

**HIGHLIGHTS
OF THE**

**ESC CONGRESS
2009**

29 Aug 2009 – 02 Sept 2009, Barcelona -Spain

SCIENTIFIC SESSIONS

Contents

- **CURRENT OASIS - 7: Doubling the dose of clopidogrel beneficial, especially in ACS patients undergoing PCI**
- **Low-dose aspirin not recommended in primary prevention of CV events**
- **ESC 2006 controversy on DES: Is it time to turn the page on Barcelona 2006?**
- **Analysis of GISSI-HF: Rosuvastatin may lower the incidence of atrial fibrillation in chronic HF patient**
- **TRITON-TIMI 38: Use of PPI with clopidogrel or prasugrel not associated with increased CV risk in ACS patients with planned PCI**
- **B-CONVINCED: Continued beta-blocker therapy safe & non-inferior to interrupted beta-blocker use in acutely decompensated HF**
- **PRAGUE-7: Routine use of GP IIb/IIIa inhibitor, abciximab, fails to show any benefit in acute MI patients with cardiogenic shock**
- **TRIANA: Primary angioplasty superior to thrombolysis in senior acute MI patients**
- **GRACE registry: PCI, the preferred strategy in left main disease**
- **NORDISTEMI: Early invasive strategy following thrombolysis beneficial in STEMI patients from remote areas**
- **ACTIVE: Angiotensin receptor blocker, irbesartan, may prevent development of atrial fibrillation-related HF**
- **KYOTO HEART: Addition of an ARB shows greater reduction in CV events vs non-ARB therapy in high-risk hypertensives**
- **PROTECT: Rolofylline fails to provide any benefit in acute decompensated HF patients**
- **MADIT-CRT: Resynchronization therapy reduces mortality and heart failure events in patients with mild heart failure or LV dysfunction**
- **Results of meta-analysis: Non-TIMI major bleeding as important as TIMI major bleeding in terms of predicting mortality in PCI patients**
- **MAGGIC study: Lower mortality in preserved-EF HF**

- **RELID: Interventionalists at high risk of developing cataract**
- **Hospital mortality from PCI is unrelated to procedural volume**
- **SYNTAX year 2: Higher MI rate in PCI, no increase in CABG stroke**
- **FAME trial: Benefits of FFR-guided PCI over the traditional angiography-guided PCI confirmed by the 18-month data**

CURRENT OASIS - 7: Doubling the dose of clopidogrel beneficial especially in ACS patients undergoing PCI

The **Clopidogrel Optimal Loading Dose Usage to Reduce Recurrent Events/Optimal Antiplatelet Strategy for Interventions (CURRENT OASIS-7)** study presented at the *European Society of Cardiology 2009 Congress* by the lead investigator, Dr Shamir Mehta, McMaster University, Hamilton, revealed that **doubling the loading and maintenance doses of clopidogrel in acute coronary syndrome (ACS) patients undergoing planned percutaneous coronary intervention (PCI) significantly reduces stent thrombosis and cardiovascular events, the benefits largely driven by the reductions in myocardial infarction (MI), without significant increase in major bleeding.** In addition, the study showed **no difference in the safety or efficacy of higher-dose aspirin vs lower-dose aspirin.**

The CURRENT OASIS-7 study is a 2x2 factorial, randomized trial which evaluated the optimal dose of clopidogrel and aspirin in ACS patients presenting to an emergency department and scheduled to undergo an early invasive strategy with intent to perform PCI no later than 72 hours after randomization.

Recent data has suggested that doubling the loading and maintenance dose of clopidogrel would result in a greater and more rapid antiplatelet effect, which would translate into better clinical outcomes. Regarding aspirin, there is large variance worldwide, including disparities in the clinical guidelines, about the optimal aspirin dose for the treatment of ACS. In this trial, patients assigned to high-dose clopidogrel received a 600-mg loading dose on day 1 and then 150 mg once daily for next seven days, followed by 75 mg once daily until 30 days. Patients in the standard clopidogrel arm received a 300-mg loading dose on day 1, followed by 75 mg once daily until 30 days. Patients were also assigned in an open-label manner to 300 to 325 mg of aspirin once daily or 75 to 100 mg aspirin once daily.

In terms of efficacy, there was **no significant difference observed in the primary composite end point of death, MI, or stroke; or its components with the higher & lower dose of aspirin.** Use of **aspirin 300-325 mg did not result in any significant differences in major bleeding** (defined as TIMI major bleeding or CURRENT major and severe bleeding) **vs low-dose aspirin.**

"The rationale that we have used in the past for low-dose aspirin has been that if we use high-dose aspirin there will be more bleeding," said Dr. Mehta. "Certainly the observational data in the past have suggested that, but we've now done **a randomized trial showing that there is no increased bleeding with higher doses of aspirin.** In fact, if you look at the data carefully in this study, **the higher-dose aspirin group consistently did better, both for the primary outcome and for the PCI group. So there is really no reason not to use high-dose aspirin, at least for 30 days after placing a stent.**"

In the clopidogrel arm of the study, there was **no significant difference in the overall cohort of patients who received the higher loading and maintenance doses**, most likely because the patients who did not undergo PCI had no significant coronary disease by angiogram or the drug was stopped when patients were scheduled for CABG surgery.

In patients who underwent PCI, there was a **significant 15% reduction in cardiovascular, death, MI, and stroke**, and this reduction was driven by a **significant 22% reduction in the risk of MI**. In addition, there was a **significant 42% reduction in the risk of definite stent thrombosis**.

In terms of bleeding risks, when the TIMI major bleeding definition was used there was **no difference between the standard and doubled clopidogrel doses**. However, when the CURRENT major and severe bleeding definition was used, **significant increase in bleeding was observed**, and this was driven by an increased need for red blood cell transfusions. Importantly, there was **no difference in fatal bleeding, intracranial hemorrhage, or CABG-related major bleeding**.

The clinical implications of the present study are such that **for every 1000 patients with ACS receiving PCI, doubling the loading and maintenance dose of clopidogrel will prevent an additional six MIs and seven stent thromboses with an excess three severe bleeds and no increase in fatal, CABG-related, or TIMI major bleeds**. While those who are not undergoing PCI should continue using the **standard dose of clopidogrel**.

Discussant, Dr Frans Van de Werf, University of Leuven, Belgium, agreed with the conclusions of the trial, stating that **most ACS patients undergoing PCI should receive the doubled clopidogrel dose because of the favorable net clinical benefit & he also agreed that ACS patients treated medically should continue to receive the standard clopidogrel dose**. However, he contradicted the conclusions regarding aspirin, saying that the data does not provide any support for the use of the higher dose. He agreed with the investigators who suggested that the **borderline significant interaction between aspirin and clopidogrel doses might be a "spurious finding" since it was attenuated to nonsignificance when MI and stent thrombosis were used as an outcome measure**.

Future research is still needed to test the effectiveness of doubling the dose in patients with the known loss-of-function polymorphism associated with clopidogrel resistance, as well studies with higher-dose clopidogrel compared with newer agents, among them prasugrel and ticagrelor.

*Adapted from <http://www.theheart.org/article/995967.do>. As accessed on 31st August 2009.
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

Low-dose aspirin not recommended in primary prevention of CV events

The use of low-dose aspirin in the primary prevention of cardiovascular (CV) events in healthy individuals with asymptomatic atherosclerosis is currently not warranted, according to a large "real-world" study, **Aspirin for Asymptomatic Atherosclerosis (AAA) trial**. In the randomized trial of 3350 subjects deemed at high risk for CV and cerebrovascular events because of a low ankle-brachial index (ABI) (≤ 0.95), aspirin had absolutely no effect on reducing events compared with placebo, Dr Gerry Fowkes (University of Edinburgh, Scotland) said.

The results of the trial are in conflict with findings from a meta-analysis from the Antithrombotic Trialists' (ATT) collaboration, published this year in the *Lancet*, discussant **Dr Carlo Patrono** (Catholic University School of Medicine, Italy) told. He questioned how the results of AAA could be interpreted in light of the 12% relative risk reduction in serious CV events, largely driven by a reduction in nonfatal MI that was seen in the ATT trial.

The AAA was a pragmatic trial, Fowkes explained, conducted in a deprived population in central Scotland, where rates of CHD and related mortality are high. Between 1998 and 2001, the AAA trialists screened 28,980 men and women 50-75 years old for asymptomatic atherosclerosis by measuring their ABI. A low ABI in otherwise-healthy individuals has been shown to be related to an increased risk of future CV events. Of this, 3350 had a low ABI and were thus eligible to be entered into the trial. They were randomly allocated to 100-mg enteric coated aspirin daily or to placebo and followed for a mean of 8.2 years. The primary end point of the trial was the composite of an initial fatal or nonfatal coronary event, stroke, or revascularization. Secondary end points were all vascular events, which included a composite of initial fatal or nonfatal coronary event, stroke, or revascularization, angina, intermittent claudication, transient ischemic attack, and all-cause mortality.

Patients in both groups were matched for age (mean age 62 years), gender (roughly 30% were men), and comorbidities. One-third of the study population consisted of smokers. Aspirin had no effect in terms of reducing CV and cerebrovascular events. There were 181 (10.8%) events in the aspirin group and 176 (10.5%) in the placebo group (hazard ratio 1.03, 95% CI 0.84-1.27).

Primary end-point results for aspirin vs placebo

End point	Aspirin (n=1675), n (%)	Placebo (n=1675), n (%)
Fatal coronary event	28 (1.7)	18 (1.1)
Fatal stroke	7 (0.4)	12 (0.7)
Nonfatal coronary event	62 (3.7)	68 (4.1)
Nonfatal stroke	37 (2.2)	38 (2.3)
Coronary revascularization	24 (1.4)	20 (1.2)
Peripheral revascularization	23 (1.4)	20 (1.2)

Interestingly, cancer mortality was higher in the placebo group than in the aspirin group. Adverse events, including major hemorrhage, were greater in the aspirin group (HR 1.71, 95% CI 0.99-2.97).

Adverse event	Aspirin (n=1675), n (%)	Placebo (n=1675), n (%)
Major hemorrhage	34 (2.0)	20 (1.2)
Gastrointestinal ulcer	14 (0.8)	8 (0.5)

Fowkes pointed out that 40% of patients were noncompliant and did not take their aspirin as prescribed over the duration of the trial. Such a low compliance rate could have affected the results. "The 60% compliance rate is the typical level of compliance that you will find in the primary-prevention setting, and obviously there are many reasons that people stop taking aspirin. So whether aspirin is beneficial in clinical practice among patients who have a low ankle-brachial index and who are fully compliant with aspirin is unknown, and so our results cannot be extrapolated to that situation," he said. He further mentioned that "I think that given that these are high-risk individuals, it is probably reasonable to give them a **statin**. Obviously, there is the possibility of giving a stronger antiplatelet such as **clopidogrel** or some of these new drugs that are being developed, but one would have to trial those properly."

Patrono said the AAA study may have been underpowered and suggested that was one reason for its negative findings. "The sample size would have to be about four times larger to achieve the power to show a 12% relative risk reduction," he said. Other reasons: "The presence of peripheral arterial disease, whether symptomatic or asymptomatic, may render platelet activation more critically dependent on ATP than thromboxane release, and there is some experimental as well as clinical evidence supporting this possibility." An accelerated platelet turnover associated with peripheral arterial disease—at least in some patients—may also be a cause for the discrepancy, Patrono said.

Fowkes told that there is no reason to think that the relative reduction in CV events created by aspirin should be different in the primary or secondary setting. It's just that the benefits in the secondary setting far outweigh the risks. "The absolute reduction is much higher in secondary prevention than in primary prevention, but the level of bleeding is the same. So in secondary prevention, you've got a big reduction in events and a small amount of bleeding. In primary prevention, you have a smaller amount of reduction of events, and the same amount of bleeding. These two have got to be counterbalanced in the primary-prevention situation, and that is where the concern is at the moment."

*Adapted from <http://www.theheart.org/article/996383.do>. As accessed on 31st August 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

ESC 2006 controversy on DES: Is it time to turn the page on Barcelona 2006?

Even three years after the drug-eluting-stent (DES) "firestorm" ignited at the **World Congress of Cardiology 2006**, the topic of late stent-thrombosis risk with DES still produced sparks. In a session entitled "Is it time to turn the page on Barcelona 2006?" investigators for some of the biggest trials—including **Dr Edoardo Camenzind** (University Hospital Geneva, Switzerland), whose presentation that year became emblematic of the controversy and subsequent dramatic fall-off in DES usage—debated the evidence and tried—with mixed success—to find some common ground.

Camenzind led off by reviewing original and follow-up published papers and presentations from **BASKET LATE**, **RAVEL**, **SCAAR**, and others. Camenzind emphasized that the bulk of the evidence points to an enduring risk of late stent thrombosis of 0.5-0.7% after one year and out to at least five years with DES. Several published papers of randomized controlled trials, he noted, have reported numerical differences in stent-thrombosis rates for DES and bare-metal stents but have failed to report p values, adding to the lingering uncertainty. On the flip side, most of the reassuring information on the lack of any clinical significance of a real or hypothetical increased stent-thrombosis risk with DES has come from registry data, Camenzind noted. "We have to keep in mind that the level of evidence for registries is B or even C." As such, Camenzind concluded, "The doubt that total death and MI . . . have a higher incidence in potent DES, as compared with bare-metal stents, cannot in my view be definitively dissipated since Barcelona 2006." Moreover, seemingly inconsistent or incomplete papers have complicated matters. Camenzind's "practical advice" to physicians was to use DES that allow for vascular healing. "Ask first if you, yourself, would like to have one of the stents you're implanting," he said. "And your approach to dual antiplatelet therapy should be [to use it] until complete healing [of the vessel wall has occurred]. And last, resist short-term distractions and stick with medical evidence."

Camenzind's review of DES contrasted sharply, however, with that of **Dr Adnan Kastrati** (Deutsches Herzzentrum, Germany), who followed with a review of the randomized clinical trials of DES, opening with the bold statement: "It's clear to all that DES are a very effective therapy." Kastrati showed data pointing to the clear reductions in repeat revascularization for DES across different DES and across different subsets of patients, including patients with diabetes and AMI. But he emphasized, "all DES are not equal," pointing to findings from the recent ZEST results, which showed the Endeavor and Cypher stents to be superior to the Taxus in an all-comers randomized trial. And while Camenzind in his talk referred to a "transitional solution," referring to the promise of up-and-coming DES, Kastrati cautioned that newer doesn't always mean better, pointing to disappointing results of devices like the COSTAR and the GENOUS. Asked why, if he thinks there is "no problem" with even the more potent DES currently available, he still believes that new stents in the pipeline are important, Kastrati acknowledged.

In a third presentation, **Dr Stefan James** (Uppsala Clinical Research Centre, Sweden) sided closer to Kastrati, concluding that it was indeed time to turn the page on the rampant concerns of 2006. James and his Swedish coinvestigators contributed significantly to DES disquiet late in 2006 with their now-infamous "SCAAR scare." Registry data from Sweden presented during a 2006 FDA hearing indicated that rates of death, MI, and death/MI after six months were significantly higher among DES-treated patients than among bare-metal-stent-treated patients over 2.5 years of follow-up and after adjustment for background characteristics. But showing new SCAAR data here on almost 61,000 patients treated with stents between 2003 and 2006, James declared the "SCAAR scare" is no more. At up to five years, rates of death/MI after the one-year mark (the time at which most patients stopped taking clopidogrel) were no different between patients with DES and those with bare-metal stents.

The Achilles heel for DES, however, remains stent thrombosis, James added. Emphasizing that the findings are only hypothesis-generating, based on observational data, James showed SCAAR data indicating that the increased risk of stent thrombosis seen back in 2006 remains in 2009, roughly double that seen in bare-metal stents over the long term. But again showing new Swedish data, James pointed out that the stent-thrombosis rate does seem to differ for different DES, and indeed, for different bare-metal stents.

Both Camenzind and Kastrati acknowledged the flaws of registry data, and emphasized that DES safety and efficacy differs by type of stent. But Camenzind, while refusing to give the "brand names" of the DES he *will* use, says "there is no space" in his practice for "very potent DES." Like James, Camenzind said that he believes appropriate usage of DES is likely around 35% of total stent use. And he advised that when such "potent" DES are used, "you have to be aware that that is likely going to have to be combined with lifelong dual antiplatelet therapy." Kastrati, however, said he "cannot agree" with Camenzind, saying he continues to use DES in 100% of patients. James, for his part, stressed that despite the confusion and controversy, the 2006 "firestorm" served an important purpose. "A wake-up call was needed: all of us interventional cardiologists were overly enthusiastic—we thought that DES would solve everything and we started to stent patients we never should have stented," he told.

*Adapted from <http://www.theheart.org/article/996053.do>. As accessed on 31st August 2009.
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

Analysis of GISSI-HF: Rosuvastatin may lower the incidence of atrial fibrillation in chronic HF patient

A study presented at the *European Society of Cardiology 2009 Congress* showed that **treatment with rosuvastatin may result in a lower incidence of atrial fibrillation (AF) in patients with chronic heart failure (HF)**. This study which evaluated the effect of rosuvastatin on incidence of AF in patients with chronic HF, analyzed the data from the GISSI-HF trial.

The GISSI-HF was a 2x2 factorial design study that compared omega-3 polyunsaturated fatty acids (n-3 PUFA) and rosuvastatin with corresponding placebos in chronic HF patients. In the rosuvastatin portion of the trial, 4,575 patients with chronic New York Heart Association (NYHA) class II-IV HF, irrespective of cause and left ventricular ejection fraction, were randomized to rosuvastatin 10 mg daily or placebo.

In the current analysis, patients who did not have AF at the time of randomization were included. Of the 4,575 patients randomized to rosuvastatin or placebo in the main trial, approximately 19% were excluded due to the presence of AF on baseline ECG. At baseline, patients with AF occurrence were older, had higher blood pressure, lower left ventricular (LV) ejection fraction, worse renal function, worse NYHA class, more frequent history of hypertension, chronic obstructive pulmonary disease, AF, and HF hospitalizations. They were also less likely to be on beta-blockers. The primary endpoint of the analysis was AF occurrence; defined as AF on ECG during follow-up or hospitalization, and AF causing admission or worsening HF.

During a mean follow-up of 3.7 years, **new AF events occurred in 13.9% patients in the rosuvastatin arm vs 16.0% patients in the placebo arm. The unadjusted difference was not statistically significant however after adjustment for clinical variables, laboratory examinations and background therapies, risk of new AF occurrence was significantly decreased by 13%**. The overall incidence of AF in patients with chronic HF on optimal medical therapy remained relatively high (15.0%). However, with rosuvastatin **absolute risk reduction was only 2.1% while NNT was 47 in order to prevent one AF event**.

As in many studies of AF; a major limitation in this study is that the detection of AF relied on routine ECG and clinically significant AF. In addition, number of patients with ischemic cardiomyopathy and diabetes mellitus who were on statins at baseline is unclear. Besides, whether this possible benefit on occurrence of AF with statin is due to its lipid-lowering property or pleiotropic benefits, warrants further research.

*Adapted from <http://www.cardiosource.com/rapidnewssummaries/summary.asp?SumID=446>. As accessed on 31st August 2009.
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

TRITON-TIMI 38: Use of PPI with clopidogrel or prasugrel not associated with increased CV risk in ACS patients with planned

Some recent observational studies have suggested that use of a proton pump inhibitor (PPI) with clopidogrel is associated with an increased risk of cardiovascular (CV) outcomes. However, the TRITON-TIMI 38 trial presented at *European Society of Cardiology Congress 2009* revealed that the use of a PPI with either clopidogrel or prasugrel in patients with acute coronary syndrome (ACS) and planned percutaneous coronary interventions (PCI) was not associated with an increased risk of CV events

TRITON-TIMI 38 trial randomized 13,608 patients with ACS and planned PCI to prasugrel or clopidogrel. The main trial had shown reduced rate of CV events with prasugrel but it was associated with an increased risk of major bleeding. The current study used multivariable Cox proportional hazards model to evaluate the association between PPI use at randomization and the risk of clinical outcomes. The decision to treat with PPI was left to the discretion of the treating physician. At randomization, 33% of patients were on PPI. Patients on a PPI were more likely older, female, had a history of peptic ulcer disease, and had lower hemoglobin at baseline.

At the end of median 15-month follow-up, there was **no difference in the primary endpoint [i.e. CV death, myocardial infarction (MI) or stroke]** between patients with or without PPI receiving either clopidogrel or prasugrel. Similarly, **no difference was observed in secondary endpoints including stent thrombosis, TIMI major or minor bleeding, or net clinical outcome (primary endpoint plus TIMI major non-coronary artery bypass graft bleeding).**

As use of PPI was not randomized but left at the discretion of the treating physician prior to randomization, confounding variables may exist despite of the multivariate adjustments.

Use of PPI may result in reduction in the conversion of clopidogrel to its active metabolite via CYP2C19 inhibition, which may lead to adverse events. However, considering the conflicting results between the present trial and the other studies in the past, it is unclear whether PPI causes or is merely associated with adverse clinical events. **Patients who physicians choose to treat with a PPI may be very sick and at higher risk of CV events and thus the risk seen may not be related to the PPI use. Thus with the present study, the initial observation of an association of PPI and CV events now seems a bit less certain.**

*Adapted from <http://www.cardiosource.com/rapidnewssummaries/summary.asp?SumID=452>. As accessed on 1st September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

B-CONVINCED: Continued beta-blocker therapy safe & non-inferior to interrupted beta-blocker use in acutely decompensated HF

The B-CONVINCED (Beta-blocker CONTinuation Vs. INTerruption in patients with Congestive heart failure hospitalizED for a decompensation episode) study, which was presented at the *European Society of Cardiology 2009 Congress*, found that **continuing beta-blocker therapy was safe and associated with a significantly higher rate of beta-blocker use, 3 months post-discharge, as compared to the patients in whom beta-blocker therapy was stopped during hospitalization.**

The 2008 European Society of Cardiology (ESC) guidelines recognize that beta-blocker therapy may have to be stopped or the dosage reduced during acutely decompensated heart failure (ADHF), but it also advises that the therapy should be reinstated as rapidly as possible. Thus the current recommendations from the ESC are not clear-cut, reflecting the lack of data from randomized controlled trials.

B-CONVINCED, a randomized, controlled, open-label, non-inferiority trial, was undertaken to determine whether beta-blocker use should be interrupted during episodes of ADHF. The study enrolled 169 patients upon hospitalization for acute HF with pulmonary edema, including dyspnea and pulmonary rales or radiological evidence of edema. All patients had a left ventricular ejection fraction <40% and had been receiving beta-blocker therapy at a stable dosage for more than 1 month prior to admission. The patients were randomized to continue beta-blocker therapy without dosage modification or to stop beta-blockers for at least 3 days.

On day 3, **92.8% of patients who had continued beta-blocker therapy versus 92.3% of those who had stopped beta-blocker showed improvement in both dyspnea and general wellbeing.** Thus, the study demonstrated non-inferiority for its primary endpoint with the continued use of beta-blockers vs interrupted beta-blocker therapy. Besides, the **continued beta-blocker therapy was also non-inferior to interrupted beta-blocker use for secondary endpoints, such as the proportion of improved patients on day 8, the proportion judged as improved by the patient, plasma levels of B-type natriuretic peptide on day 3, length of hospital stay, rehospitalization rate, and death rate at 3 months. Patients continuing beta-blockers were also significantly more likely than others to receive the beta-blocker therapy at 3 months post-discharge (90% vs. 76%).**

Thus, the trial demonstrated that **beta-blocker continuation during ADHF is safe and it supports the current ESC guideline recommendations.**

“More patients will be on effective therapy at 3 months and many lives will be saved by this strategy,” said the lead investigator, Dr. Guillaume Jondeau, Hôpital Bichat, France.

PRAGUE-7: Routine use of GP IIb/IIIa inhibitor, abciximab, fails to show any benefit in acute MI patients with cardiogenic shock

A new study, **PRAGUE-7**, reported at the *European Society of Cardiology Congress 2009* by Dr Petr Widimsky, Charles University, Prague, Czech Republic, showed that the **routine upfront use of the GP IIb/IIIa inhibitor, abciximab, during primary percutaneous coronary intervention (PCI) was of no benefit in patients with acute myocardial infarction (AMI) complicated by cardiogenic shock.**

PRAGUE-7, an open-label trial carried out in four centers in the Czech Republic, recruited 80 patients with AMI complicated by cardiogenic shock (a state of hypotension and poor blood flow resulting from ventricular failure). These patients received standard antithrombotic and anticoagulant treatment (either during transport or directly at the cath lab) and coronary angiography. They were then randomized to either up-front treatment with abciximab, a bolus followed by an infusion for 12 hours, or standard periprocedural treatment, where the decision about use of abciximab during PCI was left to the discretion of the interventional cardiologist. At the end, abciximab was used in all the patients in the up-front-treatment group as compared to 35% of those in the standard-therapy arm. Of all the study population, 25% had received cardiopulmonary resuscitation and 46% underwent their PCI on mechanical ventilation.

The primary endpoint of 30-day combined outcome of death/reinfarction/stroke/new renal failure was observed in 42.5% of patients in the up-front-treatment group vs 27.5% in the standard-therapy arm (p=0.24). During hospitalization, 37.5% of patients died in the up-front group vs 32.5% from the group receiving the standard treatment. There were no significant differences between the two groups in any of the other outcomes. [Secondary end points of the study were left ventricular ejection fraction assessed by echocardiography on day 30 (in those who survived), major bleeding complications, myocardial blush grade after PCI, and TIMI flow after PCI].

Dr. Widimsky explained that the outcome for patients with AMI complicated by cardiogenic shock is generally serious and that prior to an early revascularization strategy, which was shown to be superior to conservative management in the SHOCK trial, the death rate was close to 100%. Registries had shown further therapeutic benefit from the administration of GP IIb/IIIa inhibitors, but there were no randomized data to support this approach, hence the decision to conduct PRAGUE-7 was taken. However, as the trial failed to show any benefit with routine use of GP IIb/IIIa inhibitor it would be unlikely to conduct further trials using this approach.

Dr Antoine Lafont, Hôpital Européen Georges Pompidou, Paris, France, the study discussant, said the hypothesis that **GP IIb/IIIa inhibitors could be beneficial in this indication still has "a strong rationale"** and that the PRAGUE-7 findings contradict those of prior studies. He pointed out the reasons why the study failed. Dr. Lafont said that the relatively high use of abciximab in the standard-treatment arm could have

contributed to the negative findings. He also added that the inclusion criteria for the study was perhaps too heterogeneous and the randomization had some discrepancies. He noted, "The study was also likely nonconclusive for lack of power," he said, adding "we need further studies to evaluate this hypothesis."

"The only thing that can really improve mortality is timing, to make the time delay [to PCI] as short as possible. Cardiogenic shock is such an event that there is a certain margin. The key is the patient should come to the intervention as fast as possible; this is the only way to improve the mortality." concluded Dr. Widimsky.

*Adapted from <http://www.theheart.org/article/997143.do>. As accessed on 1st September 2009.
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

TRIANA: Primary angioplasty superior to thrombolysis in senior acute MI patients

According to the **Tratamiento del Infarto Agudo de Miocardio en Ancianos (TRIANA)** trial presented at the **European Society of Cardiology 2009 Congress**, **primary angioplasty may be superior to thrombolysis in senior (≥ 75 years) acute myocardial infarction (AMI) patients.**

In TRIANA, patients with ST-Elevation myocardial infarction (STEMI) or left bundle branch block (LBBB) of ≤ 6 hours in duration were randomized to thrombolysis with tenecteplase (TNK) and unfractionated heparin (UFH) or to primary angioplasty by Dr. Hector Bueno, Hospital General Universitario Gregorio Marañón, Madrid, Spain & his colleagues. Patients who were randomized to the thrombolytic arm of the study were candidates suitable for lytic therapy. The therapy was contraindicated if the patients had a history of stroke, a single blood-pressure measurement of $\geq 180/110$ mm Hg, or cardiogenic shock on admission to the hospital. The mean age of the patients in the trial was 81 years (range: 76 to 85 years) & 56% were men.

Clinicians were reluctant to refer their patients for randomization into the trial, majorly because of the concerns about bleeding from thrombolytic therapy. Thus, despite being extended for an extra year (the study began in March 2005 & was due to end in December 2006 but it was extended until December 2007) it managed to enroll only 266 patients as compared to the 570 patients it had hoped to recruit.

Patients randomized to thrombolysis received rescue percutaneous coronary intervention (PCI) if there were no reperfusion criteria met within 90 minutes, and coronary revascularization was recommended only if there was evidence of recurrent myocardial ischemia, either spontaneous or provoked. Primary angioplasty was performed with anticoagulation with UFH; abciximab was given according to the operator's discretion, and clopidogrel was given at a loading dose of 300 mg plus a median dose of 75 mg/day.

The primary endpoint of the study was composite of death, MI, or disabling stroke at 30 days where all patients were followed for a period of 12 months. The secondary endpoints included recurrent ischemia requiring emergency cath at 30 days, all-cause mortality at 30 days, major bleeding, death, disabling stroke, or new heart failure at 30 days and during 12 months.

Patients who received thrombolysis fared worse in composite primary outcome (Table 1); as well as in all its components: death (odds ratio 1.31; 95% CI 0.67-2.56; $p=0.43$), reinfarction (OR 1.60; 94% CI 0.60-4.25; $p=0.35$), and disabling stroke (OR 4.03; 95% CI 0.44-36.5; $p=0.18$). Most disabling strokes were ischemic and not hemorrhagic in origin.

Table 1: 30-day results of the primary outcome, thrombolysis vs primary angioplasty

End point	Thrombolysis, n=134	Primary angioplasty,	Odds ratio (95% CI)	P value
-----------	---------------------	----------------------	---------------------	---------

		n=132		
Composite of death, MI, or disabling stroke at 30 days	25.4 %	18.9 %	1.46 (0.81-2.61)	0.21

Recurrent ischemia requiring coronary angiography was also significantly greater in patients who received thrombolysis vs primary angioplasty (OR 14.1; 95% CI 1.8-39). Throughout the follow-up period of 12 months, the superiority of primary angioplasty with regard to recurrent ischemia continued to be significant.

Table 2: 12-month outcomes, thrombolysis vs primary angioplasty

Outcome	Thrombolysis, n=134 (%)	Primary angioplasty, n=132 (%)	OR (95% CI)
Death/re-MI/disabling stroke	32.1	27.3	1.26 (0.74-2.14)
Death	23.1	21.2	1.12 (0.63-1.99)
Re-MI	10.4	8.3	1.28 (0.56-2.9)
Disabling stroke	3.0	0.8	4.03 (0.44-36.5)

Major bleeding incidence was lower in the thrombolysis group vs angioplasty group (OR 0.72; 95% CI 0.29-1.77; p=0.47). This result was reassuring especially for those who have no option but to give thrombolytic therapy.

Dr Carlo Di Mario, Royal Brompton Hospital, London, UK, who moderated the session at which the TRIANA results were presented, said, "Some centers pulled out from the study because they decided it was unethical to use lytics. That being said, we need randomization, we need trials. It's true that we don't have strong studies indicating that primary angioplasty is better. **It's logical, but we don't have the evidence**, so I think they should be congratulated for having tried, **even though there is no p value.**"

"I think that this is the confirmation that we should consider primary PCI as the first line for elderly patients with STEMI. It reinforces the SENIOR PAMI trial, which was done in the US with elderly patients, and **confirms the guidelines of no age limits for primary PCI,**" said Dr Dariusz Dudek, Institute of Cardiology, Krakow, Poland. He further added, "TRIANA is important because some people still have concerns about which therapy should be applied for patients who are elderly. **Primary PCI is the predominant way of reperfusion, but when patients are 80 years old, people still think to avoid PCI and give them drugs. Now, it definitely looks as if elderly patients should undergo an invasive assessment and angioplasty. There are no age limits.**"

Adapted from <http://www.theheart.org/article/997589.do>. As accessed on 1st September 2009. For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.

GRACE registry: PCI, the preferred strategy in left main disease

Results of the Global Registry of Acute Coronary Events (GRACE) presented at *European Society of Cardiology Congress 2009* showed that **percutaneous coronary intervention (PCI) is the preferred revascularization strategy in unprotected left main coronary disease**, despite the absence of randomized, clinical trials in this patient population.

Unprotected left main coronary disease is rare in patients with acute coronary syndrome. However, it is associated with high mortality, especially in patients with ST-Elevation myocardial infarction (STEMI) and/or hemodynamic instability. While PCI is associated with the highest in-hospital mortality risk, primarily because higher-risk patients undergo PCI rather than being referred for surgery or medical therapy, both coronary artery by-pass graft (CABG) and PCI improve survival compared with no revascularization from hospital discharge to six months.

Dr. Gilles Montalescot, Institut de Cardiologie, Pitié-Salpêtrière Hospital, Paris, France, the lead investigator of the study, pointed out that the American College of Cardiology and the American Heart Association currently label left main PCI as a class III indication unless patients are considered unsuitable candidates for bypass surgery. The European guidelines consider left main PCI a class II recommendation. These recommendations are based on studies involving stable patients. However there is no single randomized study in ACS.

Patients with ACS and left main coronary disease (N = 1799) representing just 4% of patients included in the GRACE registry between 2000 and 2007 were analyzed in the study. Of these patients, 514 were treated with PCI, 612 with CABG, and 673 with medical therapy. **The overall in-hospital mortality rate was 7.7% and the mortality rate at six months was 14%. Among STEMI patients, in-hospital mortality was 11% while it was as high as 34% for patients presenting with cardiac arrest or cardiogenic shock.**

After adjustment for baseline characteristics, **multivariate analysis revealed that PCI was associated with a significantly increased risk of in-hospital mortality vs patients with no revascularization. CABG surgery was also associated with an increased risk vs medical therapy, but the association was not significant.**

From discharge to six months, both PCI and CABG were associated with significant 55% and 89% reductions in the risk of death compared with patients who did not undergo revascularization. Patients undergoing CABG had significantly higher rate of stroke out to six months than those treated medically or those undergoing PCI.

Dr Christian Hamm, Kerckhoff Heart Center, Bad Nauheim, Germany, said that although **PCI was associated with higher mortality rate, it do not mean that it is**

associated with any inherently greater risks but it indicates that the patients being treated were sicker. Dr. Montalescot agreed to the point & he added that patients who go to surgery are stable, whereas those who undergo PCI are in shock or cardiac arrest and have low blood pressure and STEMI.

"PCI has become the most common strategy of revascularization and is preferred in emergent and serious cases despite what we have in the guidelines," said Dr Montalescot. "CABG is associated with good survival and is performed in low-risk patients and usually [done] later. PCI is performed on the first day, whereas CABG was performed on average five days later. I think it's clear that the two modes of revascularization are useful and probably complementary in our practice."

Dr. Hamm further said that in the absence of randomized, controlled, clinical-trial data, clinicians need to learn from others, such as those participating in the GRACE registry. **If PCI is the option, he said, clinicians should have the best qualified assistants available and be clear about technique and medication use.**

In an editorial of the study, Drs Roberto Corti and Stefan Toggweiler, University Hospital Zurich, Switzerland, suggested that **ostial and shaft lesions are easier to treat with PCI, whereas clinical features, such as the presence of multivessel disease, might be best suited for surgery.**

*Adapted from <http://www.theheart.org/article/997295.do>. As accessed on 1st September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>*

NORDISTEMI: Early invasive strategy following thrombolysis beneficial in STEMI patients from remote areas

The Norwegian study on District treatment of ST-elevation Myocardial Infarction (NORDISTEMI) presented at the **European Society of Cardiology Congress 2009** by Dr Sigrun Halvorsen, Oslo University Hospital, Ulleval, Norway, suggested that the **ST-Elevation myocardial infarction (STEMI) patients living in the remote areas who are given thrombolysis locally benefit from routine immediate transfer for percutaneous coronary intervention (PCI).**

Although primary PCI is the preferred strategy for STEMI patients, it cannot be performed within the recommended time (90 to 120 minutes since symptom onset) in remote areas which are far from PCI centers, thus thrombolysis is given in this group. Transfer for angiography and PCI after thrombolysis is recommended, but the role and timing of early PCI after thrombolysis have not been established for patients living in rural areas with very long transfers.

The present study included 266 STEMI patients from a remote area. These patients received thrombolysis (full-dose tenecteplase), aspirin, enoxaparin, and clopidogrel (average around two hours from symptom onset). Patients were further randomized to either immediate transfer for angiography/PCI or to standard management in the community hospitals, with urgent transfer only for a rescue indication or with clinical deterioration. The median transfer distance was 158 km, with 25% of patients being transferred more than 200 km. Angiography was performed in 99% of the invasive group at an average time of 130 minutes postlysis and 95% of the conservative group at an average time of 5.5 days postlysis while PCI was performed in 89% of the invasive group (average time 163 minutes postlysis) and in 71% of the conservative group (average time three days postlysis).

Results of the study showed that **there was a reduction in the primary composite end point of death, reinfarction, stroke, or new ischemia within 12 months in the early invasive group, but the reduction was not significant.** However, **significant reduction was observed in secondary end point of death, reinfarction, or stroke at 12 months.**

Table 1: Primary and Secondary endpoint – 12 month results

End point	Conservative, n=132 (%)	Early invasive, n=134 (%)	Hazard ratio (95% CI)	p
Primary endpoint: Death, re-MI, stroke, new ischemia	27.3	20.9	0.72 (0.44-1.18)	0.18
Death/re-MI/stroke	15.9	6.0	0.36 (0.16-0.81)	0.01

Death, reinfarction, stroke, or new ischemia end point was significant at earlier 30-day time point (21% vs 10%; p=0.03). There was no significant difference in bleeding or infarct size, and transfer-related complications were few in spite of long transfer distances.

Dr Freek Verheugt, Nijmegen University, Netherlands, the discussant of the study, said that previously it was thought that PCI should not be performed after thrombolysis if the patient was doing well. However five new studies (GRACIA-1, TRANSFER AMI, CARESS AMI, CAPITAL MI, and SIAM III) published in the past few years have proved the **benefits of a routine invasive strategy over a conservative approach after lysis**. He pointed, **"If 95% of patients ended up in the cath lab, I wouldn't call this a conservative approach."** He further added that **NORDISTEMI would not lead to any additional changes to the guidelines, which already recommends an invasive approach to be performed three to 24 hours after thrombolysis.**

Dr Halvorsen concluded, **"Our study indicates a potential for improving reperfusion strategies for patients living in rural areas with long transport distances. This may be achieved by applying a well-organized pharmacoinvasive approach, including prehospital thrombolysis and rapid transfer to a PCI center."**

*Adapted from <http://www.theheart.org/article/997033.do>. As accessed on 1st September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

ACTIVE: Angiotensin receptor blocker, irbesartan, may prevent development of atrial fibrillation-related HF

Atrial Fibrillation Clopidogrel Trial with Irbesartan for Prevention of Vascular Events (ACTIVE) trial program presented at the *European Society of Cardiology Congress 2009* suggested that **there might be a role of an angiotensin receptor blocker (ARB), irbesartan, to prevent the development of atrial-fibrillation-related heart failure.**

Dr Salim Yusuf, McMaster University, Hamilton, ON, said that most clinicians treating atrial fibrillation worry about stroke, but hypertension is the most common cause of the rhythm disorder, and that in addition to a later stroke risk, heart failure is also a concern.

In the present study, 9016 patients were randomized to placebo or irbesartan 300 mg /day. **Treatment with an ARB showed an absolute reduction of 2.91 mm Hg systolic and 1.88 mm Hg diastolic. The reduction in BP was greater than that observed with placebo.** Treatment with irbesartan had no effect on the primary composite end point of stroke, myocardial infarction (MI), and vascular death. When hospitalization for heart failure was added to the composite end point, there was a small, nonsignificant benefit observed with irbesartan. However, when **heart-failure hospitalizations was considered alone as a secondary end point, it was observed that there was significant 14% reduction in risk with irbesartan treatment.**

In addition, investigators also observed trends in the reduction of stroke, transient ischemic attack (TIA), and non-central-nervous-system (CNS) systemic embolism, different types of stroke, including hemorrhagic stroke.

Dr Yusuf said the findings of the study are "**consciousness-shifting**" and "**clinically useful**" & **the results should get more physicians thinking about preventing future heart-failure events in the atrial-fibrillation setting.** He further added "So many atrial-fibrillation patients have hypertension. You might as well use a drug where there is some clinical benefit. **What this is really saying is that there is a part of atrial fibrillation that's being ignored, and we need to pay attention to it.**"

Dr Heinz Drexel, Academic Teaching Hospital, Feldkirch, Austria, a spokesperson for the ESC who was not the part of the trial, said, "**The natural course of the disease is high blood pressure, atrial fibrillation, and then heart failure. Most patients are going to be treated with various blood-pressure medications on top of drugs to prevent stroke risk, so using an ARB in this setting makes sense.**"

*Adapted from <http://www.theheart.org/article/998137.do>. As accessed on 2nd September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

KYOTO HEART: Addition of an ARB shows greater reduction in CV events vs non-ARB therapy in high-risk hypertensives

KYOTO HEART study presented at the *European Society of Cardiology Congress 2009* and simultaneously published online in the *European Heart Journal* reported that **addition of an angiotensin receptor blocker (ARB), valsartan, to the conventional therapy in high-risk hypertensives reduced more cardiovascular (CV) events as compared to the conventional non-ARB treatment alone.** Dr Takahisa Sawada, Kyoto Prefectural University School of Medicine, Kyoto, Japan, further added that **since there was no significant difference in blood pressure (BP) between the two treatment arms, benefits with valsartan could not be entirely explained by its antihypertensive effects.**

In the KYOTO HEART trial, 3031 patients with uncontrolled hypertension (systolic BP ≥ 140 mm Hg &/or diastolic ≥ 90 mm Hg) taking 1-2 antihypertensive drugs who had one or more risk factors for CV disease, including a history of myocardial infarction (MI) or stroke, diabetes, obesity, abnormal lipid levels, left ventricular (LV) hypertrophy, or current smoking, were randomized to add-on valsartan (maximum dose = 160 mg/day, the highest recommended daily dose in Japan; mean dose = 88 mg/day) or the non-ARB group (which was given other antihypertensive agents, excluding angiotensin converting enzyme (ACE) inhibitors and ARBs). A patient receiving an ARB before randomization was excluded. The median follow-up period was just over three years, and the primary end point was a composite of new onset or recurrence of stroke (including transient ischemic attack [TIA]); new onset or recurrence of acute MI or angina, PCI, or CABG; hospitalization due to heart failure; new onset or recurrence of peripheral arterial disease or aortic dissection; or transition to dialysis or doubling of creatinine levels. Secondary end points included all-cause mortality, new-onset diabetes, and worsening of cardiac function.

The primary endpoint was significantly reduced by 45% in the valsartan group vs non-ARB group. This reduction was majorly driven by a significant decrease in stroke by 45%, of which <10% were TIAs, and angina which was significantly reduced by 49%. Because of these remarkable results which were seen with add-on valsartan, the study was stopped early.

One of the secondary end points, **new-onset diabetes, was also significantly reduced in the valsartan group.** This finding was also seen in the VALUE trial and it suggests the **antidiabetic action of an ARB which should be considered when physicians are treating hypertensive patients at high risk of diabetes.**

"These substantial benefits were noted despite a short median follow-up of 3.27 years and with blood-pressure-lowering effects being similar between valsartan add-on treatment and non-ARB groups," they note.

The senior author of the study, Dr Hiroaki Matsubara, Kyoto Prefectural University School of Medicine, said that he believes the **main message of the trial is "that in high-risk hypertension patients, valsartan should now be considered a first-line drug."** This message applies to Asian patients and "probably" also to Europeans and Americans, he said.

The Japanese doctors say that the findings of the present trial are highly relevant to Western populations because the use of ARBs and ACE inhibitors is very high in the US and Europe compared with Japan, where calcium-channel blockers are more frequently employed.

In an editorial accompanying the publication of the study, Dr Franz Messerli, St Luke's Roosevelt Hospital, New York; Dr. Sripal Bangalore, Brigham and Women's Hospital, Boston, MA, and Dr. Frank Ruschitzka, University Hospital, Zurich, Switzerland said, **"The impressive results of the KYOTO study lead to the question of whether ARBs as a class have come of age and should now be considered as preferred or baseline therapy in hypertension."**

The president-elect of the European Society of Cardiology, Dr Michel Komajda, Groupe Hospitalier Pitié-Salpêtrière, Paris, France, said regarding the trial: **"I think that it provides incremental information on the potential benefit of ARBs for preventing some CV outcomes in hypertensive patients from Asia. All epidemiologic studies show that Asian populations are at high risk of stroke events, and I think this is probably the most relevant part of this study."** However he thinks it would be difficult to say whether this benefit would translate to Western European or North American populations, who generally have a much higher risk of coronary events than stroke.

When asked as to whether ARBs should now be considered as preferred or baseline therapy in hypertension, Messerli, Bangalore, and Ruschitzka said in the editorial, **"could be a resounding yes if efficacy were defined as blood-pressure reduction."** However, BP is merely a surrogate end point that correlates to some extent with the true end point—ie, heart attack, stroke, and death." Thus they concluded that ARBs are efficacious and even superior to other drug classes in stroke prevention, but their efficacy with regard to coronary events remains uncertain.

*Adapted from <http://www.theheart.org/article/997973.do>. As accessed on 2nd September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

PROTECT: Rolofylline fails to provide any benefit in acute decompensated HF patients

Presenting the results of the PROTECT study at the *European Society of Cardiology Congress 2009*, Dr Marco Metra, University of Brescia, Italy, said that **no difference was observed in the main efficacy endpoints with the selective A₁ adenosine receptor antagonist, rolofylline, vs placebo**. In fact the **drug was seen to be associated with an increased rate of seizures and strokes as compared to placebo**.

Patients with acute decompensated heart failure often develop worsening renal function and adenosine has been implicated as a mediator as it causes a reduction in renal blood flow and glomerular filtration rate and decreases sodium excretion. In the PROTECT-Pilot study, rolofylline was associated with trends toward symptom improvement, less worsening of renal function, and fewer deaths or readmissions for heart failure or renal dysfunction over the next 60 days. Thus, PROTECT trial was designed to confirm these benefits.

The PROTECT trial involved 2033 patients hospitalized for heart failure within 24 hours with signs of fluid overload and impaired renal function. The patients were randomized 2:1 to rolofylline 30 mg/day or placebo, administered as a four-hour daily infusion & it was repeated for three days. The primary endpoint of the study was made up of three categories i.e. treatment success (defined as improved dyspnea at 24 and 48 hours in the absence of any criteria for treatment failure, which included death or readmission for heart failure, worsening symptoms of heart failure, or persistent renal impairment), patient unchanged (patients were categorized as unchanged if they did not meet criteria for either treatment success or treatment failure), or treatment failure.

With respect to the **primary outcome, no significant difference was observed between rolofylline and placebo**. Although, more number of patients on rolofylline showed improvement in dyspnea vs placebo treatment this effect was counterbalanced by a lack of effect on persistent renal impairment.

With respect to its safety data, serious adverse events were seen in 13.8% of rolofylline and 14.7% of placebo patients. Trend towards a lower incidence of adverse cardiac events was seen with rolofylline but on the other hand rate of neurological events, specifically seizures, a known adverse effect of A₁ receptor antagonists, (0.8% vs 0%), and strokes (1.2% vs 0.5%) were higher with the drug.

Thus, Dr. Metra concluded by saying that he could not say how these results would affect other drugs in this class but noted that another trial is still ongoing with an oral adenosine A₁ antagonist.

*Adapted from <http://www.theheart.org/article/998299.do>. As accessed on 2nd September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

MADIT-CRT: Resynchronization therapy reduces mortality and heart failure events in patients with mild heart failure or LV dysfunction

MADIT-CRT (Multicenter Automatic Defibrillator Implantation Trial with Cardiac Resynchronization Therapy) presented at the *European Society of Cardiology Congress 2009* and simultaneously published online in the *New England Journal of Medicine*, supported the use of cardiac resynchronization therapy (CRT) in patients with systolic dysfunction, ventricular dyssynchrony by ECG, but only mild heart failure or LV systolic dysfunction without symptoms. Use of primary-prevention implantable cardioverter defibrillator (ICD) is already indicated in this patient profile, however the present study showed that the addition of resynchronization pacing (CRT-D) reduces the risk of death or heart-failure events by about a third over two and a half years.

MADIT-CRT randomized 1820 patients at 110 centers in North America and Europe who were in NYHA class I or II and had an left ventricular ejection fraction (LVEF) $\leq 30\%$ and ventricular dyssynchrony as defined by an electrocardiographic QRS duration of at least 130 ms. Three patients received CRT-D devices for every two that got an ICD only. Optimal medical therapy was required in both the groups. The inclusion criteria specified that the patients with ischemic cardiomyopathy could be in NYHA class I or II and that those with nonischemic disease had to be in NYHA class II.

After the follow-up period of 2.4 years, the primary endpoint of death from any cause or nonfatal HF events was significantly reduced CRT-D patients vs those getting an ICD (17.2% vs 25.3%).

Table 1: Hazard ratio, CRT-D patients (n=1089) vs ICD-only patients (n=731)

End point	All patients	Patients with ischemic cardiomyopathy	Patients with nonischemic cardiomyopathy
Primary endpoint - Death or HF*	0.66 (0.52-0.84) ^a	0.67 (0.52-0.88) ^b	0.62 (0.44-0.89) ^c
HF only	0.59 (0.47-0.74) ^a	0.58 (0.44-0.78) ^a	0.59 (0.41-0.87) ^c
Death	1.00 (0.69-1.44)	1.06 (0.68-1.64)	0.87 (0.44-1.70)

a. $p \leq 0.001$, b. $p = 0.003$, c. $p = 0.01$

CRT-D was associated with significantly improved LV volumes in a subgroup of 746 CRT-D patients and 620 ICD patients who underwent two-dimensional echocardiography at baseline and at one year. Significantly higher increase was also observed in LVEF with resynchronization.

Table 2: Change in left ventricular volumes by echocardiography over one year

Parameter	CRTD, n=746	ICD, n=620
Left ventricular end diastolic volume(mL)	-52	-15
Left ventricular end-systolic volume (mL)	-57	-18

$p < 0.001$ for all differences between CRT-D and ICD

A prespecified subgroup analysis showed that the CRT-D benefit for the primary end point was driven by the significant 52% risk reduction in patients with QRS duration of ≥ 150 ms vs shorter QRS. Women showed significantly greater benefits than men.

Dr. Guenter Breithardt, University Hospital, Münster, Germany, said "I think it will very possibly change our indications in the future, to include also these patients". He observed that patients in the trial had a lower LVEF and more dyssynchrony than those in REVERSE, but were otherwise very similar. He further added, "We of course have to be cautious about this conclusion, but both trials point in the same direction, **that the greatest benefit is achieved in patients in class II, and with longer QRS complexes. Class II patients were dominant in both trials, he said, so perhaps CRT should be aimed more at them.**

Results of MADIT-CRT are consistent with REVERSE trial done in past. Dr. Kenneth Dickstein, University of Bergen, Stavanger, Norway, who chairs the writing committee for the European CRT guidelines, observed that that neither REVERSE nor MADIT-CRT was published when the last recommendations came out. **"So now we'll have to update the guidelines."** However, Prof Heinz Völler, Klinik am See, Rüdersdorf, Germany, thought that we need more data on this before changing the recommendations in the guidelines, because it's an invasive therapy. He also observed that the MADIT-CRT report didn't alleviate all concern about the safety of CRT in its patient population. The study didn't mention anything about the prevalence of appropriate and inappropriate ICD shocks. Also, he observed, the left-ventricular coronary-vein lead had to be repositioned within the first month in 4% of the CRT-D patients.

In an editorial, Dr Mariell Jessup, University of Pennsylvania, Philadelphia, points out that "it is not completely clear how the enrolled patients differ from those in earlier CRT trials, since no objective criteria were used to classify functional status at baseline," and functional status assessments thereafter weren't blinded. Dr Mariell Jessup thought that no clear idea about the patient population for MADIT-CRT was a weakness of the trial. Not all patients in the trial had always been asymptomatic; some apparently had mild heart failure after having responded to medical therapy.

Dr Jessup suggested that further trials should have narrower entry criteria which includes group of patients with a very wide QRS, 150 ms. He further questioned whether it's really needed to put these expensive devices or there can be some other way to keep people out of the hospital.

*Adapted from <http://www.theheart.org/article/997499.do> As accessed on 2nd September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

Results of meta-analysis: Non-TIMI major bleeding as important as TIMI major bleeding in terms of predicting mortality in PCI patients

Definition of bleeding varies from trial to trial which possess a difficulty in attempts to compare bleeding rates in different studies. With an aim to come up with a concise, uniform definition of bleeding which could be used in future studies Dr Roxana Mehran, Columbia University, New York, and her colleagues are setting up a group, Bleeding Academic Research Consortium (BARC), which would include experts in the field, stakeholders, and regulators. They aim to develop a system under which each component of bleeding is weighted and an overall bleeding score can be worked out.

At *European Society of Cardiology Congress 2009*, Dr Mehran presented an analysis which explained that **in patients undergoing percutaneous coronary intervention (PCI) with stable or unstable ischemic heart disease, the occurrence of a non-coronary artery bypass graft (CABG) major bleed within 30 days has an independent & significant impact on one-year mortality, comparable to that of having myocardial infarction (MI).** The study also showed that **non-TIMI major bleeding is as important as TIMI major bleeding in terms of predicting mortality.**

In the current pooled analysis, a total of 17,000 PCI patients from the three trials (REPLACE-2, ACUITY and HORIZONS) were evaluated to investigate whether different types of bleeding after PCI have different impact on subsequent mortality. The investigators focused on four types of protocol-defined major bleeding in decreasing order of severity:

- TIMI-defined major bleed
- Non-TIMI major bleed with blood transfusion
- Non-TIMI major bleed without blood transfusion
- Large (≥ 5 cm) hematoma only

The study showed that any non-CABG related major bleed was associated with a similar hazard ratio for mortality at one year as the occurrence of an MI (Table 1).

Table 1: Independent hazard ratio of non-CABG-related major bleeding and MI within 30 days on mortality within one year

Event	Hazard ratio (95% CI)	Deaths within 1 yr, n	p
Non-CABG major bleed	3.1 (2.4-3.9)	104	<0.001
MI	2.8 (2.2-3.6)	77	<0.001

Of the four defined components of major bleeding, **TIMI major bleed was the most important individual type of bleed contributing to mortality.** However, **non-TIMI major bleed with or without blood transfusion together accounted for slightly more deaths.** On the other hand, **large hematoma does not appear to increase subsequent mortality.** (Table 2)

Table 2: Independent hazard ratio of four defined components of major bleeding within 30 days on mortality within one year

Event	Hazard ratio (95% CI)	Deaths within 1 y, n	p
TIMI major bleed	4.85 (3.56-6.60)	53	<0.001
Non-TIMI major bleed with transfusion	2.98 (2.10-4.24)	40	<0.001
Non-TIMI major bleed without transfusion	1.79 (1.09-2.93)	17	0.021
Large (>5 cm) hematoma only	1.30 (0.58-2.92)	6	0.53

Dr Mehran commented that, many people would be surprised by the study result that non-TIMI major bleeding is as important as TIMI major bleeding in predicting mortality, as it is thought that TIMI major bleeds are the most severe. In contrast, the results showed that hematoma ≥ 5 cm, which is often included in major bleeding definitions, was not associated with increased mortality at one year. So on basis of the study Dr Mehran says, that **to discount non-TIMI major bleeding would mean discounting a very important component of bleeding**. She further added, "We showed that these hematomas are perhaps just a nuisance. While it is certainly not pleasant for a patient to have a big lump in their groin, an isolated hematoma is not going to increase the risk of death,"

Dr William Wijns, Cardiovascular Center Aalst, Belgium, discussant of the presentation, said the present meta-analysis used the highest level of scientific evidence as it has used specific statistical methods for pooling the data. He added that the **current analysis showed that a standardized definition of bleeding is needed to be used across all trials**.

*Adapted from <http://www.theheart.org/article/999161.do>. As accessed on 4th September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

MAGGIC study: Lower mortality in preserved-EF HF

A new individual patient-data meta-analysis has clearly shown that those with HF with preserved ejection fraction (HFPEF) have a lower mortality than HF patients with impaired EF. Dr Robert Doughty (University of Auckland, New Zealand) presented the findings of the Meta-Analysis Global Group in CHF (MAGGIC).

"We hope this data set will help to characterize those with preserved-EF heart failure much better and that this, hopefully, will lead to targeted therapies for those patients. This is a heterogeneous group of patients that we need to specifically target therapies to, as opposed to just treating everybody the same," he said. Much of the problem is that those with HFPEF "typically present with the same symptoms and clinically they look the same [as those with impaired-EF HF]." In MAGGIC, researchers did manage to identify some clinical pointers: "We found that **preserved-EF HF patients are slightly older and more frequently women and more often have a history of hypertension and less often one of coronary artery disease than those with low EF.**" It was discovered that **mortality only really starts to increase below an EF of 40%.**

Discussant, Dr David Kaye (Baker Heart Research Institute, Australia) said the study clearly indicates "that there are two heterogeneous populations of patients with different LV biology and that survival is significantly better in those with preserved EF," but it leaves "many unanswered questions." Doughty explained that MAGGIC was conducted because individual studies have reported variable results in relation to total mortality in patients with HFPEF. Using a data set of 43,373 patients, including registry data and randomized clinical trials, the researchers found that around 25% of patients with a measurable EF could be classified as having HFPEF, defined as left ventricular EF of $\geq 50\%$. They also discovered that "missing EF data" are common in clinical trials. They found a much lower mortality among those with HFPEF than those with impaired-EF heart failure—hazard ratio 0.68 (95% CI 0.65-0.72), a highly significant finding. Those with an EF of between 40% and 50% essentially had the same death rate as those with EF of 50% and above.

This "unique data set" will be used for further analysis, Doughty explained, including modeling of outcomes in those with missing EF data. "Other work will involve identifying predictors of outcomes in those with preserved-EF HF, with the ultimate aim of improving the identification of patients with a high risk of death and hospitalization in this increasingly recognized condition."

"Beyond survival, for these older patients, hospitalization and control of symptoms is clearly a goal, and by and large clinical trials to date have not yielded positive results," Kaye added. "This study raises many important questions that behoove us to think about the mechanisms responsible not only for outcome in terms of survival, but for symptoms in these patients—the pathophysiology of HF with preserved EF is extremely complex, as we are only just learning." And aggressive treatment of confounding factors, such as ischemia and atrial fibrillation, "are also clearly highly important in this group of patients," he said. Also essential are noncardiac factors, such as adequately

managing the plasma volume in these patients and addressing key issues such as ventricular/vascular coupling, "which will provide new and potentially therapeutic gains for the management of these patients," Kaye concluded.

*Adapted from <http://www.theheart.org/article/999019.do>. As accessed on 4th September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

RELID: Interventionalists at high risk of developing cataracts

Findings of the Retrospective Evaluation Study of Lens Injuries and Dose (RELID) presented at the *European Society of Cardiology Congress 2009* showed that almost **40% of the interventional cardiologists included in the study had radiation-induced lens injuries.**

Interventionalists often remain in proximity to patients and therefore may be within the high-scatter X-ray field during the procedures. The eye lens has high radio sensitivity, and the ionizing radiations can cause protein coagulation, producing opacity in the lens that can eventually lead to cataracts.

In this retrospective evaluation, where the largest sample of professionals were screened, three independent ophthalmologists performed papillary dilatation and slit lamp exams for cataract staging on the eyes of 59 interventional cardiologists and 59 paramedical personnel during two recent regional meetings of SOLACI. The participants also filled in a detailed questionnaire including information on their medical history and workload, the fluoroscopy time, number of cine series, and type of X-ray systems and radiation protection tools (ceiling suspended screen and protective eyewear) used so that radiation doses to the lens could be estimated. The mean age of the interventionalists, who had been working in that field for an average of 14 years, was 46 years. The nurses and technicians (paramedical personnel) were on average, 38 years old, and they had been working with the interventionalists for a mean period of seven years. A control group of 93 nonexposed people of similar age were also followed.

Dr Ariel D Duran, Sociedad Latinoamericana de Cardiología Intervencionista (SOLACI), Buenos Aires, Argentina, explained that a parameter known as the Merriam-Focht score was used to record lens opacity, with a score of 0 being normal and 4 being a full cataract. Of the **interventionalists followed, significant percent i.e. 37.9% had opacities in one or both eyes, vs 12% from the control group. About 12 interventionalists had a Merriam-Focht score of between 0.5 and 2, and 13 had never or infrequently used eye protection or leaded ceiling screens. While 21% of the nurses and technicians had opacities in one or both eyes, with a Merriam-Focht score of 0.5.**

It was difficult to predict exactly how many of these doctors would go on to develop cataracts in the future, but the results indicate that the **training of interventionalists with regard to radiation procedures must be improved, and the use of radiation-protection tools should be promoted.** The **increased number of lens opacities seen in interventional nurses and technicians, suggests ocular risk in these workers,** although this finding was not statistically significant.

With regard to the promotion of good working practice, Dr Duran said the strategies required will differ from country to country, and that it is hard to apply one set of rules to all. However, he mentioned that the investigators were trying to send a **message to young doctors: to teach them to take care of themselves.**

The results of the study thus indicate that **more care needs to be taken by interventionalists and national authorities need to apply more recommendations and a regulatory framework concerning radiation safety in cardiology laboratories.**

*Adapted from <http://www.theheart.org/article/999871.do>. As accessed on 4th September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

Hospital mortality from PCI is unrelated to procedural volume

Hospital mortality after emergency or elective PCI is unrelated to procedural volume, according to a review of all in-patient PCI procedures done in Germany in 2007. The result puts an end to the widely held notion that centers that do more procedures have better mortality outcomes, said Dr Albrecht Vogt, Burgfeld-Krankenhaus, Germany.

He and his colleagues analyzed the complete nationwide reporting of all inpatient PCI procedures and determined that the overall hospital mortality rate for the 236,849 PCIs that were done in Germany's 474 hospitals in 2007 was 2.2%. The majority of these deaths (55%) occurred within 24 hours of transmural MI. Deaths were determined by the discharge mode from administrative data, and not from physician reports, which are often unreliable, he stressed. After adjustment for known risk factors for hospital mortality after PCI, including age, gender, acute coronary syndrome with and without ST elevation, shock, diabetes, renal or cardiac failure, and PCI of the left main artery, **no mortality differences could be found, either for elective or emergency PCI, regardless of the procedure volume.**

Mortality rates according to procedure volume

Procedures/year, n	Mortality (%)
5135	2.10
34,741	2.61
62,755	2.16
1,34,218	2.13

Dr Stefan James (Uppsala University Hospital, Sweden), who moderated the session, told that he thought the German study was good because it used a nationwide registry and included all PCI patients in Germany. However, the fact that the study did not look for other factors that contribute to bad outcomes was a negative, he said. "The mortality outcome measure might be a bit too general, because there is so much else that is important for mortality. It's not only the procedure itself; it's the hospital quality, it's the medications given, it's the care, so there are a lot of factors that influence mortality. Another weakness was that he wasn't able to present operator volume and compensate for that. That would be another important piece of data to adjust for." "We have very similar results in Sweden. We have a very large data set, and we can't find any differences in any type of measurement—mortality, reinfarction rates, restenosis rates, [target lesion revascularization] TLR rates, bleeding complications, neurologic complications, and hospital stay—between low- and high-volume centers." This reassuring message about similar mortality outcomes in low- and high-volume centers does not apply in the US, where there are many very small-volume centers, he said. "I still think it is reasonable to have a lower limit. In Sweden, we have set that at around 400 cases per year. But if you go lower than that, we are suspicious. So I still think the current recommendations by the American Heart Association and the American College of Cardiology are okay. We have a different situation in Europe. Our low-volume centers still do reasonable numbers of procedures per year." Vogt said the issue has become

politicized in Germany, where cardiologists from large hospitals are agitating to have all PCI procedures done in high-volume centers.

*Adapted from <http://www.theheart.org/article/999469.do>. As accessed on 4th September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

SYNTAX year 2: Higher MI rate in PCI, no increase in CABG stroke

Two-year results from SYNTAX show what many people had predicted: that event rates in patients treated with either CABG or PCI for complex coronary disease would continue to diverge, with CABG cementing its status as the preferred strategy. **But presenting the results, Dr Pieter Kappetein (Erasmus Medical Center, Netherlands), who provided no details on the type or cause of MI, cautioned that it will be important to wait for the full five-year follow-up before drawing conclusions. "At two years, [major adverse coronary and cerebrovascular event] MACCE rates were significantly higher for PCI than CABG, mainly driven by higher repeat revascularization in the PCI arm," he said. "The two-year results suggest that CABG remains the standard of care for patients with complex disease; however, PCI may be an acceptable alternative revascularization method to CABG when treating patients with less complex disease."**

Dr Alfred Bove (Temple University Medical Center, Philadelphia) first commented that patients in the trial are typically getting four or five stents. "If you go in and try to stent all those lesions, knowing that the probability of restenosis is 5% or 6% in any given stent, multiple that by four or five, and you're going to have a pretty high recurrence rate. From the standpoint of the patient at the time, it doesn't sound good to have a sternotomy and all that stuff, but if you look out three or four years, they may forget the sternotomy a year later, and their long-term outcomes from a standpoint of recurrence might be better."

SYNTAX was an 1800-patient trial (Europe and US), randomizing patients to either CABG or PCI using the Taxus DES. The one-year results showed that the primary end point (MACCE) occurred significantly more often among PCI-treated patients than among CABG-treated patients, a 7.7% difference driven by repeat procedures in the PCI group. As such, PCI did not meet the prespecified margin of noninferiority of 6.6%. For the composite, "harder" safety end point of death/cerebrovascular events/MI, rates were almost identical between the two groups, whereas the stroke rate, by contrast, was higher in the CABG-treated patients. Of note, however, stroke rates were analyzed on an intention-to-treat basis, and almost half of the strokes in the CABG arm actually occurred prior to surgery, but postrandomization, while patients were awaiting a surgery date. Almost 96% of the original trial numbers were included in the two-year analysis: 836 in the CABG arm and 885 in the PCI arm. **At two years, MACCE rates were significantly different between the two groups, driven by a repeat revascularization rate in PCI-treated patients that was more than double that of the CABG-treated group.** The significantly higher rate of strokes seen in CABG-treated patients at one year was also seen by two years, but the difference appeared to be a carryover from the first 12 months, since very few strokes occurred between the one- and two-year mark in either group. For the hard end point of death/stroke/MI, there were no significant differences between the two groups.

Two-year outcomes for SYNTAX

End point	CABG (%)	PCI (%)	p
All-cause death	4.9	6.2	0.24
All stroke	2.8	1.4	0.03
Stroke before 1 y	2.2	0.6	0.003
Stroke after 1 y	0.6	0.7	0.82
MI	3.3	5.9	0.01
MI before 1 y	3.3	4.8	0.11
MI after 1 y	0.1	1.2	0.008
All-cause death, stroke, MI	9.6	10.8	0.44
Repeat PCI	8.6	17.4	<0.001
MACCE	16.3	23.4	<0.001

Investigators also stratified the two-year findings according to SYNTAX score, noting that rates of MACCE were no different between the two revascularization strategies for patients who were low risk by SYNTAX score at baseline (17.4% for CABG, 19.4% for PCI; $p=0.63$). But as that risk rose, so too did the curves begin to separate: in patients with intermediate risk, MACCE rates were 16.4% for CABG-treated patients and 22.8% for PCI-treated patients, just missing statistical significance ($p=0.06$). **In high-risk patients, CABG was clearly the winner, with MACCE rates of 15.4% vs 28.2% in the PCI-treated group ($p<0.001$).** As with the one-year results, the two-year outcomes differed according to whether the patients were enrolled in the study for treatment of three-vessel disease or for left main stenting. Kappetein cautioned that the subset analysis included low numbers and was not appropriately powered, so it had to be considered only hypothesis-generating. But at least for the **primary MACCE end point, event rates were significantly lower in CABG patients with three-vessel disease—14.4% vs 23.8% ($p<0.001$)—but were no different, statistically, between the groups for patients with left main disease—19.3% for CABG, 22.9% for PCI ($p=0.27$).**

Commenting on the study, Dr Roxana Mehran (Columbia University, New York) said, "I would like to know what types of MIs are seen—are these related to new procedures or stent thrombosis?" Also commenting, Dr William Wijns noted the efficacy is more or less the same and the safety end points "are still okay, even though there is fear for late stent thrombosis in the PCI group. There seems to be a signal indicating that the initial good results with PCI will erode progressively, especially with infarction rates. We seem to recognize the signal because we may be expecting late stent thrombosis. However, so far numbers remain—fortunately—small."

Everyone, including Dr Manuel Antunes (University Hospital, Portugal), the discussant, echoed, "The two-year follow-up now presented to us confirms all the results and trends shown by the one-year report. The differences that were statistically different remain so and the differences that were not significant continue the trends toward significance, which, all appears to indicate, [they] will reach with time."

*Adapted from <http://www.theheart.org/article/998863/print.do>. As accessed on 4th September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*

FAME trial: Benefits of FFR-guided PCI over the traditional angiography-guided PCI confirmed by the 18-month data

Follow-up data from the Fractional Flow Reserve versus Angiography for Guiding PCI in Patients with Multivessel Coronary Artery Disease (FAME) trial presented at the *European Society of Cardiology Congress 2009* confirms the one-year results showing that the **routine measurement of fractional flow reserve (FFR) during angioplasty significantly improves clinical outcomes when compared with traditional angiography-guided treatment.**

In the FAME study, 1005 patients with multivessel disease were randomized to angiography- or FFR-guided percutaneous coronary intervention (PCI). Myocardial FFR is a measure of the functional severity of coronary lesions and is calculated from pressure measurements made during coronary angiography. Patients with lesions with FFR <0.80 received a drug-eluting stent, while those with FFR >0.80 did not. In the angiography arm, all lesions with >50% stenosis were revascularized.

Similar to the one-year results seen in the earlier report of the trial, the 18-month data showed a **significant reduction of 5.3% in the primary composite endpoint of mortality, MI, coronary artery bypass graft (CABG) surgery, or repeat PCI among patients randomized to the FFR-guided revascularization compared with angiography-guided interventions. Benefits were also reported in various subgroups, including those with and without diabetes, unstable-angina patients, and non-ST-segment-elevation-MI patients.**

According to the lead investigator of the study, Dr Nico Pijls, Catharina Hospital, Eindhoven, Netherlands, said, "We see at **18 months that there is a further improvement in the functional class in favor of the FFR-guided group**, and what is also really surprising is **that the number of patients free from angina is increasing, which is often not the case in these studies.**" He further added, "If there is no ischemia, there is no benefit to stenting. In a trial like COURAGE, there were some ischemic lesions that were treated medically, and that's no good. What we need are good selection criteria to tell us which lesions are ischemic and which lesions are not. They all look the same unless we have a way of showing us the dangerous ones."

Dr Thomas Luescher, University of Zurich, Switzerland, the discussant of FAME trial, said the results confirm data showing that only hemodynamically important lesions lead to events. However, he is **not sure whether the results would change clinical practice.** But he noted that **procedure times were similar in both treatment arms and that the time is correct to alter how clinicians decide which lesions to stent.** He added that **FFR would be particularly helpful in lesions of between 50% and 70% stenosis.**

Dr Alfred Bove, Temple University Medical Center, Philadelphia, noted, "If you have a patient who has a questionable lesion and you put a stent in, you've really changed that

patient's life a lot. It's always a drug-eluting stent now, and these drug-eluting stents complicate the patient's life later on, from anything from dental cleaning to colonoscopy. **So if you could eliminate the group of patients who don't need therapy by using the flow wire it would have an impact in this middle-ground area."**

An economic analysis of the data showed that the **use of FFR also saves money, by reducing future events as well as by reducing the number of stents used during the procedure.** Dr. Pijls thus pointed that it is a rare situations in medicine in which a **new innovative treatment not only improves outcomes but is also cost saving.** He concluded by saying that since the presentation of FAME one year ago, worldwide use of pressure wires for FFR measurements has increased by almost 100%, and he thinks the use will continue to grow.

*Adapted from <http://www.theheart.org/article/998821.do>. As accessed on 4th September 2009
For further details, logon to <http://www.escardio.org/congresses/esc-2009/Pages/welcome.aspx?hit=QuickAction>.*