Report of the American Heart Association (AHA) Scientific Session 2017, Anaheim, California

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On November 11–15, the American Heart Association (AHA) Scientific Sessions 2017 were held in Anaheim, California, for the first time in 16 years. The annual sessions attracted nearly 18,000 attendees, with a global presence from more than 100 countries, and featured 5 days of programming for cardiovascular basic scientists, clinicians, and researchers. As usual, activities of participants from Japan were prominent. From the exciting sessions, I report the topics and key presentations including the late-breaking clinical trials.

Key Words: American Heart Association; Guidelines; Japanese Circulation Society; Late-breaking clinical trials

The American Heart Association (AHA) Scientific Sessions were held on November 11–15, 2017, back in Anaheim, California, after a 16-year absence. Anaheim is the sun-splashed southern California city, located between Los Angeles and San Diego, best known as the home to the Disneyland® Resort and the major baseball team Los Angeles Angels of Anaheim (Figure 1A,B). The Anaheim Convention Center is located across from the Disneyland® Resort (Figure 1C,D). The meeting attracted more than 18,000 participants, including physicians, research scientists, students, and paramedical personnel, from more than 100 countries. Sessions over the 5 days included a comprehensive and unparalleled education delivered via more than 5,000 presentations, with 1,000 invited faculty members and 4,000 abstract presentations from the world leaders in cardiovascular disease. In addition to 33 late-breaking science sessions, the new hypertension guidelines were presented. From this exciting conference, I report highlights and key presentations.

Opening Session
President's Speech and His Ironic Fate
In the opening session on Sunday November 12, the AHA president John J. Warner talked about his family history at the beginning of his presentation (Figure 2A). He mentioned how both his father and grandfather had heart bypass surgery in their 60s. He also lost his maternal grandfather and great grandfather to heart disease. And he closed his speech as follows: “I look forward to a future where people have the exact opposite experience of my family, that children grow up surrounded by so many healthy, beloved, elderly relatives that they couldn’t imagine life any other way.” However, he had minor heart attack on Monday morning, was taken to a local hospital and had a coronary stent inserted. Local media reported that the AHA president had recovered and was doing well. Although he met an ironic fate, I wish him a complete and speedy recovery.

Two Partnerships
The AHA CEO Nancy Brown announced 2 partnerships (Figure 2B). First, the formation of a strategic business relationship between the AHA and XPRIZE Foundation, which is known for creating grand challenge domains, will invite creative people from the USA and around the globe to design a roadmap, including prizes that can inspire courageous thinking and break-through solutions. Second, she announced a relationship with Lawrence Livemore National Laboratory, which has the world’s most powerful computer facilities, to generate a robust drug discovery pipeline.

Conner Memorial Lecture: Acceleration Towards Precision Medicine
In the Conner Memorial Lecture on Sunday at the Scientific Sessions, the National Institute of Health’s All of Us research program was introduced by the program director Eric Dishman (Figure 2C). The program aims to create one of the largest, richest biomedical datasets for future studies, thus accelerating scientific and medical breakthroughs to improve and save lives. As announced in AHA 2016 in New Orleans, the AHA and the USA accelerate the drive toward precision health. Eric Dishman said that it’s exciting to imagine what this research platform of at least a million people, hopefully many more million people, will do to accelerate science, to accelerate the discoveries that are going to change people's lives.

Contributions of Japanese Circulation Society (JCS)
The JCS maintains a close relationship with the AHA every
This year, the AHA-JCS Joint Session chaired by Dr. Issei Komuro of the University of Tokyo and Dr. Joseph Loscalzo of the Harvard Medical School focused on DNA damage response and cardiometabolic disease (Figure 3A). Dr. Hiroshi Akazawa of the University of Tokyo talked about DNA damage in the pathogenesis of heart failure. Dr. Tohru Minamino of the Niigata University talked about DNA damage and diabetes mellitus. Dr. Jose Marin-Garcia of the Molecular Cardiology Institute talked about mitochondrial DNA damage in diseases.

The JCS also had a booth in the Science and Technology Hall, which advertised JCS activities to the AHA attendees (Figure 3B).

Late-Breaking Science Sessions
At AHA 2017, 33 late-breaking science sessions were opened. Of them, 18 studies are presented in this section.

Late-Breaking Science From Japan
From Japan, 2 late-breaking science sessions were presented. In “Late-breaking science: EP peri-procedural dilemmas” on Sunday afternoon, Dr. Ahihiko Nogami of the University of Tsukuba reported The Ablation Preoperative Dabigatran in use Envision in Japan (ABRIDGE-J) trial (Figure 4A). And in “Late-breaking Science in Prevention” on Monday morning, Dr. Takeshi Kimura of the Kyoto University presented the Randomized Evaluation of Aggressive or Moderate Lipid Lowering Therapy with Pitavastatin in Coronary Artery Disease (REAL-CAD) trial (Figure 4B).

ABRIDGE-J
The ABRIDGE-J trial compared the efficacy and safety of minimally interrupted dabigatran with uninterrupted warfarin for catheter ablation for nonvalvular atrial fibrillation. Patients in the dabigatran arm had anticoagulation interrupted for 1 or 2 doses to allow for ablation. There were no thromboembolic events in the dabigatran group and 1 event in the warfarin group in the year.1-4
first 90 days following ablation. Dabigatran also showed a significant reduction in the risk for major bleeding compared with warfarin. In conclusion, anticoagulation with minimally interrupted dabigatran was associated with fewer bleeding complications than uninterrupted warfarin, with no increase in thromboembolic events.

REAL-CAD The REAL-CAD trial assessed the safety and efficacy of high-dose pitavastatin (4 mg/day) for better cardiac outcomes compared with lower-dose (1 mg/day) therapy in patients with stable coronary artery disease (CAD). Patients on the higher dose showed sharp and consistent declines in lipid parameters and high-sensitivity C-reactive protein (hsCRP). High-intensity patients also had a 19% reduction in the primary endpoint of cardiovascular death, myocardial infarction (MI), ischemic stroke or unstable angina requiring emergency hospitalization. In addition, a secondary endpoint of coronary revascularization gave the high-dose patients a 17% advantage compared with the low-dose patients. The results of this trial indicated that high-dose pitavastatin 4 mg/day is superior to low-dose pitavastatin 1 mg/day in reducing adverse cardiovascular events among patients with established stable CAD.

Late-Breaking Science in Intervention and Surgery

TRiCS III The Transfusion Requirements in Cardiac Surgery (TRiCS III) trial randomized 5,243 cardiac surgery patients at 74 sites across 19 countries to either a restrictive blood transfusion trigger of <7.5 g/L or a more liberal transfusion trigger of <9.5 g/L. The primary outcome was a composite of all-cause death, MI, new renal failure with dialysis or stroke. This trial shows that a restrictive red-cell transfusion strategy resulted in fewer red-cell transfusions and was noninferior for major clinical outcomes among moderate- to high-risk patients undergoing on-pump cardiac surgery.

PRESEVERE In the Prevention of Serious Adverse Events Following Angiography (PRESEVERE) trial, high-risk patients undergoing angiography with contrast dye were randomized to intravenous 1.26% sodium bicarbonate vs. 0.9% sodium chloride and to oral n-acetylcysteine vs. placebo for the prevention of major adverse outcomes and acute kidney injury. There were no differences across study groups, no differences across primary endpoints and no differences across secondary endpoints.

DACAB The goal of the Dual Ticagrelor Plus Aspirin Antiplatelet Strategy After Coronary Artery Bypass Grafting (DACAB) trial is to assess the safety and efficacy of aspirin monotherapy, ticagrelor monotherapy, or dual antiplatelet therapy (DAPT) with aspirin and ticagrelor among patients undergoing coronary artery bypass grafting (CABG). The primary outcome was saphenous vein graft (SVG) patency at 1 year on computed tomography/coronary angiography. The trial indicates that DAPT results in superior SVG patency at 1 year following CABG compared with low-dose aspirin monotherapy. Although there is an increase in all bleeding with this strategy, major bleeding rates were similar.

Late-Breaking Science in Ischemic Heart Disease

STEMI ACCELERATOR-2 In this study, investigators worked with leaders, healthcare professionals, paramedics, nurses, emergency medicine physicians and cardiologists in 12 major US metropolitan regions to develop centralized STEMI plans for emergency medical service (EMS) catheterization laboratory activation and rapid transfer from non-PCI hospitals. The primary endpoint was the change, from baseline to final quarter, in the proportion of EMS-transported patients with first medical contact to device (FMC2D) time ≤90 min. As a result, the proportion of patients with a FMC2D time ≤90 min increased from 67% to 74% (P<0.002). This coordination of training was associated with significant reductions in heart failure and death, and demonstrated a marked and statistically significant decline in mortality.

GEMINI-ACS-1 An update of the GEMINI-ACS-1 trial, Safety of Rivaroxaban Versus Acetylsalicylic Acid in Addition to Either Clopidogrel or Ticagrelor Therapy in Participants With Acute Coronary Syndrome, assessed the safety of low-dose rivaroxaban 2.5 mg BID compared with aspirin in patients with recent acute coronary syndrome (ACS) also on a P2Y12 inhibitor. This trial showed that low-dose rivaroxaban did not result in higher bleeding compared with aspirin 100 mg daily in patients already on a P2Y12 inhibitor post-ACS.

RE-DUAL PCI The Randomized Evaluation of Dual Antithrombotic Therapy With Dabigatran vs. Triple Therapy With Warfarin in Patients With Nonvalvular Atrial Fibrillation Undergoing Percutaneous Coronary Intervention (RE-DUAL PCI) trial evaluated dual therapy compared with triple therapy among patients with atrial fibrillation...
undergoing coronary revascularization. Triple therapy usually consists of aspirin, an ADP receptor antagonist, and warfarin. Patients were randomized to dual therapy with dabigatran at a dose of 110 mg vs. triple therapy with dabigatran at a dose of 150 mg vs. triple therapy with warfarin. This trial showed that dual therapy with dabigatran was superior to triple therapy with warfarin at preventing bleeding.

Late-Breaking Science in Vascular Disease

FOURIER In Further Cardiovascular Outcomes Research With PCSK9 Inhibition in Subjects With Elevated Risk (FOURIER), patients with atherosclerotic cardiovascular disease (ASCVD) who were receiving background statin therapy were randomized in a double-blind manner to continued statin therapy, plus treatment with either evolocumab, a PCSK9 inhibitor, or placebo. The trial showed that the addition of the PCSK9 inhibitor evolocumab to statin therapy not only reduces the risk of first major vascular events by 18% in patients with stable atherosclerotic disease, but also reduces the risk of recurrent cardiovascular events. In particular, patients with peripheral artery disease (PAD) had larger absolute risk reductions for the primary endpoint (3.5% with PAD, 1.6% without PAD).*

Subanalysis of PAD Patients From EMPA-REG OUTCOME A subanalysis of EMPA-REG OUTCOME compared cardiovascular death, all-cause death, MACE, heart failure hospitalization, a composite of heart failure hospitalization or death, neuropathy and adverse events in patients with and without PAD. In the vulnerable subgroup of patients with type 2 diabetes mellitus (T2DM) and PAD, empagliflozin reduced mortality, hospitalization for heart failure, and progression of renal disease with no observed increase in the risk of lower limb amputation.† These data have important translational implications for risk reduction approaches in patients with T2DM and PAD.

PROPEL The Progenitor Cell Release Plus Exercise to Improve Functional Performance in PAD (PROPEL) trial assessed whether granulocyte-macrophage colony-stimulating factor (GM-CSF) combined with supervised treadmill exercise improves 6-min walk distance, compared with exercise alone and compared with GM-CSF alone in patients with lower extremity PAD. Results showed that at 12 weeks, exercise+GM-CSF did not significantly improve 6-min walk distance more than exercise alone.10

Late-Breaking Science in Heart Failure

ALLSTAR The ALLogeneic Heart STEM Cells to Achieve Myocardial Regeneration (ALLSTAR) trial evaluated treatment with intracoronary allogeneic stem cells compared with placebo among patients with prior MI. The primary outcome was percentage change from baseline in infarct size between groups at 6 months and 12 months. However, intracoronary stem cells did not reduce infarct size at either 6 or 12 months.

REDUCE LAP-HF In Transcatheter InterAtrial Shunt Device for the Treatment of Heart Failure with Preserved Ejection Fraction (REDUCE LAP-HF), 44 HF patients with preserved ejection fraction ≥40% with exercise pulmonary capillary wedge pressure ≥25 mmHg were randomized to receive an interatrial shunt device to lower left arterial pressure or undergo a sham procedure. This trial showed treatment with an interatrial shunt device may reduce pulmonary capillary wedge pressure during exercise.11 However, whether this mechanistic effect will translate into sustained improvements in symptoms and outcomes requires further evaluation.

HOPE-Duchenne The Halt Cardiomyopathy Progression Outcomes Study (HOPE)-Duchenne trial randomized 25 male patients with Duchenne muscular dystrophy (DMD) and a mean age of 17.8 years to receive either standard medical care plus cell-based therapy CAP-1002 (75 million allogeneic cardiosphere-derived cells) or standard medical care alone. The trial showed an approximately 5% reduction at 6 months in scar size in the hearts of those who received CAP-1002 as measured by MRI compared to the standard medical care group. Although this did not achieve statistical significance (P=0.09), it is a notable observation because scar progressively increases over time in DMD.

DECIDE-LVAD The Effectiveness of a Shared Decision Making Intervention for Patients Offered a Destination Therapy Left Ventricular Assist Device for End-Stage Heart Failure (DECIDE-LVAD) trial randomized to a control group of usual care or an intervention group comprised of clinician education, use of destination therapy (DT) left ventricular assist device (LVAD) pamphlet and patient video decision aids. The trial concluded that a shared decision-making intervention for DT LVAD improved patient decision quality as measured by patient knowledge and concordance between stated values and patient-reported treatment preference.

Late-Breaking Science in Hypertension

Blood Pressure (BP) Measurements From the SPRINT Trial In a new analysis from the SPRINT trial, patients were divided into 4 groups: always alone, never alone, alone for rest, and alone for BP measurement. The study showed similar results whether the measurement was taken with a provider present, absent or absent part of the time. Authors concluded that the use of a validated, automated BP device, staff training to allow for a quiet rest period, proper positioning, use of proper cuff size and averaging multiple measurements may be more important than whether the measurement is attended or unattended.

GATEWAY In the Gastric Bypass to Treat Obese Patients With Steady Hypertension (GATEWAY) trial, obese patients on ≥2 antihypertensive agents were randomized to either gastric bypass surgery and medical therapy (n=49) or medical therapy alone (n=47). Gastric bypass surgery plus medical therapy resulted in significantly better BP control compared with medical therapy alone and 11 patients (22.4%) from the gastric bypass group were able to achieve SPRINT levels without antihypertensive drugs. This trial suggests bariatric surgery represents an effective strategy for BP control in a broad population of patients with obesity and hypertension.12

Late-Breaking Science in Prevention

CANTOS The Canakinumab Anti-Inflammatory Thrombosis Outcomes Study (CANTOS) trial evaluated whether canakinumab, which is a monoclonal antibody targeting interleukin-1β, was superior to placebo at preventing adverse cardiac events among patients with a history of MI and elevated hsCRP. Patients were randomized to canakinumab 50 mg vs. canakinumab 150 mg vs. canakinumab 300 mg vs. placebo. This trial indicated patients who showed an high initial response to treatment as measured by hsCRP levels (<2 mg/L after canakinumab) had the greatest reduction in subsequent cardiovascular events, a
25% reduction in major adverse cardiac event, a 31% reduction in cardiovascular deaths and a 31% reduction in all-cause deaths.\footnote{13}

### New Guidelines for Hypertension

The new 2017 ACC/AHA high BP guidelines\footnote{14} were released on November 13, 2017. The guidelines have reclassified the grades of hypertension for the first time as having “elevated” BP with a systolic BP (SBP) level of 120–129 mmHg and stages I vs. II hypertension as being 130–139/80–89 mmHg and >140/>90 mmHg, respectively. Based on the new classification, the total number of American adults with elevated BP will increase to 46%, using the proposed SBP and DBP cut-points for definition of “elevated” BP, as compared with 32% of elevated BP in the adult population recommended in the 2003 JNC guidelines. However, non-drug treatment management is recommended for the majority of adults who will be newly classified as having SBP 120–129 mmHg with DBP remaining <80 mmHg. In addition, as the topic, a new threshold for pharmacologic treatment is set at >130/80 mmHg. However, these new recommendations are based on the 10-year ASCVD risk derived from the ACC/AHA pooled cohort risk calculator of 10-year risk or higher. The use of the risk calculator to identify those in the primary prevention population who should be treated at the new lower 130/80 mmHg threshold is an important advancement, consistent with European risk-based treatment guidelines for hypertension, as well as our own US ATP III guidelines for cholesterol management from 2001. In addition, at the setting of BP >140/90 mmHg, even if ASCVD risk is <10%, antihypertensive treatment is indicated with the goal of reaching <130/80 mmHg. These guidelines for drug treatment initiation and goal BP levels hold for most adults, including those with diabetes.

The new guidelines also place an increased emphasis on the use of out-of-office and self-monitoring of BP; that is, home BP monitoring (HBPM) and/or ambulatory BP monitoring (ABPM) to confirm the diagnosis of hypertension and for titration of BP medication.

### Closing Remarks

The hot 5 days featured topics on cardiovascular diseases. As in last year’s sessions, precision medicine was again a topic this year. In addition, the definition of hypertension has been changed in the new hypertension guidelines, which will present a topic in Japan. I hope that my report will help inform Japanese cardiologists who were unable to join the AHA Scientific Sessions.

### Funding Sources / Disclosures

None.

### References