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Jahrestagung der Österreichischen Kardiologischen Gesellschaft 28. bis 31. Mai 2008, Salzburg

Abstracts

(in alphabetischer Reihenfolge nach Erstautoren)

Chronic Heart Failure Leads to an Expanded Plasma Volume and Pseudoanemia, But Does Not Lead To a Reduction In The Body's Red Cell Mass 044

C. Adlbrecht, S. Kommata, M. Huelsmann, T. Szekeres, C. Bieglmayer, G. Strunk, G. Karanikas, R. Berger, D. Mörtl, K. Kletter, G. Maurer, I. M. Lang, R. Pacher
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Background Chronic heart failure (CHF) is frequently associated with a decreased hemoglobin level. Although in some patients renal anemia may develop, the mechanisms underlying the decrease in hemoglobin in isolated CHF remain largely unknown. We explored robust determinants of anemia including red cell mass as well as related markers and the plasma volume in patients with CHF without renal dysfunction based on non-cardiac reasons.

Methods One-hundred consecutive CHF patients were enrolled. The total red cell volume (RCV) was determined by a 51Cr assay. Furthermore, serum ferritin, erythropoietin, hepcidin, and renal function parameters were assessed. The influence of each factor on hemoglobin concentrations was determined in a multiple regression model.

Results Mean hemoglobin concentrations were slightly lower in patients with CHF (13.7 ± 1.6 mg/dL) compared to a healthy control group (14.6 ± 1.3 mg/dL). However, the RCV was not reduced in CHF patients (CHF with decreased hemoglobin: 1718.8 ± 569.3 mL, CHF with normal hemoglobin: 1828.4 ± 641.3 mL, healthy controls: 1634.4 ± 470.8 mL), and there was no severe deficiency of iron or erythropoietin detectable in CHF patients. We found that plasma volume levels were significantly higher in patients with CHF compared to healthy individuals, suggesting the presence of pseudoanemia ($p < 0.001$). Correspondingly, the plasma volume was the best predictor of hemoglobin concentrations in the regression model applied ($B = –0.483$; $p < 0.0001$).

Conclusion Hemodilution leading to pseudoanemia is the key determinant influencing hemoglobin levels in isolated CHF. The observation that the RCV is normal in isolated CHF and there is no iron- or erythropoietin deficiency is an argument against supplementation therapy in this group of patients.

Incidence and Prognostic Impact of Coronary Flow Restoration After Guidewire Insertion Before Balloon Inflation in ST-Elevation Myocardial Infarction 084

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Background and Objective ST-elevation myocardial infarction (STEMI) is characterized by an acute thrombotic obstruction of the coronary artery. Recent randomized clinical trials evaluating thrombectomy have yielded conflicting results. Patient inclusion and randomization in these trials was performed after the initial angiogram, but importantly, before guidewire insertion. We hypothesized that guidewire insertion alone, prior to balloon inflation or thrombectomy, may lead to flow restoration in the infarct related coronary artery (IRA), and that this phenomenon influences mortality. This may represent an important confounder in thrombectomy trials.

Methods Angiograms of 1012 consecutive STEMI patients between January 2003 and December 2005 were evaluated and TIMI flow was graded at the time of the initial angiogram and after guidewire insertion. The incidence of coronary flow restoration after sole guidewire insertion was assessed and patient baseline characteristics were collected by chart review. Subsequently, death and death dates of all patients with an initial TIMI 0 flow were assessed.

Results An initial TIMI 0 was present in 476 (47.0 %) individuals. Of these, full angiographic data were available of 403 (84.7 %) patients. Coronary flow restoration immediately after guidewire insertion occurred in 150/403 (37.2 %) patients with an initial TIMI 0. Kaplan Meyer analysis revealed improved survival in patients with flow restoration after guidewire insertion ($p = 0.17$). Furthermore, in a Cox regression model, flow restoration after guidewire insertion had significant impact on mortality ($p = 0.041$). Finally, revascularization guidewire insertion was more likely in the right coronary artery (HR = 2.291, CI = 1.387–3.786; $p = 0.005$).

Discussion Coronary flow restoration following guidewire insertion is a frequent event in emergency STEMI percutaneous coronary intervention and significantly influences long-term clinical outcome. Thus the exact time point of randomization in thrombectomy studies appears to be more important than previously expected.

Prognosis of Acute Coronary Syndrome at High versus Low Altitude Yemeni Patients 001

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Background A cohort study design was employed for this study, aimed at evaluating the prognosis of acute coronary syndrome (ACS) among Yemeni patients at high and low altitudes.

Methods 157 ACS patients from high and low altitudes were evaluated from admission to CCU up to 12 months. We evaluated the possible effect of altitude on the rate of the prevalence of ACS risk factors, in-hospital complications and one year treatment and outcome of ACS.

Results The mean age of ACS patients at low altitude region was higher (58.2 ± 6.8 years vs 55.5 ± 8.8 years; $p = 0.042$). The mean heart rate (HR) was higher for altitude patients (94.4 ± 19.3 beat/min vs 83.7 ± 17.1 beat/min; $p < 0.001$). High altitude patients were seen to have higher mean of CK-MB, WBC, total cholesterol, LDL-C and TG than low altitude patients. The prevalence of past history

of hyperlipedaemia among ACS patients was higher for high altitude patients (56.4 % and 39.7 %; CI = 1.02–3.75; p = 0.040). Betablocker use was higher for low altitude patients (49.2 % vs 31.9 %; CI = 0.251–0.934; p = 0.02). Streptokinase, diuretics, ACE-I and statins were prescribed more frequently for high altitude patients, while heparin was prescribed more frequently to low altitude patients. The hospital and one year mortality rates were slightly higher among high altitude patients.

Conclusion Acute coronary syndrome occurs at a younger age at high altitude residence. During hospitalization, after 6 months and 1 year follows up, HR, SBP, DBP, incidence of HF and reduced LVEF were higher for high altitude patients. High altitude ACS patients also have more prevalent cardiovascular risk factors. They also demonstrated more severe complications and more adverse clinical outcome. These findings suggest that high altitude itself should be considered as an independent risk factor for ACS.

Prognostic Significance of Body Mass Index and Body Fatness in Women Undergoing Coronary Angiography 107

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Purpose We sought to evaluate the prognostic significance of simple measures of obesity (body mass index – BMI and body fatness – BF) in elderly women with known coronary anatomy. Former studies showed contradictory results concerning the relation between obesity, and total and cardiovascular mortality in coronary artery disease (CAD) patients.

Methods In 393 women undergoing coronary angiography for suspected CAD, BMI was calculated using standard formula, BF measured using bioelectrical impedance analysis.

Results Mean age was 67.2 ± 10.1 years, 20.4 % had diabetes, 75.1 % arterial hypertension, 56 % CAD and 22.6 % impaired systolic function. Mean BMI was 28.1 ± 4.7 kg/m^2, mean BF 39.0 ± 6.2 %. During a mean follow-up of 44.4 months, 46 patients died (24 from cardiovascular causes). We observed a tight correlation between BMI and BF ($r = 86$; $p < 0.0001$). BF by tertile (T) was: T1 < 37 %, T2 37–41.9 % and T3 ≥ 42 %. The unadjusted incidence of all-cause and cardiovascular mortality demonstrated an U-shaped relationship to BF, with the lowest risk for all-cause mortality (unadjusted hazard ratios: T1 3.9 [CI 1.6–6.7], T2 reference, T3 2.4 [CI 0.96–5.1]) and cardiovascular mortality (unadjusted hazard ratios: T1 13.1 [CI 1.9–14.6], T2 reference, T3 7.9 [CI 1.3–15.2]) in T2. In multivariable analysis, including age, extent of CAD, left ventricular function, diabetes and presence of malignancy as covariates, results were substantially unchanged. In contrast, we found no significant relationship between BMI and all-cause or cardiovascular mortality.

Conclusions In our cohort, BF analysis was a better prognostic marker than BMI. Our results come up to controversial findings that a mildly elevated BF is linked to better survival and fewer cardiovascular events in patients with CAD.

Reference Values of NT-proBNP are Elevated in Healthy Pregnancies 074

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Objective Serum concentration of Amino-terminal pro-B-type Natriuretic Peptide (NT-proBNP) may be used to monitor cardiac function during pregnancy. We investigated NT-proBNP in normotensive healthy pregnancies to determine normal reference values.

Methods Serum NT-proBNP were measured in 110 normotensive, healthy pregnant women between 18 and 45 years every 5 weeks beginning from 12th gestational week (GW) in a longitudinal study and compared to a non pregnant control group of 521 women between 18 and 45 years.

Results Serum NT-proBNP (± SEM) was significantly higher in pregnant women compared with non pregnant women (71.61 [± 2.79] pg/ml vs 48.37 [± 1.44] pg/ml [$p < 0.001$]). NT-proBNP increased during pregnancy to 95.76 (± 7.42) pg/ml in the 11+6 to 13+6 GW. However, NT-proBNP levels in the 33+0–37+6 GW were comparable to not pregnant levels, but increased again to 70.46 (± 7.2) pg/ml close to term.

Conclusion NT-proBNP is significantly higher in healthy pregnancies than in non-pregnant women. An upper cut-off value of 220 pg/ml may be used for normal NT-proBNP levels during 11+6 to 22+6 GW.

Erste Erfahrungen mit einem MR-tauglichen Herzschrittmacher: Medtronic ENRHYTHM MRI 048

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Das Enrythm MRI-System besteht aus dem MR-tauglichen Schrittmacher Medtronic ENRHYTHM MRI mit speziellen Programmiermöglichkeiten und MR-tauglichen Sonden Capsurefix MRI 5086. An der Universitätsklinik für Chirurgie Graz wurden im Zeitraum 8/2007–2/2008 10 Patienten mit diesem System versorgt (5 Männer, 5 Frauen, mittleres Alter 46 Jahre). Indikation zur Schrittmachertherapie war SSS bei 4 und AV-Block bei 6 Patienten. Bislang wurden 3 Patienten im MR mittels standardisiertem MR des Schädels und der WS untersucht. Während der MR-Untersuchung wurde der Schrittmacher in AOO bei 2 Patienten und ODO bei einem Patienten programmiert.

Ergebnisse Während der MR-Untersuchung kam es zu keiner Störung der Schrittmacherfunktion, die Reizschwellen waren unverändert. Lediglich das EKG zeigte auffällige Veränderungen, sodass bei einer MR-Untersuchung unbedingt eine simultane Pulsoxymetrie notwendig ist.

Prevention, Physical Exercise 013

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The Women's Health Centre for Tyrol focuses on cardiac prevention. Numerous information events and diagnosis campaigns are offered, where heart risk profiles are drawn up. In self-assessment by our patients, on average 90 % reply that they get ample physical exercise, even though we on average do not believe it.

Our out-patient clinic for Turkish women shows that physical exercise entails special problems. This fact is known in this group and from the literature, and the patients also admit it. At 2 prevention campaigns in 2000 and 2001 we surveyed 1,536 women. Physical exercise at least three times a week for thirty minutes received a positive reply from only 1/4 (403; 26.2 %) of the women, while 3/4 (1,126; 73.3 %) denied it and 7 (0.5 %) gave no answer. Since compliance is particularly questionable in this area, we decided to make an initiative through the Turkish women's out-patient clinic. First was a "Walk" campaign. Once a week a one-hour accompanied walk through town was made, starting from the hospital. The women were examined before and after the program for heart risk factors, and incentives were offered for them get more exercise in the hope that networks for group walking would develop. Thereafter, an "Exercise Group" was started with healthy Turkish women who promised to exercise at the hospital for one hour once a week and to also do exercises at home.

Compliance is very good with regard to attendance, which is certainly due in part to the excellent networking that already exists in this ethnic group.

Possible Interaction Between Gender and Cardiovascular Risk Factors in First-Second-Generation Turkish Migrant Women 014

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In the third year of a CVD prevention program aimed at both second- and first-generation Turkish migrant women in rural Austria 910 participants completed a questionnaire on self-assessed CVD risk factors. Second generation was defined as having gone to school in Austria. More than half of the participants (477) were young adult women between 20 und 40 years of age. As expected, results varied widely between first and second generation.

The greatest differences were found in gender- and lifestyle-related risk factors. BMI > 30 (first 26.3 %/second 6.2 %), exercise 3 times a week (36.3 %/71.3 %) and healthy diet (61.7 %/83.6 %) showed significantly better results among second-generation women. Smoking (16.7 %/38.5 %) showed significantly worse results in second-generation women.

Having fewer language barriers, twice as many second- as first-generation migrants consume German-language media.

Even though fewer language barriers led better awareness of health risk factors to be expected in second-generation migrants, they were less informed about their clinically measured risk factors like blood pressure, cholesterol and blood glucose levels than was the first migrant generation in the same age group. Thus, culturally coded gender expectations might be a stronger impetus for health behavior than health information for second-generation migrant women.

Healthcare providers should strengthen positive health behavior of the culture of origin and the host culture to support good CVD health of women whose gender roles are in transition.

Primary Prevention of Coronary Heart Disease in Women 015

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Heart death is the number-one killer of women in Austria. The Women's Health Office thus offered check-ups specially for women outside the hospital and doctor's office, namely as stop-ins.

We offered health information material specifically for women and a 30-min check-up covering blood pressure, BMI, cholesterol, blood glucose and a doctor's consultation. For further treatment the women were referred to their primary-care physician.

In 2003, 304 women (average age 53.3 years ± 16.7 years) participated. A standardized questionnaire evaluated cardiac risk. Of the respondents 118 (38.8 %) reported a family history of risk, 234 (79.9 %) sports (minimum three times per week). 274 (90.1 %) reported a healthy diet including fiber, and 43 (14.1 %) smoked. The check-up also included a questionnaire for self-evaluation of health: 24 (6.6 %) reported not so good and only 4 (1.1 %) poor health; 57 (16.0 %) reported pre-existing cardiocirculatory disorders. An out-patient women's health clinic was requested by 238 (78.3 %) women; 285 (93.8 %) wanted more health information specifically for women.

Values measured: total cholesterol > 200 in 171 (56.3 %) women, blood glucose > 126 in 47 (15.5 %), blood pressure > 160/90 in 56 (18.4 %), BMI > 30 in 33 (10.9 %).

Ultimately, the great discrepancy between the risk profile given by the respondents and the measured values is not surprising. This shows there is a huge need for information, as reflected in the wish for an out-patient women's health clinic providing more specific health information. Despite Austria's free access to medical care for everyone, there remains a need for low-threshold health information specifically for women.

The Metabolic Syndrome, Angiographically Determined Stable Coronary Artery Disease, and Subclinical Inflammation 030

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Background The metabolic syndrome (MetS) and stable coronary artery disease (CAD) frequently coincide; the individual contributions of these entities to subclinical inflammation have not been investigated yet.

Objective We therefore aimed at investing markers of inflammation in patients with the MetS, in patients with CAD, and in patients who had both, the MetS and CAD.

Methods We enrolled 935 consecutive patients undergoing coronary angiography for the evaluation of suspected or established stable CAD. The MetS was defined according to National Cholesterol Education Programme Adult Treatment Panel III criteria; coronary stenoses with lumen narrowing ≥ 50 % were considered significant.

Results From our patients 520 (55.6 %) had significant coronary stenoses; the prevalence of the MetS was higher in our patients with significant stenoses than in those without such lesions (39.0 % vs 32.8 %; p = 0.048). The inflammatory markers hsCRP and white blood cell count (WBC) were significantly higher in MetS patients than in those without the MetS both among patients with significant coronary stenoses (0.49 ± 0.71 vs 0.42 ± 0.88 mg/dl; p = 0.004 and 7.0 ± 1.8 vs 6.5 ± 1.8 G/l; p = 0.003, respectively) and in subjects who did not have such lesions (0.44 ± 0.51 vs 0.37 ± 0.54 mg/dl; p = 0.004 and 7.1 ± 1.8 vs 6.4 ± 1.8 G/l; p < 0.001, respectively). In contrast, these inflammatory markers were not significantly elevated in patients with significant stenoses among subjects with the MetS (p = 0.776 and p = 0.713, respectively) nor among those who did not have the MetS (p = 0.882 and p = 0.119, respectively). Similar results were obtained with the International Diabetes Federation definition of the MetS.

Conclusions We conclude that subclinical inflammation is strongly and significantly associated with the MetS but not with angiographically determined stable CAD.

BNP in Low-Flow, Low-Gradient Aortic Stenosis is Strongly Related to Functional Capacity. Results from the Multicenter TOPAS Study 080

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Background We have previously reported that plasma levels of BNP (B-type natriuretic peptide) are a strong predictor of outcome in low-flow low-gradient aortic stenosis (AS). More recently, we found impaired functional capacity in the six-minute walk test to be associated with poor outcome in this challenging subset of patients. The objective of the present study was to evaluate the relationship between BNP and parameters of functional capacity in low flow AS.

Methods BNP measurements and dobutamine stress echocardiography (DSE) were performed in 71 pts with low-flow AS (effective orifice area [EOA] ≤ 1.2 cm^2, indexed EOA ≤ 0.6 cm^2/m^2, mean gradient ≤ 40 mmHg, LVEF ≤ 40 %). Functional capacity was assessed using the Duke Activity Status Index (DASI) and six minute walk test (6MWT) was performed in a subset of 54 pts.

Results Median BNP was 545 (inter-quartile range: 276 to 982) pg/ml. Mean DASI was 26 ± 14 and mean 6MWT distance was 316 ± 122 m. Log BNP was significantly related to DASI (r = –0.31; p < 0.01) and 6MWT distance (r = –0.56; p < 0.0001; **Figure 1**), as

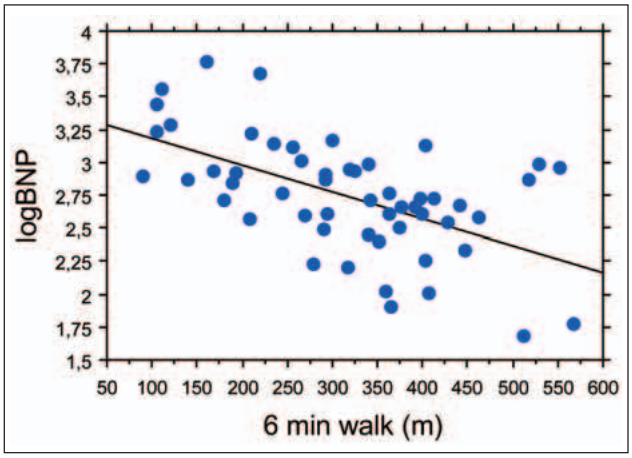

Figure 1: J. Bergler-Klein et al.

well as to maximal oxygen consumption derived from the DASI (r = 0.27; p = 0.02).

Conclusion BNP is strongly related to parameters of functional capacity, in particular six minute walk test distance. These data support that BNP may improve operative risk stratification and clinical decision making in low-flow AS.

N-terminal pro B-type Natriuretic Peptide and Speckle Tracking Derived Systolic Strain Predict Early Left Ventricular Deterioration in Severe Asymptomatic Aortic Stenosis: Pilot Study 081

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Introduction Natriuretic peptides predict outcome in asymptomatic aortic stenosis (AS). Speckle tracking derived systolic strain has been shown to predict early deterioration of left ventricular function. BNP has been shown to relate to longitudinal strain in symptomatic patients with AS, but this has not been studied in asymptomatic severe AS. The purpose of this study was therefore to evaluate the relationship of longitudinal systolic strain with NT-proBNP in pts with AS and whether it may have a potential for timing of surgery.

Methods Echocardiographic evaluation of left ventricular function by speckle tracking (GE Vingmed) was performed in 17 consecutive pts with severe asymptomatic aortic stenosis (age 72 ± 11 yrs, female 7 pts, mean gradient MG 72 ± 25 mmHg, valve area AVA 0.63–0.15 cm^2) and plasma NT-proBNP was determined (Roche, Elecsys).

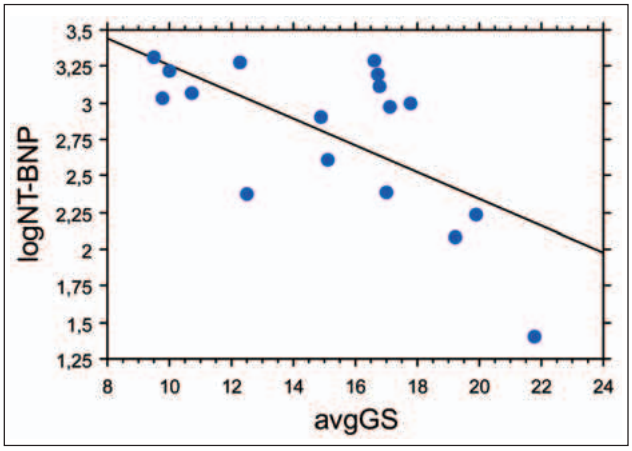

Figure 2: J. Bergler-Klein et al.

Results Left ventricular function by standard echocardiographic criteria was normal in 16 pts and borderline in 1 patient with asymptomatic AS. Mean NT-proBNP was 972 ± 690 pg/ml. Longitudinal systolic strain (avgGS) was reduced in 14 of 17 pts, and was inversely related to NT-proBNP (r = –0.64; p < 0.01).

Conclusion Elevated NT-proBNP is related to reduced peak systolic strain even in pts with asymptomatic severe AS and maintained left ventricular systolic function. Together, natriuretic peptides assessed by a simple blood test, and systolic strain, easily determined by speckle tracking in routine echocardiography, may help to identify patients developing left ventricular dysfunction who might benefit from early surgery (**Figure 2**).

Rolle des Transkriptionsfaktors GATA4 für die IGF-1 induzierte physiologische kardiale Hypertrophie 077

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GATA4 ist ein essentieller Transkriptionsfaktor in pathologischen Hypertrophiemodellen, die langfristig in eine Herzinsuffizienz übergehen. Im Gegensatz dazu induziert Insulin like growth factor 1 (IGF-1) eine physiologische Hypertrophie ohne pathologische Konsequenzen und kann in Herzinsuffizienzmodellen therapeutische Effekte entfalten. Das Zusammenspiel von IGF-1 und GATA4 ist unbekannt und wurde von uns daher in vitro und in vivo untersucht.

Methoden und Ergebnisse In neonatalen Kardiomyozyten der Ratte wurden die Effekte von IGF-1 (10 nmol/L) mit denen von Phenylephrin (PE, 20 µmol/L), einem bekannten GATA4-Stimulator, verglichen. Beide Substanzen führten zu einer vergleichbaren Zunahme von Zellgröße und Proteinsyntheserate (Leucin-Inkorporation). Parallel nahm sowohl unter PE (176 ± 18 %) als auch unter IGF-1 (165 ± 18 %, beide p < 0,05) die Bindungsaktivität von GATA4 (ELISA-Technik) zu. Zudem führten beide Agonisten zu einer gesteigerten Phosphorylierung von GATA4 an Serin 105 (PE 2,4-fach, IGF-1 1,8-fach; p < 0,05). IGF-1 aktivierte darüber hinaus die Kinasen AKT (3,4-facher Anstieg an Phospho-Serin 473; p < 0,05) und GSK3beta (1,5-facher Anstieg an Posphor-Serin 9; p < 0,05), was eine nukleäre Anreicherung von GATA4 bewirkte (Quotient von nukl. zu zytoplasmatischem GATA4 3-fach gesteigert; p > 0,05). Die Expression GATA4-abhängiger Gene (BNP, ANF, Troponin I, skel. Actin, gemessen via Realtime-PCR) wurde durch PE stark stimuliert, wohingegen IGF-1 nur schwache Effekte zeigte. Ein adenoviral vermittelter Knockdown von GATA4 (siRNA) blockierte die PE-vermittelten Effekte auf Zellgröße, Proteinsynthese und Genexpression. Im Falle von IGF-1 hingegen zeigte es außer auf die Genexpression keine blockierenden Effekte.

Mäuse mit einer kardiospezifischen Überexpression des IGF-Rezeptors (IGFR, n = 8) wiesen eine Hypertrophie mit hyperkontraktiler Funktion und Absenz histopathologischer Merkmale auf. Eine Kreuzung dieser Mäuse mit heterozygoten GATA4-Knockout-Mäusen (n = 9) zeigte keinerlei Beeinflussung dieses Phänotyps.

Schlussfolgerung GATA4 ist Teil des IGF-1-Signalweges, jedoch zur Induktion der Hauptmerkmale einer physiologischen Hypertrophie kein notwendiger Faktor.

Quantitative Evaluation of the Changes in Myocardial Perfusion in the Targeted Area After Combined Cardiac Delivery of Autologous Stem Cells – Subanalysis of the MYSTAR-Study 095

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Background The aim of this substudy of the MYSTAR (Myocardial Stem Cell Administration After Acute Myocardial Infarction) randomized trial was to analyze changes in myocardial perfusion in NOGA-defined regions with intramyocardial injections of autologous stem cells using an elaborated transformation algorithm.

Methods and Results In 31 patients after acute myocardial infarction (AMI) with reopened infarct-related artery unselected autologous bone marrow derived stem cells were injected percutanously using the NOGA-Myostar catheter mapping system. The injected area (region of interest, ROI) was delineated as a best polygon by connecting the injection points marked on NOGA polar maps. The ROI was projected onto the baseline and follow-up rest maps of the 99m-Tc-tetrofosmin single-photon emission computed tomography scintigraphy calculating the extent and severity (expressed as the mean normalized tracer uptake) of the ROI automatically. The patients were divided into three groups according to the NOGA determined mean unipolar voltage values of the ROI. In patients with a moderate impairment in the myocardial viability (mean unipolar voltage value in the treated area between 7 and 14 mV) the normalized mean activity in scintigraphy increased significantly (from 60.07 ± 1.68 to 67.07 ± 9.62; $p < 0.05$ 3 months after the stem cell injections). There was a trend to increase in the normalized mean activity of the injected area in patients with a normal unipolar voltage (from 66.80 ± 23.78 to 75.93 ± 17.56; $p = 0.26$) and no change in those with severely impaired myocardial viability in the treated area (from 54.11 ± 15.13 to 54.6 ± 12.86; $p = 0.81$).

Conclusions Projection of the NOGA-guided injection area onto the single-photon emission computed tomography polar maps permits quantitative evaluation of myocardial perfusion in the targeted area. On the basis of our results only myocardial areas showing moderate viability in the NOGA unipolar voltage map should be treated with intramyocardial stem cell therapy.

Unique Course of An Ischaemic Ventricular Septal Defect 038

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Background Though the establishment of early reperfusion therapy has decreased the incidence of ischaemic VSD in acute myocardial infarction to less than 1 %, the mortality in this complication is still excessive high. A spontaneous closure of an acquired VSD is very rare and was reported just in a few cases.

Case report A 56 year old male patient was admitted with angina pectoris over 30 hours.

The ECG showed typical signs of a subacute anterior myocardial infarction with a highest CK of 2060 IU/L (MB-fraction 13 %). Transthoracic echocardiography revealed a large akinesia involving the anterior wall, the apex, the apical septum und the apical inferior wall with mildly reduced systolic function of the left ventricle.

The coronary angiogram showed an occluded mid-LAD, a chronic occluded mid-RCA and a 90 % stenosis of the lower marginal branch of the dominant CX.

The condition of the haemodynamically stable patient improved soon, though the heavily calcified LAD could not be recanalized. 14 days later the patient suffered from atypical chest pain again.

A harsh holosystolic murmur was now heard with p. m. at Erb.

The TTE demonstrated a new small VSD in the apical septal region, which enlarged even during the echocardiographic investigation. The patient deteriorated haemodynamically slowly. The now two centimetres sized VSD was closed with a polyester patch in combination with a single venous graft to the CX.

Two weeks later a small rerupture of the ventricular septum at the edges of the patch could be found in TTE.

During close follow-up the VSD slowly increased in size with further enlargement of the right ventricle and further impairment of LVEF.

Four months later the septal rerupture showed surprisingly a spontaneous closure and has remained sealed during further follow-up for more than 1.5 years.

The patient is well and achieves about 70 % of predicted workload in exercise test.

Conclusion To our knowledge the first case of spontaneous closure of a post surgery reruptured ischaemic VSD is reported.

Epidemiologie des kardiogenen Schocks in Österreich: Das Österreichische Schockregister 085

M. Vafaie, I. Pretsch, A. Geppert, B. Fellner, H. Weber, P. Lechleitner, W. Grander, P. Siostrzonek, J. Reisinger, T. Publig, G. Heinz, G. Delle Karth für die Arbeitsgruppe Kardiovaskuläre Intensiv- und Notfallmedizin der Österreichischen Kardiologischen Gesellschaft
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Hintergrund Mit Spitalsmortalitätsraten um die 50 % ist der kardiogene Schock (KS) immer noch mit einer sehr schlechten Prognose assoziiert. Die häufigste Ursache des KS ist das akute Koronarsyndrom (ACS) und im besonderen der ST-Elevations-Myokardinfarkt (STEMI). Die Datenlage zum KS in Österreich ist spärlich. Ziel dieses Registers war es, epidemiologische Daten zum KS in Österreich zu erfassen.

Methoden Zwischen Juli 2004 und Juni 2006 wurden 179 Patienten (Pat.) mit KS in 19 Zentren erfasst und mittels Datenblatt dokumentiert. Einschlusskriterien waren ein systolischer arterieller Blutdruck < 90 mmHg oder die Notwendigkeit von Vasopressoren, klinische Zeichen der Organ-Minderperfusion und Zeichen für ein erhöhtes intravasales Volumen. Patienten nach OP, mit Sepsis oder Blutung wurden ausgeschlossen.

Vorläufige Ergebnisse 64,2 % der registrierten Pat. waren männlich. Das mittlere Alter betrug 66,5 ± 13 Jahre, der Aufnahme-SAPS-II-Score lag bei 45 ± 26. Die häufigste Ursache für den KS war mit 46 % ein STEMI, gefolgt von einer dekompensierten Herzinsuffizienz unterschiedlicher Genese mit 42 %. 19 % der Pat. entwickelten einen KS im Rahmen eines NSTEMI. Zur initialen Kreislaufstabilisierung wurde in 68 % der Pat. Noradrenalin, in 42 % Dobutamin und in 30 % bzw. 10 % Suprarenin und/oder Dopamin eingesetzt. Interessanterweise wurde auch bei 24 % der Pat. Levosimendan verwendet. 39 % der Pat. (50 % der Pat. mit ACS) erhielten innerhalb von 24 Stunden nach Schockbeginn eine intraaortale Ballonpumpe (IABP), 65 % der Pat. wurden maschinell beatmet. Bei 64 % der Pat. (bei 79 % der Pat. mit ACS) wurde eine Herzkatheteruntersuchung durchgeführt. Die Hospitalsletalität betrug 59 %.

Zusammenfassung Unsere Daten weisen darauf hin, dass der KS wie andere kardiovaskuläre Erkrankungen mehr Männer als Frauen betrifft. Bei einem Durchschnittsalter von 66,5 Jahren scheint es sich nicht primär um eine Erkrankung der sehr alten Menschen zu handeln. Besonders unter diesem Blickwinkel ist die Spitalssterblichkeit mit knapp 60 % sehr hoch.

Valvular Calcification in Asymptomatic Aortic Stenosis: Prognostic and Therapeutic Implications 005

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Aims The prospective, randomized, placebo-controlled Tyrolean Aortic Stenosis Study (TASS) sought to characterize the natural history, risk factors and their possible modulation by new-onset atorvastatin treatment (20 mg daily versus placebo) in patients with asymptomatic calcified aortic stenosis.

Methods and Results 47 patients without previous lipid-lowering therapy or an indication for it according to guidelines at study entry were randomized to atorvastatin treatment or placebo and prospectively followed for a mean study period of 2.3 (± 1.2) years. Patient prognosis was worse than expected, as 23 (48 %) suffered from a major adverse clinical event (new onset of symptoms followed by aortic valve replacement in most cases). Mean systolic pressure gradient and an increased NT-proBNP plasma level allowed prediction of clinical outcome, which was not influenced by concomitant coronary calcification, age or initiation of atorva-

statin treatment. Independent risk factors, however, turned out to be aortic valvular calcification (AVC), as assessed by multidetector computed tomography (MDCT), and plasma levels of C-reactive protein. As shown in a subgroup of 35 patients (19 randomly assigned to atorvastatin and 16 to placebo), annular progression in AVC was similar in both treatment groups. Within 24 months, AVC raised from 2197 (± 1178) arbitrary units (AU) to 2749 (± 1376) AU in the placebo group, and from 2421 (± 1326) AU to 2979 (± 1228) AU in the atorvastatin group.

Conclusion Precise risk factor stratification of calcified aortic stenosis should include quantification of valvular calcification by MDCT and measurement of plasma C-reactive protein. This study supports the concept that the natural history in these patients is worse than previously considered. New-onset standard-dosed lipid-lowering therapy with atorvastatin could not halt progression of valvular calcification, the strongest risk factor for adverse clinical outcome in multivariate regression analysis.

Local Complement Activation Triggers Leukocyte Recruitment to the Site of Thrombus Formation in Acute Myocardial Infarction 035

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Atherosclerotic plaque rupture with subsequent mural thrombus formation is considered the main event compromising epicardial flow in acute myocardial infarction (AMI). The precise mechanisms underlying acute coronary occlusion are unknown. To search for soluble factors enriched at the culprit lesion site we compared the proteomic profiles of systemic plasma and plasma derived from fresh coronary thrombus aspirates of 34 patients (male 71 %, age 57 ± 10 years) with ST-elevation myocardial infarction. Two-dimensional gel electrophoresis and ELISA indicated a local activation of the complement system, with a selective accumulation of the complement activator C-reactive protein (CRP) and the downstream effector products C3a and C5a. CRP in coronary thrombus colocalized with C1q and C3 immunoreactivities, suggesting classical complement activation. In vitro, culprit site derived plasma enhanced leukocyte chemotaxis in a C3 dependent manner. We conclude that localized complement activation at the site of coronary thrombosis plays a key role in leukocyte recruitment, and contributes to vessel occlusion in AMI.

Lipid Predictors of Cardiovascular Events in Statin-Treated Coronary Patients With Type 2 Diabetes 032

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Background Vascular risk in diabetic patients remains high despite statin treatment.

Objective We aimed at identifying which lipid parameters drive vascular risk in this important patient population despite statin treatment.

Methods We recorded vascular events over 5.6 years in 491 consecutive statin-treated patients with angiographically proven stable CAD, covering 2750 patient-years.

Results From our patients 116 (23.6 %) had type 2 diabetes (T2DM). In the total cohort, low HDL cholesterol (standardized adjusted hazard ratio [HR] 0.73 [0.60–0.89]; p = 0.001), low apolipoprotein A1 HR 0.77 [0.65–0.92]; p = 0.003) a small LDL particle diameter (0.76 [0.64–0.91]; p = 0.002), and high triglycerides (1.20 [1.05–1.38]; p = 0.007) significantly predicted vascular events, but not total cholesterol (p = 0.995), LDL cholesterol (p = 0.961), or apolipoprotein B (p = 0.077). Patients with T2DM were at a significantly higher vascular risk than non-diabetic subjects (38.6 % vs 24.1 %; p < 0.001). Importantly, like in the total population, low HDL cholesterol (HR = 0.58 [0.41–0.82]; p = 0.002), low apolipoprotein A1 (HR = 0.70 [0.51–0.95]; p = 0.022), a small LDL particle diameter (0.67 [0.50–0.91]; p = 0.010), and high triglycerides (1.30 [1.11–1.53]; p = 0.001) drove vascular risk in our statin treated coronary patients with T2DM, whereas total cholesterol (p = 0.822), LDL cholesterol (p = 0.235), and apolipoprotein B (p = 0.366) did not.

Conclusions The pattern of low HDL cholesterol, low apolipoprotein A1, small LDL particles, and high triglycerides is the main lipid risk factor in statin treated coronary patients with T2DM.

Coronary Artery Bypass and Surgical Left Ventricular Remodelling for Heart Failure in Patients with Ischemic Cardiomyopathy: Mid-Term Follow-up 066

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Background and Aim Optimal treatment strategies for patients with ischemic cardiomyopathy remain controversial. We assessed the early and mid-term outcomes after surgical revascularisation alone vs. left ventricular (LV) remodelling combined with revascularisation in these patients.

Methods Between 2000 and 2002, 285 consecutive patients with ischemic cardiomyopathy were surgically treated with coronary artery bypass grafting alone (group A, n = 165) or open LV remodelling (apex resection and pericardial patch reconstruction) in addition to revascularisation (group B, n = 120). Preoperatively, the New York Heart Association (NYHA) Class, left ventricular ejection fraction and end-diastolic diameter were comparable (group A 3.2 ± 0.6, 37.7 ± 11.2 % and 59.1 ± 7.3 mm versus group B 3.1 ± 0.6, 40.9 ± 12.1 % and 57.8 ± 8.6). Early and mid-term outcomes, hemodynamic performance and quality of life were evaluated during a mean follow-up period of 70 months.

Results Operative mortality was significantly lower in group B (7.5 %) compared to group A (12.8 %). Group B patients had significantly longer ventilation times, higher blood loss and need for blood transfusion. At last follow-up, survival was 74.3 ± 8.1 % in group A vs 84.2 ± 5.4 % in group B (p < 0.05). Follow-up examinations revealed greater reduction of functional class in group B with mean 2.03 ± 0.8 vs 1.7 ± 0.7 in group A (p < 0.05). Both LV ejection fraction and end-diastolic diameter improved significantly more in group B compared to group A.

Conclusions Patients with ischemic cardiomyopathy, in which surgical ventricular remodelling was performed, demonstrated longer ventilation times and higher postoperative blood loss, but superior early and mid-term outcomes regarding survival, functional class and quality of life.

Hemodynamic Effects of Left Ventricular Pacing Site in an Animal Model of Heart Failure 070

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Background Missing response to left ventricular (LV) pacing is observed in 20–30 % of heart failure (HF) patients, possibly the ideal pacing site was not reached by the coronary sinus lead. This study investigates how different epicardial and endocardial pacing sites influence hemodynamic performance in an animal model.

Methods In 6 adult sheep dilated HF was induced by rapid pacing. Endocardial mapping and pacing were performed using a 64-electrode basket catheter. Epicardial pacing was achieved by temporary electrodes. LV volumes and diameters were measured by Echocardiography.

Results **Table 1** summarizes the hemodynamic and echocardiographic results.

Table 1: O. Dzemali et al.

	Baseline	Lateral wall	Inferior wall	Apex	RV
Endocardial					
Heart rate*	82.8 ± 10.2	102.0 ± 4.5	102.0 ± 4.5	99.8 ± 7.4	97.2 ± 1.9
RR mean*	73.0 ± 17. 7	82.2 ± 13.2	65.0 ± 16.7	64.0 ± 18.4	58.8 ± 11.6
PAPmean**	18.8 ± 6.9	19.6 ± 11.9	18.4 ± 5.1	18.8 ± 5.9	17.0 ± 5.4
PCWP*	12.4 ± 5.5	10.8 ± 3.6	14.0 ± 3.5	14.8 ± 3.5	15.6 ± 4.1
CO*	2.7 ± 0.4	3.8 ± 0.65	2.8 ± 0.6	2.7 ± 1.1	2.0 ± 0.9
LVDd*	4.87 ± 0.7	4.06 ± 0.8	5.25 ± 0.2	5.16 ± 0.6	5.91 ± 0.2
IVSd*	1.40 ± 0.2	1.85 ± 0.1	0.99 ± 0.2	1.28 ± 0.2	0.64 ± 0.4
Epicardial					
Heart rate*	–	103.0 ± 6.7	102.0 ± 4.5	100.0 ± 0	96.2 ± 5.8
RR mean*	–	83.0 ± 16.1	66.2 ± 15.8	67.6 ± 10.2	56.4 ± 12.4
PAPmean**	–	18.4 ± 5.4	18.2 ± 3.9	19.6 ± 5.1	19.2 ± 4.3
PCWP*	–	10.6 ± 3.4	15.6 ± 2.8	15.2 ± 3.2	14.8 ± 3.3
CO*	–	3.6 ± 0.65	2.7 ± 0.4	2.5 ± 0.7	2.1 ± 0.5
LVDd*	–	4.55 ± 0.4	5.83 ± 0.6	5.6 ± 0.7	5.67 ± 0.4
IVSd*	–	1.79 ± 0.2	0.99 ± 0.3	1.11 ± 0.1	0.67 ± 0.3

LVDd = diastolic LV diameter; IVSd = interventricular septum diameter
*($p < 0.05$); **($p > 0,05$)

Conclusion In this sheep model with induced HF, endocardial and epicardial pacing of the lateral myocardium led to optimal systolic function and hemodynamics, right ventricular pacing induced further reduction of LV performance. As this optimal pacing site cannot always be reached via the coronary sinus, surgical implantation of epicardial electrodes should be considered in all non-responding patients.

Spherical Dilatation of the Apex in Failing left Ventricles: A Target for Surgical Remodelling Techniques 071

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Background The present study investigates the geometry of failing left ventricles especially focussing on the apical deformation. A new surgical remodelling technique is presented.

Methods and Results The geometry of the left ventricle (LV) was evaluated by MRI scanning in 124 heart failure patients undergoing CABG. Besides the conventional sphericity index SI 2 further indices were calculated, a length index (LV lengthsyst/LV lengthdiast) and an apical conicity index (apical axis/short axis). The results were compared to 15 patients with normal LV function and 10 test persons. A new apical compression stitch was placed in 35 heart failure patients; a second MRI was performed to evaluate the remodelling result.

In failing left ventricles LV length increased (enddiastolic diameter 5.3 ± 0.6 cm/m^2 vs 4.7 ± 0.8 cm/m^2 in control patients and 4.6 ± 0.3 cm/m^2 in test persons). The length index was also elevated (0.94 ± 0.04 vs 0.78 ± 0.06 and 0.81 ± 0.07). The classical systolic sphericity index was 0.56 ± 0.06 in heart failure patients vs 0.50 ± 0.05 in control patients and 0.48 ± 0.04 in test persons. The apical conicity indices were 0.71 ± 0.08 vs 0.59 ± 0.07 and 0.58 ± 0.06, thus the deformation was more pronounced at the apex. A significant remodelling was achieved in the apical stitch patients. The length index improved to 0.85 ± 0.1, the apical index to 0.62 ± 0.06.

Conclusions Detailed analysis of the geometry of failing left ventricles demonstrated reduction in longitudinal contractility as well as spherical deformation with pronounced apical dilatation. An apical remodelling stitch led to significant remodelling which was accompanied by improvement in ventricular function.

Impact of Different Pacing Modes on Left Ventricular Function Following Cardiopulmonary Bypass 072

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Background Patients with severely impaired left ventricular (LV) function often demonstrate prolonged inter- and intraventricular conduction. This prospective study investigates hemodynamic effects and outcomes of perioperative temporary biventricular pacing in patients with heart failure undergoing heart surgery.

Methods Eighty consecutive cardiac surgery patients with a LV ejection fraction below 35 % received biventricular stimulation via temporary myocardial electrodes. Group 1 consisted of 40 patients with LV dilatation (mean-LVEDD 65 ± 5 mm), group 2 of 40 patients with normal or slightly dilated LV (mean-LVEDD 52 ± 4 mm).

Results Hemodynamic parameters were measured immediately, 6 and 24 hours after operation. An increase of cardiac index (CI) and arterial blood pressure with biventricular pacing was observed in 27 patients (group 1/67.5 %) versus 22 patients (group 2/55 %) from 2.4 ± 0.7 l/min/m^2 to 3.5 ± 0.5 l/min/m^2 ($p < 0.01$). This benefit persisted 6 and 24 hours postoperatively. The remaining patients already showed higher cardiac index prior to pacing (3.7 ± 0.9 l/min/m^2). In group 1, responding patients required shorter times for ventilation support and intensive care. QRS duration before surgery was not predictive for the response to biventricular pacing.

Conclusions In the majority of patients with reduced LV function, temporary biventricular pacing improves CO and arterial blood pressure after surgery, especially when LV-dilatation is present.

Ergebnisse nach PTCA, Stent und CABG bei Patienten nach Herztransplantation 091

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Ziel dieser Untersuchung war es, unsere Ergebnisse nach PTCA, Stentimplantation und Koronarbypassoperation zur Behandlung der Graftvaskulopathie nach Herztransplantation (HTX) zu evaluieren.

Methode Im Zeitraum 1989 bis 2006 wurden 55 Patienten (11 % weiblich) aufgrund einer symptomatischen Graftvaskulopathie behandelt. Das Durchschnittsalter zum Zeitpunkt der HTX war 49 Jahre. Der Zeitraum zwischen HTX und der Revaskularisation war im Mittel 103 Monate. Es wurden insgesamt 298 Läsionen behandelt. Dreiundachtzig Läsionen sind primär dilatiert worden, 124 Läsionen sind primär oder sekundär mit einem Stent versorgt worden und 5 Patienten wurden primär bypassoperiert.

Die primäre Erfolgsrate, die Restenoserate sowie sekundäre kardiale Spätkomplikationen wurden monitiert.

Ergebnis Die primäre Erfolgsrate betrug 99 %. Der durchschnittliche Nachbeobachtungszeitraum nach der Revaskularisation war 72 Monate, währenddessen wurden 26 % Läsionen nach primärer PTCA und 15 % Läsionen nach primärem oder sekundärem Stent nachinterveniert. In der Gruppe der Patienten nach Bypassoperation waren alle Bypässe bei der jeweiligen Kontrolle einwandfrei offen. Zwei Patienten sind im Verlauf an einem Myokardinfarkt verstorben und 2 Patienten sind aufgrund der fortschreitenden ischämischen Kardiomyopathie retransplantiert worden. Weitere 2 Patienten sind aus nicht-kardialer Ursache verstorben.

Zusammenfassung Die Inzidenz der revaskularisationspflichtigen Graftvaskulopathie nach HTX ist in dieser Serie niedrig. Der Großteil der Läsionen ist mit einem individuellen Therapiekonzept gut behandelbar. Trotz einer geringen Inzidenz an späten Therapieversagern, bleibt die routinemäßige Kontrollangiographie ein unverzichtbarer Bestandteil der guten Nachsorge dieser Patienten.

Prävalenz und Verbesserung gestörter Glukosetoleranz (IGT) bei Patienten mit koronarer Herzerkrankung (KHK) während eines stationären Rehabilitationsprogrammes 039

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Einleitung Patienten mit KHK haben eine hohe Prävalenz von nicht diagnostiziertem Diabetes mellitus. Andererseits kann eine langfristige Lebensstilmodifikation den Glukosemetabolismus verbessern. Unklar ist, ob eine kurzzeitige Intervention einen Effekt auf IGT oder Diabetes mellitus zeigt.

Der Hintergrund unserer Studie war, die Prävalenz von IGT bei KHK-Patienten und den Effekt eines kurzfristigen stationären Rehabilitationsprogrammes bei diesen Patienten zu zeigen.

Methodik Bei 235 konsekutiven Patienten mit KHK ohne bekannten Diabetes mellitus und normalem Nüchternblutzucker wurde zu Beginn des Aufenthaltes ein Glukosetoleranztest (OGTT) entsprechend den WHO-Kriterien sowie eine Ergometrie durchgeführt. Alle Patienten nahmen in der Folge an einem 3–4-wöchigen stationären Rehabilitationsprogramm, bestehend aus Ausdauertraining und cholesterinarmer Diät, teil. Am Ende wurden OGTT und Ergometrie wiederholt.

Ergebnisse Bei Aufnahme hatten 35 Patienten (15 %) eine pathologische Glukosetoleranz, bei 4 Patienten (0,02 %) wurde ein Diabetes mellitus neu entdeckt. Am Ende des stationären Rehabilitationsprogrammes (18 ± 4 Tage) konnte eine signifikante ($p < 0,05$) Gewichtsreduktion (80 ± 14 vs. 78 ± 13 kg) sowie signifikante Verbesserung des OGTT-2h-Wertes (164 ± 25 vs. 15 ± 28 mg/dl) und der Leistungsfähigkeit (87 ± 34 vs. 111 ± 33 W) dokumentiert werden. Bei 3 der 4 (75 %) neu entdeckten Diabetiker verbesserte sich dieser zu IGT, bei 12 Patienten (35 %) mit IGT normalisierte sich die Glukosetoleranz.

Schlussfolgerung Unsere Ergebnisse bestätigen die hohe Prävalenz von IGT bei Patienten mit KHK und normalem Nüchternblutzucker. Weiters zeigt unsere Studie, dass sogar ein kurzzeitiges stationäres Rehabilitationsprogramm einen pathologischen Glukosemetabolismus bei diesen Patienten wesentlich verbessern kann.

Kardiale Rehabilitation eines Patienten mit dilatativer Kardiomyopathie mit linksventrikulärem Assist Device 099

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Einleitung Ausdauertraining ist eine etablierte Therapie für Patienten mit stabiler Herzinsuffizienz, wogegen Benefit und Sicherheit von körperlichem Training für Patienten mit linksventrikulärem Assist Device (LVAD) nicht evaluiert sind.

Fall R.P.; 38 a; männlich; 178 cm; 69,4 kg

1994 Diagnose einer Dilatativen Kardiomyopathie nach Unterschenkelfraktur

1996 LVEF 20 %, Ergometrie bis 62 W (27 % Soll), für Herztransplantation (HTX) gelistet

1999 LVEF 50 %, Ergometrie bis 125 W, von der HTX-Liste genommen

2006 Arrhythmiebedingte Synkope, ICD-Implantation nach Herzkatheter, wegen Verschlechterung der LVEF neuerlich für HTX gelistet

Tabelle 2: U. Eherer et al.

	19.09.2006	17.10.2006
QoL/SF 36*		
physischer SS	27	34.4
psychischer SS	27	39
QoL/Minesota**	80	61
NT-proBNP	3436 U/l	1816 U/l
Ergospirometrie		
Pmax	–	60 W–33 % Soll
VO_2max	–	13,5 ml/min/kg–37 % Soll
O_2HFmax	–	6,3 ml
Ve/VCO_2 slope	–	40
Laktat max	–	3,36 mmol/l
USKG		
LVEDD	74 mm	72 mm
LA	49 mm	44 mm
EPSS	28 mm	21 mm

* Höherer Score = Verbesserung; ** Niedrigerer Score = Verbesserung

Nach einigen Wochen zu Hause neuerliche Dekompensation. Medikamentöse Rekompensation erfolglos, daher Implantation eines LVAD als Bridging zur HTX. Entlassung am 14. September, 5 Tage später Aufnahme in unserem Rehabilitationszentrum für einen 4-wöchigen Aufenthalt.

Programm Ausdauertraining: Ergometertraining 5 W/20 min./Tag, Spaziergänge 1,2 km bzw. 30 min./Tag

Krafttraining: Theraband (leicht) für Flexoren und Beine: 5 Wiederholungen, 2–3 Serien/Tag, Atemmuskeltraining, Physiotherapie: Oberkörper, psychologische Betreuung.

Verlauf Das individuell gestaltete Training wurde gut angenommen und gut toleriert. Die NYHA-Klassifikation verbesserte sich von III auf II–III und korrelierte mit dem Rückgang der Herzgröße und pulmonal-venösen Stauungszeichen im Thoraxröntgen (**Tabelle 2**: Objektive Parameter).

Schlussfolgerung Die Teilnahme an einem kardiologischen Rehabilitationsprogramm für einen Patienten mit LVAD war sicher und effektiv, und verbesserte die kardialen Parameter ebenso wie die Lebensqualität.

Blutdruckkontrolle bei Patienten mit chronischer Nierenerkrankung 024

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Einführung Die verbesserte Kontrolle des Bluthochdrucks hat bekanntermaßen einen positiven Einfluss auf den Fortschritt der chronischen Nierenerkrankung, aber nur wenig ist bekannt über die Qualität der Behandlung in Erwachsenen – speziell im Hinblick auf die veränderten bzw. strengeren Leitlinien.

Methodik Aus den Daten des LIFEinLIFE-Projektes haben wir die Einstellung von systolischem und diastolischen Blutdruck ermittelt und beurteilt, welche Faktoren diese beeinflussen.

Ergebnisse Von den 18.565 Teilnehmern hatten 2,14 % einen Blutdruck von < 130/80 mmHg, wohingegen unter den 1659 Teilnehmern mit chronischer Niereninsuffizienz 3,98 % einen Blutdruck < 130/80 mmHg aufwiesen. Von den Teilnehmern mit ungenügend eingestelltem Blutdruck hatten 1,79 % einen systolischen Blutdruck von < 130 mmHg mit einem diastolischen Blutdruck von > 80 mmHg, wohingegen 7,36 % einen systolischen Blutdruck von > 130 mmHg mit einem diastolischen Blutdruck von < 80 mmHg aufwiesen.

Der Anteil der Nierenkranken mit einem kontrollierten Blutdruck von < 130/80 mmHg stieg unter der Therapie mit Losartan von 3,98 % auf 14,09 %

Schlussfolgerung Die Kontrolle des Blutdrucks ist in der Bevölkerung sehr schlecht, insbesondere unter Patienten mit chronischer

Nierenerkrankung. Die schlechte Kontrolle ist primär auf den systolischen Blutdruck zurückzuführen. Eine Losartan-basierte Therapie trägt zu einer verbesserten Blutdruckkontrolle bei.

Impact of High- versus Normal-Impedance Ventricular Leads On Pacemaker Generator Longevity 016

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Background Pacemaker generator longevity depends on current consumption, which is directly related to current drain of the pacing lead. The use of high impedance pacing leads should therefore result in an extension of battery longevity due to a decrease in current drain. This study was aimed to evaluate the long term effects of high-impedance versus standard-impedance pacing leads on pacemaker generator longevity.

Methods In 40 patients (21 women; age 73 ± 13 years) identical pacemaker generators and atrial pacing leads were implanted. In a randomized fashion, a bipolar standard-impedance ventricular lead was implanted in 20 patients and high-impedance leads were implanted in the remaining patients.

Results The 2 patients group did not differ with respect to atrial lead performance, including current drain and in lead related complications, as well as the number of paced and sensed events, atrial and ventricular sensing and pacing thresholds. At the 39-month follow-up period, the standard-pacing impedance lead group displayed a significant increase in battery current as compared to the high-impedance lead group (20.6 ± 1.9 vs 18.9 ± 1.1 μA; $p < 0.05$) and the extrapolated generator longevity was significantly increased in the high-impedance lead group (107.3 ± 8.4 vs 97.6 ± 9.0 months; $p < 0.05$). However, the effective pacemaker replacement time did not significantly differ between high-impedance versus standard-impedance lead group (86.0 ± 13.6 vs 88.6 ± 8.4 months; $p = 0.63$).

Conclusion Implantation of high-impedance pacing leads increase estimated replacement interval but does not prolong the effective pacemaker longevity.

Impact of Cryoablation versus Radiofrequency Ablation on Bidirectional Conduction Block in Isthmus Dependent Atrial Flutter 017

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Introduction Cryoablation (Cryo) is a treatment modality in patients with atrial flutter with potential advantages, such as improved tissue-adherence of the ablation catheter and reduction of pain, as compared to radiofrequency (RF) ablation. Bidirectional conduction block (BCB) in the inferior cavotricuspidal isthmus (ICI) is a marker for successful ablation and crucial to minimize conduction recurrence. This study aimed to test the effects of RF vs cryoablation on BCB, respectively on the recurrence rates of atrial flutter.

Methods Ablation of atrial flutter was performed in 93 pts with radiofrequency energy (58 ± 8 years, 17 female) using a 4-mm irrigated tip catheter and in 49 pts (59 ± 10 years, 9 female) with cryoenergy using a 8-mm tip catheter. Endpoint of each ablation procedure was a BCB verified by electroanatomical mapping (CARTOTM XP). The mean follow-up period was 37 ± 26 months.

Results BCB was obtained in 81.3 % (RF) vs 93.6 % (Cryo) of the patients ($p < 0.05$). The recurrence rate was 15 % (14/93 pts) after RF vs 4.3 % (2/49 pts) after cryoablation ($p < 0.05$). BCB was obtained after 13 ± 9 RF and 9 ± 4 cryoenergy applications ($p < 0.01$). Fluoroscopy time was 29 ± 14 (RF) vs 19 ± 6 minutes (Cryo) ($p < 0.01$). Procedural analgesic medication was decreased during Cryo as compared to RF ablation (1.9 ± 4 vs 3.3 ± 5 mg; $p < 0.01$). No difference in complication rate was obvious in between both groups.

Conclusions Cryoablation improves the achievement of bidirectional conduction block and decreases the recurrence rate of isthmus-dependent atrial flutter as compared to radiofrequency ablation.

CardioMon: Eine neue Methode zur nicht-invasiven Beurteilung der Hämodynamik bei Patienten mit akuter kardialer Dekompensation 061

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Hintergrund Der Erfolg der Rekompensation einer akuten Phase der Herzinsuffizienz wird meist anhand klinischer und/oder laborchemischer Parameter bestimmt. Angaben zur Hämodynamik sind meist nicht verfügbar. Die nicht-invasive Bestimmung hämodynamischer Parameter könnte die Rekompensation unterstützen. CardioMon ist ein Gerät, das über die oszillographische Messung des Blutdruckes hämodynamische Parameter errechnet. Die vorliegende Untersuchung dient der Beurteilung, ob CardioMon praktikable Informationen über hämodynamische Parameter liefern kann.

Patienten und Methodik Zwölf Patienten mit akuter kardialer Dekompensation (7 Männer, 5 Frauen, mittleres Alter 75 ± 11 Jahre) wurden während des stationären Aufenthaltes mit CardioMon gemessen. Die gewonnenen Daten (Blutdruck-RR systolisch/diastolisch, Puls) sowie die daraus berechneten Werte (totaler peripherer Widerstand-TPR, Schlagvolumen-SV) wurden über Near-Field-Communication (NFC) an ein NFC-taugliches Handy übertragen und an die Datenzentrale übermittelt. Jede Messung wurde 2× durchgeführt und der Mittelwert berechnet. Begleitend wurde NT-pro-BNP gemessen.

Resultate Es wurden 220 Messungen durchgeführt (18 ± 11 Messungen/Patient). Die Streubreite der gemessenen Werte war unter 2 %, jene der berechneten Werte unter 7 %. Der stationäre Aufenthalt betrug im Mittel 10 ± 5 Tage (**Tabelle 3**).

Während NT-proBNP einen signifikanten Rückgang zeigte, gingen die übrigen gemessenen bzw. berechneten Werte nur tendenziell zurück, das Schlagvolumen stieg tendenziell an.

Alle Messwerte konnten mittels NFC-Handy übertragen werden, kein Patient verstarb während des stationären Aufenthaltes.

Schlussfolgerung CardioMon ist ein einfaches, praktikables Messgerät zur nicht-invasiven Bestimmung hämodynamischer Parameter. Die Datenübermittlung an die Studiendatenbank mittels NFC-Handy erlaubt eine effiziente, qualitätsgesicherte Durchführung klinischer Studien. Diese sind nötig um herauszufinden, ob CardioMon den Erfolg einer Rekompensationstherapie aussagekräftig beurteilen kann.

Tabelle 3: F. Fruhwald et al.

	Bei Aufnahme (median)	Vor Entlassung (median)	p-Wert
RRsyst (mmHg)	132	120	n. s.
RRdiast (mmHg)	63	62	n. s.
Puls (1/min)	66	61	n. s.
SV (ml)	56	59	n. s.
TPR (dyne*s/cm^5)	1726	1660	n. s.
NT-proBNP (pg/ml)	8607	5677	0,04

Table 4: G. Gouya et al.

	Group 1			Group 2			p
	Target dose achieved (n = 108)	Target dose not achieved (n = 111)	p	Target dose achieved (n = 82)	Target dose not achieved (n = 112)	p	Group 1 vs. Group 2
Age	57 ± 10	54 ± 16	n. s.	63 ± 11	61 ± 13	n. s.	< 0.0001
Males (%)	84	69	< 0.01	79	72	n. s.	n. s.
Heart rate (beats/min)	70 ± 13	69 ± 13	n. s.	78 ± 16	73 ± 14	< 0.05	< 0.0001
RR s	125 ± 18	125 ± 22	n. s.	126 ± 23	118 ± 22	< 0.05	< 0.05
NYHA I/II/III/IV (%)	31/35/34/0	31/41/25/3	n. s.	10/38/45/7	3/28/62/7	0.05	< 0.0001
Creatinin mg/dl	1.1 ± 0.3	1.2 ± 9.4	n. s.	1.3 ± 0.5	1.4 ± 0.6	n. s.	< 0.0001
NT-BNP pg/ml	336 ± 249	295 ± 236	n. s.	3563 ± 5105	4845 ± 5413	n. s.	< 0.0001
Coronary artery disease (%)	33	36	n. s.	43	43	n. s.	< 0.01

More Benefit for Newly Admitted Patients to an Out-patient Heart Failure Clinic in First Year 051

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Objectives Based on the ESC guidelines, heart failure patients should be cared by a specialized out-patient unit. It is unclear whether the same benefit is equally seen in newly referred patients (comparable to a study population) compared to patients already cared on long-term.

Methods and Results Variables of a cohort of 511 patients with CHF were prospectively assessed (follow-up period of 12 months). 382 HF patients already treated on long-term (Group A) were compared to 129 newly referred patients (Group B). With the exception of age and heart rate, patients group were comparable. Group B patients were more severe diseased (higher NYHA functional class [p = 0.04], higher Minnesota Living with Heart Failure Score (38 ± 27 vs 28 ± 23; p = 0.001) and higher NT-proBNP (3387 ± 4483 vs 2250 ± 4384 pg/ml; p = 0.01) and had less pharmacological therapy (patients on target dose of recommended HF-therapy 3 % vs 42 %). A successful up-titration of recommended HF-therapy to target dosage was performed in 25 % cases of group B but only in 10 % of group A (p < 0.0001). Cardiac resynchronization therapy was more often implemented in group B (9 % vs 3 %; p = 0.02). These resulted in a significant decrease of NT-proBNP at the end of the follow-up period in group B (1074 ± 581 pg/ml; p = 0.04), whereas NT-proBNP of group A did not change over time. All cause mortality was comparable in both groups.

Conclusion Our data implicate a special benefit for newly referred patients in respect of therapy and change in NT-proBNP if managed by a specialized HF unit whereas only distinct patients might profit from long-term specialized care.

Influence of Optimized Pharmacotherapy on Short-Term Survival in Patients with Different Severities of Chronic Heart Failure 053

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Objectives There is consensus that all patients with chronic heart failure (CHF) should be treated with a combination of neurohumoral antagonist therapy. The impact of optimized medical therapy on short-term outcome in different severities of the disease is not clear yet.

Methods and Results Variables of a cohort of 511 patients with CHF of our specialized outpatient heart failure clinic were prospectively assessed (follow-up period of 12 months). According to the median value of NT-BNP of 882 pg/ml patients were stratified dependent on the severity of heart failure: group 1 (low severity NT-BNP ≤ median) and group 2 (high severity NT-BNP > median). Moreover patients were classified in respect of achievement of an optimized pharmacotherapy to recommended target dose of ACEI (inhibitors of angiotensin converting enzyme) or ARB (angiotensin receptor blockers) and beta-blockers after 1 year. Demographics and clinical data are shown in **Table 4**. The impact of optimized pharmacotherapy to target dose on survival was measured. Kaplan Meier life time analysis only showed a significant reduction of mortality in group 2 (2 % vs 11 %; p < 0.01) after achievement of optimized pharmacotherapy to recommended target dose.

Conclusion Optimization of recommended neurohumoral antagonist pharmacotherapy in chronic heart failure patients results in a short-term survival benefit only in patients with severe heart failure reflected by high NT-BNP levels.

Triage of an Asymptomatic Risk Population by NT-proBNP to Exclude a Short-Term Risk for Cardiac Events in Primary Care 054

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Objectives N-terminal pro brain natriuretic peptide (NT-proBNP) is used as a screening tool in the diagnosis of different cardiac diseases, mainly heart failure (HF). To determine the diagnostic properties of NT-proBNP for triage in asymptomatic high risk population with hypertension, diabetes and ischemic heart disease (IHD) (previous myocardial infarction excluded) this prospective community cohort study in primary care was conducted.

Methods After clinical diagnosis of hypertension and/or diabetes and/or IHD in patients without clinical signs and symptoms of any heart disease the patients were tested for NT-proBNP levels by the primary care physician. Patients were divided in group A (NT-proBNP > 125 pg/ml) and group B (NT-proBNP < 125 pg/ml). Outcome data were documented in both groups.

Results Of a cohort of 267 patients, 43 % were stratified to group A and 57 % to group B. Follow-up period in both groups was 4.3 ± 2.2 months. Patients in group A were older (62 ± 12 vs 69 ± 10; p < 0.0001). 44 % in group A versus 55 % in group B were male (p = 0.05). Hypertension (94 %), diabetes (40 %) and IHD (22 %) without previous MI were equally distributed in both groups. All cause hospitalization (9 % vs 2 %; p = 0.007) and all over cardiac hospitalization (p = 0.009) were significantly higher in group A (hospitalization due to ischemic events was 0 vs 2.3 %; p = 0.04, due to heart failure 0 vs 1.6 % and arrhythmia 0 vs 1.6 %; both p = n. s.).

Conclusion Even on short-term NT-proBNP measurement is helpful to identify high risk patients. More important is to safely rule out a low risk population for patients' triage. Thus, in primary care NT-proBNP might be a valuable tool for decision making about intensity of care in risk population.

NT-proBNP for Risk Stratification of Newly Presented Symptomatic High Risk Patients in Primary Care 055

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Objectives N-terminal pro brain natriuretic peptide (NT-proBNP) has emerged as interesting predictor of risk for mortality and hospitalization in patients with heart failure (HF). However, the optimal use of NT-proBNP measurement for risk stratification of patients

newly presented to a primary care physician with signs and symptoms of heart failure remains unclear.

Aim The aim of the present study was to define the role of NT-proBNP in high risk symptomatic patients in primary care to stratify for further investigation with echocardiography.

Methods and Results A total of 419 newly presented patients of primary care cohort (age 68 ± 13 years, 48 % male) with hypertension, diabetes or ischemic heart disease (IHD) with signs and symptoms of heart failure were consecutively analyzed in this study. Patients were divided in group A (NT-proBNP > 125 pg/ml; n (5) and group B (NT-proBNP < 125 pg/ml; n (4). Patients in group A were significantly older (71 ± 11 vs 62 ± 14; p < 0.0001) with no difference in gender between groups. Hypertension was diagnosed more in group A (79 % vs 69 %; p = 0.03), prevalence of diabetes (20 %), IHD (45 %) and MI (25 %) was similar in both groups. 47 % of patients stratified for group A showed a left ventricular systolic dysfunction on echocardiography. Follow-up period was 4.2 ± 2.3 months. All cause hospitalization was 18 % in group A compared with 3 % in group B (p < 0.0001). All cardiac hospitalization was 9 % in group A vs 0.7 % (1 patient) in group B (p = 0.002), 6 % of group A vs non in group B had a hospitalization due to heart failure (p = 0.001). No significant differences were documented for hospitalization based on ischemic heart disease (4 % in group A vs 0.7 % in group B) as well as hospitalization based on arrhythmias (3 % group A vs 0 % in group B). None of the patients died within the follow-up period.

Conclusion Our data suggest that NT-proBNP has a high pretest probability to diagnose heart failure in this population. More important a level below the cut-off level of 125 pg/ml in newly presented symptomatic high risk patients is safe to abstain from further echocardiographic diagnostics.

Inter-Observer-Variabilität zur CRT-Non-Responder-Prädiktion mittels Vektorkardiographie 115

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Einleitung Die kardiale Resynchronisationstherapie (CRT) ist eine akzeptierte Behandlungsform für Patienten mit schwerer Herzinsuffizienz. Etwa 30 % der Patienten profitieren nicht von der Therapie und werden als Non-Responder eingestuft. Zur Responderbestimmung wird aus dem Vektor-EKG (VKG) die Vektorzeitfläche berechnet und das Zeitintervall (TI) vom Maximalvektor bis zum Ende der Vektorzeitfläche bestimmt. Der TI-Index wird für die Prädiktion des CRT-Respons verwendet. Bisher gibt es keine Daten bezüglich der Reproduzierbarkeit und der Untersuchervariabilität für diesen neuen Parameter.

Methode Bei 65 Patienten (47 m; 65,3 J.; QRS-Breite 157 ms, ± 22,9; EF 22,7 %; LVEDD 72,2 mm) wurden die VKG-Daten prospektiv vor der CRT-Implantation registriert. Der TI wurde offline, unabhängig und geblindet von 2 differenten Untersuchern bestimmt. Patienten mit einem TI > 65 ms wurden als Responder zur CRT eingestuft. Die Ergebnisse wurden mit dem hämodynamisch ermittelten Respons korreliert. Invasiv, hämodynamisch wurden die Kontraktilität (LV dp/dt) und der Pulsdruck (PP) gemessen. Als positiver CRT-Respons wurde eine Zunahme von > 10 % dp/dtmax und > 5 % PP, unter Stimulation gegenüber dem Ausgangswert ohne Stimulation, definiert.

Ergebnisse 14 Patienten (21 %) wurden über die invasiv, hämodynamischen Parameter als Non-Responder bewertet. Jeder der beiden Untersucher bewertete 12 von diesen Patienten (85 %) leicht unterschiedlich aber korrekt über das TI als Non-Responder. Die Inter-Observer-Variabilität, für die Qualität des TI als diagnostischer Test, wurde für die Übereinstimmung der beiden Untersucher berechnet: Sensitivität 79 % (jeder Untersucher allein 85 %), Spezifität 90 % (Untersucher 1: 96 %, Untersucher 2: 92 %), positiv prädiktiver Wert 69 % (Untersucher 1: 85 %, Untersucher 2: 75 %), negativ prädiktiver Wert 94 % (jeder Untersucher allein 96 %).

Zusammenfassung Der TI-Algorithmus ist ein valider und reproduzierbarer Prädiktor für die CRT-Responder- bzw. Non-Responder-Bestimmung. Das von beiden Untersuchern unabhängig und geblindet berechnete TI ergab eine Übereinstimmung von 88 %. Das TI als CRT-Prädiktor ist weitgehend Untersucher-unabhängig.

Ein neuer Vektor-EKG-Algorithmus als Prädiktor für den CRT-Response 116

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Einleitung Für Patienten mit schwerer Herzinsuffizienz und ventrikulären Leitungsstörungen ist die kardiale Resynchronisationstherapie (CRT) eine akzeptierte, additive Therapie. Jedoch nicht alle Patienten profitieren davon, ca. 30 % der Patienten werden als Non-Responder eingestuft. QRS-Breite, LSB und echokardiographische Messungen stellen Parameter für die Indikation dar, sind aber für die Responder-Prädiktion nicht valide. Ein neuer Algorithmus, basierend auf der Vektor-EKG-Analyse (VKG), soll zur Differenzierung von Respondern und Non-Respondern beitragen. In dieser Studie wird die Effektivität des VKG-Algorithmus untersucht und mit hämodynamischen Daten verglichen.

Methode Bei 65 Patienten (47 m; 65,3 J.; QRS-Breite 157 ms, ± 22,9; EF 22,7 %; LVEDD 72,2 mm) wurden die VKG-Daten prospektiv vor der CRT-Implantation aufgezeichnet. Aus dem VKG wurde die Vektorzeitfläche berechnet und das Intervall (TI) vom Maximalvektor bis zum Ende der Vektorzeitfläche bestimmt. Der TI-Wert wurde mit den Ergebnissen der hämodynamischen Messungen, die nach der CRT-Implantation erhoben wurden, korreliert. Invasiv, hämodynamisch wurden die Kontraktilität (LV dp/dt) und der Pulsdruck (PP) gemessen. Als positiver CRT-Respons wurde eine Zunahme von > 10 % dp/dtmax und > 5 % PP, unter Stimulation gegenüber dem Ausgangswert ohne Stimulation, definiert. Eine Zunahme von > 20 % dp/dtmax und > 10 % PP wurde als exzellenter Respons gewertet.

Ergebnisse 14 Patienten (21 %) wurden über die invasiv, hämodynamischen Parameter als Non-Responder bewertet. Das Vektorzeitflächen-Intervall (TI) bei den Non-Respondern war < 65 ms. Bei den exzellenten Respondern wurde ein TI > 90 ms gefunden. Die Qualitätskriterien für das TI als diagnostischer CRT-Prädiktor waren: Sensitivität 79 %, Spezifität 96 %, positiv prädiktiver Wert 85 %, negativ prädiktiver Wert 94 %. CRT-Responder zeigen im VKG ein typisches Depolarisationsmuster der Vektormagnitude.

Zusammenfassung Der TI-Algorithmus in Verbindung mit der VKG ist eine neue Methode für die Responder- bzw. Non-Responder-Bestimmung zur CRT mit einer Sensitivität von 79 % bei einer Spezifität 96 %. Dies unterstützt die Hypothese, dass die späte elektrische Depolarisation linksventrikulärer Areale und eine langsame Depolarisationsgeschwindigkeit, speziell nach Beginn der isovolumetrischen Kontraktion, eine bessere Prädiktion für den CRT-Response erlauben.

Attainment of Local Drug Delivery of Paclitaxel with Drug-eluting Balloon in Porcine Coronary Arteries 093

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Background The aim of the present study was to confirm the local drug delivery of paclitaxel-eluting balloon by percutaneous intervention of single arterial segments or bifurcations by measurement of the tissue paclitaxel concentration after Dior (2.5 µg paclitaxel/mm^2 balloon surface) balloon dilatation of porcine coronary arteries.

Methods After general anaesthesia, 8 domestic pigs were subjected to 2× 30 sec Dior balloon (3.0 or 2.75 mm of size, 15 mm of length) dilatation of the left anterior (LAD), left circumflex (mid portion after the first side branch) and proximal right coronary arteries. Bifurcation intervention followed by kissing balloon dilatation was performed in 6 arteries. Non-coated balloon dilatation of the LAD in additional pigs served as control. After euthanasia, the dilated segments of the coronary arteries, the distal and proximal reference segments were prepared for measurement of tissue paclitaxel concentration using HPLC. Plasma samples were taken 10, 20, 30, 60, 120 min while tissue samples were harvested mean 1.5h, 12h, 24h and 48 h after balloon dilatation, respectively. The dilated arterial sections were subjected to TUNEL immunochemistry and the apoptotic smooth muscle cells were counted as a percent of total cells 48 h post-dilatation.

Results The tissue paclitaxel concentration of the single dilated segment was 1.82 ± 1.60 µM/L 1.5 h post-dilatation, and decreased significantly to 0.73 ± 0.27 (p = 0.032), 0.62 ± 0.34 and 0.44 ± 0.31 µM/L after 12, 24 and 48 h. The bifurcation intervention resulted in 5.10 ± 1.80 µM/L tissue paclitaxel dosis of the main branch, which decreased at 12 h to 1.41 ± 1.23 µM/L (p = 0.004). The bifurcation side branch tissue contained 7.00 ± 4.80 µM/L paclitaxel 1.5 h post-dilatation, which was decreased to 2.72 ± 0.40 µM/L (p = 0.034). The mean paclitaxel concentration of the reference segments decreased gradually from 0.84 ± 0.99 to 0.34 ± 0.36 µM/L (p = 0.09), and further to 0.28 ± 0.16 and 0.19 ± 0.18 µM/L tissue 1.5, 12, 24 and 48 h post-dilatation, respectively. No paclitaxel was found in the peripheral blood 10, 20, 30 min, 1 h, 2 h, 12 h, 24 h and 48 h after Dior balloon dilatation. Mild increase in cell proliferation within the media was found in arterial segments dilated with coated and non-coated balloon. Increased number of apoptotic cells (4.4 ± 0.8 % vs 2.5 ± 0.9 %; p < 0.05) in the media was found in coated balloon-treated vessels as compared with the arteries dilated with non-coated balloon.

Conclusions Short exposition of coronary artery to paclitaxel by local drug delivery with coated balloon is sufficient to reach adequate tissue concentration of paclitaxel in order to exert antiproliferative effect.

Comparison of Early and Late Combined Cardiac Application of Bone Marrow Mononuclear Stem Cells after Myocardial Infarction: Results of the MYSTAR Prospective Randomized Study 094

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Background In MYSTAR study, results of combined delivery of autologous bone marrow-derived mononuclear cells (BM-MNCs) were compared in patients with recent acute myocardial infarction (AMI).

Methods Patients with left ventricular (LV) ejection fraction (EF) < 45 % after AMI were randomized to Early or Late (32 ± 12 or 93 ± 15 days post-AMI) groups. Primary endpoints of the study are changes in infarct size and global EF 3 months after BM-MNCs therapy. Secondary endpoints include safety, feasibility, changes in LV segmental motion, myocardial viability, end-diastolic, end-systolic volumes and clinical symptoms.

Results Patients in Early vs Late groups received NOGA-guided intramyocardial injections of 476 × 10^6 (363; 840 × 10^6; median with first quartiles) vs 648 × 10^6 (408; 956 × 10^6) BM-MCs followed by intracoronary injections of 2614 × 10^6 (1996; 3795 × 10^6) vs 3049 × 10^6 (2223; 5086 × 10^6) BM-MNCs into the open infarct-related artery. The mean (± SD) change (between pre-treatment and control) in infarct size was –3.5 ± 5.1 % (95 % confidence interval [CI]: –5.5 to –1.5; p = 0.001) vs –3.9 ± 5.6 % (95 %-CI –6.1 to –1.6; p = 0.002) and in EF 3.5 ± 5.6 % (95 %-CI: 1.3 to 5.6; p = 0.003) vs 3.4 ± 7.0 % (95 %-CI: 0.7 to 6.1; p = 0.017) in Early vs Late groups, without significant difference between the groups. Myocardial viability and NYHA improved significantly in both groups, with no change in the other secondary endpoints. Frequency distribution analysis revealed, that the infarct size decreased by at least 5 % in 36.7 % of the patients in the Early group and in 30 % of those in the Late group. An improvement of least 5 % in global EF was measured in 40 % of the patients in the Early group and 30 % in the Late group. Multivariate analysis revealed total number of intramyocardially delivered BM-MNCs and CD34+ cells to be significant predictor of improvement in infarct size and EF, respectively.

Conclusions Combined delivery of unselected BM-MNCs induce a moderate but significant improvement in myocardial infarct size and LV function, paired with significant improvement in myocardial viability.

Short- and Long-Term Outcome of Yukon DES Implantation in a Real World Setting: Results of the Single-Center Yukon Registry 114

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Background Rapamycin is one of the most powerful substances to inhibit intimal poliferation and reduce in-stent restenosis. In-spite of proven beneficial effect of the rapamycin-coated Cypher stent on angiographic and clinical outcome of percutaneous coronary intervention (PCI), the delayed endothelialization and consequent late thrombosis might hamper the use of this polymer-based drug-eluting stent (DES). The Yukon stent with its microporous (PEARL) surface allows the drug adsorption to the stent without polymer, resulting in a faster re-endothelialization without polymer remnant. The aim of the present study was to assess the angiographic and clinical outcomes of implantation of rapamycine (2 % rapamycin solution resulting in 2.2 µg/mm^2 stent + balloon surface) – coated Yukon stents.

Methods Sixty-seven patients (73 % male) with 73 significant coronary stenoses were included in the Registry. In accordance with the nature of the Registry, no exclusion criteria were defined. Six-month angiographic follow-up (FUP) was performed in 65 % of patients, clinical FUP in all patients. Baseline and FUP quantitative angiographic parameters were measured. The occurrences of short- (acute stent thrombosis) and long-term major adverse cardiac events (MACE, cardiac death, acute myocardial infarction and target lesion revascularization: TLR) were recorded.

Results Totally, 105 Yukon stents were implanted (34 % in LAD, 25 % in LCx, 33 % in RCA and 8 % in bypass vessels) in 28 patients (42 %) with acute coronary syndrome, 2 patients (3 %) in cardiogenic shock and 37 patients (55 %) with stable angina pectoris. The stents/lesion ratio was 1.44 with 1.57 stent/patient ratio. There was no procedural complication. Subacute stent thrombosis occurred 6 days post-stenting in a 80 year old patient with STEMI during the index procedure. During the FUP, 3 patients died, 2 of them with initial cardiogenic shock, and one due to terminal renal insufficiency. Thus the cardiac death was 3 % (non-stent related). TLR was performed in 10 patients (14.9 %), with a composite MACE of 17.9 %. The pre, post-stent and FUP minimal lumen diameter was 1.01 ± 0.39, 2.54 ± 0.39 and 2.11 ± 0.55 mm, and the percent diameter stenosis 63 ± 12, 17 ± 8 and 24 ± 16 %. The acute lumen gain was 1.43 ± 0.97 mm, the in-stent late lumen loss 0.41 ± 0.44 mm. The binary restenosis rate was 11.4 %.

Conclusions The polymer-free coating of the stent with rapamycin results in a similar angiographic and clinical outcome as observed in other DES in real-world setting.

Brauchen wir die kardiale Magnetresonanzuntersuchung zur nicht-invasiven Differenzierung zwischen akuter Virusmyokarditis und akutem Koronarsyndrom im klinischen Alltag? 009

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Einführung Patienten, bei denen der klinische Verdacht auf eine akute Virusmyokarditis besteht und die eine Enzymauslenkung haben, haben nur relativ selten ein akutes Koronarsyndrom (ACS), eine routinemäßige Koronarangiographie scheint daher nicht gerechtfertigt. Ein abwartendes Procedere mit 6–8 Wochen körperlicher Schonung und anschließender Ergometrie zum Ausschluss einer koronaren Herzkrankheit (KHK) scheint jedoch angesichts der erwiesenen Vorteile einer raschen invasiven Abklärung akuter Koronarsyndrome ebenfalls nicht vertretbar. Die rasche Durchführung einer kardialen Magnetresonanzuntersuchung (MR) bietet den theoretischen Vorteil, sowohl das ACS als auch die akute Virusmyokarditis nicht-invasiv zu diagnostizieren. Wir haben in unserem Haus untersucht, wie sich dieser theoretische Vorteil in der Praxis umsetzen lässt.

Ergebnisse In den 6 Jahren vor Einführung der kardialen MR in die Myokarditis-Diagnostik (1999–2005) wurden 27 Patienten mit Verdacht auf akute Virusmyokarditis stationär aufgenommen (5 Patienten hatten keine Enzymauslenkung, 22 Patienten hatten eine Enzymauslenkung). Bei 23 % (5 von 22) der Patienten mit Verdacht auf akute Virusmyokarditis und Enzymauslenkung wurde eine Koronarangiographie durchgeführt, 2 Patienten hatten blande Koronargefäße, 3 Patienten hatten eine koronare Herzkrankheit (KHK); insgesamt wurde bei 14 % (3 von 22) der Patienten mit initialem Verdacht auf akute Virusmyokarditis und Enzymauslenkung die Diagnose eines ACS gestellt. Bei den restlichen Patienten (77 %, d. h. 17 von 22) war die Entlassungsdiagnose „Verdacht auf akute Virusmyokarditis", als weiteres Procedere wurden 6–8 Wochen körperliche Schonung mit anschließender Ergometrie zum Ausschluss einer KHK empfohlen.

In den 2 Jahren seit Einführung der kardialen MR in die Myokarditis-Diagnostik wurde bei 43 Patienten eine kardiale MR mit der Fragestellung „Myokarditis" durchgeführt. Bei 30 Patienten bestand der Verdacht auf eine akute Virusmyokarditis (10 Patienten hatten keine Enzymauslenkung, 20 Patienten hatten eine Enzymauslenkung). 10 % (2 von 20) der Patienten mit Verdacht auf akute Virusmyokarditis und Enzymauslenkung hatten ein ischämie-typisches „late enhancement" und wurden koronarangiographiert, wodurch die Diagnose einer KHK jeweils bestätigt wurde. Bei 55 % (11 von 20) fand sich in der kardialen MR eine gesicherte Myokarditis (nicht-ischämietypisches „late enhancement" und „relative global enhancement ratio" > 5), bei 15 % (3 von 20) eine wahrscheinliche Myokarditis (kein nicht-ischämietypisches „late enhancement", aber „relative global enhancement ratio" > 5), bei 20 % (4 von 20) war die Myokarditis unwahrscheinlich (kein nicht-ischämietypisches „late enhancement", „relative global enhancement ratio" < 5). Bei 4 Patienten mit laut kardialer MR-gesicherter Myokarditis konnte die kardiale MR erst so spät durchgeführt werden, dass noch vorher eine Koronarangiographie durchgeführt wurde, alle Patienten hatten blande Koronargefäße.

Während Patienten mit klinischem Verdacht auf akute Virusmyokarditis und Enzymauslenkung vor Einführung der kardialen MR in die Myokarditis-Diagnostik nur in 14 % der Fälle eine definitive Diagnose erhielten (ACS), konnte nach Einführung der kardialen MR in die Myokarditis-Diagnostik in 80 % der Fälle eine definitive Diagnose vergeben werden (Myokarditis oder ACS).

Schlussfolgerung Bei Patienten mit klinischem Verdacht auf akute Virusmyokarditis und Enzymauslenkung erlaubt die kardiale MR einerseits die sichere Erkennung des ACS, andererseits kann in einem hohen Prozentsatz über den Ausschluss eines ACS hinaus die Diagnose einer Myokarditis frühzeitig bestätigt werden. Bei rascher Verfügbarkeit kann die kardiale MR daher bei Patienten mit klinischem Verdacht auf akute Virusmyokarditis und Enzymauslenkung die Notwendigkeit der invasiven Abklärung mittels Koronarangiographie auf das absolut notwendige Minimum reduzieren.

Dilated Cardiomyopathy in Cardio-MRI – Old Wisdom with a New Tool 007

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Cardio-MRI (CMRI) is the golden standard for evaluation of left ventricular volume and mass. To show, that's not only fact in a normal left ventricular function, we compared the cardiac functional parameters of healthy volunteers with patients with dilated cardiomyopathy (DCM).

We examined 24 patients with DCM (age 62 years, 3 women, 21 men) with Cardio-MRI (1,5 T, Siemens Sonata, Fa. Siemens-Erlangen). All of them had a late gadolinium enhancement intraseptal (midwall-sign) in CMRI and a coronary heart disease was rule out in a coronary angiography. The data were compared with a healthy group (n = 100, 50 women, 50 men, age 46 years, with no cardiac risk factors).

The enddiastolic volume in the DCM group was 257 ± 85 ml, and the endsystolic volume was 182 ± 75 ml, with a stroke volume of 74 ± 14 ml and an ejection fraction of 31 %. The left ventricular mass was 263 ± 56 g.

In the healthy adults the enddiastolic volume was 117 ± 29 ml, endsystolic volume was 41 ± 15 ml, stroke volume 76 ± 18 ml, and the ejection fraction was also normal with 64 ± 7 %. The normal left ventricular mass was 134 ± 27 g.

In comparison in DCM there was an increase of the enddiastolic volume by 120 %, and the endsystolic volume rises by 343 %. The ejection fraction in DCM was only the half as in healthy persons, otherwise the stroke volume was still normal.

To reach this aim, not only the left ventricular volume rises, but also the left ventricular mass rises up to 96 %.

In the healthy group, there was a linear correlation between enddiastolic volume, as a preload parameter, and stroke volume ($r = 67$; $p < 0.001$). In dcm this physiological correlation was absolutely canceled ($r = 0.166$; $p = 0.65$).

With CMRI the intact mechanism of Frank-Starling could be shown in a healthy population. In patients with DCM this was canceled and an adequate stroke volume was the result of massive increase of left ventricular volume and mass. The known massive increase of the endsystolic volume could be shown in cardio MRI.

The left ventricular dilatation and the pathophysiology of DCM was illustrated with CMRI.

Evaluation of the Aortic Valve in Cardio-MRI 008

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Cardio-MRI (CMR) is a standard method for evaluation left ventricular function, detecting volume parameters and left ventricular muscle mass. Also the anatomy and the function of the aortic valve can be visualized.

We examined the aortic valve and the left ventricular function in normal persons (n = 100, age 18–64 years, 50 female, 50 male), and in 77 patients with echocardiographic known aortic valve disease (37 patients with aortic stenosis [AS] and 40 patients with aortic valve regurgitation [AR] with CMR [Siemens Sonata, 1.5 T]).

Volumetry was performed in 12 short axis slices (trueFISP-Sequences) and the aortic valve was visualized in FLASH-Sequences with planimetry of the valve orifice in systole and in diastole, to get the regurgitant orifice in AR.

The normal valve orifice was 3.9 ± 0.7 cm^2 and the ejection fraction (EF) was 56 ± 6.8 %, stroke volume (SV) 73 ± 15 ml, and left-ventricular mass (LVM) 97 ± 19 g. In AS the orifice was 1.0 ± 0.35 cm^2, and the reduction to 26 % of the normal valve area was combined

with an increase of the left ventricular mass to 172 ± 56 g ($p < 0.001$; 44 % increasing).

EF (62 ± 7 %) and SV (77 ± 12 ml) were still normal.

In AR the diastolic valve area was 0.40 ± 0.21 cm^2, and the regurgitation volume was 35 ± 33 ml/beat, consecutively the regurgitation fraction was 29 ± 12 %.

The left ventricular function was persistent normally (EF 60 ± 8 %, SV 100 ± 38 ml), where left ventricular muscle mass increases to 179 ± 65 g.

Aortic valve, left ventricular anatomy and function could be examined in a fashionable manner with CMR in normal persons and also in patients with diseased aortic valve. Planimetry of the valve orifice in systole and in diastole (in AR) is easy and reproducible.

The consequences for the left ventricle due to volume and pressure overloading in aortic valve disease can be examined conclusively, and CMR should be integrated for making decision of the severity of aortic valve's disease.

Myocardial Ischemia/Reperfusion Injury in Hematopoietic Cell-Restricted β1 Integrin Knockout Mice

022

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Objective Evidence indicates that the intercellular adhesion molecule-1 and its counter-receptor β2 integrin are cardioprotective proteins during myocardial ischemia/reperfusion, but no data are available concerning the role of blood cell β1 integrins in this process. We studied the effects of temporary myocardial ischemia and reperfusion in blood cell-restricted β1 integrin knockout mice (β1–/–).

Methods The left descending coronary artery in conditional β1 integrin –/– (β1–/–), β1 integrin +/+ (β1+/+), and β1 integrin –/– bone marrow chimeric (β1–/– BM) mice was ligated for 30 min followed by reperfusion of either 3 h or 3 weeks. Plasma levels of troponin T were evaluated as an index of cardiac cellular damage. The histological evaluation of tissue damage was performed with hematoxilin and eosin stained sections. Cell infiltrations in the ischemic area were investigated by immunofluorescence studies.

Results Plasma troponin T was at a similar level in β1–/–, β1+/+, and β1–/– BM mice treated with 30 min ischemia and 3 h reperfusion. Histological analysis showed that ischemia/reperfusion resulted in marked myocardial injury in all groups of animals, but the damage score of the hearts was not significantly different between β1–/–, β1+/+, and β1–/– BM mice after 3 h of reperfusion following 30 min of ischemia (2.8 ± 0.5 vs 2.6 ± 0.5 vs 2.8 ± 0.6; n. s.). Furthermore, no difference in scar sizes in ischemia-injured hearts was found 3 weeks after ischemia. Semi-quantification of cells demonstrated that compared to β1+/+ mice, the number of infiltrating neutrophils was significantly reduced in β1–/– and β1–/– BM mice, whereas MAC-1-positive cells in the ischemic regions were similar in myocardial tissues of all groups.

Conclusion Absence of β1 integrin expression in hematopoietic cells results in reduced neutrophil infiltration in the ischemic regions, but does not influence myocardial damage of ischemic hearts.

Erhöhte Expression von iNOS und zelluläre kontraktile Dysfunktion während prolongierter akuter Myokardischämie im Schwein

050

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Die Bildung von Stickstoffmonoxid (NO) aus L-Arginin durch die induzierbare NO-Synthase (iNOS) ist bei chronischer Herzinsuffizienz und im myokardialen Stunning von wesentlicher Bedeutung. Eine erhöhte NO-Produktion durch iNOS hemmt die kontraktile Funktion in Herzmuskelzellen. Bei akuter moderater Myokardischämie kommt es zunächst zu einer dem reduzierten Blutfluss proportionalen Abnahme der Myokardfunktion. Nach einigen Stunden nimmt jedoch auch bei konstantem Blutfluss die kontraktile Funktion im vitalen Myokard weiter ab.

Wir untersuchten in einem Modell der prolongierten Myokardischämie im Schwein, ob die kontraktile Dysfunktion der Kardiomyozyten vom in vivo umgebenden Gewebe unabhängig und mit einer erhöhten iNOS-Aktivität verbunden ist. In 10 narkotisierten Schweinen wurde die linke vordere Koronararterie kannüliert und der mittlere koronararterielle Druck (CAP) für 6 h auf 40 % des Ausgangswertes reduziert (ISCH), 4 dieser Tiere erhielten einen iNOS-Inhibitor (AG, L-NIL), 6 weitere Tiere dienten als Kontrolle (CAP unverändert). Regionale Wandfunktion (systolische Wandverdickung, WTh) der Herzvorderwand (VW) und -hinterwand (HW) wurden aufgezeichnet. Nach 6 h wurden aus VW- und HW-Biopsien zur Bestimmung von NOS-Proteinexpression, NOS-Aktivität und NO-Metabolite (Nitrit, Nitrat, Nitrosospezies) entnommen. In simultan aus VW und HW enzymatisch isolierten Herzmuskelzellen wurden kontraktile Funktion und Ca2+-Transienten mit und ohne Zugabe von L-Arginin (100 µM) untersucht (Feldstimulation).

Durch Hypoperfusion reduzierte sich WTh in ISCH-VW von 42 ± 4 % (M.W. ± S.E.) auf 16 ± 3 %. WTh in ISCH-HW und in SHAM blieb unverändert. Proteinexpression und Aktivität von iNOS, nicht jedoch von eNOS, waren erhöht, und iNOS-Expression korrelierte mit der Nitritanreicherung. Zellverkürzung (CS) war reduziert in ISCH-VW vs. Sham-VW (4,4 ± 0,3 % vs. 5,6 ± 0,3 %). L-Arginin führte zu einem weiteren CS-Abfall in ISCH-VW (auf 2,8 ± 0,2 %) und ISCH-HW (auf 3,4 ± 0,4 % vs. 5,4 ± 0,4 %), jedoch nicht in SHAM oder in Gegenwart von iNOS-Inhibitoren. Intrazelluläres Ca2+ blieb unbeeinflusst. In Gegenwart von L-Arginin korrelierte VW-CS in vitro mit VW-WTh in vivo (r = 72).

Schlussfolgerung Prolongierte Myokardischämie bei konstanter Hypoperfusion führt zur Induktion von iNOS und NO-abhängiger zellulärer kontraktiler Dysfunktion.

Verminderte Aktivität des kardialen Na/Ca-Austauschers bei chronischer β1-adrenerger Stimulation in der Maus

052

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Einleitung und Methodik Chronische adrenerge Aktivierung ist verbunden mit der Progredienz einer myokardialen Dysfunktion, myokardialem Remodelling und einer erhöhten Morbidität und Mortalität. Im Tierexperiment führt die chronische β1-adrenerge Stimulation in β1-Adrenozeptor transgenen (β1TG) Mäusen bereits früh (im Alter von 2–4 Monaten) zu Störungen der intrazellulären Ca-Homöostase mit einem verzögerten diastolischen Abfall des intrazellulären [Ca], noch bevor sich in vivo eine Verminderung der basalen Kontraktilität nachweisen lässt [Circulation 2004; 109: 1154]. Die Ursachen für den verzögerten Ca-Transport aus dem Zytosol, der durch den Na/Ca-Austauscher (NCX) und die Ca-ATPase (SERCA) des sarkoplasmatischen Retikulums (SR) vermittelt wird, sind derzeit noch nicht geklärt.

Wir untersuchten die Ca-Homöostase (Fluo-4 AM) in stimulierten Kardiomyozyten (0,5 Hz-Feldstimulation, Raumtemp.) von jungen (3–4 Monate) β1-Adrenozeptor transgenen (β1TG) und Wildtyp-(WT-) Mäusen.

Ergebnisse In β1TG war das maximale systolische [Ca] höher (496 ± 53 nM vs. 335 ± 27 nM, n = 27 bzw. 37; Mittelwert ± S.E.; $p < 0,05$) und wurde später erreicht (140 ± 5 ms vs. 127 ± 3 ms; $p < 0,05$). Der diastolische Ca-Abfall war verzögert (Zeitkonstante TAUstim: 223 ± 16 ms vs. 182 ± 9 ms in WT). Die Ca-Beladung des SR (Bestimmung mit 20 mM Koffein) war in β1TG erhöht (114 ± 14 µmol/L vs. 64 ± 15 µmol/L Zytosol; $p < 0,05$; n = 16 bzw. 14).

Der prozentuale Anteil der elektrisch stimulierten Ca-Freisetzung aus dem SR („fractional Ca release") war vergleichbar (36 ± 4 % β1TG vs. 44 ± 3 % WT; p = n. s.). Die Zeitkonstante des Abfalls des Ca-Transienten in Gegenwart von Koffein (TAUcoff) wird durch die Aktivität des NCX bestimmt. TAUcoff war in β1TG signifikant verzögert (3683 ± 337 ms vs. 2304 ± 272 ms; p < 0,01). Die sequenzielle Messung von TAUstim und TAUcoff erlaubte die Berechnung der Zeitkonstante von SERCA während des diastolischen Abfall der Ca-Transienten bei 0,5 Hz; dabei fand sich kein signifikanter Unterschied zwischen β1TG und WT (235 ± 27 ms vs. 199 ± 20 ms). Die Proteinexpression von NCX im linksventrikulären Myokard war unverändert.

Zusammenfassung Eine verminderte NCX-Aktivität im Vorwärtsmodus (Ca-Extrusion) trägt zum verzögerten diastolischen zytosolischen Ca-Abfall nach chronischer Stimulation des β1-Adrenozeptors in vivo bei. Die unveränderte NCX-Proteinexpression legt eine funktionelle Aktivitätsminderung des NCX im Vorwärtsmodus nahe (z. B. durch erhöhtes intrazelluläres Na+). Die verminderte NCX-Aktivität im frühen Stadium der Herzinsuffizienz könnte im Hinblick auf die bekannten kardiotoxischen Effekte einer erhöhten zytosolischen Ca-Last für die Entwicklung der Herzinsuffizienz von wesentlicher Bedeutung sein.

NO-Eluting Introducer Sheath Prevents Arterial Vasospasms During Catheterization Procedure 097

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Purpose Inserting an introducer sheath in an artery induces vasospasm and transient or, in worst case, permanent vessel occlusion. Therefore the aim of our study was to evaluate the antispastic effect of an NO-eluting introducer sheath on the femoral arteries of juvenile domestic pigs, which have similar lumen size as human radial or cubital arteries.

Methods The access to the right or left femoral artery was performed through direct puncture of the arteries in 20 pigs (30–35 kg). Either a NO-coated sheath or a non-coated control device (6F) were inserted randomly into the right and left femoral arteries, respectively. After sheath placement, an angiography of the femoral arteries was carried out, and sham coronary intervention was performed in order to simulate the shear stress outside the sheath, in contact with the artery. After 1 hour coronary procedure, angiography of the femoral artery was repeated, the sheaths were pulled out, and Angio-Seal closure device was used to close the arterial puncture site. 10 animals (Group Acute) were euthanized and 10 animals (Group FUP) were allowed to recover. A week later control angiography of the right and left iliaca, and femoral arteries were performed using a carotid artery access. The femoral arteries of both groups were harvested and assessed histopathomorphometrically and histophathologically.

Results Angiography revealed significant larger proximal and distal reference diameters of the femoral arteries after the procedure with NO-eluting sheaths as compared to non-coated control devices (prox ref. diam.: 4.27 ± 0.40 mm vs 3.77 ± 0.42 mm; p = 0.01 and dist. ref. diam.: 3.37 ± 0.46 mm vs 2.74 ± 0.53 mm; p = 0.001). Histopathological results show a trend towards lower luminal thrombosis with NO-coated devices as compared to control devices after one week (2.7 ± 3.6 % vs 4.9 ± 5.6 % thrombosis occupying the lume; p = 0.331).

Conclusion The inseration of the NO-eluting sheath shows efficiency in preventing acute vasospasm during catheterization and resulted in a trend towards less luminal thrombosis.

Determinanten des NT-proBNP bei Mitralklappenprolapssyndrom 006

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Einleitung B-Typ natriuretisches Peptid (BNP) und N-terminales proBNP (NT-proBNP) erlangen zunehmendes Interesse auch zur Verlaufskontrolle von Patienten mit Vitien. Allerdings gibt es noch wenige größere Studien zur Rolle des NT-proBNP bei Patienten mit primärer Mitralklappeninsuffizienz (MI). Daher untersuchten wir NT-proBNP bei Patienten mit Mitralklappenprolaps (MKP) und MI unterschiedlicher Schweregrade.

Methodik Es wurde NT-proBNP bei 72 Patienten (50 Männer, 22 Frauen; Alter: 63,7; Min-max-Jahre) mittels eines Routinetest von Roche Diagnostics bestimmt. Eine Standardechokardiographie wurde bei allen Patienten routinemäßig durchgeführt und die folgenden Messgrößen erhoben: Diameter und Wandstärken der Herzhöhlen, sPAP, LVEF, MI-Schweregrad. Das NYHA-Stadium, klinische Zeichen der kardialen Dekompensation, Rhythmus und Medikation wurden erhoben. Zusätzlich wurden alle Standardlaborparameter (z. B. Blutbild, Hämogloben, Nieren- und Leberwerte) routinemäßig bestimmt.

Ergebnisse 26 Patienten zeigten Beinödeme. Die NYHA-Stadienverteilung war wie folgt: 21 I, 20 II, 26 III, 5 IV. 24 Patienten waren im Vorhofflimmern. MI-Schweregradverteilung: 5 I, 7 II, 32 III und 28 IV. In einem multiplen linearen Regressionsmodell fanden sich von allen echokardiographischen, klinischen, demografischen und Laborparametern eine unabhängige, signifikante Assoziation des NT-proBNP (mit abnehmenden Beta-Koeffizienten und zunehmendem p-Wert) nur mit dem Vorhandensein von klinischen Zeichen der kardialen Dekompensation, von Vorhofflimmern, dem Schweregrad der MI und der Größe des linken Vorhofes.

Schlussfolgerung Unsere Ergebnisse zeigen, dass die echokardiographischen Parameter der Linksventrikelfunktion und -größe keine signifikante Assoziation mit NT-proBNP bei einer primären MI zeigen. Erwartungsgemäß waren klinische Zeichen der kardialen Dekompensation, der Rhythmus, die Größe des linken Vorhofes und der MI-Schweregrad unabhängige signifikante Prädiktoren.

Das Myokardinfarkt-Netzwerk Mostviertel: 1-Jahres-Ergebnisse 011

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Einleitung Die Prognose des ST-Hebungs-Infarktes (STEMI) hängt vom Zeitintervall zwischen Schmerzbeginn und Reperfusion durch Thrombolyse (TT) oder primärer koronarer Intervention (PPCI) ab. Durch die Etablierung von Netzwerken zur Versorgung von Patienten mit STEMI, konnte eine Verbesserung der Prognose erzielt werden. Informationen hinsichtlich der Etablierung von Myokardinfarkt-Netzwerken im ländlichen Raum sind dagegen nur spärlich vorhanden. Es wurde daher im Juli 2006 das Myokardinfarkt-Netzwerk Mostviertel in Niederösterreich gegründet, um in einer ersten Phase (August–Dezember 2006) den Ist-Zustand der STEMI-Versorgung zu erheben. Auf der Basis dieser Daten wurde in einer zweiten Phase (Jänner–Juli 2007) ein standardisiertes Transport- und Behandlungsprotokoll etabliert, um die internationalen Richtlinien in der Behandlung des STEMI einzuhalten.

Methodik Das Netzwerk Mostviertel besteht aus 5 primär versorgenden Krankenhäusern (Lilienfeld, Melk, Waidhofen/Ybbs, Amstetten, Scheibbs) und dem PCI-Zentrum St. Pölten. Die Notarztstützpunkte der jeweiligen Krankenhäuser sowie der Stützpunkt Pöggstall (Bezirk Melk) waren in das Netzwerk ebenfalls eingebunden. In der primären Phase wurden die Behandlungsstrategien die inter- und intrahospitalen Transferzeiten und die 30-Tage-Mortalität erfasst. In der zweiten Phase wurden die Behandlungsstrategien entsprechend den internationalen Richtlinien (AHA und ESC) etab-

Tabelle 5: M. M. Hirschl et al.

	AUG–DEZ 2006	JÄN–JUL 2007	p-Wert
Zahl der Patienten	132	113	
Schmerz–1.EKG (min)	376 (124)	172 (111)	< 0,001
Transportzeit nach St. Pölten (min)	158 (46)	84 (22)	< 0,01
1. EKG–PCI (min)	240 (98)	182 (78)	< 0,01
Richtlinienkonforme Therapie (%)*	88 %	96 %	n. s.
30-Tage-Mortalität	10,3 %	7,5 %	< 0,05

* Acetylsalicylsäure, Clopidogrel, Heparin (UFH oder LMWH)

liert. Ziel der Studie war es, die Auswirkungen des Netzwerkes auf die Behandlungsqualität, die Transferzeiten und die 30-Tage-Mortalität zu evaluieren.

Resultate Es wurden 245 Patienten (Phase 1: 132, Phase 2: 113) mit akutem STEMI im Netzwerk versorgt. **Tabelle 5** zeigt die Transportzeiten, der Behandlungsqualität und der 30-Tage-Mortalität im Vergleich der beiden Beobachtungszeiträume.

Zusammenfassung Die Etablierung des Netzwerkes führte zu einer signifikanten Reduktion der Transferzeiten (inter- und intrahospital). Die bereits sehr hohe Behandlungsqualität konnte durch die Etablierung von Netzwerkstandards weiter verbessert werden. Die Veränderungen der Transportzeit und die Erhöhung des Prozentsatzes richtlinienkonformer Therapie bewirkten eine signifikante Reduktion der 30-Tage-Mortalität.

Signifikante Reduktion von NT-Pro-BNP nach Hochfrequenzablation von paroxysmalem und kurzzeitig persistierendem Vorhofflimmern als klinischer Erfolgsparameter 060

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Einleitung Im Vergleich zu Patienten (P) mit Sinusrhythmus weisen Patienten mit Vorhofflimmern, möglicherweise als Ausdruck einer subklinischen Herzinsuffizienz, erhöhte NT-Pro-BNP-Werte (BNP) auf. Ziel unserer Untersuchung war es festzustellen, ob BNP durch eine erfolgreiche Pulmonalvenenisolation (PVI) beeinflusst werden können.

Methoden Bei 52 konsekutiven P (mittleres Alter 62 ± 8 Jahre, 35 männlich [67 %] mit einer Auswurffraktion von 63 ± 6 %), die aufgrund von hochsymptomatischem paroxysmalem oder kurzzeitig persistierendem Vorhofflimmern (AF) ohne zugrunde liegender struktureller Herzerkrankung einer PVI unterzogen wurden, erfolgte eine BNP-Bestimmung vor und 3 Monate nach durchgeführter Ablation. Basierend auf einem persönlichen Patiententagebuch zum Eintragen von Dauer und Frequenz des Auftretens von AF-Episoden und wiederholten 24-Stunden-EKGs wurden die Patienten in 2 Gruppen aufgeteilt: 36 P (69 %) hatten einen klinischen Erfolg und 16 P hatten weiterhin Episoden von AF. Bezüglich demografischer oder prozeduraler Daten zeigten sich keine Unterschiede in beiden Gruppen.

Ergebnisse BNP vor PVI waren in den beiden Gruppen vergleichbar (431 ± 603 pg/ml vs. 535 ± 531 pg/ml; $p > 0,05$), aber gegenüber der Norm erhöht (Referenzwert: 0–125 pg/ml). Nach 3 Monaten wiesen P mit klinisch erfolgreicher PVI signifikant niedrigere BNP gegenüber der Gruppe ohne erfolgreicher PVI auf (336 ± 461 pg/ml vs. 796 ± 906 pg/ml; $p = 0,03$). Gegenüber vor der PVI ergab sich in der erfolgreich behandelten Gruppe ein Trend, aufgrund der zu geringen Fallzahl jedoch keine statistische Signifikanz ($p > 0,05$). Dadurch ergab sich mittels BNP-Reduktion eine Spezifität von 67 % und eine Sensitivität von 57 % bezüglich klinischem Erfolg.

Schlussfolgerung Bei P mit AF ohne struktureller Herzerkrankung und ohne klinischer Zeichen einer manifesten Herzinsuffizienz sind BNP erhöht gegenüber der Referenz bei P ohne Arrhythmien. Nach erfolgreicher PVI ist ein signifikanter Rückgang der BNP im Vergleich zu P ohne erfolgreicher PVI zu beobachten.

Randomisierter angiographischer Vergleich von Restenoserate und Late-lumen-loss zwischen Paclitaxel-eluting Stents versus Bare-metal Stents bei Nierenarterienstentimplantation 075

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Einleitung Bei hämodynamisch signifikanten Nierenarterienstenosen (NAS) und klinisch relevanter Hypertonie ist eine perkutane Angioplastie mit Stentimplantation eine etablierte Therapieoption. Trotz des meist größeren Gefäßdurchmessers kann es jedoch ebenso wie bei Koronarstents hierbei zu Instent-Restenosen (ISR) kommen. Eine Evidenz für die Verhinderung dieser ISR durch Verwendung medikamentös beschichteter Stents liegt jedoch noch nicht vor. Wir verglichen in unserer Untersuchung den angiographischen Verlauf von Patienten (P) mit hämodynamisch relevanten NAS und Implantation von Bare-metal Stents (BMS) oder Paclitaxel-eluierende Stents (PES).

Methoden Wir schlossen prospektiv alle P mit einer schlecht einstellbaren Hypertonie, definiert durch rezidivierende Blutdruckentgleisungen trotz medikamentöser Therapie und einer angiographisch gesicherten zumindest unilateralen signifikanten NAS, in die Studie ein. Unmittelbar vor der Intervention wurden die P zu einem BMS oder PES randomisiert. Eine invasive angiographische Kontrolle wurde nach 6 Monaten durchgeführt. Sämtliche angiographische (automatisierte quantitative Auswertung) Daten wurden prospektiv und bezüglich des implantierten Stents verblindet evaluiert. Eine signifikante ISR wurde mit einem Stenosegrad < 70 % definiert.

Ergebnisse 78 P (48 Frauen) mit insgesamt 88 NAS (bei 10 P [16 %] bilaterale Stenosen) und einem durchschnittlichen Alter von 72 ± 9 Jahren wurden randomisiert. In 43 S (49 %) erfolgte die Implantation eines PES (Taxus, Boston Scientific) und in 45 S (51 %) eines BMS (Radix, Sorin). Bei 10 P erfolgte eine bilaterale Implantation. Die Stentimplantation war bei allen P erfolgreich. Der mittlere Stentdiameter betrug 5,4 ± 0,8 mm (BMS) vs. 4,7 ± 0,7 mm (PES, $p < 0,05$) und einer mittleren Stentlänge von 14,4 ± 2,5 mm (BMS) vs. 15,4 ± 3,8 mm (PES, $p > 0,05$). Eine angiographische Kontrolle wurde in der BMS-Gruppe bei 33 NAS (73 %) sowie bei 30 NAS (70 %) der BPS-Gruppe durchgeführt. Insgesamt betrug der Late-lumen-loss 0,8 ± 0,7 mm (PES) vs. 1,5 ± 1,1 mm (BMS; $p = 0,02$), wobei sich 4 ISR (8,9 %) in der BMS-Gruppe und 2 ISR (4,7 %, p = n.s.) in der PES-Gruppe fanden.

Schlussfolgerung Die Stentrevaskularisation von Nierenarterienstenosen zeigt sowohl bei PES als auch bei BMS bezüglich Lumenerhalt effektive Langzeitergebnisse. PES verhindern auch in NAS eine überschießende Intimahyperplasie im Sinne eines verminderten Late-lumen-loss. Die Rate signifikanter Restenosen lag bei den PES trotz signifikant geringerem Stentdurchmesser nur halb so hoch wie bei den BMS. Aufgrund der geringen Fallzahl erreichte diese Differenz jedoch keine Signifikanz.

Monocyte Chemoattractant Protein 1 and Macrophage Colony Stimulating Factor Are Markers of Adverse Outcome in Heart Failure Patients 113

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Introduction Recruitment and differentiation of progenitor cells may play an important role in the repair of injured myocardium. Granulocyte colony stimulating factor (G-CSF) is an important

mobilization factor for hematopoietic progenitor cells, whereas monocyte chemoattractant protein 1 (MCP-1) and macrophage colony stimulating factor (M-CSF) are essential cytokines for recruitment and survival of monocytic progenitor cells and macrophages.

Methods G-CSF, MCP-1 and M-CSF protein was determined in baseline plasma of 360 patients (mean age 72 ± 13 years) with advanced heart failure with a mean BNP 678.98 ± 760.45 pg/ml and LVEF of 28.8 ± 10 % by specific ELISAs. 35 % of the patients were females. During a median follow-up period of 16 month (confidence interval [CI]: 15–17) 92 patients died (26 %), death was used as endpoint.

Results While plasma levels of G-CSF were not significantly different in the event group (27.95 ± 20.25 vs 25.55 ± 21.37 pg/ml; p = 0.064) MCP-1 (103.54 ± 76.81 vs 87.46 ± 64.18 pg/ml; p = 0.036) and M-CSF (659.5 ± 413.13 vs 434.25 ± 343.88 pg/ml; p < 0.001) were significantly higher in the event group compared to the event-free group. Univariate Cox regression analysis showed a trend for a protective effect of G-CSF with a crude proportional hazard ratio (HR) of 0.70 (95 %-CI: 0.42–1.15; p = 0.161) and a significant harmful effect of MCP-1 with a HR of 1.78 (95 %-CI: 1.04–3.04; p = 0.035) for death comparing third to first tertile. Furthermore, we found a significant gradual increase of risk for death with concentrations of M-CSF with a HR of 2.31 (95 %-CI: 1.31–4.06; p = 0.004) between the second and the first tertile and a HR of 2.64 (95 %-CI: 1.51–4.62; p = 0.001) between the third and the first tertile. Applying multivariable analysis (including clinical variables and BNP) the HR was 1.84 for MCP-1 (95 %-CI: 1.05–3.23; p = 0.033) and 1.89 for M-CSF (95 %-CI: 1.05–3.4; p = 0.033) comparing third to first tertile.

Conclusion Our results indicate that higher plasma levels of MCP-1 and M-CSF are associated with a higher rate of mortality in heart failure and could serve as independent markers besides BNP. Therefore we speculate that a prolonged activation of monocytes and macrophages could have detrimental effects on the injured myocardium.

Prognostic Relevance of TIMI flow and NT-proBNP Concentrations in ST-Elevation Myocardial Infarction: A Substudy of ASSENT IV-PCI 100

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Background We investigated the prognostic significance of NT-proBNP in addition to TIMI flow determined prior to coronary intervention in STEMI patients from ASSENT IV-PCI.

Methods Plasma NT-proBNP was available in 1,037 STEMI patients (pts) when pts were randomized to primary PCI) or to full-dose tenecteplase prior to PCI (fPCI). The study endpoint was the composite of death, cardiogenic shock or congestive heart failure at 90 days. The Chi-square (Chi^2) Automatic Interaction Detectors algorithm (CHAID) of classification-tree analysis comprised our statistical calculations.

Results Failure of fibrinolytic therapy to achieve TIMI-3 flow prior to PCI (n = 296) was associated with a significantly higher 90-day event rate (22.0 %) compared to pts with successful fibrinolysis (n = 228; 12.7 %; p = 0.006) or primary PCI (TIMI-3 flow n = 66: 13.6 %; p = 0.13; TIMI 0–2 flow n = 425: 12.0 %; p < 0.001). In latter group prePCI TIMI flow had no influence on clinical outcome. According to CHAID-analyses, patients with NT-proBNP > 694 pg/ml (> 80th percentile) had highest risk for 90-day events in both treatment arms (pPCI: 30.1 %, and fPCI: 36.3 %; p = 0.4) irrespective of TIMI-flow grade before PCI (**Figure 3**). The lowest 90-day event rate was observed in patients with a TIMI-3 flow before PCI pre-treated with fibrinolysis and NT-proBNP levels ≤ 694 pg/m. However, in fibrinolytic nonresponders (TIMI 0–2 flow) event rates were significantly higher than in all other groups.

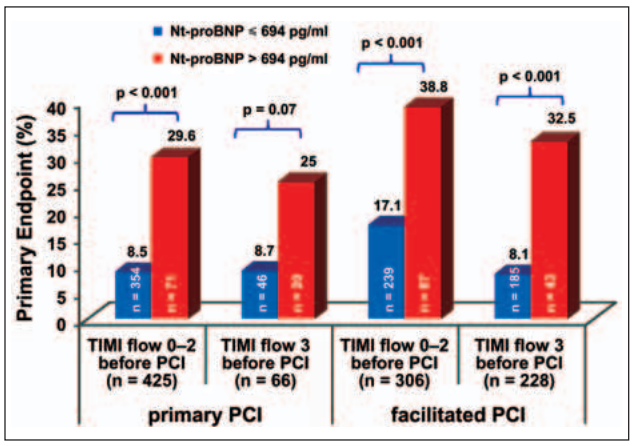

Figure 3: R. Jarai et al.

Conclusion Clinical outcome of pts with high baseline plasma concentrations of NT-proBNP was poor irrespective of TIMI-flow before PCI or the assigned treatment. By contrast in pts with low NT-proBNP levels outcome appeared modulated by prePCI TIMI flow when pre-treated with fibrinolysis.

Relation of NT-proBNP and Time to Treatment to Outcome of Patients with ST-Elevation Myocardial Infarction: an ASSENT IV-PCI Substudy 101

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Background Survival of ST-elevation myocardial infarction (STEMI) pts depends on time between symptom onset and coronary reperfusion. In the present substudy from ASSENT IV-PCI pts were randomly assigned to primary PCI (pPCI) or fibrinolytic-facilitated PCI (fPCI), and we investigated, whether elevated Nt-proBNP in the acute phase of STEMI relates to time to reperfusion and independently predicts outcome irrespective of time.

Methods Plasma NT-proBNP was available in 1,037 STEMI patients when pts were randomized to primary PCI) or to full-dose tenecteplase prior to PCI (fPCI).The study endpoint was the composite of death, cardiogenic shock or congestive heart failure at 90 days. The Chi-square (Chi^2) Automatic Interaction Detectors algorithm (CHAID) of classification-tree analysis comprised our statistical calculations.

Results NT-proBNP concentrations and time-to-treatment showed a weak but significant linear correlation (r = 0.22; p < 0.001). Using time-intervals specified by international guidelines (< 3 h vs ≥ 3 h) median NT-proBNP was significantly higher in pts with longer delay to treatment (pPCI: 90 pg/ml vs 207 pg/ml, p < 0.001; fPCI: 125 pg/ml vs 248 pg/ml, p < 0.001). Using shorter conventional time-intervals (< 2 h, 2–4 h and > 4 h) similar increases of NT-proBNP with time-to-treatment in both study arms (pPCI: 76 pg/ml, 163 pg/ml and 237 pg/ml, p < 0.001; fPCI: 103 pg/ml, 158 pg/ml and 375 pg/ml, p < 0.001) were evident. However, pts with NT-proBNP levels > 694 pg/ml (> 80th percentile) had higher 90-day event rates irrespective of time-to-treatment and the reperfusion-strategy used. Among patients with NT-proBNP of ≤ 694 pg/ml, 90-day event rates increased non-significantly in both treatment groups with increasing time-delay: however they were lower when PCI was performed < 2 hours after symptom onset whereas the highest event rates were associated with fPCI treated > 4 hours (p = 0.01 for trend).

Conclusion Patients with elevated NT-proBNP early in the course of STEMI have a significantly increased 90-day event rates irrespective of the treatment delay and reperfusion strategy. It is fea-

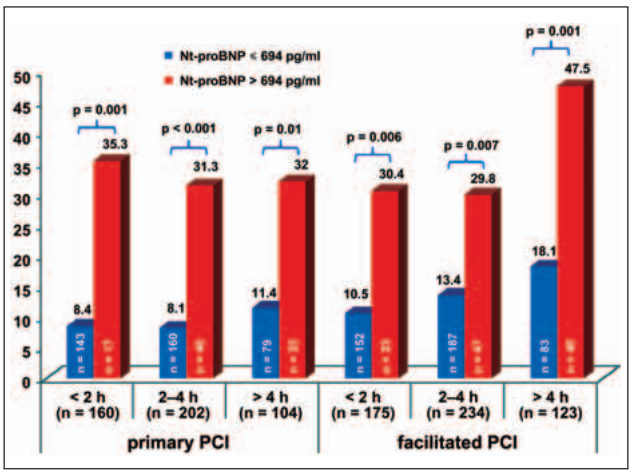

Figure 4: R. Jarai et al.

sible that clinical outcomes of STEMI pts with low NT-proBNP on presentation might be further improved by early initiation of pPCI. Accordingly, determination of Nt-proBNP in the acute phase of STEMI might be helpful in choosing the optimal reperfusion strategy (**Figure 4**).

Prognostische Wertigkeit des Brain Natriuretic Peptide (BNP) für Graftsklerose bei Patienten nach Herztransplantation 090

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Hintergrund Ziel der Studie war die Evaluierung der Wertigkeit von Brain Natriuretic Peptide (BNP) bei Patienten nach Herztransplantationen (HTX) und dessen Nützlichkeit bei der Ermittlung der Graftsklerose für den klinischen Verlauf.

Methodik Eine Gruppe von 48 Patienten (post HTX) die sich aufgrund einer wirksamen Graftsklerose einer invasiven Revaskularisation unterziehen mussten, wurden mit einer Gruppe von Patienten nach HTX ohne wirksame Graftsklerose 1:1 gematcht. Die Gruppen unterschieden sich hinsichtlich Alter, Geschlecht, Patienten und Spendergeschlecht, Diabetes mellitus, Hyperlipidämie, Hypercholesterinämie, Hypertonie, Cytomegalovirus-Status und Grunderkrankung nicht. Patienten, die Abstoßungsreaktionen zeigten, wurden ausgeschlossen. Die BNP-Werte wurden nach einer mittleren Follow-up-Zeit von 72 Monaten nach der HTX analysiert.

Resultate Die mittleren BNP-Werte von Patienten mit manifester Graftsklerose waren signifikant (3028 pg/ml vs. 493 pg/ml, $p < 0{,}001$) höher als bei Patienten ohne Graftsklerose. Bei 89,58 % der Patienten mit Graftsklerose ist der mittlere BNP-Wert höher als bei der Kontrollgruppe.

Diskussion Das BNP ist ein wertvoller Marker für Patienten nach einer HTX in Hinblick auf eine wirksame Graftsklerose. Weiters stellte sich heraus, dass der BNP-Wert auch im Langzeit-Follow-up für Patienten nach Stentimplantation und PTCA-Eingriffen als nützlicher Marker dient.

Der Einsatz von „Drug-eluting Stents" bei primärer perkutaner Intervention in der Behandlung von ST-Hebungsinfarkten – Outcome und 6-Monats-Follow-up 023

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Einleitung Seit Beginn des „Drug-eluting Stent- (DES-)" Zeitalters gilt der Einsatz dieser Stenttypen beim akuten Myokardinfarkt (AMI) als Off-label-Indikation. Mittlerweile haben sie sich jedoch als Alternative etabliert.

Patienten und Methodik Insgesamt wurde an unserer Abteilung 127 Patienten (P) einer notfallmäßigen Koronarintervention (Akut-PCI) wegen eines AMI mit Implantation eines DES unterzogen. Die Entscheidung über den verwendeten Stenttyp oblag dem jeweils diensthabenden invasiven Kardiologen.

Ein Follow-up wurde 6 Monate nach erfolgter PCI durchgeführt.

Ergebnisse Von 127 P waren 27 (21 %) Frauen, das durchschnittliche Alter lag bei 59,9 ± 13 Jahren. Die durchschnittliche Schmerzdauer lag bei 340 Minuten, die Anzahl der P mit kardiogenem Schock war 16 (13 %), die Anzahl der P, bei denen eine Rescue-PCI nach erfolgloser intravenöser Lysetherapie durchgeführt wurde, war 11 (9 %).

Der Ramus interventricularis anterior war in 67 Fällen (52 %), der Ramus circumflexus in 16 (13 %), die rechte Koronararterie in 39 (31 %), Venengrafts in 4 (3 %) sowie der Hauptstamm der linken Koronararterie in einem Fall (1 %) das Zielgefäß. Die linksventrikuläre Auswurffraktion lag bei 51 ± 13 %. Eine Mehrgefäßerkrankung wiesen 24 P (19 %) auf. 8 P (6 %) verstarben im Rahmen des stationären Aufenthalts.

Die Ergebnisse des 6-Monats-Follow-up waren wie folgt: 113 P (95 %) konnten nachkontrolliert werden; 5 Patienten waren in der Zwischenzeit verstorben. Der klinische Verdacht auf eine Restenose lag bei 36 P vor (33 %), angiographische Instent-Restenosen fanden sich bei 14 P (13 %). Von diesen konnten 10 reinterveniert werden, 4 P wurden zur elektiven aortokoronaren Bypassoperation gesandt. Eine Intervention in einem anderen als dem akuten Zielgefäß der Primärintervention erfolgte bei 6 P (5 %).

Schlussfolgerung Die Intervention mit DES bei AMI ist mit einer Restenoserate von 13 % behaftet und liegt damit deutlich höher als bei der On-label-Anwendung dieser Stenttypen.

High Restenosis-Risk of Drug-Eluting Stents in Patients with Low Basal Endogenous Plasma Levels of VEGF 105

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Background Drug-eluting stents (DES) reduce the rate of instent restenosis (ISR) compared to bare-metal stents (BMS) through inhibition of migration and proliferation of coronary smooth muscle cells. However, recent studies suggest that DES also inhibit endothelial cell proliferation leading to delayed healing of the endothelium and a chronic inflammatory reaction that may result in late stent thrombosis and ISR. VEGF treatment has been proofed to reduce intimal proliferation through accelerated reendothelialization. The aim of this study was to evaluate whether endogenous plasma levels of VEGF are associated with development of ISR after implantation of DES.

Methods and Results We studied 85 patients that were treated with 159 DES. Blood samples for measurement of VEGF antigen were taken directly before and 24 hours after implantation of DES. Restenosis was evaluated at 6 to 8 months by coronary angiography. During the follow-up period, 2 patients (2.4 %) died of cardiovascular causes and 12 patients (14.5 %) developed ISR. Patients with ISR showed significantly lower plasma levels of VEGF compared to patients without ISR ($p < 0.05$). Restenosis rates declined according increasing tertiles of VEGF (25.9 %, 14.3 % and 3.6 %; $p < 0.05$) independently from clinical and angiographic risk factors. Interestingly, patients with ISR showed an overshooting increase of VEGF plasma levels 24 hours after PCI (± 0 % vs + 298 %; $p < 0.001$).

Conclusion Low endogenous plasma levels of VEGF are associated with increased ISR rates in DES possibly due to delayed reendothelialization. Whether low endogenous VEGF is also associated with late stent thrombosis needs to be further studied.

Immediate Primary Transcatheter Closure of Post-infarction Ventricular Septal Defects: A Prospective Series of 29 Cases 073

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Background Immediate surgical repair of ventricular septal defect (VSD) complicating acute myocardial infarction is associated with high mortality. Percutaneous device closure of postinfarction VSD appears to be safe and effective in patients treated for a residual shunt after initial surgical closure or in the chronic setting after VSD occurrence. Primary transcatheter VSD closure early after diagnosis might offer advantages over surgery.

Methods and Results Between 09/2003 and 02/2008 29 consecutive patients underwent primary transcatheter VSD closure. Clinical, procedural and outcome data were collected.

For risk assessment patients were divided into those with and those without cardiogenic shock at presentation. The median follow-up time was 730 days. The median time between VSD occurrence and closure was 1 day (interquartile range 1.0; 3.0) and the initial procedural success rate was 86 %. Procedure related complications such as major residual shunting, left ventricular rupture and device embolization occurred in 41 %. The overall 30-day survival rate was 35 %. Mortality was higher for cardiogenic shock in comparison to non-shock patients (88 % vs 38 %; $p < 0.001$, log-rank).

Conclusions Interventional VSD closure is a promising technique with a high initial success rate. It might offer an alternative to surgery in particular in critically ill patients. Despite the less invasive technique, mortality of postinfarction VSD remains high in particular for patients in cardiogenic shock. Further developments in devices and delivery techniques are required.

Are there Gender-Specific Differences in NT-proBNP Levels? 098

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Background and Aim The diagnosis of heart failure (HF) as a clinical syndrome could be in some cases rather difficult. In the last years the use and measurement of natriuretic peptides (NP) is well established in routine clinical practice and provides additional information concerning diagnosis and prognosis. Gender-specific differences in diagnosis, therapy and management in chronic heart failure (CHF) between men and women are evident, and determination of NP could deliver complementary information in this specific aspect.

Methods Plasma NT-proBNP levels of 250 patients from our HF outpatient unit on optimized neurohumoral HF therapy were recorded. We compared the NT-proBNP values in different New York Heart Association (NYHA) classes between men and women.

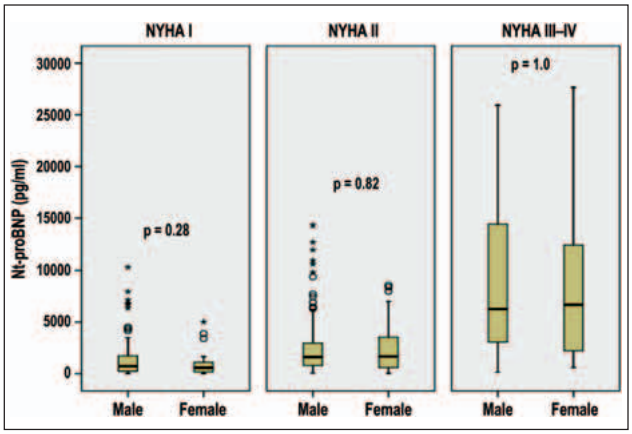

Figure 5: I. Kozanli et al.

Results NT-proBNP values showed a correlation to the NYHA class, but there was no significant difference between males and females in each NYHA class (NYHA I $p = 0,28$, II $p = 0,82$, III–IV $p = 1,0$). The NT-proBNP ranges are given in **Figure 5**.

Conclusions Among outpatients with stable HF elevated NT-pro BNP levels are demonstrating a good relation to the functional class independent from sex. This relationship highlights the importance of measurement of NP to detect clinical severity of disease with higher NT-proBNP values without gender-specific aspects.

HK-Angiographie nach CT-Angiographie 096

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Die Darstellung der Herzkranzgefäße in der CT-Angiographie mittels Multislice-CT findet eine zunehmende Verbreitung. In unserer Sonderkrankenanstalt-Rehabilitationszentrum St. Radegund wurden im Jahr 2007 44 Patienten (Pat.) mit vorbestehendem CTA-Befund zur Herzkatheteruntersuchung zugewiesen.

Verglichen mit der CTA zeigen sich im HK folgende Ergebnisse:

LM:
- in CTA 39 Pat. < 50 %, davon 1 Pat. falsch negativ: im HK 1 Pat. > 50 %;
- in CTA 5 Pat. > 50 %, davon 2 Pat. falsch positiv: im HK 2. Pat < 50 %;

LAD:
- in CTA 13 Pat. < 50 %, davon 2 Pat. falsch negativ: im HK 2 Pat. > 50 %;
- in CTA 31 Pat. > 50 %, davon 12 Pat. falsch positiv: im HK 12 Pat. < 50 %;

LCX:
- in CTA 28 Pat. < 50 %, davon 5 Pat. falsch negativ: im HK 5 Pat. > 50 %;
- in CTA 16 Pat. > 50 %, davon 5 Pat. falsch positiv: im HK 5 Pat. < 50 %;

RCA:
- in CTA 28 Pat. < 50 %, davon 5 Pat. falsch negativ: im HK 5 Pat. > 50 %;
- in CTA 16 Pat. > 50 %, davon 3 Pat. falsch positiv: im HK 3 Pat. < 50 %.

Bei einer Fallzahl von 44 Patienten, die nach einer CT-Angiographie zur einer weiteren invasiven Abklärung zugewiesen wurden, bestätigt diese Evaluierung die Daten aus der Literatur. Derzeit bietet die invasive Abklärung mittels Herzkatheter die größere Genauigkeit in der Graduierung koronarvaskulärer Stenosen.

Therapierefraktäre ektope atriale Tachykardie aus der Vena cava superior 087

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Fokale atriale Tachykardien sind selten, machen bei elektrophysiologischen Untersuchungen weniger als 10 % aller Rhythmusstörungen aus und haben ihren Ursprung hauptsächlich im Bereich der Crista terminalis, in den Pulmonalvenen sowie am Mitralring. Wir beschreiben eine Patientin mit einer medikamentös therapierefraktären fokalen atrialen Tachykardie mit ungewöhnlichem und sehr seltenen Ursprungsort, der Vena cava superior (VCS).

Eine 62-jährige Patientin wurde mit einer seit Stunden anhaltenden supraventrikulären Tachykardie in ein auswärtiges Krankenhaus eingewiesen. Die Patientin war bei der Aufnahme kreislaufstabil, klagte nur über geringe Dyspnoe. In der Vorgeschichte hatte die Patientin vor wenigen Wochen einmalig für wenige Stunden anhaltendes Herzrasen mit spontaner Terminierung. Die weitere ausführliche kardiale Vorgeschichte war unauffällig. Im EKG zeigte sich eine Schmalkomplextachykardie mit einer Herzfrequenz von 170/Minute. Eine medikamentöse Terminierung mit Betablocker (BB),

Klasse-I- und Klasse-IIII-Antiarrhythmika war ineffektiv. Eine nachfolgend durchgeführte elektrische Kardioversion brachte bis auf einen für 10 Schläge anhaltenden Sinusrhythmus ebenfalls keinen Erfolg. Daraufhin wurde die Patientin zur weiterführenden invasiven Abklärung an unsere Abteilung transferiert.

In der elektrophysiologischen Untersuchung zeigte sich unter BB-Therapie eine anhaltende atriale Tachykardie mit einer atrialen Tachykardie-Zykluslänge von 390 msec. und inkonstanter AV-Überleitung. Das Oberflächen-EKG deutete auf eine atriale Tachykardie im hohen rechten Vorhof hin mit positiven P-Wellen in den inferioren und linksgerichteten Ableitungen. Ein Aktivierungsmapping mit einem elektroanatomischen Mapping-System (CARTOTM; Biosense Webster) wurde durchgeführt und die früheste lokale Aktivierung im anterolateralen Bereich der Vena cava superior knapp unterhalb der Aufteilung in die rechte und linke Vena brachiocephalica detektiert. Durch Manipulation in diesem Bereich wurde die Tachykardie vorübergehende mechanisch terminiert. Radiofrequenzenergie wurde daraufhin im Bereich der frühesten lokalen atrialen Aktivierung abgegeben (20 Watt, 20 Sekunden) und eine sofortige Terminierung der atrialen Tachykardie erzielt. In der Kontrollstimulation wurden keine Rhythmusstörungen mehr ausgelöst. Die danach durchgeführte Kontrastmitteldarstellung der VCS sowie die CT-Untersuchung waren unauffällig. Die Patientin ist seit nunmehr 5 Monaten ohne antiarrhythmische Medikation beschwerdefrei.

Unseres Wissens ist dies die erstmalige Beschreibung einer medikamentös therapierefraktären Form einer unaufhörlichen fokalen atrialen Tachykardie aus der Vena cava superior. Im Vergleich zu den Fallberichten in der Literatur wurde die VCS nicht isoliert, sondern der Fokus direkt abladiert.

Telemedizinische Nachkontrolle von Patienten mit ICDs: Zeit- und Kostenersparnis 088

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Hintergrund Durch die stetig wachsende Anzahl von Patienten mit implantierbaren Kardioverter-Defibrillatoren (ICD) sind neue Strategien in der ICD-Patientennachsorge erforderlich, um weiterhin effektive Nachkontrollen durchführen zu können. Die Verwendung neuer telemedizinischer Technologien könnte eine Methode sein, um die steigende Anzahl an Patienten besser bewältigen zu können.

Ziel dieser prospektiven Studie war es, Patientenakzeptanz und Durchführbarkeit sowie Zeit- und Kostenersparnis des neuen Medtronic CareLink-Systems in der Routinenachsorge von ICD-Patienten zu erheben.

Methoden In 2 Zentren wurden konsekutive Patienten mit einem implantieren Medtronic ICD im Rahmen der Routinenachsorgen eingeschlossen. Anstelle 3-monatiger Nachkontrollen im implantierenden Zentrum, überprüften die Patienten ihr ICD-Aggregat mit einem speziellen Monitor zu Hause und sendeten die verschlüsselten Daten über eine Standardtelefonleitung an einen Daten-Server, welche die Ärzte im Folgenden auf einer sicheren Webseite kontrollieren konnten. Die übermittelten Daten sind die gleichen, die während einer konventionellen Nachsorge abgefragt werden, wie z. B. programmierte Parameter, Systemintegritätsdaten und Episodendaten mit EGMs inklusive eines 10 Sekunden-online-EGM zum Zeitpunkt der Übertragung. Die Datensammlung erfolgte während der konventionellen Nachsorge bei Einschluss und nach einem Jahr sowie bei jeder telemedizinischen Fernnachsorge. Die Zeitersparnis für den Patient wurde mit speziellen Fragebögen erfasst, der jeweilige zeitliche Aufwand für den Arzt gemessen und die Kostenreduktion anhand des festgesetzten Kilometergeldes kalkuliert.

Ergebnisse 149 Patienten (Alter 67 ± 12 Jahre) wurden eingeschlossen (Einkammer-ICDs 33, Zweikammer-ICDs 86, CRT-D 30). Während eines durchschnittlichen Nachsorgezeitraumes von 163 ± 77 Tage erfolgten insgesamt 202 Übertragungen. Davon wurden 23 außerplanmäßige Fernnachsorgen aufgrund von Symptomen oder ICD-Schockabgaben durchgeführt. Während des Nachsorgezeitraumes gab es keine falschen oder inkorrekten Übertragungen.

Für Patienten, die zu einer konventionellen Nachsorge anreisten, betrug die durchschnittliche Anreisedistanz zwischen Krankenhaus und Wohnort 48 ± 45 km, die durchschnittliche Anreisezeit war 50 ± 28 min., die Wartezeit 34 ± 31 min. 13 % der Patienten wurden mit einem Krankentransport zum Krankenhaus gebracht. Der Patientenaufwand für eine Fernnachsorge von zuhause betrug 11 ± 6 min. Auf der Seite der Ärzte dauerte eine konventionelle Nachsorge im Krankenhaus durchschnittlich 31 ± 10 min., eine Fernnachsorge 4,5 ± 2,5 min., dies entspricht einer 85%igen Zeitreduktion. Die kalkulierte Transportkostenersparnis betrug € 38 ± 31 pro Patient.

Zusammenfassung Die Fernnachsorge mit dem Medtronic CareLink-System ist eine praktikable und sichere Methode in der Routinenachsorge von ICD-Patienten mit signifikanter Zeit- und Kostenersparnis für Patient und Arzt bei gleichwertiger Qualität der Nachkontrolle. Die Implementierung des Systems als Routinekontrolle in der ICD-Nachsorge würde mit einer Kostenreduktion für das Gesundheitssystems verbunden sein.

Lebensdauer der einzelnen ICD-Geräte in Abhängigkeit von Gerätetyp und Hersteller 092

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Hintergrund Der implantierbare Kardioverter-Defibrillator (ICD) ist eine etablierte Therapie in der Sekundär- und Primärprävention des plötzlichen Herztodes. Neben Sicherheit und adäquater Therapieabgabe ist die Lebensdauer eines ICD-Aggregates von ausschlaggebender Bedeutung für Arzt und Patient. Abgesehen von den Angaben der Hersteller sind Daten zur Lebensdauer der einzelnen ICD-Aggregate begrenzt.

Das Ziel dieser Untersuchung war die Evaluierung der Lebensdauer der unterschiedlichen ICD-Aggregate in Abhängigkeit vom Gerätetyp und Hersteller.

Methoden Alle Patienten, bei denen an unserer Abteilung zwischen Jänner 1995 und Februar 2008 eine ICD-Implantation durchgeführt wurde, sind für die Evaluierung herangezogen worden. Die Lebensdauer von Einkammer- (VVI), Zweikammer- (DDD) und biventrikulären ICD-Systemen (CRT-D) wurde bei allen Aggregaten berechnet, die die Kriterien zum elektiven Aggregatwechsel (ERI) erreichten. Ausgeschlossen wurden Patienten mit vorzeitigem Aggregatwechsel aufgrund einer Taschеninfektion, Aufrüstung auf ein DDD- oder CRT-D-System oder eines empfohlenen Austausches wegen möglicher technischer Defekte einzelner Gerätetypen.

Ergebnisse Im Beobachtungszeitraum zwischen 1995 und 2008 wurden insgesamt 758 ICD-Implantationen durchgeführt, davon 191 (25,2 %) Aggregatwechsel. Bei 161 erfolgte der Austausch wegen Batterieerschöpfung (VVI 78, DDD 56, CRT-D 27). Die mittlere Lebensdauer lag bei 58,3 ± 17 Monate (VVI 59,6 ± 17.6; DDD 58,8 ± 17,3; CRT-D 53,6 ± 14,4 Monate). 12 Aggregate hatten eine Lebensdauer unter 3 Jahren, bei 9 betrug sie mehr als 7 Jahre (maximale Lebensdauer 102 Monate). Die Lebensdauer der ICD-Aggregate differierte innerhalb der einzelnen Hersteller signifikant: Medtronic 65,8 ± 15,5 Monate, Guidant/Boston 54,8 ± 14,9, St. Jude Medical 41,2 ± 7,5 und Intermedics 36,3 ± 1.

Zusammenfassung In unserem Kollektiv war die durchschnittliche Lebensdauer der ICD-Aggregate nahezu 6 Jahre. Bei den unterschiedlichen Gerätetypen konnte keine signifikante Beeinflussung der Lebensdauer nachgewiesen werden, ein signifikanter Unterschied konnte jedoch zwischen den verschiedenen Herstellern beobachtet werden.

Atrial Fibrillation is a Strong and Independent Predictor of Death and Coronary Events in Angiographied Coronary Patients 025

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Background The impact of atrial fibrillation on future coronary events is uncertain. In particular, the prognostic impact of atrial fibrillation in the clinically important population of angiographied coronary patients is unknown.

Objective The aim of our study was to investigate 1.) the prevalence of atrial fibrillation, 2.) its association with coronary atherosclerosis, and, 3.) its impact on future events in angiographied patients.

Methods In a consecutive series of 613 patients who underwent coronary angiography we evaluated electrocardiograms. Prospectively, we recorded death and cardiovascular events over 4.0 ± 0.6 years.

Results From our patients, 37 (5.9 %) at baseline had atrial fibrillation, and 576 (92.6 %) exhibited sinus rhythm. Presence of atrial fibrillation was associated with a lower prevalence of coronary artery disease and of significant coronary stenoses ≥ 50 % at the baseline angiography. However, prospectively, patients with atrial fibrillation were at a strongly increased risk of all-cause mortality (adjusted hazard ratio [HR] = 0.15 [2.36–11.26]; $p < 0.001$), coronary death (HR = 8.16 [2.89–23.09]; $p < 0.001$), and major coronary events (HR = 3.80 [1.45–9.94]; $p = 0.007$).

Conclusions Although inversely associated with the presence of angiographically determined coronary atherosclerosis, atrial fibrillation is a strong predictor of death and future coronary events in angiographied coronary patients.

Prevalence of Pulmonary Hypertension in Patients after Splenectomy 067

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Background Patients after splenectomy are at increased risk of developing chronic thromboembolic pulmonary hypertension (CTEPH). However, the prevalence of CTEPH among splenectomized individuals is unknown.

Methods In the context of the pulmonary hypertension (PH) screening program at the Medical University of Vienna, 1100 general practitioners and internal medicine specialists in Vienna and Lower Austria were invited to refer patients (pts) at least one year after splenectomy. Screening was performed by transthoracic echocardiography with Doppler. In cases of elevated systolic pulmonary arterial pressure (sPAP > 40 mmHg) and absence of left ventricular or valvular dysfunction, right heart catheterization was performed.

Results Between November 2006 and October 2007, 91 patients were referred (50 males/41 females). Mean age was 52.6 ± 14.2 years. Median time since splenectomy was 143 months. Reasons for splenectomy were trauma (n = 39), hematological disorders (n = 18), surgical complications (n = 18) and others (n = 16). CTEPH was newly diagnosed in 4 pts who had suffered from exertional dyspnea.

Table 6: A. Martischnig et al.

Parameter	Patients (n = 13)	Controls (n = 8)	p-value
Age (years)	72.8 ± 8.4	54.4 ± 18.7	0.023
Sex (male)	4	4	0.239
mDCs (%)	0.19 ± 0.07	0.10 ± 0.52	0.012
pDC (%)	0.97 ± 0.10	0.06 ± 0.03	0.282
TNF-alpha (%)	53.73 ± 13.06	32.76 ± 24.07	0.048
IL1-beta (%)	52.90 ± 4.94	41.93 ± 23.37	0.478

Conclusion CTEPH was diagnosed in 4.4 % of pts after splenectomy. Echocardiographic screening for CTEPH is useful after splenectomy, especially in pts with unexplained dyspnea.

The Role of Myeloid Dendritic Cells in Calcific Aortic Stenosis 068

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Background The degree of valvular calcification predicts disease progression in calcific aortic stenosis (CAS). Recently, dendritic cells (DCs) that ingress from circulating blood have been identified in aortic valves explanted from patients with CAS. We hypothesized that the number of circulating DCs is increased in affected individuals and correlates with the degree of valvular calcification.

Methods Venous blood and aortic valve tissue were obtained from 13 otherwise healthy patients undergoing valve replacement surgery for CAS. Eight healthy individuals served as controls. Circulating myeloid DCs (mDCs) defined as $CD14^{-}CD16^{-}CD85^{+}CD33^{+}$, plasmacytoid DCs (pDCs) defined as $CD14^{-}CD16^{-}CD85^{+}CD123^{+}$ and respective cytokines, such as interleukin-1, interleukin-2 and tumor necrosis factor α (TNFα) were analyzed using 5-color flow cytometry. After explantation, the degree of aortic valve calcification was quantified by computed tomography utilizing the Agatston score.

Results Compared with controls, CAS patients displayed higher numbers of circulating mDCs with increased levels of corresponding cells-bound cytokines interleukin-1 and TNFα. There was a borderline correlation between the number of peripheral blood mDCs and the Agatston score ($\rho = 0.66$, $p = 0.07$).

Conclusion The number of circulating mDCs and corresponding cell-bound cytokines are increased in CAS and may serve as biomarkers for calcification and disease progression in affected patients (**Table 6**).

Chronic Thromboembolic Pulmonary Hypertension and Associated Medical Conditions 069

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Rationale CTEPH is characterized by nonresolving pulmonary thromboemboli. Although traditional thrombosis risk factors are generally absent, specific CTEPH-predisposing medical conditions, such as splenectomy, ventriculo-atrial (VA-) shunt and certain inflammatory disorders have been identified.

Objective We sought to confirm known and to identify novel CTEPH risk factors in a large cohort of prevalent CTEPH cases collected in 3 European centers offering pulmonary endarterectomy.

Methods and Measurements Data from CTEPH patients were compared with pulmonary arterial hypertension cohorts at the participating institutions utilizing logistic regression analysis.

Main Results The study population comprised 585 patients assessed at the time of diagnosis between 1996 and 2007. Among 401 patients with CTEPH were 53 % females, mean age was 56 ± 14 years and the median (lower quartile, upper quartile) pulmonary vascular resistance was 822 (571, 1095) dynes.s.cm-5. Data confirmed that patients with VA-shunts and patients with infected

pacemakers (odds ratio [OR] and 95 %-CI 76.40 [7.67–10351]; p < 0.001), splenectomy (OR 17.87 [1.56–2438]; p = 0.17), previous venous thromboembolism (VTE) (OR 4.52 [2.35-9.12], p < 0.001), recurrent VTE (OR 14.49 [5.40-43.08], p < 0.001), blood groups non-0 (OR (OR 2.09 [1.12–3.94]; p = 0.019), and lupus anticoagulant/anti-phospholipid antibodies (OR 4.20 [1.56–12.21]; p = 0.004) have an increased risk for CTEPH. Thyroid replacement therapy (OR 6.10 [2.73–15.05]; p < 0.001) and a history of malignancy (OR 3.76 [1.47–10.43]; p = 0.005) emerged as novel CTEPH risk factors.

Conclusions This European database confirmed previous knowledge on CTEPH risk factors, and identified thyroid replacement therapy and a history of malignancy as new medical conditions associated with CTEPH.

NT-proBNP Early After Acute Myocardial Infarction: Relation to Infarct Size, Myocardial Function and Serial CK-MB/cTnT Measurements 062

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Background The aim of the present study was to correlate N-terminal brain natriuretic peptide (NT-proBNP) concentrations determined 48 and 72 hours after admission for acute myocardial infarction to infarct size and functional parameters determined by cardiac magnetic resonance (CMR) imaging. Furthermore we compared the results to those obtained with serial creatine-kinase (CK) and cardiac Troponin T (cTnT) measurements.

Methods Therefore we performed CMR in 37 consecutive patients (32 male) within 1 to 6 days after first acute myocardial infarction and primary angioplasty. Infarct size was determined as percent of LV tissue on delayed Gadolinium enhanced phase-sensitive IR-SSFP sequences. End-diastolic (EDV) and end-systolic (ESV) volume as well as ejection fraction (EF) and myocardial mass (MM) were obtained from short-axis cine-MR sequences. Blood was routinely drawn 24, 48 and 72 hours after admission. CK-MB and cTnT values were determined after 23 ± 4, 46 ± 6 and 68 ± 6 hours. NT-pro BNP was determined after 45 ± 10 and 69 ± 6 hours. Mean and maximum values were determined for all laboratory measures.

Results NT-proBNP values significantly correlate positively with infarct size. The strongest correlation was observed if blood was drawn early (r: 0.522 at 48 hours vs r: 0.431 at 72 hours; all p < 0.02). Further NT-proBNP values at 48 hours were inversely correlated with EF and positively with ESV (r: –0.427 and r: 0.349; all p < 0.05) but not with EDV and MM (all p > 0.05). Mean and maximum values seemed not to be superior to measurements at 48 hours. NT-proBNP levels at both timepoints were significantly correlated with CK and cTnT values (all p < 0.01). Mean and maximum CK and cTnT values showed the highest correlation to infarct size (r: 0.610 to 0.706; all p < 0.001).

Conclusion NT-proBNP values determined 48 hours after admission may provide a useful tool in the estimation of infarct size and myocardial functional with similar performance than CK or cTnT determination.

NT-proBNP has a High Negative Predictive Value to Rule-Out Short-Term Cardiovascular Events in Patients with Diabetes Mellitus 043

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Purpose Although it is widely recognized that the absolute risk of cardiovascular events varies among individuals with diabetes mellitus there is a lack of reliable short-term predictors to guide timely and individualized management. This study evaluated the predictive value of NT-proBNP for patients with diabetes and compared the prognostic aptitude of this neurohumoral marker to traditional intermediate and long-term markers of cardiovascular events.

Methods A prospective observational study in 631 patients with diabetes mellitus. The composite endpoint consisted of unplanned cardiovascular hospitalization and death within the observation period of 9.1 ± 4. 7 months.

Results NT-proBNP was significantly associated with an increased risk of reaching the composite endpoint in the entire population (p < 0.0001). The association was maintained for patients without a history of cardiovascular disease (p < 0.0001). Of all variables analyzed (age, gender, history of hypertension, history of ischemic heart disease, history of any cardiac disease, NYHA-class, Dyspnoe Score, Minnesota Living with Heart Failure Questionnaire, history of smoking, duration of diabetes, body mass index, blood pressure, LDL-cholesterol, HbA1c, blood glucose, serum-creatinine, glomerular filtration rate, microalbuminuria), NT-proBNP gave the most potent information in the stepwise logistic regression model (p < 0.0001, with NYHA-class and glomerular filtration as additional independent variables) as well as in a stepwise Cox-regression analysis (p < 0.0001, with duration of diabetes, Dyspnoe Score and glomerular filtration rate as additional independent variables).

Conclusions In the present study we have demonstrated a strong and independent correlation between plasma NT-proBNP levels and short-term prognosis of cardiovascular events for patients with diabetes mellitus. With a high negative predictive value it can safely identify those individuals who are not at intermediate risk for cardiovascular events.

Furthermore, NT-proBNP, a functional marker of cardiovascular health, proved to be of higher predictive value than traditional cardiovascular markers in our study.

Comparison of Copeptin, B-type Natriuretic Peptide, and Amino-Terminal pro-B-Type Natriuretic Peptide in Patients with Chronic Heart Failure: Prediction of Death at Different Stages of the Disease 045

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Purpose Vasopressin has demonstrated to be increasing with the severity of chronic heart failure. Copeptin is a fragment of pre-provasopressin, which is being synthesized and secreted in equimolar amounts to vasopressin. Both hormones have a short life time in vivo – similar to b-type natriuretic peptides – but in contrast to Vasopressin, Copeptin is very stable in vitro. The predictive value of Copeptin has been shown in advanced heart failure, where it was superior to BNP to predict 24-month mortality. Our aim was to evaluate the predictive value of Copeptin over the entire spectrum of heart failure (HF), and compare it to the current benchmark markers, BNP and NT-proBNP.

Methods Long-term observational study in 786 HF patients from the whole spectrum of heart failure (NYHA I–IV, BNP 688 ± 948 pg/ml [range 3–8536 pg/ml] LVEF 25 ± 10 % [range 5–65 %]).

Results NYHA-class was the most potent single predictor of 24-month outcome in a stepwise Cox-Regression model. BNP, Copeptin and glomerular filtration rate were related to NYHA-class (for trend p < 0.0001). Copeptin was the most potent single predictor of mortality in patients with NYHA-class II (p < 0.0001) and NYHA-class III (p < 0.0001). In NYHA-class IV the outcome of patients was best predicted by serum-sodium, but again, Copeptin added additional independent information.

Conclusion Increased levels of Copeptin are linked to excess mortality, and this link is maintained irrespective of the clinical signs of severity of the disease. Copeptin was superior to BNP or

NT-proBNP in this study, but both markers appear to be closely related.

Predictive Value of Repetitive Measurement of Copeptin in Patients with Chronic Heart Failure 046

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Purpose Vasopressin and Copeptin – a fragment of pre-pro-vasopressin – has demonstrated to be increasing with the severity of chronic heart failure. The predictive value of Copeptin has been shown in heart failure. Our aim was to investigate the predictive value of repetitive measurements of Copeptin.

Methods Long-term observational study in chronic heart failure patients that were admitted for an episode of cardiac decompensation. Copeptin was measured at time of discharge and after 3 months.

Results Copeptin was measured in 181 consecutive patients. Mean age was 70 ± 12 years, body mass index 27.4 ± 4.9 kg/m^2, LVEF 29 ± 8 %, NYHA class I/II/III/IV was 0/2/52/46 %. Copeptin at index time was 23.5 ± 24.7 pmol/l and after 3 months 15.4 ± 16.4 pmol/l on average. Copeptin decreased by 8.1 ± 19.4 pmol/l on average. Building a stepwise Cox-regression analysis – corrected for age and gender – Copeptin values at follow-up (Exp [B] 1.031; $p < 0.007$) was the best predictor of death and neither baseline Copeptin nor changes over time contributed additional independent information. In a similar model regarding hospitalization due to heart failure, Copeptin measured at follow-up was again the most potent single predictor (Exp [B] 1.042; $p < 0.001$). Only age could provide additional independent information. The combined endpoint death and hospitalization based on heart failure was best predicted by age (Exp [B] 1.051; $p < 0.0001$) in a Cox regression model, but Copeptin at follow- up revealed additional independent information (Exp [B] 1.032; $p < 0.016$).

Conclusion Increased Copeptin levels measured at follow-up after an episode of cardiac decompensation is a better predictor of outcome than baseline Copeptin levels. Interestingly, changes in Copeptin over time did not reveal additional independent information.

Comparison of Two Cardiac Imaging Modalities: Contrast Enhanced Magnetic Resonance and Echocardiography 049

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Background The purpose of this study is to compare two cardiac imaging modalities, cardiovascular magnetic resonance (CMR) and echocardiography, by using the AHA 17-segments model and to assess the improvement of left ventricular function in patients treated with primary angiography (p-PTCA) for acute myocardial infarction.

Methods We performed CMR and echocardiographic investigations in 64 patients with first AMI shortly after p-PTCA and four months thereafter. Global (EF, %) and regional (systolic wall thickening, %) left ventricular function was determined from Cine-MR images. In echocardiography the global (EF, %) left ventricular function and regional wall motion abnormalities were determined. A segment was scored as infarcted if it was > 50 % hypokinetic.

Results EF in echocardiography correlates with EF MRI at baseline (r: 0.357; $p < 0.004$) and at follow-up (r: 0.553; $p < 0.001$). The total number of infarcted segments in echocardiography correlates with the total number of segments which show a systolic wall thickening (SWT) < 30 % (r: 0.503; $p < 0.001$) at baseline and (r: 0.541; $p < 0.001$) at follow-up. The number of infarcted segments in echocardiography correlates with the number of LE segments and the infarcted mass in grams at baseline (r: 0.468; $p < 0.001$ and r: 0.467; $p < 0.001$) and at follow-up (r: 0.383; $p < 0.002$, and r: 0.561; $p < 0.001$). Out of 1024 evaluated segments the following parameters improvement was highly significant ($p < 0.001$) after a four month period. The total number of infarcted segments in echocardiography decreased from 141 to 78. At baseline the mean EF Echo was 50.67 ± 8.33 % and at follow-up 53.84 ± 8.33 % ($p < 0.01$). The mean EF MRI increased from 43.61 ± 11.09 % to 48.05 ± 11.19 %.

Conclusion CMR and echocardiography correlate well in the assessment of regional wall motion abnormalities and left ventricular function. Systolic wall motion thickening at less than 30 % can be used as a cut-off value to define a pathologic, infarcted segment.

Keine Auswirkungen von altersabhängiger Zunahme der viszeralen Adipositas bei adipösen Frauen auf die Prävalenz kardiometabolischer Risikofaktoren 047

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Einleitung Für die Diagnose der Adipositas werden in der täglichen Praxis BMI und Bauchumfang (BU) herangezogen. Studien zeigen, dass steigender BU (gleichbedeutend mit Zunahme der viszeralen Adipositas) eine höhere prädiktive Aussagekraft für die Entwicklung des Metabolischen Syndroms (MS) hat als der BMI. Die Zunahme des BU bei Frauen mit steigenden Lebensalter ist bekannt (z. B. [Zefalu, Wang 1995]).

Fragestellung Gibt es altersabhängige Unterschiede bei BMI und BU adipöser Frauen? Entstehen dadurch Auswirkungen auf die Prävalenz des MS und/oder seiner Teilfaktoren?

Patienten und Methode Bei 122 konsekutiven adipösen Frauen (BMI > 28 kg/m^2; BU > 88 cm) kaukasischer Abstammung unserer Adipositasambulanz wurden in Abhängigkeit vom Alter, Größe, Gewicht, BU, BMI, syst. und diast. Blutdruck, ges. Chol, HDL-C, Serum TG und Nüchtern-BZ sowie die Prävalenz eines MS (ATP-III-Kriterien) verglichen. Es wurden Mittelwerte, Standardabweichung, Median, Quartile, Minimum und Maximum oder Häufigkeiten errechnet. Die Subgruppenanalysen erfolgten mittels U- und Chi-Quadrat Tests.

Ergebnisse Die Frauen zwischen 22 und 76 Jahren (~ 49,25 Jahre) wurden für die Auswertung 2 Subgruppen zugeordnet: unter 50 Jahre: nc (~ 37,92 Jahre; S.D. 8,18) und über 50 Jahre: nY (~ 61,34 Jahre; S.D. 6,83). Obwohl das ~-Gewicht und der ~-BMI der < 50-jährigen Frauen signifikant höher war als bei den > 50-jährigen (~ 109,96 vs. 100,49; p = 0,003; ~ 39,65 kg/m^2, S.D. 5,99 vs. ~ 37,21 kg/m^2, S.D. 6,46; p = 0,008), war der BU in beiden Gruppen nahezu gleich (~ 114 cm S.D. 0,11 vs. ~ 116 cm; S.D. 0,17; p = 0,923). Beide Altersgruppen hatten eine gleich hohe Prävalenz des MS (60,3 vs. 57,6 %; p = 0,763). Bei den Teilfaktoren des MS waren nur die mit dem Alter korrelierbaren syst. RR-Werte der älteren Frauen signifikant höher (~ 146,67 mmHg; S.D. 21,76 vs. ~ 133,69; S.D. 19,56), die übrigen Teilfaktoren wiesen keine signifikanten Unterschiede auf.

Schlussfolgerungen Adipöse Frauen in unserer Adipositasambulanz haben zu ca. 60 % ein MS (nach ATP-III-Kriterien). Die > 50-Jährigen haben bei geringerem BMI eine signifikante Zunahme der viszeralen Adipositas. Dieses veränderter Fettverteilungsmuster hat keinen signifikanten Einfluss auf der Prävalenz des MS und/ oder seiner Teilfaktoren.

Erste Ergebnisse des steirischen Projekts „herz.leben" – ein strukturiertes Schulungsprogramm für Hypertoniker mit erhöhtem kardiovaskulären Risiko 076

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Einleitung Die Hypertonie trägt deutlich zur kardio- und zerebrovaskulären Morbidität und Mortalität der westlichen Welt bei. Trotz medikamentöser Mehrfachtherapie und nicht-medikamentösen Therapieempfehlungen gelingt es derzeit nur bei < 34 % der Patienten, den Zielblutdruck zu erreichen (USA; NHANES III). Deshalb wurde 2002 nach dem Vorbild der Diabetesschulungen damit begonnen, ein Programm für strukturierte Betreuungsmodelle verbunden mit Hypertonieschulungen für Patienten mit erhöhtem kardiovaskulären Risiko einzuführen. Dem Schulungsprotokoll liegt das Düsseldorfer-Hypertonieschulungsprogramm zugrunde, bei dem die Patienten in 4 Schulungseinheiten zu 1,5 Stunden von einem Arzt sowie einer ausgebildeten Fachkraft geschult werden.

Patienten und Methodik Eingeschlossen werden Hypertoniker mit oder ohne medikamentöser Vortherapie mit Blutdruck- (BD-) Werten von > 160 mmHg systolisch und > 95 mmHg diastolisch oder 140/90 mmHg und einem New Zealand Risc Score von 315 %.

Für die Schulung werden Ärzte für Allgemeinmedizin und Fachärzte für Innere Medizin sowie Diabetesberaterinnen und Diplom-Krankenschwestern herangezogen, die eine standardisierte Ausbildung absolvieren mussten. Die wissenschaftliche Evaluation dieses Projektes wird mittels der „herz.leben-Studie" (clinicaltrial.gov NCT 00453037) durchgeführt.

Ergebnisse Bisher wurden 580 Patienten in 22 Zentren geschult. Die Auswirkungen der Schulung bei 174 Patienten (Alter 63,8 ± 10,8 [Mittelwert ± Standardabweichung] Jahre, 55 % weiblich) nach einem einjährigen Follow-up (FU) im Vergleich zum Zeitpunkt des Einschlusses in das Schulungsprogramm (Baseline [B]) werden in der Folge dargestellt.

Der systolische BD wurde von 161 ± 20 mmHg auf 142 ± 17 mmHg (minus 20 ± 21 mmHg; p < 0,001), der diastolische BD von 90 ± 11 mmHg auf 82 ± 10 mmHg (minus 8 ± 11 mmHg; p < 0,001) signifikant reduziert werden. Weiters wurde ein Trend zu einer Reduktion des Körpergewichts (B: 83 ± 15 vs. FU 82 ± 15 kg [minus 1 ± 4; p = 0,005]) beobachtet. Alle weiteren ermittelten Parameter (BMI, Blutzucker, Blutfette) erfuhren keine signifikante Veränderung. Die Verschreibungshäufigkeit der antihypertensiven Medikamente änderte sich von B vs. FU nicht signifikant. Nicht-medikamentöse Therapiemaßnahmen nahmen von 31,1 % auf 76,7 % (p < 0,001) signifikant zu.

Zusammenfassung und Konklusion Die ersten Daten von herz.leben belegen den Nutzen der Patientenschulung durch eine signifikante Blutdruckreduktion. Nicht-medikamentöse Therapiemaßnahmen wurden nach der Schulung signifikant häufiger eingesetzt, wodurch ein Trend zur Reduktion des Körpergewichts nachweisbar war. Nach erfolgreicher Evaluation des Projektes mittels der derzeit im Gange befindlichen herz.leben-Studie ist eine Übernahme der strukturierten Betreuung und Schulung von Hypertonikern in die Regelversorgung anzustreben.

Serum Catecholamine and Endostatin Levels During Bicycle and Mental Stress Test: Gender Aspects 021

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[1,2]Students of Medical University of Vienna (MUV); [3,4]Department of Laboratory Diagnostics, MUV; [6]Department of Medical Statistics, MUV; [5,7]Department of Cardiology, Stabsstelle Gender Mainstreaming, MUV

Background Stress is a well known, independent risk factor for the development of cardiovascular diseases (CAD). However, data on gender-specific differences on hemodynamic and neurohumoral responses to mental and physical stress are limited. Endostatin, a type XVIII collagen fragment, has been identified as a potent angiostatic and anti-atherosclerotic factor, fighting against the development and progression of CAD. Recently it was observed, that Endostatin release was significantly increased in men during physical exercise. So the aim of this present study was to show (1) if the hemodynamic response to physical and mental stress of women are different compared to men and (2) if mental and physical stress affect Endostatin, Prolactin and Cortisol release differently in both sexes.

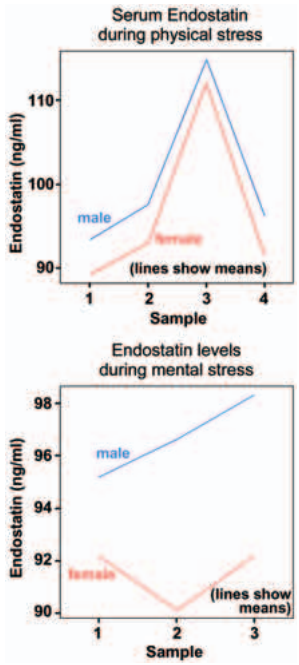

Figure 6: M. Priglinger et al.

Methods and Material We studied 20 women and 19 men (aged between 18 and 35, healthy, non-smokers) through a bicycle stress-test to exhaustion and a controlled mental stress-test (Stroop-Test). Blood pressure, heart rate and blood samples were taken at different intervals for analysing Endostatin as well as other representative stress hormones (Norepinephrine, Cortisol, Prolactin).

Results Both tests resulted in a proper increase in the typical stress parameter norepinephrine, confirming that all subjects were equally subdued to a sufficient stress level. The results show that under physical stress, Endostatin increases in women by the same equivalent as in men. In addition, an increase of Endostatin in men during mental stress remained statistically insignificant (**Figure 6**).

Discussion Regular physical activity counts among the most important lifestyle modifications in the prevention of cardiovascular diseases. The fact that Endostatin is an important inhibitor of atherosclerosis development and that it increases under physical stress both leads to the conclusion that it plays a major part in the prevention of cardiovascular diseases through the means of physical exercise. This study shows that this connection between exercise and the protection from pathological developments applies in the same amount to men and women.

Cell-specific Deletion of VEGF-R2/Flk-1-Results in a Failure of Thrombus Resolution 012

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Background Chronic thromboembolic pulmonary hypertension (CTEPH) is characterized by occlusive vascular remodelling of pulmonary thromboemboli. The mechanisms underlying misguided

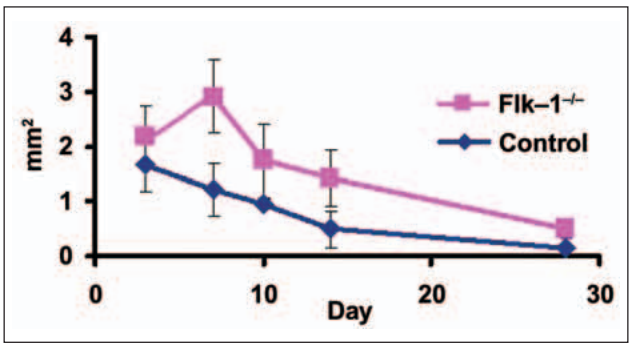

Figure 7: B. Redwan et al.

thrombus resolution in CTEPH are still unclear. Previous studies have demonstrated an involvement of angiogenetic molecules in the pathogenesis of pulmonary hypertension. To test the role of angiogenesis in thrombus resolution, we investigated the effect of a cell-specific deletion of VEGF-R2/flk-1, an important regulator of angiogenesis, in a murine model of stagnant flow venous thrombosis.

Methods Thrombosis was induced in the infrarenal vena cava of Tie2/Cre flk-1 flox/flox mice on a C57/BL6 background by creating a venous stenosis with a silk suture. Thrombi were harvested on days 3, 7, 10, 14 and 28 after surgery for analysis (n = per time point). Non-transgenic siblings served as controls.

Results Thrombus cross-sectional area analysis over time demonstrated a significant increase in thrombus area by day 7 after surgery in flk-1-/-animals compared with controls (ANOVA; $p < 0.05$) (**Figure 7**).

Conclusion Cell-specific deletion of VEGF-R2/flk-1 leads to a misguided thrombus resolution. The data demonstrate that angiogenesis plays a crucial role in thrombus resolution.

Key Role of Low HDL Cholesterol for the Association of the Metabolic Syndrome With Inflammation in Coronary Patients 026

P. Rein, C. H. Saely, St. Beer, A. Vonbank, M. Woess, C. Boehnel, V. Jankovic, H. Drexel
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Background The association of the metabolic syndrome (MetS) and of the individual MetS stigmata with inflammation in patients with established coronary artery disease (CAD) has not been investigated yet.

Objective To investigate the association of the MetS with inflammation in this clinically important patient population.

Methods We enrolled 759 consecutive patients with angiographically proven stable CAD.

Results In univariate analyses, hsCRP was higher in patients with the MetS (ATP-III definition; n = 39) than in those who did not have the MetS (0.48 ± 0.66 vs 0.41 ± 0.78 mg/dl; $p < 0.001$), and also was higher in patients who fulfilled the large waist (0.48 ± 0.67 vs 0.39 ± 0.80 mg/dl; $p < 0.001$) and the low HDL (0.71 ± 1.16 vs 0.37 ± 0.59 mg/dl; $p < 0.001$) criteria than in those who did not. Importantly however, after adjustment for age, gender, smoking and LDL cholesterol by means of analysis of covariance only the low HDL cholesterol criterion ($F = 21.99$; $p < 0.001$) remained significantly associated with hsCRP. The significant and independent association of low HDL with hsCRP was confirmed after additional adjustment for all other MetS traits ($F = 23.59$; $p < 0.001$).

Conclusions We conclude that among patients with angiographically proven stable CAD, low HDL cholesterol drives the association between the MetS and subclinical inflammation. This observation is well in line with the paramount role of low HDL cholesterol as a marker of cardiovascular risk in this important patient population.

Decreasing Kidney Function Predicts Vascular Events Independently From the Glomerular Filtration Rate at Baseline: A Prospective Cohort Study on Men Undergoing Coronary Angiography for the Evaluation of Coronary Artery Disease 028

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Background Impaired kidney function is associated with cardiovascular disease. However, it is uncertain, in as far a current decrease in the estimated glomerular filtration rate (eGFR) predicts consequent vascular events in angiographied coronary patients.

Objective We aimed at investigating the impact of a current decrease in eGFR on future vascular events.

Methods At baseline and after 2 years we measured serum creatinine in 400 consecutive men undergoing coronary angiography for the evaluation of stable coronary artery disease (CAD); the eGFR was calculated by the Mayo clinic quadratic equation (MCQE). Vascular events were recorded over 6 years from baseline.

Results Baseline eGFR levels significantly predicted vascular events in our cohort of angiographied men after adjustment for age, BMI, hypertension, diabetes, LDL-C, HDL-C, and smoking (standardized adjusted HR = 0.808 [0.673–0.971]; p = 0.023). Importantly, also a decrease in kidney function from baseline to the follow-up visit at 2 years later significantly predicted vascular events in the following 4 years independently from the baseline eGFR (standardized adjusted HR = 1.472 [1.162–1.865]; p = 0.001).

Conclusions Independently of the baseline eGFR a decrease in eGFR over two years strongly and significantly predicts vascular events over the consequent 4 years in men undergoing coronary angiography.

Albuminuria, the Glomerular Filtration Rate, and Angiographically Determined Coronary Atherosclerosis 036

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Background A recent finding in the Cardiovascular Health Study was that microalbuminuria was associated with cardiovascular events but not with atherosclerosis (as measured by carotid intima-media thickness), leading the authors to conclude that microalbuminuria may be associated with plaque destabilization rather than with atherosclerosis itself.

Objective We aimed addressing this issue in a large population of 856 consecutive patients undergoing coronary angiography for the evaluation of (CAD).

Methods The urinary albumin/creatinine ratio (ACR) was determined and the eGFR was calculated by the Mayo clinic quadratic equation.

Results From our patients, 278 had an eGFR < 90 ml/min/1.73 m^2, and 204 had an elevated ACR (≥ 30 mg/g). When compared to subjects with both normal eGFR and normal ACR (n = 67), the prevalence of significant coronary stenoses (i. e. stenoses with lumen narrowing ≥ 50 %) was significantly higher in patients with normal eGFR and elevated ACR (n = 111) and in those with decreased eGFR and elevated ACR (n = 93), but similar in those (n = 185) who had decreased eGFR but normal ACR (51.8 vs 64.0 %, p = 0.021; 51.8 vs 65.8 %, p = 0.015; and 51.8 vs 49.2 %; p = 0.545, respectively). Concordantly, in logistic regression analysis the ACR but not the eGFR predicted significant coronary stenoses after multivariate adjustment, with odds ratios (OR) of 1.26 (95 %-CI: 1.02–1.56); p = 0.032 and 1.05 (0.86–1.28); p = 0.63, respectively. The association between the ACR and significant coronary stenoses remained significant after further adjustment for eGFR (OR = 1.28 [1.03–1.60]; p = 0.025).

Conclusions Albuminuria is strongly associated with angiographically determined coronary atherosclerosis, independent of conventional cardiovascular risk factors and of the eGFR.

Plaques in the Common Carotid Artery are Independent Predictors of Angiographically Determined Coronary Atherosclerosis 037

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Background Atherosclerosis is a systemic disease. However, the association between the presence of common carotid artery (CCA) plaques and angiographically determined coronary atherosclerosis is unknown.

Objective The aim of this study was to examine whether common carotid artery (CCA) plaques are associated with angiographically determined coronary atherosclerosis.

Methods A total of 194 patients undergoing coronary angiography for the evaluation of established or suspected stable coronary artery disease (CAD) were included. Each patient underwent carotid arterial ultrasound examination; the presence of focal plaques in the CCA was recorded. Coronary stenoses with lumen narrowing ≥ 50 % were considered significant.

Results From our patients, 55.7 % had significant CAD, and plaques in the CCA were present in 34.5 %. The prevalence of significant coronary stenoses was significantly higher in patients with plaques in the CCA than in patients who did not have such lesions (76.1 vs 44.9 %; $p < 0.001$). In logistic regression analysis adjusting for age, gender, body mass index, blood pressure, diabetes, smoking, LDL cholesterol and HDL cholesterol, plaques of the CCA proved significantly and independently predictive of significant stenoses at angiography, with an odds ratio of 3.50 (95 %-CI: 1.62–7.54); $p = 0.001$.

Conclusion Common carotid artery plaques are independently predictive for the presence of angiographically determined CAD.

Das Hospital Screening Projekt (HSP): Lipidprofil und Therapiestatus in der Sekundärprävention bei Patienten mit klinisch manifester Atherosklerose und/oder Diabetes mellitus mit hohem kardiovaskulären Risiko in Österreich 111

*M. Roden[1], K. Huber[2] für die HSP-Projektgruppe**
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Einleitung Kardiovaskuläre Erkrankungen tragen wesentlich zur Morbidität und Mortalität in Europa bei. Aufgrund seiner hohen Assoziation mit der kardiovaskulären Mortalität gilt die Reduktion des Low Density Lipoprotein-Cholesterins (LDL-C) als primäres Ziel der lipidsenkenden Therapie. In 20 österreichischen Abteilungen für Innere Medizin mit den Schwerpunkten Kardiologie oder Diabetes/Stoffwechselerkrankungen wurden zwischen Juli 2006 und Februar 2007 Lipidprofile und Therapiestatus von Patienten mit hohem kardiovaskulären Risiko erfasst und in Bezug auf eine lipidsenkende Therapie nachbeobachtet.

Ergebnisse Von 9152 Patienten (Alter [Mittelwert ± SD]: Frauen 69 ± 13, Männer 65 ± 12 Jahre) wiesen 6838 ein sehr hohes Risiko (Risikogruppe 1) mit einem LDL-C von 99 ± 38 mg/dl und 2314 ein hohes kardiovaskuläres Risiko (Risikogruppe 2) mit einem LDL-C von 108 ± 39 mg/dl auf. Von den 4886 Statin-behandelten Patienten erreichten 48 % nicht das Therapieziel für Risikogruppe 1 (LDL-C < 70 mg/dl) bzw. für Risikogruppe 2 (LDL-C < 100 mg/dl). Dennoch wurde bei 68 % dieser Patienten die Therapie nicht adaptiert. In der Gruppe der 4266 medikamentös nicht vorbehandelten Patienten verfehlten 62 % ihr LDL-C-Ziel, wobei 1555 dieser Patienten (58 %) trotz Betreuung in einem Zentrum weiterhin unbehandelt blieben. Die Ursachen dafür sind vielfältig, wobei organisatorische Gründe und die fehlende Bereitschaft zur Dosistitration im niedergelassenen Bereich im Vordergrund standen.

Zusammenfassung Das Ergebnis der Untersuchung bestätigt, dass zur Erreichung der geforderten LDL-C-Zielwerte in Österreich eine konsequente Nachadjustierung der lipidsenkenden Therapie erforderlich ist, wobei die gewählten Maßnahmen (Hochtitration, Anwendung stärker wirksamer Statine oder Kombinationstherapien) durch die gültigen Behandlungsrichtlinien (basierend auf klinischen Endpunktstudien) bestimmt sein sollten.

* HSP-Projektgruppe: AKH Linz, II. Medizinische Abteilung (Leitung: Prim. Univ.-Prof. Dr. Georg Biesenbach) / Med. Universitätsklinik Graz, Innere Medizin (Leitung: Ass.-Prof. Dr. Helmut Brussee) / LKH Innsbruck, Universitätsklinik für Innere Medizin (Leitung: OA Prof. Dr. Christof Ebenbichler) / Klinikum Kreuzschwestern Wels, II. Interne Abteilung (Leitung: Prim. Univ.-Prof. Dr. Bernd Eber) / LKH Bregenz, Abteilung für Innere Medizin (Leitung: Prim. Univ.-Doz. Dr. Berhard Föger) / KH der Barmherzigen Brüder Salzburg, Abteilung für Innere Medizin (Leitung: Prim. Univ.-Prof. Dr. Friedrich Hoppichler) / Wilhelminenspital, Wien, Abteilung für Kardiologie (Leitung: Univ.-Prof. Dr. Kurt Huber) / LKH Innsbruck, II. Interne Abteilung (Leitung: Prim. Univ.-Doz. Dr. Hans Nesser) / LKH Innsbruck, Abteilung für Kardiologie (Leitung: Univ.-Prof. Dr. Otmar Pachinger) / St. Johann Spital, Salzburg, Innere Medizin I (Leitung: OA Univ.-Doz. Dr. Bernhard Paulweber) / St. Johann Spital, Salzburg, Innere Medizin II (Leitung: Prim. Univ.-Prof. Dr. Maximilian Pichler) / Kaiser Franz Josef Spital, Wien, V. Med. Abteilung für Kardiologie (Leitung: Prim. Univ.-Doz. Dr. Andrea Podczeck-Schweighofer) / Krankenhaus Hietzing, Wien, III. Med. Abteilung mit Stoffwechselerkrankungen und Nephrologie (Leitung: Univ.-Prof. Dr. Rudolf Prager) / Hanusch-Krankenhaus, Wien, I. Med. Abteilung (Leitung: Prim. Prof. Dr. Michael Roden) / Krankenanstalt Rudolfstiftung, Wien, I. Med. Abteilung (Leitung: Prim. Univ.-Prof. Dr. Guntram Schernthaner) / Krankenanstalt Rudolfstiftung, Wien, II. Med. Abteilung (Leitung: Prim. Univ.-Prof. Dr. Jörg Slany) / Medizinische Universitätsklinik Graz, Abteilung für Kardiologie (Leitung: Univ.-Prof. Dr. Thomas Wascher) / LKH Villach, I. Med. Abteilung (Leitung: Prim. Dr. Harald Wimmer) / AKH Wien, Universitätsklinik für Innere Medizin III (Leitung: Univ.-Prof. Dr. Anton Luger) / AKH Wien, Universitätsklinik für Innere Medizin II (Leitung: Univ.-Prof. Dr. Andrea Willfort-Ehringer).

Pigment Epithelium-Derived Factor PEDF: a New Anti-Angiogenic Player in the Human Heart 106

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Introduction The pigment epithelium derived factor (PEDF), a 50kD secreted glycoprotein, is a non-inhibitory member of the serpin family. It is widely expressed in different human adult tissue such as brain and eye, and it is also found in plasma. Its role is pleiotroApic acting as a neuroprotective, neurotrophic, anti-tumorigenic and also anti-angiogenic factor. PEDF inhibits endothelial cell growth and migration and suppresses ischemia- and VEGF-induced retinal neovascularization.

Due to the fact that angiogenesis plays a crucial role in the revascularization of human heart after myocardial infarction we investigated the expression of PEDF in human heart and human cardiac cells and assessed the hypothesis that PEDF is associated with poor prognosis in heart failure patients.

Methods Protein and RNA were isolated from explanted heart tissue from healthy donor hearts unsuitable for transplantations and from explanted hearts from patients undergoing heart transplantation. Human adult cardiac myocytes (HACM) and fibroblasts (HACF) were cultivated and exposed to inflammatory stimuli, anoxic conditions and $CoCl_2$ respectively for 48 hours. Protein expression was determined by a specific ELISA, by Western blotting or by immunohistochemistry. RT-PCR was used to determine mRNA levels employing specific primers. For the clinical study we enrolled 360 patients suffering from advanced heart failure (age: 72 ± 13 years, female: 35 %, LVEF: 28.8 ± 10 %, BNP 678.98 ± 760.45 pg/ml). A combined endpoint of rehospitalization and/or death was observed in 174 patients (48 %) during a median follow-up period of 16 month (95 % confidence interval [CI]:15–17 month). PEDF protein was determined at baseline in plasma samples with a specific ELISA.

Results We could detect PEDF expression in human heart tissue on the protein and RNA level. Both HACM and HACF secreted PEDF constitutively in vitro. The PEDF secretion was reduced

down to 40 % by anoxia in HACM and HACF from 4 different donors. $CoCl_2$, which by stabilizing hypoxia inducible factor-1-alpha mimics anoxic conditions reduced PEDF secretion dose dependently. The data could be confirmed at RNA level.

Analysis of plasma samples of patients suffering from advanced heart failure showed that PEDF was a predictive marker for the combined endpoint with crude proportional hazard ratios of 1.58 (95 %-CI: 1.07–2.32; p = 0.021) and 1.94 (95 %-CI: 1.33–2.84; p < 0.001) in the second and third tertile compared to the first.

Conclusion We could show PEDF expression in human heart tissue and the regulation in human adult cardiac myocytes and fibroblasts by anoxia. Our clinical analysis showed that PEDF is independently associated with an elevated risk of death and rehospitalization in patients with advanced heart failure. Due to our findings we suggest a role of PEDF in the regulation of angiogenesis in the ischemic human heart e.g. after myocardial infarction.

Body Mass Index and Waist Circumference as Predictors of the Incidence of Type 2 Diabetes Among Angiographied Coronary Patients 031

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Background No data on the impact of body mass index (BMI) and of waist circumference on the incidence of type 2 diabetes (T2DM) among angiographied coronary patients are available.

Objective To investigate in as far BMI and waist circumference predict incident T2DM in this clinically important patient population.

Methods The incidence of T2DM was recorded over 6 years in a population of 503 consecutive non-diabetic patients undergoing coronary angiography for the evaluation of stable coronary artery disease.

Results During follow-up, T2DM was newly diagnosed in 86 (17.1 %) of our patients. In logistic regression analysis both baseline BMI (standardized adjusted odds ratio [OR] = 0.28 [1.01–1.63]; p = 0.041) and baseline waist circumference (OR = 1.54 [1.19–1.99]; p = 0.001) significantly predicted the incidence of type 2 diabetes after multivariate adjustment when entered separately into the regression models. When BMI and waist circumference were entered simultaneously into a logistic regression model, waist circumference after adjustment for BMI remained significantly predictive of T2DM (OR = 1.66 [1.14–2.41]; p = 0.008), whereas the association of BMI with incident T2DM after adjustment for waist circumference was no longer significant (p = 0.585).

Conclusions We conclude that among angiographied coronary patients a large waist circumference predicts the incidence of T2DM independently from BMI, whereas BMI does not predict T2DM independently from waist circumference.

Type 2 Diabetes Significantly Modulates the Cardiovascular Risk Conferred by the PAI-1 -675 5G/4G Polymorphism in Angiographied Coronary Patients 033

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Background The association of the -675 5G/4G polymorphism of the plasminogen activator inhibitor-1- (PAI-1-) gene with cardiovascular disease in patients with type 2 diabetes (T2DM) is unknown.

Objectives To investigate the association of the PAI-1 -675 5G/4G polymorphism with angiographically determined coronary artery disease (CAD) and its impact on future vascular events in patients with T2DM and in non-diabetic subjects.

Methods Genotyping was performed in 672 consecutive Caucasian patients undergoing coronary angiography for the evaluation of stable CAD. Vascular events were recorded over 4 years.

Results Genotype distributions were similar in non-diabetic subjects (n = 24) and in patients with T2DM (n = 148). In non-diabetic subjects, the homozygous PAI-1 4G4G genotype was significantly associated with significant coronary stenoses ≥ 50 % (adjusted odds ratio [OR] 1.85 [95%-CI: 1.20–2.85]; p = 0.005); however, no such association was observed in T2DM patients (OR 0.81 [0.33–1.93]; p = 0.627). An interaction term T2DM × 4G4G genotype was significant (p = 0.014), indicating a significantly stronger association of the polymorphism with CAD in non-diabetic subjects than in patients with T2DM. Also prospectively, the 4G4G genotype conferred an increased risk of vascular events in non-diabetic subjects but not in T2DM patients, with adjusted hazard ratios of 1.76 (1.13–2.74); p = 0.014 and 0.68 (0.30–1.54); p = 0.360, respectively. Again, the interaction T2DM × 4G4G genotype was significant (p = 0.018).

Conclusions Presence of T2DM significantly modulates the vascular risk conferred by the PAI-1 -675 5G/4G polymorphism in angiographied coronary patients.

Cardiology Training in Europe: the EBSC Survey 2006 034

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Background and Methods The European Board for the Speciality of Cardiology (EBSC) strives to harmonize standards in cardiology training in Europe. Therefore the EBSC developed European criteria for accreditation as specialist in cardiology [EHJ 1996; 17: 996–1000], including a total training duration of 6 years, which includes a common trunk of internal medicine (at least of 2 years). Furthermore a basic cardiology training of at least 3 years will be recommended. Trainees must keep a personal log-book. Each training programme should be assessed at least every 5 years.

To achieve a picture as accurate as possible of cardiology training in Europe EBSC surveyed national authorities in 49 ESC member states containing questions regarding the training in internal medicine, cardiology training and about the infrastructure of training centers.

Results 27 (55 %) of the replying ESC countries, among them 22 EU/EFTA (71 % of all EU/EFTA) countries responded. Cardiology as an independent mono-speciality is recognized in 15 (55 % of all responders) countries. In further 7 (26 %) countries (NOR, PL, AT, SE, BG, BLR, BIH) internal medicine is a prerequisite for a cardiologist. 5 (19 %) countries did not answer.

The minimum of 2 years training in internal medicine (common trunk) is usual in 22 (82 %) countries. These criteria are not fulfilled in 4 (15 %) countries: 1 year BLR and ES; 1.5 years CZ and FR; no reply: EE.

A minimum of 3 years in cardiology training is obligatory in 22 (82 %) countries. 5 (18 %) countries have different training durations in cardiology: 2 years in BG, BIH, BLR, LV and PL.

A training logbook is used in all but 5 (18 %) countries: DE, FR, ISR, SUI, TR; no reply: GB.

Most countries have an assessment procedure at the end of training in cardiology except of 2 (7 %): AT, ES.

Evaluation of training centers (every 5 years) is mandatory in 13 (48 %) countries. There is a lack of explicit information of this evaluation process in 14 (52 %) countries: TR, FI, PL, BE, GR, ISR, ES, DE, FR, SK, BIH, EE, BLR, SUI.

Conclusion Within Europe tremendous differences exist in cardiology training. Providing a standardised patient care and free move-

ment of medical specialists within Europe harmonisation and standardisation of the training in cardiology is of utmost urgency and a vital need.

Endothelial Progenitor Cells Are Reduced in Type 2 Diabetic Patients with Microalbuminuria and Macroalbuminuria 089

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Type 2 diabetic (T2D) patients presenting with microalbuminuria (Mi-A) or macroalbuminuria (Ma-A) have an increased risk for cardiovascular morbidity and mortality. Endothelial progenitor cells (EPC) are bone marrow derived cells involved in adult neovascularisation and endothelial homeostasis and may predict macrovascular disease and mortality. Thus, it was of interest to investigate the potential role of EPC in T2D patients presenting with Mi-A or Ma-A in comparison with normoalbuminuric (No-A) patients.

138 patients with T2D were included: 72 No-A, 42 Mi-A and 24 Ma-A. The patients in the 3 groups were carefully matched and did not differ (by ANOVA) for the following: age (65.0 ± 10.6 years), diabetes duration (13.1 ± 9.5 years), HbA1c (7.8 ± 1.6 %), BMI (29.8 ± 5.1 kg/m^2), systolic and diastolic blood pressure, total cholesterol, LDL-cholesterol, triglyceride as well as serum creatinine (1.2 ± 0.4 mg/dl) (given are mean of all patients). Circulating progenitor cells (CPC; CD34+/133+) and EPC (CD34+/133+/309+) were enumerated by flow cytometry in peripheral blood.

EPC were decreased in patients presenting with Mi-A compared with patients with No-A (102 ± 54 vs 144 ± 84; p = 0.01). In patients with Ma-A the number of EPC was even more decreased (53 ± 29 vs 144 ± 84; p < 0.001). Patients with Mi-A or Ma-A were also significantly different for the number of EPC (102 ± 54 vs 53 ± 29; p < 0.001). By contrast, total circulating progenitor cells, which have mainly an important role in hematopoiesis, were not significantly different among the 3 groups of T2D patients with No-A, Mi-A or Ma-A (p = 0.16).

Multivariate regression analysis revealed that EPC were independently associated with diabetes duration (Beta = 0.165; p = 0.036) and history of cardiovascular disease (Beta = –0.203; p = 0.01) but strongest with status of albuminuria (Beta = –0.380; p < 0.001).

In conclusion, this is the first study demonstrating decreased numbers of endothelial progenitor cells in T2D patients with microalbuminuria or macroalbuminuria. Since low EPC are important predictors of future cardiovascular morbidity and mortality in nondiabetic high risk patients, these new findings could be relevant for the understanding of the high cardiovascular risk of T2D patients with microalbuminuria or macroalbuminuria.

Der transfemorale Aortenklappenersatz – Interimsanalyse der kardiologischen Abteilung der Medizinischen Universität Wien 104

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Einleitung In mehreren rezenten Studien mit kleiner Fallzahl konnte der transfemorale Aortenklappenersatz (transfem AKE) als Option in multimorbiden Herzpatienten (EuroScore > 20) mit hochgradiger Aortenstenose dargestellt werden. Dies ist eine Interimsanalyse aller bis zuletzt an unserem Zentrum durchgeführten transfem AKEs.

Patienten und Methodik Seit Mai 2007 sind in unserem Herzkatheterlabor 20 Aortenklappen (AK) implantiert worden. Das durchschnittliche Alter dieser Patienten betrug 83 Jahre, der durchschnittliche logistische EuroScore 25,88 % (NYHA-IV: n = 3, NYHA-III: n = 11 und NYHA-II: n = 6). Nach entsprechenden Screening-Untersuchungen des vaskulären Zugangs erhielten 16 Patient/innen eine Edwards Sapiens Klappe und 4 eine Core Valve.

Resultate Die Erfolgsrate der Klappenimplantation betrug 100 %. Die durchschnittliche Interventionsdauer lag bei 176,73 min. Postinterventionell zeigte sich in der Echokardiographie bei 11 Patient/innen eine leichte valvuläre, bei 8 eine leichte paravalvuläre und bei 6 eine mittelgradige paravalvuläre Insuffizienz. Periprozedural ereignete sich bei einer Patientin eine Perikardtamponade und bei einer anderen ein Insult. Im Bereich der Beckenarterien kam es zu 5 Dissektionen und einer Perforation, welche 3× katheterinterventionell und 3× konservativ geführt wurden. Im Follow-up lag die 30-Tage-Mortalität bei 0 %. Der durchschnittliche Intensivaufenthalt betrug durchschnittlich 1,75 Tage (1–14 Tage), der Spitalsaufenthalt 18,11 Tage (6–84 Tage). Die Patienten zeigten postinterventionell eine deutlichen Verbesserung des funktionellen Status (NYHA-III: n = 4, NYHA-II: n = 5, NYHA-I: n = 11).

Konklusion Angesichts der hohen primären Erfolgsrate, der niedrigen 30-Tage-Moratlitätsrate und der guten funktionellen Ergebnisse erscheint der transfem AKE als eine vielversprechende Methode zur Therapie der hochgradigen Aortenklappenstenose bei multimorbiden Patienten.

Accurately Measured and Heart-Rate Corrected QTc Intervals Do Not Show Any Day-Time Variability 109

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Background Circadian rhythm of heart rate corrected QTc interval has been repeatedly reported with conflicting and inconsistent results. At the same, QTc spontaneous variability is of particular importance for clinical studies investigating proarrhythmic liability of pharmaceutic compounds.

Aim The study investigated the extent of QTc variability due to imprecise heart rate correction and inaccurate expression of RR interval used in the correction of QT interval.

Methods 24-hour continuous 12-lead ECG recordings were obtained in 54 male healthy volunteers. In each recording, ~ 200 ECG samples of 10-sec duration were obtained throughout the whole day-time recordings period, all preceded by relatively stable heart rates (fluctuations ≤ ± 2 bpm). In each of the ECG samples, QT interval was measured in 1000 Hz sampled superimposed images of all 12 leads by two independent cardiologists. The measurement was repeated and reconciled by a third cardiologist in case of disagreement. Four different RR interval expressions were used: (a) average of 3 first RR intervals of the ECG sample, (b) average of all RR intervals in the 10-sec sample, (c) average of 250 RR intervals within and preceding the 10-sec sample, and (d) these 250 RR intervals processed by an independently established QT/RR hysteresis profile optimised for each subject separately. With all RR interval expressions, the QT intervals were corrected by Fridericia correction and by individually optimised curvature correction. The variability of QTc interval was expressed by intra-individual standard deviation.

Results With Fridericia correction and the RR expressions (a)–(d), the QTc variability obtained was (a) 8.6 ± 1.5 ms, (b) 6.9 ± 1.4 ms, (c) 6.3 ± 1.7 ms, and (d) 5.6 ± 1.7 ms, while with individualised curvature correction, the QTc variability was (a) 7.4±1.5 ms, (b) 5.8 ± 1.3 ms, (c) 5.2 ± 1.3 ms, and (d) 4.4 ± 1.3 ms. All differences (b) vs (a), (c) vs (b), and (d) vs (c) were highly statistically significant (p < 1.0E-10 in all cases).

Conclusion The previously reported QTc variability was largely resulting from methodological imprecision. Providing the ECG signals are measured accurately and the QT interval is corrected for RR interval expressing the appropriate heart rate, there is practically no QTc variability in day-time recordings of healthy subjects.

Simultane 64-Zeiler Spiral-CT-Koronarangiographie bei der kardialen CT-Untersuchung vor geplanter Katheterablation von Vorhofflimmern 079

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Hintergrund Durch zunehmende technische Verbesserungen hat sich die CT-Koronarangiographie (CT-KA) mittels hochauflösender Spiral-Computertomographie (CT) als zuverlässige Methode zum Ausschluß einer koronaren Herzkrankheit (KHK) etabliert. Spiral-CT-Untersuchungen werden jedoch auch zunehmend zur Erfassung anatomischer Informationen, die für eine integrative Bildgebung bei der Ablation von Vorhofflimmern (VHF) verwendet werden, durchgeführt. Da VHF in gewissem Ausmaß mit einer zugrunde liegenden KHK assoziiert ist, erscheint eine simultane CT-KA bei Patienten (P) mit Herz-CT vor geplanter VHF-Ablation sinnvoll.

Wir untersuchten Machbarkeit, Qualität und Aussagekraft der simultanen CT-KA bei kardialer CT-Untersuchung von P mit VHF und fehlender KHK-Anamnese.

Methodik Patienten (P) mit paroxysmalem VHF und niedriger bis mittlerer Prätestwahrscheinlichkeit für KHK, bei denen zur Vorbereitung der VHF-Ablation einer Herz-CT-Untersuchung geplant war, wurden in das Register aufgenommen. Nicht eingeschlossen wurden P mit bekannter KHK, nach Koronarinterventionen oder aortokoronarer Bypassoperation.

Die Erfassung der kardialen Anatomie und der CT-KA erfolgte mit dem selben Scan nach intravenöser Kontrastmittelinjektion.

Zusätzlich erfolgte ein Kalzium-Scoring (Agatston-Score-Äquivalent, ASÄ).

Die Auswertung erfolgte unmittelbar nach Ende der Untersuchung. Es wurde der Ausschluß einer KHK oder Nachweis einer nicht-signifikant stenosierenden Sklerose (NSS) beziehungsweise von signifikanten Koronarstenosen (> 70 %, SST) evaluiert. Die Qualifizierung der CT-KA als unauffällig (ASÄ = 0 und normales Angiogramm), nicht NSS und SST erfolgte ebenso wie die Beurteilung der Bildqualität in gut, mittel und schlecht im Konsens zweier Untersucher.

Ergebnisse Es wurden 46 P (35 männlich) mit einem mittleren Alter von 63 ± 9 Jahren untersucht.

Die mittlere Scan-Zeit betrug 13,9 ± 0,7 Sekunden, die mittlere Herzfrequenz der P während der Untersuchung 54 ± 6 Schläge/Minute. Bei allen P konnten die gewonnenen anatomischen Informationen für die Ablation des VHF verwendet werden. Das mittlere ASÄ war 178 ± 88. Bei 45 P erlaubte die Bildqualität eine Untersuchung aller Gefäße (gut bei 40, mittel bei 5 P), bei einem P machten hochgradige zirkuläre Gefäßverkalkungen eine valide Befundung unmöglich. Eine koronare Herzerkrankung konnte bei 14 P (30 %) ausgeschlossen werden, weitere 22 P (48 %) wiesen eine NSS auf, während bei 10 P (22 %) zumindest eine SST suspiziert wurde. Bei diesen P wurde eine konventionelle Koronarangiographie durchgeführt, in der sich signifikante Stenosen in 5 Fällen (50 %) zeigten.

Schlussfolgerung Im Rahmen einer kardialen CT-Untersuchung für geplante VHF-Ablationen kann simultan eine CT-KA mit hoher Bildqualität erfasst werden. Bei P mit paroxysmalem VHF und geplanter Ablation ist auch ohne typische KHK-Anamnese eine Atherosklerose der Koronararterien in etwa der Hälfte der Patienten zu erwarten.

Analyse von Instent-Stenosen und Stentthrombosen: Inzidenz, klinische Marker und IVUS-Ergebnisse 063

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Einleitung Die Inzidenz der Koronaren Stentthrombose (STT) beträgt in rezenten Studien < 1–2 %.

Methodik Wir überprüften anhand unserer Herzkatheter-Datenbank die Inzidenz von Instent-Stenosen und Stentthrombosen, welche zwischen 1. Jänner 2007 und 31. Dezember 2007 dokumentiert wurden.

Ergebnisse Von 1374 Patienten, welche einer Koronarangiographie unterzogen wurden, erfolgten bei 564 Patienten (730) perkutane Interventionen (PCI). Davon wurden 342 Patienten (60 %) wegen eines akuten Koronarsyndroms (ACS), interveniert (130 STEMI, 192 NSTEMI). Von 52 Patienten, deren Erstprozedur in 5 verschieden österreichischen Zentren durchgeführt wurde, zeigten 19 Patienten ein ACS (STEMI 9, NSTEMI 10). Von diesen 19 Patienten hatten 8 einen Drug-eluting Stent (DES), 9 einen Bare-metal Stent (BMS) und 2 einen antikörperbeschichteten Stent (AKS). Es zeigten sich 2 akute STT (1 DES, 1 BMS), 4 subakute STT (1 DE, 2 BMS, 1 AKS), 7 Spätthrombose (3 DE, 3 BMS, 1 AKS) und 6 sehr späte STT (3DES [range 1–3 Jahre] und 3 BMS [range 1–10 Jahre]). Die intravaskuläre Ultraschalluntersuchung (IVUS, Volcano, Eagle Eye® Gold) zeigte bei (75 %) eine suboptimale Expansion des Stents bzw. ein Malapposition der Stentstruts und in 25 % eine hochgradige Intimahyperplasie. Die häufigste Risikokonstellation war eine DE-Stentimplantation während eines ACS bei der Erstprozedur.

Zusammenfassung Stentthrombosen zeigen sich bei DES und BMS und sind möglicherweise Folgen einer suboptimalen Implantationstechnik.

Stellenwert des MS-CT (64-Zeiler) im Management der suspekten KHK: Auswirkungen auf die Interventions-/Ausschlussrate im Herzkatheterlabor 064

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Einleitung In ca. 20–35 % der Herzkatheteruntersuchungen (HK), die mit einer Morbidität von 1 % und Mortalität von 0,1 % verbunden sind, erfolgt ein Ausschluss einer obstruktiv wirksamen koronaren Herzkrankheit. Rezente Studien bescheinigen dem MSCT bei einem selektioniertem Patientengut einen sehr hohen negativen Vorhersagewert („negative predictive value", NPV > 90 %), damit könnte diesen Patienten eine invasive Untersuchung erspart werden.

Methodik Wir überprüften anhand unserer Herzkatheter-Datenbank die Häufigkeit von Ausschlüssen einer obstruktiv wirksamen KHK, die zwischen 1. Jänner 2005 und 31. Dezember 2007 dokumentiert wurden. Patienten mit einer gering bis mäßigen Vortestwahrscheinlichkeit wurden ab dem Jahr 2006 vermehrt einer MSCT-Untersuchung zugeführt. Die Befundung erfolgte in Kooperation mit dem Radiologen teleradiologisch.

Ergebnisse Über einem Beobachtungszeitraum von 12 Monaten wurden 111 Patienten von der kardiologischen Ambulanz einem MSCT zugewiesen, eine obstruktiv wirksame KHK konnte bei 95 (85 %) Patienten ausgeschlossen werden. Von niedergelassenen zuweisenden Internisten/Kardiologen wurden 192 MSCTs indiziert, davon konnte bei 137 (70 %) Patienten eine obstruktiv wirksame KHK ausgeschlossen werden. 73 Patienten wurden aufgrund eines pathologischen MSCT-Befundes angiographiert, wobei eine obstruktiv wirksame KHK bei 60 Patienten (82 %) unter zusätzlichen Einsatz von Druckdraht oder intravaskulärem Ultraschall (IVUS) bestätigt wurde.

Die Interventionsrate (PCI/CABG) stieg von 44 % im Jahr 2005 auf 55 % im Jahr 2006 und 56 % im Jahr 2007. Die HK-Zahlen blieben weitgehend stabil (von 2005 bis 2007: 1116, 1323, 1375). Die Ausschlussrate einer obstruktiv wirksamen KHK nahm von 33 % im Jahr 2005 auf 20 % im Jahr 2007 ab.

Die Wartezeit für Hochrisikopatienten konnte dabei von 10 Tagen auf 0 Tage reduziert werden.

Zusammenfassung Der gezielte Einsatz des MSCT ermöglichte eine Effektivitätssteigerung unseres Herzkatheterlabors durch Reduktion der unauffälligen Koronarangiographien.

Stellenwert der kardialen Magnetresonanztomographie im Management der KHK 065

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Hintergrund Die Magnetresonanztomographie (MR) bietet bei KHK-Patienten die Möglichkeit einer Kombination aus funktionellen Tests zur Erkennung von Ischämie und Quantifizierung von etwaigen Myokardinfarkten („late enhancement", LE). Rezente Studien bescheinigen der kardialen MR diesbezüglich eine ausgezeichnete Sensitivität und Spezifität.

Ziel der Studie war 1.) die Beurteilung der Machbarkeit der myokardialen Stressperfusion (MPERF) und der Infarktdarstellung (DE) im klinischen Alltag sowie 2.) die Bestimmung des prognostischen Wertes einer negativen Stressperfusion.

Methode 60 selektionierte Patienten (45 Männer) mit Grenzwertstenosen nach einer Koronarangiographie und 15 Patienten (7 Männer) mit einer fraglichen KHK wurden mit der MR (MAGNETOM Espree 1.5 T, Siemens) bestehend aus Cineaufnahmen, Stress- und Ruheperfusion sowie LE untersucht. Die MPERF wurde mit 0,1 mmol/kg Gadolinium (GE-Healthcare) und Adenosin (140 µg/min/kg KG) für mindestens 3 Minuten durchgeführt. Die Bilder wurden in Kooperation von Kardiologen und Radiologen visuell ausgewertet.

Ergebnisse Die Stress-PERF war in 3 Patienten nicht auswertbar (inadäquate Reaktion auf Adenosin). Alle Untersuchungen hatten diagnostisch ausreichende Bildqualität. Die mittlere Untersuchungszeit betrug 45 (± 11) min. Die Prävalenz einer Perfusionsstörung betrug 44 %, die des LE 60 %. Ähnlich wie bei der Druckdrahtuntersuchung zeigte sich bei ca. 75 % der Grenzwertstenosen kein Perfusionsdefizit. Aufgrund einer fehlenden Perfusionsstörung wurde bei 13 Patienten auf eine HK-Untersuchung verzichtet. Aufgrund eines fehlenden Perfusionsdefektes bzw. einer transmuralen Narbe (LE > 75 % der Wanddicke) wurde bei 42 Patienten ein weniger „aggressives" Vorgehen gewählt: 17× anstatt einer operativen Revaskularisierung (CABG) → ein konservatives Vorgehen, 3× anstatt CABG → PTCA, 22× anstatt PTCA → konservativ medikamentöses Management. In 17 Fällen wurde aufgrund eines Ischämienachweises und bei vitalem Gewebe (oder LE < 50 %) ein „aggressives" Vorgehen gewählt: 6× von konservativ medikamentös → PTCA, 8× von konservativ medikamentös → CABG und 3× von PTCA → CABG. Während einer mittleren Beobachtungszeit von 6 Monaten (± 3) kam es bei einem konservativ gemanagtem Patienten zu einem akutem Koronarsyndrom. Ein Patient ohne Ischämienachweis und ein Patienten mit einer ausgedehnten Narbe wurden auswärts interveniert.

Zusammenfassung Die kardiale Magnetresonanztomographie (MR) mit Perfusion und Infarktdarstellung stellt eine im klinischen Alltag in akzeptabler Zeit durchführbare Methode dar. Die Darstellung einer transmuralen Narbe mittels LE und der fehlende Nachweis eines Perfusionsdefektes (Ischämie) führen bei einem Großteil der KHK-Patienten mit Grenzwertstenosen zu einem weniger aggressiven Vorgehen.

Incidence of Arrhythmogenic Right Ventricular Dysplasia Assessed by Cardiac Magnetic Resonance Imaging 040

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Background Arrhythmogenic right ventricular dysplasia (ARVD) is a lipo-fibrotic remodelling of the right ventricle with subsequent ventricular arrhythmias (extrasystoles or tachycardia). Incidence is anticipated about 1/10,000 in the general population. In our institution, susceptible ARVD is the most frequent reason for assignment to cardiac magnetic resonance imaging (CMRI). Thus, we aimed to investigate the incidence of ARVD as assessed by CMRI.

Methods In this analysis, we included all patients assigned to CMRI for susceptible ARVD. Evidence of ARVD was defined by right ventricular dyskinesia with a lipidic remodelling and/or positive late contrast-enhancement 10 minutes after intravenous application of gadolinium.

Results Between March 1996 and November 2007, 1572 patients were examined with CMRI in our institution. Overall 473 of them (51 % male; age: 39.9 ± 17.1 years) were assigned to CMRI because of susceptible ARVD (30.1 % of all assignments). Allocated patients suffered from ventricular tachycardia (49.5 %), ventricular extrasystoles (37.5 %), echocardiographic right ventricular dyskinesia (7 %), wide complex tachycardia (4 %), or were sudden death survivors (2 %). CMRI evidence of ARVD was found in 14 patients (3 %). In these patients, ventricular tachycardia was the most frequent finding before assignment (78 %).

Conclusion Even though ARVD was the most frequent reason for assignment to CMRI, incidence of ARVD might be less common than expected. Thus, a more detailed rhythmologic (e.g. by event recorder) and clinical examination (e.g. by echocardiography) should be performed prior to assignment for CMRI.

Incidence and Causes of Inappropriate Shocks in Patients with Implantable Cardioverter/Defibrillator 042

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Background Implantable cardioverter/defibrillators (ICD) are today's therapeutic option for primary and secondary prevention of sudden cardiac death due to ventricular arrhythmias. Inappropriate shocks (InS; e.g. due to atrial fibrillation, T-wave oversensing or artefacts by electrical interference) are the main complication of ICD therapy.

Methods The aim of this single center retrospective analysis was to investigate the "real world" incidence of ICD interventions in an overall collective (66.4 % with coronary artery disease, 18.5 % with non-ischemic cardiomyopathy, 15.1 % with other indications such as hypertrophic obstructive cardiomyopathy or Brugada syndrome).

Results Between June 1988 and October 2007, ICD were implanted in 1061 patients (82.3 % male; age at implantation 58.9 ± 13.6 years, range 4–90 years), of which 36 were lost to clinical follow-up after implantation (3.4 %). Within a follow-up period of 52 ± 48 months in the remaining 1025 patients, overall mortality was 29.6 % (304 patients). Overall, 204 patients (19.9 %) had inappropriate shocks, whereof 118 patients (11.5 %) exclusively underwent InS. Single-chamber ICD had a significantly higher incidence of InS than dual-chamber devices (p = 0.32). Causes of InS were atrial fibrillation (37.9 %), other supra-ventricular tachycardia (26.1 %), lead dysfunction (10.3 %), non-sustained ventricular tachycardia (7.4 %), T-wave oversensing (7.1 %), artefacts due to electrical interference (3.5 %) and others (7.7 %).

Conclusions ICD therapy saves lives indeed. However, inappropriate ICD therapies are still a major problem, with atrial fibrillation being the most important underlying cause, and resulting in considerable ICD associated morbidity.

Long-term Outcome in Patients with Chronic Heart Failure and Implantable Cardioverter/Defibrillators 059

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Background Implantable cardioverter/defibrillators (ICD) have become a cornerstone therapy for primary and secondary prevention of sudden cardiac death by ventricular arrhythmias. The degree of left ventricular impairment is an important prognostic marker of

long-term outcome. The aim of this study was either to investigate mortality in patients with reduced LVEF (> 35 %) vs preserved LVEF and, especially for patients with impaired LVEF, mortality rates in ischemic cardiomyopathy (iCMP) vs non-ischemic cardiomyopathy (non-iCMP).

Patients Between June 1988 and October 2006, 947 patients underwent ICD implantation in our institution (82 % male; age at implantation 58.9 ± 13.6 years), of which 34 were lost to clinical follow-up after implantation (3.6 %). Data on LVEF and mortality were available in 877 patients. In the collective with impaired LVEF (438 patients), 333 suffered from iCMP (76 %) and 105 from non-iCMP (24 %).

Results Within a follow-up period of 51 ± 44 months, overall mortality was 31.8 % (290 patients, of which LVEF was not available in 11 patients). Mortality of patients with impaired LVEF was 186/438 (42.5 %), while it was 93/439 (21.2 %) in patients with preserved LVEF ($p < 0.001$). 5 and 8 year mortality rates were 38.2 % and 53.6 % in patients with reduced LVEF compared to 17.6 % and 34.8 % in patients with preserved LVEF ($p < 0.001$), respectively. In the collective with impaired LVEF, mortality among patients with iCMP was 151/333 (45.3 %) while it was 35/105 (33 %) in patients with non-iCMP. Five and 8 year mortality rates were 40.9 % and 54.1 % in patients with iCMP whereas subjects with non-iCMP showed mortality rates of 27.6 % and 52 % ($p = 0.104$), respectively.

Conclusion Although there were highly significant differences in long-term mortality between patients with impaired and preserved LVEF, mortality rates between patients with iCMP and non-iCMP did not differ significantly.

Influence of Left Ventricular Impairment on Shock Occurrence in Patients with ICDs 082

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Background The implantable cardioverter-defibrillator is effective in improving survival in high risk cardiac patients. The degree of left ventricular ejection fraction (LVEF) is an important prognostic marker of long-term survival. The purpose of this study was to determine the influence of heart failure, as reflected by LVEF, on shock occurrence in a large cohort of ICD recipients.

Methods Between June 1988 and October 2006, 947 patients underwent ICD implantation in our institution (82 % male, age at implantation 58.9 ± 13.6 years, CAD 65.6 %, dilated CMP 21.4 %, others 13 %). Data on LVEF and shock delivery were available in 849 patients (89.7 %).

Results Within a follow-up period of 51 ± 44 months, 34.4 % of our patients received at least one appropriate shock. At the end of follow-up, 61.5 % of patients with impaired LVEF and 69.6 % of patients with preserved LVEF were free of appropriate shocks, respectively. The 1- and 3-year incidence of appropriate shocks was 18 %/33.1 % in patients with impaired LVEF, compared to 14.7 %/26.1 % in patients with preserved LVEF, respectively ($p = 0.02$). One-hundred and ninety-four of 849 patients (22.9 %) received inappropriate shocks. The 1- and 3-year incidence of inappropriate shocks was 10.5 %/22.5 % in patients with impaired LVEF, compared to 10.1 %/20.5 % in patients with preserved LVEF, respectively. The mean time to the first inappropriate shock averaged 26.2 ± 2.9 months in patients with impaired LVEF compared to 28.3 ± 3.6 months in patients with preserved LVEF (p = n. s.).

Conclusion Our study found a high incidence of appropriate and inappropriate shocks, respectively. Although we could demonstrate significantly decreased time to the first appropriate shock in patients with impaired left ventricular function, impaired pump function seems to have no influence on the incidence of inappropriate shocks.

Shock Occurrence in ICD Patients with Ischemic and Non-Ischemic Cardiomyopathy 083

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Mortality benefit from implantable cardioverter-defibrillator therapy in ischemic (ICM) and non-ischemic dilated cardiomyopathy (NICM) is well defined. The aim of this study was to determine the actuarial incidence of appropriate and inappropriate shocks in these two groups of patients.

Methods Between June 1988 and October 2006, 743 patients with ischemic or non-ischemic cardiomyopathy underwent ICD implantation in our institution (82 % male; age at implantation 58.9 ± 13.6 years). Patients were eligible for our study when LVEF was less than 35 percent.

Results From 418 patients (56.2 %) with impaired LVEF, 321 patients (78 %) had coronary artery disease (CAD), the remaining 97 patients (22 %) had dilated cardiomyopathy. At the end of follow-up, 64.5 % of patients with ICM compared to 48.5 % with NICM were free of appropriate shocks. The 1- and 3-year incidence of appropriate shocks was 14.7 %/29.5 % in patients with ischemic CMP and 30.7 %/43.6 % in patients with non-ischemic cardiomyopathy, respectively. In patients with appropriate shocks, the mean period to the first appropriate shock averaged 31.5 ± 3.0 months in patients with ICM and 22.2 ± 3.7 months in patients with NICM ($p < 0.001$).

21.8 % of patients in the ICM group and 31.6 % of patients in the NICM group received inappropriate shocks. 1- and 3-year incidence of inappropriate shocks was 7.6 %/19.9 % in patients with ischemic CMP and 19.3 %/31 % in patients with non-ischemic CMP, respectively ($p = 0.12$).

Conclusion We found a high incidence of appropriate and inappropriate shocks. Patients with NICM received appropriate and inappropriate ICD discharges earlier and at a greater rate than patients with ICM.

Timing of Blood Sampling Determines the Platelet Reactivity in Patients Undergoing Percutaneous Coronary Intervention 018

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Background Non-responsiveness to anti-platelet therapy is associated with increased platelet reactivity, which corresponds to an increased risk of major adverse coronary events (MACE).

Objectives To investigate the variability of platelet reactivity in patients undergoing percutaneous coronary intervention (PCI) with four different test assays at two different time points.

Methods Platelet function was assessed by the Vasodilator Stimulated Phosphoprotein (VASP) phosphorylation assay, Impedance Aggregometry (Multiplate Analyzer), Platelet Function Analyzer (PFA-100®) and Cone and Platelet Analyzer (CPA, Impact®). Measurements were performed during percutaneous coronary intervention (PCI, after implantation of the first stent and after 250 mg of injectable acetyl-salicylic acid had been given intravenously) and 1 day thereafter (20–24 h) in 17 patients, who had been pre-treated with Clopidogrel and aspirin.

Results Inhibition of platelet function by Clopidogrel and aspirin was less during PCI than one day after PCI as measured with the VASP assay and the aggregometry: the platelet reactivity index (PRI, VASP assay), the adenosine diphosphate/prostaglandin (ADP + PG) and the arachidonic acid (AA) induced platelet aggregation were 36 % ($p = 0.035$), 140 % ($p = 0.047$) and 70 % ($p = 0.025$) higher during PCI than one day after PCI, respectively. Both tests showed a higher prevalence of high post-treatment platelet reactivity (HPPR) during PCI than 1 day thereafter: VASP assay 41 % vs 0 % ($p = 0.002$), aggregometry: 76 % vs 29 % ($p = 0.016$). The col-

lagen/adenosine diphosphate closure time (PFA-100®, CADP-CT) was two-fold shorter one day after PCI as compared to the value measured during PCI (p = 0.008), which could in part be due to a two-fold increase in von Willebrand factor-ristocetin cofactor activity (vWF: RICO) 1 day after PCI (p = 0.001). There was no difference in the ADP or AA triggered platelet aggregation during PCI and 1 day thereafter as measured with the Cone and Platelet Analyzer (CPA).

Conclusion There is a considerable variability in platelet reactivity between the two time points of blood sampling, during PCI and 20–24 hours thereafter, in three of four test systems, including the VASP assay, which is most specific for Clopidogrel. Inhibition of platelets by Clopidogrel and aspirin was greater 20–24 hours after stent implantation as compared to during the intervention. These data indicate that the time of platelet function testing is important for the determination of cut-off points and the definition of non-responsiveness to antiplatelet drugs.

Impaired Glucose Tolerance Strongly and Significantly Increases the Risk of Future Vascular Events in Angiographied Coronary Patients 027

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Background The prevalence of impaired glucose tolerance (IGT) in angiographied coronary patients is extremely high; it is unknown whether IGT increases the risk of future vascular events in this important patient population.

Objective We aimed at investigating the association of IGT with incident cardiovascular events in angiographied coronary patients.

Methods We enrolled 1040 patients (374 women, 666 men; mean age 63.7 ± 10.2 years) who underwent coronary angiography for the evaluation of established or suspected stable coronary artery disease. An oral glucose tolerance test was performed in subjects without known diabetes. Prospectively, we recorded vascular events over 3 years.

Results From our patients, 394 had a normal glucose tolerance (NGT), 190 IGT, and 456 type 2 diabetes (T2DM; in 244 previously known and in 212 newly diagnosed). When compared with the event rate of NGT subjects (8.9 %), the incidence of vascular events was significantly higher in IGT patients (14.9 %; p = 0.029) as well as in patients with T2DM (13.4 %; p = 0.004). Vascular risk was not significantly different between IGT and T2DM patients (p = 0.778). Multivariate adjustment in Cox regression analysis confirmed these results, with adjusted hazard ratios of 1.89 (95 %-CI: 1.11–3.24); p = 0.020 for patients with IGT and of 1.731 (1-10-2.74); p = 0.019 for patients with T2DM.

Conclusions Impaired glucose tolerance strongly and significantly increases the risk of future vascular events among angiographied coronary patients. Therefore, an oral glucose tolerance test should be performed in these patients for cardiovascular risk stratification.

Pulmonalvenenablation mittels eines neuen zirkumferentiellen Ablationskatheters 019

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Hintergrund Die elektrische Diskonnektion der Pulmonalvenen (PV) zur interventionellen Behandlung von Vorhofflimmern erfordert üblicherweise separate Mapping- und Ablationskatheter beziehungsweise aufwendige Techniken der integralen Bildgebung.

Der zirkumferentielle Mesh Ablator®-Katheter (Bard Inc., Lowell, USA) besteht aus einem zirkulären Drahtgeflecht mit 36 Kreuzungen, über die sowohl hochauflösendes bipolares Mapping als auch Radiofrequenzstromablationen durchgeführt werden können. Der Katheter wird über ein steuerbares transseptales 13F-Sheath dirigiert und hat in entfaltetem Zustand die Form eines Diskus. Dieser wird unter Fluoroskopie im Bereich des Antrums der einzelnen PV platziert und ermöglicht dort ohne weiteres Manövrieren die Erstellung zirkumferentieller Läsionen.

Ziel unserer prospektiven Studie war es, die prozedurale Effektivität und Sicherheit dieses neuen Katheters zu untersuchen.

Methodik Es wurden nur Patienten (P) mit hochsymptomatischem paroxysmalem Vorhofflimmern eingeschlossen. Vor der Ablation wurde eine Computertomographie des linken Vorhofs durchgeführt, um PV-Varianten (gemeinsames Ostium, 3 PV rechts) auszuschließen. Die Prozedur wurde allein mit dem Mesh Ablator®-Katheter durchgeführt, der sowohl für das Mapping als auch für die Ablation (gepulste Energieabgabe mit 5 ms Pulsen über jeweils 300 s, maximale Energieabgabe pro PV: 900 s, Zieltemperatur 58 °C, maximale Energie 80 Watt, quadrantenweises Temperatur- und Impedanzmonitoring über Tempulse®- [Bard Inc., Lowell, USA] und Stockert®-Generator [Biosense Webster Inc., Diamond Bar, USA]) verwendet wurde. Um eine Gefährdung des rechten Nervus phrenicus rechtzeitig registrieren zu können, wurde während der Diskonnektion der rechten oberen PV eine kontinuierliche Stimulation des Nervs vom rechten Vorhof aus durchgeführt.

Ergebnisse Wir untersuchten 17 P (9 männlich, mittleres Alter = 63 ± 10 Jahre). Bei 15 P (88 %) konnten sämtliche 4 PV mit dem Mesh Ablator®-Katheter erreicht und elektrisch diskonnektiert werden. Bei 2 P (12 %) konnte jeweils 1 PV (1 linke obere PV, 1 rechte untere PV) nicht vollständig diskonnektiert werden. Die mittlere Energieabgabe pro PV betrug 715 ± 288 s. Die mittlere Prozedurdauer betrug 194 ± 36 min. mit einer mittleren Durchleuchtungszeit von 34 ± 10 min. Energieabgaben mittels eines zusätzlichen konventionellen Ablationskatheters wurden im Sinne der intendierten vereinfachten Prozedur nicht durchgeführt. Intraprozedurale Komplikationen traten nicht auf. Eine Inspektion des Mesh Ablator®-Katheters unmittelbar nach der letzten Energieabgabe zeigte bei einem P (6 %) eine kleine (2 mm) fest adhärente Thrombusbildung.

Schlussfolgerung Mit dem neuen zirkumferentiellen Mapping- und Ablationskatheter Mesh Ablator® können PV in einem hohen Prozentsatz ohne zusätzliche linksatriale Katheter diskonnektiert werden. Fragen der Langzeitsicherheit und Effektivität in Hinblick auf anhaltenden klinischen Erfolg müssen in zukünftigen großen Registern oder randomisierten Studien geklärt werden.

Vergleich von 64-Zeiler Spiral-CT-Angiographie mit konventioneller Angiographie zur Evaluierung von Nierenarterienstents – eine prospektive Studie 020

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Hintergrund Im Gegensatz zur Detektion von Nierenarterienstenosen hatte die nicht-invasive Bildgebung in der Evaluierung von Nierenarterienstents (NAS) bislang keinen gesicherten Stellenwert. Durch neue hochauflösende Spiral-Computertomographen („64-Zeiler", CT) ist jedoch auch eine Visualisierung des Lumens von gestenteten Nierenarterienabschnitten möglich. Wir untersuchten die Aussagekraft der CT-Nierenarterienangiographie (CT-NA) mittels 64-Zeiler-CT in der Evaluierung von Nierenarterienstents im Vergleich zur konventionellen Nierenarterienangiographie (K-NA) im Rahmen einer prospektiven Studie.

Methodik Bei allen Patienten (P), die von Februar 2006 bis Juli 2007 an unserer Abteilung einen NAS erhielten, wurde 6 Monate nach der Stentimplantation eine CT-NA mittels 64-Zeiler-CT (Siemens „Somatom Sensation 64 Cardiac") sowie eine nachfolgende K-NA durchgeführt. Nicht eingeschlossen wurden lediglich Patienten mit einem Kreatininwert von über 2,5 mg/dl. Die technische Durchführung der CT-NA im Spiralmodus beinhaltete eine Rotationszeit von 370 ms und eine Kollimation von 64 × 0,6 mm bei einer intravenösen Injektion von 80 ml Kontrastmittel (Flussgeschwindigkeit 5 ml/s). Die K-NA wurde jeweils selektiv mit einem rechten diagnostischen Koronarkatheter durchgeführt. Die Auswer-

tung der CT-NA erfolgte über axiale Bilder sowie mittels multiplanarer und gekurvter planarer Reformation, die der K-NA mittels semiautomatischer quantitativer Analyse. Überprüft wurden Sensitivität, Spezitivität, sowie positiv und negativ prädiktiver Wert (PPW, NPW) der Detektion von signifikanten (> 70 %) Instent-Restenosen (ISR) mittels CT-NA im Vergleich zur K-NA.

Ergebnisse Es wurden 63 NAS bei 48 P (25 männlich) mit einem mittleren Alter von 71 ± 9 Jahren untersucht. Die Bildqualität der CT-NA erlaubte eine Evaluierung von 60 NAS (95 %), wohingegen 3 NAS (bei 2 P) wegen Aufhärtungsartefakten infolge hochgradiger Verkalkungen der gestenteten Abschnitte nicht beurteilt werden konnten. Die K-NA am Tag nach der CT-NA fand insgesamt 5 ISR (8 %), von denen alle zuvor mittels CT-NA korrekt erkannt worden waren (Sensitivität und NPW jeweils 100 %). Eine einzige in der K-NA nicht signifikante ISR wurde in der CT-NA überschätzt und als signifikant eingestuft (Spezifität 98 %, PPW 83 %). Bei 6 NAS (10 %) war mittels CT-NA eine geringe Intimahyperplasie darstellbar, welche in der K-NA nicht nachgewiesen werden konnte.

Schlussfolgerung Die Evaluierung von NAS mittels hochauflösender CT-NA ermöglicht die Identifizierung von signifikanten ISR mit einer Sensitivität von 100 % bei einer Spezifität von 98 % und kann daher als nicht invasive Kontrollmethode empfohlen werden.

In- and Outpatients with Noncompaction: Differences in Cardiac and Neuromuscular Co-Morbidity 056

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Background and Methods The prognosis of patients with left ventricular hypertrabeculation/noncompaction (LVHT) is controversial. LVHT is associated with neuromuscular disorders (NMD) and diagnosed echocardiographically in in- as well as outpatients. We compared cardiologic and neurologic findings and mortality in LVHT-patients according to their diagnosis established as in- or outpatients.

Results Among 113 patients (33 females, mean-age 53 years), 91 were investigated neurologically. Fifty-nine inpatients were older (55 vs 50 years, $p < 0.05$), more frequently referred because of heart failure (73 vs 37 %; $p < 0.001$), had more often diabetes (24 vs 7 %; $p < 0.05$), heart failure (81 vs 57 %; $p < 0.01$), a lower left-ventricular fractional-shortening (21 vs 26 %; $p < 0.05$) and more extensive LVHT (1.7 vs 1.5 affected walls, $p < 0.05$). Fifty-four outpatients were referred more often because of chest-pain (33 vs 12 %; $p < 0.01$), myopathy (13 vs 2 %; $p < 0.05$), were more often neurologically normal (20 vs 7 %; $p < 0.05$) or had a specific NMD (28 vs 12 %; $p < 0.05$). During a mean follow-up of 3.8 years, mortality was 5.8 %/year. Inpatients had a higher mortality (12.1 vs 2.1 %/year; $p = 0002$) and a shorter time between LVHT-diagnosis and death (1.7 vs 4.6 years; $p = 0.0197$) than outpatients.

Conclusions Outpatients with LVHT have a better prognosis than inpatients. Inpatients with LVHT should be closely monitored.

Atrial Fibrillation in Left Ventricular Noncompaction is Associated With a Poor Prognosis – With and Without Neuromuscular Disorders 057

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Aims The study in patients with left ventricular hypertrabeculation/noncompaction (LVHT) aimed to compare patients with and without atrial fibrillation (AF) regarding prevalence of neuromuscular disorders (NMD), cardiac symptoms, electrocardiographic (ECG) findings, left ventricular function, location and extension of LVHT and mortality.

Methods and Results LVHT was diagnosed in 102 patients (30 female, age 53 ± 16 years) between June 1995 and November 2006. A specific NMD was diagnosed in 21, a NMD of unknown etiology in 47, the neurologic investigation was normal in 14, and 20 patients refused. The 15 patients with AF were older (65 versus 51 years; $p < 0.01$), suffered more often from exertional dyspnoea (100 vs 62 %; $p < 0.01$), diabetes mellitus (33 vs 12 %; $p < 0.05$) and heart failure (100 vs 57 %; $p < 0.01$) than patients without AF. The prevalence of NMD was slightly higher in patients with than without AF (87 vs 82 %; p = n. s.). AF patients had more frequent ECG abnormalities (2.3 vs 1.4; $p < 0.01$), valvular abnormalities (93 vs 48 %; $p < 0.01$), lateral wall LVHT (87 vs 37 %; $p < 0.01$), more extensive LVHT (2.1 vs 1.5 ventricular parts; $p < 0.05$), a worse left-ventricular fractional-shortening (14 vs 25 %; $p < 0.01$) and higher mortality during 3.8 years.

Conclusion LVHT-patients with AF deserve special care because they have a worse prognosis than LVHT-patients without AF.

Cardiac and Neurologic Implications of Left Ventricular Hypertrabeculation/Noncompaction Affecting the Septum 058

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Left ventricular hypertrabeculation/noncompaction is mainly detected by echocardiography. Left ventricular hypertrabeculation/noncompaction is commonly associated with cardiac and extra-cardiac disorders, preferentially neuromuscular disorders. Left ventricular hypertrabeculation/noncompaction is mainly located within the left ventricular apex, lateral, posterior and anterior wall but only rarely in the medial and basal portions of the interventricular septum.

Aim of the present review is to summarize the knowledge about septal affection in left ventricular hypertrabeculation/noncompaction. Septal affection in left ventricular hypertrabeculation/noncompaction is a finding in predominantly children and adolescents. Septal left ventricular hypertrabeculation/noncompaction occurs more in females than in males. Patients with septal left ventricular hypertrabeculation/noncompaction have a poor prognosis. Septal left ventricular hypertrabeculation/noncompaction is most likely congenital. The association of septal left ventricular hypertrabeculation/noncompaction with extracardiac abnormalities and neuromuscular disorders remains unclear. Presumably left ventricular hypertrabeculation/noncompaction does not represent a cardiac manifestation of a neuromuscular disorder.

Significant Reduction of Radiation Exposure Using a Protection Cabin for Electrophysiological Procedures 041

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Background Fluoroscopy is the main visualization technique for intracardiac catheter positioning in electrophysiology. This may result in high cumulative operator radiation exposure with potential stochastic and deterministic sequels. Traditional radiation protection is frequently associated with discomfort and leaves unprotected body parts. Thus a radiation protection cabin (RPC) shielded with 2 mm lead-equivalent walls was tested as an alternative protection tool (Cathpax, Lemer Pax). The main objective was to compare radiation doses inside the RPC vs. outside the RPC.

Methods The X-ray system used was either a biplane or a monoplane Philips Allura Xper FD10 system. Significant air kerma reduction was achieved with pulsed fluoroscopy at 3 to 7 frames/s and entrance dose limitation. Cumulative dose-area product (DAP) and total fluoroscopy times were measured. To assess the scattered radiation to the operator inside the RPC an electronic personal dosi-

meter (EPD; Mk2, Thermo Electron) was placed at the neck level of the operator. Another EPD was located outside the RPC on the left side lateral wall of the cabin, at 150 cm height from the floor, to record the presumable "head radiation dose". Initial punctures and catheter positioning were performed before placement of the RPC. All ablation procedures were fully performed and completed with the RPC in use.

Results A total number of 42 of electrophysiological procedures (AVNRT, WPW = 3, AFL, AF = 5, VT = 4) were included so that a clinically wide spectrum of fluoroscopy duration and radiation doses (62 % of cases in the biplane lab) could be evaluated. The mean age of the patients (71 % males) was 57 ± 13 years, mean BMI 28 ± 5 kg/m^2 (range 19–42). Fluoroscopy times had a median of 45 min (range 8–110), and the DAP a median of 5368 cGy.cm^2 (range 1442–65620). Doses outside the RPC showed values ranging from 4 to 4881 µSv with a median of 166 µSv. The highest doses were measured for AF ablations despite use of 3-D navigation systems. In 5 of the total procedures doses were > 1000 µSv, indicating a high exposure to the head. Doses inside the RPC were detected only at sensitivity threshold/background levels (0.41 ± 0.96 µSv; range 0–4). The total accumulated dose for all 42 procedures outside the RPC was 21739 µSv, however, for the operator inside the RPC only 17 µSv.

Conclusions There were highly concordant low dose values measured for the operator inside the RPC, irrespective of procedure and fluoroscopy duration and of externally applied radiation energy. The doses measured outside the RPC confirm that electrophysiology operators are exposed to relatively high dose levels, particularly to unprotected body parts. Therefore, the dose reduction with the RPC represents a major benefit over the use of a lead apron and contributes like other measures to a dose reduction to "as low as reasonably achievable" (ALARA principle).

Ein neuer elektronischer Algorithmus zur Lokalisierung einer akzessorischen Leitungsbahn im Oberflächen-EKG bei WPW-Syndrom 010

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Einführung Die exakte Lokalisierung der akzessorischen Leitungsbahn (AP) hat in der Diagnostik des WPW-Syndroms eine große Bedeutung. Die Information der Polarität und des Lagetyps der Deltawelle im Oberflächen-EKG wird vor der Durchführung einer invasiven Abklärung zur Beurteilung der elektrophysiologischen Eigenschaften der akzessorischen Bahn, zur Abschätzung des Risikos einer permanenten AV-Blockierung durch die Radiofrequenzablation und zur Planung des Zugangsweges für die Ablation verwendet. Alle bisher entwickelten Algorithmen können die wahrscheinliche Lage der AP nur ungenau abschätzen. Wir entwickelten daher einen neuen elektronischen Algorithmus zur Lokalisierung der AP bei WPW-Patienten.

Methodik Zur Entwicklung des Algorithmus wurden die Befunde von 188 Patienten herangezogen, die an unserer Institution zwischen 1997 und 2006 aufgrund eines symptomatischen WPW-Syndroms zur Radiofrequenzablation einer akzessorischen Leitungsbahn aufgenommen wurden. Im Oberflächen-EKG vor der Untersuchung wurde die Deltawelle von 3 unabhängigen Untersuchern als „positiv", „negativ", „biphasisch", „nicht sichtbar" oder „ungewiss" bewertet. Anhand dieser Information und der Stelle der erfolgreichen Ablation wurde „LocAP", ein Computerprogramm zur Berechnung der Lage der akzessorischen Bahn entwickelt. Die 3 wahrscheinlichsten Positionen wurden von dem Programm errechnet und die Verlässlichkeit des Algorithmus wurde anhand von 30 Patienten, die ab 2007 aufgrund eines WPW-Syndroms abladiert wurden, prospektiv untersucht und mit 3 bestehenden Algorithmen verglichen.

Resultate Insgesamt konnten in den elektrophysiologischen Untersuchungen 15 linksseitige, 2 rechtsseitige und 13 septale akzessorische Leitungsbahnen identifiziert werden. Durch eine gering ausgeprägte Präexzitation betrug die QRS-Breite in 5/30 EKGs unter 100 ms, und die PQ-Zeit bei 10/30 EKGs über 120 ms. Wenn die wahrscheinlichste Lage von LocAP berechnet wurde, konnte die Lokalisation von 20/30 AP (66,6 %) richtig berechnet werden. Die richtige Einschätzung stieg weiter an, wenn Patienten mit wenig Präexzitation von der Auswertung ausgeschlossen wurden (20/25 [80 %] bei QRS-Breite > 120 ms und 17/20 [85 %] bei PQ-Zeit < 120 ms). Verglichen mit den bestehenden Algorithmen schnitt LocAP damit in der Berechnung der Lage der AP (Milstein 33,3 %, Arruda 40 %, Fitzpatrick 50 %) signifikant besser ab.

Zusammenfassung Mit LocAP wurde ein elektronischer Algorithmus entwickelt, der die Lage einer akzessorischen Leitungsbahn im Oberflächen-EKG in einem Großteil der Patienten richtig bestimmen konnte. Die Verlässlichkeit des Algorithmus hängt vom Ausmaß der Präexzitation im EKG ab und übersteigt die der bestehenden Algorithmen.

Long-term Outcome After Drug-eluting Stent Implantation in Comparison With Bare-metal Stents: a Single Centre Experience 102

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Background Aim of our study was to evaluate the effect of drug-eluting stents (DES) compared with bare-metal stent (BMS) on all-cause mortality and clinical in-stent-restenosis (ISR) in a "real world" clinical setting.

Methods 1,490 consecutive patients, who underwent PCI, were included in a prospective registry from January 2003 until December 2006. Patients were divided retrospectively into two groups, those who received a DES and those who received a BMS. All-cause mortality and the combined endpoint death and ISR was evaluated during a mean follow-up period of 24.56 ± 12.5 months (range 6–52 months).

Results In total 2,062 stents were implanted in 1,769 lesions. 1,033 patients (69.3 %) received 1,441 BMS, while 457 patients (30.7 %) received 621 DES. Gender, arterial hypertension, history of MI, PCI, CABG, cancer, smoking and PAOD were not different between groups. Significant differences were found for age (DES: 62.17 ± 12.14 vs BMS: 65.18 ± 12.34; p < 0,001), hyperlipidemia (78 % vs 72 %; p = 0.01), diabetes mellitus (25.8 % vs 20.6 %; p = 0.02), heart failure (2.8 % vs 5.5 %; p = 0.02), previous cerebral insult (2.9 % vs 6.5 %; p = 0.004), presence of acute coronary syndrome (ACS) during intervention (38.7 % vs 55.5 %; p < 0.001), respectively.

12.3 % of patients with BMS but only 5.7 % with DES died during the follow-up (p = 0.01). With ACS 4.5 % of DES patients and 12.9 % of BMS died (p = 0.02). No differences in mortality could be demonstrated between DES and BMS treated patients with or without diabetes.

Using the combined endpoint (all-cause death and ISR), 12.9 % of patients with DES and 21.3 % with BMS (p = 0.01) had an event during the follow-up. Patients with ACS treated with DES had a significantly lower combined event rate than patients treated with BMS (9.6 % vs 21 %; p = 0.006). Diabetics with DES, had a significantly lower combined event rate than diabetics with BMS (11 % vs 23.9 %; p = 0.04), while no significant difference could be demonstrated in non-diabetic patients.

Conclusion Our results obtained in a "real world" clinical setting showed a clinical long-term benefit for DES (59 % TAXUS®, 22 % CYPHER®, 19 % other) compared with BMS in almost all patient groups and underline the safety and efficacy of DES over BMS.

Long-term Outcome after Drug-eluting Stent Implantation in Patients With or Without Diabetes mellitus 103

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Background Diabetes mellitus is associated with an increased risk of death and clinical in-stent restenosis after percutaneous coronary interventions. Aim of our study was to evaluate the impact of diabetes mellitus on all-cause mortality and clinical in-stent-restenosis (ISR) in patients undergoing drug-eluting stent (DES) implantation in a routine "real world" clinical setting.

Methods 457 consecutive patients, who underwent PCI and DES implantation, were included in this prospective registry from January 2003 until December 2006. Patients were divided retrospectively into two groups, diabetics and non-diabetics. All-cause mortality, ISR and the combined endpoint death and ISR was evaluated during a mean follow-up period of 24.56 ± 12.49 months (range 6–52 months).

Results Gender, hyperlipidemia, as well as history of MI, PCI, CABG, cancer, smoking, PAOD, heart failure, previous cerebral insult, and presence of acute coronary syndrome (ACS) during intervention were not different between groups. Significant differences were found for age (diabetics: 64.53 ± 12.64 vs non-diabetics: 61.34 ± 12.53; p < 0,001), and arterial hypertension (82.2 % vs 72 %; p = 0.028), respectively.

5.9 % of patients with diabetes and 5.6 % without diabetes died during the follow-up (p = 0.9). No differences in mortality could be demonstrated between DES and BMS treated patients with or without diabetes mellitus.

ISR was observed in 6 patients with diabetes and 27 without diabetes (5.1 % vs. 8 %; p = 0.3)

Using the combined endpoint (all-cause death and ISR), 11 % of patients with diabetes and 13.6 % without diabetes (p = 0.4) had an event during the follow-up.

Conclusions Our results obtained in a "real world" clinical setting demonstrate that diabetes mellitus does not affect the long-term clinical outcome (all-cause mortality and ISR) after DES implantation.

G148A – A Non Conservative Polymorphism of the Glycoprotein 130 is Associated with Coronary Artery Disease 108

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Purpose The cytokines of the interleukin-6 (IL-6) family have been proven to play a pivotal role in inflammation, regulating the development and progression of atherosclerosis. They are characterized by their functional redundancy and pleiotropy, sharing a common signal transducing receptor subunit: glycoprotein 130 (gp130). The importance of individual variation in inflammatory response for atherosclerotic risk is becoming an increasingly interesting and exciting new frontier in cardiovascular research. Such variation is partially triggered by single nucleotide polymorphisms (SNPs). Therefore we investigated whether a non conservative SNP (G148A) of the gp130 gene affects the functional properties of the gp130 receptor and its possible association with coronary artery disease.

Methods 522 patients, scheduled for elective coronary angiography were enrolled in this study. Absence (n = 53) or presence (n = 469) of coronary artery disease was assessed by coronary angiography. DNA was extracted from whole blood and gp130 polymorphism was detected by restriction fragment length analysis. We calculated structure refinement and solvent accessible surface of the gp130 using an in silico model.

Results CAD was confirmed in 394 out of 445 (89 %) carriers of the common G148G allele, in 70 out of 72 (97 %) carriers of the heterozygous (G148A) and 5 out of 5 (100 %) homozygous (A148A) carriers of the Arg allele. For hetero- and homozygous carriers of the Arg allele, univariate logistic regression revealed an odds ratio of 4.85 (95 %-CI: 1.15–20.37; p = 0.03) for coronary artery disease. This association remained significant after correction for age, sex, body mass index, diabetes, smoking, family history, hypertension, triglycerides, and total cholesterol levels in a multivariate logistic regression model. Using an in silico model, we could show that the G148A polymorphism induces a change in the solvent accessible surface of the gp130 receptor.

Conclusion The role of the immune system in atherosclerosis is as complicated as the disease itself, and the majority of the complex immunological influences and interactions remain to be fully elucidated. Exactly this complexity, however, offers an explanation for the subtle, yet significant alteration in individual susceptibility to CAD caused by a protein alteration secondary to this SNP. The G148A polymorphism of gp130 correlates significantly with CAD. We speculate that this effect may derive from an alteration in the extracellular binding region of the receptor, resulting in a change in the affinity of the receptor for its ligands.

Hohe Akzeptanz und Zunahme des Sicherheitsgefühls für den Patienten durch die Telemedizinische Nachkontrolle und Monitoring von ICDs 078

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Hintergrund Aufgrund der zunehmenden Umsetzung der Richtlinien und Erweiterung der Indikationsstellung von implantierbaren Defibrillatoren (ICD), die in einer steigenden Anzahl an behandelten Patienten resultieren, werden neue Methoden für das Management von ICD-Patientennachsorgen notwendig. Die Verwendung der Telemedizin könnte eine Methode sein, um diese steigende Anzahl an Patienten besser bewältigen zu können. Ziel dieser prospektiven Studie war es, Patientenakzeptanz, das Gefühl der Sicherheit für den Patienten, Durchführbarkeit und den möglichen Nutzen des neuen Medtronic CareLink-Systems zur Routinenachsorge von ICDs zu erheben.

Methoden Patienten mit einem Medtronic ICD wurden konsekutiv während einer Routinenachsorge in 2 Zentren eingeschlossen. Anstelle alle 3 Monate zu einer konventionellen Nachsorge zu kommen, fragten die Patienten ihren ICD mit einem speziellen Monitor zu Hause ab und sendeten die Daten über eine Standardtelefonleitung an einen Daten-Server. Ärzte kontrollierten die Daten im Folgenden auf einer sicheren Webseite. Die übermittelten Daten entsprechen den Daten, die ein Arzt bei der Abfrage während einer konventionellen Nachsorge erhält (z. B. programmierte Parameter, Systemintegritätsdaten und Episodendaten mit EGMs) inklusive eines 10 Sekunden-EKGs. Die Datensammlung erfolgt während der konventionellen Nachsorge bei Einschluss und nach einem Jahr sowie bei jeder telemedizinischen Fernnachsorge. Durchführbarkeit und Patientenakzeptanz sowie das Gefühl der Sicherheit werden mit Hilfe von Fragebögen bei der 3-Monats- und Einjahresnachsorge erfasst.

Ergebnisse 149 Patienten (Durchschnittsalter 67 ± 12 Jahre, 21 % davon Frauen,) wurden konsekutiv eingeschlossen (33 Einkammer-ICDs, 86 Zweikammer-ICDs, 30 CRT-D, 54 Implantate davon mit automatischem kabellosem Übertragungsmodus und der Möglichkeit von automatischen Ereignismeldungen). Während eines durchschnittlichen Nachsorgezeitraumes von 163 ± 77 Tage wurden 202 Übertragungen gesendet. Davon wurden 23 außerplanmäßige Fernnachsorgen aufgrund von Symptomen oder ICD-Schockabgaben durchgeführt. Während des Nachsorgezeitraumes gab es keine falschen oder inkorrekten Übertragungen.

Bei den Implantaten mit Möglichkeit der automatischen Ereignismeldung (z. B. AF/AT-Episoden, Schocks, ERI, Optivol, Elektrodenwarnung) wurden 33 Ereignisse registriert.

Abhängig von der Ereignisart erfolgte eine telefonische Kontaktaufnahme mit dem Patienten bzw. wurde eine vorzeitige ambulante Begutachtung vereinbart. In den meisten Fällen (92 %) waren allerdings keine weiteren Schritte erforderlich.

Alle 71 Patienten, die zumindest eine telemedizinische Kontrolle hatten, empfinden die Benutzung des Monitors als leicht oder sehr leicht. 37 von 71 Patienten (52 %) gaben an, dass ihr Sicherheitsgefühl gesteigert bzw. stark gesteigert wurde, 48 % fühlten keine Änderung, kein Patient (0 %) gab an, ein reduziertes oder stark reduziertes Sicherheitsgefühl zu haben. 70 von 71 Patienten (99 %) bevorzugen die telemedizinische gegenüber der konventionellen Nachsorge.

Als wichtigste Vorteile dieser Methode gaben die Patienten an: Zeitersparnis (69 %), nicht an Krankenhaustermin gebunden sein (69 %), rasche Kontrollmöglichkeit bei Problemen (68 %), Sicherheit (58 %), Kostenersparnis (49 %). 70 von 71 Patienten (99 %) würden die Monitor-Nachsorge anderen Patienten weiterempfehlen.

Konklusion Die Patientenakzeptanz für die telemedizinische Nachsorge von ICD-Patienten mit dem Medtronic CareLink-System ist sehr hoch. Die Patienten schätzen vor allem die einfache und zeitsparende Möglichkeit der ICD-Fernnachsorge, weiters das bei den meisten gesteigerte Gefühl der Sicherheit.

Anhand der telemedizinischen Nachsorge bzw. des Monitorings im Falle auftretender Ereignisse über das CareLink-System kann eine Verbesserung der Qualität und der Sicherheit der Patientenbetreuung sowie eine Verbesserung der Prävention und Individualisierung der Behandlung erzielt werden.

Short- and Long-term Mortality in Patients with Non-ST-Segment Elevation Acute Coronary Syndrome (NSTE-ACS) 112

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Background and Aim In 2002 updated guidelines recommend an early invasive and pharmacologically more aggressive therapy in patients with NSTE-ACS. We aimed to compare the clinical outcome in consecutive patients admitted to our department before implementation of the new guidelines (2001–2002) and thereafter (2003–2004).

Methods In a systematic retrospective review of clinical records data on 813 patients admitted to our cardiology department for either unstable angina (UA) or non-ST-segment elevation myocardial infarction (NSTEMI) between January 2001 and December 2004 were analyzed. Data concerning 1- and 2-year mortality were received either from hospital records in patients regularly controlled in our outpatients ward or from the Mortality Statistics Austria.

Results In patients with unstable angina (Tn negative) the percentage of an invasive strategy increased from 32.0 % before to 63.6 % after implementation of guidelines ($p < 0.001$). While 23.8 % of patients admitted 2001/2002 received early invasive therapy within 48 hours, it was 53.7 % of patients admitted 2003/2004 ($p < 0.001$). The administration of clopidogrel increased from 34.1 % to 67.2 % ($p < 0.001$). In-hospital mortality rate was not different between both treatment periods (1.6 % vs 1.6 %; $p = 0.967$). After 1 year mortality decreased from 11.7 % to 7.0 % ($p = 0.152$), a result which was statistically significant after 2 years (19.4 % vs 7.8 %; $p = 0.003$), respectively.

In patients with non-ST-segment myocardial infarction (Tn positive) the rate of interventions increased from 31.8 % to 47.9 % ($p = 0.001$). In 2001/2002, 28.6 % of the interventions were performed within 48 hours but reached 51.5 % in 2003/2004 ($p = 0.007$). Administration of clopidogrel on admission increased (44.2 % vs 66.2 %; $p < 0.001$). In-hospital mortality was reduced from 17.5 % to 9.4 % ($p = 0.014$) and 1-year mortality decreased from 33.1 % to 24.5 % ($p = 0.057$) due to a more aggressive and early invasive approach. 2-year mortality was still lower in patients treated in 2003/2004 but did not reach statistical significance any longer (29.6 % vs. 36.0 %; $p = 0.149$).

Conclusion The increase of an early invasive and pharmacologically more aggressive therapy in patients with NSTE-ACS led to beneficial results of short- and long-term mortality in all subgroups (**Figure 8**). Despite a more aggressive treatment (including early PCI within 48 hours) this therapeutic option, however, is still withheld in a relatively high number of high-risk patients most obviously due to an expected increased rate of side effects (e.g. elderly patients and/or individuals with co-morbidities). According to these data, more patients of this high-risk group should receive an early invasive and pharmacologically more aggressive treatment.

Current Cholesterol Guidelines and Clinical Reality: A Comparison of Coronary Artery Disease Patients From Now and From Seven Years Ago 029

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Background Current guidelines recommend serum LDL cholesterol < 100 mg/dl for patients with stable coronary artery disease (CAD) and < 70 mg/dl for the very high risk patients with CAD plus type 2 diabetes (T2DM). We aimed at investing compliance with these guidelines in two cohorts of CAD patients from now and from seven years ago.

Methods We obtained lipid panels in two cohort of patients who were referred to coronary angiography for the evaluation of previously (> 1 month) established stable CAD in 1999–2000 (n = 49) and in 2005–2007 (n = 656), respectively.

Results The prevalence of diabetes was 24.9 % in the first and 26.9 % in the second cohort. Overall, 59.3 % and 64.6 % of diabetic patients and 50.8 % and 58.5 % of non-diabetic patients were on statins in the first and in the second cohort (p for difference between the cohorts = 0.408 and 0.043, respectively). Among non-diabetic patients with CAD, the proportion of subjects with LDL cholesterol < 100 mg was 23.5 % in the first cohort and 28.9 % in the second cohort ($p = 0.182$); among patients with CAD plus T2DM 36.0 % and 40.6 % ($p = 0.481$) and 8.1 % and 9.1 % ($p = 0.788$) had LDL cholesterol < 100 mg/dl and < 70 mg/dl in the first and in the second cohort, respectively.

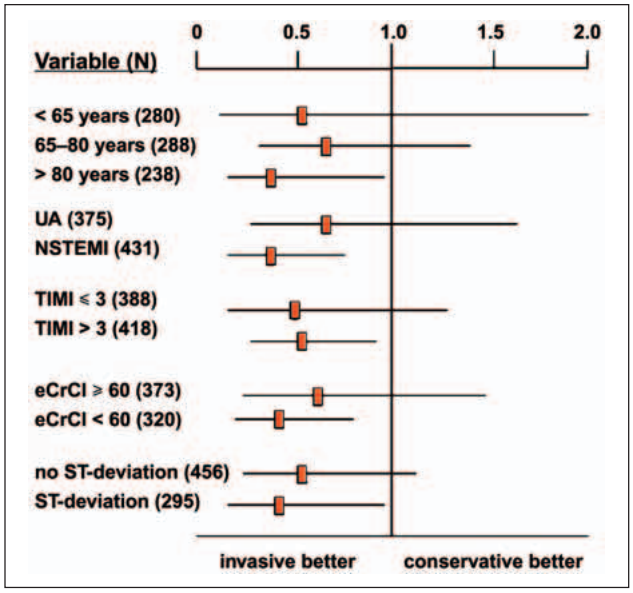

Figure 8: B. Vogel et al.

Conclusion The proportion of patients with stable CAD who meet current lipid treatment goals is low and has only marginally improved during the last 7 years. This in particular holds true for the very high risk patients with CAD plus diabetes.

Aortic, but not Brachial Systolic Blood Pressure Predicts Survival in Cardiomyopathy 002

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Rationale Blood pressure (BP) has been inversely linked to mortality in patients with impaired systolic function. Recently, a superior prognostic value of the aortic as compared to the brachial BP has been suggested in hypertensives. We tested the prognostic implications of aortic versus brachial BP in patients with cardiomyopathy.

Methods In 150 patients with impaired systolic function and known coronary anatomy, brachial BP was measured, and aortic BP was derived non-invasively, using radial applanation tonometry and a validated transfer function. Patients were followed prospectively, primary endpoint was all-cause mortality, secondary endpoint cardiovascular mortality. Statistics was univariate and multivariate Cox proportional hazards regression analysis.

Results Mean age was 65.1 ± 10.9 years, 30.6 % were female, 82.6 % had ischemic etiology. Mean ejection fraction was 40.3 ± 10.9 %. After a follow-up of 45.9 ± 16.0 months, 39 patients had died (29 of cardiovascular causes). Analyzing BP as a continuous variable revealed a 17.3 % (95 %-CI: 0.2–31.4 %) decrease in all-cause mortality (p = 0.49) as well as a 23.1 % (95 %-CI: 4.0–38.4 %) decrease in cardiovascular mortality (p = 0.02) for every 10 mmHg increase in aortic systolic BP. In contrast, brachial systolic BP did not predict total (p = 0.16) or cardiovascular (p = 0.10) mortality. After adjustment for age, gender, presence of coronary artery disease, and degree of systolic impairment, a 10 mmHg higher aortic systolic BP was associated with a 19.2 % (95 %-CI: 1.1–33.9 %) lower all-cause mortality (p = 0.04) and a 25.5 % (95 %-CI: 5.1–41.6 %) lower cardiovascular mortality (p = 0.02).

Conclusions Aortic systolic BP, the pressure that is actually "seen" by the heart, is a better predictor of outcome than brachial systolic BP in cardiomyopathy patients.

Plasma Levels of Asymmetric Dimethylarginine (ADMA) Predict All-Cause Mortality in Patients Undergoing Coronary Angiography 003

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Background Asymmetric dimethylarginine (ADMA) is an independent cardiovascular risk factor in renal patients. We aimed to study the association between ADMA and mortality in patients undergoing coronary angiography.

Methods In 255 patients, we measured plasma levels of ADMA, using a validated ELISA assay, at the time of the angiogram. Patients were followed prospectively, primary endpoint was all-cause mortality. Statistics was univariate and multivariate Cox proportional hazards regression analysis.

Results Mean age 65.7 ± 9.5 years, 51.7 % were men, 15.7 % had diabetes, 51 % coronary artery disease, 87.8 % normal systolic function, 19.6 % underwent coronary interventions. Mean ADMA levels were 0.63 ± 0.16 micromol/l. During a follow-up of 52.5 ± 8.2 months, 12 patients died. Analyzing ADMA as a continuous variable revealed a 44.8 % increase in mortality (95 %-CI: 5.5–98.7 %; p = 0.2) for every 0.1 micromol/l increase in ADMA levels. In a multivariable regression model (p < 0.0001), ADMA (47.7 % increase in mortality per 0.1 micromol/l increase in ADMA levels; CI: 3.1–111.7 %; p = 0.03), log NT-proBNP, and age predicted the primary endpoint, whereas gender, presence of coronary artery disease, and systolic function did not.

Conclusions In relatively low risk patients undergoing coronary angiography, plasma levels of ADMA are independent predictors of all-cause mortality.

Plasma Levels of Matrix Gla protein are Inversely Associated with Mortality and Severe Cardiovascular Events in Patients Undergoing Coronary Interventions 004

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Background Matrix Gla protein (MGP) is a potent inhibitor of tissue calcification. Serum levels of MGP have been inversely correlated with the extent of coronary artery calcification. However, it is unknown whether MPG levels are predictive for severe clinical cardiovascular events including mortality in patients undergoing percutaneous coronary interventions (PCI).

Methods Plasma levels of MGP were measured, using a validated ELISA, in 234 patients at the time of the PCI. Patients were followed prospectively, primary endpoint was total mortality, secondary endpoint mortality, nonfatal myocardial infarction, and restenosis. Statistics were logrank test and multivariate Cox proportional hazards regression analysis.

Results 30.8 % were female, mean age was 65.6 ± 10.4 years, 23.9 % were diabetic and 70.9 % hypertensive. Systolic function was preserved in 66.2 %. Median plasma level of MGP was 6.61 nmol/l (CI: 6.29–7.11 nmol/l). During a follow-up of 49.9 ± 11.5 months, 22 patients died, and 69 patients reached the secondary endpoint. MGP levels above the median were associated with improved survival (HR for total mortality 0.27, CI: 0.13–0.71; p = 006, as compared to MPG values below the median) and with a 54 % reduction of the risk of death, myocardial infarction, and restenosis (HR 0.46; CI: 0.28–0.76; p = 0.002, as compared to MPG values below the median). In multivariable models, MGP and age predicted all cause mortality, whereas MGP, extent of coronary artery disease, and diabetes mellitus predicted the secondary endpoint.

Conclusions MGP is a powerful, independent predictor of severe cardiovascular events and total mortality in patients undergoing PCI.

Safety and Efficacy of Endothelial Progenitor Cell Capture Stent Implantation (Genous® Bio-Engineered R Stent) in Higher Risk Patients: A Single Center Experience with Intermediate- to Long-term Clinical Follow-up 110

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Background The Genous® Bio-engineered R stent is coated with an antibody (antihuman CD 34) that captures endothelial progenitor cells (EPCs) to accelerate the natural healing process and reendothelialisation. Rapid recovery of a functional endothelium after stent implantation is believed to be protective against stent thrombosis and to reduce the occurrence of restenosis. Increasing circulating EPCs by statin therapy seems to be of potential benefit.

Objectives The aim of this study was to evaluate the safety and efficacy of Genous® stent implantation in higher risk patients with acute coronary syndrome (ACS) or selected elective patients with atrial fibrillation, mechanical valve replacement or scheduled non cardiac surgery regarding major adverse cardiac events (MACE) at 1 year follow-up and the impact of statin therapy.

Methods and Results From November 2005 to August 2007 129 Genous® stents were successfully implanted in 98 patients. Mean age was 62 ± 12 years, 77 % were male and 26 % had diabetes. 67 % of patients presented with an (ACS; STEMI: 82 %,

NSTEMI: 12 %). 52 % of elective patients had an indication for antithrombotic triple therapy (atrial fibrillation, mechanical valve replacement) and 38 % had planned non cardiac surgery.

Lesion classification was B2/C in 44 %, the LAD was treated in 40.8 % of patients (ACS: 38 % vs elective 47 %, p = n. s.) and LM in 2 % (ACS 1 and elective 1). Mean lesion length was 18 ± 7.9 mm with mean reference vessel diameter of 3.2 ± 0.6 mm.

All patients were followed by telephone contact after 1 year and angiography was performed in 36 % of patients after median 199 days (range 48 to 408 days).

During FUP (median 360 days, range 24 to 770 days):

Overall mortality rate was 7.1 % (ACS: 3 % vs elective 15.6 %; p = 0.036), cardiac death occurred in 4.1 % (ACS: 3 % vs elective 6 %; p = n. s.), myocardial infarction occurred in 1 % (1 patient with STEMI due to another culprit vessel, no stentthrombosis) (ACS: 1 % vs elective 0 %; p = n. s.), target lesion revascularization (TLR) was performed in 9.2 % of patients (ACS: 10.6 % vs elective 6.3 %; p = n. s.) or 6.9 % of implanted stents (ACS: 8.1 % vs elective 4.7 %; p = n. s.).

Overall MACE rate including 3 coronary artery bypass graft operations (2 in ACS patients, 1 in elective patient) was 19 % (ACS: 16.7 % vs elective 25 %; p = n. s.).

Statin therapy was prescribed in 87 % of patients (ACS: 89 % vs. elective 81 %; p = n. s.) at discharge. There was a statistical not significant trend towards higher MACE rates in patients without statin therapy: TLR 15.4 vs 8.2 %, mortality 15.4 vs 5.9 %, overall MACE 30.8 vs 17.6 %. Dual antiplatelet therapy was prescribed in ACS patients for 12 months, in elective patients for 4 weeks. Subacute stent thrombosis occurred in1 ACS patient (on day 7), but no incidence of late stent thrombosis was observed.

Conclusion Genous® stent implantation appears safe and effective with low rates of TLR and no late stentthrombosis in selected higher risk patients, especially with ACS and STEMI. Statin therapy might reduce MACE rates after Genous® stent implantation. The higher non cardiac mortality in our elective patient cohort reflects the higher comorbidity in this selected patient group.

Comparison of Percutaneous Coronary Intervention with Implantation of Drug-Eluting Stents (Taxus®) versus Endothelial Progenitor Cell Capture Stents (Genous®) during ST Elevation Myocardial Infarction: A Non-Randomized Single Center Experience 117

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Background Although recent data suggest that percutaneous coronary intervention (PCI) with drug-eluting stent implantation (DES) in ST elevation myocardial infarction (STEMI) provides better clinical outcomes compared to bare-metal stenting, there still exist concerns about DES safety issues in this patient population. The Genous® Bio-engineered R stent is coated with an antibody (antihuman CD 34) that captures endothelial progenitor cells (EPCs) to accelerate the natural healing process including reendothelialisation and seems therefore of potential benefit in this patient population.

Objectives This study evaluated the clinical outcomes of consecutive STEMI patients after PCI with DES (Taxus®) or EPC capture stent (Genous®) implantation.

Methods From November 2005 to August 2007, 256 consecutive STEMI patients were treated with Taxus® (n = 202) or Genous® (n = 54) stent implantation. Stent choice was left to the discretion of the operator.

Results High-risk patients (cardiogenic shock or cardio pulmonary resuscitation) comprised 16 % of the Taxus® group and 19 % of the Genous® group (p = 0.68). Mean age in the Taxus® group was 59 ± 13 years, 76 % male, LAD involvement in 48 % (LM 2 %) and in the Genous® group 60 ± 13 years, 77 % male, 44 % LAD treatment (LM 2 %) (p = n. s., in all cases).

The 30-day major adverse cardiac event (MACE) rate for Taxus® and Genous® was 7.9 % and 3.7 % (p = 0.28), respectively. 30 day mortality was 5 % and 0 % (p = 0.09), subacute stentthrombosis (ST) occurred in 1.5 % and 1.9 % (p = 0.85), coronary artery bypass graft operation (CABG) was performed in 2.0 % and 1.9 % (p = 0.95). The mean follow-up was 444 ± 183 days in the Taxus® group and 406 ± 195 days in the Genous® group (p = 0.33). The overall long term MACE-free survival was 85 % in the Taxus® group and 82 % in the Genous® group (p = 0.51). The mortality rate after 30 days was 3.5 % and 5.6 % (p = 0.52), myocardial infarction occurred in 1.1 % and 5.8 % (p = 0.04), late ST occurred in 0.5 % and 0 % (1 vs 0; p = 0.61) and target lesion revascularization (TLR) was performed in 2.7 % and 7.7 % (p = 0.09) in the Taxus® group and Genous® group, respectively.

Conclusion PCI with DES (Taxus®) implantation in acute STEMI offers equivalent long term safety with higher efficacy compared to Genous® stent implantation in an all comers population. The initial observed higher 30 day MACE rate in the Taxus® group was statistically not significant and seems attributable to the rather small number of Genous® patients. Long term MACE rate was in favor of Taxus® with lower rates of MI and TLR, despite one case of late ST.

Our data do not support concerns that DES implantation in STEMI might cause additional harm, however to draw final conclusions the results of the worldwide randomized HORIZONS Trial should be awaited.

Echokardiographische Bestimmung der koronaren Flussreserve bei Patienten nach Ross-Operation und mechanischen Aortenklappenersatz 086

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Hintergrund Die koronare Flussreserve (CFR) ist ein wichtiger Parameter der Langzeitprognose bei Patienten nach Aortenklappenersatz (AKE). Der AKE führt zu einer Verbesserung, aber nicht vollständigen Normalisierung der CFR.

Eine reduzierte CFR kann Ursache für eine erhöhte kardiale Komplikationsrate, höhere Mortalität und reduzierte linksventrikuläre Funktion sein.

Ziel der Studie war die Bestimmung der CFR bei Patienten nach Ross-Operation im Vergleich zu Patienten nach mechanischem AKE.

Methodik Die CFR wurde bei 34 Patienten mit der transthorakalen Doppler-Echokardiographie (TTDE) im Mittel 7,5 Jahre nach der Operation bestimmt.

Im Rahmen einer randomisierten Studie wurde zwischen 1999 und 2001 bei 16 Patienten ein mechanischer AKE (Gruppe A) und bei 18 Patienten eine Ross-Operation (Gruppe B) durchgeführt; 10 gesunde Probanden (Gruppe C) dienten als Kontrollgruppe.

Die Bestimmung des Koronarflusses wurde in Ruhe und nach 5-minütiger Stresstestung mit Adenosin (140 mg/kg/min) durchgeführt.

Ergebnisse In Ruhe bestand kein signifikanter Unterschied bezüglich der mittleren koronaren Flussgeschwindigkeit (CFV) zwischen den Gruppen A vs. B vs. C.

Unter Stresstestung mit Adenosin zeigt sich ein signifikant erniedrigter Anstieg (p < 0,005) der CFV in der Gruppe A (24,4 ± 3,3 cm) verglichen mit den Gruppen B (45,7 ± 6,1 cm) und C (51,4 ± 6,0 cm).

Die CFR war signifikant erniedrigt in der Gruppe A (1,56 ± 0,18; p < 0,005) verglichen mit den Gruppen B (2,52 ± 0,2) und C (2,68 ± 0,16).

Schlussfolgerung Die CFR ist bei Patienten nach Ross-Operation signifikant erhöht gegenüber Patienten nach mechanischem AKE. Die signifikant erhöhte CFR stellt eine mögliche Erklärung für die bessere Langzeitprognose nach Ross-Operation gegenüber mechanischem AKE da.

Zur Publikation nachgereichte Abstracts

(Die Arbeiten wurden rechtzeitig eingereicht und positiv begutachtet, wegen technischer Probleme aber zur Publikation nachgereicht)

Oncostatin M-enhanced Vascular Endothelial Growth Factor Production by Human Vascular Smooth Muscle Cells is Attenuated by Interferon-gamma 121

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Background Vascular endothelial growth factor (VEGF) is present in atherosclerotic lesions and involved in blood vessel growth and in the regulation of the expression of prothrombotic and proinflammatory mediators in monocytes and endothelial cells at these sites. Oncostatin M (OSM) is a member of the glycoprotein 130 (gp130) receptor cytokine family. It is controversial whether interferon-γ (IFN-γ), which is expressed at high levels in atherosclerotic lesions, promotes or attenuates vascular remodelling in hyperproliferative vascular disorders, such as neointima formation after balloon injury.

Methods Human coronary artery smooth muscle cells (HCASMC) and human aortic SMC (HASMC) were treated with the gp130 ligands OSM, cardiotrophin-1 (CT-1), cardiotrophin-like cytokine (CLC), ciliary neurotrophic factor (CNTF), IL-6, IL-11 or leukemia inhibitory factor (LIF). VEGF-A protein was determined by a specific ELISA and mRNA specific for VEGF-A, gp130, OSM receptor (OSMR), IL-6 receptor (IL-6R) and LIF receptor (LIFR) was detected by RT-PCR.

Results Only OSM increased VEGF production significantly in both HCASMC and HASMC up to 7-fold in a dose- and time-dependent manner. The effect of OSM on VEGF production was reproducible in the preparation of HCASMC and HASMC derived from different donors (n = 9 for HCASMC, n = 6 for HASMC). OSM upregulated also mRNA specific for VEGF in these cells. OSM induced Akt and p38 MAPK phosphorylations in HASMC. PI3K inhibitors and p38 MAPK inhibitors reduced OSM-induced Akt and p38 MAPK phosphorylation, and VEGF upregulation. HCASMC and HASMC were shown to express gp130, OSMR, IL-6R and LIFR. IFN-γ, but not IL-4 or IL-10, dose-dependently reduced OSM-induced VEGF production on protein and mRNA levels in both HCASMC and HASMC. We found a culture-condition-dependent effect of OSM and IFN-γ on proliferation of these cells.

Conclusion We show here that OSM induces VEGF production in vascular SMC. Since activated T-cells and macrophages have been found in atherosclerotic lesions we hypothesize that OSM produced by these cells could induce VEGF production thereby contributing to plaque angiogenesis and destabilization. IFN-γ attenuates OSM-induced VEGF production by vascular SMC.

Immediate and Long-term Clinical Outcome After Percutaneous Mitral Valvuloplasty (PMV) in Austria 118

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Introduction Since its introduction in 1984 by Inoue, the technique of percutaneous balloon mitral valvuloplasty (PMV) has been confirmed as a safe and effective procedure, and is still first-line therapy in patients with symptomatic mitral stenosis (MS) and suitable valve morphology.

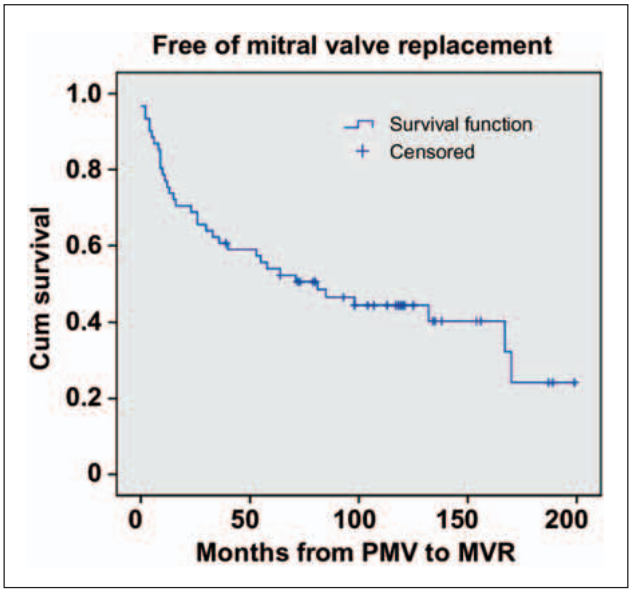

Figure 9: J. Moser et al.

Few long-term echocardiographic and clinical follow-up studies of PMV are available in Europe, with a high percentage of elderly patients and unfavorable valve morphologies.

Aims We evaluated immediate valvular changes (mitral valve area and mean mitral valve gradient) after PMV performed between 1990 and 2005 at the General Hospital of Vienna, and long-term clinical outcomes.

Methods and Results We report the immediate procedural results of 141 patients (mean age 51.5 ± 16 years; range 17 to 82), the long-term clinical outcomes in 90 patients over a mean observation period of 73.3 ± 56 months (range, 3 to 199 months). Echocardiographic follow-ups were available in 89 patients after a mean observation period of 62.7 ± 49 months (range, 1 to 194 months). Kaplan-Meier analysis was performed to estimate event-free survival (death and mitral valve replacement).

There were 6 (4.3 %) unsuccessful PMV procedures, and one (0.7 %) urgent mitral valve replacement. No procedure-related deaths occurred. PMV resulted in an immediate increase in mitral valve area from 1.04 ± 0.56 to 1.69 ± 0.38 cm² (p = 0.372), and in a change of mean mitral valve gradient (mGrad) from 13.56 ± 11.08 mmHg to 5.59 ± 2.80 (p = 0.002). Mitral area loss was 1.44 ± 0.34 (p = 0.0001) at 62.7 ± 48 months after PMV, and mGrad had increased to 7.62 ± 2.84 mmHg (p = 0.01). Mean NYHA functional class was III prior to and II at 73.3 ± 56 months after PMV after (p = 0.34). Atrial fibrillation was present in 50 patients (35.5 % of 117; 42.7 valid %) and in 59 patients (41,8 % of 76, 77.6 valid %) after PMV (p = 0.0001). Survival free of mitral valve replacement (MVR) was 75.4 %, 53.9 %, 44.3 % and 24.2 % at 1, 5, 10 and 15 years, respectively (n = 61, number of MVR: 36, **Figure 9**). Survivals were 100 %, 89.4 %, 86.6 % and 70.7 % at 1, 5, 10 and 15 years, with 7 reported deaths.

Conclusions Immediate and long-term clinical and echocardiographic results of PMV in Austria, including many elderly patients are good. PMV is an effective procedure to increase mitral valve area, to decrease symptoms of MS (NYHA functional class) and to

delay mitral valve surgery, with more than one half of the patients free of MVR 5 years after PMV. Nevertheless there is a loss of mitral valve area over time and 15 years after PMV less than one third of patients are free of MVR.

Gender Differences in Risk Factors Including C-reactive Protein in a Large Consecutive Patient Cohort Undergoing Elective Coronary Angiography 119

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Background Little information is available about gender differences concerning the presence and influence of cardiovascular risk factors including C-reactive protein (CRP) in consecutive patients undergoing coronary angiography (CA) for the evaluation of coronary artery disease (CAD).

Methods 5,641 consecutive patients (33.1 % women) undergoing elective CA were analysed. Cardiovascular risk factors were assessed by standardised questionnaire and routine blood chemistry. CAD was graded by visual estimation of lumen diameter stenosis. Significant stenoses were defined as lumen diameter reduction ≥ 70 % in at least one major coronary artery. Coronary angiograms were graded as non-significant CAD, as 1-, 2- or 3-vessel disease or as non-CAD.

Results Women were older than men (65.2 ± 11.0 vs 63.1 ± 11.0 years; $p < 0.001$) and had more often a positive family history for premature CAD (30.2 vs 24.5 %; $p < 0.001$). The number of risk factors was higher in men (2.4 ± 1 vs 2.3 ± 1; $p = 0.01$) and smoking was more common in men (55.9 vs 35.0 %; $p < 0.001$). In addition, CRP levels were higher in men (0.82 vs 0.97 mg/dl; $p = 0.02$). The prevalence of hypertension (76.1 vs 77.5 %; $p = 0.25$), hypercholesterolemia (68.5 vs 69.4 %; $p = 0.47$) and diabetes (17.6 vs 17.4 %; $p = 0.86$) was not different between gender. CAD was more often found in men (80.0 vs 59.1 %; $p < 0.001$). In multinomial logistic regression analyses including age, total cholesterol, HDL-cholesterol, CRP, diabetes, hypertension and prior statin use in men all variables except hypertension were independent predictors of CAD. In women total cholesterol and hypertension were not independently associated with CAD. According to Wald statistics, CRP was a much stronger independent predictor of CAD in men than in women.

Conclusion In this large consecutive patient cohort women and men have almost similar risk factor profiles when referred for CA. The influence of traditional risk factors on the prevalence of CAD is similar between gender, but CRP is a stronger independent predictor of CAD in men.

Climate Change and Acute Coronary Angiographies in an Alpine Country 120

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Background Weather conditions are known to aggravate symptoms in chronic stable coronary artery disease (CAD). Whether the ongoing climate change with rapid temperature increase year by year may also influence the incidence and outcome of non-ST-elevation (NSTEMI) and ST-elevation (STEMI) myocardial infarctions referred for acute coronary angiography (CA) is less clear.

Methods According to weather data from the Institute of Meteorology and Geophysics, Innsbruck University, the winter 2005/2006 was very cold (CW) and the winter 2006/2007 extraordinarily warm (WW). Patients referred for acute CA suffering an acute STEMI or NSTEMI, their risk factors and in-hospital mortalities in these two consecutive winters were recorded.

Results As expected, average temperature was lower (–1.6 vs +5.9 °C; $p < 0.001$) and humidity was higher (82 vs 79 %; $p < 0.012$) in CW compared to WW with no significant differences in other weather conditions (rain/snowfall: 59 vs 39 days; sunshine: 3.9 ± 2.5 vs 4.3 ± 2.5 hours/day; air pressure: 713.0 ± 6.7 vs 713.8 ± 7.1 hPa).

There were no differences in the number of overall CA (987 vs 983) in these two winters, whereas the number of acute CA (12.9 % vs 10.4 % of overall CA; $p = 0.046$) and the diagnosis of STEMI as indication for acute CA (74.0 % vs 62.7 %; $p = 0.046$) were higher in CW. Furthermore, patients in CW were younger (58.2 ± 12.4 vs 61.7 ± 11.7 years; $p < 0.03$), had higher LDL-cholesterol (134.8 ± 44.6 vs 116.7 ± 36.0 mg/dl; $p < 0.003$) and were less frequent hypertensives (52.8 % vs 70.6 %; $p < 0.01$). In-hospital mortality (2.4 % vs 1.0 %; p = n. s.), patients' nationalities (Austrians: 78.0 % vs 77.5 %), delays in STEMI treatment (3.9 ± 3.5 vs 3.8 ± 3.1 hours) and other traditional risk factors were not different between WW and CW.

Conclusion The dramatic average temperature increase of 7.5 °C from the cold to the warm winter was associated with a decrease in acute coronary angiographies and a lower incidence of STEMI referred for primary percutaneous intervention. However, in-hospital mortality was not different between the cold and the warm winter, probably due to the generally low mortality.

Autorenindex

(nur Erstautoren)

Zur Publikation nachgereichte Abstracts

Long-Term Clinical Follow-Up of Drug-Eluting Coronary Stents After Successful Treatment of Bare Metal Stent Instent Restenosis 122

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Background Different trials have demonstrated a dramatic reduction in incidence of in-stent restenosis (ISR) following implantation of drug eluting stents (DES) compared with bare metal stents (BMS). The clinical outcome following successful (no re-restenosis after 6 months) implantation of a DES for BMS ISR is less well defined. The aim of this study was to assess the safety and efficacy of DES (sirolimus and paclitaxel) in the treatment of patients with BMS ISR which had angiographicaly less than 50 % restenosis at 6 months after implantation of DES.

Methods and results All 204 patients (mean age 66 ± 10, 52 female, 152 male) who received a DES (120 sirolimus, 84 paclitaxel) for treatment of BMS ISR from May 2002 to December 2004 at a single institution were entered into a prospectively collected database. Six month angiographic follow-up and long term clinical outcomes (36–60 months) were collected. At baseline, the most common target vessel was the left anterior descending coronary artery (41 %), and 3 % of lesions were in the left main (LM). Multivessel disease was present in 82 (40 %) of patients. Saphenous vein grafts were excluded. The mean reference diameter was 2.79 ± 0.6 mm and the mean lesion length was 18.1 ± 11 mm. There was one acute letal stent thrombosis three days after implantation of a sirolimus stent. No additional procedural or in-hospital major adverse cardiac events (MACE – cardiac death, myocardial infarction or target lesion revascularisation) occurred. In patients who were symptomatic at the time of controll angiography, 25 (12.2 %) had significant (> 60 %) restenosis. In all of these patients a new DES was implanted. At this point of time, a paclitaxel eluting stent was implanted in pts. previously treated with a sirolimus eluting stent and vice versa. The six months MACE rate was 12.2 %. Of the remaining 179 (100 %) patients long term clinical follow-up (36–60 months) was available in 177 (98.8 %) patients. The 36–60 months MACE rate was 17.4 %. Late stent thrombosis occurred in 4 (2.3 %) of patients. There were 7 (4 %) cardiac death and 3 (1.7 %) non-cardiac deaths.

Conclusion Stenting of restenosis after BMS using a DES evolves as an option with acceptable short-term and mid-term results. Whether a change of stent type (paclitaxel to sirolimus and vice versa) during treatment of re-restenosis is of further benefit has to be defined.

Fourteen-Month Follow-Up of Acute Myocardial Infarcts With Contrast-enhanced Cardiac Magnetic Resonance: Size and Function 123

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Background Cardiac magnetic resonance (CMR) imaging is a unique tool to study infarct size and cardiac function with high accuracy and reproducibility. Nevertheless data on long-term investigations in acute myocardial infarction is limited.

Methods We performed CMR in 28 patients (age: 55 ± 12 years, 23 male) within 2.14 ± 1.8 days after first acute myocardial infarction and primary angioplasty as well as 4 ± 1 and 14 ± 1 months thereafter. Infarct size was determined as percent of LV tissue on delayed Gadolinium enhanced phase-sensitive IR-SSFP sequences. Ejection fraction (EF) as well as left ventricular myocardial mass (MM) were obtained from short-axis cine-MR sequences.

Results Mean infarct size at baseline was 10.8 ± 2.1 %. Two patients were excluded from further evaluation because the increase in infarct size exceeded that of the rest by ≥ 2SD and therefore recurrent ischemia could not be ruled out. Infarct size measures between baseline and the follow-ups showed an excellent agreement ($r = 0.740$ and $r = 0.886$, $p < 0.001$) while infarct size decreased to 11 ± 2 % after 4 months ($p < 0.05$) and 10.2 ± 6.5 % after 14 months ($p < 0.002$, p = ns versus 4 months). Large infarcts showed a greater reduction in size as expressed by the linear correlation of initial infarct size with the percentage in size reduction ($r = –0.856$, $p < 0.001$).

EF increased from 45.7 ± 9.0 % to 51.9 ± 8.9 % ($p < 0.001$) and 50.8 ± 8.3, respectively ($p < 0.001$, p = ns versus 4 months) whereby the separate measures showed good correlations (baseline to 4 months $r = 0.704$, baseline to 14 months $r = 0.763$, $p < 0.001$). Patients with initially lower EF recovered myocardial function moderately better as indicated by the inverse correlation of baseline EF to the increase in EF during follow-up ($r = –0.455$, $p < 0.02$).

Conclusion Our pilot study shows that CMR is a useful research tool for the long-term follow-up of acute myocardial infarctions although its clinical impact in this setting has to be further determined.

Percutaneous Aortic Valve Replacement for Severe Symptomatic Aortic Stenosis: Patient Selection and Management 124

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Background Degenerative aortic stenosis (AS) is currently the most frequent heart valve disease in industrialised countries with surgical aortic valve replacement as the treatment of choice. Since comorbidities increase the operative risk of surgical valve replacement, particularly in elderly patients, percutaneous aortic valve replacement (PAVR) might be a suitable alternative therapy for high risk patients. However, patients need to be selected very carefully.

Methods Between April 2007 and January 2008, 63 patients (25 males, 38 females, age 79 ± 7 years) with severe symptomatic AS (aortic valve area 0.55 ± 0.15 cm², peak transvalvular aortic pressure gradient 95 ± 32 mmHg, mean transvalvular aortic pressure gradient 58 ± 20 mmHg) and various comorbidities (St. p. coronary artery bypass graft, St. p. mitral valve replacement, severe chronic obstructive pulmonary disease, end-stage renal failure, haematologic diseases) were admitted to our institution in order to assess the eligibility for PAVR with the self-expanding CoreValve bioprosthesis. Risk calculation revealed a logistic EuroSCORE of 28 ± 15 %. Further to clinical assessment echocardiography, cardiac catheterisation, and computed tomography were performed.

Results 52 patients were found to be eligible for PAVR. Nevertheless, in five of these patients surgical aortic valve replacement was recommended due to an acceptable individual risk score. In 20 patients PAVR was performed successfully within two months following initial admission. Four patients refused PAVR, another five deceased prior to PAVR being on the waiting list, and 18 are still waiting for PAVR. Eleven patients were not suitable for PAVR since the diameter of the aortic valve annulus was < 19 mm (four patients), the ascending aorta was dilated > 45 mm at the sino-tubular junction (one patient), and vascular access was impossible due to severe peripheral arterial disease (six patients), respectively.

Discussion PAVR emerges as a suitable alternative treatment for severe symptomatic AS, particularly in elderly patients with high risk of surgical valve replacement. However, thorough patient selection is mandatory including clinical assessment, echocardiography, cardiac catheterisation, and computed tomography.

Percutaneous Aortic Valve Replacement for Severe Symptomatic Aortic Stenosis: an Emerging New Treatment Option for High-Risk Patients 125

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Background Degenerative aortic stenosis (AS) is currently the most frequent acquired heart valve disease in industrialised countries. In symptomatic patients with severe AS, operative aortic valve replacement is the treatment of choice. However, not only symptomatic AS becomes more prevalent in elderly patients, but also comorbidities that increase the risk for operative valve replacement. Therefore, percutaneous aortic valve replacement (PAVR) might be an alternative therapy for high-risk patients.

Patients and Methods In our institution, 20 patients (6 male, 14 female; mean age 80 ± 6 years) with symptomatic severe AS underwent PAVR between May 2007 and February 2008. Aortic valve area was 0.5 ± 0.1 cm², logistic EuroSCORE 28 ± 15 %. The procedure was performed in the catheterization laboratory via a bifemoral percutaneous approach under local anaesthesia and analgesic sedation without surgical cut-down and hemodynamic support. After balloon valvuloplasty the self-expanding CoreValve prosthesis (diameter 26 mm, n = 15; 29 mm, n = 5) was implanted using the current 18 French delivery catheter system.

Results Acute procedural success rate was 100 %. Device implantation resulted in a significant reduction of mean aortic transvalvular gradient (59 ± 16 mmHg vs 11 ± 3 mmHg, $p < 0.0001$) and a marked decline of NT-proBNP 30 days after PAVR (5645 ± 6319 pg/ml vs 2610 ± 2753 pg/ml, $p = 0.07$). Postprocedural aortic regurgitation was trivial or mild in 16 patients and moderate in four patients. Permanent pacemaker implantation was necessary in two patients due to complete atrioventricular block. There was no myocardial infarction but one periprocedural stroke in a patient who died from multiorgan failure two days later. Another patient died 27 days after PAVR due to pneumonia (overall 30-day mortality rate 10 %). The remaining 18 patients had an uneventful postprocedural course with marked clinical improvement over a total of 72 patient-months.

Conclusion PAVR with the self-expanding CoreValve bioprosthesis is an emerging alternative treatment for high-risk patients with symptomatic severe AS. Complication rate is acceptable, and mortality rate is lower than predicted by risk calculation.

Mid-Term Results of the Freedom Solo® Stentless Pericardial Aortic Valve Prosthesis 126

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Objective Implantation of stentless prosthesis in patients with severe aortic valve disease provides several advantages in haemodynamics, as low transvalvular gradient and a more physiological blood flow, furthermore short cross-clamp time and no need for permanent anticoagulation. The Freedom Solo® pericardial aortic valve prosthesis (Sorin Biomedica, Saluggia, Italy) is a new stentless bioprosthesis for supra-annular insertion by running suture. This study provides mid-term results of a patient series treated in our institution.

Methods This is a prospective single-center observational study to investigate survival and haemodynamic parameters such as transvalvular aortic gradient in patients treated with the above mentioned aortic valve prosthesis. Therefore patients underwent transthoracic echocardiography before surgery, at time of discharge an after about 18 month. Transvalvular gradient was measured using continuous-wave Doppler signal and aortic regurgitation was judged by colour Doppler imaging.

Results Between October 2004 and February 2007, 50 patients (25 male, mean age 77 ± 4 years) underwent first time aortic valve replacement with the Freedom Solo valve due to severe aortic stenosis. Twenty of those (40 %) had to undergo simultaneous bypass grafting. Ejection fraction was 62 ± 12 % before surgery. Mean cross-clamp time was 66 ± 19 min. in the entire group and 54 ± 7 min. in the valve replacement only group.

At a mean follow-up period of 20 ± 9 months 42 patients (84 %) were alive. Three patients (6 %) died in the very early period (one due to low cardiac output, two patients due to bleeding of ruptured aorta), five more patients (10 %) died in the remaining follow-up time. Regarding haemodynamic parameters, mean transvalvular gradient was 11 ± 5 mmHg and ejection fraction was 65 ± 7 % at 20 months. Transvalvular regurgitation occurred in 20 patients (40 %). It was trivial in 16 patients (32 %) and mild in the remaining four (8 %).

Conclusion Mid-term results of the Freedom Solo aortic valve stentless prosthesis are encouraging. Transvalvular gradients are low and survival is acceptable with respect to the age and risk of the patient population. Larger studies and results of long-term follow-up have to be expected.

High Rate of Esophageal Ulceration after Ablation of Atrial Fibrillation in a Subgroup of Patientes with General Anesthesia 127

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Background Atrioesophageal fistula is an uncommon but often lethal complication of atrial fibrillation (AF) ablation. The incidence of asymptomatic esophageal ulceration (EU) detected by endoscopy is high (35.7–46 %) as recently reported. The purpose of our study was to investigate if direct visualisation of the esophagus and energy titration at the posterior atrial wall (PW) can prevent EU.

Methods 83 patients (52 paroxysmal, 31 persistent) were randomized into three groups and underwent oesophagogastroscopy 24 hours after ablation:

Group 0: AF ablation without real-time esophageal visualization, 25W power limit at the PW (n = 47).

Group 1: Direct visualization of the esophagus using barium swallows (gastric tube in patients in general anesthesia) and energy reduction to 15W at the PW (n = 12).

Group 2: Direct visualization of the esophagus and energy reduction to 25W and a maximum of 10 seconds energy delivery at the PW ("short burns") (n = 19).

Ablation was performed with a 3.5 mm tip open irrigation catheter with a target temperature of 43 °C. For navigation in the left atrium (LA) we used a 3D mapping system with CT integration.

Conscious sedation with midazolam and propofol was used in 70 patients (84 %) and general anesthesia in 13 patients (16 %). In the latter group we used a nasogastric tube for visualisation of the esophagus in 6 patients.

Results In total we found 5 of 83 patients presenting EU on endoscopy (6 %). 2 patients were from the paroxysmal, and 3 from the persistent group. Out of five 3 patients belonged to the subgroup with general anesthesia and esophagus visualization with a nasogastric tube. 1 patient belonged to the group 0 without visualisation and 4 patients to the group 2 with visualisation ($p = 0.027$). Patients with general anesthesia and esophagus visualization with a nasogastric tube developed EU in 50 % of cases ($p = 0.013$). We found no significant difference between energies delivered on the PW comparing groups with and without EU.

Conclusions Ablation guided by real-time visualisation of the esophagus was not able to prevent EU, but with the power limitation to 25 W on the PW we found a much lower rate of EU than reported in other series. With a power setting of 15W no EU was reported at all.

We identified a subgroup of patients with general anesthesia and nasogastric tube as a high risk population for EU.

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