Positron emission tomography (PET) and single photon emission computed tomography (SPECT) imaging of macrophages in large vessel vasculitis: Current status and future prospects

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POSITRON EMISSION TOMOGRAPHY (PET) AND SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY (SPECT) IMAGING OF MACROPHAGES IN LARGE VESSEL VASCULITIS: CURRENT STATUS AND FUTURE PROSPECTS

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ABSTRACT

Macrophages are key players in the pathogenesis of large-vessel vasculitis (LVV) and may serve as a target for diagnostic imaging of LVV. The radiotracer, ^{18}F-FDG has proven to be useful in the diagnosis of giant cell arteritis (GCA), a form of LVV. Although uptake of ^{18}F-FDG is high in activated macrophages, it is not a specific radiotracer as its uptake is high in any proliferating cell and other activated immune cells resulting in high non-specific background radioactivity especially in aging and atherosclerotic vessels which dramatically lowers the diagnostic accuracy. Evidence also exists that the sensitivity of ^{18}F-FDG PET drops in patients upon glucocorticoid treatment. Therefore, there is a clinical need for more specific radiotracers in imaging GCA to improve diagnostic accuracy. Numerous clinically established and newly developed macrophage targeted radiotracers for oncological and inflammatory diseases can potentially be utilized for LVV imaging. These tracers are more target specific and therefore may provide lower background radioactivity, higher diagnostic accuracy and the ability to assess treatment effectiveness. However, current knowledge regarding macrophage subsets in LVV lesions is limited. Further understanding regarding macrophage subsets in vasculitis lesion is needed for better selection of tracers and new targets for tracer development. This review summarizes the development of macrophage targeted tracers in the last decade and the potential application of macrophage targeted tracers currently used in other inflammatory diseases in imaging LVV.