

## Molecular imaging by PET/SPECT

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Molecular imaging by PET/SPECT with radiopharmaceuticals enables noninvasively quantitative evaluation of physiological function, gene expression, pharmacokinetics of proteins and peptides and distribution of receptors with high sensitivity. Together with recent development of imaging equipments, molecular imaging by PET/SPECT is expected to contribute to elucidation of physiological and pathological functions, medical sciences and clinical diagnoses. Molecular imaging with radiopharmaceuticals started from diagnosis of cancer with  $^{18}\text{F}$ -2-fluoro-2-deoxyglucose ( $[^{18}\text{F}]\text{FDG}$ ). Currently,  $[^{18}\text{F}]\text{FDG}$  is commonly used in the field of clinical diagnosis, because it can provide qualitative information on malignancy and metastasis of tumor. Since its achievement, much effort has been devoted to the development of radiopharmaceuticals that bind or interact with the in vivo biomarkers. For example, a number of radiopharmaceuticals based on proteins and peptides with high binding affinities to various biomarkers have been applied for the diagnosis of tumor, arteriosclerosis, thrombus and so on. Furthermore, Alzheimer's disease is also a major target for diagnosis by PET/SPECT imaging. The development of low-molecular-weight radiolabeled probes for the quantitation of  $\beta$ -amyloid plaques and neurofibrillary tangles in Alzheimer's brains is a topic of current PET/SPECT imaging studies. Here, some recent progress and development of radiopharmaceuticals for PET/SPECT imaging will be reviewed.