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The Evaluation of Lupus Myocarditis with N-13 Ammonia and 18F-FDG PET scan

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Introduction:

While uncommon, lupus myocarditis carries a prevalence of 8-25% (*1*). A common method utilized for diagnosis is a combination of physical exam findings, ECG and echocardiography. Unfortunately, findings are non-specific and are found in other pathologic processes such as drug induced cardiomyopathy (antimalarials, cyclophosphamide, phenothiazines), postpartum cardiomyopathy and uremia. Under those circumstances, a myocardial biopsy is needed in order to confirm the cause of myocarditis (*2*). This case study demonstrates that 18F-FDG PET can be utilized to evaluate lupus myocarditis.

Case report:

21 y/o Female with a history of worsening lupus myocarditis. N-13 Ammonia and 18F-FDG PET scan was ordered. The patient was instructed to take a high-fat low-carbohydrate diet the day prior without additional overnight fast. After one hour delay, multiple metabolic tomographic images of the myocardium were obtained. The N-13 ammonia rest perfusion images demonstrated defects in the basal inferior and basal inferior lateral regions with corresponding increased FDG uptake in these regions; consistent with active infiltration of the myocardium (figure 1). The patient was started on with high dose prednisone, imuran and colchicine. The follow-up PET myocardial imaging study after 3 months demonstrated similar findings to prior study with EF of 33%(figure 2). As a result, patient's treatment regimen was changed and placed on cellcept. These findings indicate poor response to treatment

Discussion:

A literature search looking for common findings of lupus myocarditis on 18F-FDG PET has yielded no results and thus this case study will hopefully popularize an underutilized diagnostic modality for this rare but devastating disease.

To evaluate for inflammatory process in the heart such as in cardiac sarcoidosis and lupus myocarditis; N-13 ammonia, or Rb-82 radiotracers with 18F-FDG can be used (3). Cardiac magnetic resonance (CMR) is a new non-invasive method, which has high spatial resolution, allows evaluation of morphology, function, and tissue

characterization, and works without any radiation (*4*). PET/MRI combines the strengths of both techniques. PET is a non-invasive imaging technique, which can detect metabolic active processes with high sensitivity. Hence, a combination with MRI using gadolinium-DTPA (providing high spatial resolution and lack of radiation exposure) seems reasonable (*4*). In the absence of coronary artery disease, the perfusion defects seen in the PET scan can strongly point to the diagnosis of an inflammatory condition such as cardiac sarcoidosis or lupus myocarditis(*3*). In a normal myocardium, PET images will show normal perfusion and normal 18F-FDG radiotracer uptake. However, in inflamed myocardium, there will be decreased perfusion and increased 18F-FDG radiotracer uptake (*3*). In our case, the results indicate poor response to treatment which corresponds to the unchanged clinical decline. Therefore, the treatment regimen was changed and will be followed with a PET scan within the next few months to monitor the effectiveness of the new treatment. Also, another option is endomyocardial biopsy to distinguish between lupus myocarditis and other cardiomyopathies.

Conclusion:

While the utilization of N-13 Ammonia and 18F-FDG PET scan shows great promise as a diagnostic tool of heart involvement in inflammatory diseases, it can also be an equally powerful study for following disease progression and effectiveness of treatment. In our case, we demonstrated that 18F-FDG PET can be effectively used to follow up the effectiveness of treatment of lupus myocarditis.

References:

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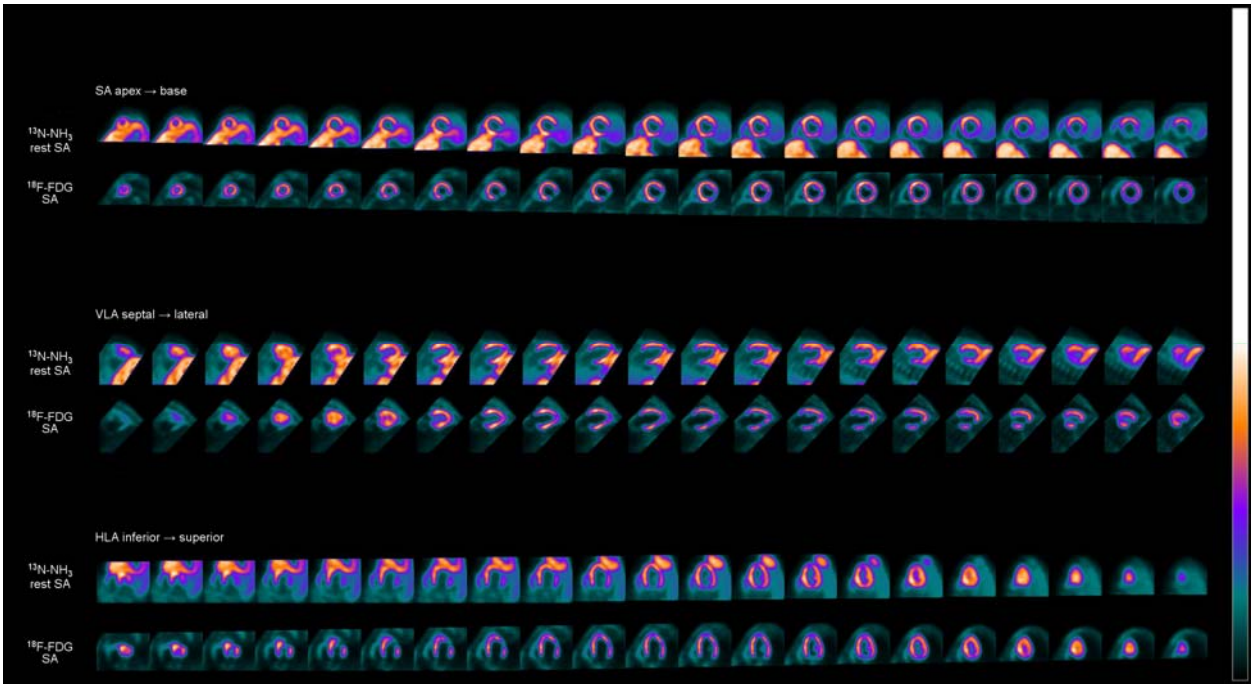
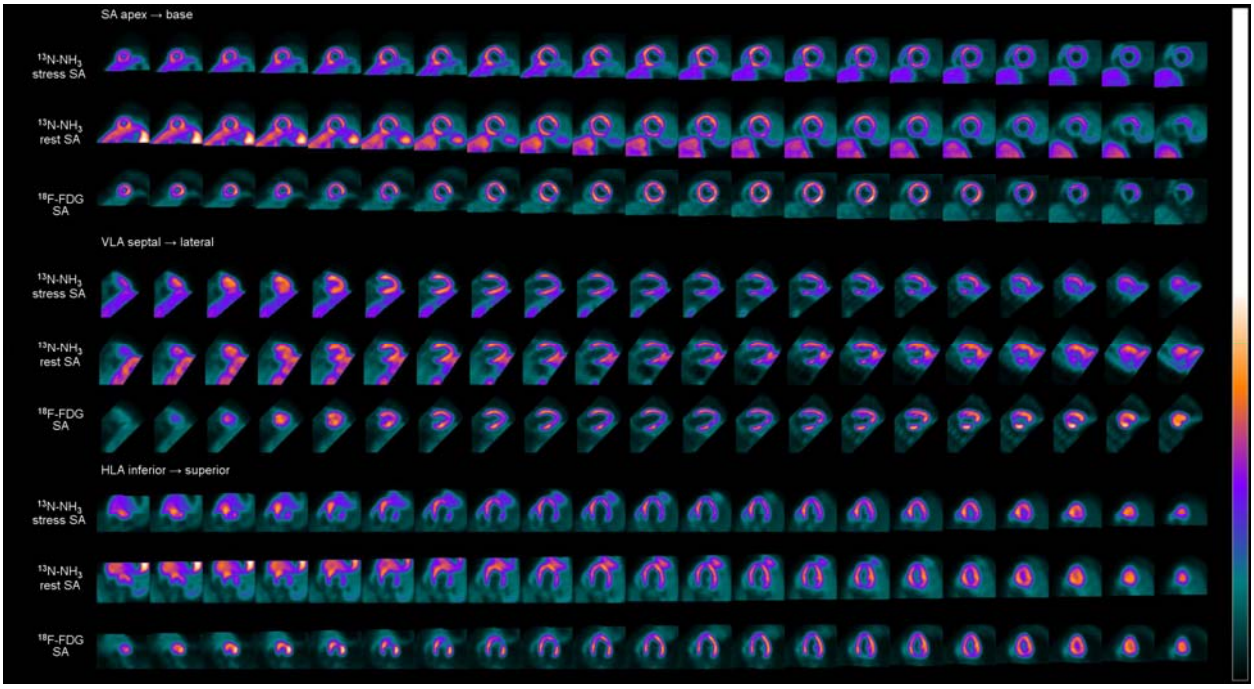
Figure 1.



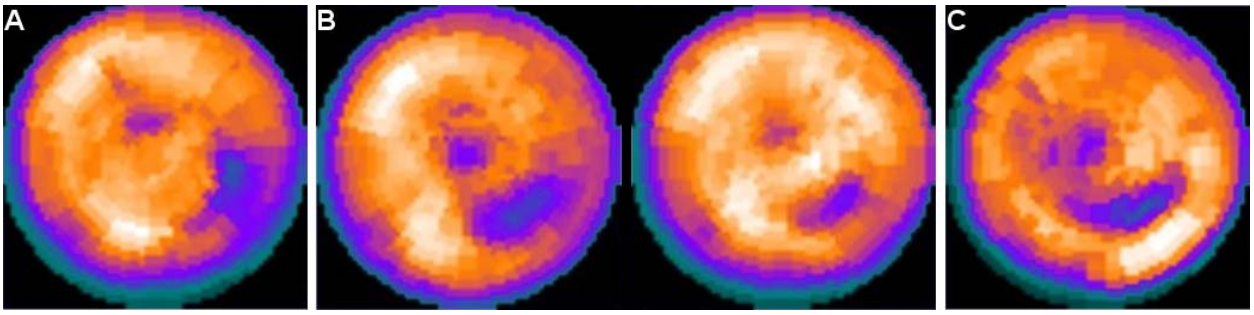
Legend: The N-13 ammonia rest perfusion images demonstrated defects in the basal inferior and basal inferior lateral regions with corresponding increased FDG uptake

Figure 2.



Legend: The N-13 ammonia stress and rest perfusion images demonstrated decreased uptake in the basal inferior lateral regions with corresponding increased FDG uptake. Also, there is sever hypoperfusion on both stress and rest images in the mid inferior lateral region extending to the mid inferior region, which has no enhanced FDG uptake and is suspected to be fibrosis/scar formation.

Figure 3.



Legend: polar plot images. (A) Rest ammonia polar plot image before treatment. (B) Rest and Stress ammonia polar plot image after treatment. (C) F18 FDG polar plot image after treatment.