Journal of the American College of Cardiology
© 2007 by the American College of Cardiology Foundation
Published by Elsevier Inc.

Vol. 50, No. 25, 2007
ISSN 0735-1097/07/$32.00
doi:10.1016/j.jacc.2007.10.010

# Highlights of the 2007 Scientific Sessions of the European Society of Cardiology

## Vienna, Austria, September 1–5, 2007

Steen D. Kristensen, MD, DMSc,* Helmut Baumgartner, MD,† Helmut Drexler, MD,‡ Eric Eeckhout, MD,¶ Gerasimos Filippatos, MD,# Anselm K. Gitt, MD,§ Cecilia Linde, MD, PhD,** Luc A. Pierard, MD, PhD,†† Don Poldermans, MD, PhD,§§ Heribert Schunkert, MD,‖ Karin R. Sipido, MD, PhD,‡‡ Ernst E. van der Wall, MD, PhD,‖‖ Kim Fox, MD,¶¶ Jeroen J. Bax, MD, PhD‖‖

*Aarhus, Denmark; Vienna, Austria; Hannover, Heidelberg, and Luebeck, Germany; Lausanne, Switzerland; Athens, Greece; Stockholm, Sweden; Liege and Leuven, Belgium; Rotterdam and Leiden, the Netherlands; and London, United Kingdom*

The annual congress of the European Society of Cardiology (ESC) was held in Vienna, Austria, September 1 to 5, 2007. The total attendance was close to 30,000 participants from 136 different countries. Excellent new congress facilities hosted 186 prearranged sessions (28 meeting rooms running in parallel), including several joint sessions organized in collaboration with other societies, including the American College of Cardiology (ACC) and the American Heart Association (AHA). A total of 9,691 abstracts from 92 different countries were submitted, and 3,501 (36%) were selected for presentation, including 29% dedicated to basic science.

From the *Aarhus University Hospital, Skejby, Aarhus, Denmark; †Vienna General Hospital/Medical University of Vienna, Vienna, Austria; ‡Zentrum Innere Medizin, Abteilung Kardiologie, Hannover, Germany; §Institut fuer Hertzinfarktforschung Ludwigshafen an der Universitaet Heidelberg, Heidelberg, Germany; ‖Universitaetsklinikum Schleswig-Holstein, Campus, Luebeck, Germany; ¶Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland; #Athens University Hospital Attikon, Athens, Greece; **Karolinska University Hospital, Stockholm, Sweden; ††C.H.U. du Sart-Tilman, Universite de Liege, Liege, Belgium; ‡‡University of Leuven (KUL), Leuven, Belgium; §§Erasmus Medical Center, Rotterdam, the Netherlands; ‖‖Leiden University Medical Center, Leiden, the Netherlands; and the ¶¶Royal Brompton Hospital, London, United Kingdom. Dr. Fox is president of the European Society of Cardiology (ESC). Dr. Bax is the ESC Congress Program Committee Chair. Dr. Kristensen has received lecture fees from and is on the advisory board of AstraZeneca, Bristol-Myers Squibb, Eli Lilly, GlaxoSmithKline, Nycomed, and Sanofi-Aventis. Dr. Eeckhout has received research grants from Boston Scientific, Medtronic, Abbott Vascular, B Braun, and Cordis. Dr. Gitt has received lecture fees and grants from and is on the advisory board of Merck Sharpe & Dohme, Bristol-Myers Squibb, Sanofi-Aventis, Essex Pharma, Schering-Plough, Amgen, Abbott Vascular, Eli Lilly, and Pfizer. Dr. Linde is a consultant to Medtronic Inc. Dr. Poldermans has received research grants from Merck and Novartis. Dr. Schunkert has received lecture fees from and is on the advisory board of Merck, Sharpe & Dohme/Essex Pharma, Novartis, Sanofi-Aventis, AstraZeneca, Pfizer, and Nycomed. Dr. Fox has received research grants and honoraria from Servier. Dr. Bax has received research grants from GE Healthcare, Bristol-Myers Squibb Medical Imaging, St. Jude, Medtronic, and Boston Scientific.

Manuscript received October 25, 2007; accepted October 25, 2007.

The theme of the meeting was "Heart Failure." The pathophysiology, diagnosis, and management of patients with heart failure (HF) were addressed in 37 pre-arranged sessions and 16 scientific abstracts sessions. In this review, the contributions related to HF are discussed first, followed by the Hotlines and the Euro Heart Survey Program. Thereafter, a summary of the most important contributions presented at the different sessions is provided.

## Heart Failure

Heart failure is a major cause of hospital stays in the Western world, and many patients are readmitted or suffer from high mortality after discharge. A large registry followed 48,612 patients with acute HF after discharge (1). A pre-specified sample of 10% was followed for 60 to 90 days and investigated for coronary revascularization. Patients with ischemic etiology of HF had a significantly worse outcome at 90 days as compared with nonischemic HF, although patients with ischemic HF who underwent coronary revascularization had similar survival to patients with nonischemic HF. These observations underscore that evaluation of coronary status in patients admitted to the hospital with acute HF is crucial.

A pilot study investigated the effects of chronic use of sildenafil on exercise capacity and reactive pulmonary hypertension in patients with HF in a controlled clinical trial, enrolling 19 HF patients with New York Heart Association class I to III function, with left ventricular ejection fraction (LVEF) ≤40%, and who were on optimized medical therapy (2). Peak oxygen uptake increased (+13%) and pulmonary pressure decreased (−32%) significantly in the sildenafil group.

Peripartum cardiomyopathy is a rare but potentially devastating disease of unknown etiology. A recent report has shown that a cathepsin D-cleaved 16 kDa form of prolactin can mediate peripartum cardiomyopathy and that inhibition of prolactin release by bromocriptine in a mouse model can prevent the emergence of the disease. Forster et al. (3) reported that the addition of bromocriptine to standard HF therapy improved outcomes in patients with previous peripartum cardiomyopathy. Although LVEF continued to decrease between post-delivery and follow-up in patients on standard medical care, a significant improvement in LVEF was observed in the bromocriptine group.

Weight loss and leanness simultaneously predicted poor prognosis in a broad spectrum of HF patients (4). Moreover, recent weight loss strongly predicted short-term mortality risk. It remains unclear whether weight loss in HF patients is due to cachexia, impaired/reduced food intake, or dehydration from fluid loss. Yet, good management should closely monitor weight change in HF patients.

There is compelling evidence that the adult heart has resident cardiac stem cells. However, the functional properties of these cells in HF patients are unknown. Marcon et al. (5) evaluated both donor and recipient human hearts and isolated multipotent adult stem cells and reported that adult stem cells obtained from failing hearts had impaired function, including impaired cardiomyocyte and endothelial differentiation and reduced migration. Thus, the resident cardiac stem cell reservoir is functionally impaired in pathological processes, which might limit therapeutic use of these resident cardiac stem cells.

## Euro Heart Survey

The Euro Heart Survey Program includes repeated surveys and ongoing registries; data from current surveys and registries were presented in 5 symposia concerning HF, secondary prevention, acute coronary syndromes (ACS), percutaneous coronary intervention (PCI), and diabetes.

**HF.** The Euro Heart Survey on Heart Failure II enrolled 3,580 patients with acute HF to document adherence to ESC guidelines on diagnosis and treatment of acute HF. The majority of patients (85%) had echocardiography in the acute phase, but only 50% of patients with ACS as the underlying cause for acute HF underwent coronary angiography. At discharge, 71% of patients received angiotensin-converting enzyme (ACE) inhibitors, 61% beta-blockers, and 48% aldosterone blockers with large variations between the different centers. The use of class IA-recommended ACE inhibitors as well as beta-blockers was associated with a significant decrease in 1-year mortality. Moreover, analysis of the Euro Heart Survey data identified the following predictors of short-term mortality: advanced age, low systolic blood pressure, renal failure, peripheral hypoperfusion, ACS as precipitating factor, and pulmonary edema. A risk score including these parameters was presented, allowing discrimination of patients with a low (0.5%) to very high risk (22%) of death.

**Secondary prevention.** Data on clinical reality of secondary prevention in Europe were presented comparing the current results of EUROASPIRE (European Action on Secondary Prevention through Intervention to Reduce Events) III with those of the previous surveys EUROASPIRE I and II, with time trends in the management of lifestyle and risk factors like blood pressure, lipids, and diabetes as well as drug treatment over the last 12 years. The results regarding the time trends in lifestyle were disappointing, with no change in smoking and a dramatic increase in obesity (one-third of patients had a body mass index $>30$ kg/m$^2$), as well as in waist circumference ($>50\%$ of patients being centrally obese). The prevalence of diabetes increased to 43%. No improvement in blood pressure management could be documented, with 50% of patients not reaching the recommended target of 140/90 mm Hg. Lipid management dramatically improved, owing to widespread use of statins, but only 53% of patients reached the target of $<2.5$ mmol/l for low-density lipoprotein (LDL) cholesterol. It seems that patients would rather take pills than change their lifestyle. More professional support for lifestyle changes and risk-factor modification by comprehensive prevention and rehabilitation programs is needed.

**ACS.** Following the Euro Heart Surveys on ACS-I in 2000 and ACS-II in 2004, an ACS-Registry is currently ongoing. Data on treatment and outcome of ACS patients admitted to cardiology versus internal medicine departments were presented. Patients admitted to a cardiology department were younger, less often female, and more often presented with ST-segment elevation ACS than with non–ST-segment elevation ACS. Primary reperfusion rates were higher, both for ST-segment and for non–ST-segment elevation ACS, whereas no significant differences were observed in use of adjunctive medical therapy, including aspirin, clopidogrel, beta-blockers, statins, and ACE inhibitors. Despite the higher rate of ST-segment elevation ACS, the in-hospital mortality was lower in cardiology versus internal medicine departments (3.8% and 5.5%, respectively), probably related to the use of primary PCI in cardiology departments. Another analysis demonstrated the impact of renal failure on treatment and outcome of ACS. Patients with renal failure were frequently older, had diabetes, and a history of PCI or coronary artery bypass surgery. They more often presented with non–ST-segment elevation ACS, less often underwent coronary angiography as compared with patients without renal failure, and more often had 3-vessel disease but less often received reperfusion treatment. Hospital mortality was doubled in patients with renal failure, a consistent finding in the ACS-I and -II surveys and the ACS-Registry.

**PCI.** The Euro Heart Survey on PCI enrolled 14,575 consecutive patients in 134 centers of 39 ESC member countries between June 2005 and January 2006, and the currently ongoing PCI-Registry additionally enrolled

19,007 patients since May 2006. Preliminary data of the PCI-Registry were presented to compare practice in 2007 and 2005 (PCI-Survey). There were no changes in baseline characteristics with a mean age of 64 years, 75% male patients, and 25% diabetic patients. Patients treated with PCI in 2007 had a higher prevalence of prior infarction, prior PCI, and history of HF. About two-thirds of patients underwent PCI for ACS, with no significant changes between 2005 and 2007. More patients received multilesion and multivessel treatment in 2007, reflecting more complete revascularization as compared with 2005. More bifurcation lesions were treated, but there was no change in the overall use of drug-eluting stents (DES) (45% of all stents). Only 50% of patients undergoing primary PCI received glycoprotein IIb/IIIa receptor blockers without any change over the years, whereas a small increase in the use of glycoprotein IIb/IIIa receptor blockers could be documented for PCI in non–ST-segment elevation ACS (32.5% vs. 26.3%). The overall complication rate remained low, with a mortality of 1.8%.

**Diabetes.** Analyses of different surveys within the Euro Heart Survey Program presented the burden of diabetes on cardiovascular disease in Europe. In patients with ACS, diabetic patients less often received reperfusion and adjunctive medical therapy and had higher in-hospital mortality (13.5% vs. 6.8%) in 2007. In the Euro Heart Survey on HF, diabetes was present in about 30% to 40% of patients with acute and chronic HF. Diabetes was an independent risk factor for 1-year mortality in acute and new as well as chronic decompensated HF. In the Euro Heart Survey on stable angina, 17% of patients had known diabetes. Diabetes was independently associated with more severe coronary artery disease (CAD) on angiography and with adverse long-term prognosis.

## Hotlines and Clinical Trial Updates

The 5-year follow-up results of the getABI (German Epidemiological Trial Ankle-Brachial Index) registration of primary care patients with peripheral arterial disease (PAD) revealed a high mortality. In 6,880 patients (≥65 years from 344 primary care centers) ankle-brachial index was assessed to determine the presence and severity of PAD. The incidence of PAD was 21%, with more than 50% being asymptomatic. In patients with severe PAD the 5-year mortality was 50%, predominantly because of late cerebrocardiovascular events. There was a correlation between the severity of PAD and prognosis; importantly there was no difference between asymptomatic and symptomatic PAD patients.

Diabetes mellitus and hypertension are well-known cardiovascular risk factors. In diabetic patients, the ESC guidelines recommend a target blood pressure below 130/80 mm Hg. The ADVANCE (Action in Diabetes and Vascular Disease-PreterAx and DiamicroN MR Controlled Evaluation) study, including 11,140 patients, was designed to determine the beneficial effects of blood-pressure lowering on cardiovascular events. This randomized, placebo-controlled study used a fixed combination of perindopril-indapamide on top of current therapy, irrespective of pre-treatment blood pressure. The average pre-treatment blood pressure was 145/81 mm Hg, indicating a mixed population of mild hypertensives and normotensives. In the treatment arm, systolic and diastolic blood pressure dropped on average 5.6 and 2.2 mm Hg, respectively. During a 4.3-year follow-up, there was 14% reduction of all-cause mortality ($p = 0.025$), with 18% reduction of cardiovascular deaths ($p = 0.027$) in the treatment arm. There was no difference between patients with and without hypertension.

Aliskiren is a recently introduced oral renin inhibitor. The safety and efficacy effects of aliskiren on top of ACE inhibitors, angiotensin receptor blockers, or beta-blockers were evaluated in a placebo-controlled study, randomizing 302 patients with stable heart failure to aliskiren or placebo added to standard therapy. The primary end point of the study was safety, regarding renal function, symptomatic hypotension, and hyperkalemia. During 12 weeks of follow-up, there were no safety concerns regarding the new study drug; renal function and serum potassium showed no significant differences. Aliskiren effectively inhibited plasma renin activity. During the short study period, no difference in LVEF was observed. Brain natriuretic peptide (BNP) levels were significantly reduced ($-12.2$ vs. $-61$ pg/ml, $p < 0.05$).

The effects of vitamin B supplements to lower homocysteine levels were studied in WENBIT (Western Norway B-vitamin Intervention Trial). A total of 3,090 patients with proven CAD were randomized to vitamin B therapy, including 4 groups (vitamin B6; folic acid plus vitamin B12; a combination of vitamins B6, B12, and folic acid; and placebo). During a mean follow-up of 38 months, no difference in the primary outcome (composite of all-cause mortality, nonfatal infarction, unstable angina, and stroke) was observed in patients randomized to vitamin B supplements. Vitamin B supplementation is presently not recommended as secondary prevention for CAD.

The 3-year follow-up of the DANAMI-2 (Second Danish Acute Myocardial Infarction) trial showed that the initial benefit of transferal for primary PCI compared with fibrinolysis was sustained. One-year follow-up in the STEEPLE (Safety and Efficacy of Enoxaparin in Percutaneous Coronary Intervention Patients) trial showed that enoxaparin was superior to unfractionated heparin in patients undergoing elective PCI, and similarly in the ExTRACT-TIMI (Enoxaparin and Thrombolysis Reperfusion for Acute Myocardial Infarction Treatment—Thrombolysis In Myocardial Infarction)-25 study, the benefit of enoxaparin compared with unfractionated heparin after fibrinolysis in patients with ST-segment elevation myocardial infarction (STEMI) was still present after 1 year.

The PRAGUE-8 trial randomized patients undergoing diagnostic angiography (n = 1,028) to routine pre-loading with clopidogrel (600 mg) before angiography or selective in-lab administration for PCI patients only. There was no difference in the primary ischemic end point (death, infarction, stroke, and reintervention within 7 days), even in nonselective patients who underwent PCI compared with selective control subjects (1.3% vs. 2.2%). Nonselective therapy induced significantly more bleeding complications (7.2% vs. 0.7%). Therefore, routine clopidogrel administration before diagnostic angiography cannot be recommended. It increased bleeding risk without benefit on ischemic periprocedural complications.

In the CARESS (Combined Abciximab Reteplase Stent Study in Acute MI) trial, 600 patients with acute STEMI were all treated with one-half-dose reteplase plus abciximab and then randomized to transferal for immediate primary PCI or medical therapy (with rescue PCI if necessary). The primary outcome was the composite of all-cause mortality, reinfarction, or refractory ischemia at 30 days. In the group randomized to immediate transfer, there was a significant 67% reduction in the primary end point. This trial confirms the results of other trials suggesting that fibrinolytic therapy in STEMI should be followed by early coronary angiography with PCI.

The FINESSE (Facilitated Intervention with Enhanced Reperfusion to Stop Events) trial randomized 2,452 patients with STEMI referred for primary PCI to upstream one-half-dose reteplase plus abciximab, upstream abciximab, or abciximab administered in the catheterization laboratory. There was no significant difference in the primary end point (composite of death, repeat hospital stay for HF, resuscitated ventricular fibrillation [<48 h after randomization], and cardiogenic shock at 90 days) among the 3 groups. The occurrence of Thrombolysis In Myocardial Infarction major and minor bleeding was significantly lower in the in-lab abciximab group, and therefore facilitation neither with one-half-dose reteplase plus abciximab nor with abciximab alone can be recommended in primary PCI.

The Swedish nationwide PCI registry presented 4-year clinical outcomes in about 180,000 procedures (>37,000 DES implanted). No differences in mortality and infarction were observed between bare-metal stents (BMS) and DES. Data from the GRACE (Global Registry of Acute Coronary syndromEs) registry of patients with ACS were also presented. Patients with ACS with DES had a significantly lower in-hospital death rate (1.1%) than BMS patients (2.7%), although mortality of the 2 groups was identical at 6 months. Between 6 months and 2 years, however, there was a significantly higher reinfarction rate in DES as compared with BMS (2.9% vs. 5.4%, $p < 0.05$). Mortality, in contrast, was similar between 6 months and 2 years (DES 4.8%, BMS 4.6%) in the ACS patients.

## Interventional Cardiology

Drug-eluting stent safety was also a hot topic in the abstract sessions. A 4-year update of the Bern–Rotterdam DES registry was presented (6). Investigators performed 100% DES in consecutive patients between 2002 and 2005 (n = 8,146) and kept a permanent track on angiographic stent thrombosis. At 4 years, it was concluded that the cumulative incidence of stent thrombosis continues to rise at 3.3%, with a slope indicating an annual risk of 0.6%. Further follow-up of this patient cohort is thus warranted.

The French Left Main Taxus registry reported on the safety and efficacy of DES in this specific lesion subset (7). In 291 patients treated at 4 centers, 0.7% in-hospital mortality (predicted 6.4% according to the logistic EuroScore) and 5.2% cardiac mortality at 2 years were presented. The need for revascularization at follow-up was only 7.9%. Dutch investigators presented follow-up data of a randomized, controlled trial on BMS versus DES in acute infarction (8). In 619 patients, there was no difference in the primary end point of death, infarction, and the need for reintervention at 2-year follow-up (15.4% BMS vs. 11.1% DES).

A Polish trial addressed the practical issue of immediate total percutaneous revascularization versus staged intervention in acute infarction patients with multivessel disease (n = 208) (9). At 1-year follow-up, there was no difference in primary end point (absolute change in LVEF) between both groups but also no difference in adverse events, and a 1-stage approach seemed more cost-effective.

Finally, the results of the first-in-man use of a fully bioabsorbable everolimus-eluting stent (polylactic acid polymer backbone) were presented (10). A total of 30 patients with single, de novo lesions were treated, including follow-up angiography and intravascular ultrasound. Overall, a late luminal loss of 0.44 ± 0.35 mm was reported, resulting in a binary restenosis rate of 11.5%. Only 1 acute adverse event occurred (partial stent dislodgement). Luminal reduction was due to remodeling and recoil (mean 11.7%) and discrete neointimal hyperplasia (mean 5.5%).

## Acute Coronary Syndromes

**Non–ST-segment elevation myocardial infarction (NSTEMI) ACS.** The new ESC guidelines on NSTEMI ACS recommend early angiography (within 72 h) and subsequent revascularization as appropriate in high-risk patients with ACS. Data from the GRACE registry showed that in NSTEMI ACS patients undergoing angiography, only 30% had angiography performed within 72 h as recommended (11). A study from Korea confirmed that the GRACE risk score is a useful predictor of mortality in patients with ACS (12). Data from a prospective multicenter cohort study showed that Thrombolysis In Myocardial Infarction risk score and plasma levels of interleukin (IL)-6 at admission were the only independent markers of serious cardiovascular events at 30 days (13).

Post hoc analysis of data from the ACUITY (Acute Catheterization and Urgent Intervention Triage strategY) trial showed that the occurrence of baseline anemia is associated with an increased risk of early death, infarction, and major bleeding in patients with moderate and high-risk ACS (14). Premature discontinuation of clopidogrel in patients presenting with NSTEMI had a deleterious effect characterized by occurrence of major cardiovascular events at a rate higher than in patients treated with aspirin alone (15).

**STEMI.** For patients with STEMI, the mortality record in a French registry dramatically decreased over the past 10 years. This decrease is likely related to a broader use of reperfusion therapy and other recommended therapeutic strategies, such as statins, beta-blockers, and low-molecular-weight heparin during the first days of the acute episode (16). Registry data from Portugal showed that the pre-hospital delay for STEMI is too long, particularly in elderly patients, in diabetic patients, and in patients with a history of angina (17). Results of the Czech National PCI Registry showed that every 15-min delay in door-to-balloon time and every 1-h delay in total ischemia time significantly increased 30-day mortality, emphasizing the need for immediate PCI (18).

French registry data showed that pre-hospital thrombolysis combined with high use of subsequent PCI is associated with excellent early and mid-term outcomes (19). The use of thrombectomy devices in primary PCI was evaluated in a meta-analysis of 7 randomized trials. Myocardial reperfusion evaluated as ST-segment resolution and myocardial blush grade was reduced in the thrombectomy group (20). A study from Canada showed that, in carefully selected patients who were stable after primary PCI in a tertiary PCI hospital, immediate re-transfer to the referring hospital is safe and feasible (21). A meta-analysis of trials on STEMI patients presenting after 12 h of symptoms showed that late revascularization of the occluded artery with PCI might improve LV systolic function and prevent remodeling (22).

## Acute Cardiac Care

Limited data are available about the management of cardiogenic shock in elderly patients. Gasior et al. (23) presented the in-hospital outcomes of 4,518 patients with acute infarction and cardiogenic shock on admission who were registered in the prospective Polish ACS registry between 2003 and 2006. An early invasive strategy in elderly patients (≥75 years) resulted in lower in-hospital mortality comparable to younger patients.

Recent data suggest that inappropriate vasodilation might occur in cardiogenic shock. In 27 patients presenting with cardiogenic shock and inappropriate vasodilation, an arginine-vasopressin infusion (2 to 4 IU/h) was used to support circulation; this approach significantly improved hemodynamic status and diuresis (24).

Advances in cardiopulmonary resuscitation were also presented. It has recently been suggested that a simpler form of cardiopulmonary resuscitation could be as effective as standard cardiopulmonary resuscitation. Among 11,275 patients who reported to the Swedish Cardiac Arrest Registry between 1990 and 2005, survival was significantly lower among those who received mouth-to-mouth ventilation only (25). However, there was no significant difference in 1-month survival between patients who received standard cardiopulmonary resuscitation (survival 7.2%) compared with those who received chest compression only (survival 6.7%).

In the international resuscitation guidelines, mild hypothermia is recommended after return of spontaneous circulation from cardiac arrest to improve neurological recovery. Wolfrum et al. (26) investigated the feasibility of mild hypothermia in 16 patients with STEMI and subsequent cardiac arrest who needed "acute" PCI. Hypothermia was initiated before patients were transported to the cardiac catheterization laboratory. When compared with an historical control group, initiation of mild hypothermia did not delay PCI, and patients tended to have lower 6-month mortality with an improved neurological outcome. Early administration of selenium after cardiopulmonary resuscitation was evaluated in another study; this approach improved neurological outcome without a 6-month survival benefit (27).

## Hypertension and Risk Factors

Widely discussed during the congress were the new 2007 ESC/European Society of Hypertension guidelines for the management of hypertension, which define "hypertension" as blood pressure levels between 130 and 140 mm Hg systolic and 80 and 90 mm Hg diastolic, taking comorbidities and other risk factors into consideration. Indeed, patients with diabetes, renal disease, or manifestations of atherosclerosis should be diagnosed at levels below 140 mm Hg and thus be treated with antihypertensive drugs.

Similarly, the threshold at which cholesterol-lowering reduces cardiovascular events is under debate. The IDEAL (Incremental Decrease in End Points through Aggressive Lipid Lowering) Investigators presented a post hoc analysis that suggests no further risk reduction beyond LDL lowering <89 mg/dl in patients with previous infarction (28). At that threshold level, a further decrease of LDL levels was not associated with further cardiovascular benefits. Rather, in subjects with low LDL under optimal statin treatment, other modifiable risk factors such as arterial hypertension and diabetes determined future risk of cardiovascular events.

The ESC congress also introduced novel genetic and proteomic risk factors. Genome-wide association studies revealed that a substantial proportion of the inherited risk for infarction is located at chromosomes 9p21.3, 6q25.1, and 2q36.3. Another test might be of future relevance for patients with manifestation of atherosclerosis in the carotid arteries. A careful proteomic tissue profiling on a carotid atherectomy specimen predicted future infarction, stroke, or symptomatic PAD events during long-term follow-up in

667 patients, if high osteopontin levels were found in the plaque material (29). Eventually, these data might provide new insights in the pathogenesis, progression, and hopefully prevention of atherosclerosis.

## Arrhythmias and Pacing

Various studies were dedicated to atrial fibrillation (AF). One study evaluated whether transient AF in the setting of inferior STEMI with preserved LV function was linked to future risk of AF and stroke (30). All patients (59 transient AF, 372 sinus rhythm) were discharged with antiplatelet therapy. At 12 months' follow-up, patients with transient AF had a higher recurrence rate (22% vs. 1.3%) and higher incidence of ischemic stroke (10.2% vs. 1.8%) than sinus rhythm patients but total mortality was similar (5.6% vs. 6.8%). This finding implies that oral anticoagulation should be considered in patients with inferior infarction, preserved LV function, and transient AF.

The long-term outcome of AF presentation in ACS with and without ST-segment elevation was assessed in 120,566 patients (31) in a retrospective study of 10 randomized, controlled trials. The overall prevalence of AF was 7.5% (8% vs. 6.4% in patients with versus without ST-segment elevation ACS, p = NS). Atrial fibrillation was associated with a 2- to 4-fold risk for death, infarction, bleeding, and stroke in both groups, similar to previous studies. Thus, AF implies excess risk of similar magnitude in ACS with or without ST-segment elevation.

Another study reported the outcome of patients with AF undergoing cardiac resynchronization therapy (32); 438 patients were followed for 22 months after cardiac resynchronization therapy. Sinus rhythm patients (n = 337) had better survival than AF patients (n = 146), despite His-bundle ablation or high atrioventricular block at the time of implantation.

Radiofrequency ablation of atrial flutter is a curative procedure but can be painful to the patient. Cryoablation is a new and pain-free technique. In a prospective, randomized study, 154 patients with atrial flutter were randomly assigned to radiofrequency ablation or cryoablation with 8-mm-tip ablation catheters (33). The end points were acute and 3-month success rate and bidirectional conduction block on repeat electrophysiological studies. The acute success rate was comparable between the groups (92.4% for radiofrequency ablation and 93.4% for cryoablation). Five relapses were observed in the cryoablation group and none in the radiofrequency ablation group; the repeated electrophysiological studies showed bidirectional block in 84.9% of the radiofrequency ablation group as compared with 63.5% in the cryoablation group ($p < 0.05$). Accordingly, radiofrequency ablation remains superior to cryoablation in the treatment of atrial flutter.

The reliability and utility of remote transmissions of intracardiac electrocardiograms (ECGs) from implantable cardioverter-defibrillators were assessed in 522 defibrillator recipients followed for a mean of 303 days (34). The transmitted intracardiac ECGs were compared with intracardiac ECGs interrogated from the device at the next clinical visit. During follow-up, 1,998 ventricular tachycardia episodes and 488 ventricular fibrillation episodes were recorded in 198 patients. The success rate of transmitting intracardiac ECGs was 79% for slower and 65% for faster ventricular tachycardias; for ventricular fibrillation the success rate was 76%.

## Valvular Heart Disease

A number of abstracts focused on pathophysiology and potential therapeutic options in calcified aortic stenosis (AS). Speidl et al. (35) studied AS in a rabbit model of apolipoprotein AI-Milano, a mutant form of apolipoprotein AI, that has previously been shown to cause regression of established atherosclerotic lesions. Histology demonstrated a marked reduction in valve thickening and inflammatory infiltration in the treatment group, and Doppler echocardiography revealed a significant decrease in transvalvular gradient with an increase in valve area, whereas gradients increased and valve areas decreased in the placebo group. Amlodipine significantly improved valve function and decreased lesion thickness, inflammation, and lipid infiltration in an animal model of AS (36), and ramipril resulted in a significant retardation of functional deterioration and worsening of endothelial function (37). Finally, beta 2-adrenergic receptor agonists inhibit osteoblastic differentiation of human aortic valve interstitial cells, suggesting its potential role in preventing valve calcification (38). Although these results are promising, they have to be viewed with caution, because previous experience showed the difficulties in translating experimental studies into the clinical setting of AS.

A number of abstracts reported on predictors of outcome and their potential to improve patient management. Patients with severe AS were studied before and 9 months after aortic valve replacement with strain rate imaging and magnetic resonance imaging (MRI) and had myocardial biopsies taken during surgery (39). Postoperative functional outcome was closely related to the extent of fibrosis on contrast-enhanced MRI. Preoperative longitudinal strain was significantly lower in patients with poor post-operative functional class; importantly, pre-operative LVEF was normal in the majority of patients and did not predict post-operative outcome.

Valencia Serrano et al. (40) reported that the serum concentration of the carboxy-terminal propeptide of procollagen type I correlated well with myocardial fibrosis in AS defined by the collagen volume fraction. Monin et al. (41) confirmed that BNP is an important predictor of outcome in asymptomatic AS, and Bergler-Kein et al. (42) studied BNP in low-flow AS. The BNP was a potent predictor of outcome in all subgroups. Most importantly, BNP <550

pg/ml identified patients without contractile reserve but nevertheless good survival.

Bonan et al. (43) updated the promising experience with percutaneous aortic valve repair for AS in 175 patients. The 30-day mortality of 15% compared favorably with the EuroScore predicted operative mortality of 24%. Percutaneous mitral valve repair for functional mitral regurgitation (MR) with the MONARC system (Edwards Lifesciences LLC, Irvine, California), a device implanted into the coronary sinus to reduce the annulus, was reported to be feasible and safe (44).

## Imaging

A variety of abstracts related to echocardiography in clinical patient management were presented. According to recent ESC and ACC/AHA guidelines, the management of asymptomatic MR should integrate data on severity of regurgitation, LV function, and feasibility to repair the valve. The proximal isovelocity surface area method is traditionally used to quantify MR, with the paradigm of a hemispheric flow convergence region and a constant orifice. Real-time 3-dimensional (3D) echocardiography was used to assess the true shape and potential variability of flow convergence regions; the vast majority were hemi-ellipsoid and not hemispheric, and >30 % were variable. A patient-tailored algorithm was evaluated in a direct comparison between 2-dimensional (2D) and 3D echocardiography. Surprisingly, the 2D proximal isovelocity surface area method remained superior over 3D, possibly related to the higher spatial and temporal resolution (45).

Another study (46) presented the feasibility of a real-time 3D transesophageal echocardiography with a matrix probe, which significantly improved visualization of valvular abnormalities and could facilitate planning of surgical valve repair. Lancellotti et al. (47) assessed various parameters (with 2D echocardiography, tissue Doppler imaging, and 2D radial strain) at rest and during exercise in patients with severe asymptomatic MR and demonstrated that 2D strain at exercise was the best predictor for development of LV dysfunction over time.

Biagini et al. (48) reviewed echo-Doppler studies of 239 patients with hypertrophic cardiomyopathy over a follow-up period of 10 ± 8 years, to assess the importance of restrictive filling (defined as E deceleration time <130 ms and E/A ratio >2). There were 39 cardiac deaths and 16 heart transplantations during follow-up; a restrictive filling pattern was associated with an increased risk of (sudden) death or transplantation.

Research in multidetector computed tomography (MDCT) was mainly focused on noninvasive angiography. Gilard et al. (49) evaluated the prognostic value of a normal MDCT. During a follow-up period of 14.7 months, the event death rate was 0%, whereas the infarction rate was 0.7%. Noninvasive angiography with MDCT might be particularly useful in high-risk asymptomatic populations to detect CAD. In 119 asymptomatic diabetic patients, 64-slice MDCT detected atherosclerosis in 77%, with 27% having at least 1 significant stenosis (50). It was also shown that systemic inflammatory plasma markers are related to atherosclerosis on MDCT; in 230 individuals the inflammatory parameters IL-7 and -13 strongly correlated with the presence of coronary artery calcium (51). Furthermore, Pundziute et al. (52) performed a head-to-head comparison between MDCT and intravascular ultrasound with virtual histology in patients with stable CAD and ACS. More noncalcified plaques were observed on MDCT in ACS; these lesions had larger necrotic cores on intravascular ultrasound with virtual histology, suggesting more vulnerable lesions. The main drawback to noninvasive angiography with MDCT remains the radiation dose. Conradi et al. (53) compared the effective dose in 210 patients, with 56 undergoing 16-slice MDCT, 47 having 64-slice MDCT, and 107 undergoing dual-source CT. The effective doses were 9.76 ± 1.84 mSv, 13.6 ± 2.8 mSv, and 13.4 ± 6.8 mSv, respectively, indicating no dose reduction with the newer scanners.

Various abstracts were presented on the prognostic value of contrast-enhanced MRI. In 118 patients with chronic ischemic LV dysfunction, the extent of viability on contrast-enhanced MRI (defined as the segments with scar extending to <50% of the LV wall) predicted death and HF hospital stay independently from LVEF (54). In 105 consecutive patients with known or suspected CAD, a combination of dipyridamole stress perfusion and delayed contrast-enhanced MRI was performed to detect CAD (55). From the MRI studies, rest and stress wall motion were derived as well as stress perfusion defects, in addition to scar tissue. Invasive coronary angiography was used as the gold standard for CAD. Perfusion defects seemed the most sensitive for detection of (particularly multivessel) CAD.

Novel work in nuclear cardiology was presented by Hyafil et al. (56), who evaluated atherosclerotic aortic rabbit plaques with positron emission tomography (PET)-CT. With PET, imaging with F18-fluorodeoxyglucose was performed to detect metabolic activity in the aortic plaques. Co-registration with CT was performed, and a new CT contrast agent (N1177) was used that is formed of a suspension of insoluble iodine molecules and is taken up by macrophages. A correlation between contrast-enhanced activity on CT and metabolic activity on PET was shown. Moreover, immunostaining of aortic cross-sections revealed macrophage-rich areas correlating with the PET-CT active regions. These preliminary findings suggest that molecular imaging with PET and CT contrast is feasible and might potentially detect vulnerable lesions. Doue et al. (57) reported on the use of technetium-99m annexin 5 (a tracer for apoptosis) in rabbits developing aortic atherosclerotic plaques on a high-cholesterol diet; significantly lower tracer activity was observed in the plaques when these rabbits were receiving statin therapy.

## Basic Science

More than 300 abstracts were presented in the topic group "Basic Science," offering insights into mechanisms underlying disease and identifying novel potential therapeutic strategies. In the area of atherosclerosis the focus was on plaque stability and rupture. Kraaijeveld et al. (58) showed in a molecular, cellular, and in vivo approach that disruption of the myocyte-enhancer-binding-factor 2 gene leads to intraplaque bleeding. Donners and Waltenberger (59) used a yeast-2-hybrid screen to elucidate downstream mediators of the vascular endothelial growth factor receptor signaling pathway that could serve as more specific therapeutic targets. They identified a disintegrin and metalloprotease 10 as a novel potential target. A new approach for targeted immunocytokine therapy was presented by Dietrich et al. (60). Human IL-2 was targeted to active plaque via linking to a single-chain antibody against extra domain-B–fibronectin, thereby locally activating regulatory T-cells and significantly reducing plaque in the apolipoprotein $E^{-/-}$ mouse. In vascular repair several studies investigated mechanisms of homing of endothelial progenitor cells. Limbourg et al. (61) demonstrated the critical role of notch signaling in this process. Wassmann et al. (62) showed that a knockdown of the angiotensin type-1 receptor on bone marrow–derived cells improves endothelial function, decreases macrophage infiltration of plaques, and reduces atherosclerosis in hypercholesterolemic apolipoprotein $E^{-/-}$ mice, indicating that this receptor can contribute to the atherosclerotic process.

Stromal-derived factor (SDF)-1 recruits and induces differentiation of CD34+ progenitor cells and can do so via platelets (63). Segers et al. (64) sought to improve homing of stem cells to the area of myocardial infarction with SDF-1 with a novel "peptide technology" developed for local cartilage repair. They designed a metalloprotease-resistant SDF-1 and linked it to RAD16-II, a so-called self-assembling peptide that forms nanofibers and hydrogel at the place of injection, thereby potentially increasing and prolonging the local effects of SDF-1. In a rat model of myocardial infarction, the engineered peptides improved function and capillary density.

Other work examined the role of connective tissue growth factor in cardiac remodeling (65,66) with a transgenic mouse with a cardiac-restricted overexpression of this growth factor. Somewhat unexpectedly, this protein that is known to induce fibrosis in vitro actually prevented dilatation and improved cardiac function after aortic banding and pressure overload. The hearts were also protected during ischemia-reperfusion with a reduction of infarct size by more than 60%.

Looking for alternative ways to provide protection to the ischemic heart after reperfusion, Ghaleb et al. (67) demonstrated that interrupting caspase-mediated cell death with the recombinant protein BIR3/RING issued from the X-linked inhibitor of apoptosis protein, even at 3 h after reperfusion, protects the myocardium against infarction. Babiker et al. (68) showed that protection offered by pacing-induced dyssynchrony during the early reperfusion phase in isolated rabbit hearts relies on "classic" pathways.

Several studies reported on ways to improve stem cell therapy and tissue regeneration. The role of micro-ribonucleic acid in differentiation was highlighted by Sluijter et al. (69). A study by van Vliet et al. (70) reported that hyperpolarization of adult cardiac stem cells in culture speeded and improved differentiation toward a cardiac phenotype.

**Reprint requests and correspondence:** Dr. Steen D. Kristensen, Department of Cardiology, Aarhus University Hospital, Skejby, Brendstrupgaardsvej, DK-8200 Aarhus N, Denmark. E-mail: steendk@dadlnet.dk.

### REFERENCES

1. Flaherty JD, Rossi JS, Davidson CJ, et al. Coronary revascularization status and survival in acute heart failure: a report from the OPTIMIZE-HF registry (abstr). Eur Heart J 2007;28 Suppl:389–90.
2. Clausell N, Behling A, Colombo FC, et al. Effects of chronic use of sildenafil on exercise capacity and reactive pulmonary hypertension in patients with heart failure: a controlled clinical trial (abstr). Eur Heart J 2007;28 Suppl:387.
3. Forster O, Hilfiker-Kleiner D, Ansari AA, et al. The addition of bromocriptine to standard heart failure therapy improves outcome in peripartum cardiomyopathy (abstr). Eur Heart J 2007;28 Suppl: 386–7.
4. Dobson J, Pocock S, Granger C, et al. Weight loss is associated with increased mortality risk in patients with chronic heart failure: evidence from the CHARM program (abstr). Eur Heart J 2007;28 Suppl:270.
5. Marcon P, D'aurizio F, Finato N, et al. Pluripotent stem cells obtained from failing heart are functionally impaired (abstr). Eur Heart J 2007;28 Suppl:786.
6. Daemen J, Wenaweser P, Jüni P, Boersma E, Serruys P, Windecker S. Late coronary stent thrombosis following drug-eluting stent implantation in routine clinical practice; 4-year follow-up of 8146 patients from Bern and Rotterdam (abstr). Eur Heart J 2007;28 Suppl:509.
7. Vaquerizo B, Lefevre T, Garot P, et al. Long term predictors of death in patients treated by drug-eluting stents for unprotected left main lesions: insights from the French Left Main Taxus registry (abstr). Eur Heart J 2007;28 Suppl:136.
8. Dirksen MT, Suttorp MJ, Vink MA, et al. No improvement of outcome and no increase in stent thrombosis 2 years after PCI with Paclitaxel-eluting Stents compared to uncoated stents for ST-segment Myocardial InfarctION: the PASSION trial (abstr). Eur Heart J 2007;28 Suppl:10.
9. Ochala A, Wojakowski W, Smolka G, et al. Complete versus two-staged revascularization in patients with ST elevation myocardial infarction and multi-vessel coronary disease: final results of the prospective, randomized, multicenter trial (abstr). Eur Heart J 2007;28 Suppl:135–6.
10. Ormiston JA, Thuesen L, Dudek D, et al. Six-month angiographic and IVUS results of the first-in-man use of the Bioabsorbable Everolimus Eluting Coronary Stent System: the ABSORB trial (abstr). Eur Heart J 2007;28 Suppl:262.
11. Devlin G, Swanson N, Silverstone A, et al. Do treatment delays influence outcomes following presentation with non-ST elevation acute coronary syndrome? The GRACE registry (abstr). Eur Heart J 2007;28 Suppl:65.
12. Jeong MH, Gill GC, Moon JY, et al. Clinical value of GRACE score in the prediction of mortality in patients with acute coronary syndrome (abstr). Eur Heart J 2007;28 Suppl:657.
13. Kaski JC, Fernandez-Berges D, Cruz Fernandez JM, et al. A comparative study of multiple inflammatory markers for risk prediction in acute coronary syndrome (abstr). Eur Heart J 2007;28 Suppl:518.

14. Dangas G, Manoukian SV, Nikolsky E, et al. Baseline anemia is independently associated with early mortality in patients with ACS: results from the ACUITY trial (abstr). Eur Heart J 2007;28 Suppl: 516.
15. Bertrand ME, Montalescot G, Collet JP, Bassand JP, Yusuf S. Discontinuation of clopidogrel within the year following a non-ST-segment elevation acute coronary syndrome has a deleterious effect: evidence from the CURE trial (abstr). Eur Heart J 2007;28 Suppl:193.
16. Gueret P, Blanchard D, Cambou JP, et al. Major improvement in in-hospital and 6-month mortality after STEMI from 1995 to 2005 in relation to early management: results from the French USIK, USIC 2000 and FAST-MI registries (abstr). Eur Heart J 2007;28 Suppl:383.
17. Tavares Aguiar CM, Ferreira J. Predictors of prehospital delay time in acute ST-elevation myocardial infarction (abstr). Eur Heart J 2007;28 Suppl:825.
18. Zelizko M, Kala P, Vojacek J. Predictors of death after primary PCI. Results of the Czech National PCI Registry (abstr). Eur Heart J 2007;28 Suppl:828.
19. Danchin N, Belle L, Goldstein P, et al. Combined pre-hospital thrombolysis and high use of early PCI in STEMI patients is associated with mortality outcomes comparing favourably with those of primary PCI: data from the French FAST-MI register (abstr). Eur Heart J 2007;28 Suppl:571–2.
20. Sanchez-Recalde A, Moreno R, Rivero F, et al. Impact of simple manual aspiration thrombectomy on myocardial perfusion in patients with ST-elevation myocardial infarction: a meta-analysis of seven randomized trials (abstr). Eur Heart J 2007;28 Suppl:59.
21. Matteau A, Rinfret S, Dorais M, Lelorier J, Reeves F. Safety and feasibility of immediately returning patients transferred for primary percutaneous coronary intervention in ST-elevation myocardial infarction (abstr). Eur Heart J 2007;28 Suppl:62.
22. Abbate A, Biondi-Zoccai GGL, Appleton DL, et al. Late percutaneous coronary intervention following acute myocardial infarction: a meta-analysis of the effects on cardiac function and remodeling (abstr). Eur Heart J 2007;28 Suppl:60.
23. Gasior M, Gierlotka M, Witkowski A, et al. Elderly patients with acute myocardial infarction and cardiogenic shock on admission significantly benefit from invasive strategy. Results from PL-ACS registry (abstr). Eur Heart J 2007;28 Suppl:762.
24. Fuhrmann JT, Kolschmann S, Hirschmeyer J, Wunderlich C, Schoen SP, Strasser RH. Hemodynamic effects of arginin-vasopressin in the occurrence of an inappropriate vasodilation complicating cardiogenic shock (abstr). Eur Heart J 2007;28 Suppl:762.
25. Bohm K, Rosenqvist M, Herlitz J, Svensson L. Is chest compression only as effective as standard treatment in out-of-hospital bystander cardiopulmonary resuscitation? (abstr) Eur Heart J 2007;28 Suppl:528.
26. Wolfrum S, Pierau C, Radke PW, Schunkert H, Kurowski V. Hypothermia after cardiac arrest due to ST-elevation myocardial infarction (STEMI) in patients undergoing acute PCI (abstr). Eur Heart J 2007;28 Suppl:527.
27. Reisinger J, Hoellinger K, Lang W, et al. Does early administration of selenium improve neurological outcome after cardiac arrest? (abstr) Eur Heart J 2007;28 Suppl:527–8.
28. Kastelein JJP, Holme I, Faergeman O, et al. Lipid cut points below which lipids no longer predict residual risk (abstr). Eur Heart J 2007;28 Suppl:732.
29. Pasterkamp G, Hellings WE, De Kleijn D, De Vries JP, de Bruin P, Moll F. Local plaque characteristics are predictive for systemic cardiovascular events. Results from the ongoing Athero-Express study: a longitudinal study in 667 patients undergoing carotid endarterectomy (abstr). Eur Heart J 2007;28 Suppl:256.
30. Jim MH, Siu CW, Ho HH, et al. Transient atrial fibrillation complicating acute inferior myocardial infarction: implication on future risk for ischemic stroke (abstr). Eur Heart J 2007;28 Suppl:732.
31. Lopes RD, Mahaffey KM, Harrington RH, et al. Atrial fibrillation is associated with worse outcomes in ST elevation and non ST elevation acute coronary syndromes (abstr). Eur Heart J 2007;28 Suppl:259.
32. Leclercq C, Rosier A, Crocq C, et al. Is baseline atrial rhythm a predictive factor of long term clinical response to cardiac resynchronisation therapy? (abstr) Eur Heart J 2007;28 Suppl:288.
33. Kuniss M, Vogtmann T, Ventura R, et al. Comparison of radiofrequency ablation with cryoablation using a 8 mm tip ablation catheter for the ablation of common atrial flutter—a randomised study (CRYOTIP) (abstr). Eur Heart J 2007;28 Suppl:159.
34. Perings C, Bauer W, Bondke H, et al., on behalf of the RIONI Investigator Group. Automatic remote transmission of intracardiac electrograms after tachyarrhythmia detection enables improvements in ICD therapy (abstr). Eur Heart J 2007;28 Suppl:39.
35. Speidl WS, Ibanez B, Santos-Gallego CG, et al. ApoAI-treatment rapidly increases aortic valve area in a hypercholesterolemic rabbit model (abstr). Eur Heart J 2007;28 Suppl:655.
36. Richardson M, Marechaux S, Corseaux D, et al. Amlodipine improves aortic valve function in an experimental model of aortic valve sclerosis (abstr). Eur Heart J 2007;28 Suppl:654.
37. Ngo DTM, Stafford I, Wuttke RD, et al. Ramipril retards progression of aortic valve stenosis: association with preservation of nitric oxide effects (abstr). Eur Heart J 2007;28 Suppl:513.
38. Chester AH, Latif N, Sarathchandra P, et al. Beta 2-adrenergic receptor agonists inhibit osteoblastic differentiation of human aortic valve interstitial cells (abstr). Eur Heart J 2007;28 Suppl:652.
39. Weidemann F, Herrmann S, Strotmann JM, et al. Prognostic impact of functional and morphological changes in patients with severe aortic valve stenoses after valve replacement (abstr). Eur Heart J 2007;28 Suppl:117.
40. Valencia Serrano F, Lopez Salazar B, Gomez Doblas JJ, et al. Non-invasive assessment of myocardial fibrosis in severe aortic stenosis patients (abstr). Eur Heart J 2007;28 Suppl:653.
41. Monin JL, Lim P, Monchi M, et al. Predictors of outcome in asymptomatic aortic stenosis: incremental value of B-type natriuretic peptide (abstr). Eur Heart J 2007;28 Suppl:512.
42. Bergler-Klein J, Mundigler G, Pibarot P, et al. Is prognostic value of B-type natriuretic peptide superior to contractile reserve in low-flow aortic stenosis? Results from the multicenter TOPAS study (abstr). Eur Heart J 2007;28 Suppl:513.
43. Bonan R, Grube E, Laborde JC, et al. Update experience with the percutaneous CoreValve aortic valve replacement in patients unsuitable for surgical aortic valve replacement (abstr). Eur Heart J 2007;28 Suppl:765.
44. Messika-Zeitoun D, Harnek J, Buller C, et al. Preliminary results of the percutaneous MONARC system for the treatment of functional mitral regurgitation (abstr). Eur Heart J 2007;28 Suppl:765.
45. Necas J, Kovalova S, Vespalec J. Real-time 3D echocardiography: impact on quantification of mitral regurgitation by PISA method (abstr). Eur Heart J 2007;28 Suppl:395.
46. Sugeng L, Shernan SK, Shook D, Weinert L, Fox J, Lang RM. Real-time three-dimensional echocardiographic evaluation of cardiac anatomy: initial experience with a matrix transesophageal transducer (abstr). Eur Heart J 2007;28 Suppl:790.
47. Lancellotti P, Radermecker M, Cosyns B, et al. Detection of latent left ventricular dysfunction in patients with organic mitral regurgitation by quantitative exercise 2-D speckle tracking echocardiography (abstr). Eur Heart J 2007;28 Suppl:395.
48. Biagini E, Rocchi G, Lofiego C, et al. Left ventricular restrictive filling pattern in hypertrophic cardiomyopathy: prevalence, incidence, clinical/pathophysiological profile and prognostic implications (abstr). Eur Heart J 2007;28 Suppl:125–6.
49. Gilard M, Le Gal G, Cornily JC, et al. Prognosis of patients with suspected coronary artery disease and normal computed tomography (abstr). Eur Heart J 2007;28 Suppl:23.
50. Dobrecky-Mery I, Gaspar T, Azencot M, et al. Prevalence of coronary artery disease demonstrated by 64-slice coronary CT angiography in asymptomatic patients with type 2 diabetes mellitus (abstr). Eur Heart J 2007;28 Suppl:23.
51. Garlichs CD, Yilmaz A, Frank T, et al. Evaluation of systemic inflammatory markers improves the prediction of coronary calcifications (abstr). Eur Heart J 2007;28 Suppl:107.
52. Pundziute G, Schuijf JD, Jukema JW, et al. Plaque composition in stable coronary artery disease and acute coronary syndromes; systematic evaluation with multislice computed tomography and virtual histology intravascular ultrasound (abstr). Eur Heart J 2007;28 Suppl: 658.
53. Conradi G, Rixe J, Rolf A, Deetjen A, Hamm CHR, Dill T. Radiation dose of the new dual source CT in multislice computed tomography of the coronaries (abstr). Eur Heart J 2007;28 Suppl:22.
54. Kuhl HP, Battenberg T, Heussen N, et al. Prognostic relevance of contrast-enhanced cardiovascular magnetic resonance in patients with severe ischemic cardiomyopathy (abstr). Eur Heart J 2007;28 Suppl: 275.

55. Husser O, Bodi Peris V, Sanchis J, et al. Diagnosis of multivessel disease and localization of coronary lesions using dipyridamole stress CMR in patients with chest pain (abstr). Eur Heart J 2007;28 Suppl:275.
56. Hyafil F, Cornily JC, Rudd JH, et al. Quantification of macrophages in atherosclerotic plaques of rabbits using the novel specific CT contrast agent N1177: a comparison with PET-CT and histology (abstr). Eur Heart J 2007;28 Suppl:280.
57. Doue T, Ohtsuki K, Hikosaka T, et al. The feasibility of Tc-99m annexin A5 to evaluate the anti-atherosclerotic therapy by HMG-CoA reductase inhibitor pravastatin in cholesterol-fed rabbits (abstr). Eur Heart J 2007;28 Suppl:793–4.
58. Kraaijeveld AO, Lucerna ML, Van Oort R, et al. Myocyte enhancer binding factor 2 activity disruption induces phenotypic changes and signs of bleeding in atherosclerotic plaques (abstr). Eur Heart J 2007;28 Suppl:123.
59. Donners M, Waltenberger J. ADAM10: a novel metalloprotease interacting with the VEGF(R) pathway, expressed in human atherosclerosis and associated with plaque neovascularization (abstr). Eur Heart J 2007;28 Suppl:746.
60. Dietrich T, Atrott K, Stawowy P, et al. Targeted immunocytokine therapy with interleukin-2 reduces plaque formation in aortic lesions from ApoE-deficient mice (abstr). Eur Heart J 2007;28 Suppl:746–7.
61. Limbourg A, Ploom M, Elligsen D, Bahlmann F, Drexler H, Limbourg FP. Notch signaling regulates human endothelial progenitor cell differentiation and vascular repair via CXCR4 (abstr). Eur Heart J 2007;28 Suppl:505.
62. Wassmann S, Czech T, Werner N, Nickenig G. Role of AT1a receptor expression on bone marrow-derived cells for the development of endothelial dysfunction and atherosclerosis (abstr). Eur Heart J 2007;28 Suppl:747.
63. Stellos K, Langer H, Bigalke B, et al. Platelet-derived SDF-1 recruits and induces differentiation of human CD34+ progenitor cells to endothelial cells: implications in vascular and tissue regeneration (abstr). Eur Heart J 2007;28 Suppl:506.
64. Segers VFM, Tokunou T, Macgillivray C, Gannon J, Higgins LJ, Lee RT. Intramyocardial delivery of protease-resistant stromal cell derived factor-1 by self-assembling peptide nanofibers (abstr). Eur Heart J 2007;28 Suppl:123.
65. Ahmed MS, Thomas Von L, Gravning JA, Edvardsen T, Smiseth OA. Connective tissue growth factor inhibits myocardial growth, stimulates fibrosis, but preserves myocardial function in chronic pressure overload (abstr). Eur Heart J 2007;28 Suppl:7.
66. Gravning J, Ahmed MS, Martinov V, et al. Novel cardioprotective role of connective tissue growth factor in ischemia/reperfusion injury and heart failure (abstr). Eur Heart J 2007;28 Suppl:740.
67. Ghaleb B, Souktani R, Pons S, et al. Inhibition of ischemia-induced cell death with the protein TAT-BIR3/RING extends the window for cardioprotection during reperfusion (abstr). Eur Heart J 2007;28 Suppl:741.
68. Babiker FA, Vanagt WY, Baynham TC, Spinelli J, Delhaas T, Prinzen FW. Exploration of the mechanisms of pacing postconditioning (abstr). Eur Heart J 2007;28 Suppl:359–60.
69. Sluijter JPG, Van Mil A, Korfage TH, Metz CHG, Doevendans PAFM, Goumans MJ. MicroRNA-1 is involved in cardiomyocyte differentiation of human-derived cardiomyocyte progenitor cells (abstr). Eur Heart J 2007;28 Suppl:223.
70. Van Vliet P, De Boer TP, Sluijter JPG, Van Der Heyden MAG, Doevendans PA, Goumans MJ. Potassium inward rectifier expression is regulated by TGFbeta and BMP and increases during differentiation of cardiomyocyte progenitor cells (abstr). Eur Heart J 2007;28 Suppl:3.