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FOCUS ISSUE: CARDIAC SARCOIDOSIS－FROM THE CME SESSION AT 63rd SNMMI ANNUAL MEETING: EDITRIAL

Roles of ^{18}F-FDG PET in Diagnosis and Management of Cardiac Sarcoidosis－from the Continuing Medical Education Session at the 63rd SNMMI Meeting, June 2016

Nagara Tamaki, MD, PhD[1), 2)], Osamu Manabe, MD, PhD[1)] and Keiichiro Yoshinaga, MD, PhD, FACC, FASNC[3)]

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Sarcoidosis is a multi-system disorder with unknown etiology which is characterized by the presence of non-caseating granulomas in the involved organs, such as lung, lymph nodes, eyes, and skin. While in most patients the disease follows a benign course, in some other patients it may be associated with fatal disorders, mainly involving the cardiac system (1-3).

Reaching an antemortem diagnosis of cardiac sarcoidosis (CS) is challenging since many patients remain asymptomatic throughout life. As well, while CS may lead to potentially life-threatening clinical manifestations, such as conduction disorders, congestive heart failure, ventricular arrhythmias, or sudden cardiac death, these conditions may have numerous causes, and CS is not the first thing to come to mind as a diagnosis (2-4). Cardiac biopsy to identify characteristic non-caseating granulomas has been used for CS diagnosis. However, this procedure may not lead to accurate diagnosis since the sensitivity of biopsy is quite suboptimal. On the other hand, non-invasive cardiac imaging techniques, such as computed tomography (CT), magnetic resonance imaging (MRI), echocardiography, and positron emission tomography (PET) have most recently been used for determining cardiac involvement of sarcoidosis.

Echocardiography and MRI have provided high-resolution myocardial images showing myocardial fibrosis, myocardial thinning, and edema with or without regional wall motion abnormalities in CS (4-9). Similarly, radionuclide myocardial perfusion imaging (MPI) has also shown regional perfusion abnormalities indicating myocardial fibrosis not related to coronary artery distribution (10).

^{18}F-fluorodeoxyglucose (^{18}F-FDG) PET has been used as a non-invasive tool not only for diagnosis but also to evaluate therapeutic effects and prognosis on the basis of high accumulation of ^{18}F-FDG in inflammatory and granulomatous lesions in CS (6, 10-14). ^{18}F-FDG uptake may improve dramatically after immunosuppressive therapy. In addition, recurrence of symptomatic ventricular tachycardia may be predicted with increased ^{18}F-FDG uptake during tapering of steroid dose (15).

Our group has extensively studied the diagnostic and prognostic values of ^{18}F-FDG PET in CS (16-20). We have found a number of factors that may facilitate use of this elegant technique to detect CS when it is suspected in asymptomatic patients and to monitor CS during and after immunosuppressive treatments.

Japanese nuclear cardiology communities have lead the clinical investigations in diagnosis of CS and Japan is the only country to have health ministry's approval for ^{18}F-FDG PET for diagnosis of CS since 2012 (21). Japanese circulation society also just updated clinical guidelines of CS this year (22). Based on these background, we organized a continuing medical educational (CME) session entitled "Detection and

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1) Nagara Tamaki, Osamu Manabe
Department of Nuclear Medicine, Hokkaido University Graduate School of Medicine, Sapporo, Japan
2) Nagara Tamaki
Department of Radiology, Kyoto Prefectural University of Medicine, Kyoto, Japan
E-mail: natamaki@koto.kpu-m.ac.jp
3) Keiichiro Yoshinaga
Diagnostic and Therapeutic Nuclear Medicine, National Institute of Radiological Sciences, Chiba, Japan

Assessment of Cardiac Sarcoidosis by ^{18}F-FDG -PET" for the 63rd Society of Nuclear Medicine and Molecular Imaging (SNMMI) annual meeting in 2016 in San Diego, California. To accurately diagnose CS through ^{18}F-FDG -PET, optimal patient preparation is required in order to minimize physiological ^{18}F-FDG uptake in normal myocardium. Japanese guidelines for diagnosing cardiac sarcoidosis are frequently cited throughout the world. An objective and quantitative assessment of cardiac ^{18}F-FDG uptake is important not only for accurate diagnosis, but also to assess the severity of CS on the basis of quantitative characteristics of PET. Such an objective assessment of ^{18}F-FDG uptake may also be used to monitor CS patients. Recently, contrast enhancement in MRI has been used to detect and manage CS with ^{18}F-FDG -PET. Since delayed enhancement of MRI may identify different CS lesions from those identified through ^{18}F-FDG -PET, MRI and PET should play complementary roles in clinical settings. These important messages were delivered by four speakers from Japan on the basis of their extensive experience with CS and ^{18}F-FDG -PET. In addition, clinical perspectives for CS management were well summarized by Dr. David H. Birnie, chair of the Heart Rhythm Society expert consensus statement on the diagnosis of CS.

The major learning objectives are (1) how to prepare patients for ^{18}F-FDG injection in order to reduce physiological myocardial ^{18}F-FDG uptake including diet modification and prolonged fasting period longer than 12 hours, (2) how to analyze ^{18}F-FDG uptake in cardiac regions for detection and treatment monitoring, (3) how to use ^{18}F-FDG -PET for risk assessment and patient management, and finally (4) how to understand characteristics of CS lesions identified by both ^{18}F-FDG -PET and enhanced MRI. Many clinical experiences and new applications for ^{18}F-FDG -PET in the study of CS in Japan were reported on, and there were excellent discussions with and comments from members of audiences from around the world and by my co-chair, Dr. Marcelo F DiCarli. We sincerely appreciate the participation of all speakers and audiences who took part in this informative session.

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Conflicts of interest

None.

Reprint requests and correspondence:
Nagara Tamaki, MD, PhD
Department of Radiology, Kyoto Prefectural University of Medicine, 465 Kajii-cho, Kawaramachidori-Hirokoji, Kamigyo-ku, Kyoto, 602-8566, JAPAN
E−mail: natamaki@koto.kpu-m.ac.jp

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