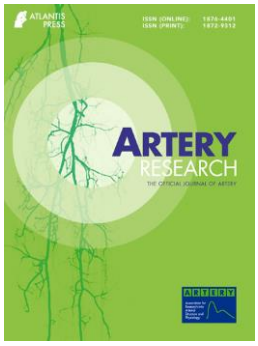

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4.5: U-SHAPED RELATIONSHIP OF RESERVOIR PRESSURE TO CARDIOVASCULAR EVENTS IN PATIENTS WITH HEART FAILURE WITH REDUCED EJECTION FRACTION

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Our aim was to define the arterial phenotype in mice conditionally inactivated for the integrin α_v subunit in VSMC[8,9,10](α_v ^{SMKO}) and its role in angiotensin II (AngII)-induced arterial fibrosis. Transgenic mice α_v ^{SMKO} and their control littermates (WT) were treated with two doses of AngII, low (0.3 mg/kg/day) and high (1.5 mg/kg/day), for 4 weeks.
At baseline, blood pressure was lower in α_v^{SMKO} compared to WT mice. Carotid distensibility was increased in α_v ^{SMKO} mice (13.3±0.7 vs 10.3±0.6 $mmHg^{-1}\cdot10^{-3}$). With low dose AngII isobaric distensibility remained higher in α_v^{SMKO}mice (12.4±1.2 vs 10.7±1.0 $mmHg^{-1}\cdot10^{-3}$).With high dose AngII the increase in collagen content in carotid media was lower in α_v^{SMKO}than in WT (19 vs 35%) for a similar increase in blood pressure (30 mmHg) and arterial wall hypertrophy. Collagen immunostaining and fluorescence measurements (multiphoton microscopy second harmonic generation) confirmed that high dose AngII induced lower increases in collagen content in α_v^{SMKO} mice versus WT (8.9±1.7 vs 14.2±1.4 greyscale mean/pixel). The combination of similar arterial wall hypertrophy with less fibrosis in mutant mice explains an increased distensibility in response to AngII.
The α_v subunit regulates AngII-induced arterial fibrosis as determined by collagen staining, immunostaining and fluorescence. Pharmacological targeting of vascular α_v integrin may have clinical applications in the treatment of patients with fibrosis associated with hypertension and atherosclerosis.

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4.5

U-SHAPED RELATIONSHIP OF RESERVOIR PRESSURE TO CARDIOVASCULAR EVENTS IN PATIENTS WITH HEART FAILURE WITH REDUCED EJECTION FRACTION

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Objectives: Parameters of aortic stiffness are considered important indicators of cardiovascular risk. However, in heart failure with reduced ejection fraction (HFrEF), their association to outcome was found to be inversed. The aim of this work was to analyze the relationship of the amplitude of reservoir pressure (PresAmp) to cardiovascular events in HFrEF.
Methods: Patients with HFrEF were collected from a cohort undergoing coronary angiography at the hospital Wels-Grieskirchen, Austria. PresAmp was computed from central pressure obtained from radial readings by a generalized transfer function. A combination of myocardial infarction, death, stroke and cardiovascular revascularization served as primary endpoint. Cox-regression analysis and Kaplan-Meier estimates were used for survival analysis.
Results: 83 (9 female) patients were included with a mean age of 61 years. During a median follow-up of 1272 days, 30 patients suffered from the combined endpoint. No significant linear association to outcome was found for PresAmp, brachial or central pulse pressure in Cox-analysis. In all three cases, Kaplan-Meier analysis comparing the respective quartiles indicated a nonlinear, U-shaped relation, but only for PresAmp the increase in risk was significant ($P<0.05$) in both directions. Although patients with low (16.6 (2.8 SD) mmHg) and high (26.1 (3.2 SD) mmHg) PresAmp showed similar risk, they differed in blood pressure, age, presence of hypertension, presence of coronary artery disease, ventricular dimensions, ejection fraction and diastolic function (table).
Conclusion: We found a U-shaped relation of reservoir pressure to outcome in our population. Pulsatile hemodynamics seem to separate patients with HFrEF into different phenotypes with different prognosis.

Table: Comparison of patients with low (1st quartile) and high (4th quartile) PresAmp. PP, pulse pressure. EF, ejection fraction. LVEDV, left ventricular end-diastolic volume. LVESV, left ventricular end-systolic volume. Values are presented as mean (standard deviation).

Parameter	1st quartile PresAmp	4th quartile PresAmp	P-value
N patients	21 (19m/2f)	21 (19m/2f)	
Age, years	57.1 (9.68 SD)	69.4 (9.24 SD)	<0.001
Hypertension	6 (29 %)	19 (90 %)	<0.001
Coronary artery disease	8 (38 %)	14 (67 %)	0.06
Brachial PP, mmHg	31.0 (6.87 SD)	63.0 (8.32 SD)	<0.001
Central PP, mmHg	20.4 (4.08 SD)	48.6 (9.33 SD)	<0.001
E/E'medial	30.8 (15.8 SD)	19.3 (10.0 SD)	0.008
EF, %	22.5 (7.33 SD)	31.6 (7.49 SD)	<0.001
LVEDV, ml	253 (91.3 SD)	162 (64.5 SD)	<0.001
LVESV, ml	199 (75.8 SD)	112 (50.8 SD)	<0.001

4.6

BEAT-BY-BEAT ASSESSMENT OF CARDIAC AFTERLOAD USING AORTIC PU LOOP — A PILOT STUDY

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Purpose/Background/Objectives: Cardiac afterload evaluation is crucial during general anesthesia (GA) especially during hypotension episode. Using beat to beat aortic pressure (P) / flow velocity (U) loop constructed from routine signals recorded during GA might allow to track afterload changes.
Methods: We defined 3 angles characterizing the PU loop (alpha, beta and Global After-Load Angle (GALA) angles). Augmentation index (AIx) and total arterial compliance (Ctot) were also measured via radial tonometry and transfer function. Twenty patients were recruited and classified into low and high cardiovascular (CV) risk group. Vasopressors were administered, when baseline mean arterial pressure (MAP) fell by 20%.
Results: We studied 118 pairs of pre/post bolus measurements. At baseline, patients in the lower CV risk group had higher cardiac output (6.1±1.7 vs