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JSNC YOUNG INVESTIGATOR AWARD－REVIEW ARTICLE

Latest Research Topics from the Young Investigator Award Session at the 2016 Japanese Society of Nuclear Cardiology Annual Scientific Meeting

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Abstract

The Japanese Society of Nuclear Cardiology (JSNC) annual scientific meeting has a young investigator competition (YIA) session each year. The JSNC scientific committee selects the top 3 qualified abstracts submitted by JSNC members under age 40 who wish to receive the YIA. Given the high quality of presentations and content on the latest research topics, the YIA session is one of the highlights of the JSNC annual scientific meeting. Each of the 3 YIA candidates makes a presentation at the YIA session. At last year's annual meeting, the scientific committee selected 2 clinical research abstracts and 1 technical research abstract. These 3 abstracts included the latest findings in nuclear cardiology on topics including risk stratification after coronary revascularization, myocardial blood flow quantification, and the performance of a new-generation single-photon emission computed tomography (SPECT) scanner.

Keywords: Award, Blood flow, Japanese Society of Nuclear Cardiology, Perfusion, Small heart
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In 2000, the Japanese Society of Nuclear Cardiology (JSNC) established the Young Investigator Awards (YIA) for researchers under age 40 to promote nuclear cardiology research activities among young physicians and technologists. In 2014, the JSNC executive committee changed the YIA selection format (1). The top 3 abstracts among those submitted are selected for YIA candidacy. Audiences can learn about the newest research topics in a timely manner, in line with the aims of a scientific meeting. In fact, some of the presentations at the JSNC YIA session have been published in top journals (2-4). In this review, we will report on the latest research topics from the 2016 JSNC YIA session.

Latest research topics in nuclear cardiology, cardiac imaging, and nuclear cardiology technology

Stress myocardial perfusion single-photon emission computed tomography (SPECT) has been widely applied for risk stratification in clinical settings. A summed stress score, which includes both the size of myocardial injury and the degree of stress-induced ischemia is considered to be the most powerful parameter of cardiovascular event risk measurement (5, 6). The COURAGE trial nuclear sub-study revealed that an ischemic burden reduction assessed by a summed difference score (SDS) was associated with improved patient outcomes (7). In particular, a reduction in ischemic burden of more than 5% contributed to a decrease in the number of patients who had hard cardiac events including cardiac death and non-fatal myocardial infarction. The SYNTAX score is a well-recognized marker. This score is useful to determine patients suitable for coronary artery bypass graft rather than coronary interventions (8). Hayase et al. compared the prognostic power of the SYNTAX score combined with the reduction of ischemic burden evaluated by Δ SDS% in patients with coronary interventions. Patients with a SYNTAX score of lower than 15 and a greater than 5% reduction in ischemia were shown to have the best prognosis. Conversely, patients

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with a SYNTAX score of 15 or higher and less than 5% reduction in ischemia showed the worst prognosis. In this regard, Hayase et al. concluded that a combination of anatomical severity and functional assessment would be useful in risk stratification of hard cardiac events. Reduction of ischemic burden is usually associated with a patient's outcome, but its effects would vary depending on anatomical severity of coronary artery disease (CAD). In future, calculation of the SYNTAX score using coronary computed tomography (CT) angiography might be helpful in predicting the effect of interventions prior to invasive coronary angiography.

Myocardial perfusion positron emission tomography (PET) has been popular in Japan since 2012 when the Health Ministry approved the use of ^{13}N-ammonia PET (9). Among the currently available PET myocardial blood flow (MBF) tracers, ^{15}O-labeled water has the highest extraction fraction (EF) and is therefore considered to be the standard for measurement of MBF (10). In this regard, many previous studies using ^{15}O-labeled water PET have involved physiological clinical research with small study populations. Recently, Danad et al. evaluated the diagnostic value of ^{15}O-labeled water PET/CT in suspected CAD in comparison with the current clinical diagnostic standard of fractional flow reserve (FFR) (11). This study indicated that ^{15}O-labeled water can be used in clinical settings, and many nuclear cardiology physicians expect to expand the clinical role of PET myocardial perfusion imaging (MPI) including that using ^{15}O-labeled water. Dr. Tadao Aikawa from Hokkaido University looked into the diagnostic utility of quantitative MBF measurements in patients with CAD, especially those with advanced disease. The authors evaluated whether MBF or coronary flow reserve (CFR) had additional diagnostic value in advanced CAD over cardiac magnetic resonance (CMR) imaging. The authors selected myocardial strain and infarct size as CMR parameters. Infarct size and CFR correlated with coronary anatomical severity of CAD evaluated as a SYNTAX score. In addition, stress MBF had incremental diagnostic value over the pretest probability of CAD, myocardial strain, and infarct size in patients with severe CAD. The data imply that stress MBF quantification obtained by ^{15}O-labeled water PET may further improve the diagnostic accuracy in severe CAD.

The JSNC annual meeting also had a Technologist Award session. However, JSNC board members expected that more technologists would be involved in the scientific session. In this regard, having technological abstracts in the YIA session was one of the important steps for JSNC. Most of the SPECT programs have been developed in the United States (US) using members of the US population as a standard database. For the SPECT MPI study, the body habitus of Japanese population is in general smaller than that of the US population (12). Therefore, it is a challenge to evaluate left ventricular (LV) end-diastolic volume (LVEDV), LV end-systolic volume (LVESV) and LV ejection fraction (LVEF) using an automated LV function analysis program such as quantitative gated SPECT (QGS). In particular, the LVEF of patients with smaller body habitus is often overestimated. This is the so-called "small heart" phenomenon. Approaches to correctly estimate LVEDV, LVESV, and LVEF in the small heart population have been proposed. New-generation SPECT systems such as IQ-SPECT may improve this issue (13). Shibutani et al. recently applied IQ-SPECT to estimate LV volume information. In this regard, they performed a phantom experimental study and a clinical study. The authors compared the estimated values to the values obtained using a standard gamma camera. The data from the cardiac phantom study was the gold standard. The estimated LV volumes and LVEF obtained by IQ-SPECT were similar to those obtained using the previous generation of gamma camera. In addition, these values were similar to standard values estimated in the cardiac phantom study. Therefore, IQ-SPECT may possibly be used to estimate LV volumes and LVEF using gated SPECT in clinical settings. However, the authors did not show whether IQ-SPECT was able to improve the accuracy of LV volume measurements. This important issue should be evaluated as the next step of the current study.

Conclusions

Topics under consideration in the JSNC YIA competition added to the research topics from last year's session. These 3 presentations reflected current research topics. The next YIA session will be expected to provide JSNC members with information on the latest significant research topics.

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Conflicts of interest

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