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### **P12: VALIDATION OF SYNTHESIZED CENTRAL PRESSURE WAVEFORM IN PATIENTS WITH AN INFRARENAL AORTIC ANEURYSM BEFORE AND AFTER ENDOVASCULAR REPAIR**

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calcification. Development of aortic calcifications shares many similarities with atherogenesis, we thus hypothesize that people with short TL may have higher risk to develop aortic valve stenosis.

**Methods:** Aortic valves were obtained from 11 patients undergoing valve replacement surgery. Each valve cusp was macroscopically dissected into healthy, intermediate and calcified regions. DNA was extracted by phenol/chloroform method and TL measured by Southern blots of the terminal restriction fragments.

**Results:** TL from healthy and intermediate valve regions were similar and then merged in a non-calcified group. In all subjects, TL of calcified regions were shorter than TL in non-calcified regions. The gap between TL of non-calcified and calcified regions was 0,53kb ( $p < 0.007$ ).

**Conclusion:** Calcified aortic valve regions have shorter telomere length than non-calcified. Directionality of the relationship between telomere dynamics and aortic valve stenosis will be explored *in vitro*.

## P8

### THE EFFECT OF CAFFEINE ON MENTAL STRESS RELATED CARDIOVASCULAR RESPONSE

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**Background:** Caffeine, the most widely used pharmacologically active substance causes mental stimulation and a slight raising of blood pressure. The aim of our work was to evaluate the effect of caffeine on the cardiovascular system during rest and during mental stress.

**Methods:** RR interval duration, arterial blood pressure and Laser-Doppler (LD) flux were monitored in 40 healthy volunteers (aged  $21.98 \pm 0.9$  years) before and after ingestion of 200 mg of caffeine. The measurements were performed during rest (360s), during mental stress (90s) and during relaxation after mental stress (510s). The measurements were performed twice: under the effect of caffeine and under the effect of placebo. The study was approved by the National Medical Ethics Committee; written informed consent was obtained from each subject.

**Results:** During resting condition RR interval (ms) increased ( $910,49 \pm 130,5$  before and  $958,96 \pm 130,66$  after) ( $p < 0,05$ ), systolic blood pressure (mm Hg) increased ( $119,35 \pm 14,3$  before and  $127,54 \pm 15,9$  after) ( $p < 0,05$ ), diastolic blood pressure (mm Hg) increased ( $68,78 \pm 11,2$  and  $76,20 \pm 11,6$ ) ( $p < 0,05$ ), LD flux decreased ( $150,05 \pm 96,4$  and  $115,15 \pm 86,7$ ) ( $p < 0,05$ ) and temperature decreased ( $30,92 \pm 3,5$  and  $29,71 \pm 3,5$ ) ( $p < 0,05$ ) after ingestion of caffeine. During mental stress systolic and diastolic blood pressure increased significantly less, RR interval was nearly the same and LD flux after mental stress increased more and earlier after ingestion of caffeine.

**Conclusion:** Although caffeine raises blood pressure it has favourable effect on the cardiovascular system during and after mental stress.

## Poster Session I – Clinical aspects

### P10

#### COMBINATION OF FLOW-MEDIATED DILATION AND PULSE WAVE VELOCITY PROVIDES FURTHER CARDIOVASCULAR RISK STRATIFICATION IN PATIENTS WITH CORONARY ARTERY DISEASE: FLOW-MEDIATED DILATION JAPAN STUDY A (FMD-J A)

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**Purpose/Background/Objective:** The usefulness of vascular function tests for management of patients with coronary artery disease (CAD) has not been fully investigated.

**Methods:** We measured flow-mediated vasodilation (FMD) and brachial-ankle pulse wave velocity (baPWV) in 462 patients with CAD for assessment of the predictive value of FMD and baPWV for cardiovascular events in a prospective multicenter observational study. The first primary outcome was

coronary events, and the second primary outcome was a composite of coronary events, stroke, heart failure, and sudden death.

**Results:** A median follow-up period was 49.2 months. First primary outcome occurred in 56 patients and the second primary outcome occurred in 66 patients. FMD above the cutoff value of 7.1%, derived from receiver-operator curve analyses for the first and second primary outcomes, was significantly associated with lower risk of the first (hazard ratio [HR], 0.27; 95% confidence interval [CI], 0.06–0.74;  $P = 0.008$ ) and second (HR, 0.32; 95% CI, 0.09–0.79;  $P = 0.01$ ) primary outcomes. baPWV above the cutoff value of 1731 cm/s was significantly associated with higher risk of the first (HR, 1.86; 95% CI, 1.01–3.44;  $P = 0.04$ ) and second (HR, 2.19; 95% CI, 1.23–3.90;  $P = 0.008$ ) primary outcomes. Among the four groups stratified according to the combination of cutoff values of FMD and baPWV, stepwise increases in the calculated risk ratio for the first and second primary outcomes were observed.

**Conclusions:** Both FMD and baPWV were independent predictors of cardiovascular events in patients with CAD. The combination of FMD and baPWV provided further cardiovascular risk stratification.

## P11

#### EFFECT OF AGING ON THE PRESSURE ASYMPTOTE AND TIME CONSTANT OF EXPONENTIAL DIASTOLIC AORTIC PRESSURE DECAY IN HUMANS

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There are few data regarding the effect of aging on pressure asymptote (Pasymp) and time constant (Tau) of exponential diastolic aortic pressure (AoP) decay in normal human heart. To investigate this issue, we analyzed high-fidelity AoP, measured by use of a catheter-tipped manometer in 71 normal subjects who underwent diagnostic cardiac catheterization but who were found to have normal coronary artery and LV function. Subjects who had hypertension, diabetes or renal disease were excluded. There were 49 men and 22 women, ranging in age from 20 to 80 years. We analyzed diastolic AoP sampled every 5 ms from the point of minimal dP/dt to the top of ECG-R waves of the next beat, and estimated Tau and Pasymp by the exponential best fitting with a variable Pasymp results. Systolic AoP were significantly increased with age, but mean and diastolic AoP remained unchanged. Pasymp was  $58.5 \pm 8.1$  mmHg and Tau was  $436 \pm 105$  msec. Pasymp show no significant age-related change, but strongly and positively correlated with systolic, diastolic and mean AoP ( $R^2 = 0.39, 0.70$  and  $0.66$ , respectively). For Tau, it was weakly and positively related with both age and AoP (Age:  $R^2 = 0.20$ , AoP:  $R^2 = 0.08-0.20$ ).

**Conclusion:** We documented Pasymp and Tau of the Windkessel with the beating heart in normal humans. Tau was associated with aging, whereas Pasymp, which increased with the level of AoP, did not vary with aging per se, at least until the ninth decade. These data may provide insight into the understanding of AoP physiology.

## P12

#### VALIDATION OF SYNTHESIZED CENTRAL PRESSURE WAVEFORM IN PATIENTS WITH AN INFRARENAL AORTIC ANEURYSM BEFORE AND AFTER ENDOVASCULAR REPAIR

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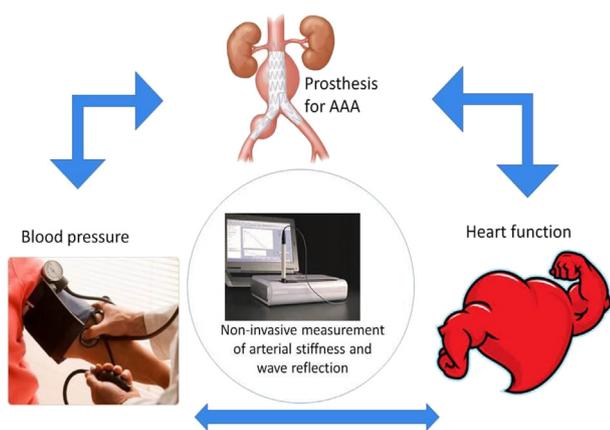
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**Background:** Abdominal aortic aneurysm (AAA) disease is mainly treated by endovascular aneurysm repair (EVAR), which shows short-term advantages in terms of lower morbidity and mortality compared to open repair. Long-term outcome seems to be inferior with regard to survival. This could partly be explained by a change in dynamics of the aortic wall, including aortic central pressure (CP) waveforms, induced by the endograft (Figure). Arterial stiffness is predictive of cardiovascular disease but has not been investigated in AAA-patients. We investigated if CP and Augmentation index (AIX) can be calculated correctly in AAA-patients.

**Methods:** Non-invasive and invasive waveform recordings and CP- and stiffness-calculations were performed simultaneously before and after EVAR. Non-invasive radial artery waveforms were recorded, from which CP was estimated by SphymoCor (Atcor Medical, Sydney, Australia). Invasive pressure measurements were performed with a fluid-filled catheter in the infrarenal aorta. A generalized ascending-to-abdominal aorta transfer function (GTFAA) was used to estimate CP from the invasively measured abdominal aorta pressure-waveform, which served as reference for the non-invasively estimated CP. From the CP waves, systolic pressure and AIX were computed.

**Results:** The difference between the invasive and non-invasive peak CP showed a bias of 23.9 mmHg (limits-of-agreement: -37.2:85.0) before and a bias of 0.4 (-32.6:33.4) after implant. Mean AIX (SD) was -30.7(11.2) and -38.9(31.2) before and after implant, respectively.

**Conclusion:** Synthesizing CP with non-invasive measurements in combination with the use of a GTF in patients with AAA is feasible especially after EVAR. Differences in CP and AIX could be explained by differences in AAA-morphology or an error in phase unwrapping, which are currently investigated in-vitro and in-vivo (NCT01220245).



### P13 VASCULAR AND MUSCLE DETERIORATION IN OLDER OUTPATIENTS

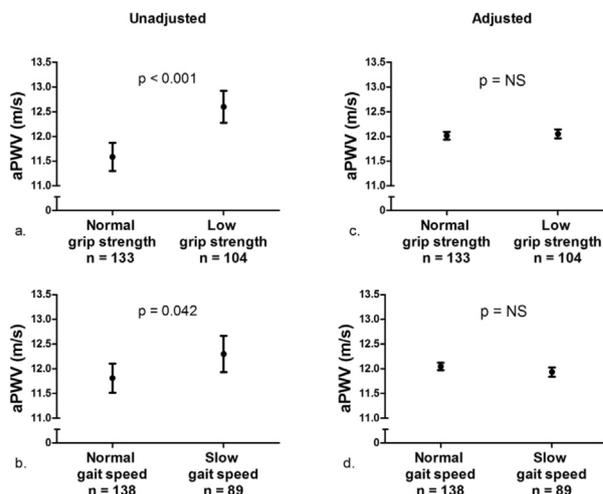
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**Background:** Vascular and muscle deterioration are age-related processes, which both have a major impact on health and might share common predisposing factors and mechanisms. We investigated the possible association between aortic stiffness and physical performance in older outpatients.

**Methods:** Aortic stiffness was non-invasively measured as aortic pulse wave velocity (aPWV) by the Mobil-o-Graph. Physical performance was assessed by the (a) hand grip strength and (b) usual gait speed on 5-meter course. Low grip strength was  $<20$  kg for women and  $<30$  kg for men. Slow gait speed was defined as  $\leq 0.8$  m/s. Mean values of aPWV were investigated in patients according to their physical performance.

**Results:** We included 240 consecutive outpatients. Mean age was 77.6 ( $\pm 7.1$ ) years, mean aPWV was 12.0 ( $\pm 1.7$ ) m/s. Low hand grip strength was found in 43.3%, slow gait speed in 37.1%. Compared to the normal physical performance group, patients with low grip strength were 5.3 years older ( $p < 0.001$ ) and patients with slow gait speed were 2.9 years older ( $p = 0.002$ ). Patients with normal grip strength had lower aPWV than patients with low grip strength (11.58 vs 12.6,  $p < 0.001$ ). Patients with normal gait speed had lower aPWV than patients with slow gait speed (11.81 vs 12.3,  $p = 0.042$ ). After adjustments for age, sex and mean arterial pressure, no differences were found in aPWV between patients with a normal and low physical performance.

**Conclusion:** Higher aortic stiffness is associated with lower physical performance in older outpatients. However, age plays a crucial role in this relationship.



### P14 REFERENCE VALUES OF THE WEST SPANISH POPULATION OF THE HEMODYNAMIC INDICES EVALUATED WITH A NEW WRIST WORN DEVICE

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**Objective:** To describe the reference value of arterial stiffness parameter measurement by wrist worn device (Microsoft) in west Spanish population.

**Methods:** Cross-sectional study. Study population: From the population assigned to the participating healthcare centres, a cluster random sampling stratified by age and gender was performed to obtain 501 participants aged between 35 and 75, 100 per decade, (50% women) without cardio or cerebrovascular disease. Measurements: Central (CAIx) and peripheral (PAIx) augmentation index, Heart rate (HR) and heart rate variability (HRV) by a new wrist worn device developed by Microsoft.

**Results:** Mean age was: 55.9  $\pm$  14.2y. Mean PAIx was 91.22  $\pm$  16.05, in women 95.34  $\pm$  16.17 and in men 87.08  $\pm$  14.86 ( $p < 0.05$ ). The PAIx and CAIx increased with each decade, (PAIx was 79.85 in born in 1981 and 99.68 in born in 1941, and CAIx 19.25 in born in 1981 to 35.11 in born in 1941), and HRV decrease with each decade (3.31 in born in 1981 and 2.52 in born in 1941). No differences were found in heart rate. This data is the same in men and women. Correlation of age with PAIx was  $r = 0.424$ , CAIx  $r = 0.323$ , HRV  $r = -0.364$  ( $p > 0.01$  for all) and HR 0.51 ( $p > 0.05$ ).

**Conclusion:** The PAIx and CAIx were higher in women than men. PAIx and CAIx increase with aging while the HRV decreases.

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