JSNC TECHNICAL AWARD

Introducing JSNC Technical Award —Recent Advances of SPECT Facilities for Cardiac Imaging—

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Received: July 6, 2015/Revised manuscript received: July 14, 2015/Accepted: July 22, 2015

Abstract

The Japanese Society of Nuclear Cardiology (JSNC) has given Technical Award for outstanding technologists since 2012 to promote nuclear cardiology research. Yasuyuki Takahashi won the 3rd JSNC Technical Award. This issue of Annals of Nuclear Cardiology contains his review article related to his work wining the prize. Masao Miyagawa, his colleague, also presented another review article concerning myocardial SPECT with semiconductor detectors. They mainly focused on recent advances of SPECT facilities, and data acquisition, image processing and clinical applications of the new system in comparison with those in conventional SPECT. Various advantages of this system are shown in their articles and this review.

Keywords: Technical award, Japanese Society of Nuclear Cardiology, Myocardial SPECT, Semiconductor detector

Ann Nucl Cardiol 2015；1（1）：136-138

The Japanese Society of Nuclear Cardiology (JSNC) has given Technical Awards for outstanding technologists since 2012 to promote nuclear cardiology research conducted by them. Candidates submit their published or unpublished work to the JSNC selection committee, and the committee determines the best work considering not only the quality of the work itself but also his (her) previous works, clinical experiences and expected performances toward the future. The winner of the prize is recommended to submit a review article or an original paper depending on whether the work has been published or not. The submitted manuscript appears in Annals of Nuclear Cardiology (ANC) after undergoing the peer review process. Now, the JSNC executive committee is changing the system of this award to increase the number of candidates. The prize is expected to be easier to apply after the revision. Please check information on the web site of JSNC before applying to the prize in the forthcoming spring.

Topics from JSNC Technical Award

Recently new myocardial SPECT systems featuring high sensitivity have successively been introduced in Japan. These are mainly divided into two types. One is based on a conventional gamma camera mounted ad hoc fan-beam collimators focusing on the myocardium supplied by Siemens (1). This system is named IQ-SPECT, and employs a specific rotation orbit and a reconstruction algorithm specific to this projection data. The other type comprises two systems equipped with semiconductor detectors and dedicated for myocardial imaging. These are Discovery NM 530c (General Electric) and D-SPECT (Spectrum Dynamics Medical) (2-10). The former employs fixed 19 detectors equipped with pin-hole collimators, and the latter incorporates multiple moving detectors with parallel-hole collimators. These systems permit to complete myocardial SPECT acquisition within several minutes without increasing injected doses or degrading image quality

doi：10.17996/ANC.01.01.136

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（8，9）. It is also possible to reduce administered doses by preserving acquisition time, resulting in reduced radiation exposure（2，3）. Other than the reduction of acquisition time and injected doses, SPECT cameras with semiconductor detectors enables us to measure the values reflecting coronary flow reserve（CFR）and to obtain ^{99m}Tc and ^{123}I emission data simultaneously（3，8-10）. This article focuses on such versatility of SPECT with semiconductor detectors in relation to the work by Yasuyuki Takahashi who is the winner of the 3rd JSNC Technical Award.

This issue of ANC contains his review article related to his work wining the prize（8）. Masao Miyagawa, his colleague, also presented another review article concerning myocardial SPECT with semiconductor detectors（3）. In these reviews, they focused on recent advances of SPECT facilities, and data acquisition, image processing and clinical applications of the new system in comparison with those in conventional SPECT. They obtained data by using NM 530c, and reported its excellent sensitivity, spatial and energy resolution.

Thanks to excellent energy resolution, simultaneous dual-isotope imaging using ^{99m}Tc and ^{123}I is available in this system, which requires modification of energy settings in conventional SPECT due to crosstalk（11）. To date, dual-isotope imaging protocols have usually employed the combination of ^{201}Tl/^{123}I or ^{201}Tl/^{99m}Tc in myocardial SPECT. Since ^{201}Tl cannot be used to label compounds, its data is limited to assessing myocardial perfusion or tumor cell viability. On the other hand, ^{99m}Tc and ^{123}I are available for labeling a number of compounds. Thus, dual-isotope imaging with these two radionuclides engenders a vast array of information. Moreover, this dual-isotope imaging offers easier evaluation of the mismatch of distributions of the two radionuclides than conventional ^{201}Tl/^{99m}Tc imaging because of the following reason. For example, when we encounter regional reduced uptake to almost the same extent and severity in both ^{201}Tl and ^{123}I-beta-methyl（*p*-iodophenyl）pentadecanoic acid（BMIPP）SPECT, it is often difficult to judge whether the findings are derived from the attenuation effects or from the real perfusion-metabolism mismatch, or from both. On the other hand, we can interpret the images without considering the difference in the attenuation effects by employing the combination of ^{99m}Tc and ^{123}I in dual SPECT. Similarly, in the normal subject, it is easier to say that the findings are more normal in ^{99m}Tc/^{123}I SPECT than in ^{201}Tl/^{123}I because of reduced photon attenuation. Accordingly, it is worth performing ^{99m}Tc/^{123}I dual-isotope imaging in clinical practice.

High sensitivity of semiconductor SPECT allows the measurement of regional myocardial blood flow（MBF）and CFR（10）. Dynamic image acquisition is prerequisite to calculate MBF and CFR, because it is necessary to obtain sequential count changes of the myocardium and blood, which is difficult in conventional SPECT. Significances of calculating CFR are improved diagnostic performance due to the reduction of false negative SPECT findings in balanced ischemia, evaluation of effects of lipid lowing therapy in view of coronary circulation, incremental prognostic value to the measurement of fractional flow reserve（FFR）and so on. Although measurement of CFR has been mostly replaced by FFR in cath. lab., cases of microvascular disease often manifest preserved FFR and reduced CFR（12）. As the prognostic value of CFR has been established, I hope measurement of CFR with semiconductor SPECT will become a standard technique by overcoming underlying technical problems.

Conclusions

The 3rd JSNC Technical Award was won by Yasuyuki Takahashi. His review article appeared in this issue of ANC focusing on recent advances of myocardial SPECT. Now, the JSNC executive committee is changing the system of this award to make the prize easier to apply. I hope the number of applicants will increase.

Acknowledgments

I appreciate GE Healthcare Japan for providing technical information.

Source of Funding

None

Conflicts of Interest

None

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