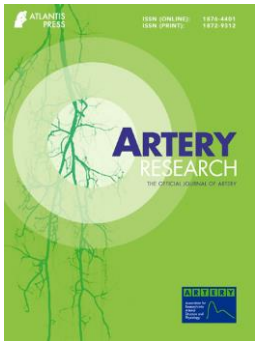

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P5.33: REVERSE DIPPING STATUS IS INVERSELY ASSOCIATED WITH HEALTH-RELATED QUALITY OF LIFE

D.A. Vrachatis, A. Argyris, A. Papadopoulos, T.G. Papaioannou, E. Aissopou, G. Konstantonis, D. Niakas, P. Sfikakis, A. Protogerou

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Methods: Seventy-nine (51 male & 28 female) healthy subjects were recruited. All were lifelong non-smokers, normotensive, normolipidaemic and normoglycaemic. Augmentation index (AIx) and pulse wave velocity (PWV) were measured using applanation tonometry (Sphygmacor & Vicorder). Daily physical activity patterns were measured using triaxial accelerometry and expressed as time spent being sedentary, lightly active and vigorously active. Body composition was estimated using bioimpedence. The adipose associated markers, leptin & adiponectin, and inflammatory markers, IL-6, TNFá & MCP-1 were also measured.
Results: Time spent being sedentary was significantly associated with AIx ($r=0.38$, $P<0.001$), PWV ($r=0.33$, $P<0.01$), body fat composition ($r=0.40$, $P<0.001$) and age ($r=0.30$, $P<0.01$). Vigorous activity was inversely correlated with AIx ($r= -0.28$, $P<0.05$) body fat composition ($r=-0.30$, $P<0.01$), post prandial insulin ($r=-0.35$, $P<0.01$) and leptin/adiponectin ratio ($r=-0.28$, $P<0.05$). The inflammatory cytokines, IL-6, TNFá and MCP-1, were not significantly correlated with any activity categories.
Conclusion: The main findings of the study are that people, who spend more time being sedentary, despite being clinically healthy, have stiffer arteries and more body fat compared to those who spend less time being sedentary. Conversely, people that spend more time being active have less arterial stiffness, lower body fat, post prandial insulin and leptin/adiponectin ratio. These results suggest that activity related changes in arterial stiffness in healthy people may be mediated by the hormonal/metabolic consequences of inactivity rather than pro-inflammatory mechanisms.

P5.31
CENTRAL PRESSURES ARE HIGHER IN PATIENTS WITH TRANSIENT ISCHAEMIC ATTACK (TIA) THAN HEALTHY ADULTS

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Introduction: The increased risk of stroke following a Transient Ischaemic Attack (TIA) is well established. Central aortic pressure, a marker of arterial stiffness, is emerging as a predictor of cardiovascular events including stroke. Additionally brachial Blood Pressure (BP) measurements may not accurately reflect the haemodynamic status of an individual, as systolic BP is amplified peripherally. The association and interplay of central aortic pressure and brachial BP parameters in TIA patients have not previously been explored.
Methods: Twenty-six participants with a mean age of 70 years (SD±10.1) and a confirmed diagnosis of TIA were recruited from Brighton and Sussex University Hospitals Trust. Central aortic BP and brachial BP were measured using Arteriograph®. Carotid-femoral pulse wave velocity (C-F PWV) and carotid-radial pulse wave velocity (C-R PWV) were measured using Complior®.
Results: Twenty participants had complete BP recordings. Central aortic BP was higher than peripheral BP (mean difference= 2 mmHg). Healthy patients are expected to have a central BP 10-15mmHg lower than peripheral BP.[1,2] C-F PWV was found to be higher in TIA participants compared to published normal values (C-F 10.9 m/s).[3]

Measurement	Mean ± SD	Range	n
Peripheral BP (mmHg)	128 ±14.7	102-163	20
Central BP (mmHg)	130 ±19.3	97-171	20
C-F PWV (m/s)	11.5 ±3.18	7.2-20.6	22
C-R PWV (m/s)	10.8 ±1.26	8.3-13.7	22

Conclusions: In this TIA cohort, there was a tendency towards an increase in central BP and aortic stiffness in comparison to published normal values.
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P5.32
WAON-THERAPY (WARMING THERAPY) IMPROVED CARDIAC FUNCTION ASSOCIATING WITH DECREASING CARDIO-ANKLE VASCULAR INDEX (CAVI) IN HEART FAILURE PATIENTS

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Objects: Waon-Therapy was invented for the therapy of heart failure by Dr. Tei. The purpose of this study was to confirm the efficacy of Waon therapy and to clarify the role of Waon-therapy in the arterial stiffness monitoring with cardio-ankle vascular index (CAVI).
Subjects and methods: Study 1 Subjects were 7 patients with chronic heart failure. They were divided randomly into Waon-therapy group and conservative therapy group. Waon therapy was performed as follows; worming up at 60 for 15 min in a chamber, and then, laying down in supine position with covering warm blanket for 30 min. They took this therapy once a day for 14 days. Study 2. A person, 64 years old man with diabetes mellitus, who is taking hemodialysis therapy. He also was suffering from systemic arteriosclerosis and heart failure. He took Waon therapy for 3 months. CAVI was measured using Vasela1500 (Fukuda Denshi. Co.LTD).
Results: Study 1; Among 7 heart failure patients, Waon therapy group 4 patients showed improved BNP from 1220- 780 pg/ml, whereas conservative group 720- 920 pg/ml. CAVI improved in Waon group from 10.5 to 9.3, but in conservative group, CAVI did not change Study 2: 65 year old man taking maintenance hemodialysis were suffering from necrosis of penis because of arteriosclerosis. He took Waon therapy for 3 months. At every week, BNP decreased from 4200, 3400, 2600 to 1560 pg/ml after 3 months. CAVI also decreased 13.4, 13.2 12.3, 11.2, 10.8, 11.2. Penis necrosis was improved completely.
Conclusion: Waon therapy improved heart failure, associating with improvement of CAVI. Improved CAVI which means decreased arterial stiffness, and also decreased after-load, might be involved in improving left ventricular dysfunction.

P5.33
REVERSE DIPPING STATUS IS INVERSELY ASSOCIATED WITH HEALTH-RELATED QUALITY OF LIFE

D. A. Vrachatis [1,2,3], A. Argyris [1], A. Papadopoulos [2], T. G. Papaioannou [3], E. Aissopou [1], G. Konstantonis [1], D. Niakas [2], P. Sfikakis [1], A. Protogerou [1]
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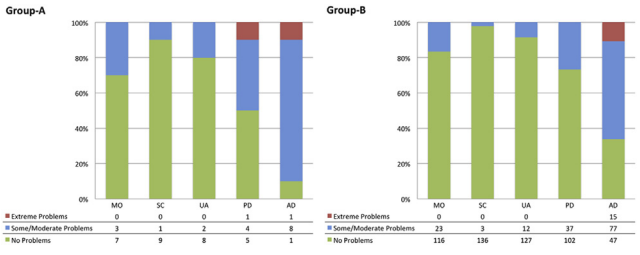
Objectives: We sought to investigate whether reverse dipping status is associated with self-reported health-related quality of life (HRQOL).
Methods: BP was evaluated non-invasively under 24-hour ABPM with a brachial cuff-based automatic oscillometric device (Mobilo-O-Graph, IEM); all subjects maintained a time-log indicating awake/asleep periods. Subjects were classified as Reverse Dippers (Group-A) if SBP-asleep > SBP-awake; the rest were included in Group-B. For HRQOL assessment the EQ5D instrument was utilized prior to BP evaluation. EQ5D estimates the following dimensions: mobility (MO), self-care (SC), usual activities (UA), pain/discomfort (PD), anxiety/depression (AD); each is subdivided in three severity levels (1=no, 2=some/moderate and 3=extreme problems). Moreover, an index (MVH-York-A1-tariff) is calculated by the combination of these dimensions. Additionally, EQ5D involves a visual analogue scale (VAS) in which respondents self-rate their health state (0=worst, 100=best imaginable).
Results: Group-A consisted of 10 subjects and Group-B of 139. The two groups were comparable regarding demographic and clinical characteristics (males 50% vs. 53%, 63 vs. 55 years old, BMI 26.5 vs. 27.2, hypertension 60% vs. 48.2%, diabetes mellitus 10% vs. 10%, respectively; p=ns for all). MO, SC, UA, AD and MVH-York-A1-tariff (A: 0.74±0.23 vs. B: 0.86±0.74) did not differ between the two groups. Yet, a higher percentage of Group-A stated some/moderate or severe problems in PD dimension compared to Group-B (Figures A, B; p<0.001). Moreover, lower levels of VAS were observed in Group-A compared to Group-B (72.5±10.9 vs. 78.7±13.7, respectively; p=0.037).



Conclusions: In the present study reverse dipping status is associated with lower levels of HRQOL.

P6 Methods and Modelling

P6.01
IMPLANTABLE PULSE WAVE VELOCITY SENSOR

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In case of vascular weakness or thrombosis stents are implanted and brace vessels from the inside to assure the proper blood flow. A widespread method to monitor the state of blood vessels in terms of their stiffness and diameter is to measure the pulse wave velocity (PWV). The stiffer or the narrower a vessel is the higher is the pulse wave velocity. At present no diagnosis method exists to determine the state of the implanted stent directly and non-invasive. In case of a reasonable suspicion catheterization for precise diagnosis is required. The new approach developed at Fraunhofer IPA allows measuring the PWV locally, so it can be applied in shorter intervals. This approach is based on inductive coupling. It consists of two passive units integrated into the stent and an extra-corporal detection unit. The passive units consist of a capacitive pressure sensor and an air-coil (Fig.1). They form an oscillating circuit, the resonance frequency of which functionally depends on the local blood pressure. The extra-corporal detection unit consists of an excitation coil which generates an alternating magnetic field and a circuit for signal detection. The spreading pulse wave changes the resonance frequency of the passive oscillating circuits inside the vessel in such a way, that it crosses the frequency of the externally applied field while the pulse wave passes by (Fig. 2). The short resonance leads to a shift in the impedance measured at the excitation coil. As the distance between the two sensors is known the PWV can be determined.

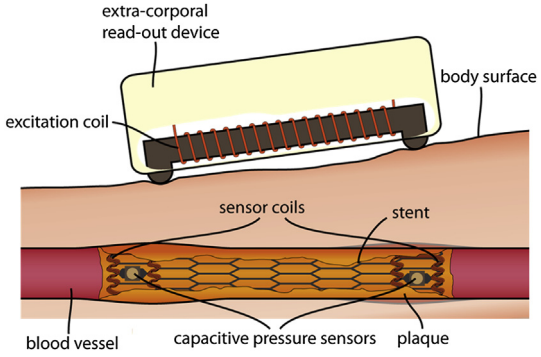

Figure 1 Scheme of functional principle

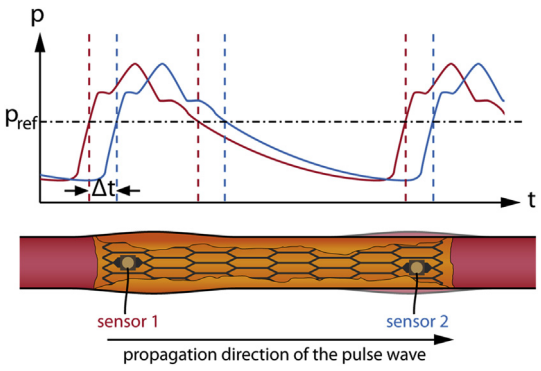

Figure 2 Schematic pulse wave propagation

P6.02
TOTAL ARTERIAL COMPLIANCE ESTIMATED BY A NOVEL METHOD AND ALL-CAUSE MORTALITY IN THE ELDERLY: THE PROTEGER STUDY

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Aortic stiffness assessed by carotid-to-femoral pulse wave velocity (PWV) often fails to predict cardiovascular (CV) risk and mortality in the very elderly. This may be due to the non-linear association between PWV and compliance, or to blood pressure decrease in the frailest subjects. Moreover, total arterial compliance (C_T) is the most relevant arterial property regarding cardiac function and ventriculo-arterial coupling. A new method for C_T estimation, based on PWV, was recently proposed. We aimed to investigate the value of this method to predict all-cause mortality at the elderly.
Methods: PWV was estimated (Complior) in 279 elderly subjects (85.5±7.0 years) who were followed-up for a mean period of 1 year. C_T was estimated by the formula $C_T = k \times PWV^{-2}$; coefficient k is body-size dependent based on previous *in silico* simulations. In this study, k was adjusted for body mass index (BMI) with a 10% change in BMI corresponding to almost 11% change in k. For a reference BMI = 26.2 kg/m^2, k = 37.
Results: Survivors (n = 185) and non-survivors (n = 94) had similar PWV (14.2±3.6 versus 14.9±3.8 m/s, respectively; p = 0.139). In contrast, non-survivors had significantly lower C_T than survivors (0.221±0.1 versus 0.198±0.128 ml/mmHg; p = 0.018). Cox-regression analysis showed that C_T was a significant predictor of mortality (p = 0.022, odds ratio = 0.326), while PWV was not (p = 0.202). Interestingly, age was an independent determinant of C_T (p = 0.016), but not of PWV.
Conclusions: It was demonstrated that C_T, estimated by a novel method, can predict all-cause mortality in the elderly. C_T could be a more sensitive arterial biomarker than PWV regarding CV risk assessment.

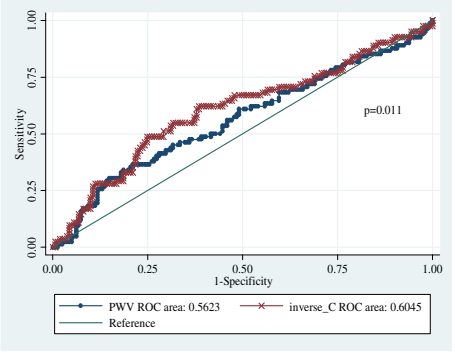

Figure. Receiver-operator-curve analysis of carotid-to-femoral pulse wave velocity (PWV) and total arterial compliance (inversed values) for the prediction of

Figure Receiver-opertor-curve analysis of carotid-to-femoral pulse wave velocity (PWV) and total arterial compliance (inversed values) for the prediction of

P6.03
A FSI MODEL OF CAROTID ARTERIES WITH VISCOELASTIC WALL BEHAVIOUR

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Objectives: Human carotid arteries exhibit viscoelastic behaviour characterised by hysteresis of the pressure-diameter relation and longitudinal wall motion[1]. Ultrasound techniques have been used to measure vessel wall displacements, as well as pressure and diameter waveforms, from which viscoelastic properties can be derived[2]. The aim of this study is to develop a fully-coupled numerical model for pulsatile flow in human arteries with viscoelastic wall behaviour.