

Review of the first 5 years of dedicated FDG PET/CT for Cardiac Inflammation

R. Donnelly^{1,2,3}, T. Basquel-Fahy², C. Patchett⁶, D. Keane⁴, M. Barrett⁴, L. Harris¹, E. McGrath⁵, C. McCarthy^{3,5}, D.J. Murphy^{1,3}

1. Department of Radiology, St. Vincent's University Hospital, Elm Park, Dublin 4, Ireland.
2. Medical Assessment Unit, St. Vincent's Private Hospital, Dublin 4, Ireland.
3. School of Medicine, University College Dublin, Belfield, Dublin 4, Ireland.
4. Department of Cardiology, St. Vincent's University Hospital, Elm Park, Dublin 4, Ireland.
5. Department of Respiratory Medicine, St. Vincent's University Hospital, Elm Park, Dublin 4, Ireland.
6. Department of Infectious Diseases, St. Vincent's University Hospital, Elm Park, Dublin 4, Ireland.

Abstract

Aims

This study aimed to evaluate the effectiveness of cardiac 2-deoxy-(F) fluoro-D-glucose (FDG)-PET/CT (F18 FDG PET/CT) in assessing cardiac inflammation, particularly in suspected cardiac sarcoidosis by analyzing patient compliance with dietary instruction and the effect this had on study accuracy.

Methods

A single centre audit was conducted on all cardiac F18 FDG PET/CTs from 2018 to 2023 inclusive. Data collected included patient demographics, referral sources, scan indications and myocardial suppression levels.

Results

Between November 2018 and December 2023, 73 F18 FDG PET/CT scans were performed on 53 patients, mostly male (41, 77%), with a mean age of 57 years. Internal referrals accounted for 29 cases (55%), while 24 (45%) originated from external hospitals. The primary indication was suspected cardiac sarcoidosis, with 30 patients also showing suspicion of extra-thoracic disease. One case involved suspected prosthetic valve infection. Adequate myocardial FDG suppression was achieved in 64 scans (87.7%), with 4 (5.4%) showing suboptimal suppression and 5 (6.8%) being non-diagnostic. In total, 68 scans (93.2%) yielded sufficient myocardial suppression to support a definitive radiological interpretation.

Discussion

This audit highlights the robust diagnostic performance of our FDG-PET/CT program in the evaluation of cardiac sarcoidosis and related conditions. Further investment in scanning capacity and protocol optimization, alongside ongoing technological and evidentiary advances, will enhance its integration into personalized cardiac care.

Introduction

Non-invasive cardiac imaging plays a pivotal role in the assessment of cardiac disease. The use of 2-deoxy-(F) fluoro-D-glucose (FDG)-PET/CT (F18 FDG PET/CT) for advanced non-invasive cardiac imaging has evolved over recent years, in the evaluation of cardiac inflammation (especially cardiac sarcoidosis) and both native and prosthetic cardiac infection¹.

F18 FDG PET/CT is primarily used in oncology imaging, taking advantage of the tendency of tumours to be relatively hypermetabolic compared to background normal tissues, providing an accurate whole-body assessment for metastatic disease. The radiotracer FDG is a radioactive glucose analogue that is taken up into cells via the GLUT receptors akin to glucose, undergoing phosphorylation but not entering the Krebs cycle. It emits positively charged high energy electrons (positrons) that can then be detected by a camera with a high energy threshold—this is the basic principle behind F18 FDG PET/CT. A low dose CT scan is acquired just before the PET scan for attenuation correction purposes and for anatomical localisation. Post-processing fusion of these two image datasets then provides the coloured image series that physicians are familiar with when reviewing F18 FDG PET/CTs.

For a standard oncology F18 FDG PET/CT patients typically fast for 4-6 hours to reduce circulating insulin levels to minimise FDG concentration in skeletal muscle, maximising the available tracer for hypermetabolic tumour to take up. Typically, after this length of fasting, there remains heterogenous or diffuse physiological uptake throughout the left ventricular myocardium, limiting the ability to evaluate for cardiac pathology. However, the myocardium can use both glucose and free fatty acids to meet its substantial energy requirements². When performing FDG cardiac PET to look for areas of infection or inflammation, we try to take advantage of this by essentially 'switching' the myocardial cells from glucose to free fatty acid metabolism. By doing this, when we administer FDG, we can look for areas of increased uptake which are then likely to represent areas of infection or inflammation, depending on the clinical scenario.

Ensuring effective suppression of physiological FDG uptake is important for obtaining diagnostic images scans, and various strategies involving dietary and/or pharmacological adjustments have been devised for this purpose. These include a prolonged (>18 hour) fast preceded by a high-fat low-carbohydrate diet the day prior to the scan, with some centres giving a bolus of unfractionated heparin prior to FDG injection to increase circulating free fatty acids^{3,4}.

We began a cardiac PET service in St Vincent's University Hospital (SVUH) in 2018. The objective of this paper is to describe how this service has been used to date, encompassing referral patterns, image quality and scan results.

Methods

We reviewed all cardiac FDG PET/CTs performed in St Vincent's University Hospital between the service commencement in November 2018 until December 2023. The sample population was derived from the St Vincent's University Hospital Syngo Workflow Browser database (Siemens, Germany) where discrete datapoints relating to patient demographic, referral location, scan indication and radiologist reported physiological myocardial suppression for each of the respective scans was recorded and tabulated. This protocol was reviewed and accepted by the St Vincent's University Hospital Audit Committee prior to the commencement of the study.

Our current patient preparation protocol prior to a cardiac FDG PET/CT instructs patients to follow a high-fat, high-protein, low-carbohydrate diet at least 24 hours before, along with a 15-hour fast prior to the scan. Between 9am–7pm, the day prior to examination, we recommend selecting one protein option from Group A – either a 250g casserole (prepared with chicken, bacon, shallots and mushrooms), 150g grilled salmon, 200g fried Quorn or a cheese omelette made with four eggs – and complemented with any combination of vegetables from Group B. Foods and drinks high in carbohydrates or heavily processed were excluded. Prohibited items included all fizzy drinks, alcoholic beverages, sweetened drinks, processed meats, fish, or poultry, as well as high-carb vegetables (e.g. potatoes, peas, carrots), dairy products like milk and processed cheese, condiments with added sugars (e.g. ketchup, barbecue sauce), and starchy foods such as pasta, bread, rice, cereals, fruit, sweets and chocolate. If unsure, participants were advised to choose items with minimal or no carbohydrate content. These instructions are sent out to the patient in a leaflet along with the appointment details (see sample instructions on the next page).

Diet Timetable Guide

Day before the scan

Normal breakfast before 9am

9am - 7pm Special Diet*

>7pm Fast - Water only

Day of Scan

Fasting until Scan

Normal diet once scan completed

Snack ideas – Celery sticks/cheddar chunks/nuts

Food Instructions

Group A - Protein

Grilled Salmon (Fish Option)

Quorn Pieces (Vegetarian
Option)

Omelette (Egg Option)

Chicken (Meat Option)

Group B - Vegetable

Broccoli

Cauliflower

Celery

Courgette

Aubergine

Cucumber

Lettuce

Curly Kale

Spinach

Mushrooms

Garlic

Pepper

Patient's should take a combination on Group A with a selection of
steamed or boiled vegetables

In cases where suppression of myocardial glucose uptake has been successful, the myocardium is imperceptible on the PET only images. To examine how successful our protocol has been, an assessment of St Vincent's University Hospital's dietary protocol was performed by reviewing the radiologist reported suppression of physiological myocardial FDG-uptake on all cardiac F18 FDG PET/CTs. Scans were categorised as 'adequate', 'suboptimal' and 'non-diagnostic' based on the radiologist visual qualitative assessment of residual myocardial tracer uptake. 'Adequate' scans were classified as those where the reporting radiologist stated that an adequate level of myocardial FDG-suppression was achieved that would not jeopardise the diagnostic integrity of the scan. A scan was classified as 'suboptimal' if the scan was reported but did specify poor physiological suppression that may affect diagnostic accuracy. Scans classified as 'non-diagnostic' if the scan was reported as non-interpretable for cardiac assessment due to the lack of myocardial glucose suppression. No exclusion criteria

were applied to the cases. Results of this project were recorded and assessed using Excel (Microsoft Corp.) and SPSS (IBM Corp.).

Results

In total, 73 cardiac FDG PET/CTs were performed during the eligible period and were included. This included a cohort of 53 individual patients (41 male, 12 female, mean age 57 +/- 12 years) (Table 1). Patients were primarily referred for assessment of suspected (n = 62, 84.9%) with 30 patients (55.5%) having known extra-cardiac sarcoidosis prior to referral. New cardiac arrhythmias, including ventricular tachycardia or atrial fibrillation, or unexplained left ventricular dysfunction with suspected fibrosis, prompted further imaging evaluation for this subgroup. Other indications included suspected prosthetic valve infection in one patient while another for assessment of a cardiac mass.

Referrals in SVUH are currently accepted from anywhere nationally. Many of the scans performed in SVUH were taken from in-house referrals (n = 29 patients, 55%). However, patient referrals were also seen from other institutions (n = 24, 45%). The number of scans performed on an annual basis has remained relatively steady since the inception of the programme with 5, 13, 12, 10, 18 and 16 being performed from 2018 until 2023 inclusive.

In this cohort, 44 patients underwent a single F18 FDG PET/CT scan, while 9 patients had between 2 and 5 scans over a six-year period for disease monitoring and therapeutic guidance (Table 2). Complete resolution of metabolic activity was observed in 6 patients, while 3 demonstrated a partial response (Figure 1 – 2). Notably, F18 FDG PET/CT incidentally detected two cases of colorectal cancer, which were subsequently confirmed through histological analysis.

Of the total number of scans performed, (n = 64, 87%) had an adequate level of myocardial FDG-suppression, providing diagnostic image quality (Table 3). There were fewer scans deemed as either suboptimal (n = 4, 5.4%) or non-diagnostic (n = 5, 6.8%) (Figure 3). The protocol demonstrated a strong performance when represented as a total of the resulted scans (n = 68, 93.1%).

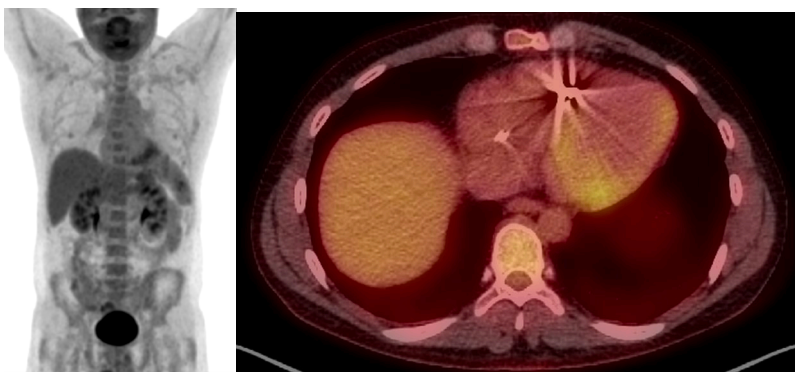


Figure 1. Transverse cardiac FDG-PET/CT image demonstrating excellent myocardial glucose suppression. Focal areas of FDG uptake are noted, indicative of cardiac sarcoidosis, with a maximum standardized uptake value (SUVmax) of 9.18.

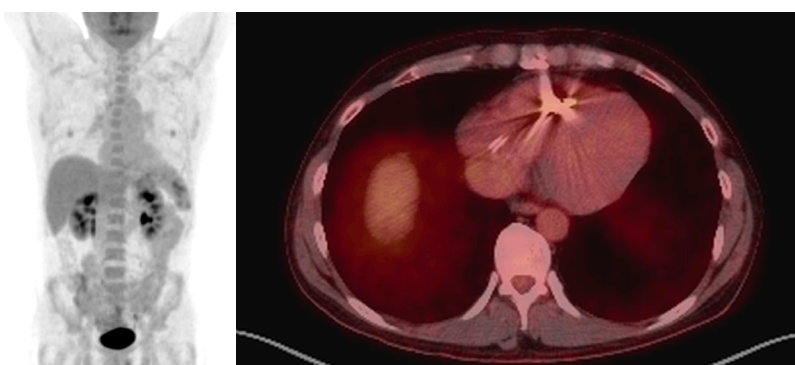


Figure 2. A series of cardiac FDG-PET/CT scans were conducted after immunosuppressive therapy, demonstrating excellent myocardial glucose suppression and complete resolution of the previously observed metabolic activity. These imaging results provided valuable justification for the continuation of immunosuppressive treatment.

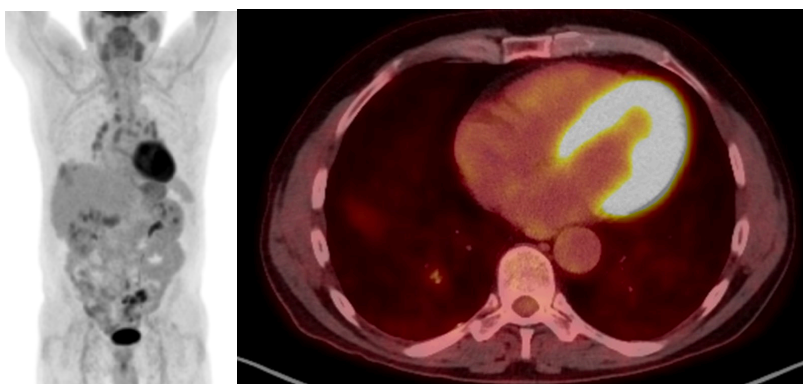


Figure 3. A non-diagnostic Cardiac FDG-PET/CT attributable to dietary protocol noncompliance. Diffuse myocardial FDG uptake likely represents physiological activity and is non-diagnostic for assessment of cardiac inflammation. Multi-station, symmetric mildly metabolically active mediastinal lymph nodes in a pattern typical for sarcoid are demonstrated on the maximum intensity projection (MIP) PET image on the left.

Table 1. Table displaying patient demographics and scan data. A detailed breakdown of patient demographic information including age, sex, and relevant scan indication is outlined. Referral sources with annual distribution of scans performed across the study period are comprehensively discussed.

Patient Demographic Table		N (%)
Total Scans		73
Patients		53
Sex		
Male		41 (77)
Female		12 (23)
Mean Age (Years)		57 +/- 12
Scan Indications		
Evaluation of Confirmed/Suspected Cardiac Sarcoidosis		64 (87)
Unexplained LV Dysfunction		3 (4)
Recurrent Tachyarrhythmia		4 (5)
Prosthetic Device Infection		2 (3)
Cardiac Mass		1 (1)
Referral Location		
SVUH Referral		29 (55)
Other Institutions		24 (45)
Scans performed		
	2018	5 (7)
	2019	13 (19)
	2020	12 (17)
	2021	10 (8)
	2022	18 (26)
	2023	16 (23)

Table 2. Table presenting a detailed comparison between the number of scans performed and the corresponding metabolic responses observed via FDG-PET/CT. Metabolic outcomes are categorized based on changes in serial SUVmax measurements. A "partial" response is defined as a reduction in SUVmax that remains elevated above the basal metabolic activity seen in the cardiac myocardium, while a "complete" response indicates full metabolic resolution.

Breakdown of Scans Performed vs Metabolic Outcome			
Number of FDG-PET/CT (N=73)	Patients (N=53)	Metabolic Response	
		Complete	Partial
1	43 (83)	-	-
2	4 (8)	1 (25)	3 (75)
3	1 (2)	1 (100)	0
4	1 (2)	1 (100)	0
5	3 (5)	3 (100)	0

Table 3. Table performance metrics of the patient preparatory protocol.

Performance of Preparatory Protocol	
Level of Myocardial Suppression	N = 73 (%)
Optimal	64 (87)
Suboptimal	4 (6)
Non-diagnostic	5 (7)

Discussion

FDG-PET/CT is an advanced non-invasive cardiac imaging modality providing important information on cardiac metabolism. This study evaluates the protocol used at a tertiary academic hospital in Ireland, aligning with current guidelines. Our findings indicate satisfactory performance of the current protocol with approximately 93% of scans having adequate myocardial glucose suppression (Table 3, Figure 1–3). The protocol utilized a high-fat, high-protein, low-carbohydrate diet followed by a prolonged fasting period exceeding 12 hours, demonstrating patient-friendliness, particularly for those with low health literacy. Alternative protocols, such as extended fasting or heparin co-administration, present significant challenges. Prolonged fasting poses risks for diabetic patients and may necessitate hospital admission, an impractical solution given the current bed shortage. Heparin administration carries risks for patients with bleeding disorders or those on anticoagulants.

The main indication for cardiac FDG PET/CT in our cohort was for the diagnosis/monitoring of cardiac sarcoidosis (Figure 1–2). This role is established internationally and supported by consensus guidelines in Europe, the US and Japan. For example, the joint consensus document by SNMMI (Society of Nuclear Medicine and Molecular Imaging) and ASNC (American Society of Nuclear Cardiology) highlights the integration of FDG-PET/CT in the diagnostic framework for cardiac sarcoidosis as per the HRS (Heart Rhythm Society) criteria^{5,6}. A comprehensive meta-analysis encompassing 33 studies, and 1997 patients reports a sensitivity of 72% and a specificity of 82%, underscoring FDG-PET/CT's diagnostic value in this domain⁷. Additionally, a recent meta-analysis by Coulden et al. examined the prognostic value of FDG-PET/CT in cardiac sarcoidosis, demonstrating that FDG uptake during PET was predictive of major adverse cardiac events (MACE) with an odds ratio of 2.1 (95%CI 1.4 - 3.2; $P < .001$)⁸.

This growing body of evidence highlights the critical need for accurate diagnosis and early intervention in cardiac sarcoidosis due to its association with significant morbidity and mortality, including sudden cardiac death and progression to advanced myocardial fibrosis or end-stage heart failure⁹. The burden is especially pertinent in Ireland, where sarcoidosis prevalence appears among the highest rates globally¹⁰. Timely identification and specialist cardiology input are essential, particularly for patients at high risk who may benefit from advanced imaging. FDG-PET/CT is increasingly recognised for its utility in diagnosis, therapeutic guidance, and risk stratification. Given that cardiac involvement occurs in up to 25% of sarcoidosis cases, of which approximately one-quarter may present as isolated cardiac sarcoidosis, clinicians should maintain a high index of suspicion¹¹. Notably, up to 60% of patients with cardiac sarcoidosis may require ICD implantation due to the risk of sudden cardiac death¹².

Evaluation of cardiac infection, in particular prosthetic infections, is another use we have seen for cardiac PET. The European Society of Cardiology (ESC) recommends incorporating abnormal FDG uptake as a major criterion for diagnosing prosthetic valve endocarditis (PVE) in cases initially classified as "possible" or "denied" by the modified Duke criteria⁶. Conversely, the American Heart Association (AHA) underscores the necessity for further studies to validate FDG-PET/CT's efficacy in diagnosing infective endocarditis¹³. A meta-analysis by Ten Hove, D. et al. reveals a sensitivity of 95% and a pooled specificity of 91% for detecting device-related infections¹⁴.

The pattern of FDG uptake on PET/CT plays a central role in differentiating an underlying pathological process from benign physiological uptake, as shown in Figures 1–3. Diffuse uptake, typically uniform across the myocardium, is often physiologic due to suboptimal dietary preparation but may occasionally indicate global inflammation such as diffuse myocarditis or sarcoidosis, when paired with perfusion abnormalities¹⁵. In contrast, heterogeneous or patchy uptake suggests focal inflammation, infection, or infiltration and often aligns with clinical symptoms¹⁶. An inflamed myocardium usually has preserved perfusion with increased FDG uptake¹⁷, while ischemic regions may show reduced perfusion and variable uptake based on viability¹⁸. A perfusion-FDG mismatch indicates viable but dysfunctional (hibernating) myocardium, whereas matched defects with low uptake point to scar. Patchy FDG uptake with normal perfusion supports focal inflammation. Integrating perfusion imaging with PET thus improves diagnostic precision and guides management.

Incidental pulmonary findings suggestive of pulmonary sarcoidosis can often prompt further investigation using FDG-PET/CT, a modality with reported sensitivity and specificity of 0.97 and 0.87, respectively¹⁹. Despite this, the imaging technique remains relatively underutilized in cases of pulmonary sarcoidosis. In our cohort, some externally referred patients may have undergone FDG-PET/CT primarily to characterise pulmonary findings or monitor treatment response. Recent findings highlight significant variability in the referral patterns for this imaging, often made on a case-by-case basis. In the absence of robust, standardized guidelines for using PET in pulmonary sarcoidosis, its application remains inconsistent and variable²⁰.

Globally, inequities in access to PET/CT imaging are tracked by the IMAGINE database, an area where Ireland underperforms²¹. SVUH currently accepts referrals from across the country, with nearly 50% of our cohort coming from external institutions. In response to growing demand, efforts are focused on enhancing cost-effectiveness and accessibility through advances in scanner technology and standardized imaging protocols. Given the high radiation burden and limited availability of FDG-PET/CT, equitable and efficient use is essential. Specialist cardiology oversight in the referral process is critical to maintaining diagnostic

accuracy, preventing inappropriate use, and ensuring sustainable access as demand continues to rise.

However, one challenge not addressed by this study is the absence of an internal control to verify patient compliance with the prescribed pre-scan dietary protocol. Compliance was assessed primarily through radiographer-administered questionnaires and documentation on the morning of the scan, relying heavily on patient self-reporting. As myocardial glucose suppression depends critically on strict dietary adherence, it remains unclear whether non-diagnostic scans reflected protocol inefficacy or patient non-compliance. This distinction, which was not explored in the present study, limits the ability to draw firm conclusions about the true performance of the dietary preparation protocol. Furthermore, the relatively low volume of cardiac FDG-PET/CT scans limits statistical power and generalizability, an acknowledged constraint common to studies of this nature. Despite these limitations, the study contributes meaningful data to the literature and enables more informed comparisons between dietary protocols. Future research incorporating larger cohorts and objective measures of adherence will be essential to validate and extend these findings.

This audit highlights the robust diagnostic performance of our FDG-PET/CT program in the evaluation of cardiac sarcoidosis and related conditions. Further investment in scanning capacity and protocol optimization, alongside ongoing technological and evidentiary advances, will enhance its integration into personalized cardiac care.

Declarations of Conflicts of Interest:

Ryan Donnelly is funded by a UCD Newman Fellowship from the UCD. Otherwise, none declared.

Corresponding author:

David J. Murphy,
Department of Radiology,
St. Vincent's University Hospital
Elm Park,
Dublin 4,
Ireland.

E-Mail: David.Murphy@st-vincent's.ie

References:

1. Bourque JM, Birgersdotter-Green U, Bravo PE, Budde RPJ, Chen W, Chu VH, et al. 18F-FDG PET/CT and radiolabeled leukocyte SPECT/CT imaging for the evaluation of cardiovascular infection in the multimodality context: ASNC Imaging Indications (ASNC I2) Series Expert Consensus Recommendations from ASNC, AATS, ACC, AHA, ASE, EANM, HRS, IDSA, SCCT, SNMMI, and STS. *Clinical Infectious Diseases*. 2024.
2. Sha X, Gong G, Han C, Qiu Q, Yin Y. Quantification of Myocardial Dosimetry and Glucose Metabolism Using a 17-Segment Model of the Left Ventricle in Esophageal Cancer Patients Receiving Radiotherapy. *Frontiers in Oncology*. 2020;10.
3. Osborne MT, Hulten EA, Murthy VL, Skali H, Taqueti VR, Dorbala S, et al. Patient preparation for cardiac fluorine-18 fluorodeoxyglucose positron emission tomography imaging of inflammation. *Journal of Nuclear Cardiology*. 2017;24(1):86-99.
4. Taegtmeyer H. Tracing Cardiac Metabolism In Vivo: One Substrate at a Time. *Journal of Nuclear Medicine*. 2010;51(Supplement 1):80S-7S.
5. Chareonthaitawee P, Beanlands RS, Chen W, Dorbala S, Miller EJ, Murthy VL, et al. Joint SNMMI-ASNC Expert Consensus Document on the Role of (18)F-FDG PET/CT in Cardiac Sarcoid Detection and Therapy Monitoring. *J Nucl Med*. 2017;58(8):1341-53.
6. Doherty JU, Kort S, Mehran R, Schoenhagen P, Soman P. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate Use Criteria for Multimodality Imaging in Valvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *Journal of the American College of Cardiology*. 2017;70(13):1647-72.
7. Wang H-Y, Ding H-J, Chen J-H, Chao C-H, Lu Y-Y, Lin W-Y, et al. Meta-analysis of the diagnostic performance of [18F]FDG-PET and PET/CT in renal cell carcinoma. *Cancer Imaging*. 2012;12(3):464-74.
8. Coulden RA, Sonnex EP, Abele JT, Crean AM. Utility of FDG PET and Cardiac MRI in Diagnosis and Monitoring of Immunosuppressive Treatment in Cardiac Sarcoidosis. *Radiology: Cardiothoracic Imaging*. 2020;2(4):e190140.
9. Sink J, Joyce C, Liebo MJ, Wilber DJ. Long-Term Outcomes of Cardiac Sarcoid: Prognostic Implications of Isolated Cardiac Involvement and Impact of Diagnostic Delays. *Journal of the American Heart Association*. 2023;12(19).

10. Nicholson TT, Plant BJ, Henry MT, Bredin CP. Sarcoidosis in Ireland: regional differences in prevalence and mortality from 1996-2005. *Sarcoidosis Vasc Diffuse Lung Dis.* 2010;27(2):111-20.
11. Mathai SV, Patel S, Jorde UP, Rochlani Y. Epidemiology, Pathogenesis, and Diagnosis of Cardiac Sarcoidosis. *Methodist DeBakey Cardiovascular Journal.* 2022;18(2):78-93.
12. Takaya Y, Nakagawa K, Miyoshi T, Nishii N, Morita H, Nakamura K, et al. Life-Threatening Ventricular Tachyarrhythmia in Isolated Cardiac Sarcoidosis Compared with Cardiac Sarcoidosis with Extracardiac Involvement. *American Journal of Cardiology.* 2025; 238:65-9.
13. Baddour LM, Wilson WR, Bayer AS, Fowler VG, Tleyjeh IM, Rybak MJ, et al. Infective Endocarditis in Adults: Diagnosis, Antimicrobial Therapy, and Management of Complications. *Circulation.* 2015;132(15):1435-86.
14. Ten Hove D, Treglia G, Slart RHJA, Damman K, Wouthuyzen-Bakker M, Postma DF, et al. The value of 18F-FDG PET/CT for the diagnosis of device-related infections in patients with a left ventricular assist device: a systematic review and meta-analysis. *European Journal of Nuclear Medicine and Molecular Imaging.* 2021;48(1):241-53.
15. Nakazato R, Berman DS, Alexanderson E, Slomka P. Myocardial perfusion imaging with PET. *Imaging Med.* 2013;5(1):35-46.
16. Tahara N, Tahara A, Nitta Y, Kodama N, Mizoguchi M, Kaida H, et al. Heterogeneous Myocardial FDG Uptake and the Disease Activity in Cardiac Sarcoidosis. *JACC: Cardiovascular Imaging.* 2010;3(12):1219-28.
17. Buechel RR, Ciancone D, Bakula A, von Felten E, Schmidt GA, Patriki D, et al. Long-term impact of myocardial inflammation on quantitative myocardial perfusion-a descriptive PET/MR myocarditis study. *Eur J Nucl Med Mol Imaging.* 2023;50(12):3609-18.
18. Kottam A, Hanneman K, Schenone A, Daubert MA, Sidhu GD, Gropler RJ, et al. State-of-the-Art Imaging of Infiltrative Cardiomyopathies: A Scientific Statement From the American Heart Association. *Circulation: Cardiovascular Imaging.* 2023;16(11).
19. Donnelly R, McDermott M, McManus G, Franciosi AN, Keane MP, McGrath EE, et al. Meta-analysis of [(18)F]FDG-PET/CT in pulmonary sarcoidosis. *Eur Radiol.* 2024.
20. Donnelly R, Franciosi AN, Forde S, McDermott M, Keane MP, McGrath EE, et al. Late Breaking Abstract - Deciphering disagreement: sarcoidosis management and the role of FDG-PET/CT. *European Respiratory Journal.* 2024;64(suppl 68):OA947.
21. Agency IAE. IMAGINE - IAEA Medical imAGIng and Nuclear mEdicine global resources database 2024 [Available from: <https://humanhealth.iaea.org/HHW/DBStatistics/IMAGINE.html>].