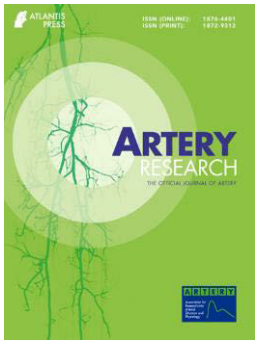

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P56: CENTRAL PULSE PRESSURE IS ASSOCIATED WITH RETINAL ARTERIOLAR WALL THICKNESS AND WALL CROSS SECTIONAL AREA AS EVALUATED BY ADAPTIVE OPTICS

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P53
ZERO FLOW PRESSURE (PINFINITY) IS LARGER THAN MEAN CIRCULATORY FILLING PRESSURE. A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Zero flow pressure (P∞), the steady-state pressure following cardiac arrest or cessation of flow is often assumed to equal mean circulatory filling pressure (MCFP). [1] However, this assumes complete equilibration of circulatory pressures, which may not occur if there is a 'critical closing pressure' or 'Waterfall' in the circulation. We undertook a systematic review and meta-analysis to obtain robust estimates of P∞ and compared this with MCFP measured in the same studies.
Methods: A literature search was performed using PubMed and was limited to full articles in English using the search terms "mean circulatory filling pressure" OR "critical closing" OR "zero-flow". Only data relating to measurements of pressure following cardiac arrest or cessation of blood flow were included. Other exclusions were: individual case-reports, pregnancy, non-adult animals, not mammalian, or any non-human models of disease. Meta-analysis was performed using a random effects model in Stata 15.1. Data are mean (95% confidence intervals).
Results: A total of 1082 unique publications were identified; 1062 were excluded during screening. The remaining 20 studies with P∞ data were used to perform a meta-analysis. These included data from dog, rat, pig and human; 8 of these articles also provided data on MCFP. From this analysis P∞ = 26.5(23.4, 29.5) mmHg (n = 20) and the difference between P∞ and MCFP was 15.1(12.0, 18.3) mmHg (n = 8).
Conclusions: P∞ and MCFP differ substantially, indicating non-equilibration of pressures in the circulation following cessation of flow at least in the short-term (seconds to minutes).

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P54
A MACHINE LEARNING SYSTEM FOR CAROTID PLAQUE VULNERABILITY ASSESSMENT BASED ON ULTRASOUND IMAGES

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Purpose/Background/Objectives: Carotid plaque vulnerability assessment is essential for the identification of high-risk patients. A specific mouse model for the study of carotid atherosclerosis has been recently developed. Aim of this study was to develop a predictive mathematical model for carotid plaque vulnerability assessment based on the post processing of micro-Ultrasound (μUS) images only.
Methods: 17 ApoE-/- male mice (16 weeks) were employed. After three weeks of high-fat diet, a tapered cast, designed to induce the formation of an unstable plaque upstream from the cast and a stable one downstream from it, was surgically placed around the right common carotid. μUS examination was repeated before the surgical procedure and after three months from it. Color-Doppler, B-mode and Pulsed-wave Doppler images were acquired to assess morphological, functional and hemodynamic parameters. In particular, texture analysis was applied on both the atherosclerotic lesions post-processing B-mode images. Peak velocity (Vp), Relative Turbolence Intensity (rTI) and velocity range (rangevel) were assessed from PW-Doppler images. Relative Distension (relD) and Pulse Wave Velocity (PWV) were evaluated for both the regions. All the μUS indexes underwent a feature reduction process and were used to train different machine learning approaches.
Results: The downstream region presented higher PWV values than the upstream one; furthermore, it was characterized by higher values of rTI and rangevel. The weighted kNN classifier supplied the best providing 92.6% accuracy, 91% sensitivity and 94% specificity.
Conclusions: The mathematical predictive model could represent a valid approach to be translated in the clinical field and easily employed in clinical practice.

P55
EFFECTS OF CAROTID PRESSURE WAVEFORM OBTAINED IN DIFFERENT WAYS ON THE RESULTS OF WAVE SEPARATION, WAVE INTENSITY AND RESERVOIR PRESSURE ANALYSIS

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Purpose/Background/Objectives: Recently great attention has been placed on innovative cardiovascular biomarkers obtained from wave separation (WS), wave intensity analysis (WIA) and the reservoir-wave (RW) concept. Pressure waveforms needed to implement these techniques can be obtained in different ways. Aim of this study was to evaluate differences in WS, WIA and RW parameters obtained deriving pressure curves in different ways.
Methods: Twenty-two individuals (49 ± 17 years, 59% males) were examined. Common carotid blood flow waveforms were obtained from Pulsed-Wave Doppler images. Carotid pressure waveforms were obtained in four different ways: 1) standard method, i.e., with applanation tonometry; 2) linear scaling from ultrasound (US)-derived diameter curve; 3) exponential scaling from US-derived diameter curve; 4) linear scaling from an accelerometric-derived diameter signal. In each case, reflection magnitude (RM) and reflection index (RI) were obtained from WS. The amplitude of the first positive peak (W1), of the second positive peak (W2) and of the negative one (Wb) were calculated from WIA; the maximum of the reservoir (maxPr) and the excess (maxPex) pressure were achieved from RW.
Results: According to the intra-class coefficient values, the agreement between the standard method and all the others was excellent in case of RM, RI, maxPrand maxPex(0.82—0.97), while reached only a fair/good level in case of W1, W2and Wb(0.44—0.82).
Conclusions: The use of alternative carotid pressure waveforms does not influence the cardiovascular parameters obtained by WS and RW, while those derived by WIA are affected by the carotid pressure curve employed.

P56
CENTRAL PULSE PRESSURE IS ASSOCIATED WITH RETINAL ARTERIOLAR WALL THICKNESS AND WALL CROSS SECTIONAL AREA AS EVALUATED BY ADAPTIVE OPTICS

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Introduction: In 1991 Baumbach et al demonstrated taht pulse pressure (PP) but not mean arterial pressure (MAP) was correlated with pial arterioles wall cross-sectional area (WCSA)in rats. Adaptive optics (AO) allows a near-

histological evaluation of retinal microcirculation (which shares the same embryological origins as the cerebral one) in a completely non-invasive fashion in humans. The aim of the study was to evaluate the relationship between PP/MAP and retinal arteriolar microcirculation.
Methods: Assessment included office BP measurements realized with SphygmoCor® with the patient resting in a supine position for at least 5 minutes followed by retinal microvascular analysis with AO RTX1® Camera to measure WT, internal diameter (ID), wall-to-lumen ratio (WLR) and WCSA, realized with the patients sitting in a stable position for at least 5 minutes.
Results: The study cohort consisted of 103 subjects on primary prevention and at intermediate risk, aged 20 to 80 years, with arterial hypertension and/or dyslipidemia. Study population was stratified according to median central PP (40 mmHg) and MAP (94 mmHg). Main results are shown in Table 1. Patients with a higher central PP showed an increased WT and WCSA. No difference was observed in WT and WCSA according to MAP.
Conclusions: Central PP is associated with structural changes in retinal microcirculation, namely a wall thickening and an increased vascular mass, as previously found on cerebral arterioles. Adaptive Optics allows a non-invasive evaluation of a microvascular territory which shares many morphological and physiological properties with the cerebral microcirculation, representing a promising tool for the prevention of cerebrovascular events.

	Pulse Pressure			Mean Arterial Pressure		
	< 40 mmHg	≥ 40 mmHg		< 94 mmHg	≥ 94 mmHg	
Small retinal arteries	n=49	n=53	p	n=48	n=54	p
Wall Thickness, - µm	21.7 ± 3.7	24.3 ± 4.2	0.002	22.6 ± 3.4	23.4 ± 4.7	0.794
Internal Diameter - µm	77.7 ± 13.1	81.2 ± 9.4	0.207	79.1 ± 9.6	79.9 ± 12.9	0.417
Wall to Lumen Ratio	0.284 ± 0.05	0.302 ± 0.05	0.120	0.287 ± 0.04	0.298 ± 0.06	0.410
Wall Cross Sectional Area, -µm²	3067± 873	3585 ± 845	0.005	3245 ± 755	3417 ± 999	0.529

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Poster Session I — Interventions

P57
POLYPHENOLS IN COCOA-RICH CHOCOLATE IMPROVE VASCULAR FUNCTION, THE VENTRICLE—ARTERIAL COUPLING AND COGNITIVE PERFORMANCE OF YOUNG AND HEALTHY ADULTS

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Objective: To evaluate and explore the benefits of dark chocolate in young healthy adults.
Methods: Randomized study in 30 healthy participants aged 18 to 27 years. Half of the participants ingested a 20 g dose of low cocoa chocolate (LCC: ~55%; 12,61 ± 1,35 mg equivalent of epichatequin/g) and the others ingested a daily dose of 20 g of high cocoa chocolate (HCC: ~90%; 18,19 ± 2,64 mg equivalent of epichatequin/g). A baseline evaluation was performed before the participants started ingesting the assigned chocolate for a 30 days period, after which a final evaluation was performed. Each evaluation included heart ultrasonography, carotid-femoral pulse wave velocity (PWV) and carotid pulse wave analysis (PWA), flow mediated slowing (FMS), an analysis of the ventricular-arterial coupling (VAC), cognitive testing and functional near infra-red spectroscopy (fNIR) of the pre-frontal cortex.
Results: A statistically significant improvement was depicted over the brachial and central systolic and pulse pressures in the HCC group, and a trend for improvement in the AiX and the FMS was also observed in the HCC. The VAC parameters showed a significant improvement in the HCC group after intervention, increasing from 0.674 to 0.719 (p=0.004). Improvement in the memory scores (speed and accuracy) was observed in both groups, with a larger improvement in the HCC group, and related with an improvement in the pre-frontal cortex perfusion.
Conclusions: The intake of cocoa-rich chocolate improves vascular function and cognitive performance in healthy young adults, by reducing blood pressure, promoting vascular dilation, and improving brain perfusion over the prefrontal cortex.

P58
SINGLE-PORT THORACOSCOPIC SYMPATHICOTOMY FOR TREATMENT RESISTANT RAYNAUD'S PHENOMENON: FIRST REPORT OF A NOVEL MINIMALLY INVASIVE ENDOSCOPIC TECHNIQUE

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Background: Raynaud's phenomenon of the hands is a great burden and reduces quality of life. In some patients, complaints may be resistant to vasodilatory treatment, for which additional options are very limited. Previously thoracic sympathectomy has been shown effective, but with great surgical burden. In our centre, single-port thoracoscopic sympathicotomy (SPTS) was developed, a new minimally invasive endoscopic technique extensively limiting surgical burden.
Objectives: The aim of this pilot study was to evaluate feasibility and efficacy of SPTS in patients with treatment resistant Raynaud's.
Methods: In the current study, we aim to include 10 patients with treatment resistant Raynaud's. SPTS was performed on the left side and the effects were compared contralateral after 1 and 12 months. To assess perfusion of the hands a cooling fingertip plethysmography (PPG) and laser Doppler imaging (LDI) were used. Pulse wave velocity (PWV) of the carotis-femoralis and carotis-radialis was measured.
Results: During this interim report, 7 patients are included so far (age 42 ± 13 years, 5/2 male/female, 5/2 primary/secondary Raynaud's). All 7 patients were satisfied. A clear improvement in hand perfusion was observed with LDI and PPG during cooling, as compared to the contralateral side. A trend in decrease of PWV carotis-radialis left was seen, while PWV at the other sites did not change significantly (figure 1).
Conclusions: SPTS is a novel minimally invasive technique which appears to be safe and feasible in patients with treatment resistant Raynaud's and increases hand perfusion. However, this study is on-going and long-term efficacy needs to be established.

P59
KNOW YOUR VASCULAR AGE: A FEASIBILITY STUDY ON A NEW SERVICE IN COMMUNITY PHARMACIES

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Background: Multiple studies report that stiffness of the elastic arteries has a predictive value independent of cardiovascular (CV) risk. According to the 2016 European Guideline on CV Disease Prevention in Clinical Practice by the European Society of Cardiology, arterial stiffness (AS) may predict future CV events and improve the classification of CV risk. (1-3).
Purpose: To evaluate the feasibility of incorporating AS assessment as a point-of-care test in community pharmacies, both as an independent parameter and integrated in a holistic service on CV risk assessment.
Methods: Eleven community pharmacies were selected to participate in the pilot project. Community pharmacists were trained to provide the service, and manuals were developed to assist them in the patient care process. Data were collected through GoogleForms®.
Results: Since March 2017, over 650 patients were incorporated in the service. 19.9% of participants displayed an increased Pulse Wave Velocity (PWV). Noteworthily, 12.3% of participants without previously known risk factors presented high PWV. 24 patients were referred to the GP. Several referrals to pharmacy services were made (n = 341). Based on feedback from pharmacies (on service pricing, service duration, and communication with patients and other healthcare professionals) modifications to the service were incorporated for the second phase of the study; in particular, the service price was adjusted, since only 33.3% of participants were willing to pay €15 for it.