Cardiology News /Recent Literature Review / Fourth Quarter 2013

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ACC Congress 2014: Washington, DC, 29-31/3/2014

Athens Cardiology Update 2014: Athens (Crown Plaza Hotel), 10-12/4/2014

HRS Meeting: San Francisco, 7-10/5/2014

EuroPCR: Paris, 20-23/5/2014

CardioStim 2014: Nice, 18-21/6/2014

ESC Congress 2014 (Barcelona, 30/8-3/9/14)

Only One Fifth of the Sudden Cardiac Arrest Victims in the Community are Eligible for a Primary Prevention ICD Before the Event, but Among These, a Small Proportion (13%) are Actually Implanted

According to data from the Oregon Sudden Unexpected Death study, among 2093 victims of sudden cardiac arrest (SCA) over a decade, of 448 having information about left ventricular ejection fraction (LVEF), 92 (20.5%) were eligible for primary ICD implantation, 304 (67.9%) were ineligible because of LVEF>35%, & the remainder (52, 11.6%) had LVEF ≤35% but were ineligible on the basis of clinical criteria. Among eligible subjects, only 12 (13%) received a primary ICD. Compared with recipients, ICD nonrecipients were older (age at LVEF assessment, 67.1±13.6 vs 58.5±14.8 years, *P*=0.05), with 20% aged ≥ 80 years (vs 0% among recipients, *P*=NS). Additionally, a subgroup (26%) had either a clinical history of dementia or were undergoing chronic dialysis. The authors concluded that only one fifth of the SCA cases in the community were eligible for a primary prevention ICD before the event, but among these, a small proportion (13%) were actually implanted. Although older age and comorbidity may explain nondeployment in a subgroup of these cases, other determinants such as socioeconomic factors, health insurance, patient preference, and clinical practice patterns may play a role (Narayanan K, et al, ***Circulation*** 2013;128:1733-1738).

Appropriate ICD Therapies over 10 Years are More Prevalent in Symptomatic Brugada Syndrome (19-48%) but Still Occur in Asymptomatic Patients (12%)

A total of 378 patients (310 men; aged 46±13 years) with a type 1 Brugada ECG pattern were implanted with an implantable cardioverter-defibrillator-ICD; 31 for aborted sudden cardiac arrest, 181 for syncope, and 166 asymptomatic. During a mean follow-up of 77±42 months for 363 patients, 7 patients (2%) died (1 as a result of an inappropriate shock), and 46 patients (12%) had appropriate device therapy (5±5 shocks per patient). Appropriate device therapy rates at 10 years were 48% for patients whose ICD indication was aborted sudden cardiac arrest, 19% for those with syncope, and 12% for the asymptomatic patients. At 10 years, rates of inappropriate shock and lead failure were 37% and 29%, respectively. Inappropriate shock occurred in 91 patients (24%) because of lead failure (n=38), supraventricular tachycardia (n=20), T-wave oversensing (n=14), or sinus tachycardia (n=12). Reduced inappropriate shocks were noted with introduction of remote monitoring, programming a high single ventricular fibrillation zone (>210–220 bpm), and a long detection time. The authors concluded that appropriate therapies are more prevalent in symptomatic Brugada syndrome but are not insignificant in asymptomatic patients (1%/y). Optimal ICD programming and remote monitoring dramatically reduce inappropriate shocks. However, lead failure remains a major problem in this population (Sacher F et al, ***Circulation*** 2013;128: 1739-1747).

Complex Antithrombotic Therapy Prescribed to Elderly Patients Increases the Risk of Gastrointestinal Bleeding

Among 78,133 veterans (98.6% white; mean age 72.3±7.7), 64% were prescribed aspirin(ASA)-antiplatelet and anticoagulant-antiplatelet and 6% were prescribed triple therapy (anticoagulant-antiplatelet-ASA). The incidence of upper gastro-intestinal (GI) bleeding was 20.1/1000 patient-years, and the incidence of lower GI bleeding was 70.1/1000 patient-years. ASA-anticoagulant and triple therapy were associated with the highest incidence of transfusion and hospitalization. A 40%-60% increased risk of upper GI bleeding was observed with all strategies. Lower GI bleeding was 30% higher with anticoagulant-antiplatelet, and transfusion increased with ASA-anticoagulant (hazard ratio-HR, 6.1) and triple therapy (HR, 5.0). Increased risk of hospitalization was noted with all strategies. The number needed to harm for upper or lower GI bleeding ranged from 52-65 & 15-23, respectively. The number needed to harm for hospitalization was 39 (anticoagulant-antiplatelet), 34 (ASA-anticoagulant), 67 (ASA-antiplatelet), and 45 (triple therapy) patients. The authors concluded that among elderly patients, complex antithrombotic therapy-related lower and upper GI bleeding events are clinically relevant risks resulting in increased hospitalizations and transfusions (Abraham NS, et al, ***Circulation*** 2013;128: 1869-1877).

POST Trial: Negative Results for Ischemic Postconditioning During Primary PCI

In the POST (Postconditioning on Myocardial Reperfusion in Patients With STEMI) trial, a total of 700

patients undergoing primary percutaneous coronary intervention (PCI) for ST–elevation myocardial infarction (STEMI) within 12 hours after symptom onset were randomly assigned to the conventional primary PCI group or to the postconditioning group (balloon positioned at the culprit lesion was inflated 4 times for 1 min with low pressure inflations at <6 atm, each separated by 1 min of deflation). Complete ST resolution occurred in 40.5% of patients in the post-conditioning group and 41.5% of patients in the conventional PCI group (*P*=NS). The rate of myocardial blush grade of 0 or 1 and the rate of major adverse cardiac events (a composite of death, MI, severe heart failure, or stent thrombosis) at 30 days did not differ significantly between the postconditioning group and the conventional PCI group (17.2% vs 22.4% and 4.3% vs 3.7%, respectively; P=NS). The authors concluded that ischemic postconditioning did not improve myocardial reperfusion in patients with STEMI undergoing primary PCI **(**Hahn J-Y**,** ***Circulation*** 2013;128:1889-1896).

Patients With Normal Flow/Low Gradient Severe Aortic Stenosis With Preserved Ejection Fraction Have Favorable Survival With Medical Management, and the Impact of Surgery on Survival is Neutral

Among 1704 severe aortic stenosis (AS) patients with aortic valve area <1 cm^2 and preserved ejection fraction (≥50%), those with normal flow (≥35mL/m^2)/low gradient (<40 mm Hg) (n=352, 21%) had favorable survival with medical management (2-year estimate, 82% vs 67% in normal flow/high grade; *P*<0.0001). Low flow/low gradient severe AS (n=53, 3%) was characterized by lower ejection fraction, more prevalent atrial fibrillation and heart failure, reduced arterial compliance, and reduced survival (2-year estimate, 60% vs 82% in normal flow/high gradient; *P*<0.001). In multivariable analysis, the low flow /low gradient pattern was the strongest predictor of mortality (hazard ratio-HR, 3.26; *P*<0.001 vs normal flow/low gradient). Aortic valve replacement was associated with a 69% mortality reduction (HR, 0.31; *P*<0.0001) in low flow/low gradient and normal flow/high gradient, with no survival benefit associated with aortic valve replacement in normal flow/low gradient and low flow/ high gradient. The authors concluded that normal flow/low gradient severe AS with preserved ejection fraction exhibits favorable survival with medical management, and the impact of aortic valve replacement on survival was neutral. Low flow/low gradient severe AS is characterized by a high prevalence of atrial fibrillation, heart failure, and reduced survival, and aortic valve replacement was associated with improved survival (Eleid MF, et al, ***Circulation*** 2013;128:1781-1789).

Similar Benefit from TAVI of Patients With Low-Flow, Low-Gradient, Severe AS and either Normal or Low Ejection Fraction With Those With High-Gradient AS

A total of 208 TAVI patients had high-mean gradient (MG ≥40 mmHg) severe aortic stenosis (AS) (HG-AS), 85 had 'paradoxical' low-flow, low-gradient PLF-LG (MG ≤ 40 mmHg, aortic valve area - AVA ≤0.6 cm^2 m^{-2}, stroke volume index ≤35 mL/m^2, ejection fraction-EF ≥50%), and 61 had low-flow low-gradient (LEF-LG; MG ≤ 40 mmHg, AVA ≤0.6 cm^2 m^{-2}, EF ≤40%). Compared with HG-AS, PLF-LG and LEF-LG had higher systemic vascular resistances but lower valvulo-arterial impedances. At 30 days, no differences in cardiac death (~5-6.5%) or death (~6-8.4%) were observed among the 3 groups. At 1 year, functional improvement occurred in most surviving patients (HG-AS: 69.2% vs. PLF-LG: 71.7% vs. LEF-LG: 89.3%, *P*=0.09) and no significant differences in overall mortality were observed (~17.5-24.5%, *P*=NS). Compared with HG-AS, LEF-LG had a higher 1 year cardiac mortality (hazard ratio 2.45, *P*=0.04). The authors concluded that TAVI in PLF-LG or LEF-LG patients is associated with overall mortality rates comparable with HG-AS patients and all groups have similar benefit (O'Sullivan CJ et al, *Eur Heart J* 2013; 34: 3437-3450).

National Australian Childhood Cardiomyopathy (CM) Study: The Highest-Risk Period for Children With Dilated CM is in the First Year After Diagnosis (26% Compared With ~1% per Year in Subsequent Years)

Among 175 patients 0 to <10 years of age at time of diagnosis of dilated cardiomyopathy (DCM), survival free from death or transplantation was 74% 1 year after diagnosis, 62% at 10 years, and 56% at 20 years. In multivariable analysis, age at diagnosis <4 weeks or >5 years, familial CM, and lower baseline left ventricular (LV) systolic function were associated with increased risk of death or transplantation. At 15 years after diagnosis, echocardiographic normalization had occurred in 69% of surviving patients. Children with lymphocytic myocarditis had better survival and a higher rate of echocardiographic normalization. At the latest follow-up, 100 of 104 of survivors (96%) were free of cardiac symptoms, and 83 (80%) were no longer receiving pharmacotherapy. The authors concluded that death or transplantation occurred in 26% of patients with childhood DCM within 1 year of diagnosis and ~1% per year thereafter. Risk factors for death or transplantation include age at diagnosis, familial CM, and severity of LV dysfunction. The majority of surviving patients are well and free of cardiac medication **(**Alexander PM et al, ***Circulation*** 2013;128: 2039-2046).

Analysis of 93 801 Procedures of Catheter Ablation of Atrial Fibrillation in the United States (2000 – 2010): Major Complication Rates Steadily Increasing

An estimated 93,801 AF ablations were performed from 2000 to 2010 in the US. The overall frequency of in-hospital complications was 6.29% with combined cardiac complications (2.54%) being the most frequent. Cardiac complications were followed by vascular (1.53%), respiratory (1.3%), and neurological complications (1.02%). The in-hospital mortality was 0.46%. Annual operator (<25 procedures) and hospital volume (<50 procedures) were significantly associated with adverse outcomes. There was a small, albeit non-significant, rise in overall complication rates. The authors concluded that overall complication rate was 6.29% in patients undergoing AF ablation. There was a significant association between operator and hospital volume and adverse outcomes **(**Deshmukh A et al, ***Circulation*** 2013; 128:2104-2112).

Favorable Effect of a PCSK9 Monoclonal Antibody in Homozygous Familial Hypercholesterolemia

A small number (n=8) of patients with homozygous familial hypercholesterolemia on stable drug therapy were treated with subcutaneous 420 mg Evolocumab/AMG 145 (monoclonal antibody to proprotein convertase subtilisin/kexin 9 - PCSK9) every 4 weeks for ≥12 weeks, followed by 420 mg every 2 weeks for an additional 12 weeks. Mean change from baseline in LDL cholesterol at week 12 was −16.5% (*P*=NS) and −13.9% (*P*=NS) with 4- and 2-week dosing, respectively. No reduction was seen in the 2 LDL receptor-negative patients. Over the treatment periods, mean LDL cholesterol reductions in the 6 LDL receptor–defective patients were 19.3±16% and 26.3±20% with 4- and 2-week dosing, respectively (*P*=0.03 for both values). There were no serious side effects. The authors concluded that evolocumab produced significant and dose-related LDL cholesterol lowering in homozygous familial hypercholesterolemia patients with defective LDL receptor activity but no reduction in those who were receptor negative **(**Stein EA et al, ***Circulation*** 2013;128: 2113-2120).

Baseline Mitral Regurgitation >Mild is Associated With Higher Mortality After Corevalve–TAVI

Among 1007 consecutive patients undergoing Corevalve transcatheter aortic valve implantation (TAVI), 670 (66.5%) had no/mild, 243 (24.1%) moderate, and 94 (9.3%) severe mitral regurgitation (MR). At 1 month after TAVI, patients with severe or moderate MR showed similar mortality rates, but both were higher compared with patients with mild/no MR (odds ratio-OR, 2.2 & 1.9, respectively; P<0.05). One-year mortality was also similar between patients with severe and those with moderate MR (hazard ratio-HR, 1.4; *P*=0.06) and still higher compared with patients with mild/no MR (HR, 1.7; *P*<0.001; & HR, 1.4; *P*=0.03, respectively). Severe pulmonary hypertension, atrial fibrillation (AF), and MR > mild, but not an improvement of ≥1 grade in MR severity, were independent predictors of mortality at 1 year. At 1 year, an improved MR was observed in 47% of patients with severe and 35% with moderate MR. Functional MR and absence of severe pulmonary hypertension and AF independently predicted the improvement in MR severity. The authors concluded that baseline MR >mild is associated with higher mortality after CoreValve–TAVI. A significant improvement in MR was more likely in patients with functional MR and without severe pulmonary hypertension or AF. The improvement in MR did not independently predict mortality (Poli A et al, ***Circulation*** 2013;128:2145-2153).

PARTNER A Trial: Transcatheter Aortic Valve Implantation (TAVI) May be a Reasonable Option in Select Patients with Concomitant Mitral Valve Disease

Among the PARTNER A trial patients with severe, symptomatic aortic stenosis undergoing either transcatheter (TAVI) (n=331) or surgical aortic valve replacement (AVR) (n=299), moderate or severe mitral regurgitation (MR) was reported at baseline in 65 TAVI patients (19.6%) and 63 surgical patients (21.2%). At 30 days, among survivors who had isolated AVR/TAVI, moderate/severe MR had improved in 25 AVR patients (69%) and 30 TAVI patients (58%), was unchanged in 10 AVR patients (28%) and 19 TAVI patients (36.5%), and worsened in 1 AVR patient (3%) and 4 TAVI patients (6%; *P*=NS). Mortality at 2 years was higher in AVR patients with moderate or severe MR than in those with mild or less MR (50% vs 28%; hazard ratio-HR, 1.73; *P*=0.04). In contrast, MR severity at baseline did not affect mortality in TAVI patients (37% vs 33%, moderate/severe vs none/mild; HR, 1.14; *P*=0.58). The authors concluded that both TAVI and AVR were associated with a significant early improvement in MR in survivors. However, moderate or severe MR at baseline was associated with increased 2-year mortality after AVR but not after TAVI. TAVI may be a reasonable option in selected patients with concomitant mitral valve disease **(**Barbanti M et al, ***Circulation*** 2013;128:2776-2784).

Automated External Defibrillators Inaccessible to >50% of Cardiac Arrests in Public Locations During Evening, Nighttime, and Weekends

Of 1864 cardiac arrests in public locations in Copenhagen, Denmark (1994-2011), 61.8% (n=1152) occurred during the evening, nighttime, or weekends. Of

552 registered automated external defibrillators (AEDs), 9.1% (n=50) were accessible at all hours, and 96.4% (n=532) were accessible during the daytime on all weekdays. Regardless of AED accessibility, 28.8% (537 of 1864) of all cardiac arrests were covered by an AED. Limited AED accessibility decreased coverage of cardiac arrests by 4.1% (9 of 217) during the daytime on weekdays and by 53.4% (171 of 320) during the evening, nighttime, and weekends. The authors concluded that limited AED accessibility at the time of cardiac arrest decreased AED coverage by 53.4% during the evening, nighttime, and weekends, which is when 61.8% of all cardiac arrests in public locations occurred. Thus, attention is warranted not only at strategic placement but also at uninterrupted AED accessibility, if public-access defibrillation is to improve survival after out-of-hospital cardiac arrest **(**Hansen CM et al, ***Circulation*** 2013;128:2224-2231).

Patients with Major Bleeding on Dabigatran Managed with Supportive Care, Require More Red Cell but Less Plasma Transfusions, but Outcomes do not Appear Worse than for Warfarin

Bleeding reports were reviewed from 1034 patients with 1121 major bleeds enrolled in 5 trials comparing dabigatran with warfarin in 27,419 patients treated for 6-36 months. Patients with major bleeds on dabigatran (n=627 of 16,755) were older, had lower creatinine clearance, and more frequently used aspirin or non-steroid anti-inflammatory agents than those on warfarin (n=407 of 10 002). The 30-day mortality after the first major bleed tended to be lower in the dabigatran group (9.1%) than in the warfarin group (13.0%; *P*=0.057). After adjustment for gender, age, weight, renal function, and concomitant antithrombotic therapy, the odds ratio for 30-day mortality with dabigatran vs warfarin was 0.66 (*P*=0.051). Major bleeds in dabigatran patients required more blood transfusions (423/696, 61%) than bleeds in warfarin patients (175/425, 42%; *P*<0.001) but less frequently plasma (dabigatran, 19.8%; warfarin, 30.2%; *P*<0.001). Dabigatran patients with a bleed had shorter stay in the intensive care unit (mean 1.6 nights) compared with warfarin patients (mean 2.7 nights; *P*=0.01). The authors concluded that patients who experienced major bleeding on dabigatran required more red cell but less plasma transfusions, required a shorter stay in intensive care, and had a trend to lower mortality compared with those who had major bleeding on warfarin (Majeed A et al, ***Circulation*** 2013;128:2325-2332).

Active Myocarditis: Left Ventricular Dysfunction at Baseline Defines a Subgroup of Patients Characterized by Poorer Long-Term Prognosis

From 1981 to 2009, 82 patients with biopsy-proven active myocarditis were followed-up for 147±107 months. At baseline, left ventricular dysfunction (LVEF<50%) and left atrium enlargement were independently associated with long-term heart transplantation–free survival, regardless of the clinical pattern of disease onset. At 6 months, improvement/normalization of LVEF was observed in 53% of patients. Persistence of NYHA III-IV classes, left atrium enlargement, and improvement/ normality of LVEF at 6 months emerged as independent predictors of long-term outcome. The authors concluded that baseline LV function is a marker for prognosis; its reassessment at 6 months appears useful for assessing longer-term outcome (Anzini M et al, ***Circulation*** 2013;128:2384-2394).

Heart Failure Hospitalization Within 1 Year After Acute MI Remains a Marker of High-Risk, With Nearly Half of Patients Dying Within a Year After the Development of Heart Failure

Among 2 789 943 acute myocardial infarction (AMI) hospitalizations of Medicare beneficiaries (1998-2010), the number of patients hospitalized for heart failure (HF) within 1 year after AMI declined modestly from 16.1 per 100 person-years in 1998 to 14.2 per 100 person years in 2010 (*P*<0.001). After adjusting for demographic factors, a relative 14.6% decline for HF hospitalizations after AMI was observed. Unadjusted 1-year mortality following HF hospitalization after AMI was 44.4% in 1998, which decreased to 43.2% in 2004 to 2005, but then increased to 45.5% by 2010. After adjusting for demographic factors and clinical comorbidities, this represented a 2.4% relative annual decline (hazard ratio-HR, 0.976) from 1998 to 2007, but a 5.1% relative annual increase from 2007 to 2010 (HR, 1.051). The authors concluded that among Medicare beneficiaries, HF hospitalization after AMI decreased by ~14% from 1998 to 2010, which may indicate improvements in the management of AMI. In contrast, survival after HF following AMI remains poor, and has worsened (~5%) from 2007 to 2010, demonstrating that challenges still remain for the treatment of this high-risk condition after AMI (Chen J et al, ***Circulation*** 2013;128:2577-2584).

Hypertophic Cardiomyopathy (HCM): an Abnormal High-Sensitivity Cardiac Troponin T (hs-cTnT) is an Independent Predictor of Adverse Outcome

Of 183 HCM patients, 99 (54%) had abnormal hs-cTnT values (>14 pg/ml). During a mean follow-up of 4.1 $\pm$ 2.0 years, 32 (32%) of these 99 patients, and only 6 (7%) of 84 patients with normal hs-cTnT values, experienced cardiovascular (CV) events (CV deaths, heart failure admissions, sustained ventricular tachycardia, embolic

events, and progression to New York Heart Association functional class III or IV status) (hazard ratio -HR: 5.05, p < 0.001). After multivariate analysis, abnormal hs-cTnT value remained an independent predictor of CV events (HR: 3.23, p = 0.012). In the abnormal hs-cTnT group, overall risk increased with an increase in hs-cTnT value. The authors concluded that in patients with HCM, an abnormal hs-cTnT is an independent predictor of adverse outcome, and a higher degree of abnormality in hs-cTnT value is associated with a greater risk of CV events (Kubo T et al, *J Am Coll Cardiol* 2013;62:1252–1259).

MADIT-CRT: in Patients with Mild Heart Failure and a CRT-D or ICD Device, Carvedilol Conferred a 36% Reduction in Inappropriate ATP and Shock Therapy Compared with Patients Receiving Metoprolol

Among patients in the MADIT-CRT study who received a cardiac resynchronization therapy (CRT) defibrillator (CRT-D) or an implantable cardioverter-defibrillator (ICD) device (N=1790), inappropriate therapy occurred in 253 (14%) over 3.4±1.1 years. Treatment with carvedilol was associated with a significantly decreased risk of inappropriate therapy (anti-tachycardia pacing-ATP or shock) compared with metoprolol (hazard ratio - HR: 0.64; p = 0.002). The risk of inappropriate therapy caused by atrial fibrillation was also reduced in patients receiving carvedilol compared with metoprolol (HR: 0.50; p = 0.004). The authors concluded that in heart failure patients receiving a CRT-D or an ICD device, carvedilol was associated with a 36% lower rate of inappropriate ATP and shock therapy compared with metoprolol. Inappropriate therapy due to atrial fibrillation was associated with a 50% lower rate in patients receiving carvedilol compared with those receiving metoprolol (Ruwald MH et al, *J Am Coll Cardiol* 2013;62:1343–1350).

Meta-Analysis of 5 Cardiac Resynchronization Therapy (CRT) Trials Confirmed Benefit in Heart Failure (HF) Patients in Sinus Rhythm & QRS >140 ms

Per a meta-analysis of 5 randomized trials comparing CRT with no active control (CARE-HF, MIRACLE, REVERSE) or CRT-D with ICD (REVERSE, MIRACLE ICD, RAFT), 3782 of 4317 patients were in sinus rhythm, with median age 66 years, QRS duration 160 ms, LVEF 24%, and left bundle branch block in 78%. Per multivariate analysis, only QRS duration predicted the magnitude of the effect of CRT on outcomes. There was an increasing benefit with increasing QRS duration, and a high probability of substantial benefit from CRT when QRS duration exceeds 140 ms. The authors concluded that QRS duration is a powerful predictor of the effects of CRT on morbidity and mortality in patients with symptomatic HF and LV systolic dysfunction who are in sinus rhythm (Cleland JG et al, *Eur Heart J* 2013; 34: 3547–3556).

EchoCRT Study: Cardiac-Resynchronization Therapy (CRT) in Heart Failure (HF) with a Narrow QRS Offers no Benefit and may Increase Mortality

A total of 809 patients with NYHA class III or IV HF, ejection fraction of ≤35%, a QRS <130 ms, and echocardiographic evidence of LV dyssynchrony were randomly assigned to have CRT on or off. On March 13, 2013, the study was stopped for futility; mean follow-up was 19.4 months. The primary outcome (death or first hospitalization for worsening HF) occurred in 116 of 404 patients (28.7%) in the CRT group, as compared with 102 of 405 in the control group (25.2%) (hazard ratio-HR, 1.20; P=0.15). There were 45 deaths in the CRT group (11.1%) and 26 in the control group (6.4%) (HR, 1.81; P=0.02). The authors concluded that in patients with HF and a QRS <130 ms, CRT does not reduce the rate of death or hospitalization for HF and may increase mortality (Ruschitzka F et al, *N Engl J Med* 2013; 369:1395-1405).

Meta-analysis of 18 Trials: Aspiration Thrombectomy During AMI is Beneficial in Reducing MACE and Mortality at 6-12 Months Compared with Conventional PCI Alone

Acute myocardial infarction (AMI) patients randomized to aspiration (18 trials, n=3,936) or mechanical thrombectomy (7 trials, n=1,598) before PCI were compared with conventional PCI alone. At mean 6-month follow-up, major adverse cardiac events (MACE) (risk ratio -RR: 0.76; p = 0.006) and all-cause mortality (RR: 0.71; p = 0.049) were significantly reduced with aspiration thrombectomy. Beneficial trends were noted for recurrent MI (p = 0.11) and target vessel revascularization (p = 0.06). Final infarct size and ejection fraction at 1 month were similar. ST resolution at 60 min (RR: 1.31; p < 0.0001) and TIMI blush grade 3 post-procedure (RR: 1.37; p < 0.0001) were both improved with aspiration thrombectomy. In contrast, there was no difference in almost all end-points with mechanical thrombectomy vs. conventional primary PCI (7 trials, n = 1,598). The authors concluded that in AMI, manual, but not mechanical, catheter aspiration, is beneficial in reducing mortality and MACE at 6-12 months compared with conventional primary PCI alone (Kumbhani DJ et al, *J Am Coll Cardiol* 2013;62:1409–1418).

EMPHASIS-HF Study: Eplerenone Appears Safe and Efficacious in Patients with Heart Failure at High Risk for Hyperkalemia and/or Worsening Renal Function

Heart failure (HF) patients at high risk for hyperkalemia or worsening renal function (WRF) in the

EMPHASIS-HF trial, i.e. patients older than 75, with diabetes, estimated glomerular filtration rate (eGFR) <60 ml/min/1.73 m^2, and relatively low systolic blood pressure, but with eGFR >30 ml/min/1.73 m^2 and serum potassium <5.0 mmol/l received eplerenone. These high-risk patient subgroups treated with eplerenone had an increased risk of potassium >5.5 mmol/l but not of potassium >6.0 mmol/l, and of hospitalization for hyperkalemia or discontinuation of study medication due to adverse events. Eplerenone was effective in reducing the primary endpoint (hospitalization for HF or cardiovascular mortality) in all subgroups. The authors concluded that eplerenone was both efficacious and safe when carefully monitored, even in subgroups at high risk of developing hyperkalemia or WRF (Eschalier R et al, *J Am Coll Cardiol* 2013;62:1585–1593).

ALTITUDE Study: In ICD or CRT-D Patients Adverse Prognosis after Shock Therapy is Related to Underlying Arrhythmia (VT/AF) and not to the Shock Itself

Comparing patients (n=3,809) with first shock with patients without a shock (n=3,630), there was an increased rate of mortality in those who received their first shock for monomorphic ventricular tachycardia (hazard ratio - HR: 1.65, p < 0.0001), ventricular fibrillation/polymorphic ventricular tachycardia (HR: 2.10, p < 0.0001), and atrial fibrillation/flutter (HR: 1.61, p = 0.003). In contrast, mortality after first shocks due to sinus tachycardia and supraventricular tachycardia (HR: 0.97, p = NS) and noise/artifact/oversensing (HR: 0.91, p = NS) was comparable to that in patients without a shock. The authors concluded that compared with no shock, those who received their first shock for ventricular rhythms and atrial fibrillation had an increased risk of death with no difference noted for shocks due to sinus tachycardia or noise/artifact/oversensing (Powell BD et al, *J Am Coll Cardiol* 2013;62:1674–1679).

Wearable Cardioverter-Defibrillator Protects High-Risk Patients Early Post-Myocardial Infarction while Waiting for an ICD

For the mandatory ICD implantation waiting time post-myocardial infarction (MI) of either 40 days or 3 months (for those revascularized), a wearable cardioverter-defibrillator (WCD) was provided in 8453 patients (2005-2011). A total of 133 patients (1.6%) received 309 appropriate shocks. Of these patients, 91% were resuscitated from a ventricular arrhythmia. For shocked patients, the left ventricular ejection fraction (LVEF) was $\leq$30% in 106, 30-35% in 17, >36% in 8, and not reported in 2 patients. Of the 38% of patients not revascularized, 84% had a LVEF $\leq$30%; of the 62% of patients revascularized, 77% had a LVEF $\leq$30%. The median time from the index MI to WCD therapy was 16 days. Of the treated patients, 75% received a shock in the first month, and 96% within the first 3 months of use. Shock success resulting in survival was 84% in nonrevascularized and 95% in revascularized patients. The authors concluded that during the 40-day and 3-month waiting periods in patients post-MI, the WCD successfully treated sudden cardiac arrest in 1.4%, and the risk was highest in the first month of WCD use (Epstein AE et al, *J Am Coll Cardiol* 2013;62:2000–2007).

Non-Receivers of Pre-Procedural Aspirin are More Likely to Experience Adverse Outcomes of PCI (Higher Rate of In-Hospital Death and Stroke)

Among 65,175 patients, 4640 (7.1%) did not receive aspirin within 24 h before undergoing PCI. Aspirin non-receivers were more likely to have had previous gastrointestinal bleeding or to present with cardiogenic shock or after cardiac arrest. Absence of aspirin before PCI was associated with a higher rate of death (3.9% vs. 2.8%; odds ratio-OR: 1.89, p < 0.001) and stroke (0.5% vs. 0.1%; OR: 4.24, p = 0.007) with no difference in need for transfusions. The authors concluded that a significant number of patients do not receive aspirin before undergoing PCI. Lack of aspirin before PCI was associated with increased in-hospital mortality and stroke (Kenaan M et al, *J Am Coll Cardiol* 2013;62:2083–2089).

Added Autonomic Denervation Enhances Pulmonary Vein Isolation (PVI) for Paroxysmal Atrial Fibrillation

A total of 242 patients with paroxysmal atrial fibrillation (PAF) were randomized to PVI (n=78), ablation of the left atrial ganglionated plexi (GP) (n=82); or PVI+GP ablation (n=82). Freedom from PAF or atrial tachycardia (AT) was achieved in 44 (56%), 39 (48%), and 61 (74%) patients in the PVI, GP, and PVI+GP groups, respectively (p=0.004). PVI+GP ablation compared with PVI alone was better (hazard ratio of 0.53; p=0.022). Fluoroscopy duration was 16$\pm$3 min, 20$\pm$5 min, and 23$\pm$5 min for PVI, GP, and PVI+GP groups, respectively (p<0.001). Post-ablation atrial flutter was similar among groups (5-6%). No serious complications were reported. The authors concluded that addition of GP ablation to PVI confers a significantly higher success rate compared with either PVI or GP alone in patients with PAF (Katritsis D et al, *J Am Coll Cardiol* 2013;62:2318–2325).

Relax-AHF Trial: Consistent Effects of Serelaxin Across All Subgroups of Patients With Acute Heart Failure

The RELAX-AHF trial included 1161 patients (placebo, n = 580; serelaxin, n = 581). Subgroup analyses did not show any difference in the effects of serelaxin vs. placebo on dyspnea relief or on the incidence of

cardiovascular death or rehospitalizations for heart failure or renal failure at 60 days. The authors concluded that subgroup analyses of the RELAX-AHF trial has shown similar effects of serelaxin, when compared with placebo, across various subgroups, suggesting a consistency of the effect of serelaxin in the patients with acute heart failure (Metra M et al, *Eur Heart J* 2013; 34, 3128–3136).

ORIGIN trial: Hypoglycemia Increases the Risk of Cardiovascular Events

A total of 12,537 patients with dysglycemia and high cardiovascular (CV) risk were randomized to basal insulin glargine titrated to a fasting glucose of ≤5.3 mmol/L (95 mg/dL) or standard glycemic care. Non-severe hypoglycemia was defined as symptoms plus glucose ≤54 mg/dL and severe hypoglycemia if required assistance or glucose ≤36 mg/dL. During a median of 6.2 years, non-severe hypoglycemic episodes occurred in 41.7% of glargine and 14.4% of standard care patients, while severe episodes occurred in 5.7% and 1.8%, respectively. Only severe hypoglycemia was associated with a greater risk for the primary outcome (CV death, MI or stroke) (HR: 1.58, P < 0.001), mortality (HR: 1.74; P < 0.001), CV death (HR: 1.71; P < 0.001) and arrhythmic death (HR: 1.77; P = 0.007). Similar findings were noted for severe nocturnal hypoglycemia for the primary outcome and mortality. The authors concluded that severe hypoglycemia is associated with an increased risk for CV outcomes in people at high CV risk and dysglycemia. Although the glargine group had an increased risk of hypoglycemia, the relative risk of CV outcomes with hypoglycemia was lower with insulin glargine-based therapy than with the standard glycemic control (ORIGIN Trial Investigators, *Eur Heart J* 2013; 34, 3137–3144).

Meta-Analysis: Patent Foramen Ovale Transcatheter Closure Superior to Medical Therapy on Recurrent Vascular Events Over a Mean Follow-up of 3.5 Years

A meta-analysis was performed of 3 randomized studies (PC, CLOSURE I, and RESPECT trials) (N= 2,303) of transcatheter (TC) closure of a patent foramen ovale (PFO) (n=1150) vs medical therapy (n= 1,153) in patients with cryptogenic stroke. Mean follow-up was 3.5 years. Baseline characteristics were similar across studies. Intention-to-treat analyses showed a statistically significant risk reduction in stroke and/or transient ischemic attack in the TC PFO closure group when compared to medical treatment (pooled HR=0.59, P=0.04). The combined outcome of death, and vascular events, showed a borderline benefit for TC PFO closure when compared to medical treatment (HR=0.67, P=0.05). Subjects with a substantial PFO shunt tend to benefit the most with TC PFO closure (HR=0.35, P=0.06) (Rengifo-Moreno P et al, *Eur Heart J* 2013; 34, 3342–3352).

Randomized Trial Comparing 3 Different Devices For Percutaneous Closure of a Patent Foramen Ovale (PFO): Significant Differences in the Neurological Event Rate Among Devices

PFO closure was technically successful in all 660 patients with cryptogenic stroke randomized to 3 different closure devices (Amplatzer, CardioSEAL-STARflex, and Helex occluder, n=220 per group). The procedure was complicated by cardiac tamponade requiring surgery in 1 (Amplatzer group) and device embolization in 3 patients (Helex group). Thrombus formation on the device was detected in 12 cases (11 CardioSEAL-STARflex, 1 Helex, 0 Amplatzer; P < 0.0001), of which 2 required surgery. Complete closure after single device implantation was more common with the Amplatzer and with the CardioSEAL-STARflex than with the Helex occluder. Within 5 years of follow-up, the primary endpoint (recurrent cerebral ischemia, i.e. stroke, transient ischemic attacks-TIA, or amaurosis fugax; death from neurological cause; or any other paradoxical embolism) occurred in 25 patients (3.8%; 10 TIAs, 12 strokes and 3 cases of cerebral death). Compared with the CardioSEAL-STARflex (6%; 6 TIAs, 6 strokes, 1 cerebral death) and Helex groups (4%; 4 TIAs, 4 stroke, 1 cerebral death), significantly fewer events (P=0.04) occurred in the Amplatzer group (1.4%; 2 strokes, 1 cerebral death). The authors concluded that procedural complications and long-term neurological event rates are low regardless of device used; however, the recurrent neurological event rate was significantly lower after Amplatzer implantation (Hornung M et al, *Eur Heart J* 2013; 34:3362–3369).

Vascular Closure Devices Largely Reduce Vascular Complications Over Manual Closure Among Patients Having Percutaneous Coronary Intervention

Of the 85,048 percutaneous coronary interventions (PCIs) performed in 32 hospitals in Michigan (2007-2009), 28,528 (37%) procedures used vascular closure devices (VCDs). VCDs were associated with reductions in vascular complications (odds ratio-OR, 0.78; *P*=0.001) and postprocedure transfusions (OR, 0.85; *P*=0.011), except in patients with a body mass index (BMI) <25 kg/m^2 and those treated with platelet glycoprotein (GP) IIb/IIIa inhibitors. VCDs were associated with fewer hematomas (OR, 0.69; *P*<0.001) or pseudoaneurysms (OR, 0.54; *P*<0.001) but an increase in the odds of retroperitoneal bleeding (OR, 1.57; *P*=0.009). The authors concluded that VCDs were associated with a significant reduction in vascular complications and need for transfusion, albeit with no benefit when GP IIb/IIIa inhibitors were used and in those with normal or lean BMI;

there was a small increase in the more serious risk for retroperitoneal bleeding (Gurm HS et al, *Ann Intern Med* 2013;159:660-666).

Atrial Ectopy is a Predictor of Incident Atrial Fibrillation

In 1260 adults without atrial fibrillation (AF) enrolled in the Cardiovascular Health Study (1989-1990), the premature atrial contraction (PAC) count was quantified by 24-hour Holter monitor. Doubling of the hourly PAC count was associated with a significant increase in AF risk (hazard ratio-HR, 1.17; *P*<0.001) and overall mortality (HR, 1.06; *P*<0.001). Compared with the Framingham model, PAC count alone resulted in similar AF risk discrimination at 5 and 10 years of follow-up and superior risk discrimination at 15 years. The addition of PAC count to the Framingham model resulted in significant 10-year AF risk discrimination improvement. The specificity for predicting AF at 15 years was >90% for PAC counts over 32 beats/h. The authors concluded that the addition of PAC count to a validated AF risk algorithm provides superior AF risk discrimination and significantly improves risk reclassification (Dewland TA eta l, *Ann Intern Med* 2013;159:721-728).

SAVOR-TIMI 53 & EXAMINE Trials: the New Dipeptidyl Peptidase 4 (DPP-4) Inhibitors, Saxagliptin and Alogliptin, May not Have Serious Adverse Cardiovascular (CV) Effects

In the SAVOR-TIMI 53 study, 16,492 patients with type 2 diabetes with history of, or at risk for, CV events were randomly assigned to receive saxagliptin or placebo. At 2 years, a primary end-point event (CV death, myocardial infarction-MI, or ischemic stroke) occurred in 613 patients (7.3%) in the saxagliptin group and in 609 patients in the placebo group (7.2%) (P=NS) The major secondary end point (CV death, MI, stroke, hospitalization for unstable angina, coronary revascularization, or heart failure) occurred in 1059 patients (12.8%) in the saxagliptin group and in 1034 patients in the placebo group (12.4%) (P=NS). More patients in the saxagliptin group (3.5%) than in the placebo group (2.8%) were hospitalized for heart failure (hazard ratio-HR, 1.27; P=0.007). Rates of pancreatitis were similar in the two groups (acute pancreatitis, 0.3% in the saxagliptin group and 0.2% in the placebo group; chronic pancreatitis, <0.1% and 0.1% in the two groups, respectively). The authors concluded that saxagliptin did not increase or decrease the rate of ischemic events, though the rate of hospitalization for heart failure was increased (Scirica BM et al, N Engl J Med 2013; 369:1317-1326).

In the EXAMINE study, a total of 5380 patients with type 2 diabetes and either an acute MI or unstable angina within previous 15-90 days underwent randomization to alogliptin or placebo and were followed for up to 40 months (median, 18 months). A primary end-point event (CV death, MI or stroke) occurred in 305 patients assigned to alogliptin (11.3%) and in 316 patients assigned to placebo (11.8%) (HR, 0.96). Glycated hemoglobin levels were significantly lower with alogliptin than with placebo (mean difference, −0.36 percentage points; P<0.001). Incidences of hypoglycemia, cancer, pancreatitis, and initiation of dialysis were similar with alogliptin and placebo. The authors concluded that among patients with type 2 diabetes who had had a recent acute coronary syndrome, the rates of major adverse cardiovascular events were not increased with the DPP-4 inhibitor alogliptin as compared with placebo (White WB et al, *N Engl J Med* 2013; 369:1327-1335).

Hokusai-VTE Study: Edoxaban is Noninferior to Warfarin for the Treatment of Symptomatic Venous Thromboembolism and Causes Less Bleeding

Patients with deep venous thrombosis (n=4921) or pulmonary embolism (n=3319), initially receiving heparin, were randomized to edoxaban at a dose of 60 mg or 30 mg (if creatinine clearance 30-50 ml/min or if weight <60 kg) once daily, or warfarin for 3-12 months. Among patients receiving warfarin, the time in the therapeutic range was 63.5%. Edoxaban was noninferior to warfarin; the primary efficacy outcome (recurrent symptomatic venous thromboembolism) occurred in 130 patients in the edoxaban group (3.2%) and 146 patients in the warfarin group (3.5%) (hazard ratio-HR, 0.89; P<0.001 for noninferiority). The safety outcome (major or clinically relevant nonmajor bleeding) occurred in 349 patients (8.5%) in the edoxaban group and 423 patients (10.3%) in the warfarin group (HR, 0.81; P=0.004 for superiority). The rates of other adverse events were similar. A total of 938 patients with pulmonary embolism had right ventricular dysfunction, as assessed by measurement of N-T pro-BNP levels; the rate of recurrent venous thromboembolism in this subgroup was 3.3% in the edoxaban group and 6.2% in the warfarin group (HR, 0.52). The authors concluded that edoxaban once daily after initial treatment with heparin was noninferior to standard therapy and caused significantly less bleeding in patients with venous thromboembolism, including those with severe pulmonary embolism (The Hokusai-VTE Investigators, *N Engl J Med* 2013; 369:1406-1415).

ENGAGE AF-TIMI 48 Trial: in Patients with Atrial Fibrillation, Edoxaban was Equivalent to Warfarin for

Prevention of Thromboembolism but Had Lower Rates of Bleeding and Cardiovascular (CV) Death

A total of 21,105 patients with moderate-to-high-risk atrial fibrillation (AF) were randomized to edoxaban, a direct oral factor Xa inhibitor (2 once daily regimens) or warfarin. At median follow-up of 2.8 years, the annualized rate of the primary end point (stroke or systemic embolism) was 1.50% with warfarin (median time in the therapeutic range, 68.4%), compared with 1.18% with high-dose edoxaban (hazard ratio-HR, 0.79; P<0.001 for noninferiority) and 1.61% with low-dose edoxaban (HR, 1.07; P=0.005 for noninferiority). In the intention-to-treat analysis, there was a trend favoring high-dose edoxaban vs warfarin (HR, 0.87; P=0.08) and an unfavorable trend with low-dose edoxaban vs warfarin (HR, 1.13; P=0.10). The annualized rate of major bleeding was 3.43% with warfarin vs 2.75% with high-dose edoxaban (HR, 0.80; P<0.001) and 1.61% with low-dose edoxaban (HR, 0.47; P<0.001). The respective annualized rates of death from CV causes were 3.17% vs 2.74% (HR, 0.86; P=0.01), and 2.71% (HR, 0.85; P=0.008), and rates of the key secondary end point (a composite of stroke, systemic embolism, or death from CV causes) were 4.43% vs 3.85% (HR, 0.87; P=0.005), and 4.23% (HR, 0.95; P=0.32). The authors concluded that both once-daily regimens of edoxaban were noninferior to warfarin for prevention of stroke or systemic embolism and were associated with significantly lower rates of bleeding and CV death (Giugliano RP et al, *N Engl J Med* 2013; 369:2093-2104).

EUROMAX: Bivalirudin Started During Transport for Primary PCI, at 30 Days Reduced Major Bleeding but Increased Acute Stent Thrombosis

A total of 2218 patients with STEMI transported for primary PCI were randomly assigned to receive either bivalirudin or unfractionated or low-molecular-weight heparin with optional glycoprotein IIb/IIIa inhibitors (control group). Bivalirudin reduced the risk of the primary outcome at 30 days (death or major bleeding) (5.1% vs. 8.5%; relative risk-RR, 0.60; P=0.001) and secondary outcome (death, reinfarction or non-CABG major bleeding) (6.6% vs. 9.2%; RR, 0.72; P=0.02). Bivalirudin also reduced the risk of major bleeding (2.6% vs. 6.0%; RR, 0.43; P<0.001). The risk of acute stent thrombosis was higher with bivalirudin (1.1% vs. 0.2%; RR, 6.11; P=0.007). There was no significant difference in rates of death (~3%) or reinfarction (1.7% vs. 0.9%). The authors concluded that bivalirudin, started during transport for primary PCI, improved 30-day clinical outcomes with a reduction in major bleeding but with an increase in acute stent thrombosis (Steg PG et al, *N Engl J Med* 2013; 369:2207-2217).

ICAP Study: Added Colchicine Therapy Reduces Rate of Incessant or Recurrent Pericarditis

A total of 240 patients with acute pericarditis were randomly assigned to receive colchicine (0.5 mg bid for 3 months if weight >70 kg or 0.5 mg qd if weight ≤70 kg) or placebo in addition to conventional antiinflammatory therapy with aspirin or ibuprofen. The primary outcome (incessant or recurrent pericarditis) occurred in 20 patients (16.7%) in the colchicine group and 45 patients (37.5%) in the placebo group (relative risk reduction, 0.56; number needed to treat, 4; P<0.001). Colchicine reduced the rate of symptom persistence at 72 hours (19.2% vs. 40.0%, P=0.001), the number of recurrences per patient (0.21 vs. 0.52, P=0.001), and the hospitalization rate (5.0% vs. 14.2%, P=0.02). Colchicine also improved the remission rate at 1 week (85.0% vs. 58.3%, P<0.001). Overall adverse effects and rates of study-drug discontinuation were similar. No serious adverse events were observed. The authors concluded that in patients with acute pericarditis, colchicine, when added to conventional antiinflammatory therapy, significantly reduced the rate of incessant or recurrent pericarditis (Imazio M et al, *N Engl J Med* 2013; 369:1522-1528).

Meta-Analysis: **Influenza Vaccination Prevents Cardiovascular (CV) Events in High-Risk Patients**

A total of 6 randomized trials were analyzed (N=6735; mean age, 67 years; 51.3% women; 36.2% with a cardiac history; mean follow-up, 7.9 months), comparing influenza vaccine vs placebo or control, stratified by subgroups of patients with and without a history of acute coronary syndrome (ACS) within 1 year of randomization. Influenza vaccine was associated with a lower risk of composite CV events (2.9% vs 4.7%; relative risk-RR, 0.64, $P = 0.003$). A treatment interaction was detected between patients with (RR, 0.45) and without (RR, 0.94) recent ACS (P for interaction = 0.02). The authors concluded that the use of influenza vaccine was associated with a lower risk of major adverse cCV events. The greatest treatment effect was seen among the highest-risk patients with more active coronary disease (Udell JA et al, *JAMA* 2013;310:1711-1720).

Dose-Dependent Inverse Association Between Nut Consumption and Total Mortality & Major Causes of Death (Heart Disease/ Cancer/ Respiratory Diseases)

The association between nut consumption and total and cause-specific mortality was examined among 76,464 women in the Nurses' Health Study (1980–2010) and 42,498 men in the Health Professionals Follow-up Study (1986–2010). During 3,038,853 person-years of follow-up, 16,200 women and 11,229 men died. Nut consumption was inversely associated with total mortality among both

women and men and was dose-dependent (best hazard ratio 0.80 for those who ate nuts ≥7 times per week; P<0.001 for trend). Significant inverse associations were also observed between nut consumption and deaths due to cancer, heart disease, and respiratory disease. The authors concluded that the frequency of nut consumption was inversely associated with total and cause-specific mortality, independently of other predictors of death (Bao Y et al, *N Engl J Med* 2013;369:2001-2011).

IABP-SHOCK II Trial: In Patients with Acute MI & Cardiogenic Shock Undergoing Revascularization, IABP did not Reduce 12-Month Mortality

In the initial IABP-SHOCK II trial, the intra-aortic balloon pump (IABP) did not reduce 30 day mortality compared with control. Follow-up was continued for 12 months. A total of 600 patients with cardiogenic shock complicating acute myocardial infarction (MI) who were undergoing early revascularization were assigned to IABP (n=301) or control (n=299). Of 595 patients completing 12 month follow-up, 155 (52%) of 299 patients in the IABP group and 152 (51%) of 296 patients in the control group had died (relative risk -RR 1·01, p=NS). There were no significant differences in reinfarction (RR 2·60, p=0.05), recurrent revascularization (0.91, p=0·77), or stroke (1.50, p=NS). The authors concluded that in patients undergoing early revascularization for MI complicated by cardiogenic shock, IABP did not reduce 12 month all-cause mortality (Thiele H et al, *The Lancet*; 382(9905):1638 – 1645).

CHAMPION Pooled Analysis: Cangrelor Reduced PCI Periprocedural Thrombotic Complications, at the Expense of Increased Bleeding

Pooled analysis of data from 3 trials (CHAMPION-PCI / CHAMPION-PLATFORM/ CHAMPION-PHOENIX) comparing cangrelor with control (clopidogrel or placebo) for prevention of thrombotic complications during and after PCI, included 24,910 patients undergoing PCI for STEMI (11.6%), non-ST-elevation acute coronary syndromes (ACS) (57.4%), and stable coronary artery disease (31%). Cangrelor reduced the primary outcome (death, MI, ischemia-driven revascularization, or stent thrombosis at 48 h) by 19% (3.8% for cangrelor *vs* 4.7% for control; odds ratio -OR 0.81, p=0.0007), and stent thrombosis by 41% (0.5% *vs* 0.8%, OR 0.59, p=0.0008). Benefits were maintained at 30 days. There was no difference in the primary safety outcome (severe bleeding) (0.2% in both groups), moderate bleeding (0.6% *vs* 0.4%), or in transfusion (0.7% *vs* 0.6%), but cangrelor increased mild bleeding (16.8% *vs* 13%, p<0.0001). The authors concluded that cangrelor reduced PCI periprocedural thrombotic complications, at the expense of increased bleeding (Steg PG et al, Lancet 2013; 382(9909):1981-92).

Important Review and Other Articles

Coronary artery revascularization in patients with diabetes (Armstrong EJ, et al, *Circulation* 2013; 128:1675-1685), Obesity in children & adolescents (Kelly AS, et al, *Circulation* 2013; 128:1689-1712), Childhood obesity and cardiovascular dysfunction (Cote AT et al, *J Am Coll Cardiol* 2013;62:1309-1319), 2013 ACCF/AHA ***Guideline for management of heart failure*** (Clyde WY et al, *Circulation* 2013;128:e240-e327; *J Am Coll Cardiol* 2013;62:e147-e239), Antithrombotic therapy during and after PCI in patients with AF (Verheugt FW, *Circulation* 2013;128:2058-2061), ICD leads (Swerdlow CD & Ellenbogen KA, *Circulation* 2013;128:2062-2071), Renal denervation for hypertension (Thukkani AK & Bhatt DL, *Circulation* 2013;128: 2251-2254;& Schlaich MP et al, *J Am Coll Cardiol* 2013,62:2031-2045), Peripheral arterial disease (Wennberg PW, *Circulation* 2013;128:2241-2250), Vitamin D & cardiovascular health (Lavie CJ et al, *Circulation* 2013;128:2404-2406), CRT (Prinzen FW et al, *Circulation* 2013;128:2407-2418), Role of vitamin D in atherosclerosis (Kassi E et al, *Circulation* 2013;128:2517-2531), Pulseless electric activity (Myerburg RJ et al, *Circulation* 2013;128:2532-2541), Effects of external electrical and magnetic fields on pacemakers and defibrillators (Beinart R & Nazarian S, *Circulation* 2013;128:2799-2809), Managing antiplatelet therapy in coronary patients requiring surgery (Capodanno D & Angiolillo DJ, *Circulation* 2013;128:2785-2798), Targeting the PCSK9 for treatment of dyslipidemia (Urban et al, *J Am Coll Cardiol.* 2013;62:1401-1408), Treatment of obstructive thrombosed prosthetic heart valve (Huang G et al, *J Am Coll Cardiol* 2013;62:1731-1736), Colchicine and the heart (Deftereos S et al, *J Am Coll Cardiol* 2013;62:1817-1825), the ***MOGE(S)*** nomenclature system for cardiomyopathies (Arbustini E et al, *J Am Coll Cardiol* 2013;62:2046-2072), Antithrombotic treatment in TAVI (Rodés-Cabau J et al, *J Am Coll Cardiol* 2013;62:2349-2359), Pulmonary hypertension (*J Am Coll Cardiol* December 24, 2013, Vol. 62, No. 25_S), **2013 ESC guidelines on the management of stable coronary artery disease (**Montalescot G et al, *Eur Heart J* 2013;34: 2949-3003), **ESC/EASD Guidelines on diabetes, pre-diabetes, and cardiovascular diseases (**Rydén L, *Eur Heart J* 2013; 34:3035-3087), Long QT syndrome (Schwartz PJ et al, *Eur Heart J 2013; 34: 3109-3116),* Stabilization of atherosclerotic plaques (Ylä-Herttuala S et al, *Eur Heart J* 2013; 34: 3251-3258), Brugada syndrome (Brugada et al, *Eur Heart J* 2013; 34: 3610-3615), Management of obstructive sleep apnea (Qaseem A et al, *Ann Intern Medicine* 2013; 159:471-483), Screening for primary hypertension in children and adolescents (Moyer VA et al, *Ann Intern Medicine* 2013; 159:613-619), Statins & cognitive function (Richardson K et al, *Ann Intern Medicine* 2013; 159:688-697), Anemia in heart disease (Quaseem A et al, *Ann Intern Medicine* 2013; 159:770-779; & Kansagara T et al, *Ann Intern Medicine* 2013; 159:746-757), Circulatory shock (Vincent J-L & De Backer D, *N Engl J Med* 2013; 369:1726-1734), β-blockers for hypertension (Wiysonge CS & Opie LH, *JAMA* 2013; 310:1851-1852), Inherited primary arrhythmia syndromes (Priori SG et al, *Heart Rhythm* 2013; 10: 1932-1963).