VITENSKAPELIGE ABSTRAKTER PRESENTERT PÅ NCS' HØSTMØTE 2012

Cardiac response to 2 years of intensified structured multi-intervention vs standard care in type 2 diabetes – a randomised trial

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Purpose: Patients with type 2 diabetes (T2D) are at elevated risk for heart failure (HF) and premature cardiovascular (CV) mortality. However, despite a strong epidemiological link, there is data suggesting that intensive glucose lowering could in fact be associated with worsened HF and CV outcomes. Since this is controversial, we hypothesized that an intensified structured multiintervention program (STRUCT) aimed against multiple HF risk factors (hyperglycaemia, dyslipidaemia and hypertension) in type 2 diabetes (T2D) would improve, or at least not be harmful to, myocardial function compared to conventional standard care (STAND).

Methods: 100 patients with T2D and ≥ 1 CV risk factor (29% females, mean age 58±10 years, diabetes duration 6±6 years,HbA1c 7.6±1.6%) were randomised to STRUCT or STAND care for 2 years. Prevalence of microalbuminuria at BL was higher in STRUCT (62% vs 22%), otherwise the groups were comparable. STRUCT comprised lifestyle intervention and pharmacological treatment to reach pre-specified targets, whereas STAND group remained under GP-care following current guidelines. Echocardiography incl. Tissue Doppler Imaging and bloodsamples were undertaken at BL and after 2 years.

Results: Lipids and glycaemia were significantly improved in STRUCT compared to STAND group, whereas reductions in BP were similar. At BL, E/e', a measure of left ventricular (LV) filling pressure, was elevated (13.3±4.7; reference-value: <8).Parameters of systolic function was preserved in both groups (Table). There were no significant between-group differences in changes in diastolic function.

Conclusion: Two years of intensified STRUCT intervention in patients with T2D improved HF risk factors, and did not worsen systolic or diastolic LV function.

Table: Echocardiographic findings in STRUCT and STAND group at BL and after 2 years. Data given as mean±standard deviation, p-value indicates between-group difference in Δ.

	STRUCT group			STAND group			p-value (Δ STRUCT vs Δ STAND)
	BL (n=50)	2 years (n=44)	Δ	BL (n=50)	2 years (n=46)	Δ	
Systolic function							
EF (%)	62 ± 8	63±6	0.5±8.7	63 ± 7	62±8	-1.7±7.6	*0.21*
Peak systolic velocity (s') cm/s	5.5±1.5	5.6±1.2	0.2±1.4	5.5±1.5	5.4±1.4	-0.1±1.5	0.32
Peak systolic longitudinal displacement (mm)	10.1±2.2	10.5±2.1	0.4±2.3	10.0±2.2	10.0±2.1	-0.2±1.6	0.14
Diastolic function							
Deceleration time (ms)	195 ± 57	211±49	11±58	194 ± 42	215±43	22±48**	0.32
E/A-ratio	0.89±0.28	1.01±0.36	0.13±0.29**	0.9 3± 0.27	0.95±0.25	0.03±0.21	*0.067*
Septal early diastolic velocity (e') (cm/s)	5.0±1.7	5.2±1.8	0.2±1.8	5.4±1.8	5.0±1.8	-0.4±1.7	*0.10*
E/e' septal	13.5±5.0	14.1±5.8	1.0±5.5	13.1±4.6	13.8±4.2	0.9±4.3	0.98
**, **, ***: p < 0.05, 0.01, 0.001 vs baseline. Values are mean±SD.*							

Effect of Renal Sympathetic Denervation (RDN) on treatment resistant hypertension and cardiovascular hemodynamic in comparison to intensive medical therapy utilizing Impedance Cardiography (Oslo RDN Study)

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Background: Hypertension is the most common cardiovascular disease, affecting approximately 1 billion people worldwide and estimated to affect around 1,5 billion by 2025. It has been estimated that there are 7.5 million deaths per year from non-optimal blood pressure control. Despite adherence to 3 or more available anti-hypertensive drugs including a diuretic, a significant proportion of patients have persistent blood pressure elevation, a condition termed treatment resistant hypertension. Impedance cardiography (ICG) is a non-invasive hemodynamic diagnostic and monitoring technology. ICG has demonstrated its usefulness and reproducibility in patients with resistant hypertension (Taler et al. Hypertension 2002), and in patients with mild to moderate hypertension (Smith et al. Hypertension 2006). Symplicity HTN-1 and HTN-2 trials showed that Renal sympathetic denervation (RDN) is feasible and effective and safe procedure in the short-term. About 87% of patients underwent RDN showed 10mmHg reduction in office blood pressure (defined as responder by Symplicity investigators). However RDN is a costly and invasive procedure, of which the long-term efficacy in terms of blood pressure control and safety has not yet been proven compared to usual care. In addition these trails have been criticized for not been using ambulatory blood pressure monitoring (ABPM) during patients selection, which is not in line with the current state-of-the-art. Oslo RDN will address these issues.

Hypothesis: When it is possible to disrupt the sympatho-renal axis by (RDN), a blood pressure reduction occurs to a greater extent and more rapidly than applying intensive medical therapy utilizing integrated hemodynamic monitoring (IHM) by impedance cardiography measurements.

Aims: 1- To demonstrate that RDN improves the control of office SBP in patients with treatment resistant hypertension, as compared to intensive medical therapy (IMT) utilizing Impedance cardiography during 6 months intensive treatment program. 2- To demonstrate that RDN improves significantly -compared with IMT the control of: a- SBP-DBP at ABPM, b- Hemodynamic (volemia status, stroke index SI, stroke systemic vascular resistance index), c- Central blood pressure and Pulse wave velocity and Augmentation index. 3- RDN reduces the number of side effects in hypertensive patients, d- RDN improves response to stressors. 3-RDN reduces the left ventricle mass index and improves the systolic and diastolic heart function. 4 -To assess RDN long term safety. 5- To assess the cost effectiveness and quality of life.

Design: 60 consecutives patients with treatment resistant hypertension will be randomized to one of two groups: (**group Co**) receives intensive medical therapy with IHM (then after 6 months offered RDN therapy if indicated); (**group RDN**) receives RDN therapy (then after 6 months offered intensive medical therapy with IHM). Patients will be followed up to 10 years

Perspectives: This study will generate long-term efficacy and safety data of RDN in comparison to non-invasive medical therapy, which will inform guideline committees and health policy makers. In addition this study will help us to understand the hemodynamics changes that will happen after RDN, thus one can predict patients who may respond to RDN in future.

Status: 2 patients included by 10.09.2012. Estimated 60 patients will be included by Aug 2013.

Safe and feasible immediate retransfer of patients to the referring hospital (Fast track) after acute coronary angiography and percutaneous coronary angioplasty (PCI), for patients with acute coronary syndrome (ACS)

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Aim: The challenge with Fast track (FT) is to avoid compromising medical safety. We aimed to investigate whether patients with ACS could be safely retransferred to

the referral hospital the same day after coronary angiography and/or PCI.

Methods and Results: 399 consecutive patients were prospectively randomized, 206 to the ordinary care (OC), and 193 to the FT group. 30% of patients were admitted for Unstable Angina Pectoris and 70% for Non-ST Segment Elevation Myocardial Infarction. The FT patients were evaluated for possible same day return after angiography and/or PCI. Crossover, acute and 30 days major events were recorded. The radial approach was used in 91% and 87% in the OC and FT group, respectively. 95% of the FT patients were returned the same day and nine crossover patients (4.7%) the next day or later. Major events occurred in nine patients (2.2%), five in the OC and four in the FT group. There were a total of five events within 24 hours. No events were observed during transportation and there were no early retransfers.

Conclusion: Immediate written reports and good communication with the referring hospital enabled that thoroughly selected patients were safely returned the same day as angiography and/or PCI.

Secreted frizzled related protein 3 (sFRP3) predicts outcomes in chronic heart failure: A Controlled Rosuvastatin Multinational Trial in Heart Failure (CORONA) sub-study

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Background: Upregulation of sFRP3, an inhibitor of Wnt-signaling, occurs in failing human myocardium. We therefore analyzed circulating levels of sFRP3 in relation to clinical outcome in a large population of patients with chronic heart failure (HF).

Methods: We investigated sFRP3 in relation to the primary endpoint (cardiovascular mortality [CVM], nonfatal MI, nonfatal stroke), all-cause mortality (ACM), CVM, death from worsening HF (WHF), any coronary event, including sudden death (SD), as well as hospitalizations for CV causes and WHF in 1444 patients randomly assigned to 10 mg rosuvastatin or placebo.

Results: Kaplan-Meier curves for all-cause- and CV mortality revealed a markedly better survival for patients in the middle tertile of sFRP3 compared to the 1st and 3rd tertile. In multivariable analyses, adjusting for LVEF, NYHA class, age, BMI, diabetes, sex, intermittent claudication, heart rate, estimated GFR and ApoB/ApoA-1-ratio, sFRP3 (dichotomized; 2nd vs. 1st and 3rd tertile) was associated with the primary endpoint, ACM, CVM and the number of coronary events, including SD. Adding CRP and NT-proBNP to the model, sFRP3 remained predictive for the primary endpoint, ACM and CVM (HR 0.57 [0.44-0.74], 0.55 [0.44-0.74] and 0.52 [0.39-0.69]; $p<0.001$), as well as for the number of coronary events (HR 0.62 [0.47-0.82], $p=0.001$) and SD (HR 0.55 [0.37-0.82], $p=0.002$). Applying sFRP3 values to the fully adjusted regression model resulted in highly significant continuous net reclassification improvements for the primary endpoint, ACM, CVM, coronary events and SD (range 0.24-0.31; $p\leq0.002$ for all).

Conclusions: Intermediate values of circulating sFRP3 are associated with better survival and fewer CV events than low or high sFRP3 levels, independently of conventional risk factors, in older patients with chronic systolic HF of ischemic origin. Our study supports a role for Wnt-signaling in chronic HF and suggests that balanced Wnt activity might confer protective effects in a clinical HF setting.

Secretoneurin regulates cardiomyocyte calcium homeostasis and is a potent marker of mortality in patients with heart failure

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Introduction: Secretoneurin (SN) is increased in the left ventricle and circulation in heart failure (HF); however, the clinical relevance of this has previously not been examined.

Methods: Functional aspects of SN were assessed in experimental models and circulating levels of SN measured in patients with HF.

Results: SN was identified as a peptide that could directly pass the cell membrane and enter the cytoplasm of cardiomyocytes by confocal imaging and immunoblotting. Bioinformatics identified the important Ca2+ regulatory kinases calmodulin (CaM) and the downstream Ca2+ / CaM-dependent protein kinase II (CaMKII) as potential targets of SN in the cytoplasm. These targets were validated in isolated cardiomyocytes and perfused hearts as SN infusion reduced CaMKII phosphorylation and activity. A key target for CaMKII in cardiomyocytes is the ryanodine receptor (RyR), the major intracellular Ca2+ release channel, and we found SN to reduce CaMKII-dependent RyR phosphorylation in cells and hearts. Testing the functional consequences of SN on cardiomyocyte Ca2+ handling, SN reduced Ca2+ spark magnitude (4%), width (12%), and duration (16%), while decreasing spark frequency (56%), which all are indicative of reduced diastolic Ca2+ leak by SN. Pertinent to this, SN perfusion enhanced sarcoplasmic reticulum (SR) Ca2+ content by 21%, but did not alter SR Ca2+ reuptake or sarcolemmal extrusion. SN perfusion increased Ca2+ transient amplitude (21%), cardiomyocyte contraction (53%), and time to peak (16%), while reducing the time to half decay (14%), all congruent with altered RyR activity. In 68 patients hospitalized for acute HF, admission SN levels were independently associated with mortality (n=17) during follow-up (median 373 days): hazard ratio [per 0.05 nmol/L increase] 2.43 (95% CI 1.63-3.61), p<0.001 in multivariate analysis.

Conclusion: SN is closely associated with cardiomyocyte Ca2+ handling and mortality in HF, possibly identifying SN as a compensatory mechanism that is activated in the most severely ill HF patients.

Pannexin 1, a new channel protein in cardiac mitochondria?

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Aim: Recently a new group of channel proteins has been discovered, the Pannexins. They have structural similarities to connexins, but appear to be two evolutionary distinct families. We have previously showed that Connexin 43 is located in cardiac mitochondria in addition to the intercalated disc. Our aim was to test if Pannexin 1 is expressed in the heart, and eventually the subcellular location of this protein in cardiac myocytes.

Methods: All samples are from Wistar rats. RT-PCR was used to investigate gene expression of Pannexin 1 in liver, heart left ventricle and cultured heart myofibroblasts. Western blotting (WB) and immune-electron microscopy (EM) with 3 different antibodies against Pannexin 1 were used for protein expression. Samples were from left ventricle for EM and from left ventricle, cardiac myofibroblasts and isolated cardiac mitochondria for WB.

Results: Pannexin 1 was expressed in liver, heart and cardiac myofibroblasts. WB showed that Pannexin 1 was present in isolated cardiac mitochondria. Immune-electron microscopy confirmed mitochondrial location. Pannexin 1 did not seem associated with the cell membrane.

Conclusion: Pannexin 1 is expressed in the heart, and probably located to mitochondria and not the cell membrane under normal condition. These findings are important for the understanding of pannexin 1 function in the heart.

Abstractprisen til Sara R. Ulimoen

Calcium Channel Blockers Improve Exercise Capacity and Lower NT-proBNP Levels Compared to Beta Blockers in Patients with Permanent Atrial Fibrillation

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Objectives: The objectives of this study were to compare the effect of four different rate-reducing once daily (o.d.) pharmacologic treatments on the exercise capacity and NT-proBNP levels in patients with permanent atrial fibrillation (AF).

Methods: Sixty patients (mean age 71±9 years, 18 women) with permanent AF and normal left ventricular function were included in a cross-over, investigator-blind study. Diltiazem 360 mg, verapamil 240 mg, metoprolol 100 mg and carvedilol 25 mg were administered o.d. for three weeks, in a randomised sequence. Maximal exercise testing was performed on a bicycle ergometer at baseline (no treatment) and on the last day of each treatment period. Blood samples for NT-proBNP analyses were obtained at rest and at peak exercise.

Results: The exercise capacity (VO_2 peak) was significantly lower during treatment with metoprolol and carvedilol compared to baseline or treatment with diltiazem and verapamil ($p<0.001$ for all). Compared to baseline, treatment with diltiazem and verapamil significantly reduced the NT-proBNP levels both at rest and at peak exercise, whereas treatment with metoprolol and carvedilol increased the levels ($p< 0.05$ for all).

Conclusion: Rate reducing treatment with diltiazem and verapamil preserved exercise capacity and reduced levels of NT-proBNP compared to baseline whereas treatment with metoprolol and carvedilol had the opposite effect. Calcium channel blockers should hence be considered more often for rate control in AF patients without comorbidities that mandate the use of beta blockers.

Low Heart Rate Predict Incident Atrial Fibrillation in Healthy Middle-aged Men

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Background: Several studies have reported that elevated resting heart rate (HR) is an independent risk factor for cardiovascular morbidity and mortality. There is however, sparse evidence about resting and exercise HR as potential long-term predictors of incident atrial fibrillation (AF), and we aimed to study these aspects in men.

Methods/Results: A total of 2014 healthy Norwegian men aged 40-60 years participated in a prospective cardiovascular survey including a standardized bicycle exercise test in 1972-1975. During 35 years follow-up 270 men developed AF documented by scrutiny of health files in all Norwegian hospitals. Risk estimation was analyzed with Cox proportional hazard models.

Mean resting HR was 61 beats per minute (bpm). Low resting HR <50 bpm showed a tendency towards increased AF risk, but significant only in a subgroup of men with above median physical fitness and hypertensive blood pressure (BP) measurements at baseline. HR after the first 6 minutes exercise on workload 100W (HR100W) was the strongest predictor of AF in our total cohort. HR100W <100 bpm (n=257) compared with ≥100 bpm showed 1.40-fold increased AF risk. The characteristics of the men with HR 100W <100 bpm were lower resting HR, maximum HR and BP, and higher physical fitness and relative heart volumes. Adjustments for age, systolic BP, physical fitness, left ventricular hypertrophy, relative heart volume and heart rate reserve showed enhanced 1.55-fold AF risk (95% CI, 1.08-2.20) with further risk increase among the participants with hypertensive BP measurements at baseline.

Conclusions: This study is the first to show that low HR after 6 minutes exercise on a moderate workload is a long-term predictor of incident AF

in healthy middle-aged men. The present results might suggest an association in fit men between vagal predominance, higher stroke volumes and increased risk of future AF. Elevated baseline BP increases the risk substantially.

Response to cardiac resynchronization therapy in patients with moderate to severe heart failure is associated with segmental myocardial viability on dobutamine stress echocardiography

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Background: Cardiac resynchronization therapy (CRT) in patients with heart failure and conduction abnormalities improves mortality and morbidity, but response to this therapy has been as low as 30-60%. Thus, preoperative predictors of response to CRT have been much sought for. The aim of the present study was therefore to test to what extent echocardiographic indices of regional myocardial viability could predict patient response to CRT.

Methods: In all, 76 patients with moderate to severe CHF referred for evaluation of CRT were included after the following criteria: 1) New York Heart Association (NYHA) class ≥III,2) left ventricular ejection fraction (LV EF) ≤35%, 3) QRS width ≥120 ms, and 4) optimal medical treatment stable for ≥3 month before inclusion. All underwent dobutamine stress echocardiography (DSE) to evaluate myocardial viability.

Results: Patients had severely depressed LV function (mean±SD: EF 22±8%) and reduced functional capacity with peak VO2 11.0±2.4 ml/kg/min. All were optimally medically treated. After 12 months CRT treatment, there was a significant reduction in LV end-diastolic diameter (67 ± 13 mm versus BL: 76±11 mm, p< 0.05) and volume (208±118 mL vs 258±112 mL, p< 0.05), and improvement in EF% by 7 percent points (p<0.0001). Multivariate regression analysis revealed that viability in >6 myocardial segments on dobutamine stress echocardiography, was a significant positive predictor for response to CRT (p=0.03) together with interventricular motion delay (IVMD, p=0.03) and LV end-diastolic diameter (p=0.01).

Conclusions: Independent baseline predictors to response to CRT are more than 6 viable LV myocardial segments, LV end-diastolic diameter, and IVMD.

The inotropic effect of levosimendan can be fully accounted for by phospho-diesterase 3 inhibition in failing human heart

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Aims: Levosimendan is widely known and marketed as a calcium-sensitiser, although it is also known to inhibit phosphodiesterase (PDE) 3. We aimed to isolate each component and estimate their relative contribution to increased contractility.

Methods: Contractile force was measured in ventricular strips from explanted failing human hearts and normal rat hearts. PDE activity was measured in a two-step PDE-activity assay on failing human ventricle.

Results: Concentration-response curves of levosimendan on failing human ventricular strips, revealed a positive inotropic response with a maximum 10^{-5} M levosimendan. This effect was abolished in the presence of the PDE3 inhibitor, cilostamide. During pretreatment with a PDE4 inhibitior and a submaximal dose of isoproterenol, levosimendan generated an amplified inotropic response with a pEC_{50} of 7.3±0.08. This response was reversed by β-adrenoceptor blockade and was not detectable in strips pretreated with cilostamide. Levosimendan (10^{-6} M) increased the potency of β-adrenergic stimulation by -0.5 log units in failing human myocardium, but no potentiation beyond cilostamide alone. Every inotropic response from levosimendan was associated with a lusitropic response. Similar findings were obtained in rat ventricular myocardium. Levosimendan did not sensitise the myocardial strips to Ca^{2+} in the presence of increasing concentrations of Ca^{2+}. PDE activity assays confirmed that levosimendan inhibited PDE3 within the concentration ranges used clinically, and with similar efficiency as cilostamide.

Conclusion: Our results indicate that the inotropic effect of levosimendan can be fully accounted for by PDE3 inhibition.

Cardiovascular Risk of High- Versus Moderate-Intensity Aerobic Exercise in Coronary Heart Disease Patients

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Background: Exercise performed at higher relative intensities has been found to elicit greater increase in aerobic capacity and greater cardioprotective effects than exercise at moderate intensities. It has also been detected an inverse association between the relative intensity of physical activity and the risk of developing coronary heart disease, independent of the total volume of physical activity. Despite that higher levels of physical activity is effective in reducing cardiovascular events, it is also advocated that vigorous exercise could acutely and transiently increase the risk of sudden cardiac death and myocardial infarction in susceptible persons. This issue may affect cardiac rehabilitation.

Methods and results: We examined the risk of cardiovascular events during organized high-intensity interval exercise training and moderate-intensity training among 4846 CHD patients in three Norwegian cardiac rehabilitation centers. Of a total of 175 820 exercise training hours where all patient performed both types of training we found one fatal cardiac arrest during moderate-intensity exercise (129 456 exercise hours), and two non-fatal cardiac arrests during high-intensity interval exercise (46 364 exercise hours). There were no myocardial infarctions in the data material. As the number of high-intensity training hours was 36% of the number of moderate-intensity hours, the rates of complications to the number of patient-exercise hours were 1 per 129 456 of moderate-intensity exercise and 1 per 23 182 of high-intensity exercise .

Conclusions: The results of the current study indicate that the risk of a cardiovascular event is low after both high-intensity exercise and moderate-intensity exercise in a cardiovascular rehabilitation setting. Considering the significant cardiovascular adaptations associated with high-intensity exercise, such exercise should be considered among CHD patients.

Vigorous physical activity impairs myocardial function in patients with arrhythmogenic right ventricular cardiomyopathy and in mutation positive family members

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Objective: High level of physical activity is supposed to increase risk of ventricular arrhythmias in patients with arrhythmogenic right ventricular cardiomyopathy (ARVC). However, the impact of high physical activity level on myocardial function in patients with ARVC has not been fully investigated.

Methods: From the Nordic ARVC registry, 125 consecutive ARVC probands (n=74) and mutation-positive family members (n=51) were studied (age 42±16, 57% male). Patients with estimated activity level > 750 metabolic equivalents (METs) -min/week or > 4 hours vigorous activity/week were defined as athletes. Left ventricular ejection fraction (LVEF) and right ventricular fractional area change (RV FAC) were assessed by echocardiography.

Results: Of the 125 included, 42 (34%) fulfilled the definition of an athlete, 71 (57%) were non-athletes and in 12 (10%) (6 probands) athlete status could not be classified. The number of probands was higher among athletes (33/42, 79%) than in non-athletes (35/71, 49%, p<0.01). Athletes had reduced RV function by RV FAC compared to non-athletes (34±10% vs. 42±10%, p<0.01). RV function correlated with LVEF in athletes (R=0.52, p<0.01), but not in non-athletes (R=0.20, p=0.16). Exercise induced VT was more frequent in athletes (28/42, 67%) compared to non-athletes (13/71, 18%, p<0.001). LVEF was lower in athletes compared to non-athletes both among probands (48±11% vs. 55± 4%, p<0.01) and mutation-positive family members (56±2% vs. 58±3%, p=0.04). Heart rate at echocardiographic examination was not significantly lower in athletes vs. non-athletes, neither in probands (58±11 bpm vs. 61±11 bpm, p=0.46) nor in family members (65±13 bpm vs. 68±14 bpm, p=0.66). Four patients (all athletes, p=0.02) underwent heart transplantation.

Conclusion: ARVC registry patients with athletic activity showed reduced RV and LV function compared to non-athletes. LVEF was reduced

in athletes compared to non-athletes both in probands and in family members. These findings indicate that vigorous exercise is related to decreased LV and RV function in ARVC patients and also in mutation positive family members.

Echocardiographic Strain is better correlated to Exercise Capacity than Ejection Fraction

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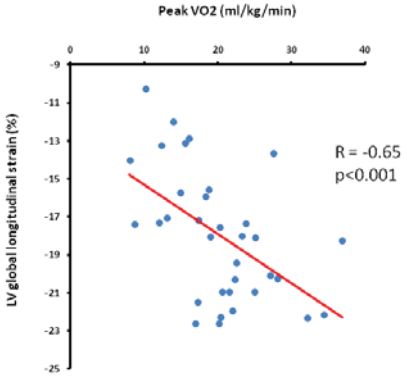
Background: Exercise capacity obtained by cardiopulmonary exercise testing is closely related to prognosis and mortality in both heart failure patients and the healthy population. Global longitudinal strain (GLS) is shown to be more accurate and sensitive than left ventricular (LV) ejection fraction (EF) for quantification and detection of myocardial function. We explored the relationship between exercise capacity and myocardial function by echocardiographic strain and EF. We hypothesized that strain can detect reduced myocardial function in patients with reduced exercise capacity better than LVEF.

Methods: Exercise capacity was measured as maximal oxygen uptake (peakVO2) by bicycle ergometer exercise testing. GLS was assessed by 2D speckle-tracking echocardiography in a 16 LV and 6 right ventricular (RV) segment model. LVEF was assessed by the Simpson biplane method.

Results: Patients (n=100) with suspected or verified cardiovascular disease (mean age 56±12 years, 26% females, NYHA class 2.3±1.1 and LVEF 42±19%) were included. In all patients LVEF, LV and RV GLS correlated to peakVO2 (R=0.64, -0.65 and -0.60, respectively, p <0.001 for all). Interestingly, in patients with preserved LVEF (≥55%, n=34), only LV and RV GLS correlated to peak VO2, (R=-0.52, p=0.002 and -0.44, p=0.01, respectively) while LVEF did not (R=0.23, p=0.19).

Conclusion: In the total study population myocardial function assessed by strain and EF were related to exercise capacity. Importantly, in patients with preserved LVEF only LV and RV strain correlated with exercise capacity while LVEF did not. Considering the strong relationship between exercise capacity and prognosis, myocardial strain analysis may help detect patients with poor prognosis, including those with only mildly decreased myocardial function.



Reduced systemic arterial compliance and stiffer proximal aorta in Juvenile Idiopathic Arthritis (JIA) patients compared with matched healthy controls - a pilot study

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Purpose: Systemic arterial properties in adult patients with JIA are not well described. The aim of this study was to evaluate arterial properties in young adults with JIA compared with age- and sex-matched controls.

Methods: Nineteen patients (37.7±3.4 years) were randomly selected from a cohort of 88 JIA-patients who were followed from their first referral to Oslo University Hospital in 1980 -85 and had active disease more than 14 years after disease onset. The patients were investigated after a mean disease duration of 29.2 ±1.3 years and compared with 19 age- and sex-matched controls. Aortic root pressure and flow data were obtained non-invasively by brachial arterial blood pressure, calibrated carotid arterial pulse trace and aortic annular Doppler flow recordings. The systemic arterial properties were described by the total arterial compliance (C), characteristic aortic impedance (Z_0), and peripheral arterial resistance (R) obtained from estimation of 3-element windkessel model (WK) parameters (C, Z_0, R), by Fourier analyses of central aortic pressure and flow data (Z_0).

Results (Table): The proximal aortic stiffness, evaluated by Z_0 was significantly higher in the JIA-patients compared to the healthy controls (p=0.016). The patients also had lower total arterial compliance (C) (p=0.022), but the arterial resistance (R) was not different (p= 0.564). The heart rate was higher in the patients than in the controls (p=0.043), but the blood pressure did not differ between the groups (p=0.443, p=0.535).

Conclusion: In spite of similar BMI, blood pressure and vascular resistance, JIA patients have stiffer proximal aorta and lower total arterial compliance than matched controls. This indicates that JIA-patients with long term active disease experience significant alteration of large systemic arterial properties.

Variables	JIA-patients Mean ± SD	Controls Mean ± SD	P-value (unpaired t-test)
BMI	25.7 ± 4.9	25.3 ± 4.0	0.785
Systolic blood pressure (mmHg)	117 ±15	114 ±11	0.443
Diastolic blood pressure (mmHg)	69 ± 9	68 ± 9	0.535
Heart rate (beats/s)	67 ± 11	60 ± 8	0.043
Cardiac output(l min -1)	5.3 ± 1.1	5.3 ± 0.9	0.982
R (mmHg/(ml/s))	1.04 ± 0.21	1.00 ± 0.23	0.564
Z_0 Windkessel Model (WK)(10ˆ-3 mmHg/ml/s)	77 ± 25	58 ± 20	0.016
C Pulse pressure method (PPM) (ml/mmHg)	1.21 ± 0.24	1.44 ± 0.34	0.022