

《特別講演 III》

Molecular Genetic Imaging Using Nuclear Medicine Techniques

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Among methods for molecular imaging, nuclear medicine based molecular imaging has several advantages in terms of sensitivity and applicability to human. In a narrow sense, molecular imaging means genetic imaging using imaging reporter genes. At first, imaging reporter genes have been investigated in combination with high-resolution PET scanning. Current PET reporter gene imaging paradigms fall into two categories: enzyme based (HSV1-tk gene) and receptor based (dopaminergic receptor gene) methods. PET images can localize the reporter gene expression, and the magnitude of reporter probe accumulation in transduced cells reflects the level of the gene expression. We and other groups proposed that sodium/iodide symporter (NIS) gene may serve as an alternative imaging reporter gene. NIS has many advantages as an imaging reporter gene due to the wide availability of its substrates, i.e., radioiodines and Tc-99m and of conventional gamma cameras. Reporter gene imaging allows the visualizations of the expressions of exogenous and endogenous genes, and of intracellular biologic events. Using cis-reporter gene system, some investigators visualized the expression of the p53 gene, HIF-1 gene, and the intracellular signal pathway of TGF receptor. We also imaged the activity of the retinoic acid nuclear receptor. This reporter gene imaging can be applied to the monitoring in vivo distributions of target cells, such as cancer cells, immune cells and stem cells.