

# KSC 2017

# DAILY

The 61<sup>st</sup> Annual Scientific Meeting  
of the Korean Society of Cardiology

2017. 10. 12. Thursday

## Today's Highlights

### New Frontiers in Cardiology 1

*Past, Present and Future of Cardiology*

09:00 AM-10:30 AM  
Rm. Theatre (B1)

### Late Breaking & Featured Research from Asia-Pacific 1

10:30 AM-12:00 PM  
Rm. Theatre (B1)

### Cross Specialty Session 1: Intervention & Arrhythmia

*Anticoagulation in AF Patients Undergoing PCI*

14:00 PM-16:00 PM  
Rm. Theatre (B1)

### Late Breaking & Featured Research from Korea

16:00 PM-18:00 PM  
Rm. Theatre (B1)

### E-Poster Session

09:00 AM-12:00 PM, 14:00 PM-17:00 PM  
Rm. Vista (B2)

## KSC 2017 Daily Welcome Message



Tai Ho Rho, MD, PhD  
President, the Korean Society of Cardiology

Congratulations on the 60<sup>th</sup> anniversary of the Korean Society of Cardiology.

Confucius (Kong Qiu) used the word "Isun(耳順)" for the age of sixty, which means the age of mastering the reason behind everything and understanding all as heard. Cardiology has begun to develop in the western world where heart diseases are more prevalent. Despite the late start, Korean doctors and scientists have made great

academic achievements and are contributing to healthy human hearts. I am very proud of our contributions and achievements. It is getting harder for doctors to devote themselves only to their patients and scientists only to research because of rapid and diverse changes surrounding

the field of medicine. Hospitality, which is the essence of historical medical arts, is being threatened even by the development of technology. However, as things get more difficult,

“*We have to get back to the basics and principles and question ourselves on why we are working in this profession.*”

On this lovely mid-autumn day, I would like to celebrate our 60<sup>th</sup> anniversary and the success of the 61<sup>st</sup> Annual Scientific Meeting. Also, I sincerely would like to express my gratitude to our members and the executive board members for this meeting.

Thank you.



Seung-Jung Park, MD, PhD  
Chairman, Board of Trustees, the Korean Society of Cardiology

On behalf of the Korean Society of Cardiology, I would like to extend my sincere welcome to the 61<sup>st</sup> Annual Scientific Meeting of The Korean Society of Cardiology (KSC 2017) to all of the attendees. KSC 2017 is being held on October 12-14 at Walkerhill, Seoul, Korea with the slogan "Heart Up, Life Up". Marking the 60<sup>th</sup> Anniversary of the Korean Society of Cardiology this year,

“*Our society would like to draw the blueprint of cardiology looking back the path we have followed over the past half-century.*”

As one of the world's leading Cardiology Societies, we are expecting to show the essence of the 60-year history through our 61<sup>st</sup> Annual Scientific Meeting. KSC 2017 is composed of various programs such as the "New Frontiers in Cardiology" session with world-class researchers

and the "Late Breaking & Featured Research from Asia-Pacific" session, which will highlight the latest knowledge and research in the field of cardiology. In the "Meet the Editor-in-Chief" session, we have invited the Editors-in-Chief of prominent foreign journals (JACC: Cardiovascular Imaging, Circulation: Cardiovascular Interventions and Circulation Journal) for the globalization of Korean Circulation Journal (KCJ). Moreover, the "Cross Specialty" sessions for vigorous exchanges in each field, the "Joint" sessions with affiliated Asian cardiology societies, and the "Education Program" for clinical fellows are organized for KSC 2017. You may experience diverse scientific programs with special impact, as we tried to contain our 60-year history in KSC 2017. We hope that KSC 2017 will be a meaningful chance to share each other's knowledge and to build a network with internal and external cardiac experts.

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#2017년 9월 3일 기준  
References 1. 식품의약품안전처. 제품정보. Available at <http://cdx.dug.mfds.go.kr/#/ICBA03F010>. Accessed 03 Sep 2017.

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## Program at a glance: Day1, Oct 12, 2017

	Theatre (B1)	Grand 1 (B1)	Grand 4 (B1)	Grand 5 (B1)	Grand 6 (B1)	Cosmos (3F)	Calla (3F)	Art (4F)	Oak (4F)	Pine (4F)
09:00	New Frontiers in Cardiology 1		Basic Research 1	Acute Myocardial Infarction 1	Oral Abstracts Vascular	Oral Abstracts Arrhythmia 1	Heart Failure 1	Oral Abstracts Echo 1	Cardiometabolic Syndrome 1	Oral Abstracts Women
10:00										
11:00	Late Breaking & Featured Research from Asia-Pacific 1	Intervention 1	Basic Research 2	Vascular 1	Acute Myocardial Infarction 2	Arrhythmia 1	Heart Failure 2	Echo 1	Cardiometabolic Syndrome 2 (Joint Session with Hypertension)	Women Heart Disease 1
12:00	Scientific Session 1 [Bayer]									
12:40						Scientific Session 3 [Daewoong]	Scientific Session 4 [Dong-A ST]	Scientific Session 5 [Samjin]		
12:50						Diamond Session [BMS]				
13:30										
14:00	Cross Specialty Session 1: Intervention & Arrhythmia	Oral Abstracts CAD 1	Oral Abstracts Basic Research 1	Lipid 1	Acute Myocardial Infarction 3	Oral Abstracts Arrhythmia 2	Heart Failure 3	Echo 2	Oral Abstracts Epidemiology & Prevention	Women Heart Disease 2
15:00										
16:00	Late Breaking & Featured Research from Korea	Intervention 2	Health Policy 1	Lipid 2	Oral Abstracts Intervention 1	Arrhythmia 2	Oral Abstracts Heart Failure 1	Oral Abstracts Echo 2	Vascular 2	Oral Abstracts Basic Research 2
17:00										
17:30										
18:00										

### Scientific & Diamond Sessions

#### Scientific Session 1 [Bayer]

Protecting Your AF Patients with Multi-Morbid through the Use of Rivaroxaban

» Oct 12, 12:00-12:40 Rm. Theatre

#### Scientific Session 2 [Hanmi]

Optimal CVD Control with Triple Therapy Based on "Amlodipine/Losartan" FDC

» Oct 12, 12:00-12:40 Rm. Grand1

#### Scientific Session 3 [Daewoong]

Primary Prevention of CVD in an Intermediate Risk Population

» Oct 12, 12:00-12:40 Rm. Cosmos

#### Scientific Session 4 [Dong-A ST]

Hypertension Paradox and New ARB Azilsartan

» Oct 12, 12:00-12:40 Rm. Calla

#### Scientific Session 5 [Samjin]

Diuretics in the Treatment of Heart Failure

» Oct 12, 12:00-12:40 Rm. Art

#### Diamond Session [BMS]

The NOACs: Evidence Meets Experience, Experience Meets Evidence

» Oct 12, 12:50-13:30 Rm. Cosmos

Presentation

**KSC 2017**

**Case zone**

*You could be the Case Winner!*

**Oct.12-14**  
**12:40-13:50**

 **Vista Hall (B2)**

2017년  
대한심장학회 정기총회  
- KSC's 60th Anniversary -

**Oct. 13 (Fri)**  
**17:30**

**Rm. Theatre**

추첨을 통해  
다양한 상품을 드립니다.



# New Frontiers in Cardiology 1

## Past, Present, and Future in Echocardiography



Jae K. Oh, MD  
Mayo Clinic, USA

Since the first demonstration of its ability to image cardiac structures by Dr. Edler and Professor Heinz, echocardiography (Echo) has established its position as the first imaging modality used for patient

care in the field of cardiology. The first true clinical application of Echo was described by Dr. Feigenbaum's group in its use in detection of pericardial effusion which was a difficult task to do in 1965. The next evolution was M-mode Echo, which allowed measurement of cardiac dimensions, left ventricular (LV) ejection fraction calculation, detection of abnormal structures, and hemodynamics crudely. After that, technical advances made it possible to generate 2-dimensional moving tomographical images, which has remained as the backbone of Echo to assess cardiac structures and function. Reduced global systolic function, regional wall motion abnormalities from coronary disease, valvular abnormalities, congenital heart diseases, pericardial effusion or tamponade, and cardiomyopathies were

readily recognized, but only qualitatively or at best semi-quantitatively until the advent of Doppler Echo. Doppler Echo pioneered by Norwegian and Japanese investigators made this imaging modality a reliable hemodynamic tool which has replaced many of invasive hemodynamic assessments including valvular hemodynamics, pulmonary artery pressure, constrictive pericarditis, and LV filling pressure. Color flow imaging allows quantitating the amount of regurgitant or shunt flow as well as locating the exact site of abnormal flow. Using pulsed- and continuous-wave Doppler echo, flow velocity and pressure gradient can be accurately assessed quantitatively. Ultrasound may not be able to visualize all cardiac structures clearly especially due to intervening less penetrable materials such as air, calcium, thick chest, or intracardiac device. In those circumstances, contrast and transesophageal Echo improve imaging quality. Contrast echocardiography also allows assessment of myocardial perfusion and assessment of intracardiac or intrapulmonary shunt. Transesophageal Echo not only improved imaging quality and resolution of cardiac images, but also has aided development or improvement of intraoperative techniques and interventional procedures such as mitral valve repair, myectomy, repair of

congenital heart diseases, transcatheter valve replacement, and mitra-clip. The most recent advances are strain imaging which is more sensitive in detecting myocardial dysfunction and 3-dimensional Echo with more than 3000 matrix elements in the transducer which duplicates our visual images of cardiac structures in real-time. Echo is now getting miniaturized and used as a point of care in the physician's office, critical care unit and emergency department. The transducer can be connected to a smart phone to display images. Future of Echo will be that it will become an extension of physical examination for initial screening and will also be used for final diagnosis for most cardiac diseases. Moreover, most of interventional and intraoperative procedures will require the assistance from echocardiography. Hence, echocardiography training will be a basic requirement for all personnel involved in the care of cardiac patients.

disease, several limitations persist, i.e. unfavorable coronary anatomy. Now, overall success in intervention to chronic total occlusion (CTO) has risen to over 80% in experienced hands. To expand intervention to most patients with CTO, novel approaches need to be developed.

Refractory restenosis is uncommon but is difficult to treat. Drug coated balloons, introduced in 2003, have been shown to be as effective as placing another DES stent in preventing restenosis but allows for repeat treatment if needed in the future. Recently, bioabsorbable stents (scaffolds) have gained considerable interest since the stent is completely absorbed after healing has occurred when the stent is no longer needed. This allows the vessel to regain vascular function, restore access to side branches and allow PCI in the future without the complications of a prior stent. The biodegradable magnesium stent (DREAMS) has shown promise in the most recent PROGRESS AMS trial and in experimental studies appears to have a low thrombosis rate. However, given the concerns from the ABSORB trial, the future of these stents seems less clear.

Percutaneous valvular intervention is another filed for intervention. Since the first human experience in percutaneous pulmonic valve replacement in 2000 by Bonhoeffer, Cribier and colleagues performed the first percutaneous aortic valve replacement (TAVR) in 2002. The balloon expandable Edwards SAPIEN valve was the first commercial valve to be studied in the randomized Partners B trial in 2010. TAVR has seen enormous growth with over 100,000 TAVRs in the US since FDA approval in 2011. Continued growth is expected with expansion of the indications. The PARTNERS 3 and SURTAVI randomized trials both showed equivalent (or superior) outcomes in intermediate risk patients and registry studies have shown TAVR to be equal in low risk patients. Randomized trials in low risk patients are being conducted.

The growth of interventional cardiology has been remarkable over the past 40 years with coronary interventions and structural valvular heart disease interventions more recently. The future breakthroughs are not clear but solutions for the treatment of CTO and emergence of percutaneous mitral valve replacement are likely. Improved imaging with fusion imaging and real time 3D imaging will be needed to guide these advanced techniques.

## Past, Present, and Future in Interventional Cardiology



David Faxon, MD  
Brigham and Women's Hospital, USA

Angioplasty was first performed 54 years ago by Charles Dotter, a radiologist from Portland Oregon. He developed a series of graduated catheters to enlarge peripheral vessels (Dotter procedure). Since then, the first coronary angioplasty was performed by Andreas Gruentzig, a Swiss Aniologist, on a 38-year-old man on Sep, 14, 1977. In its early application, the immediate success rate was 60% and 7% had emergency surgery. However, the procedures success increased with the development of smaller balloon catheters with flexible movable guidewires and improved adjunctive pharmacology. The acute complications were dramatically reduced with the introduction of self-expanding bare metal stents by Puel and Sigwart in 1986. Subsequently, bare metal stents (BMS) were shown to markedly reduce acute closure and dramatically reducing the need for emergency surgery. They also reduced restenosis from 30-40% with balloon angioplasty to 10-20%. In 2001 drug eluting stents (DES) were introduced and soon largely replaced BMS. The first-generation DES were limited by late and very late stent thrombosis. Second generation DES with improved stent design, antiproliferative drugs and polymers have shown further reductions in stent thrombosis and restenosis.

Despite the technological advances and applicability of the procedure to most patients with coronary artery

**Young**  
**Investigator award**  
**Competition**  
~Awards Ceremony~

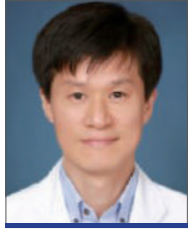
**Oct. 13 (Fri), 17:30 Rm. Theatre**

**New Frontiers in Cardiology 1**

» Thursday, Oct 12, 09:00-10:30 AM / Theatre

# Acute Myocardial Infarction

## Invasive Physiologic Assessment of Culprit and Non-Culprit Lesion in Acute Myocardial Infarction: Valid or Unreliable?



**Sung Gyun Ahn, MD, PhD**  
Yonsei University  
Wonju College of Medicine, Korea

There has been an explosion of invasive physiologic technologies that complement the diagnostic capabilities of coronary angiography. Those include coronary flow reserve (CFR), fractional flow reserve (FFR), instantaneous wave-free ratio (iFR), index of microcirculatory resistance (IMR), and hyperemic microvascular resistance (HMR). These invasive physiological indices have a body of evidence of both diagnostic and prognostic utility in patients with stable ischemic heart disease (SIHD), whereas their usefulness in AMI setting remains controversial.

Is invasive physiological assessment for the culprit coronary artery valid? It depends on the type and purpose of the exam. The FFR value in the culprit artery can be overestimated and varies according to the elapsed time after AMI and the presence of myocardial obstruction. Therefore, FFR for the assessment of residual epicardial stenosis of the culprit artery immediately after primary PCI is not generally recommended. Indeed, deferring PCI on the basis of nonischemic FFR (>0.75) in patients with AMI was associated with significantly worse outcomes than those with SIHD. FFR-guided treatment decision making did not improve outcome compared to angiography only-guided treatment strategy in patients with NSTEMI. In contrast, increased IMR, increased HMR, and decreased CFR measured in the culprit artery after PCI reflect microvascular dysfunction associated with the lack of recovery of regional wall motion abnormalities, non-viability, MVO, and increased mortality.

On the other hand, invasive physiological assessment for non-culprit coronary stenoses is likely valid. The recent COMPARE-ACUTE study revealed that in patients with STEMI and multivessel disease (MVD) who underwent primary PCI of an infarct-related artery, the addition of FFR-guided complete revascularization of non-infarct-related

arteries in the acute setting resulted in the risk of composite cardiovascular outcome that was lower than the risk among those who were treated for the infarct-related artery only.

In conclusion, it is assumed that as MVD is frequent in patients with AMI and have a prognostic impact and that a comprehensive understanding of physiologic evaluation and its appropriate application could not only provide useful prognostic information but also improve clinical outcome.

## Potent P2Y12 Inhibition in Asian: Who Benefit?



**Yongwhi Park, MD**  
Gyeongsang National University Changwon Hospital, Korea

Potent platelet inhibitors, prasugrel or ticagrelor, significantly reduced ischemic events in randomized trials. However, the prescription rate of potent P2Y12 inhibitors was lingering around 30% in Asian patients mainly due to the fear of high bleeding risk. A recent report from a large Korean registry (KAMIR-NIH) data demonstrated that ticagrelor did not reduce clinical events, but rather increased bleeding events. However, this finding cannot advocate clinical futility of potent P2Y12 inhibitors in Asians due to inherent drawbacks of registry data. Ischemic recurrences remain high even 1 year after an insult of AMI. This highlights the importance of antiplatelet therapy optimization for Asian patients to balance ischemic and bleeding risks. Indeed, clinical benefits from prasugrel or ticagrelor were exceptionally high in patients with DM or CKD. However, our analysis using KAMIR-NIH registry data demonstrated that clinical benefits of potent P2Y12 inhibitors in AMI patients were more prominent in non-CKD patients than CKD patients (**Figure 1**). Moreover, compared to clopidogrel, potent P2Y12 inhibitors reduced all-cause death in non-CKD patients but not in CKD patients. This controversial result emphasizes the importance of the assessment of benefit/risk ratio when using a potent P2Y12 inhibitors. Although several tools for ischemic or bleeding risk stratification are in use, most of them are focused on the early risk prediction and developed before

the advent of potent P2Y12 inhibitors. Among the 4 risk scoring scales - the GRACE score, DAPT score, the score from the PARIS study, and the CRUSADE score - only the CRUSADE score - only the CRUSADE score was a good tool for the prediction of the net clinical benefit in patients with potent P2Y12 inhibitors, while all scoring scales except the DAPT score were good tools for the net clinical benefit in clopidogrel users. Despite enhanced bleeding events related to potent P2Y12 inhibitor, potent platelet inhibition is required for the secondary prevention of high risk patients after MI. Scoring systems to

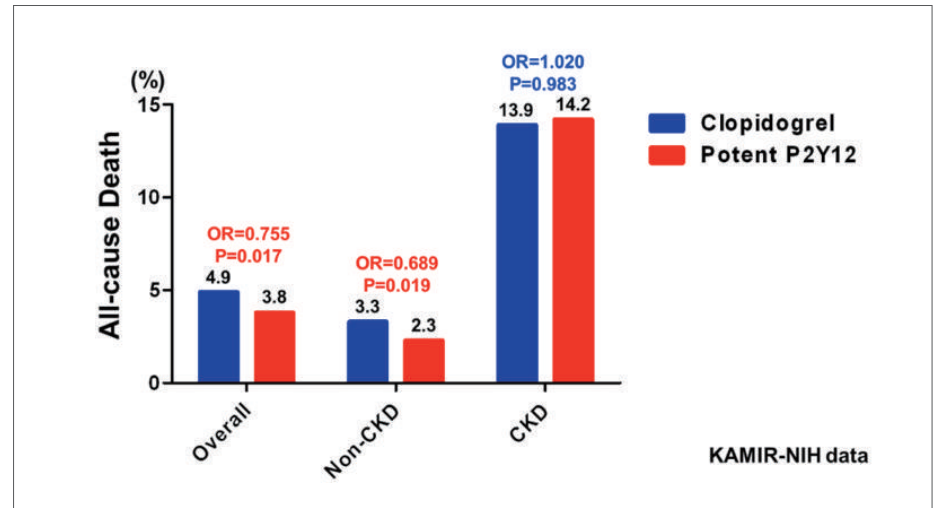


Figure 1. Mortality benefits of potent P2Y12 inhibitors according to renal function

define a benefit/risk ratio at the individual patient level are mandatory in daily clinical practice.

define a benefit/risk ratio at the individual patient level are mandatory in daily clinical practice.

### Acute Myocardial Infarction

#### AMI 1 / What are Differences from Western AMI Patients? (International)

» Thursday, Oct 12, 09:00-10:30 AM / Grand 5

#### AMI 2 / Medical Treatment of AMI

» Thursday, Oct 12, 10:30 AM-12:00 PM / Grand 6

#### AMI 3 / Interventional Treatment of AMI

» Thursday, Oct 12, 14:00-16:00 PM / Grand 6

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References  
NVAf: non-valvular atrial fibrillation  
1. Patel MR, Mahaffey KW, Garg J, et al. Rivaroxaban versus warfarin in nonvalvular atrial fibrillation: A randomised trial. *N Engl J Med*. 2011;365(10):833-41.  
2. Tamayo S, Probst A, Patel MR, et al. Characterizing major bleeding in patients with non-valvular atrial fibrillation: A pharmacovigilance study of 37 467 patients taking rivaroxaban. *Clin Cardiol*. 2015;38(2):63-68.  
3. Camm J, Ambrose P, Hays S, et al. XANTUS: A Real-World, Prospective, Observational Study of Patients Treated with Rivaroxaban for Stroke Prevention in Atrial Fibrillation. *European Heart Journal*. 2015 (Epub ahead of print:doi:10.1093/eurheartj/ehv466).



60<sup>th</sup> Anniversary Interview

## Dear colleagues,



**Yun Shik Choi, MD, PhD**  
11<sup>th</sup> Chairman, Korean Society of Cardiology  
Chairman, the preparatory committee for the 50<sup>th</sup> anniversary of KSC

I am very pleased to congratulate the 60<sup>th</sup> anniversary of the Korean Society of Cardiology. For the past 60 years, KSC has promoted the national health of Korea through vibrant research activities. I am proud that KSC members have published their articles on international journals or symposiums and contributed to great advances in cardiology all over the world.

When KSC was founded in 1957, treatment or research facilities were extremely rare, and everything was confused by the Korean War. Despite these difficulties, KSC developed into an international society that we see today because of the members with great passion for research and dedicated efforts.

I look forward to seeing KSC prosper and contribute to the promotion of cardiovascular health. I wish all the best for the Korean Society of Cardiology, and congratulations once again on the 60<sup>th</sup> anniversary of KSC.

Thank you.

## A very good day to honorable KSC members!



**Seung Woo Park, MD, PhD**  
President and Chairman, Executive Board of KSE

As the president of the Korean Society of Echo-cardiography (KSE), I would like to congratulate the 60<sup>th</sup> anniversary of the Korean Society of Cardiology on behalf of our members.

The Korean Society of Cardiology, founded in the aftermath of the Korean War in 1957, has laid the cornerstone for the cardiovascular community in Korea. We, KSE and other related societies, owe our activity so far to the Korean Society of Cardiology's support. It is also undeniable that KSC has been the center of cardiovascular research since its inception.

I expect that the role of KSC will become even more immense in the diagnosis, treatment, and prevention of cardiovascular diseases, as well as the training of specialists and patient education for our aging society. That is why the KSC's executive members must work hard for the development of KSC with a great sense of mission, and members should do the best in their roles. KSE will deservedly accompany the Korean Society of Cardiology to contribute to the cardiovascular research and education in Korea. Apart from supporting the development of various fields, I also hope that KSC constantly supports the activities of the related societies.

Lastly, I wish that KSC gathers diverse opinions from the members and continuously discovers outstanding researchers in order to successfully meet the era of the Fourth Industrial Revolution.

Congratulations again to the 60<sup>th</sup> anniversary of the founding of Korean Society of Cardiology.

Congratulations on the 60<sup>th</sup> anniversary of the Korean Society of Cardiology

**Hyo-Soo Kim, MD, PhD**  
Chairman, Board of Directors, The Korean Society of Interventional Cardiology (KSIC)  
Chairman, Board of Directors, The Korean Society of Lipid & Atherosclerosis (KSoLA)

I'm Hyo-Soo Kim, the Chairman of the Korean Society of Interventional Cardiology (KSIC) and the Korean Society of Lipid & Atherosclerosis (KSoLA), which are working with the Korean Society of Cardiology (KSC) to develop the academic field of cardiovascular medicine.

I pay tribute to the professionalism and dedication of the people who prepared for KSC 2017, celebrating its 60<sup>th</sup> anniversary this year, including the Chairman, Seung-Jung Park, the Secretary, Jae-Kwan Song, and the director of Scientific Committee, Donghoon Choi.

## To honorable KSC members,



**Young-Hoon Kim, MD, PhD**  
President, Korean Heart Rhythm Society

Congratulations on the 60<sup>th</sup> anniversary of the Korean Society of Cardiology.

The Korean Society of Cardiology (KSC), established in April 1957, has established its position as one of the most exemplary societies in the world.

I do appreciate the seniors who have devoted their efforts that brought KSC its international prestige. The sincerity and enthusiasm of the pioneers, who planned and organized the KSC in a tough situation, will linger long in our memories.

KSC always seeks the value more than just a society itself. For clinical and basic researchers in the field of cardiology, KSC has opened doors for free discussions and striven for diversity. Through these efforts, KSC has encouraged many experts and researchers of cardiology. Now, KSC functions as a hub for other international societies.

This year, Korean Heart Rhythm Society (KHRS) separated from KSC to form its own independent society. Before this, it was one of the affiliated research groups of KSC. This was possible because KSC has built a stable foundation for arrhythmia study. Thank you all, who dedicated a lot to make this possible.

KHRS will do our best to open a new chapter in the future with KSC by studying the field of cardiology and striving for the betterment of medical environment.

Congratulations again on KSC's 60<sup>th</sup> anniversary!

Congratulations on the 60<sup>th</sup> Anniversary of the Korean Society of Cardiology

**Myeong-Chan Cho, MD, PhD**  
President, the Korean Society of Hypertension

With the leadership of all the past executive members and the efforts of members, KSC has become a leading society for medical advancement as well as researches and practices in the field of cardiology. KSC has raised the level of medical care for cardiovascular diseases in Korea to the world's highest and has greatly contributed to public health promotion.

Furthermore, KSC has been recognized as one of the leading societies not only within the country but also internationally, establishing itself as a truly global leader in cardiology.

The maintenance of close collaboration among the government and related societies including the Korean Society of Hypertension should be highly encouraged in order to raise cardiovascular awareness, especially considering its high burden of disease and healthcare expenditure.

In order to prepare for a healthy aged society in Korea, prevention and overcoming of cardiovascular diseases is imperative, and I believe that KSC will lead us through the various approaches and activities.

I sincerely hope that KSC remains one of the greatest global societies that communicates with the people for health promotion, receives trust and respect from the people, and develops through creative research and international cooperation.



The day that I first became associated with KSC was 31 years ago. I remember that I made a presentation in KSC 1986 when I was a second-year resident in SNUH. The glorious history of KSC, which was once a small society but has now developed into a splendid academic body of today, is possible because of the seniors' endeavors and sacrifice. I would like to deeply thank for their contribution.

As the Fourth Industrial Revolution looms over us, KSC, celebrating its 60<sup>th</sup> anniversary, should have a new development strategy. One example of this would be to broaden its field of research to several key fields, such as vascular biology, atherosclerosis, metabolic disease, diabetes, cerebrovascular disease, and chronic inflammatory diseases. The merging of these fields would provide a broad perspective that could generate the Fourth Medical Revolution of the cardiovascular system. From this point of view, the Annual Spring Joint Scientific Conference of Cardiovascular Medicine hosted by 5 societies including KSC, KHRS, KSIC, KSE, and KSoLA, would be an important opportunity to accomplish medical innovation.

As the Chairman of KSIC and KSoLA, I will work together with KSC to nurture young scientists who will lead us into a bright future. Please let us celebrate the 60<sup>th</sup> anniversary of the KSC!

# AF & CAD: Pursuing the Balance

## Atrial Fibrillation & Coronary Artery Disease: The "Sweet-Spot" between Anticoagulants and Antiplatelets

Atrial fibrillation (AF) and coronary artery disease (CAD) are the most common cardiac diseases which predispose patients to significant medical burden. Both diseases are associated with not only increased mortality but also devastating medical conditions such as disabling stroke or acute myocardial infarction. Preventing ischemic stroke is one of the most important goal in managing AF patients. Therefore, anticoagulation with either warfarin or non-vitamin K oral anticoagulants (NOAC) is the established treatment for AF patients with increased risk of stroke (usually patients with CHA<sub>2</sub>DS<sub>2</sub>-VASc ≥ 2). Antiplatelets, such as aspirin, has long been used to treat CAD patients to prevent major adverse cardiac events, although there have been some controversies in the recent days. Whenever CAD patients receive percutaneous coronary intervention (PCI), dual antiplatelet therapy is inevitable to prevent stent thrombosis. The optimal duration of dual antiplatelet therapy is not firmly determined, but it is usually given for at least 6 months. Furthermore, single antiplatelet therapy is maintained indefinitely.

The underlying mechanism of the increased risk of ischemic stroke in AF patients is not fully understood. In contrast to acute coronary syndrome mainly caused by platelet-rich white thrombus, thrombus caused by AF in the left atrium or the left atrial appendage is known to be fibrin-rich red thrombus. It is suggested that blood stasis caused by AF makes the left atrium and the left atrial appendage a suitable place for fibrin-rich red thrombus formation. The role of platelets in the formation of thrombus in patients with AF is limited. Therefore, the main goal of antithrombotic treatment for patients with AF is to prevent fibrin formation rather than to prevent platelet aggregation. Aspirin and P2Y<sub>12</sub> inhibitors, such as clopidogrel or ticagrelor, widely used to prevent platelet aggregation in patients with coronary artery disease, have limited efficacies compared to warfarin or NOAC for the prevention of ischemic stroke in patients with AF. Therefore, therapeutic anticoagulation with warfarin or NOAC is the standard of care for AF patients to prevent ischemic stroke. At the same time, antiplatelet therapy is the standard practice for CAD patients especially for patients undergoing PCI, and the role of anticoagulants for CAD patients is not established. As far as the 'current' data suggest, anticoagulants and antiplatelets have minimal, if any, crossover effect across AF and CAD due to different mechanism of thrombus formation.

Unquestionably, anticoagulation and antiplatelet therapy is associated with significant risk of bleeding including intracranial haemorrhage. Furthermore, both treatments have 'synergistic' effect - the more antithrombotic drugs used, the more bleeding. Triple antithrombotic therapy, which consists of one anticoagulant and two antiplatelets, has unacceptable bleeding risk. The combination of AF and CAD not only is a common clinical setting, but it is also a complex setting to find an optimal antithrombotic regimen. Multiple trials suggest that prolonged triple antithrombotic regimen is not adequate due to increased risk of bleeding. However, it is also critical to prevent catastrophic complications of AF and CAD, such as disabling stroke, acute myocardial infarction, or sudden cardiac death. Therefore, we have to find the balance.



**Min Soo Ahn, MD**  
Yonsei University  
Wonju College of  
Medicine, Korea

In the cross speciality session I, Dr. Ahn will present optimal anti-thrombotic strategy in AF patients undergoing PCI. Dr. Ahn will suggest immediate post-PCI regimen and maintenance regimen for various clinical situations such as stable CAD vs. acute

coronary syndrome or patients at high risk of bleeding vs. not at high risk of bleeding. To summarize, in patients with stable CAD and AF undergoing PCI at high bleeding risk, joint consensus document recommends that triple therapy (OAC, aspirin 75–100 mg daily, clopidogrel 75 mg daily) or dual therapy consisting of OAC (i.e. whether NOAC or a VKA) and clopidogrel 75 mg/day should be given for 4 weeks after PCI followed by dual therapy with OAC and clopidogrel 75 mg/day (or alternatively, aspirin 75–100 mg/day) continued for up to 12 months. In patients with ACS and AF at high risk of bleeding, the initial use of triple therapy (OAC, aspirin, and clopidogrel) should be considered for 4 weeks following PCI irrespective of stent type; this should be followed by long-term therapy (up to 12 months) with OAC and a single antiplatelet drug (preferably clopidogrel 75 mg/day, or as an alternative, aspirin 75–100 mg/day). And then, Long-term antithrombotic therapy with OAC (i.e. whether NOAC or a VKA) (beyond 12 months) is recommended in all patients. The use of NOACs in the antithrombotic management of AF patients undergoing coronary stenting is a subject of continued interest, with clinical trials ongoing or being planned.



**Young-Hoon Jeong, MD, PhD**  
Gyeongsang National  
University Changwon  
Hospital, Korea



**Soryung Lee, MD, PhD**  
Soon Chun Hyang  
University, Korea

There have been major clinical trials, some of which are ongoing, searching for the best antithrombotic treatment in AF patients undergoing PCI such as RE-DUAL-PCI, PIONEER-AF-PCI, AUGUSTUS, APPROACH-ACS-AF, OAC-ALONE. Dr. Lee and Dr. Jeong will review these clinical trials and suggest ideal antithrombotic regimen for AF patients undergoing PCI. RE-DUAL-PCI and PIONEER-AF-PCI will be reviewed thoroughly by Dr. Lee. In brief, stented patients with AF were randomized to 1 of 3 groups in PIONEER AF-PCI trial; rivaroxaban 15mg daily plus P2Y<sub>12</sub> inhibitor for 12 months (group 1), rivaroxaban 2.5mg twice a day with stratification to a prespecified duration of dual antiplatelet therapy of 1, 6, 12 months (group 2), and triple therapy with warfarin (group 3). Although all-cause mortality was similar in the 3 groups, hospitalizations for bleeding and cardiovascular causes were reduced in 2 experimental groups. The results of the PIONEER AF-PCI trial showed that the rates of clinically significant bleeding associated with dual therapy with three-quarter-dose rivaroxaban, as well as the rates associated with triple therapy with very low-dose rivaroxaban, were lower than the rates with triple therapy with warfarin (Figure 1). Recently, the result of RE-DUAL PCI was published. This study showed that two different regimens of full-dose anticoagulation therapy with dabigatran plus P2Y<sub>12</sub>

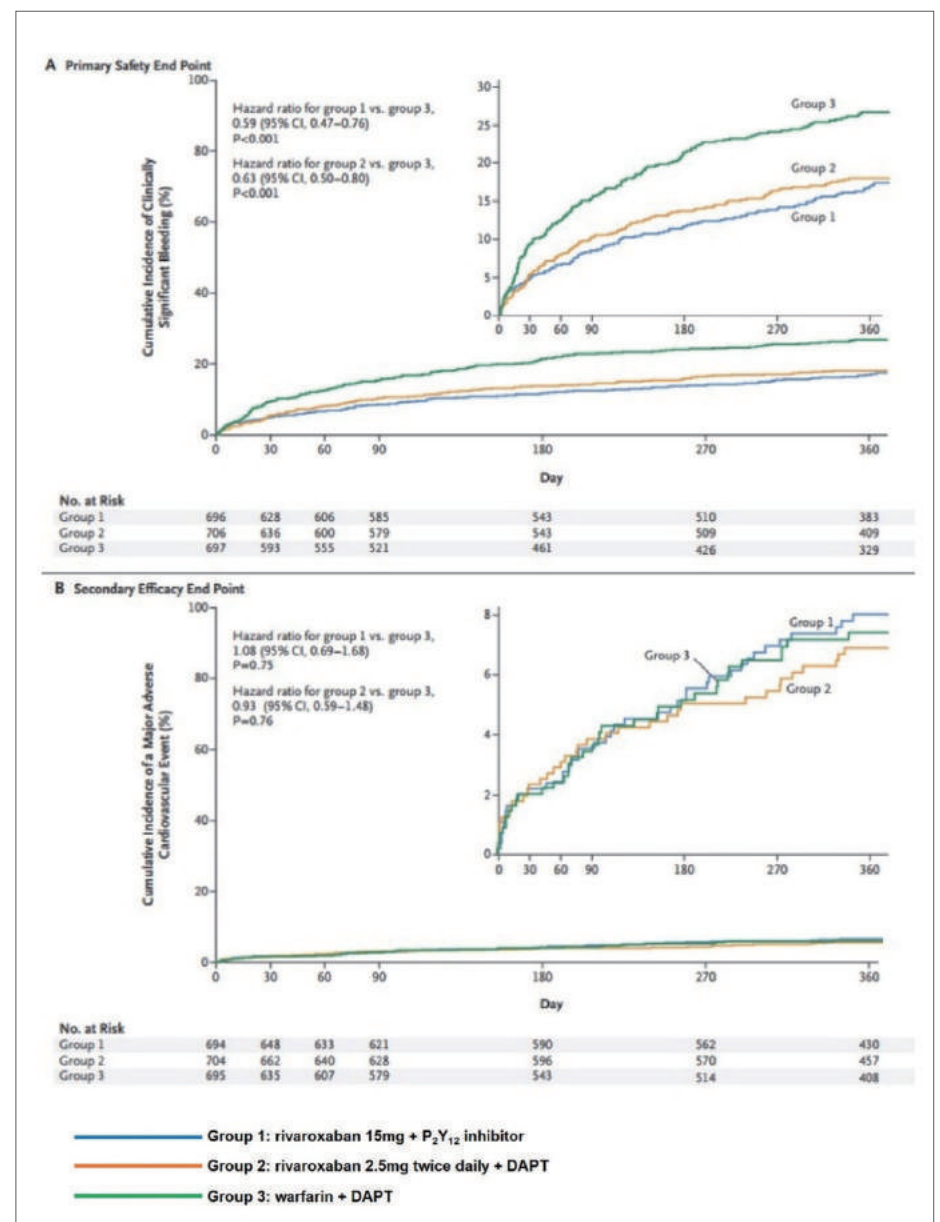


Figure 1. Summary of key results from the PIONEER AF-PCI study

inhibitor resulted in a risk of major or clinically relevant nonmajor bleeding events that was significantly lower than the risk with triple therapy with warfarin. Also, dual regimen [dabigatran + P2Y<sub>12</sub>

inhibitor] was noninferior to triple regimen [warfarin+aspirin+P2Y<sub>12</sub> inhibitor] with respect to composite efficacy end point

# Korean Atrial Fibrillation Network Genome-wide Association Study for Early-onset Atrial Fibrillation Identifies Novel Susceptibility Loci

## Novel Susceptibility Gene Loci Associated with Early Onset Atrial Fibrillation



Hui-Nam Pak, MD, PhD  
Yonsei University Severance Hospital, Korea

Atrial fibrillation (AF) is the most common sustained arrhythmia in clinical practice, and it is associated with increased morbidity and mortality. Although atrial fibrillation is predominantly a disease of the elderly, younger subjects without clear precipitating factors for AF may present with AF. These subjects have been shown to demonstrate familial clustering with significantly increased risk of AF being demonstrated for

family members of patients with lone AF. Arnar et al. also reported a five-fold increased risk of incident AF in first-degree relatives of patients diagnosed with AF before the age of 60. Previous studies to determine genetic susceptibility loci for atrial fibrillation has shown an ethnic difference between Europeans and Asians. As such, the study by Park et al has clinical significance in that it has identified two novel genetic loci associated with early onset atrial fibrillation, defined as atrial fibrillation onset before the age of 60. A genome-wide association study (GWAS) was conducted with 672 cases ( $\leq 60$  years old, Yonsei AF Ablation cohort) and 3700 controls (Korea Genome Epidemiology Study). Replication study was conducted with 200 independent cases of Korean AF Network and 1812 controls. Five previously proven genetic loci (1q24/PRRX1, 4q25/PITX2, 10q24/NEURL, 12q24/TBX5, and 16q22/ZFHX3) were validated. Two novel genetic loci associated with early-onset AF were found on

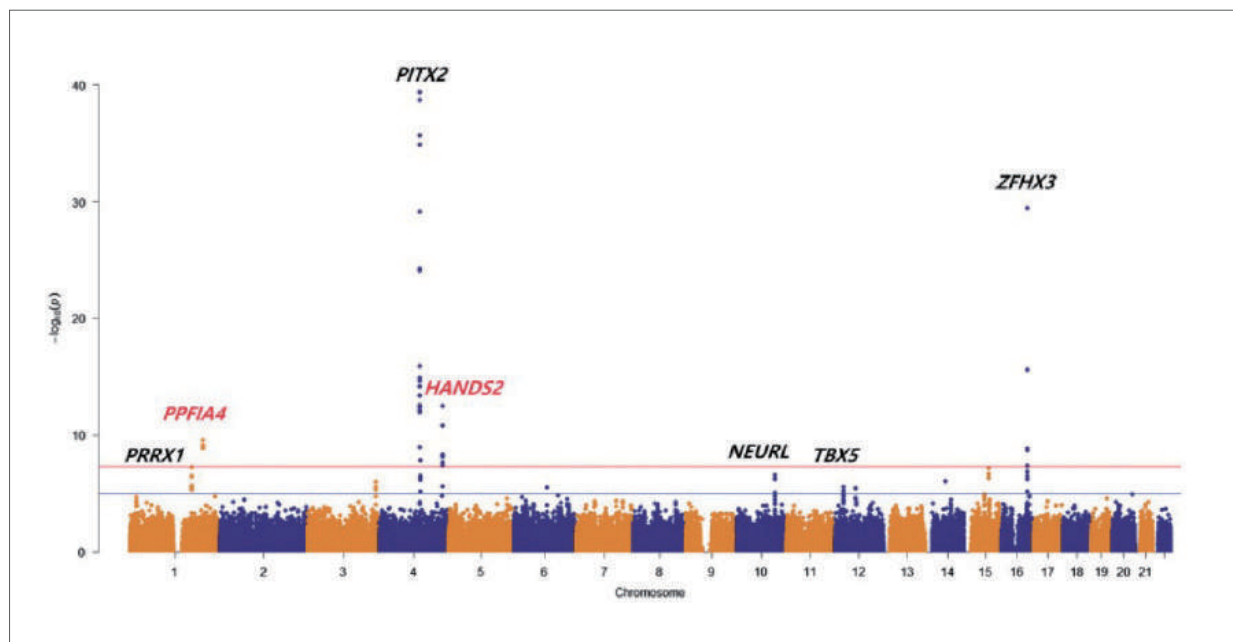


Figure 1. Manhattan plot of GWAS results. Among four loci that showed associations with early onset AF with  $P < 5 \times 10^{-8}$  in the discovery stage, two novel loci in chromosome 1q32.1/PPFIA4 and chromosome 4q34.1/HAND2 show significant associations with Korean early-onset AF

chromosomes 1q32.1/PPFIA4 (rs11579055,  $P = 6.84 \times 10^{-10}$ ) and 4q34.1/HAND2 (rs8180252,  $P = 1.49 \times 10^{-11}$ ) and replicated in an additional independent sample of the Korean AF Network (Figure 1). The two newly identified loci may have functional implications as well. The HAND2 gene is a cardiac transcription factor related to heart repair and HAND2 gene overexpression has been shown to facilitate regenerative cardiomyocyte proliferation with reprogramming of cardiac fibroblasts into functional

cardiac like myocytes.<sup>5</sup> The PPFIA4 gene encodes a member of the liprin (LAR: leucocyte antigen related, protein tyrosine phosphatase-interacting protein) protein family, which plays a key role in synapse maturation and regulation.

### Late Breaking & Featured Research from Asia-Pacific 1

» Thursday, Oct. 12, 10:30 AM-12:00 PM / Theatre

## Women's Heart Disease

### Angina, Obstructive and Non-Obstructive



Hack-Lyung Kim, MD, PhD  
Seoul National University College of Medicine, Korea

Up to 30% of patients undergoing coronary angiography due to angina do not have obstructive coronary artery disease (CAD). It has been suggested that more than a half of these patients have coronary microvascular dysfunction (CMVD), which will be discussed by Dr. Kim in further detail. CMVD is more common in women than men. CMVD has been identified as a cause of cardiac ischemia, in addition to traditional atherosclerotic disease. Clinical presentation of CMVD can vary, including stable angina and acute coronary syndrome. Current assessment of CMVD is carried out predominantly during cardiac catheterization through detection of an attenuated response of coronary blood flow in response to vasodilatory agents. Recent evidence suggests that CMVD is associated with a higher risk of cardiovascular events in the future.

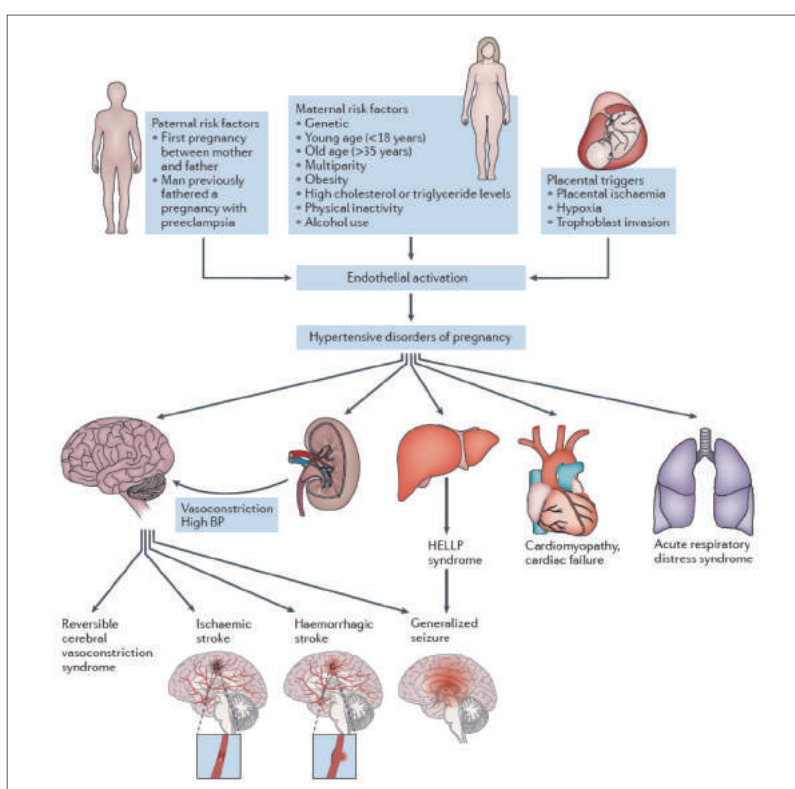


Figure 1. Hypertensive disorders of pregnancy

CMVD should be kept in mind when evaluating women with myocardial ischemia without obstructive CAD due to atherosclerosis.

### Stroke in Women



Hyung-Min Kwon, MD, PhD  
Seoul National University College of Medicine, Korea

Stroke is the second largest cause of disability-adjusted life-years lost worldwide, behind ischemic heart disease, and a leading cause of death worldwide in women. The prevalence of stroke in women is predicted to rise rapidly, owing to the increasing average age of the global female population. Vascular risk factors differ between men and women and across age groups, and specific stroke subtypes, such as cardio-embolic strokes, are more common in women than in men. Women have greater long-term mortality after stroke than do men. Some female-specific characteristics, i.e., hormonal contraception, hypertensive disorders of pregnancy, and hormone replacement therapy after menopause, increase the risk of stroke (Figure 1).

### Pregnancy-related CVD

Cardiovascular disease (CVD) is increasingly recognized as a frequent cause of pregnancy-related morbidity and mortality worldwide and arise during 0.2% to 4% of all pregnancies in the industrialized world (Figure 2). Hypertensive disorders during pregnancy are one of the most common causes of morbidity and mortality in



Continued from page 7

of thromboembolic events, death, or unplanned revascularization. COMPASS trial, a trial with considerable amount of ongoing attention, will be introduced by Dr. Jeong. The trial was terminated due to overwhelming superiority of rivaroxaban over aspirin. The precise results are not published yet, but we will be able to hear the latest update of the trial.

Dr. Shin will present very important and useful issue: the management of bleeding. Unfortunately, bleeding occurs quite frequently in patients. Therefore, clinicians should be fully aware of how to manage bleeding in patients taking anticoagulants



**Dae Hee Shin, MD, PhD**  
International St. Mary's Hospital, CKU, Korea

or antiplatelets. Dr. Shin will share his experience on hemostasis strategy according to bleeding location, activity, antithrombotic regimen, and presence of concomitant medical conditions.

**Cross-Specialty Session 1: Intervention & Arrhythmia**

» Thursday, Oct 12, 14:00-16:00 PM / Theatre

## Evil Companions in Cardiometabolic Syndrome: Hypertension and Dyslipidemia



**Chan Joo Lee, MD, PhD**  
Yonsei University Severance Hospital, Korea

Cardiometabolic syndrome is a cluster of metabolic abnormalities increasing the risk of cardiovascular disease. Although hypertension and dyslipidemia seem to be absolutely different from each other, epidemiological studies have reported

that the prevalence for the coexistence of hypertension and dyslipidemia range from 15 to 30%. Some prospective studies have reported that dyslipidemia can predict the development of hypertension. Dyslipidemia causes loss of endothelial function and vascular damage, which may elevate blood pressure. Also, insulin resistance, which plays a central role in cardiometabolic syndrome, may be involved in the progression of both hypertension and dyslipidemia. Concomitant dyslipidemia and hypertension has a more multiplicative adverse effect on the risk of cardiovascular disease than the sum of the individual factors. Therefore, a strategy to treat both would provide synergistic benefit. In this context, lifestyle modification for controlling abdominal obesity that causes insulin resistance is an important treatment

option because it could simultaneously improve both conditions. Moreover, there have been reports that the use of statins in combination with antihypertensive agents is more effective in lowering blood pressure. Inversely, calcium channel blocker or renin angiotensin aldosterone receptor blocker may be the preferred 1st line antihypertensive agents in patients with underlying dyslipidemia because these agents have a beneficial effect on insulin resistance or serum lipid levels. Intensive control of hypertension and dyslipidemia below the target level may be expected to have a much greater prognosis enhancing effect. However, disappointingly, it is not easy to treat both conditions well in clinical practice. In addition, with the increase in the elderly population, the number of patients with concomitant hypertension and dyslipidemia is increasing, and the number of medications that need to be taken increases, so there would be more patients who are less controlled. Therefore, it is necessary to make efforts to treat concomitant conditions more actively in the future.

**Cardiometabolic Syndrome 1**

» Thursday, Oct. 12, 09:00-10:30 AM / Oak

## High-Intensity Statin vs Statin with Ezetimibe in Dyslipidemic Patients



**Soo-Joong Kim, MD, PhD**  
Kyung Hee University Hospital, Korea

Dyslipidemia is one of the most important risk factors for atherosclerotic cardiovascular disease (ASCVD) and the use of 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitors (statin) to reduce the levels of low-density lipoprotein cholesterol (LDL-C) has been the standard of care for the routine management of dyslipidemia in a wide range of patients at risk of CV events. There is established linear relationship between LDL-C and CV risk, and every 1 mmol/L reduction of LDL-C could lead to about 22% reduction of major coronary and vascular events. Moreover, meta-analysis by Cholesterol Treatment Trialists' Collaboration demonstrated that intensive regimens with high dose statin produced significant 15% further reduction in major vascular events as compared with standard dose statin regimen. Therefore, the 2013 American College of Cardiology (ACC) and American Heart Association (AHA) guidelines recommend moderate- or high-intensity statin monotherapy as the first-line strategy for ASCVD risk reduction among patients with LDL-C levels of  $\geq 190$  mg/dL, preexisting ASCVD, diabetes mellitus (DM), or estimated 10-year ASCVD risk of  $\geq 7.5\%$ . However, there are some limitations for statin use. First, when statin dose is doubled, the level of LDL-C further decreases only about 6% than that with previous dose. Second, there is side effects of statin including myopathy, hepatotoxicity, and new onset DM, which are strongly dose-dependent. Therefore, it is sometimes challenging to apply these new guidelines in clinical practice, especially among patients who cannot tolerate the high intensity of statin because of adverse effects or those who have limited LDL-C response, and there is a need for moderated combination therapy with a lower-intensity statin and another lipid-modifying medication. Ezetimibe is a cholesterol absorption inhibitor that potently prevents the absorption of dietary and biliary cholesterol in small intestine. A couple of

clinical trials have shown that ezetimibe/statin combination treatment resulted in significantly greater reductions in LDL-C and other atherogenic lipids including non-HDL cholesterol, triglyceride, and apo B lipoprotein with no difference of side effects compared with the corresponding statin dose. This benefit could lead to better CV outcomes, which has been proved in IMPROVE-IT study. In this study, ezetimibe added to simvastatin could reduce the composite of CV death, MI, unstable angina requiring rehospitalization, coronary revascularization or stroke (HR 0.936, CI 0.887-0.988) in stabilized acute coronary syndrome patients as compared with simvastatin 40 mg monotherapy. Meanwhile, combination of ezetimibe and lower intensity statin have shown the similar effect on LDL-C lowering to high intensity statin with significant reduction of side effects, which makes it an alternative for intensive lipid-lowering treatment. Several randomized studies also demonstrated that addition of ezetimibe to lower intensity statin showed greater reduction of LDL-C than up-titration of corresponding statin dose in dyslipidemic patients with moderate to high risk for coronary heart disease. Of course, statins have pleiotropic effects, which are more pronounced with high dose, besides LDL-C lowering effect. In case of ezetimibe, it may also ameliorate oxidative stress, insulin resistance, atherosclerotic and inflammatory markers, as well as atherogenic profiles. Some studies demonstrated that ezetimibe combination with lower intensity statin may provide similar beneficial effects on endothelial function as high-dose statin with similar effect on LDL-C and C-reactive protein. However, it is not clear whether combination therapy with ezetimibe and low dose statin can provide better clinical outcomes than high dose statin, and future studies should evaluate long-term clinical benefit of moderated combination of ezetimibe and low dose statin.

**Lipid 1**

» Thursday, Oct 12, 14:00-16:00 PM / Grand 5

Continued from page 8



**Kyoung Im Cho, MD, PhD**  
Kosin University Gospel Hospital, Korea

mothers and babies in the industrialized world. Congenital heart defects currently account for approximately 30% to 50% of all cardiac diseases during pregnancy. In non-industrialized countries, 90% of all heart disorders

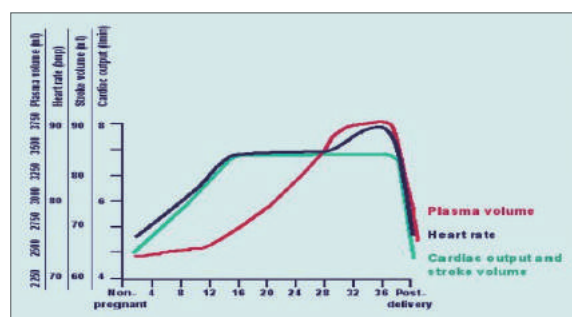


Figure 2. Cardiovascular changes in pregnancy

in women of child-bearing age are of rheumatic origin, and mitral stenosis is the most common valve defect responsible for maternal deaths with cardiac causes. Cardiomyopathy, arrhythmia and coronary heart disease are considerably rarer diseases but can also lead to complications during pregnancy. In particular, peripartum cardiomyopathy

(PPCM) presents in the last month of pregnancy or within the first 5 months postpartum. There are new therapeutic approaches for PPCM. Specific treatment involving bromocriptine has shown positive results so far in pilot studies.

**Women Heart Disease  
Women Heart Disease 1, 2**

» Thursday, Oct 12, 10:30 AM-16:00 PM / Pine

## 보험/정책분야 이슈

### 2차 상대가치 개편에 따른 '건강보험 행위급여 상대가치점수' 일부 개정고시

2차 상대가치 개편에 따른 '건강보험 행위급여 상대가치점수' 일부가 개정 고시(보건복지부 제2017-92호)됨에 따라 7월 1일부터 5,307개 의료행위에 대한 상대가치점수가 개정되었다.

보건복지부에서 3년간 상대가치운영기획단을 꾸려 의료계 심평원이 참여한 가운데 2차 상대가치 전면개편 작업을 진행한 결과는 7월 1일부터 적용되기 시작하였고 점수 개편은 2020년까지 4년간 25%씩 단계적으로 확대 적용된다.

2차 상대가치 개편은 2008년 1차 상대가치 개편 이후 9년 만에 이루어지는 것으로, 검체와 영상검사의 상대가치점수를 낮추고, 이를 수술과 처치 행위점수로 옮김으로써, 전문과목간 형평성을 제고한다는 것이 핵심 취지이다. 심장학회 보험-정책위원회에서는 내과학회와 함께 26개 전문학회의 일원으로 참여한 결과, 부하심전도검사(treadmill test) 및 심전도검사(24시간 홀터기록)가 14% 증가, 관상동맥조영이 15% 증가와 더불어 행위 재분류에 따라 급성 심근경색증의 원인병변에 대한 경피적관상동맥스텐트삽입술은 기존 점수의 55% 증가, 만성폐쇄성병변에 대한 경피적관상동맥스텐트삽입술은 112% 증가된 상대가치점수(행위수가)가 7월 1일부터 적용되었다. 향후 3차 상대가치점수 개편작업이 시작될 예정인 만큼 적정수가보장을 받기 위한 학회의 노력은 계속될 것이다.

### 중재시술 관련 데이터 수집 사업 (Korean PCI Registry) 1기 완료

대한심장학회와 대한심혈관중재학회에서는 2015년부터 표준화된 심도자 및 중재시술의 보고양식을 회원들에게 보급하여 총 92개 기관의 44,967 건의 시술 자료를 수집하여 2014년 심혈관시술 레지스트리 코호트(K-PCI registry) 구축사업을 공동으로 진행하였다. K-PCI registry는 신뢰도 높은 전국 표준의 학술적, 행정적 기초 자료를 생성함으로써 임상 연구의 발전을 도모함은 물론이고 이를 바탕으로 기존의 "중재시술인증제도"와 더불어 향후 시술 사용의 적절성 여부(appropriate use for PCI)를 판단하고 의사 및 환자의 안전을 도모할 수 있다. K-PCI registry는 의료전문가 단체에 의하여 시도된 첫 국내 데이터 수집 사업이라고 할 수 있으며 이러한 노력은 의료계 및 정부와 공유되어야 하므로 기사로 작성하여 복지부 등 국가행정부서 및 전문 의료지에 배포되었으며 2017년 9월 22일 K-PCI registry와 중재시술인증의 제도의 취지와 내용을 알리는 기자회견도 개최되었다.

#### 정책세션 1

#### Cardiac Rehabilitation in Korea: the Here and the Hereafter

» Thursday, Oct 12, 16:00-17:30 PM / Grand 4

## 정책세션 1

### Cardiac Rehabilitation in Korea: the Here and the Hereafter

Oct 12, 16:00-17:30 Rm. Grand 4

Chairpersons: 김병욱, 김철

Panel: 김형섭, 장민욱, 정인현, 이구주, 추상희

16:00-16:15	Must We Do? Scientific Evidence of Cardiac Rehabilitation According to the Guideline	성지동/성균관대
16:15-16:30	Where We Are? Real Evidence of Exercise-based Cardiac Rehabilitation in Korea	이종영/성균관대
16:30-16:45	How Can We Do? Let's Adopt Cardiac Rehabilitation Program	강석민/연세의대
16:45-17:00	How Do We Do? Reimbursement Criteria in Korean Government Insurance System	김응주/고려의대
17:00-17:15	What Is Problem? What Is the Biggest Hurdle in Cardiac Rehabilitation in Korea?	김원석/서울의대
17:15-17:30	Discussion	

## Late Breaking & Featured Research from Korea

### Mi-RNAs Associated with CTGF in a Murine Model with Banding and Debanding of the Ascending Aorta



Jung sun Joe, MD  
Daejeon St. Mary's Hospital, Korea

The ascending aortic banding model can be used as an aortic stenosis model, and the debanding model can be used for reverse cardiac remodeling. Connective tissue growth factor(CTGF) is a profibrotic factor implicated in myocardial fibrosis from pressure overload that is mediated by transforming growth factor beta (TGFβ) activation. MicroRNAs(miRNAs) are known as single-stranded, highly conserved small non-coding RNAs that can bind to the 3'UTR of mRNA and regulate gene expression with translational repression and mRNA degradation. miRNA26b, miRNA18a, miRNA133a, miRNA19b, miRNA143 regulate the expression of CTGF, as predicted by online miRNAs databases such as www.targetscan.org. Dr. Joe and her colleagues evaluated the miRNAs targeting CTGF in pressure overload and reverse cardiac remodeling models. In their study, minimally invasive ascending aortic banding was performed in 24 Sprague Dawley (SD)

rats (male, 7 weeks old). Eight of the rats were assigned to the banding group then sacrificed after 6 weeks. Eight rats were assigned to the debanding group, in which the aortic bands were removed after 28 days. These rats were sacrificed 2 weeks after band removal. Additional eight rats underwent sham surgery. We investigated the CTGF, TGFβ1, MMP2 using ELISA and examined miRNAs targeting CTGF using a real-time qPCR in three groups. Dr. Joe and her colleagues found that ascending aortic banding resulted in concentric hypertrophy. Left ventricular hypertrophy (LVH) did not differ significantly between the debanding group and the sham group, indicating that the debanding operation resulted in LVH regression. CTGF was significantly higher in banding group than in sham and debanding groups. MMP2 and TGFβ1 were significantly decreased in debanding group. Relative expression levels of miRNA26b and miRNA18a were higher in debanding group than in banding group. Based on their study, it could be considered that miRNA26b and miRNA18a may have roles for CTGF suppression in reverse cardiac remodeling model.

#### Late-Breaking and Featured Research from Korea

» Thursday, Oct 12, 16:00-18:00 PM / Theatre

Start with Pradaxa

Control with Praxbind

Pradaxa®  
dabigatran etexilate

Praxbind®  
idarucizumab

## Basic Research Session

### Enlargement of Myocardial Infarct Size by Chronic Kidney Disease: a Novel Mechanism of Disruption of Akt-GSK-3 $\beta$ /p70S6K Signaling



**Tetsuji Miura, MD, PhD**  
Sapporo Medical University, Japan

It has been known that chronic kidney disease (CKD) increases myocardial infarct size and worsens prognosis of patients with acute myocardial infarction. Dr. Miura will present the results of his study to investigate a novel mechanism of infarct size enlargement by CKD in the basic research session 2.

They examined the hypothesis that impairment of protective PI3K-PDK1-Akt and/or mTORC-Akt signaling upon reperfusion contributes to CKD-induced enlargement of infarct size. CKD was induced in rats by 5/6 nephrectomy 4 weeks before infarct size experiments, and sham-operated rats served as controls. Infarct size after ischemia/reperfusion was enlarged by CKD ( $56.3 \pm 4.6$  vs.  $41.4 \pm 2.0\%$  of area at risk), and the change in infarct size was associated with increased phosphorylation of Akt-Thr308 at baseline and suppressed phosphorylation of p-Akt-Ser473, p-GSK-3 $\beta$  and p-p70S6K upon reperfusion. Inhibition of Akt-GSK-3 $\beta$ /p70S6K signaling upon reperfusion by KU-0063794 mimicked the effect of CKD on infarct size in non-CKD controls. CKD did not

affect activities of mTORC2 and PDK1, but it reduced the PP2A regulatory subunit B55 $\alpha$ , which specifically targets Akt-Thr308.

Knockdown of B55 $\alpha$  by siRNA increased baseline p-Akt-Thr308 and blunted Akt-Ser473 phosphorylation in response to insulin-like growth factor-1 (IGF-1) in H9c2 cells. These results indicate that increased Akt-Thr308 phosphorylation by down-regulation of B55 $\alpha$  inhibits Akt-Ser473 phosphorylation upon reperfusion in CKD and that the insufficient Ser473 phosphorylation upon reperfusion mediates infarct size enlargement. In a separate series of experiments, we examined whether epoetin  $\beta$  pegol, a continuous erythropoietin receptor activator (CERA), normalizes myocardial susceptibility to ischemia/reperfusion injury. Administration of CERA (0.6  $\mu$ g/kg SC every 7 days) for 4 weeks partially restored Akt phosphorylation upon reperfusion and reduced infarct size in CKD rats to a level of infarct size in non-CKD controls, although a protective effect was not detected for the acute injection of CERA. Metabolomic analyses showed disturbed flux of malate-aspartate shuttle in mitochondria by CKD, and its contribution to altered Akt response was suggested by the finding that an inhibitor of malate-aspartate shuttle blunted response of Akt to IGF-1. These study show that CKD enlarges myocardial infarct size by inhibition of cardioprotective Akt signaling upon reperfusion, but this untoward effect of CKD is preventable by chronic treatment with CERA.

### LXR, Atherosclerosis, and Steatohepatitis



**Masahiro Koseki, MD, PhD**  
Osaka University, Japan

Recently, loci associated with levels of high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), and/or triglycerides are newly identified and many researchers have tried to explore for a novel regulatory pathway for lipoprotein metabolism and atherosclerosis. TTC39B, encoding tetratricopeptide repeat domain 39B, was one of the genes identified in a GWAS as a novel one influencing HDL-C levels. Dr. Koseki will present the results of his study on the role of TTC39B in lipid metabolism in the basic research session 1.

To examine a role of TTC39B in lipid metabolism, they generated Ttc39b knockout mice under C57BL/6 background. On a chow diet HDL-C levels were significantly increased by 22% and there were increases in LXR protein but not mRNA, increased expression of ABCA1 mRNA and protein and increased secretion of HDL by small intestinal enterocytes. When mice were challenged with a high fat/high cholesterol/bile salt diet, there was a significant 42% increase in HDL-C and also decreased incorporation of dietary cholesterol and fat into chylomicrons and marked protection from steatohepatitis; in addition to intestinal changes, there was

increased LXR $\alpha$  protein and induction of Abcg5/8 in liver. Moreover, Ttc39b deficiency inhibits hepatic sterol regulatory element binding protein 1 (SREBP-1) processing. This is explained by an increase in microsomal phospholipids containing polyunsaturated fatty acids, linked to an LXR $\alpha$ -dependent increase in expression

of enzymes mediating phosphatidylcholine biosynthesis and incorporation of polyunsaturated fatty acids into phospholipids. The preservation of endogenous LXR protein activates a beneficial profile of gene expression that promotes cholesterol removal and inhibits lipogenesis. As observed in the steatohepatitis mice model, Ldlr-/-Ttc39b-/- mice on the Western diet demonstrated increased HDL-C, decreased VLDL/LDL-C and decreased en face atherosclerotic lesion significantly.

These studies show that Ttc39b deficiency results in increased LXR primarily in enterocytes, beneficial lipoprotein changes and reduced atherosclerosis and hepatic lipid accumulation. Moreover, Ttc39b-/- mice are protected from steatohepatitis, indicating that TTC39B inhibition could be an effective strategy against both atherosclerosis and steatohepatitis.

#### Basic Research Basic Research 1, 2

» Thursday, Oct 12, 09:00 AM-12:00 PM / Grand 4

## Today's Interview



11:00-11:30

#### Past, Present and Future of Cardiology

Interviewers: Seung-Jung Park, Dae-Won Sohn  
Interviewees: Jae K. Oh, David P. Faxon, Y. Chandrashekar

14:00-14:30

#### Evidence for Circulating Stem Cells Derived from the Human Heart and Their Therapeutic Potential

Interviewer: Yong Sook Kim  
Interviewee: Han-Mo Yang

15:00-15:30

#### 3D Printed Complex Tissue Construct Using Stem Cell-Laden Decellularized Extracellular Matrix Bioinks for Cardiac Repair

Interviewer: Gilson Khang  
Interviewee: Hun-Jun Park

16:30-17:00

#### Anticoagulation in AF Patients Undergoing PCI

Interviewers: Seong Wook Park, Young-Hoon Kim

Interviewees: Seongwook Han, Min Soo Ahn

Wrap-up  
Interview



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# 2018

2018 Annual Spring Scientific Conference of the KSC  
in conjunction with KHRS, KSIC, KSE and KSoLA

# 춘계심혈관통합학술대회

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20(Fri.) – 21(Sat.). April, 2018

DCC, Daejeon



# KSC 2018

## 대한심장학회 제62차 추계학술대회

18.Thu -20.Sat, October

Walkerhill hotel, Seoul

The 62nd Annual Scientific Meeting of The Korean Society of Cardiology