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EDITORIAL

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Start from Scratch: the Prospect of Nuclear Cardiology

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The future is always hard to forecast but the prospect of nuclear cardiology has never been more unobtainable than these days. Myocardial perfusion single-photon emission computed tomography (MPS) has been one of the major nuclear medicine studies for decades, but the annual number of MPS is stagnant or steadily decreasing in Korea and other countries [1]. The challenge from coronary computed tomography (CCT) and the concern of radiation exposure of MPS [2] were the main reasons for the stalemate of nuclear cardiology. Compared to the rapid technological progress of CCT, enabling greater image resolution in conjunction with lower radiation exposure to the patients, development of new radiopharmaceuticals or scintillation imaging techniques has been at a relatively slow pace. Positron emission tomography (PET) has many advantages over MPS in terms of image resolution and radiation exposure. N-13 ammonia, O-15 H_2O, and Rb-82 are the PET perfusion agents, which are widely used all over the world. However, the capacity of cyclotrons for N-13 ammonia and O-15 H_2O usually limits the number of PET perfusion studies, and the generator for Rb-82 is not imported to Korea yet. F-18 labeled myocardial perfusion agent is under clinical trial in the U.S. [3] but even after the approval for clinical application, the cost of F-18 agent may not be readily affordable for the time being. When it comes to the development of imaging techniques, semi-conductor detector is worthy of mention [4]. The CdZnTe (CZT) detector-based cardiac gamma cameras from two manufacturers are already on the market, and two national institutes installed each model from the two vendors. The capabilities of the CZT gamma cameras are reported to exceed those of conventional Anger type gamma cameras: >2 times the spatial resolution, >1.5 times the energy resolution, and 5~10 times the sensitivity, which will make it possible to reduce the patient dose or the imaging acquisition time [4]. However, it remains to be seen whether the diagnostic efficacy for coronary artery disease is improved using those CZT gamma cameras compared to the traditional gamma cameras because the unique L-type gantry structure of CZT gamma camera may lead to spatial inhomogeneity regarding the signal detection efficiency [5].

The challenges often lead to the innovation, and the innovation usually starts from scratch. Nuclear medicine features the functional imaging that is complementary to the anatomical imaging. For example, the coronary stenosis detected by CCT is not always the stigma of symptomatic coronary artery disease. Functional significance can still be effectively assessed using the MPS. The presence of atheromatic plaque confirmed by high resolution imaging studies needs to be further characterized regarding the vulnerability. F-18 sodium fluoride holds promise for the identification of such a vulnerable plaque [6]. Quantitative imaging is also an unparalleled strength of nuclear imaging. PET is an inherently robust quantitative imaging, thanks to the coincidence detection principle. Furthermore, SPECT, in the prototype of SPECT/CT with CT-based attenuation correction, scatter correction, and resolution recovery, is now proven as a promising quantitative imaging tool [7]. Therefore, the future of nuclear cardiology is really dependent on the application of the genuine nuclear medicine principle to patient's management. The review for current update of nuclear cardiology will ensue in the next issue of Nuclear Medicine and Molecular Imaging.

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Compliance with Ethical Standards

Conflict of Interest Won Woo Lee declares no conflict of interest.

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