

KSCC 2022 DAILY

Today's Highlights

기획세션 9: 빅데이터자료를 이용한 연구

08:30-10:00 / Rm.325AB

Cross Specialty 7: Neurology & Intervention & Arrhythmia

LAO 현황 및 미래 / Cerebral Protection

08:30-10:00 / Rm.325CD

Cross Specialty 8: AI & Smart Health

AI Applications in Digital Healthcare

10:10-11:40 / Rm.325CD

Insurance Issues

12:50-14:20 / Rm.322

Healthcare Policy

발등에 불 떨어진 심장학회 큰일났네!

14:30-16:00 / Rm.322

Cross Specialty 8: AI & Smart Health

Deep Learning Related Methodologies for Electrocardiogram (ECG) Classification



Sunghoon Jung, Chief Scientific Officer, HUINNO Co. Ltd., Korea

Electrocardiogram (ECG) is a representative bio-signal that can diagnose the state of the heart activity by observing the flow of electricity generated by it. ECG is thus used as a standard measure to diagnose whether there is heart disease

such as arrhythmia or myocardial infarction.

Typical methods for measuring the ECG are a 12-lead ECG test or a Holter monitoring, but the diagnosis rate of intermittent arrhythmias is still low due to their short measurement time. Recently, published studies have reported that the arrhythmia diagnosis can be achieved more than 99% if ECG is measured continuously for about 14 days. Accordingly, wearable ECG devices that can conveniently measure long-term ECG are gaining attention and being released as products.

However, reading long-term ECG is laborious and time-consuming even for experts. Even the conventional rule-based automated ECG reading methods, which have been studied for the past decades, still do not provide satisfactory accuracy that can support fully automated analysis. **Deep learning technology is considered one of the solutions that can quickly and accurately identify arrhythmias in the long-term ECG.** Several studies based on deep learning to de-

tect arrhythmias from ECG are already being reported, and their results show better performance than trained cardiologists, as well as existing rule-based algorithms.

Physicians expect to be able to obtain several information from automated ECG analysis, such as frequency and duration of arrhythmias, heart rate variability, and ratio of premature beats, to determine need of intervention. Most of current deep learning-based ECG analysis methods are only focusing on arrhythmia detection and classification. To deliver beat-related information such as HRV and number of premature beats, analysis of each beat in the ECG must be done together.

We believe this beat-related analysis can also be resolved by deep learning in the manner of segmentation. Each beat in the ECG is composed with salient segments which are called P wave, QRS complex, and T wave. We have annotated each segment in the ECGs and trained the U-Net like CNN model (Figure 1). As a result, QRS detection is achieved with over 99% accuracy and average F1 score over 97% on the QRS classification. The integration of the two models with different roles is expected to make the automated ECG analysis more reliable.

Most important procedure for robust deep learning model development is to gather big data and reliable annotations. Many medical institutions already have a lot of real world data, but it is not

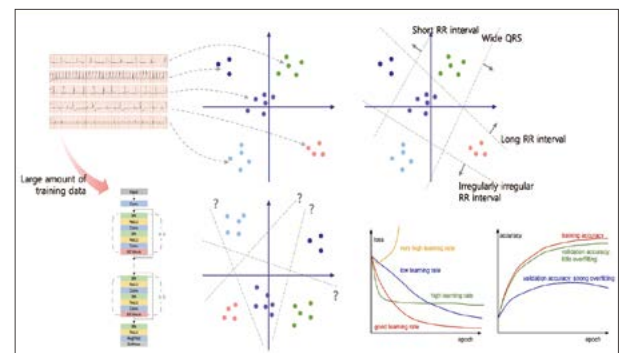


Figure 1. Deep learning model of electrocardiogram

refined in the available format or does not include appropriate annotations for model training. In the machine learning era, well-formed data based on one's knowledge will create value. The medical field is the most suitable field in this case. It is time to leap into the new era of healthcare through cooperation between medicine and engineering.

Multi-modal Learning in Electronic Health Records: Image-Text-Graph



Yoonjae Choi, PhD, KAIST, Korea

We propose a new model which adopts a Transformer-based architecture combined with a novel multimodal attention masking scheme to maximize generalization performance for both vision-language

understanding task (e.g., diagnosis classification) and vision-language generation task (e.g., radiology report generation) (Figure 2A). By rigorously evaluating the proposed model on four downstream

Continued on page 2

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Power Control

Consistent 24h BP control

Reference 1. William B. Whiet, et al. Effects of the Angiotensin Receptor Blocker Azilsartan Medoxomil Versus Olmesartan and Valsartan on Ambulatory and Clinic Blood Pressure in Patients With Stages 1 and 2 Hypertension. *Hypertension* 2011;57:413-420.

Prescribing Information [제품명] 이달비정 40밀리그램(아질사르탄 메독소밀 칼륨) / 이달비정 80밀리그램(아질사르탄 메독소밀 칼륨) [유용성분] 아질사르탄 메독소밀 칼륨 42.68mg(아질사르탄 메독소밀로서 40mg) 아질사르탄 메독소밀 칼륨 85.36mg(아질사르탄 메독소밀로서 80mg) [효능·효과] 본태성 고혈압 [용법·용량] 성인 : 이 약의 권장 초회용량은 1일 1회 40밀리그램이며, 식사와 관계없이 투여한다. 이 용량에서 혈압이 적절히 조절되지 않는 경우 1일 최대 80밀리그램까지 증량할 수 있다. 혈압강화효과는 치료시작 후 2주 이내에 나타나며 약 4주 정도에 최대효과가 나타난다. 이 약 단독 투여로 혈압이 조절되지 않는 경우, 다른 혈압강화제 [이노제 (예: 플루르탈론, 히드로클로로타이아지드나 칼슘채널차단제)와 병용투여 시 추가적인 혈압강화효과가 나타날 수 있다. (사용상의 주의사항) 1. 정고(1) 임신 2. 3기인 임부에 레닌-안지오텐신계(Renin-Angiotensin System, RAS)에 직접적으로 작용하는 약물 투여 시, 태아 및 신생아에게 손상 및 사망까지 유발할 수 있다. 따라서 임신으로 확인할 경우 즉시 이 약의 투여를 중단해야 한다. 2. 다음 환자에는 투여하지 말 것 1) 이 약 또는 이 약에 함유된 성분에 대하여 과민증이 있는 환자 2) 일부 3) 다음의 환자에게 이 약과 칼리스타틴 제제의 병용투여: 당뇨병 환자 또는 당뇨병 환자 또는 중증증-중증의 신장예 (사구체 여과율 <60mL/min/1.73m²) 환자 [저장방법] 차광기밀용기, 실온(1~30°C) 보관, 습기를 피하여 보관 [수입판매자] 셀트리온제약: 충청북도 청주시 청원구 오창읍 2산단로 82 [제 조자] Takeda Ireland Limited

* 이 내용은 허가사항을 요약한 것으로 자세한 정보는 제품의 첨부서 또는 <https://nedrug.mfds.go.kr>를 확인하십시오.

셀트리온 제약

DONG-A ST

edarbi®
azilsartan medoxomil
40 mg·80 mg tablets


Program at a glance: Day 3, Sep 25, 2022

Time	Rm. 325AB	Rm. 325CD	Rm. 324	Rm. 323	Rm. 322	Rm. 321	Rm. 320	Rm. 306A	Rm. 306B	Rm. 315	Grand Ballroom		
											Zone A	Zone B	Zone C
08:30-10:00	기획세션 및 빅데이터자료를 이용한 연구	Cross Specialty 7: Neurology & Intervention & Arrhythmia LAAO 현황 및 미래 / Cerebral Protection	Heart Failure 3 Debate: Hot Issues in HF	Vascular COVID-19 and Arterial Stiffness	Epidemiology 1 Korean Cohort Studies for CVD Prevention Research	Women Heart Disease 1 Unmet Need in Cardiovascular Medications in Women	순환기의공학회: 순환기 질환 연구를 위한 공학자-의학자 공동 연구 Successful Collaboration of Ph.D-MD	CAD 7 193-200	Intervention 4 201-208	Echocardiography 2 209-216	E-Poster 1-50 (08:30-11:40)		
10:10-11:40	개원의 연수강좌 1: 고혈압 Update in Hypertension Management	Cross Specialty 8: AI & Smart Health AI Applications in Digital Healthcare	Heart Failure 4 Advanced HF: Meet the Expert, Case Discussion with Plenary Lecture	Cardio-Oncology Cancer Associated Thrombus (CAT)	Epidemiology 2 Disparities in Cardiovascular Disease	Women Heart Disease 2 Sex and Gender Consideration in the Use of Emerging Cardiovascular Drugs		CAD 8 217-224	Vascular 225-232	Arrhythmia 5 233-240			
11:50-12:30	Scientific Session [Daiichisankyo/Daewoong] Update on Diagnosis and Treatment of High Risk Patients of Hypertension and AF	Scientific Session [JW-Pharm] The Earlier the Better, Less Safety Concerns	Scientific Session [Bayer] Xarelto®, Protection Never Rests!	Scientific Session [Yooyoung] Dyslipidemia and Cardiovascular Disease	Scientific Session [Dong-A ST/Mezoo] Updates in Cardiac Monitoring Technology & Device						Mini Oral 7 (Arrhythmia) 31-35	Mini Oral 8 (Epidemiology) 36-40	Mini Oral 9 (Intervention) 41-45
12:30-12:50	Break												
12:50-14:20	개원의 연수강좌 2: 당뇨 Management Comorbidities in Diabetes: Case-oriented Lecture	Intervention 6 Optimal Medical Treatment after PCI	Arrhythmia 6 Meet-the-expert: Interesting EP Case	Echocardiography 5 Cardiac Imaging in Non-cardiac Disease	Insurance Issues	Nurse-Technician Session 1 Part I: Hot Topic & Hot Discussion		Women Heart Disease 241-247	Epidemiology 1 248-255	Cardio-oncology 256-263	E-Poster 1-50 (12:50-16:00)		
14:30-16:00	개원의 연수강좌 3: 이상지질혈증 개원기에서 마주하게 되는 고인거리들과 해결책	Intervention 7 Essentials of Endovascular Therapy	Arrhythmia 7 Update in Sudden Cardiac Death Prevention	Echocardiography 6 Echocardiography & Cardiac Imaging for Intracardiac Device	Healthcare Policy 발등에 불 떨어진 심장학회 큰일났네	Nurse-Technician Session 2 Part II: KCTA Nursing Session		CAD 9 264-271	Epidemiology 2 272-279	Arrhythmia 6 280-287			

KSC 2022

Oral Abstract Session

Rm. 306A, 306B, 315



Scientific Session	
Scientific Session [Daiichisankyo/Daewoong]	
Update on Diagnosis and Treatment of High Risk Patients of Hypertension and AF	
11:50-12:10	The Importance of On-label Dosing of NOAC in Asians
12:10-12:30	Optimal BP Control Strategy for DM Patients
» Sep 25, 11:50-12:30, 325AB	
Scientific Session [JW-Pharm]	
The Earlier the Better, Less Safety Concerns	
11:50-12:10	Are Statins All the Same in Outcome and Safety for Asian?
12:10-12:30	Cutting Edge Care of Pitavastatin with Ezetimibe Combination Therapy
» Sep 25, 11:50-12:30, 325CD	
Scientific Session [Bayer]	
Xarelto®, Protection Never Rests!	
11:50-12:10	Protecting Vascular Events in NVAf Patient with Diabetes
12:10-12:30	Xarelto® Reliable Real-World Evidence for Stroke Prevention in Asia
» Sep 25, 11:50-12:30, 324	
Scientific Session [Yooyoung]	
Dyslipidemia and Cardiovascular Disease	
11:50-12:10	APOLLO STUDY 2year F/U Result
12:10-12:30	Why Should We Consider Pravastatin+Fenofibrate Combination?
» Sep 25, 11:50-12:30, 323	
Scientific Session [Dong-A ST/Mezoo]	
Updates in Cardiac Monitoring Technology & Device	
11:50-12:10	New Wearable Device, 하이카디 & Global Market Trend
12:10-12:30	하이카디를 이용한 진료 현장의 변화와 전망
» Sep 25, 11:50-12:30, 322	

tasks with three radiographic image-text datasets (MIMIC-CXR, Open-I, and VQA-RAD), we empirically demonstrate the superior downstream task performance and generality of our model against various baselines including task specific architectures. In addition, we qualitatively analyze our model by showing the results of retrieved image-report pairs, the attention map visualization, and generated reports. Our proposed multimodal pre-training model could flexibly adapt to multiple downstream tasks of vision-language understanding and generation with a novel self-attention scheme. We believe that our approach can provide the basis for a wide range of interpretations of vision-language multimodal in the medical domain. Additionally, we present MedGTX, a pre-trained model for multimodal representation learning of the structured and textual EHR data (Figure 2B). MedGTX uses a novel graph encoder to exploit the graphical nature of structured EHR data, and a text encoder to handle unstructured text, and a cross-modal encoder to learn a joint

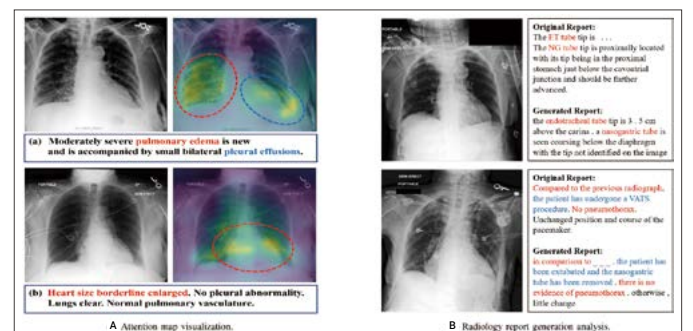


Figure 2. Multi-modal learning in electronic health records: image-text-graph

representation space. We pre-train our model through four proxy tasks on MIMIC-III, an open-source EHR data, and evaluate our model on two clinical benchmarks and three novel downstream tasks which tackle real world problems in EHR data. The results consistently show the effectiveness of pre-training the model for joint representation of both structured and unstructured information from EHR. Given the promising performance of MedGTX, we believe this work opens new doors to jointly understanding the two fundamental modalities of EHR data.

Cross Specialty 8: AI & Smart Health
AI Applications in Digital Healthcare
» Sunday, Sep 25, 10:10-11:40, 325CD

Continued from page 1

Echocardiography

Cardiac evaluation prior to liver transplantation; cardio-hepatology in liver disease



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Liver transplantation (LT) is the ultimate treatment for liver cirrhosis (LC). However, end-stage liver disease leads to specific cardiovascular responses that can be detrimental to LT candidates. **Cardiovascular changes following LC is perplexing because it is usually subclinical at rest, but can clinically manifest when rapid blood volume shift occurs during LT, subsequently leading to cardiovascular complications or death. These myocardial changes in LC is called cirrhotic cardiomyopathy.**

Diagnostic criteria for cirrhotic cardiomyopathy rely on 3 criteria, i.e. systolic dysfunction, diastolic dysfunction, and supportive criteria such as electrocardiographic findings. The diagnosis can be challenging because it mainly reflects functional rather than structural changes. A recent study has described the myocardial structural changes in LC with echocardiography and cardiac magnetic resonance, demonstrating myocardial extracellular volume expansion with augmented left ventricular systolic function at rest in LC, which can be reversible long after LT. Therefore, myocardial extracellular volume expansion is accepted to represent a structural component of myocardial changes in LC. Portopulmonary hypertension (PoPH) is also another important clinical manifestation in LC patients. The prevalence of PoPH in patients awaiting LT is 3.5~16.1%, and it significantly affects patient survival and is also a contraindication of LT when severe. Usually, mean pulmonary artery pressure (mPAP) and pulmonary vascular resistance (PVR) are two indices commonly used to determine the severity of PoPH; absolute contraindication for

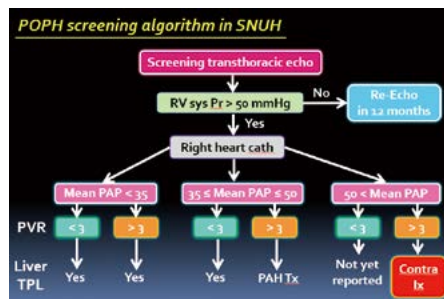


Figure 1. PoPH screening algorithm in SNUH

LT includes; i) mPAP >50 mmHg and ii) PVR >3 Wood Unit. If LC patients have 35 mmHg \leq mPAP < 50 mmHg and PVR >3 Wood Unit, targeted therapy for pulmonary artery hypertension is recommended and then patients need to be reassessed 6 months after therapy with echocardiography and cardiac catheterization for the feasibility of LT. PoPH can be resolved over 2~3 years after LT in about 70% of PoPH patients.

Echocardiography 5 Cardiac Imaging in Non-cardiac Disease

» Sunday, Sep 25, 12:50-14:20, 323

Echocardiography & Cardiac Imaging for Intracardiac Shunt Device



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Atrial septal defect (ASD) is among the most common acyanotic congenital heart disease, accounting for 30~40% of clinically important intracardiac shunts in adults. The echocardiographic and Doppler studies before and after surgical or transcatheter therapies need a thorough echocardiographic evaluation of ASD, including the size and shape of the defect, rims of tissue surrounding the defect, degree and direction of shunting, and hemodynamics of the heart and pulmonary circulation. Although guidelines exist regarding the imaging for ASD before and after surgical and transcatheter therapies, there still are

unanswered issues on the imaging work-up for ASD closure.

In patients with heart failure and ASD, hemodynamic features are significantly different between the adults and the children. In adult congenital heart disease with heart failure, recommendations are mostly based on clinical experience or position statements. **Especially in patients with overt biventricular failure, ASD closure may worsen the situation. These patients must be carefully evaluated and may require pre-interventional testing with careful assessment of hemodynamics to decide between complete, fenestrated, or no closure, considering that an increase in filling pressure by ASD closure may worsen the symptoms and outcome.** Impaired left ventricular diastolic function by decreased e' and increased E/e' could be the clue for the possible development of acute decompensated heart failure.

Invasive hemodynamic characterization with right heart catheterization may be needed in patients with ASD and heart failure. Pulmonary capillary wedge pressure (PCWP) is routinely monitored during the procedure to avoid acute congestion caused by ASD closure in patients with heart failure. If the increase of PCWP is >10 mmHg from the baseline after balloon occlusion of the ASD or PCWP is >20 mmHg either at baseline or at balloon occlusion of the defect, pulmonary edema may develop by ASD closure, and thus, the procedure should be abandoned. The creation of a fenestration in the device may avoid the abrupt hemodynamic change after the transcatheter closure of ASD. However, the optimal fenestration size has not been evaluated yet and the experiences are still limited. Pre- and periprocedural anti-congestive medication is important and effective for preventing congestive heart failure after ASD closure in patients with heart failure.

Prosthetic Valves (Mechanical, Bioprosthetic, Transcatheter)



서지원 교수
강남세브란스병원

심장판막수술은 다른 수술과는 다르게 수술로 끝나는 것이 아니라 평생 인공판막에 대한 관리와 추적관찰이 필요하다. 기계판막은 vitamin K 길항제를 이용한 항응고 치료가 평생 필요하고, 혈전증, pannus, 판막 주위 누공,

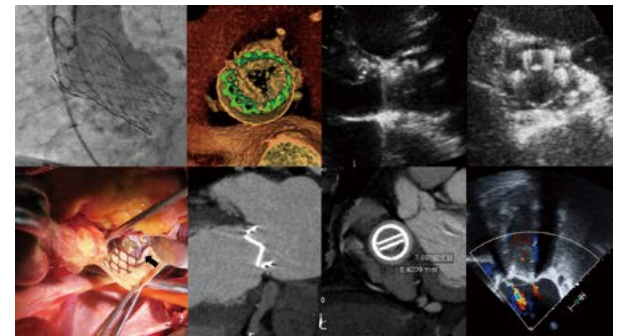


Figure 2. 여러 종류의 인공심장판막과 영상검사

감염성 심내막염, 다른 판막의 질환 발생 등에 대한 지속적 평가를 요한다. 조직 판막은 심방세동과 같은 동반질환이 없다면 항응고 치료가 불필요하나 조직 판막의 퇴행성 변화로 판막의 수명이 비교적 정해져 있다. 경피적 판막은 몇몇 고유의 특징이 있으나 수술적으로 이용되는 조직 판막과 같은 조직으로 만들어지기에 퇴행성 변화의 면에서는 크게 다르지 않다.

이러한 인공심장판막의 선택에는 여러 요소를 고려하게 된다. 가장 중요한 요인은 역시 환자의 나이와 기대여명이지만 그 외에 고려해야 할 해부학적, 혈액학적 요인들이 있고 이는 일차적으로 심초음파로 평가한다. 이외에 심장 CT 등이 혈관 상태 및 해부학적 구조 확인에 많은 도움을 주고, 특정 질환에서는 심장 MRI, PET 등이 도움이 될 수 있다.

심장판막 치환술을 받은 환자의 판막과 심장 평가를 위해서 일차적으로 이용되는 것은 역시 경흉부 심초음파이다. 이면성 경흉부 심초음파로 수술된 판막의 형태와 움직임을 평가하고 Doppler 심초음파로 혈액역학적 변화에 대한 평가를 시행한다. 인공판막에 이상이 생길 경우 좌심실과 좌심방의 크기와 기능에 변화가 동반되는 경우가 많고, 경우에 따라서는 다른 판막의 기능에도 변화가 생길 수 있기에 항상 이에 대한 가능성을 염두에 두고 평가해야 한다. 경흉부 심초음파만으로 평가에 제한이 있으면 경식도 심초음파를 적극적으로 고려해야 한다. 경식도 심초음파로 인공판막의 움직임을 보다 면밀하게 파악할 수 있고 판막 주위의 누공, 혈전이나 증식증 유무 등도 평가를 할 수 있다. 특히, 1 cm 미만의 증식증이나 판막 주위 누공에 대한 평가는 경식도 심초음파가 가장 정확한 정보를 제공한다. 반면, 판막 주위의 pannus나 혈전은 경식도 심초음파로도 충분한 정보를 얻지 못할 수가 있다. 특히, 대동맥판막과 승모판막이 모두 인공판막으로 치환되어 있는 환자에서는 대동맥판막에 대한 평가가 경식도 심초음파로 어려울 수 있다. 이 경우에는 심장 CT가 매우 도움이 될 수 있다.

인공판막의 종류에 따른 특징과 장단점을 정확히 알고 있어야 인공판막의 적절한 선택과 수술 이후의 체계적 평가가 가능하다. 또한 이것이 심초음파 및 다른 영상검사에서 어떻게 나타나는지를 아는 것이 환자의 현재 상태 평가와 향후 치료 계획 수립에 있어서 필수적이다(Figure 2).

Echocardiography 6 Echocardiography & Cardiac Imaging for Intracardiac Device

» Sunday, Sep 25, 14:30-16:00, 323

You refuse to compromise.
We couldn't agree more.

Moderate or Severe PVL at 30 days

0.8%

0.5%

PARTNER 3
N=487

SAPIEN 3 Ultra TVT Registry
N=728



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Cardio-Oncology

Asymptomatic Thrombus in Cancer Patients: Should We Treat It or Not?



Ho-Young Yhim, MD, PhD
Jeonbuk National University Hospital, Korea

Incidental venous thromboembolism (VTE) refers to VTE detected on imaging studies conducted for other indications - typically staging or restaging of cancers. The use of the term 'asymptomatic' VTE needs to be discour-

aged because patients often have unrecognized symptoms; in an international prospective cohort study of 695 cancer patients with incidental pulmonary embolism (PE), approximately 44% were symptomatic with higher rates of reported fatigue and dyspnea on exertion. The prevalence of incidental PE on chest CT performed for restaging in cancer patients has been reported at 1.5%-3.4% per scan, and the rate increases to 4%-9% in hospitalized cancer patients. In addition to PE, incidental deep venous thrombosis

(DVT) and splanchnic vein thrombosis are essential contributors to rates of cancer-associated VTE.

From the perspective of the treatment of incidental VTE in cancer patients, it is crucial to understand that incidental VTE appears to be as consequential for patients as symptomatic VTE in terms of recurrence, bleeding complications, and mortality. Based on the cohort data, although randomized data are not available regarding the treatment of incidental VTE, guidelines recommend the same anticoagulation management of cancer patients with incidental VTE as for symptomatic VTE. However, the clinical significance of cancer patients with specific incidental VTE events, i.e., isolated subsegmental PE or splanchnic vein thrombosis, is still a matter of debate. During this session, recent data on subsegmental PE in the absence of DVT and splanchnic vein thrombosis in cancer patients will be presented.

Catheter Related Thrombosis

Intravenous (IV) catheter is used in almost all inpatients, while IV catheter that can be



Nuri Kim, MD
Chonnam National University Hwasun Hospital, Korea

placed for a long time even for outpatient department-based treatment is used for cancer patients. However, IV catheter can cause endothelial injury and subsequent inflammation, and this may lead to venous thrombosis

in patients with hypercoagulable state, such as patients with active cancer. So thrombosis associated with IV catheters has become a quite common problem in real practice, but suggested management of catheter-related thrombosis (CRT) is largely based upon indirect evidence from the experiences with deep vein thrombosis (DVT) of the lower extremities.

With suspected CRT, pain in supraclavicular space like unilateral limb swelling, dysfunctional catheter, or computed tomography (CT) venogram with contrast is a useful diagnostic modality. **Although there is controversy about CRT of the upper extremity, therapeutic anticoagulation is generally recommended in the absence of absolute contraindication.**

Recommended duration of anticoagulation prescription is at least 3 months, based on extrapolation from trials in-

volving lower limb DVT and pulmonary embolism due to lack of direct evidence from upper extremity DVT. The type and intensity of anticoagulant therapy is not different for DVT of the legs, which includes parenteral anticoagulants such as low-molecular-weight heparin (LMWH), unfractionated heparin, and oral anticoagulants like warfarin and direct oral anticoagulant (DOAC). Sufficient and firm data about the use of DOAC for the management of the acute phase of CRT is lacking, but observational and small controlled studies suggested their therapeutic utilities.

Removal of the catheter is not recommended immediately if it is mandatory, functional, in the correct position, and not infected. Even in the case of occluded catheters, replacement of the catheter might cause recurrent endothelial injury and thrombosis at another site, so salvaging the thrombosed catheter with the instillation of fibrinolytic agents can be attempted. In terms of prevention of CRT, prophylactic anticoagulation does not yet have sufficient evidence.

Cardio-Oncology
Cancer Associated Thrombus (CAT)
» Sunday, Sep 25, 10:10-11:40, 323

Hanmi 한미약품

**로수젯의 RACING!!
CV Outcome 입증!!**

- 세계 최초 Rosuvastatin+Ezetimibe 복합제의 Long-term CV Outcome 입증
- Rosuvastatin 단일제와의 비교임상을 통해 로수젯의 Efficacy & Safety 우수성 입증
- Rosuvastatin+Ezetimibe 복합제에 대한 새로운 Landmark Trial

강력한 Dual-Action 이상지질혈증 치료제
로수젯
(에제티미브/로수바스타틴합제)

로수젯, RACING Trial Lancet 게재!!

Reference: *Ho-Young Yhim, Lee YJ, et al. Long-term efficacy and safety of moderate-intensity statin with ezetimibe combination therapy versus high-intensity statin monotherapy in patients with atherosclerotic cardiovascular disease (RACING): a randomised, open-label, non-inferiority trial. Lancet. 2021;397(10240):380-390.*

ROS-II-2209-01 HM-Design 2209_01

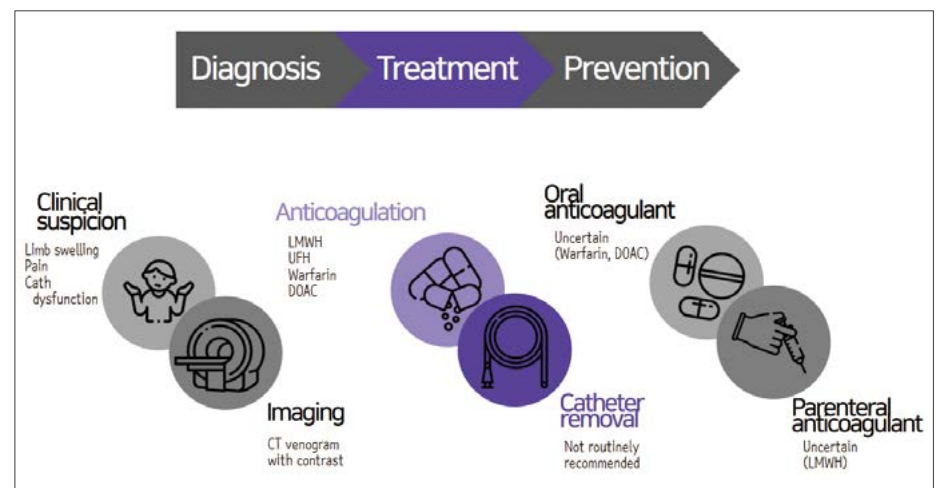


Figure 1. Diagnosis, treatment and prevention of catheter-related thrombosis

스마트한 복용을 위한 솔루션

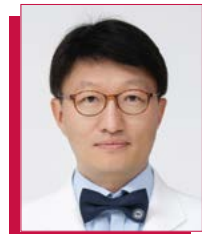
하이카디플러스

실시간 원격 모니터링과 부정맥 진단까지 복잡한 선 없이 패치 하나로!

비이스트 Nicardipine

Women Heart Disease

Pregnancy-induced Hypertension (PIH): Risk Factor or Marker?



Jinho Shin, MD, PhD
Hanyang University Hospital, Korea

Cardiologists have been familiar with angiogenesis and arteriogenesis since the late 1990s, especially those who remember late Jeffrey Isner. Recently, the mysterious preeclampsia has been greatly understood by the angiogenesis

story. So now we can be more conscious and comfortable with our thinking. The first thought striking the minds of cardiologists might be that high blood pressure (HBP) should be lowered. This auto-reflective process is derived from the never-ending routine of our daily practice.

But we still have an ongoing question: what is the deal with having HBP for a couple of months during pregnancy? Does HBP increase the risk of preeclampsia? If so, does lowering BP reduce the risk of preeclampsia? These questions arise from the angiogenesis story taking place during the placentation of the embryo. Vascular growth factor (VEGF) induces endothelial sprouting, and sphingosine 1 phosphate (S1P) induces arteriogenesis. VEGF in-

duces proliferation, and S1P induces quiescence of endothelial cell and actin polymerization of the vascular smooth muscle cell. A leading cell is not exposed to laminar shear stress (LSS), and S1P and tracking cell are exposed to LSS and S1P. The action of VEGF is inhibited by soluble fms-like tyrosine kinase 1 (sFlt-1).

These series of events are the cause of PIH and preeclampsia. Under the circumstance of increased cardiac output, increased blood pressure is just one among several dozens of markers for preeclampsia. Naturally, there is little chance of lowering BP to prevent or reduce the risk of preeclampsia.

Close monitoring and intervention (termination of the pregnancy) to prevent fetal and maternal complications is the cornerstone. The benefit of BP control to prevent some neurologic complications is just marginal. **Accurate monitoring using out-of-office BP will detect PIH very efficiently.** The impending report of Chronic Hypertension and Pregnancy (CHAP) Project will highlight "the untold truth" behind the role of BP control for PIH.

Women Heart Disease 1

Unmet Need in Cardiovascular Medications in Women

» Sunday, Sep 25, 08:30-10:00, 321

SGLT2 Inhibitors



Yong-Hyun Kim, MD, PhD
Korea University Ansan Hospital, Korea

Originally, SGLT2 inhibitors (SGLT2I) were approved for the treatment of type 2 diabetes mellitus (DM). Eventually, SGLT2Is were established as a "must-prescription drug" in heart failure (HF) after several landmark trials with SGLT2I.

SGLT2I has shown a reduction of major adverse cardiovascular events (MACE) compared to placebo in both sexes but sometimes failed to indicate statistical significance. Hazard ratio (HR) reduction was insignificant in women in the DAPA-HF (HR=0.79 [0.59–1.06]), SOLOIST (HR=0.80 [0.51–1.25]), and EMPULSE (HR=1.27 [0.88–1.83]) trials, which may be due to the lack of statistical power from the small number of female patients and the relatively small study size. Although genital infection occurred more in both sexes compared to the placebo group with varying symptoms in men and women, the rate of drug discontinuation was not high compared to the placebo group. Also, most of the symptoms of genital infection

were mild, so it would be reasonable to think that the presence of genital infection did not affect the outcomes.

Women have a relatively higher percentage of body fat, lower plasma volume, low cardiac output, and small liver compared to men, so there is a difference in the initial plasma drug concentration and drug clearance rate. However, there is insufficient evidence that these biological differences also cause varying drug effects. Sometimes the difference in the drug effects between sexes seems smaller than the difference between races.

The most important method in clinical research in evidence-based medicine is to use randomized controlled trials. However, it is impossible to conduct a randomized controlled trial to prove the difference in drug efficacy between sexes because it is impossible to randomly allocate X and Y chromosomes while administering the same drug to patients of the same age, same body size, and same culture. Nevertheless, we continue to wonder in which sex and subgroup SGLT2Is are effective.

Women Heart Disease 2

Sex and Gender Consideration in the Use of Emerging Cardiovascular Drugs

» Sunday, Sep 25 10:10-11:40, 321

Vascular

Long-term Cardiovascular Effect of COVID-19 Infection



Jah Yeon Choi, MD, PhD
Korea University Guro Hospital, Korea

Since the case of the first COVID-19 infection was reported in December 2019, the disease quickly spread worldwide, resulting in the COVID-19 pandemic. And now, COVID has become a worldwide medical issue with long-lasting multi-organ symptoms that patients endure for weeks or months after

SARS-CoV-2 infection has already subsided. Dr. Choi presented that patients suffer from chest pain, electrocardiogram (ECG) abnormalities, postural orthostatic tachycardia (POTS), or newly developed supraventricular or ventricular arrhythmias. She further explained that **previous observational studies with imaging have provided evidence of chronic peri-myocarditis with left and right ventricular dysfunction, and progression of atherosclerotic cardiovascular disease. The immune dysregulation, inflammation, microvascular endothelial dysfunction, and thrombus formation due to coagulopathy were suggested as possible pathophysiologic mechanisms of the long-term cardiovascular effect of COVID (Figure 1).**

However, as there is no rigorous evidence

for the exact mechanism, Dr. Choi discussed that the treatment plan should be approached with caution and to be patient-specific. Both nationwide large population clinical data and transitional basic studies would be needed to understand and overcome COVID-19. Current efforts will broaden our horizons in understanding the interactions between infection, immunity, and the heart, and may become a potent weapon in dealing with other infectious diseases that we may encounter in the future.

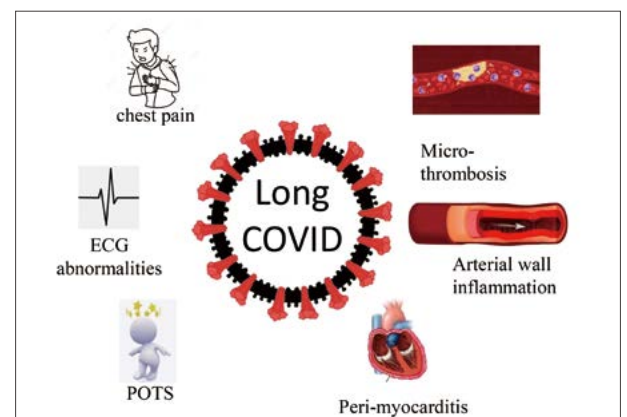


Figure 1. The cardiovascular symptoms of long COVID (Cardiovasc Res 2022;25:cvac115)

Vascular

COVID-19 and Arterial Stiffness

» Sunday, Sep. 25, 08:30-10:00, 323



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[효능/효과]

1. 비판막성 심방세동 환자에서 뇌졸중 및 전신 색전증의 위험 감소
2. 심재성 정맥혈전증 및 폐색전증의 치료
3. 심재성 정맥혈전증 및 폐색전증의 재발 위험 감소
4. 하지의 주요 정형외과 수술(술관절 또는 고관절 치환술)을 받은 성인환자의 정맥혈전색전증 예방

CHARACTERISTICS

- ① 심방세동 환자에서 혈전의 생성을 억제합니다.
- ② 뇌졸중 또는 전신색전증 발현율이 낮게 나타났습니다.
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SAMJIN 삼진제약

Intervention

PCSK9 Inhibitor vs. High Potency Statin Plus Ezetimibe in Korean Patients at Very High Risk



Kyung Hoon Cho, MD, PhD
Chonnam National University Hospital, Korea

Statins remain the drugs of choice for the treatment of hypercholesterolemia. However, despite its wide use, the residual risk of cardiovascular events is considerable. The use of non-statin drugs, such as ezetimibe or PCSK9 inhibitors, in combination with statins has shown to further reduce the risk of cardiovascular events. **In this session, oral agents, high-intensity statins with ezetimibe, and injectable agent, PCSK9 inhibitors, will be compared in terms of efficacy, safety, and implementation issues (Figure 1).**

Efficacy
High-intensity statins plus ezetimibe reduce LDL-C up to 65%. However, there is considerable inter-individual variation in the LDL-C reduction with the same dose of statins. Poor responses to statin treatment are to some extent caused by poor compliance but may also be explained by genetic backgrounds. PCSK9 inhibitors reduce LDL-C up to 65% on top of statin therapy. In the FOURIER trial, it was demonstrated that with minimal inter-individual variability in LDL-C lowering, 90.5% of patients achieved LDL-C reduction by at least 50%. In Korean patients at a very high risk of atherosclerotic cardiovascular disease (ASCVD), similar findings were observed regarding the LDL-C lowering and inter-individual variability of PCSK9 inhibitors. The FOURIER and ODYSSEY OUTCOMES trials demonstrated that PCSK9 monoclonal antibodies in addition to statin therapy reduced the risk of a cardiovascular event in patients with ASCVD.

Efficacy

Safety
High-intensity statins can have negative effects on the liver functions and muscle enzymes, and can modestly increase new-onset diabetes mellitus. Furthermore, the potential association between lipid-lowering treatments and neurocognitive disorders remains an area of debate. To date, several pooled analyses, meta-analyses, and randomized controlled trials demonstrated that PCSK9 inhibitors were not associated with neurocognitive adverse events, myalgia, new-onset diabetes mellitus, and an increased alanine or aspartate aminotransferase. However, the long-term safety (>5 years) of very low levels of LDL-C (<25 mg/dL) by lipid-lowering therapy remains unknown.

Safety

High-intensity statins can have negative

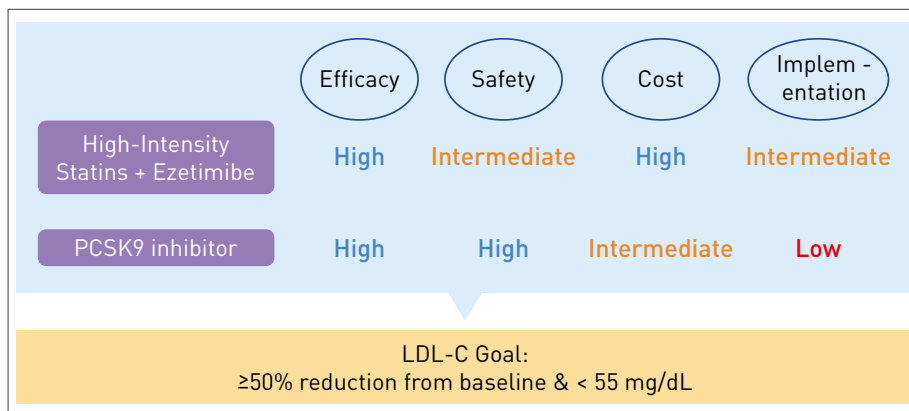


Figure 1. Take home message regarding PCSK9 inhibitor vs. high-intensity statin plus ezetimibe in Korean patients at very high risk

Implementation
Only a minority of patients at a very high risk of ASCVD are under the LDL-C target in Korea. It may be attributable to poor compliance, side effects of drugs, and physician behaviors. We need more exploration of the gap between the guidelines and real-world practice.

Implementation

Intervention 6
Optimal Medical Treatment after PCI
» Sunday, Sep. 25, 12:50-14:20, 325CD

State-of-the-Art: Medical Therapy for PAD

Peripheral arterial disease (PAD) is a type of atherosclerotic disease that leads to partial or complete peripheral artery



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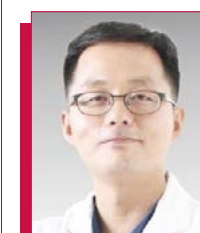
occlusion, resulting in reduced blood flow and ischemia. Patients with PAD often have reduced walking capacity and are at risk of acute and chronic critical limb ischemia leading to major adverse limb events (MALE), such as peripheral revascularization or amputation. Patients with PAD often have coexistent coronary or cerebrovascular disease, and increased likelihood of major adverse cardiovascular (CV) events. Management of PAD may include lifestyle modifications, medical management, endovascular repair, or surgery. The medical approach to PAD is multifaceted and includes cholesterol reduction, antiplatelet therapy, anticoagulation, peripheral vasodilators, blood pressure management, exercise therapy, and smoking cessation.

Medical therapies have demonstrated efficacy in reducing the risk of major adverse CV events and MALE and improving function in patients with PAD by modulating key disease-determining pathways including inflammation, vascular dysfunction, and metabolic disturbances.

Antiplatelet agents are recommended to reduce stroke, myocardial infarction (MI), and vascular death in patients with symptomatic PAD. Combination treatment

with aspirin and low-dose rivaroxaban for prevention of CV events and MALE should be considered for patients with PAD and/or stable coronary artery disease. Statin therapy is indicated for all patients with PAD, due to its designation as a subtype of atherosclerotic cardiovascular disease and benefit for CV outcomes. In patients with PAD and hypertension, antihypertensive therapy is suggested to reduce the risk of stroke, MI, heart failure, and CV death. Following revascularization post-acute limb ischemia, antiplatelet drugs and statins are recommended to decrease CV complications. Rivaroxaban plus aspirin may also be an option for decreasing amputations and mortality after revascularization. Cilostazol is effective for increasing walking distance and alleviating leg pain symptoms in patients with claudication. The heterogeneity of risk profile in patients with PAD supports a personalized approach, with consideration of treatment intensification in those at high risk of adverse events. Historically, PAD has been an underdiagnosed and undertreated disease, but increased attention in the recent years has prompted development of society guidelines and other clinical evidence supporting proper evaluation and pharmacologic treatment of PAD.

Long Term Follow-Up and Management of PAD



조유형 교수
한양대학교 교육협력 병지병원

말초동맥질환의 장기 추적 및 치료목적은 크게 두 가지다. 첫째는 심혈관 및 하지 사건위험의 감소이며, 둘째는 하지 증상, 운동 능력, 삶의 질 개선이다. 심혈관 및 하지 사건위험을 감소하기 위해 적극적으로 위험인자를 평가하고 치료해야 한다. 하지 증상, 운동 능력, 삶의 질 개선을 위해 혈관개통술, 약물 치료와 더불어 운동, 금연 등 생활습관 개선을 적극적으로 적용해

Continued on page 7

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빅데이터자료를 이용한 연구

국민건강보험 빅데이터를 이용한 임상연구



한경도 교수
승실대학교

국민건강보험공단, 질병 관리청 등 보건으로 빅데이터의 활용이 학계, 산업계 등 다양한 분야에서 활발하게 이루어지고 있다. 그 중 건강보험공단 자료는 국가라는 단일 보험자가 5천만 명 전 국민 진료 기반의 자료를 2002년부터 20여 년간 축적해 놓고 있다. 이를 활용한 질병의 역학연구, 건강검진을 연계한 대규모 코호트 연구, RWD (Real world Data) 및 RWE (Real word Evidence)로 표현되는 의약품 연구 등이 전 세계적으로 주목을 받으며, 빠르게 성장하고 있다. 이번 강에서는 건강보험공단 보건으로 빅데이터를 소개하고, 청구자료 및 건강검진을 고려한 다양한 연구방법론과 사례를 제시한다. 특히, 건강보험공단이 생애 전 주기에 걸쳐 시행하고 있는 다양한 검진 중 일 반건강검진을 이용한 연구를 중심으로 건강검진 시행 횟수에 따라서 모집단의 대푯값을 평균, 변화, 변동성, 누적 부담 지표로 정의한 순환기질환

질환 연구 및 건강보험공단 자료의 산정특례를 이용하여 정의 가능한 희귀 심장질환 연구를 소개하고자 한다(Figure 1). 더불어 데이터 3법을 통한 앞으로의 보건으로 빅데이터 전망에 대하여 논의해 보고자 한다.

보건으로 분야 CDM 적용 사례 및 미래 활용 방안



Seung Chan Yoo, MD
Ajou University, Korea

Over the last decade, the technology and economics of data collection, storage and analysis have changed dramatically. Today, utilizing data is far less costly than ever before. To the extent that data can be collected and analyzed comprehensively and at scale, there is no fundamental need any more to work only with small samples under strict assumptions. The

Big Data is reshaping the scientific method and viewpoint in the medical field. In many countries, researchers and administrative health institutions struggle to apply standardized data model to harmonize and collect medical data from various and heterogeneous sources to generate clinical 'Big Data'.

However, various barriers such as system heterogeneity, different formats, variation in human subject protection rules over the world, trust building, contracting and coordination and study governance policies, hamper it. Recently, distributed research network (DRN), such as Observational Health Data

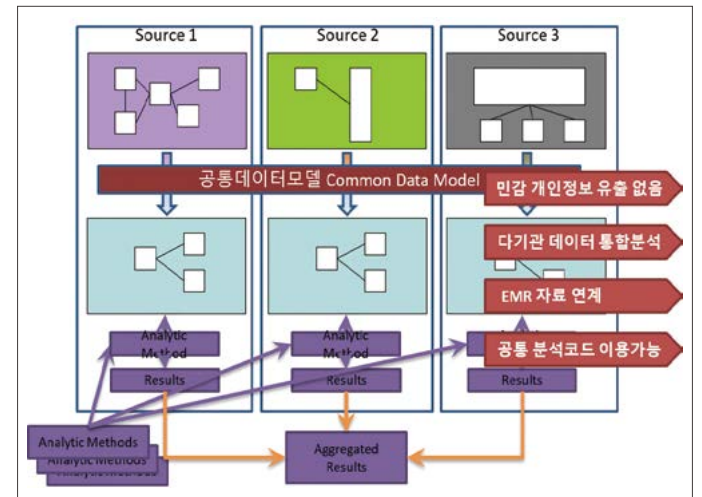


Figure 2. Overview and advantage of CDM

ational Health Data Sciences and Informatics (OHDSI) is getting popular for clinical data partners over the world. The DRN provides network-wide results by running the same analysis program for participating organizations using the same data structure, called a Common Data Model (CDM), and then combining the summarized results through the network (Figure 2). Collaborative big data analysis based on CDM will serve as a key player to improve health, by empowering a community to collaboratively generate the evidence that promotes better health decisions and better care.

기획세션 9: 빅데이터자료를 이용한 연구
빅데이터자료를 이용한 연구
» Sunday, Sep 25, 08:30-10:00, 325AB



Figure 1. 연도별 건강보험공단 자료 제공 건수 및 논문 출간 추이

단위: 건

Continued from page 6

야 한다. 하지만, 실제 임상 환경에서는 생활습관 개선 치료가 잘 활용되지 못하고 있다. 본 발표에서는 말초동맥질환의 장기 추적 및 치료를 위해 운동 프로그램을 중심으로 설명하겠다.

운동 치료는 말초동맥질환자의 기능을 향상하고 증상을 감소하는 가장 효과적이고 안전한 치료이다. 하지 파행은 혈류 감소와 연관되지만, 발목상완지수(ABI)와 보행 거리 연관성은 다양하게 나타난다. 말초동맥질환의 기능 제한에서 단순히 큰 하지 동맥의 폐쇄뿐만 아니라 하지 골격근 수준에서 구조적, 대사적 변화도 중요하다. 골격근의 변화로 근육 양 및 밀도 감소, 세포 에너지 사

용 및 대사 변화가 포함된다. 운동 치료는 성장 인자와 측부 동맥 발달 촉진, eNOS (endothelial nitric oxide synthase) 활성 증가 및 내피세포 의존 혈관 확장, 골격근 대사 및 미토콘드리아 기능을 향상시켜 골격근 효율을 증가한다. 통제 운동 프로그램(supervised exercise program)으로 운동 치료를 시행하면 최대 보행 시간을 120% - 150% 향상한다. 말초동맥질환 환자가 통제 운동 프로그램에 참여할 수 없거나 꺼려하는 경우 가정 기반 운동이 유용할 수 있다. 말초동맥질환 환자 200명에게 인지 행동 조절을 포함한 가정 기반 운동 프로그램을 적용한 연구에서 6개월째 6분 보행거리, 최대 보행 시간, 전체 신체 활동 및 WIQ (Walking Impairment Questionnaire) 점수

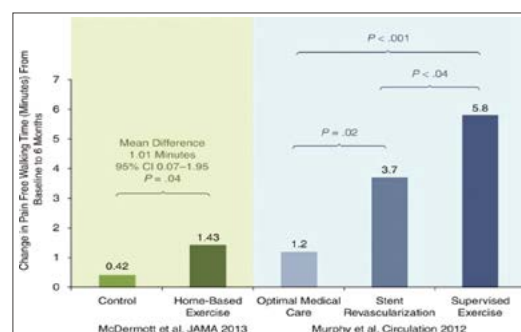


Figure 2. 우수상 말초동맥질환 환자에서 6개월까지 무통증 보행 시간의 변화(Circ Res 2015;116:1579-1598)

태 치료, 혈관중재 치료 단독을 비교한 메타분석 결과 통제 운동 프로그램과 혈관중재 치료를 함께 할 때 가장 적절한 기능 향상 결과를 얻을 수 있었다. 혈관중재 치료 단독인 경우 기능 향상이 관찰되지 않았다. 모든 말초동맥질환 환자들이 운동 치료를 받아야 하며, 선별적인 환자들이 혈관개통술을 받아야 한다(Figure 2).

Intervention 7
Essentials of Endovascular Therapy
» Sunday, Sep. 25, 14:30-16:00, 325CD

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Heart Failure

Pro: We Should Start the 4 Pillars in HFrEF, Simultaneously!



Mi-Hyang Jung, MD, PhD
The Catholic University of Korea Seoul St. Mary's Hospital, Korea

Recently updated clinical guidelines for heart failure with reduced ejection fraction (HFrEF) emphasize the need for early and rapid use of guideline-directed medical therapy (4 pillars of quadruple therapy), namely, angiotensin receptor-neprilysin inhibition (ARNI; or angiotensin-converting enzyme [ACE] inhibitors), beta-blockers, mineralocorticoid receptor antagonists (MRA), and sodium-glucose co-transporter 2 inhibitors (SGLT2i). These 4 pillar drugs have shown to decrease cardiovascular mortality and hospitalization due to heart failure. Based on this evidence, Dr. Jung supported why we advocate simultaneous and rapid initiation of 4 pillar drugs in HFrEF. First is early clinical benefit following initiation. Data showed the benefit of these 4 drugs began early with large relative and absolute reductions in mortality and hospitalization within days to weeks (Figure 1). Most recently, empagliflozin showed a significant 58% relative risk reduction in death, hospitalization for heart failure, or an emergency or urgent heart failure visit at 12 days after initiation. Delaying therapy even a few weeks comes at a cost of preventable deaths and hospitalizations. Second is additive benefits of medical therapies. Data have confirmed that all 4 pillar drugs have incremental benefits, reducing risk of death and hospitalization independent of background therapy. In other words, the magnitude of the treatment benefit of each drug class is independent of that produced by other agents. This is partly because they address different pathophysiology of heart failure. Third is the effectiveness of low dose of medical therapies. Low starting doses of foundational drugs are effective in reducing mortality and morbidity. Low doses of enalapril, carvedilol, and eplerenone exert meaningful effects on the risk of death or hospitalization, as evidenced by the benefits seen in large-scale trials before protocol-mandated increments

in dose. Last but not least is the therapies enabling tolerance of each other. The use of SGLT2i may decrease the risk of hyperkalemia and slow progression of kidney dysfunction, which may enable persistence of ARNI or MRA therapy.

Dr. Jung also commented on the significance of overcoming the treatment inertia. Despite the abundance of data supporting the benefits of 4 pillar drugs, they are still underused in real practice. Current estimates suggest ACEi/ARB usage is about 60-80%; ARNI usage is just above 10%; beta-blocker usage is about 60-80%; and MRA usage is about 30-60%. The classical sequencing approach might lead to clinical inertia, titration fatigue, and a reluctance to increase medications to target dosing. For example, when consider patients hospitalized with acute myocardial infarction, they are routinely prescribed with at least 5 new medications in 2 to 4 days, including aspirin, P2Y12 inhibitor, statin, beta-blocker, and ACE inhibitor before discharge.

Dr. Jung concluded that **in order to improve the utilization in all patients with HFrEF and rapidly improve clinical outcomes, 4 pillar drugs should be started simultaneously in eligible patients and titrated as tolerated.** Such strategy allows for maximal therapeutic benefit in a shorter period, but with less confusion surrounding medication switching, initiation, and dose intensification.

that the ACEi/ARB usage in HFrEF is 59.9%; ARNI usage is 12.8%; BB usage is 66.8%; and MRA usage is about 33.1%. Moreover, target dosing is as low as 17.5% for ACEi/ARB, 14.0% for ARNI, 27.5% for BB, and 76.6% for MRA. SGLT2i is now formally recommended for HFrEF but the lack of reimbursement program impedes the prescription of the drug for HFrEF patients without diabetes.

The optimal use of GDMT will save many lives annually. It is very important that the treatment for HFrEF be started quickly and up-titrated rapidly. Then why did what was shown in the CHAMP-HF registry happen? In fact, there are practical difficulties for simultaneous prescription of the 4-pillar drugs. The most well-known hurdle would be low blood pressure. Dr. Cho presented the studies from the KorAHF registry have shown that Korean HFrEF patients were less likely to have hypertension compared to patients from Western countries. Not even a few patients suffer from orthostatic hypotension or dizziness after GDMT. Marked bradycardia from BB, hyperkalemia from ACEi/ARB/ARNI or MRA, and genitourinary infection from SGLT2i could be more challenging. Sometimes the next steps end up reducing agents even discontinuing GDMT.

When GDMT is given sequentially, HF specialists would be able to examine the responses to the drugs in HFrEF patients carefully and then titrate the medication. That would not only be helpful for the titration of GDMT itself but also contribute to patient compliance. In addition, simultaneous administration of GDMT is not a scientific recommendation but based on summated multiple randomized controlled trials. Moreover, the actual administration of 4-pillar medications from day one has not been assessed in any trial so far.

Dr. Cho summarized that taken together, **in real practice we often encounter various difficulties in prescribing GDMT.** Every patient may have their own tolerable dose and drug combination. Just a "why not" approach with "One Size Fits All" drugs may not be most optimal in achieving the best outcome for our HFrEF patients.

From the 2021 Heart Failure (HF) treatment guidelines of the European Society of Cardiology (ESC), guideline-directed medical therapy (GDMT) for heart failure with reduced ejection fraction (HFrEF), including beta-blockers (BB), angiotensin-converting enzyme inhibitor (ACEi)/angiotensin receptor blocker (ARB) or angiotensin receptor-neprilysin inhibitor (ARNI), mineralocorticoid receptor antagonist (MRA) and sodium-glucose-cotransporter 2 inhibitor (SGLT2i) were recommended simultaneously, which is strikingly different from guidelines in the past. These medications are now called the "4-pillar drugs". The American College of Cardiology (ACC) and American Heart Association (AHA) also recommended the same via the new 2022 HF guideline this April. However, Dr. Cho presented a more careful approach for GDMT in HFrEF. He explained that despite marked advances in HFrEF treatment, utilization rates of GDMT are not enough in the large observational studies. For example, the CHAMP-HF registry has shown

Con: We Should Start the 4 Pillars in HFrEF, Step by Step!



Jae Yeong Cho, MD, PhD
Chonnam National University Hospital, Korea

that taken together, **in real practice we often encounter various difficulties in prescribing GDMT.** Every patient may have their own tolerable dose and drug combination. Just a "why not" approach with "One Size Fits All" drugs may not be most optimal in achieving the best outcome for our HFrEF patients.

being studied for the use as induction and maintenance immunosuppression, and for treatment of acute rejection. These include monoclonal antibodies (daratumumab, tocilizumab), co-stimulation blockers (belatacept), and Ig-G degrading enzymes (IgG endopeptidase). In lieu of traditional endomyocardial biopsies, novel molecular techniques such as gene expression profiling and donor-derived cell-free DNA are now being used for non-invasive acute rejection monitoring – and these techniques may be more sensitive than biopsy for detection of graft injury, and may enable personalization of immunosuppressive therapy.

Finally, Dr. Khush pointed out that xenotransplantation is finally a reality, with the first pig-to-human heart xenotransplant performed in January 2022. While this field is still in its early stages, with many scientific and ethical challenges, further developments are anticipated in the near future.

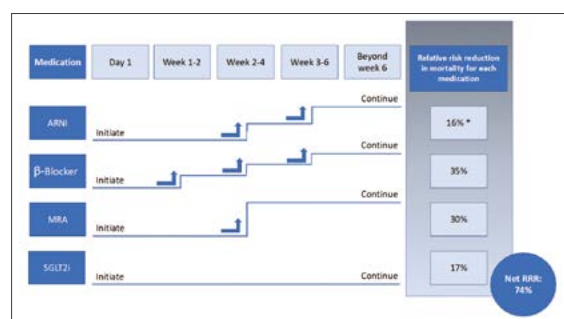


Figure 1. Simultaneous initiation of comprehensive disease modifying medical therapy (4 pillar drugs). Low starting doses should be used, in the absence of contraindications. Therapy should be up-titrated. Clinical benefits are apparent, even at low dose, within 14-30 days of initiation.

*replacing angiotensin-converting enzyme inhibitor / angiotensin receptor blocker (Card Fail Rev 2021;7:e18)



Kiran K. Khush, MD
Stanford University, USA

direct-acting anti-viral therapy post-transplant has greatly expanded the donor pool, particularly in areas most affected by the opioid epidemic. Similarly, increasing the use of donation after circulatory death donors in the US, Europe, and Australia has increased the

transplant volume, while maintaining excellent post-transplant survival. Furthermore, use of organs from donors infected with the SARS-CoV-2 virus (COVID19) appears to be safe with low risk of viral transmission to the heart transplant recipient.

Dr. Khush also explained that the revision of the US donor heart allocation system has dramatically changed the management practices for patients awaiting transplantation, with a significant increase in the use of temporary mechanical circulatory support devices and a concomitant decline in use of durable left ventricular assist devices. For post-transplantation management, new immunosuppressive agents are currently

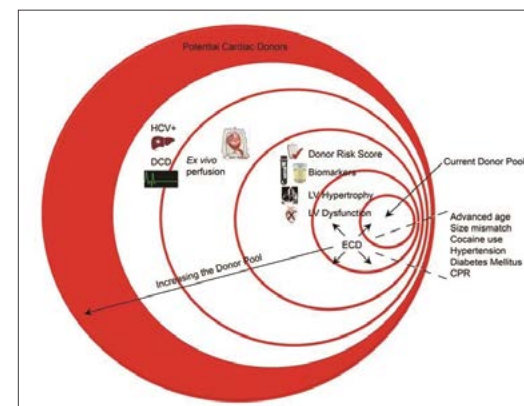


Figure 2. The concept of expansion of cardiac donor

being studied for the use as induction and maintenance immunosuppression, and for treatment of acute rejection. These include monoclonal antibodies (daratumumab, tocilizumab), co-stimulation blockers (belatacept), and Ig-G degrading enzymes (IgG endopeptidase). In lieu of traditional endomyocardial biopsies, novel molecular techniques such as gene expression profiling and donor-derived cell-free DNA are now being used for non-invasive acute rejection monitoring – and these techniques may be more sensitive than biopsy for detection of graft injury, and may enable personalization of immunosuppressive therapy.

Finally, Dr. Khush pointed out that xenotransplantation is finally a reality, with the first pig-to-human heart xenotransplant performed in January 2022. While this field is still in its early stages, with many scientific and ethical challenges, further developments are anticipated in the near future.

Heart Failure 3

Debate: Hot Issues in HF

>> Sunday, Sep 25, 08:30-10:00, 324

Updates in Heart Transplantation What's New in 2022?

The field of heart transplantation has experienced many exciting new developments in the past few years that have made transplantation available to a larger number of potential candidates and also have improved post-transplant monitoring and clinical outcomes. Dr. Khush introduced that in the United States (US), routine use of donor hearts infected with Hepatitis C virus followed by

Heart Failure 4

Advanced HF: Meet the Expert, Case Discussion with Plenary Lecture

>> Sunday, Sep 25, 10:10-11:40, 324

Epidemiology

The Namwon Study and the Donggu Study



Min-Ho Shin, MD, PhD
Chonnam National University Medical School, Korea

남원연구와 동구연구는 전남의대 예방의학교실 주도로 진행하고 있는 뇌졸중, 동맥경화, 인지기능 저하, 골다공증 등의 원인을 밝히기 위한 연구자 주도 종적 코호트 연구이다. 남원연구는 2004년부터 2007년까지 기반조사를 시행하였으며, 2007년부터 2012년까지 반복조사를 시행하였다. 기반조사

에는 남원시의 45-74세 대상인구 중 35%인 10,667명이 참여하였고, 반복조사에는 8,157명(76.5%)이 참여하였다. 동구연구는 광주광역시 동구에서 2007년부터 2010년까지 4년간 기반조사를 시행하였으며, 2014년부터 2017년까지 반복조사를 시행하였다. 기반조사에는 50세 이상 동구 주민의 27%인 9,260명이 참여하였고, 반복조사에는 5,882명(63.5%)이 참여하였다. 기반조사에서 심뇌혈관질환 관련검사들로 심전도, 심장초음파, 경동맥초음파, 맥파속도, 발목-상완지수 검사 등을 시행하였다. 또한, 검체은행을 구축하여 혈청, 소변, DNA를 포함한 생체 표본을 -70°C 미만에서 보관하고 있다.

추적조사는 능동추적조사와 수동추적조사를 병행하다 최근에는 국립암센터 암등록자료와 통계청 사망자료 연계를 통한 수동 추적조사만 시행하고 있다. 남원연구 대상자 중에서 2020년까지 1,825명(17.1%)이 사망하였고 이들 중 203명이 심뇌혈관질환으로 사망하였다. 동구연구 대상자 중에서는 2020년까지 1,635명(17.7%)이 사망하였고, 이 중 262명이 심뇌혈관질환으로 사망하였다. 주 연구 주제 이외에 치주질환 및 관절염 등에 대한 부가 연구들이 진행되었다. 연구 프로토콜 논문은 국제역학회지에 발표되었고, 코호트 자료를 활용하여 현재까지 90여편의 논문이 출간되었다.

남원연구와 동구연구는 국내에서 가장 큰 규모의 연구자 주도 다목적 종적 코호트 연구이며, 특히 동맥경화증 관련변수들을 가장 광범위하게 조사된 연구라는 의의가 있다. 향후 가족연구와 여러 세대 연구, 뇌영상 등 다양한 영상 검사를 포함한 부가 연구들이 진행될 필요가 있다. 또한 사망만을 최종 질병으로 사용하고 있는 문제점을 보완하기 위하여 의무기록조사를 포함한 능동추적조사를 통해서 심뇌혈관질환 발생에 대한 상세한 자료를 수집할 필요가 있다. 나아가 국내에서 남원연구와 동구연구

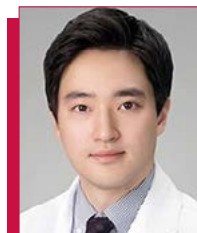
구를 포함한 심뇌혈관질환 코호트 협력연구가 필요하며, 우선적으로 지역사회기반 코호트 연구들을 통합하여 한국인에서 심뇌혈관질환 예측 모델을 개발할 필요가 있다.

Epidemiology 1 Korean Cohort Studies for CVD Prevention Research

» Sunday, Sep 25, 08:30-10:00, 322

Socioeconomic Differences in Cardiovascular Disease

Why and how should we consider socioeconomic differences in clinical practice?



Hokyou Lee, MD, PhD
Yonsei University College of Medicine, Korea

Socioeconomic status (SES) is a composite appraisal of a person's economic and social standing assessed by wealth, residential area, educational attainment, occupation, etc., and is a major predictor of disease outcomes, including cardiovascular disease (CVD) events and death. Individuals with low household income are at significantly higher risks of CVD events and mortality than those with high income. Low educational attainment, manual labor, and disadvantaged neighborhood also confer higher risks of CVD and death. The observed disparities in CVD outcomes may be attributable to differences in traditional risk factors, health behaviors, access to medical care, etc. Psychosocial stress and systemic inflammation may also mediate low SES-related risk of adverse outcomes.

Aims to improve cardiovascular health in the disadvantaged population target modifiable risk factors with strong associations with SES. Many studies have explored the impact of community interventions on CVD events and risk factors. The negative portrayal of tobacco, task shifting, subsidization of healthy food and restriction of non-healthy nutrients, and environmental

engineering are some examples. Although no medical intervention can overcome low SES, patient-level primary prevention can also focus on modifying traditional risk factors that significantly interact with SES. Low SES is strongly associated with the prevalence and management of chronic conditions and modifies their impact on adverse CVD events. Therefore, stricter risk factor control and treatment intensification may have a larger impact on lowering cardiovascular risk among patients with low SES. Furthermore, SES can be incorporated into cardiovascular risk assessment for primary prevention, including lipid-lowering or BP-lowering drug allocation. Because patients with lower SES have a higher CVD risk, current CVD risk assessment strategies (e.g., prediction models) might underestimate risk among low SES patients. Low SES can be considered as a risk enhancer or recalibration factor (Figure 1) in the risk assessment algorithm, although further research is needed for this aspect. Challenges remain regarding how to incorporate SES into clinical practice. The most important limitation is that SES is a combination of multiple factors, some of which are neither easily measured nor readily available in the existing data. Socioeconomic factors are usually self-reported; regional, cultural, and personal differences can affect SES measures. Therefore, it is difficult to standardize the measurement of SES for research and clinical purposes. More prospective

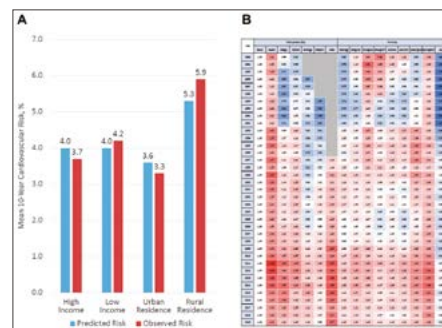


Figure 1. (A) Calibration of cardiovascular disease risk assessment according to socioeconomic status among Koreans (B) Identifying geographical hot spots of cardiovascular mortality in Korea.

studies or nationwide data with objective measures of SES are needed to overcome these limitations.

Disability and Cardiovascular Event and Mortality



Sun Young Hwang, PhD
Hanyang University, Korea

It is necessary to pay attention to subjects with physical or mental disabilities, who are one of the more vulnerable groups, to prevent cardiovascular disease (CVD). It is also essential to examine their lifestyle and cardio-

vascular risk factors. The International Classification of Functions, Disability, and Health defines disability as a condition with limitations in bodily function, structure, activity, and participation, and more than 2.4 million people with disabilities are registered in Korea, accounting for 5% of the total population. Despite the importance of the health of people with disabilities, however, they have received little attention within the health care system. Previous international studies have found that people with disabilities engage in unhealthy behaviors such as smoking, excessive drinking, lack of physical activity, unhealthy eating, poor access to preventive health care, and have more chronic diseases. In addition, overall cardiovascular mortality has increased in people with disabilities. According to a study of 395,627 people who participated in the national health checkup in Korea for four years from 2010 to 2013, 5.8% of them were physically handicapped, hearing impaired, with kidney disease, or visually impaired. Mental disabilities accounted for 0.3%. After propensity score matching of general characteristics, there was no difference in the prevalence of CVD. Still, the prevalence of hypertension was significantly higher in the mental disorder group than in the non-disabled group.

Continued on page 10



심혈관계 사건 재발 방지를 위해,
지금 선생님의 도움이 필요합니다!
ACS 환자 입원 시부터 두 번째 방문 시*까지 빠르게 레파타를 시작하세요.²

*복합판막염 소견이 없는 경우
²Repatha (evolocumab) AMGEN. Reference: 1. Sabatine MS, et al. *N Engl J Med*. 2017;376(13):1719-1722. 2. Mach H, et al. *Eur Heart J*. 2020;41(11):1198.

Arrhythmia

Focal Left Atrial Tachycardia or Atrial Fibrillation from the Left Pulmonary Veins



Sung Ho Lee, MD, PhD
Sungkyunkwan University Kangbuk Samsung Hospital, Korea

A 30-year old woman complained of recurrent palpitation. She had no history of cardiovascular disease. Electrocardiogram (ECG) showed narrow QRS tachycardia with positive deflections in the inferior leads, with biphasic (negative and positive) P wave in lead V1. Lead

I was low-amplitude flat and lead aVL was negative. Echocardiography showed normal. Tachycardia spontaneously occurred after premature atrial beat. Left focal atrial tachycardia was suspected based on ECG features and tachycardia persisted even though tachycardia cycle length variability was >15%. Electroanatomic activation mapping of the left atrium during tachycardia showed a pattern of centrifugal spread from a site on the inside of the left inferior pulmonary vein (LIPV). Electrogram of LIPV showed a shorter cycle length than that of left atrium (LA). 12-lead ECG showed atrial tachycardia, but the pattern of PV electrogram suggested atrial fibrillation (AF). CS electrogram was not acquired because duodecapolar catheter could not be advanced to the coronary sinus. Tachycardia terminated during ablation at mid carina of the left pulmonary vein.

Focal atrial tachycardia (AT) is characterized by atrial activation starting rhythmically at a small area, from which it spreads out centrifugally. AT could be initiated by

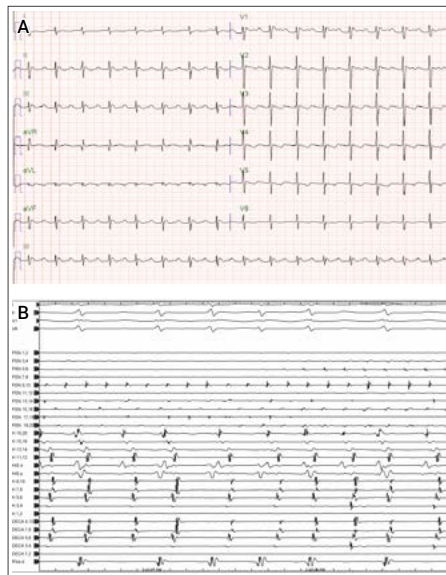


Figure 1. A) 12-lead ECG tachycardia B) Electrogram from the left pulmonary vein during tachycardia

focal discharges in the pulmonary veins (PV). The PV ostia is the most common site of origin of focal AT within the LA, accounting for 3~29% of all focal AT and approximately 67% of LA AT. Arrhythmias originating from the PV can have a critical role in the development of AF in susceptible individuals. Rapid rhythms arising in the PV can play an important role in the maintenance of AT or AF, or may even be markers of an arrhythmogenic PV that triggers AT or AF. **The cycle length of local activity within the arrhythmogenic PV is shorter than that of the atrium. The cycle length (CL) of the PV AT is longer (meaning CL of 340msec) than the reported CL of PV tachycardia in AF patients (130msec)** (Oral H, et al. J Cardiovasc Electrophysiol 2002;13:645-650; Kistler PM, et al. Circulation 2003;108:1968-1975). The CL of AT also tends to be irregular in AF but not in PV AT. Patients with AF tend to be older

than those with PV AT, and consequently more prone to widespread atrial remodeling associated with age, hypertension, or other pathologic processes. In this specific case, clinical factors such as no atrial remodeling in echocardiography and no underlying cardiovascular disease suggested PV AT, but PV electrogram showed disorganized shorter CL suggesting AF.

Arrhythmia 6
Meet-the-expert: Interesting EP Case
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Genetic Testing for Cardiac Disease



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University of Amsterdam, Netherlands

In the last 25 years, the genetic causes of cardiac disease have unravelled on a large scale, and our understanding of these disease entities has improved significantly. This has led to the identification of many pre-symptomatic individuals who can be offered timely treat-

ment to protect them from the deleterious sequelae of these diseases, such as sudden cardiac death. In addition, risk stratification has improved, and new gene based therapeutic management strategies have emerged successfully.

In a recent consensus statement document,* endorsed by all major cardiac EP societies, including the Asian-Pacific Heart Rhythm Society, the state of genetic testing for inherited arrhythmia syndromes, cardiomyopathies, sudden cardiac death, congenital heart disease, coronary artery

Table 1. Impact of genetic testing for the proband

Disease	Diagnostic	Prognostic	Therapeutic
Arrhythmia syndromes			
Long QT Syndrome	+++	+++	+++
Catecholamine-induced Polymorphic VT	+++	+	+
Brugada Syndrome	+	+	+
Progressive Cardiac Conduction Disease	+	+	+
Short QT Syndrome	+	+	+
Sinus Node Disease	-	+	-
Atrial Fibrillation	-	+	-
Early Repolarization Syndrome	-	-	-
Cardiomyopathies			
Hypertrophic Cardiomyopathy	+++	++	++
Dilated Cardiomyopathy	++	+++	++
Arrhythmogenic Cardiomyopathy	+++	++	++
Left Ventricular Noncompaction	+	+	-
Restrictive Cardiomyopathy	+	+	+
Congenital Heart Disease (CHD)			
Syndromic CHD	+++	+	-
Non-syndromic CHD	+	-	-
Familial CHD	++	-	-

+++ is recommended/is indicated or useful, ++ can be recommended/ can be useful, +: may be considered/ may be useful, -: is not recommended/ is not indicated nor useful (*EHRA/HRS/APHRS/LAHS Expert Consensus Statement on the state of genetic testing for cardiac diseases. Wilde AAM, et al. Europace 2022;24(8):1307-1367)

disease, and heart failure are addressed. For each of the individual syndromes, thus far known diagnostic, prognostic, and therapeutic implications of genetic testing are discussed (Table 1). In addition, the

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The proportion of those who engaged in physical activity more than three times a week was statistically significantly lower in the mentally disabled than the non-disabled.

A large foreign study found that CV mor-

bidity and mortality were significantly higher in participants with disabilities than in participants without disabilities, and CV mortality was higher in participants with poor health behavior and chronic disease prevalence. Similarities and differences were found as a result of examining studies conducted on the

disabled in Korea and abroad. A follow-up study is needed to determine the difference in the prevalence and lifestyle of CVD risk factors by dividing the characteristics of disability, such as mobility or intellectual disability. In addition, it is necessary to develop a health promotion intervention program, including the

improvement of physical activity for the disabled for primary and secondary prevention of CVD.

Epidemiology 2
Disparities in Cardiovascular Disease

» Sunday, Sep 25, 10:10-11:40, 322

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document presents essential principles of genetic testing, including modes of inheritance, different testing methodologies, and interpretation of variants.

It is the hope of the writing committee that with this document, appropriate genetic test is offered to appropriate patient, minimizing the downside of (extensive) genetic testing, and thereby optimizing the benefits of genetic testing.

ICD for Primary Prevention

The implantation of an implantable cardioverter-defibrillator (ICD) to reduce acute cardiac death and all mortality in patients with heart failure whose symptoms (NYHA II-III) and cardiac function decrease (LVEF \leq 35%) persist despite optimal medical treatment for more



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than 3 months was established based on two large randomized-controlled trials (2002 MADIT II study, 2005 SCD-HeFT study) nearly 20 years ago. Although the recommendation level of the guideline has been partially changed based on the recent DANISH study (2016), which showed the degree of benefit may differ depending on the etiology of heart failure (ischemic or non-ischemic), several meta-analyses and registry-based studies still reported that ICD reduces sudden cardiac death and all-cause mortality regardless of the etiology of heart failure.

However, **in real clinical practice, ICD implantation for the primary prevention of sudden cardiac death is still underused.**

According to a paper recently published in Sweden, only 16% of patients who met the criteria for primary prevention underwent ICD implantation, due to higher comorbidity burden, low socioeconomic status, and no speciality care follow-up (Eur J Heart Fail 2022 24(7):1212-1222). According to the study "Improve the prevention of sudden cardiac arrest in post-acute myocardial infarction patients" presented at the Asia Pacific Heart Rhythm Society (APHRS) conference last year, 27% of patients after myocardial infarction (MI) met the criteria for primary prevention of sudden cardiac death, and 60% of them were referred to an EP specialist for ICD implantation. This study enrolled

1,491 patients with acute MI from 6 regions in Asia. Among 237 Korean patients enrolled in this study, 20% met the criteria for primary prevention of sudden cardiac death, but only 38% of them were referred to EP specialists. In Korea, seven patients died during the 1-year follow up. Of these, 3 were due to aggravation of heart failure, 3 were sudden cardiac death, and 1 was due to an unknown cause.

More efforts are needed in real clinical practice to prevent sudden cardiac death in patients with heart failure, and this presentation will focus on the prevention of sudden cardiac death.

Arrhythmia 7

Update in Sudden Cardiac Death Prevention

» Sunday, Sep 25, 14:30-16:00, 324

Cross Specialty 7: Neurology & Intervention & Arrhythmia

Lesion Topography and Embolic Stroke: Focusing on MR and Angiographic Images



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Treatment for reducing the embolic risk of various source, including intervention procedures, have developed over the last decade. Closure of patent foramen ovale (PFO) is now a standard treatment for high risk PFOs. Furthermore, occlusion

of the left atrial appendage with devices are now shown to be effective in reducing the bleeding risk or in protecting from further ischemic event in comparison to using anticoagulation alone. However, as a procedure complication may occur, finding the true culprit may be more important.

When there is a suspect of embolism, we try to elucidate the risk of embolic stroke. For example, if a PFO is found, transthoracic echocardiography is useful for evaluating the embolic risk by PFO. In case of atrial fibrillation (AF), the type and hemodynamic properties of the left atrial appendage is associated with the risk of embolic stroke. More importantly, finding the true culprit of embolism is important. In addition to the characteristics of the embolic source, the lesion pattern also well reflects the source of embolism.

Diffusion weighted image (DWI) well shows the lesion pattern of ischemic stroke and the associated embolic source; the typical lesion pattern of stroke associated with intracranial atherosclerosis is located at the cortical and subcortical area in a single vascular territory. In case of extracranial atherosclerosis, lesions are more predominantly located at the cortical areas. With embolism from the heart, PFO related stroke is presented as a small scattered lesion predominantly located at the posterior circulation. This was explained by the emboli transferring through the small PFO, and enhancement of the blood flow through the right-to-left shunt and through the posterior circulation by Valsalva maneuver. On the other hand, a fresh clot formed from the left atrial appendage with low shear area shows a larger fresh embolus causing ischemic lesion in the corticosubcortical lesion. Emboli from the aortic arch or cancer associated stroke shows small cortical lesions in multiple territories. A study with embolic stroke of undetermined source had also shown a similar result. As such, DWI lesion pattern well represents the stroke mechanism and is important in finding the true culprit of the embolism.

Cross Specialty 7: Neurology & Intervention & Arrhythmia

LAAO 현황 및 미래 / Cerebral Protection

» Sunday, Sep 25, 08:30-10:00, 325CD

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