

Summary

Dynamic immune-imaging by using positron emission tomography

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Our section develops and uses positron emission tomography (PET) tracers as molecular probes of physiology and pathophysiology in animals and humans. To fully elucidate the dynamic immune system, we apply a highly advanced PET imaging technology to clinical immune researches for diagnosis and treatment of immune disorders. In addition to traditional radioligands, we use radiolabeled probes for *in vivo* imaging of a mitochondrial protein (18kDa translocator protein: TSPO) that is a marker for immune/inflammatory cells (activated microglia and macrophages). We've developed a new TSPO radioligand ($[^{11}\text{C}]$ PBR28), with high affinity and low levels of nonspecific uptake. We recently completed studies with the TSPO radioligand in healthy human subjects, and the results to date are quite promising. We are planning to apply the TSPO PET imaging to clinical immune researches in Osaka University Hospital. On the other hand, simultaneous multifunctional and anatomical imaging using multi-modalities has a great potential to impact biomedical imaging in basic and clinical immune researches. We have also developed original integrated PET/MRI system. Today, we introduce a new TSPO radioligand and *in vivo* simultaneous small animal images by our PET multi-modalities.