to satisfy the needs to support the embalmed bodies as true simulator for vascular surgery.
In this study, we present results of histological analysis and evaluation of mechanical properties of the arteries, achieved with our perfusion system, and its comparison with formaldehyde-embalming method. Other important features, such as the authenticity of colour, tissue consistency and elasticity (flexibility) of the vascular vessels, are also discussed.

P8.8
APELIN/APJ RECEPTOR SYSTEM INVOLVEMENT IN OBESITY-RELATED VASCULAR REACTIVITY CHANGES

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Background: Obesity associated changes of vascular reactivity could be related to inadequate secretion of adipokines. Apelin is an adipokine with cardiovascular, endocrine and metabolic actions. We aimed to investigate the possible modulator actions of apelin on obesity induced changes of vascular reactivity.
Methods: Obese prone (OP-CD) rats and obese resistant (OR-CD) rats were fed high-fat diets. After 4 weeks the pulmonary and mesenteric arteries were used to comparatively analyse the contractile (induced by phenylephrine - Phe) and relaxant (induced by acetylcholine ACh) responses. Localization of apelin and its APJ receptor was determined using immunohistochemistry.
Results: The Phe -induced contraction was amplified on PA and ACh -induced relaxation was reduced on both PA (with 62%) and MA (with almost a half) in OP-CD as compare with OR-CD. Pre-treatment with apelin 13 (AP13) improve ACh effect on PA rings form OP-CD. Administration of apelin-13(F13A) receptor antagonist increase the Emax of Phe MA from OP-CD (with 26%) and decreased the ACh effect on all rings from both OP-CD and OR-CD rats. IHC demonstrate a decrease of apelin on PA endothelium but no differences on MA for either AP or APJ receptor.
In **conclusion**, the apelin/APJ peptidergic system could be involved in obesity related reactivity alteration of arteries from both pulmonary and systemic circulation.

P8.9
MECHANICAL BEHAVIOR OF THE ABDOMINAL AORTIC ANEURYSM OBTAINED FROM THE RAT XENOGRAFT MODEL AND TREATED BY MESENCHYMAL STEM CELLS

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To prevent rupture of abdominal aortic aneurysms (AAAs), current preventive treatments involve surgery or the deployment of an endovascular stent. The development of gene or cell therapies as alternative therapeutics to stabilize AAAs represents a challenge. In the present contribution, we investigate the effect of a mesenchymal stem cell therapy on the mechanical properties of the rat xenograft model of AAA. This model reproduces the arterial dilation of the aneurismal disease and has been much used to study the biological impact of different approached therapies. The arterial structure of healthy native rat abdominal aortas, diseased untreated and treated AAAs were subjected to axial extension and pressurization tests (biaxial mechanical tests) in a pressure myograph device. A nonlinear hyperelastic and incompressible mechanical model was used to identify and compare the material parameters for the three specimen types. Histological analysis enabled a correlation between the results and the microstructure of the arterial tissue and particularly the presence of a thrombus or a neointima layer. Stress distributions within the arterial wall should then be computed by finite element modeling in order to predict the risk of rupture of aneurysms.

P8.10
VASCULAR CHARACTERIZATION BY MEANS OF WAVE INTENSITY ANALYSIS: A PRELIMINARY STUDY IN MICE

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Mouse models are increasingly employed in the comprehension of cardiovascular disease. Vascular characterization could be enriched with Wave Intensity Analysis (WIA), which provides additional information about the vascular system and its interaction with the heart. We investigated age-associated changes in vascular parameters of mice in different arterial sites and explored the role of WIA.
Five adult (5 months) and five old (16 months) wild type male mice (strain C57BL6) were examined. Instantaneous values of diameter and flow velocity were automatically achieved from carotid and abdominal aorta B-mode and PW-Doppler images and elaborated to provide the lnD-V loop; pulse wave velocity values (PWVcar and PWVabd) and relative distension measurements (relDcar and relDabd) were calculated for both carotid artery and abdominal aorta. The WIA, as introduced by Parker in 2009, was performed: the amplitudes of the first local maximum (W1_car and W1_abd) and minimum (Wb_car and Wb_abd) were calculated.
PWVcar (adult: 1.41±0.37, old: 2.19±0.49 m/s), PWVabd (1.89±0.63 vs 2.89±0.68 m/s), relDcar (27%±5.9% vs 19.7%±3.6%) and relDabd (26.2%±4.1%, vs 15.4%±3.6%) values were significantly different ($p<0.05$) in the two age groups. W1_abd amplitude was higher in adult than in old mice ($12.9\pm6.7\times10^{-7}$ m^2/s vs $5.5\pm2.2\times10^{-7}$ m^2/s, $p<0.05$); the same trend was found in Wb_car amplitude ($9.07\pm4.8\times10^{-8}$ vs $4.27\pm1.24\times10^{-8}$ m^2/s), even if the difference was not significant ($p=0.09$).
The age-associated decrease in W1_abd may suggest a change in cardiac contractility, while that in Wb_car may be related to alterations in reflected waves from cerebral circulation. Therefore, WIA might provide additional information to standard vascular biomarkers.

P8.11
ADIPOKINE DYSREGULATION IS ASSOCIATED WITH ARTERIAL STIFFNESS IN A MODEL OF DIET-INDUCED OBESITY IN MICE

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The aim of this work was to analyze vascular remodeling and mechanical alterations in mesenteric arteries in a model of diet-induced obesity in mice, as well as the impact of adipokine dysregulation in those changes. Four-week old CB57BL/6J male mice were assigned either to a control (10% kcal from fat) or to a high-fat (HF) diet (45% kcal from fat). After 32 weeks of diet, HF animals weighed 30% more than controls ($p<0.001$). Moreover, HF animals exhibited an increase in leptin but a reduction in adiponectin plasma levels. Studies of arterial structure and mechanics, performed by pressure myography did not reveal a significant vascular remodeling in HF mice. However, we observed a significant increase in arterial stiffness in HF mice, as assessed by b-values (obtained from stress-strain relationship; LF=2.4±0.5 *vs* HF=5.3±0.8, $p<0.05$) and pulse wave velocity values (LF=3.4±0.1 *vs* HF=3.9±0.1; $p<0.05$). Moreover, though we did not find differences in elastin content, a significant reduction in fenestrae number with HF diet together with a significant increase in collagen I amount ($p<0.05$) were observed. Positive and negative correlations were found between b-values and leptin or adiponectin levels, respectively ($p<0.01$). In conclusion, these data demonstrate that HF diet accounts for an increase in arterial stiffness that is associated with adipokine dysregulation. Supported by grants from Ministerio de Ciencia e Investigación (BFU2011-25303), Ministerio de Economía y Competitividad (SAF2009-09714, SAF2011-25303, BFU2012-35353), Grupos Universidad Complutense de