What’s New in Coronary Stenting?

Over the past 15 years, drug-eluting stents (DES) have continued to evolve. Nonetheless, current generation DES continue to have important limitations such as very late stent thrombosis, refractory restenosis and requiring long-term dual antiplatelet therapy.

One current approach to these issues has been the development of DES that incorporate bioabsorbable polymers (BP-DES). These newer devices use polymers that gradually dissolve or are metabolized such that ultimately, only a bare metal stent remains. To the extent that late thrombotic or restenotic events represent foreign body reactions stimulated by exposure to polymeric stent coatings, BP-DES have the potential to reduce these problematic late events.

Although the above two devices overcome many of the current limitations of DES, both leave a rigid scaffold behind, thus limiting the ability of the vessel to heal and to restore normal vasomotion. To overcome these limitations, device manufacturers have begun to develop fully bioresorbable vascular scaffolds (BVS) such as the Absorb BVS. Although there is tremendous hope that these devices would provide the best of all worlds, to date, the results have been somewhat disappointing. Specifically, clinical trials have demonstrated that the rate of early stent/scaffold thrombosis with the Absorb BVS is 3-4 fold higher than with the Xience EES, leading to higher rates of MI and target lesion revascularization as well. These studies are largely limited to 2-3 year follow-up, however, a time frame during which the Absorb BVS continues to undergo resorption. Longer term follow-up may be necessary to demonstrate the true benefit of these devices over metallic DES. Research is also ongoing to determine whether reductions in scaffold strut thickness, more rapid scaffold resorption, or even use of resorbable metals might overcome these early device limitations. Until these challenges can be overcome, however, the promise of a fully resorbable vascular scaffold remains elusive.

What is a Vulnerable Plaque and How Can It Be Imaged?

The majority of myocardial infarctions (MI) occur as a consequence of acute plaque rupture, often with little or no prior warning. Plaques that rupture have certain common pathological characteristics that include inflammation, a thin fibrous cap, positive remodelling, a large necrotic core, microcalcification.
### Program at a glance: Day 2, Oct 13, 2017

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<th>Cosmos (3F)</th>
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<th>Art (4F)</th>
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<td>Oral Abstracts Intervention 2</td>
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<td>KCJ Editors Meeting (CLOSED)</td>
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**Scientific Session 6 [BMS]**
- Recent Advances in Improving Patient Care with Apixaban
  - Oct 13, 12:00-12:40 Rm. Theatre

**Scientific Session 7 [MSD]**
- The Latest Updates on the Management of Patients with CVD
  - Oct 13, 12:00-12:40 Rm. Grand1

**Scientific Session 8 [Pfizer]**
- Clinical Challenges in Cardiovascular Prevention
  - Oct 13, 12:00-12:40 Rm. Cosmos

**Scientific Session 9 [Ildong]**
- Current Option of Antihypertensive Therapy (Triple Combination Therapy in Hypertensive Patients)
  - Oct 13, 12:00-12:40 Rm. Calla

**Diamond Session [Bayer]**
- Understanding Real World Evidence of Rivaroxaban in the World
  - Oct 13, 12:50-13:30 Rm. Grand1

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### 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

Highlights
대한심장학회 60주년 기념 영상 공개
KSC Awards Ceremony
Young Investigator Award Competition

총회에 참석하시는 분들 중
추첨을 통해 다양한 상품을 드립니다.

Happy Snack Event!
Follow KSC 2017 Facebook & Upload the picture of KSC 2017 on your Facebook and get the ‘Snack Package’
at the Members’ Lounge (Rm. Grand 3), B11

KSC 2017 Facebook
facebook.com/circulation.KSC
**Foreigner only

Today's Interview
Theatre Lobby

09:00-09:30
Past, Present and Future in Electrophysiology
Interviewer: Seongwook Han
Interviewee: Chum Hwang

10:00-10:30
The Direction of Stent
Interviewer: Kyung Woo Park
Interviewee: David Cohen

13:30-14:00
New Imaging Tool and Definition of Vulnerable Plaque
Interviewer: Bon-Kwon Koo
Interviewees: Marc Dweck

14:00-14:30
Evolving and Emerging Issue in Cardiology
Interviewer: Young-Hoon Kim
Interviewees: Raj Chackwala, Euan Ashley, Shih Ann Chen

16:00-16:30
Device Therapy in Heart Failure
Interviewers: Dong-Gi Shin, Sang-Moon Park
Interviewees: Jong-Chun Youn, Jin-oo Park

Wrap-up Interview
Imaging

Echocardiographic Findings in Cardiac Sarcoidosis

Cardiac manifestation of sarcoidosis is estimated to be about 5%. However, about 20% to 25% of patients with pulmonary/systemic sarcoidosis are expected to have asymptomatic cardiac involvement (clinically silent). Recent studies suggest that cardiac sarcoidosis appears to be increasingly diagnosed, likely due to improvements in imaging and/or more thorough investigation.

The echocardiogram is often abnormal in clinically manifest disease, but is usually normal in clinically silent cardiac sarcoidosis. Abnormalities found on echocardiography are variable and usually nonspecific, although interventricular septal thickening, especially at the basal segment, can be a feature of cardiac sarcoidosis, which can be unrecognized at its early stage. In addition, although less frequently, there may be an increase in myocardial wall thickness, simulating LV hypertrophy or resembling hypertrophic cardiomyopathy. Other abnormalities include left ventricular and/or right ventricular diastolic and systolic dysfunction, isolated wall motion abnormalities, and aneurysm formation. Cardiac sarcoidosis should be suspected in patients with regional wall motion abnormalities not consistent with coronary artery territory.

However, all of these echocardiographic findings are clinically manifest at its mid to late stage. Newer techniques, including myocardial strain and/or strain rate, show promise in the early diagnosis of cardiac sarcoidosis according to recent publications, although this should be evaluated further in future trials. Given that extent of LV dysfunction seems to be the most important predictor of prognosis, however, echocardiogram can be of a prognostic value in patients with cardiac sarcoidosis.

Late Breaking & Featured Research from Asia-Pacific 2

Coronary Atherosclerotic Precursors of Acute Coronary Syndromes

The overall objective of the ICONIC (Incident CoroNary Syndromes Identified by Computed Tomography) study was to determine the prognostic significance of APCs for the identification of individuals who will versus will not experience future ACS in a primary prevention population with known coronary artery disease (CAD).

The study was designed as a nested case-control study within a cohort of 25,251 patients from 13 sites in North America, Europe, and Asia, undergoing coronary computed tomographic angiography (CCTA) with follow-up over 3.4±1.2 years. ACS patients and non-events with no prior CAD were propensity matched 1:1 for risk factors and CCTA-estimated obstructive (≥50%) CAD.

In this case-control study of stable patients without prior CAD, the majority did not possess high-grade coronary stenosis before experiencing ACS, independent of %DS, coronary atherosclerotic precursors of ACS include fibro-fatty and necrotic core, spotty calcifications) offer the greatest prognostic utility to pinpoint patients who will experience future ACS. These results suggest the importance of quantitative characterization of coronary APCs for improved diagnosis of patients who will versus will not experience future ACS.

Post-hoc Analysis of the PARADIGM Heart Failure Trial: Pulse Pressure and Outcomes in Heart Failure with Reduced Ejection Fraction

Dr. Chen will present the results of his study, where he examined the associations between pulse pressure/pulse pressure change and outcomes in patients with HF-REF in PARADIGM-HF. Patients were randomized in PARADIGM-HF to either sacubitril/valsartan or enalapril. Pulse pressure at baseline (n=8361) and at 4 months (n=7740) were categorized as P0: ≤40 mmHg, P1: 41-54 mmHg, and P2: ≥55 mmHg. At baseline, compared to P0, neither P1 nor P2 was associated with a higher or lower risk of the primary outcome. At 4 months, P1 had a higher risk than P2 (hazard ratio 1.28, 95% CI 1.13-1.44, p<0.0001). P1 was associated with a higher (1.20, 1.06-1.35, p=0.0046) and P2 a lower (0.85, 0.75-0.97, p=0.0118) risk, compared to P0. Sacubitril/valsartan reduced pulse pressure by -0.15±1.80 mmHg, whereas enalapril increased pulse pressure by 1.73±12.76 mmHg (p<0.001). Sacubitril/valsartan improved the outcome irrespective of the baseline pulse pressure or the change in pulse pressure. The risk of outcomes did not vary by pulse pressure at baseline in PARADIGM-HF. In contrast, an increase or decrease of PP during treatment may indicate a better or worse outcome in HF-REF, possibly reflecting an improving or worsening of left ventricular function.

18F-Fluorodeoxyglucose PET/CT Predicts the Response of Steroid Therapy in Constrictive Pericarditis

Dr. Chang will present the results of her study, where she hypothesized that 18F-Fluorodeoxyglucose ([18F-FDG]) positron emission tomography/computed tomography (PET/CT) predicts the response of steroid therapy in constrictive pericarditis. Patients who were diagnosed as constrictive pericarditis (age 18 to 70 years old) were consequently enrolled. All patients had laboratory tests, echocardiography, and 18F-FDG PET/CT at enrollment and were treated with steroid for 3 months. [18F-FDG]PET/CT and echocardiography were repeated after 3 months of treatment, and SUVmax (maximum standardized uptake value) of the pericardium was analyzed.

Sixteen patients (mean age 63±12 years old and female 12%) were analyzed. Pericardial Suvmax at baseline was 7.8±1.4 in responders and 3.1±1.2 in non-responders (p<0.01). Suvmax was greater than 3.0 in all responders and only in two (29%) non-responders. [18F-FDG]PET/CT can predict the reversibility of constrictive pericarditis with 3 month of steroid therapy.

Long-Term Efficacy of Treat and Repair Strategy in Adult Patients with Atrial Septal Defect and Pulmonary Artery Hypertension

The purpose of this study was to evaluate the long-term efficacy of the treat and repair strategy for ASD with significant PAH (mean pulmonary artery pressure [mPAP] ≥25 mmHg and PVR ≥3 Wood units). A total of 616 adult patients who underwent transcatheter ASD closure were divided into 3 groups: PAH-specific medical therapy (n=11), PAH-no-specific-medical therapy (n=43), no-PAH (n=562). The endpoint was defined as cardiovascular mortality and hospitalization for heart failure.

Initially, the PHM group had higher PVR compared with non-PHM group (9.6±3.8 vs. 4.2±1.0 Wood units, p<0.01). After treatment with PAH-specific medications, PVR in this group decreased to 4.0±0.8 Wood units (p<0.01). In the PHM group, during a treatment period of 52±48 months, the WHO Functional Classification significantly improved (3.0±0.5 vs. 2.0±0.0, p<0.01), as well as in the non-PHM group (2.1±0.6 vs. 1.5±0.5, p<0.01). Treat and repair strategy for ASD with severe PAH can be considered as a safe and valuable therapeutic option even in patients complicated with significant PAH.
Investigated in a growing number of clinical trials targeting the vulnerable plaque have been used as imaging targets to identify plaques felt to be at high risk of rupture. Indeed an expanding array of invasive and non-invasive approaches have been used to identify patients at particular clinical event. This has raised questions about the value of the vulnerable plaque strategy. The most commonly used tracer 18F-fluorodeoxyglucose can be used to measure vascular inflammation in the carotid arteries with initial data suggesting increased events in patients with the highest uptake.

Computed tomography (CT) can identify high-risk plaque characteristics in addition to standard assessments of plaque burden and luminal stenosis severity. These include spotty calcification, napkin ring sign, positive remodelling and low attenuation necrotic core. Patients with plaques that have both positive remodelling and low attenuation appear at particularly high risk of future events especially if they also have obstructive coronary artery disease. T1-weighted magnetic resonance (MR) can identify plaques with acute intra-plaque hemorrhage or intraluminal thrombus based upon the high signal in methemoglobin (an important component of newly develop thrombus). This allows detection of these plaque features in the coronary and carotid arteries. Once again patients with high intensity plaque on this technique have an increased risk of future cardiovascular events. For both these imaging of the coronary arteries to provide information about disease activity and plaque vulnerability. The most commonly used tracer 18F-fluorodeoxyglucose can be used to measure vascular inflammation in the carotid arteries with initial data suggesting increased events in patients with the highest uptake.

The ultimate aim of KCJ is sharing of the latest knowledge from the world including Korea. Korean Circulation Journal will be the bridge to provide more information on cardiovascular fields and support many people to be free from the suffering of cardiovascular disease.

Figure 1. Increased 18F-fluoride PET activity localising to the culprit plaque (red arrows) in two patients following AMI. Reproduced from Joshi et al.
Arrhythmia & HF: an Area Where Electricity and Mechanics Merge

Arrhythmia & Heart Failure: Dedicated Collaboration Is Essential to Overcome Heart Failure

Heart failure is a major health problem associated with significant morbidity and mortality. Despite priceless mega-trials which demonstrated the survival benefit of beta blockers, angiotensin converting enzyme inhibitors (ACEi), angiotensin receptor blockers (ARB), mineralocorticoid receptor antagonists, and nephilysin inhibitors (ARNI), the mortality rate of heart failure is not satisfactory. Patients are getting older, and recent advances in interventional cardiology have substantially prolonged the survival of heart failure patients, which, paradoxically, has now worsened the severity of heart failure.

Beta blockers and ACEIs are the cornerstone of heart failure management. Mineralocorticoid receptor antagonists, such as spironolactone, can also increase survival of heart failure patients. However, these drugs cannot immediately improve symptoms of heart failure patients. Rather, they, especially beta blockers, can actually aggravate heart failure symptoms in the initial stage of treatment. For symptomatic care of heart failure, diuretics and inotropics such as digoxin and dobutamine can be used. Vasodilators such as nitroglycerine is also used to manage heart failure. However, these drugs have no effect on improving survival.

Recently, biventricular pacing, also known as cardiac resynchronization therapy (CRT), was introduced. CRT have proven its efficacy in a wide range of heart failure patients. The prime advantage of CRT is that it can improve both survival and symptoms. Furthermore, CRT demonstrated additive benefit in hard clinical outcomes and patient symptoms in patients already taking optimal medical therapy. Therefore, CRT is now a must-do procedure in selected cases of heart failure, and physicians should be fully aware of the current indications of CRT. Implantable cardiac defibrillator (ICD) has also proved its clinical benefit including overall mortality in various heart failure patients. In adequately selected heart failure patients, combining CRT and ICD (CRT-D), is better than either therapy alone. The incidence and prevalence of heart failure patients are rapidly growing in the recent years, and, therefore, appropriate implantation of cardiac electronic devices, such as CRT, ICD, or CRT-D, has become a cornerstone of heart failure management.

Dr. Joung will present several methods, such as antiarrhythmic drugs, ICD, and catheter ablation to control ventricular arrhythmias in heart failure patients. Dr. Park will present off-label use of biventricular pacing in critically-ill patients. Because the major randomized controlled trials with CRT excluded unstable patients, especially those on intravenous inotropic support, CRT is currently reserved for stable patients with heart failure and reduced ejection fraction who do not respond to optimal medical therapy and who have a wide QRS complex (Figure 2). Nonetheless, due to theoretical benefit of CRT on cardiac hemodynamics, biventricular pacing has been sporadically used as a "rescue therapy" in critically-ill patients, who are catecholamine dependent, but not a candidate for implantation of left ventricular assisting device or heart transplantation.

Due to its significant medical burden, extensive resources have been utilized to find a better treatment for heart failure patients. Optimal management of heart failure requires interdisciplinary collaboration: coronary interventionalists, pathologists, radiologists, and those who dedicate in rehabilitation process. After the emergence of biventricular pacing, and demonstration of its astonishing efficacy in heart failure, electrophysiologist is now a key player in the field of heart failure. Treating heart failure has now become a team game.

Figure 1. Temporal trends of CIED in Korea

Figure 2. Clinical benefits of added biventricular pacing

Cross-Specialty Session 2
Heart Failure & Arrhythmia
›› Friday Oct 13, 10:30 AM-12:00 PM / Grand 1
Dilated Cardiomyopathy

Cardiomyopathy is a disease of the heart muscle. Prevalence of cardiomyopathy has been continuously increased. In 1980, the first classification of cardiomyopathy was categorized with dilated (DCM), hypertrophic (HCM), restrictive (RCM), arrhythmogenic right ventricular (ARVC) and unclassified cardiomyopathy. Since then, several classifications have been recently suggested. In fact, cardiomyopathy has practically been classified into ischemic and non-ischemic cardiomyopathy. Non-ischemic cardiomyopathy has been interchangeably used with DCM. Strictly speaking, however, DCM is defined to a spectrum of heterogeneous myocardial disorders that are characterized by ventricular dilation and depressed myocardial performance in the absence of hypertension, valvular, congenital, or ischemic heart disease.

DCM has been characterized by symptoms/signs including dyspnea, fatigue, general weakness, pulmonary edema/pleural effusion and pitting edema, morphologic/functional cardiac findings including damaged myocardial pathology, ventricular dilation/thinning and depressed myocardial performance and several etiologies including metabolic, endocrine, autoimmune, rheumatologic, infiltrative, genetic, and infectious causes and cardiotoxins.

Management strategies vary depending on the cause, and thus should be individualized. Notwithstanding, the prognosis of DCM has generally improved due to advanced drug therapy, device therapy, and heart transplantation.

Knobology

Yesterday, Prof. Ahn gave an excellent lecture regarding the knobology of echocardiographic machine, stressing the importance of platform manipulation and probe handling to get optimal echocardiographic images. This should help make a correct diagnosis and interpret the patient’s condition.

Prof. Ahn first went over the basic controls.

(Figure 2). The gain knob controls the overall brightness of the given images. Time gain compensation (TGC) allows the adjustment of image brightness at selective depth. The depth knob allows the adjustment of the depth of the field of view. The focus knob allows the focusing depth of the ultrasound beam to the area of interest. The frequency knob adjusts the ultrasound frequency to balance depth and resolution needs. High frequency gives better resolution, but limited tissue depth of view, and vice versa. Frame rate is the number of frames per second displayed and must be over 10 frames per second to create the illusion of real-time. The current echocardiographic machine can make more than 20 frames per second. In the color Doppler bar, colors represent the mean velocity in a sample area. Colors represent the direction and velocity of blood flow. The black line at the center of the color Doppler bar indicates zero velocity. The color shown in the upper half of the color bar represents the flow toward the transducer (i.e., blue), and the color in the lower half represents the flow away from the transducer (i.e., red). A focal point can be moved to the area of specific interest to enhance the beam in that area. Doppler spectral information can displayed simultaneously with 2-D image or independently.

Finally, Prof. Ahn concluded his talk by telling that understanding “knobology” is fundamental and is a prerequisite for better imaging acquisition.
There has been a noticeable increase in mortality from ischemic heart disease in Korea. They investigated secular trends and age, period, and cohort effects in mortality from ischemic heart disease. They obtained data on deaths from ischemic heart disease between 1983 and 2015 from the Korea National Statistical Office and conducted an age-period-cohort (APC) analysis using cubic splines model. In addition, this study analyzed the effect by gender. While the crude mortality rate has been rising gradually, age-standardized mortality rate shows a downward tendency after 2007 in both genders. Age-specific mortality rate by time period has been increased with age. Age-specific mortality rate by birth control also shows an increasing tendency until the mid-2000s, and, since then, the trend has fallen into a decline. Age, cohort and period effects from the weighted APC model and male to female ratio of mortality by age group according to the APC model are presented in Figure 4 and 5. In Korea, the mortality rate from ischemic heart disease has increased steadily until the mid-2000s, and it shows an improving tendency since then. Further efforts from health care workers and national support based on long-term policies are needed.
Adverse Plaque Characteristics Predictable from Wall Shear Stress Assessed by Computational Fluid Dynamics

You Jeong Ki MD
Seoul National University College of Medicine, Korea

This study sought to determine whether computational fluid dynamics (CFD) can be used to predict the adverse plaque characteristics (APC). CFD is a novel noninvasive technology that can provide information of coronary hemodynamics. They retrospectively enrolled 296 lesions in 153 subjects (mean age 66.7±11.3, male 80.4%) who underwent invasive coronary angiography and coronary angiography. The pressure and wall shear stress (WSS) in coronary arteries were analyzed by CFD. The presence of APC, which were defined as low density plaque, positive remodeling, napkin-ring sign and spotty calcification, was assessed in the minimal lumen area segment. High-risk plaques were found in 147 of 296 stenotic lesions (49.7%) and the most common feature was low density plaque (27.7%). The plaques exposed to the highest WSS tertile had a significantly greater proportion of high-risk plaques. The addition of WSS to % diameter stenosis (DS) significantly improved the measures of discrimination and reclassification of high risk plaques (area under the curve from 0.648 to 0.673, p<0.001; category-free net reclassification index 0.351, p<0.001, integrated discrimination 0.021, p=0.010). The incremental value of WSS over % DS was observed for each feature of APC except for spotty calcification. In the ROC curve analysis, the cutoff value of WSS for the prediction of any high-risk feature plaque is 161. Hemodynamics of CT derived computational models is feasible and non-invasive technology, and may be useful in predicting APC.

A New Technique for Lipid Core Plaque Detection by Optical Coherence Tomography for Prevention of Peri-procedural Myocardial infarction

A 53-year-old man presented to our department with a 12-hour history of intermittent angina. His admission electrocardiogram demonstrated minimal ST-segment elevation in the inferior leads and a high sensitivity troponin measurement was elevated. We proceeded directly to coronary angiography and delineated a moderate stenosis with haziness in the mid right coronary artery (RCA) (Figure 1A and 1B). The non-flow limiting nature of the lesion and the consideration of using a bioresorbable vascular scaffold (BVS) led to assessment with optical coherence tomography (OCT). The OCT was very instructive, demonstrating a minimal lumen area of 2.5mm2, plaque rupture with associated luminal thrombus and a highly attenuating plaque, representing lipid core plaque (LCP), upstream of the culprit site (Figure 2A, 2B1, and 2C1). Detection of the large lipid core plaque at the site of planned intervention led to use of a filter-based distal protection device to minimize risk of distal embolization. Pre-dilation was undertaken with a 2.5x20mm compliant balloon at 14 atmosphere and a 3.5x28mm BVS (ABSORBTM, Abbott Vascular, Santa Clara, CA, USA) was implanted in the mid-RCA. Post-dilation was achieved with a 3.5x20mm non-compliant balloon and repeated OCT assessment demonstrated excellent stent expansion and good strut apposition with no edge disruption. Angiographic assessment of the filter device suggested capture of material, confirmed by evidence of macroscopic plaque on retrieval of the distal protection device (Figure 1C) and final angiogram demonstrated good distal flow without residual stenosis (Figure 1D).

Intravascular imaging, especially OCT, offers potential in the planning and optimization of percutaneous coronary intervention (PCI), however, image interpretation is challenging. We report a new technique that simplifies interpretation and provides the interventionalist with a detailed evaluation of the underlying plaque substrate. Although anecdotal, our case promotes consideration of a concept of ‘personalized’ intervention to avoid peri-procedural complication and improve outcomes for PCI.

You Jeong Ki, MD
Seoul National University College of Medicine, Korea

Yongcheol Kim, MD
Chonnam National University Hospital, Korea
Acute heart failure (AHF) is a serious condition needing prompt and accurate management, and hemodynamic evaluation is often the first step. In simple cases, basic hemodynamic monitoring and non-invasive methods may be sufficient, but in some complex cases, invasive and advanced hemodynamic monitoring such as pulmonary artery catheter (PAC) is often needed.

The assessment of congestion and the measurement of hemodynamic status is mandatory to initiate therapy. The methods include non-invasive and invasive measurements. Routine physical examination could provide preliminary information on the congestion status. This examination would include blood pressure, rales, third heart sound, jugular venous distension, etc. Chest radiography is another choice. However, these modalities all lack sufficient sensitivity, specificity, or both. Compensatory lymphatic flow in pulmonary and systemic circulation has long been implicated. Echocardiography provides cardiac output (CO) by pulsed Doppler of the left ventricular outflow tract, PCWP by a regression equation involving valve velocities, and pulmonary vascular resistance, all lack sufficient sensitivity, specificity, or both. Compensatory lymphatic flow in pulmonary and systemic circulation has long been implicated. Echocardiography provides cardiac output (CO) by pulsed Doppler of the left ventricular outflow tract, PCWP by a regression equation involving valve velocities, and pulmonary vascular resistance.

Impedance cardiography (ICG) allows calculation of hemodynamic parameters, including stroke volume and CO, afterload (systemic vascular resistance), contractility (velocity and acceleration index), and fluid status (thoracic fluid content). Data suggest that ICG may be more accurate than other assessment methods for hemodynamic monitoring. It was recommended by 2016 ESC guidelines for AHF patients presenting with refractory symptoms. (similarly with hypotension and hypoperfusion) despite titration (IIb, C). PAC also play an important role in guiding the therapy of AHF. Based on previous studies including the ESCAPE trial, and in view of its safety and efficacy, invasive methods such as PAC were not recommended during routine therapy for AHF patients but only for those with cardiogenic shock.

Who should be hemodynamically monitored? The recent ESC guidelines recommended that intra-arterial line or pulmonary artery catheter (PAC) be placed in AHF patients with hypotension and persistent symptoms despite treatment. But the criteria for hemodynamic monitoring in patients with AHF are not clearly defined. It was suggested that hemodynamic monitoring should be restricted to severe AHF patients including those with impending or full-blown respiratory or circulatory failure with progressive end-organ failure (renal or hepatic impairment) and those considered for support devices or cardiac transplantation.

Impedance cardiography (ICG) allows calculation of hemodynamic parameters, including stroke volume and CO, afterload (systemic vascular resistance), contractility (velocity and acceleration index), and fluid status (thoracic fluid content). Data suggest that ICG may be more accurate than other assessment methods for hemodynamic monitoring. It was recommended by 2016 ESC guidelines for AHF patients presenting with refractory symptoms. (similarly with hypotension and hypoperfusion) despite titration (IIb, C). PAC also play an important role in guiding the therapy of AHF. Based on previous studies including the ESCAPE trial, and in view of its safety and efficacy, invasive methods such as PAC were not recommended during routine therapy for AHF patients but only for those with cardiogenic shock.

Experience from Chinese HF Registry: Why It Is Needed in East Asia

Heart failure (HF) is a serious clinical syndrome resulting from any structural or functional cardiac disorder and is associated with increased prevalence, significant mortality, and high rehospitalization rate. It is also one of the major cardiovascular diseases of the 21st century. Evidence from epidemiological studies in 2000 has demonstrated that the incidence of HF in Chinese adults is 0.9%. Aging of the population with increased prevalence of CAD, hypertension, DM and obesity, and prolongation of the lives of cardiac patients by modern therapeutic

Innovations have led to an increasing prevalence of HF in China. ON-HF Research and CHINA-HF Research have shown that the proportion of HF with preserved ejection fraction (HFpEF) is approximately 60%, and HF with reduced EF is about 40% in all hospitalized HF patients.

The medications that improve prognosis for HFpEF, such as β-blockers, ACEI/ARB, and aldosterone antagonists are increasingly used. However, patients received lower doses of these medications rather than the target doses in China. A randomized, multicenter study indicated that herbal pillow (Qiliqiangxin) combined with GDMT for HF can lead to further reduction of the level of NT-proBNP improving cardiac function and quality of life. Implantation of CRT/ICD in our country per million population is still far lower than the western countries. The ratio of CRT-P to CRT-D is approximately 50% to 50%. Non-ischemic heart disease is the major etiology for the implantation of CRT-P and CRT-D claiming approximately 70% which is quite different from the western countries.

In 2017, the HF Group of Chinese Society of Cardiology and the China Cardiovascular Association launched the Chinese HF Standardized Management Center establishment and certification projects to promote standardized treatment of HF and clinical implementation of guideline-directed evaluation and management (GDEM). Based on the latest HF guidelines and the experience of HF center, “Certification Standards of Chinese HF Standardization Management Center” was developed in line with national conditions by the HF Group of Chinese Society of Cardiology. A multidisciplinary Management team will be formed in the HF center to promote hierarchical treatment and two-way referral system, and to implement guideline-directed standardized treatment and long-term follow-up management of patients. An integrated public healthcare platform will be set up for the registration and certification of HF centers, physician training and patient education. A large database of HF will be established, together with quality management monitoring system and training system, covering different levels of hospitals in different regions. Multicenter randomized controlled clinical studies and real-world studies will be carried out. The core value of certification is to promote the continuous improvement of the quality of HF management and the long-term management of patients with HF.

How to Assess Hemodynamic Status of Patients with Acute HF in ER

CSC-KSC Joint Symposium (Heart Failure)
Update in the Management of AHF
Friday, Oct 13, 09:00-10:30 AM / Grand 1
Advances in Plaque Biology

The main theme of JCS-KSC Joint Symposium this year is “Advances in plaque biology”. Four distinguished speakers will present to the attendees the advancements and current research trends in plaque biology. This session will offer opportunities to learn from and interact with the experts from Japan and Korea.

Professor Oh will give a lecture on immune and vascular cell network in atherosclerosis. Atherosclerosis is a chronic inflammatory disease in which intense immunological pathways play an essential role. During the progression of atherosclerosis, large numbers of inflammatory and immune cells accumulate in the intima. The accumulated immune cells, including T cells, macrophages, and dendritic cells (DCs), cross-talk with each other and affected the development of atherosclerosis. Importantly, they found DCs that were poorly phagocytic but were immune stimulatory in the steady state mouse aorta. By crossing R5-/- to Ldr-/- mice, deficiency of classical CD103+ aortic DCs exacerbated atherosclerosis and fewer Foxp3+ Treg cells. These data indicate that functional DCs are dominant in normal aortic intima, and CD103+ classical DCs are associated with atherosclerosis protection. The function of CD137, a member of the tumor necrosis factor receptor superfamily, in mediating atherosclerosis plaque stability remains unknown. They found that the activation of CD137 signaling decreases the stability of plaques via its combined effects on T cells, vascular smooth muscle cells, and macrophages (Figure 1).

Dr. Satoh will deliver a lecture titled “development of novel therapies for cardiovascular diseases by clinical application of basic research.” Cyclophilin A (CyPA) is secreted from vascular smooth muscle cells, inflammatory cells, activated platelets, and cardiac fibroblasts in response to environmental stimuli. Mechanistically, excessive and continuous activation of the RhoA/Rho-kinase system promotes the secretion of CyPA, resulting in the development of multiple cardiovascular diseases. Basigin (Bsg), a transmembrane glycoprotein that activates MMPs, is one of the extracellular receptor for CyPA and promotes cell proliferation and inflammation. Thus, the CyPA/Bsg system is potentially a novel therapeutic target for cardiovascular diseases. Recently, they reported that plasma CyPA levels are increased in patients with cardiovascular diseases. Moreover, plasma CyPA levels predicted all-cause death in those. Additionally, they reported that plasma soluble Bsg levels are increased and predicted all-cause death in patients with heart failure, suggesting that both CyPA and Bsg are novel biomarkers for cardiovascular diseases. To further discover novel molecules targeting the CyPA/Bsg system, they performed high-throughput screening of 4,452 compounds and found molecules that ameliorate the development of animal model of cardiovascular diseases. Moreover, plasma CyPA levels predicted all-cause death in those.

Dr. Horie will give a lecture on the role of microRNAs in atherosclerosis. Recent reports indicated that miR-33a located within the intron of sterol regulatory element-binding factor (SREBF) controls cholesterol homeostasis via targeting ATP-binding cassette A1 (ABCA1). ABCA1 is a key molecule to form HDL cholesterol (HDL-C), which contributes to reverse cholesterol transport system in vivo. Indeed, miR-33a deficient mice showed elevated serum HDL-C levels via increased expression of ABCA1 and resistant to atherosclerosis or abdominal aortic aneurysm formation. On the other hand, primates, but not rodents, express a second miR-33 gene (miR-33b) from an intron of SREBF1. To address miR-33b function in vivo, they developed humanized mice, in which a miR-33b transgene is inserted within a Srebf1 intron. MiR-33b knock-in mice for an intron of Srebf1 showed reduced HDL-C level via decreased expression of ABCA1 and promoted atherosclerosis formation. These results indicate that miR-33a/b, which are located in the intron of SREBF2/1 respectively, have a substantial function in regulating lipid metabolism and atherosclerosis development. Thus, miR-33a/b could be a novel therapeutic target for lipid disorder and atherosclerosis.

Dr. Han will give a talk on the role of C-reactive protein (CRP) in plaque progression. CRP is a clinical marker representing the intrinsic inflammatory status. Moreover, CRP detected in plaque, which may originate from blood circulation or de novo synthesis by macrophages and vascular smooth muscle cells (VSMCs), may directly trigger the activation of specific receptors such as Fc-gamma receptors (FyRs), and induce a number of innate immune responses including complement activation, monocyte recruitment, and the expression of cytokines and inflammatory mediators by macrophages. However, Previous animal intervention studies have reported conflicting results on the direct contribution of human CRP to the progression of atherosclerosis in murine models. CRP was found to be ineffective in murine models dominant in very low density lipoprotein (VLDL). Only one study with apoE(-/-) mice, showing exceptionally high serum CRP level (>100 mg/L), demonstrated aggravation of atherosclerosis, suggesting an atherogenic property of CRP. Kovacs and colleagues showed that the modest expression of CRP (24 to 52 mg/L) was associated with less severe atherosclerosis in ApoB100/100/LDLR(-/-) mice. They developed moderate degree of hypercholesterolemia with a human-like lipoprotein profile in LDLR(-/-) mice. Under these conditions, moderately elevated plasma CRP levels resulted in a 30% reduction of aortic surface atherogenesis compared to wild type LDLR(-/-) littermates. In the series of their work, he suggest that CRP molecule is not biologically inert, but may trigger complex cellular responses, which may result in progression or suppression of atherogenic process.

Figure 1. T Cell Co-stimulatory Factor: CD137

JCS-KSC Joint Symposium (Basic Research) Advances in Plaque Biology
Friday, Oct 13, 16:00-17:30 PM / Grand 1

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