Annals of Nuclear Medicine Vol. 18, No. 4, 275–283, 2004

Gene expression imaging with radiolabeled peptides

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An approach to image radiolabeled peptide localization at tumor sites by inducing tumor cells to synthesize membrane expressed human somatostatin receptor subtype 2 (hSSTr2) with a high affinity for radiolabeled somatostatin analogues is described. The use of gene transfer technology to induce expression of high affinity membrane hSSTr2 can enhance the specificity and degree of radiolabeled peptide localization in tumors. Employing this strategy, induction of high levels of hSSTr2 expression with selective tumor uptake of radiolabeled peptides was achieved in both subcutaneous non-small cell lung cancer and intraperitoneal ovarian cancer mouse human tumor xenograft models. The features of this genetic transduction imaging approach are: (1) constitutive expression of a tumor-associated receptor is not required; (2) tumor cells are altered to express a new target receptor or increased quantities of a constitutive receptor at levels which may significantly increase tumor targeting of radiolabeled peptides compared to uptake in normal tissues; (3) gene transfer can be accomplished by local or regional injection of adenoviral vectors; (4) it is feasible to target adenovirus vectors to tumor cells by modifying adenoviral tropism (binding) or by the use of tumor-specific promoters such that the hSSTr2 will be specifically expressed in the desired tumor; and (5) this technique can be used to image expression of a second therapeutic gene.

Key words: somatostatin receptor, peptide imaging, gene expression imaging