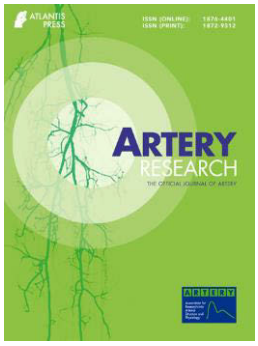

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P2.06: LEVELS OF NT-PROBNP ARE ASSOCIATED WITH ARTERIAL STIFFNESS IN PATIENTS WITH RHEUMATOID ARTHRITIS

S.A. Provan, K. Angel, P. Mowinckel, S. Agewall, D. Atar, T.K. Kvien

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activity (SLEDAI 18.74±8.25) and 72 controls (age 37.42±9.15) women. AIx was assessed non-invasively by applanation tonometry (Sphygmocor v.7.01, AtCor Medical).
Results: Using one-way ANOVA the overall difference of means of AIx between RA (24.71±11.52), SLE (20.81±12.29) and control groups (13.24±10.44); ($p<0.001$) was obtained. Post hoc tests revealed that AIx significantly differed between control group and each of disease groups ($p=0.006$ for SLE vs controls; $p<0.001$ for RA vs controls) however there was no difference between groups of SLE and RA ($p=0.253$). Adjustment for the other confounding factors, such as age, mean blood pressure, body mass index, fasting lipids and creatinine was made with a help of stepwise linear regression. However it did not change results. Variable indicating the presence of any of diseases was significant in the model for AIx ($p<0.001$).
Conclusions: RA and SLE are associated with increased arterial stiffness. The presence of both diseases contributes to increased augmentation index values and the damage of arterial wall.

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P2.03
EARLY INFLAMMATION CAN PREDICT ARTERIAL STIFFNESS: A 15-YEAR LONGITUDINAL STUDY OF 102 PATIENTS WITH RHEUMATOID ARTHTRITIS

S.A. Provan [1], K. Angel [2], A.G. Semb [1], P. Mowinckel [1], S. Agewall [2], D. Atar [2], T.K. Kvien [1].
[1] *Diakonhjemmet sykehus department of rheumatology, Oslo, Norway*
[2] *Aker university hospital, Oslo, Norway*

Objectives: To examine impact of early inflammation in RA on the development of CV disease.
Methods: 238 patients with RA of less than 4 years duration at inclusion in 1992 have been followed longitudinally. At the 15-year follow-up we performed Pulse wave analysis assessments including measurements of AI and PWV using the Sphygmocor apparatus (Atcor). The measurements were corrected for age, sex , MAP and heart rate. The AI was also corrected for height. Patients aged over 70 at the follow-up were omitted from the PWV analysis. Baseline measures of disease activity were then entered consecutively into the model.
Results: 102 patients were eligible for analysis of AI, 76 for PWV. Table 1 presents the adjusted univariate ß coefficients (CI)/p for the prediction of AI and PWV. In the multivariate model anti-CCP remained a significant predictor of AI $p=0.01$. R^2 adjusted increased from 0.43 to 0.46. In an alternative model without antiCCP, CRP remained a significant predictor $p=0.04$, R^2 adjusted 0.45. In the multivariate model CRP remained a significant predictor of PWV $p=0.02$. R^2 adjusted increased from 0.50 to 0.53.

Table1 Variable	AI (dependent variable)	PWV(dep. variable)
CRP	0.12 (0.00-0.25)/0.04	0.03(0.01-0.6)/0.02
ESR	0.06 (-0.008-0.14)/0.08	0.001 (-0.02-0.02)/0.93
IgMRF	0.02 (0.002-0.03)/0.03	0.002(-0.003-0.003)/0.89
Anti-CCP	0.02(0.004-0.03)/0.01	0.003(-0.003-0.003)/0.84
HAQ (health status)	1.67(-0.89-4.22)/0.20	0.46 (-0.05-0.99)/0.08
Sharp (radiographic)	0.09(-0.06-0.25)/0.23	-0.01 (-0.04-0.02)/0.60

Conclusion: Inflammation early in the disease course is associated with an increased augmentation index and pulse wave velocity after 15 years.

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P2.04
ASSOCIATION BETWEEN OSTEPONTIN AND ARTERIAL STIFFNESS IN PATIENTS WITH RHEUMATOID ARTHRITIS

L. Ghiadoni, L. Bazzichi, M. Bernardini, S. Bombardieri, S. Taddei.
Dep. Internal Medicine, University of Pisa, Pisa, Italy

Aim: Osteopontin (OPN) is a pleiotropic cytokine involved in the regulation of mineralization, expressed in bone and kidney, whose levels are elevated during and inflammation. We evaluated the possible relationship between OPN and arterial stiffness in patients with rheumatoid arthritis (RA).
Methods: In 40 RA patients (56±5 years, 32 females) and 40 age and sex-matched healthy volunteers, applanation tonometry (Sphygmocor®) was applied for measuring augmentation index (AIx) and carotid to femoral pulse wave velocity (PWV). Endothelium-dependent (flow-mediated dilation, FMD) and independent (sublingual glycerol trinitrate, GTN, 25 μg) vasodilation were assessed by ultrasound and computerized analysis of brachial artery diameter changes. Plasma levels of OPN and C-reactive protein were also evaluated
Results: OPN levels resulted higher in RA patients than in healthy controls (13.3±9.8 vs 5.4±3.1 ng/ml; $p<0.05$). PWV (8.7±2.5 vs 7.6± m/s; $p<0.05$), AIx (30.8±8.3 vs 26.1±7.9 units; $p<0.05$) and FMD (6.1±.3.2 vs 7.2±3.2%; $p<0.05$) were significantly different in RA patients than controls In RA patients, log-transformed OPN was related to PWV($r=0.41$; $p<0.01$), but not to AIx, FMD or response to GTN. Log-OPN levels correlated significantly also with age ($r=0.37$; $P<0.01$), and log CRP ($r=0.31$; $p<0.05$). In multiple regression analysis ($r^2=0.35$) including age, mean blood pressure and logCRP, logOPN remained a significant predictor of aortic PWV ($p<0.05$).
Conclusions: RA patients are characterized by elevated OPN levels, increased arterial stiffness and endothelial dysfunction. The selective, independent relationship between OPN levels and aortic PWV suggests that OPN might represent an important marker/mechanisms for increased arterial stiffness in RA patients.

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P2.05
CENTRAL PULSE PRESSURE IN END-STAGE RENAL DISEASE: THE ROLE OF AORTIC DIAMETER, AORTIC STIFFNESS AND WAVE REFLECTION

A. Guerin, B. Pannier, S. Marchais, G. London.
Hopital MANHES, Fleury-Merogis, France

Objectives: To assess the determinants of central pulse pressure (CPP) in end stage renal disease (ESRD), with special focus on respective roles of wave reflection, aortic stiffness and geometry (diameter) compared with controls (CT).
Methodology: 115 ESRD (49±15 years, SBP/DBP: 152±3/82±1 mmHg) were compared to 59 CT without renal insufficiency (46±13 years (NS), 143±3 (<0.02)/87±2 mmHg (NS)). Cardiac echography (stroke volume (StVl), aortic diameter), carotid artery wave analysis, aortic wave reflections (tonometry) and aortic pulse wave velocity (PWV) were measured, with calculation of characteristic impedance (Zc, $dyne.s.cm^{-5}$). Multiple regression analyses were based on 2 models: M1: age, BP, cardiac function, AI% and Zc, and M2: age, BP, cardiac function, AI%, PWV and Aortic diameter (to assess determinants of Zc).
Results: Versus CT, ESRD had higher carotid pressures, heart rate, AI%, and PWV while aortic diameter was similar. Determinants of CPP in ESRD were age, MBP, cardiac StVl, AI% and Zc (M1 model: $R^2=0.70$, $p<0.001$), in CT: MBP, AI% and Zc ($R^2=0.67$, $p<0.001$). M2 model shows in ESRD: age, MBP, AI%, Aortic diameter and PWV ($R^2=0.61$, $p<0.001$). In CT, determinants were AI% and PWV ($R^2=0.46$, $p<0.001$) with no impact of aortic geometry.
Conclusion: Increased CPP is associated with increased arterial Zc and wave reflections. In controls, CPP is linked to stiffness and AI% only, and in ESRD: mainly stiffness and AI% plus minor impact of aortic geometry. In normal subjects and hypertensives without renal failure, CPP is determined by stiffness and reflection, but not by aortic geometry.

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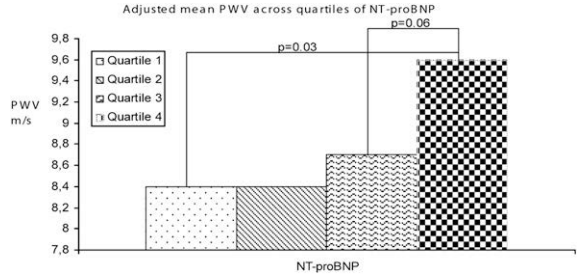
P2.06
LEVELS OF NT-PROBNP ARE ASSOCIATED WITH ARTERIAL STIFFNESS IN PATIENTS WITH RHEUMATOID ARTHRITIS

S.A. Provan [1], K. Angel [2], P. Mowinckel [1], S. Agewall [2], D. Atar [2], T.K. Kvien [1].
[1] *Diakonhjemmet Hospital Department of Rheumatology, Oslo, Norway*
[2] *Aker University Hospital, Oslo, Norway*

Background: We wished to investigate the association between arterial stiffness and NT-proBNP, a biomarker released in response to atrial and ventricular stretch (RA).
Methods: AI and PWV were measured using the Sphygmocor apparatus (Atcor) in 108 patients, 92 patients had acceptable AI, 95 patients acceptable PWV readings. The patients are included in the Euridiss register, an ongoing longitudinal study of Rheumatoid Arthritis (RA) disease activity. Cardiovascular end-points were assessed at the 2007 follow-up. AI and PWV were corrected for age, sex , MAP and heart rate and were dependent variables in separate models. AI was also corrected for height. Multivariate linear regression analysis with NT-proBNP as a continuous variable and ANOVA analysis with quartiles of NT-proBNP were performed.
Results: NT-proBNP was associated to PWV in the multivariate linear regression ß(CI) 0.024 (0.002-0.046) $p=0.03$. R^2 adjusted 0.57 R^2 change 0.02 $p=0.03$. The ANOVA analysis is shown below. NT-proBNP was not associated to AI ß(CI) 0.072 (-0.026-0.170) $p=0.15$.



Conclusion: NT-proBNP is associated to levels of PWV in patients with RA.

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P2.07
INTERRELATIONSHIP BETWEEN AORTIC STIFFNESS AND PROTEINURIA IN CHRONIC KIDNEY DISEASE

C.R. Pan [1], J. Wang [2], U. Heemann [1], M. Baumann [1].
[1] *Dept. of Nephrology, Klinikum rechts der Isar, Technical University Munich, München, Germany*
[2] *Centre for Epidemiological Studies and Clinical Trials, Ruijin Hospital, Shanghai Jiaotong University Medical School, Shanghai, China*

Aortic stiffness and proteinuria are cardiovascular risk factors. In several populations an association has been described between these factors. However, age is a strong determinant for both risk factors complicating the insight in dependencies. Therefore, we aimed to investigate whether dependencies between aortic stiffness and proteinuria exist in patients with chronic kidney disease (CKD) as in these patients renal disease is the leading cause for proteinuria.
In a cross-sectional setting 144 patients with severe to mild CKD (estimated Glomerular filtration rate (eGFR): >15 - ≤ 90 ml/min/1.73m^2 or bioptically proven renal disease) were investigated for aortic stiffness measured by carotid-femoral pulse wave velocity (C-F PWV) and proteinuria as determined by protein-creatinine ratio from morning spot urine. In stepwise linear regression analysis, C-F PWV predicted protein-creatinine ratio and *vice versa*. The diagnosis of proteinuria ($\geq$ 200 mg protein/g creatinine) was an independent predictor of C-F PWV, whereas C-F PWV did not predict the diagnosis of proteinuria.
This study demonstrates that the extent of aortic stiffness and proteinuria predict each other in a cohort of CKD similar to other populations. However, if the diagnosis of proteinuria is used as variable only apparent proteinuria predicts aortic stiffness, but not *vice versa*. This suggests that aortic stiffness is not consistently predicting proteinuria in CKD patients.

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P2.08
PREMATURE VASCULAR AGEING IN CYSTIC FIBROSIS?

J. Hull [1], R. Garrod [1], T. Ho [2], R. Knight [2], J. Cockcroft [3], D. Shale [4], C. Bolton [4].
[1] *Faculty of Health and Social Care Sciences, Kingston University and St George's, London, United Kingdom*
[2] *Frimley Park Hospital, Surrey, United Kingdom*
[3] *Dept of Cardiology, Wales Heart Research Institute, Cardiff, United Kingdom*
[4] *Dept of Respiratory Medicine, Cardiff University, Cardiff, United Kingdom*

Background: Cystic Fibrosis (CF) is the most common autosomal recessive condition affecting Caucasians. Improved survival paralleled with a high prevalence of risk factors (diabetes and systemic inflammation) suggest that cardiovascular disease may become an important co-morbidity in CF, yet currently cardiovascular risk profiling is lacking. We hypothesised that augmentation index (Aix), a marker of arterial stiffness, would be increased in CF.
Methods: We studied 50 (33 male) adults with stable CF, mean (range) age 28.0 (16-46) yrs and 26 age/gender/BMI matched controls. We measured heart rate adjusted Aix, aortic pulse wave velocity (PWV) (SphygmoCor), blood pressure, spirometry (FEV_1 & FVC), glucose tolerance status, serum CRP and lipids.
Results: Height, MAP and PWV were similar however Aix was increased in patients and the difference to controls persisted following adjustment for gender, age, MAP and height. Aix was greatest in diabetic patients (n=13), 13.1 (4.3)%, but the non-diabetic sub-group still had greater Aix: 6.9(12.3)% than controls (ANOVA, $p<0.05$). CRP was increased in patients ($p<0.005$). In patients, Aix was inversely related to FEV_1 ($r=-0.43$) and FVC ($r=-0.54$), and directly with age ($r=0.54$), all $p<0.01$ and $\log_{10}$CRP ($r=0.33$, $p<0.05$).

	Controls	Patients
Total cholesterol (mmol/L)	4.4 (0.7)	3.7 (0.7)*
Peripheral MAP (mmHg)	91.7 (8.6)	94.1 (8.3)
Aix (%)	-1.8 (13.1)	8.5 (11.1)*
Aortic PWV (m/s)	6.1 (0.8)	6.4 (1.5)

Mean(SD).*$P<0.05$.
Conclusions: Aix was increased in adults with CF, independent of glycaemic status. This apparent vascular ageing may have important implications for surveillance and cardiovascular risk stratification of these patients.

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P2.09
INCREASED AUGMENTATION INDEX IN POST-COARCTECTOMY PATIENTS WITHOUT SIGNIFICANT RESTENOSIS

B. van den Bogaard, G.J. Mackaij, B.J. Bouma, B.J.M. Mulder, M. Groenink, G.A. van Montfrans, B.J.H. van den Born.
Academic Medical Center, Amsterdam, Netherlands

Objectives: Despite successful surgical repair, post-coarctectomy patients suffer from early onset cardiovascular disease (CVD). Enhanced pressure wave reflections and increased arterial stiffness have been proposed to explain the increased risk of CVD. We therefore assessed arterial wave reflections and arterial stiffness in post-coarctectomy patients and matched controls.
Methods: We examined 10 post-coarctectomy patients aged 29 $\pm$7 yrs, 7 males, without significant restenosis and without antihypertensive treatment. Ten healthy age and gender matched subjects served as controls (age 26 $\pm$2 yrs, 6 males). Radial artery waveforms were recorded non-invasively by applanation tonometry using the Sphygmocor device. Aortic augmentation index (AIx) was calculated using a validated transfer function and corrected for heart rate. Pulse wave velocity (PWV) was measured between carotid and femoral arteries. All measurements were performed three times on the right and left side and were averaged.
Results: Post-coarctectomy patients had a higher right-sided (11.4$\pm$16.8 vs -12.4$\pm$8.8, $p<0.01$) and left-sided (22.5$\pm$7.9 vs -10.5$\pm$10.4, $p<0.01$) AIx compared to healthy controls. Carotid-femoral PWV showed no difference between patients and controls (right 5.7$\pm$0.9 vs 5.8$\pm$0.9, $p=0.70$; left 5.5$\pm$0.7 vs 5.7$\pm$0.8, p 0=.44).
Conclusions: Augmentation index is increased in post-coarctectomy patients. The finding of normal arterial stiffness combined with a distinct right to left difference in augmentation suggests that the enhanced wave reflection likely arises from early pulse wave reflection on the reconstructed aorta despite the absence of significant restenosis.

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P2.10
AMBULATORY ARTERIAL STIFFNESS INDEX IN TURNER SYNDROME: THE IMPACT OF SEX HORMONE REPLACEMENT

K.H. Mortensen [1], K.W. Hansen [2], M. Erlandsen [3], J.S. Christiansen [1], C.H. Gravholt [1].
[1] *medical Department M & Research Laboratories, Aarhus University Hospital, Aarhus, Denmark*
[2] *Department of medicine, Silkeborg Hospital, Silkeborg, Denmark*
[3] *Department of Biostatistics, Aarhus University, Aarhus, Denmark*

Objective: Women with Turner syndrome (TS) face increased morbidity and mortality from congenital and acquired cardiovascular (CV) diseases. Traditional indices of unfavourable CV risk are increased in TS. However, the single most common syndrome-related feature remains estrogen deficiency. The present trial therefore aimed to investigate total CV risk in TS as expressed by ambulatory arterial stiffness index (AASI) and the influence of female sex hormone replacement therapy (HRT).
Design and Methods: Randomly recruited women with TS receiving HRT (n=26) were examined following wash-out and during 6 months of HRT in the form of cyclical estrogen and progestin. Age-matched normally menstruating female controls (n=24) were examined once. Parameters of effect