The process of activation of the immune system of the brain, the microglia activation, occurs during several neurodegenerative disease as dementia, Parkinson, Alzheimer and Huntington’s disease as the consequence of neuronal death or at early stage as for not yet well-understood mechanisms. In the last decades, different radiopharmaceuticals specific for microglia activation have been developed to monitor neuroinflammation with in vivo Positron Emission Tomography (PET). In particular, $^{[1]}$C]PK11195 has been used to image translocator protein (TSPO), a marker that is overexpressed when microglia is activated. An analogue of $^{[1]}$C]PK11195, the compound $^{[18]}$F]VC701, has been developed in collaboration with the University of Siena and validated by the group in different animal models of neurodegeneration, as the EAE mouse model$^1$ and the Huntington’s disease rat model obtained after quinolinic acid injection$^2$. This radioligand can be used for the in vivo quantification of microglia/macrophage activation in pathological models and for the evaluation of inflammatory response after anti-inflammatory therapy. For example, Montelukast is a leukotriene receptors antagonist used to treat asthma that showed neuroprotective effects in animal models of ischemia as well as during aging. To address the mechanism of action in intact or compromised immunity system, different animal models of neurodegeneration can be treated with the drug, and $^{[18]}$F]VC701-PET used at different time points to monitor microglia activation. The expression of TSPO in vivo can be compared to post mortem Iba1 immunostaining or other microglia markers and related to different phenotype of inflammatory response.

References:

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Contacts: sara.belloli@ibfm.cnr.it (PET-CT imaging);
         presotto.luca@hsr.it (image analysis);
         moreSCO.rosamaria@hsr.it (coordinator).

Website(s): https://www.ibfm.cnr.it/