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Institutionen för klinisk vetenskap, intervention och teknik (CLINTEC), Enheten för medicinsk bild, funktion och teknologi

Nuclear Medicine Imaging of Lung Cancer and Esophagus Cancer

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ABSTRACT

Background: Somatostatin receptors (SSTRs) occur in cancer tissue, and ^{99m}Tc-depreotide is a labelled somatostatin receptor analogue, binding to SSTRs subtype 2, 3, and 5.

Purpose: The general aim of the present thesis was to study somatostatin receptor scintigraphy (SSTRS) with ^{99m}Tc-depreotide in the diagnosis and characterization of cancers in the lung and oesophagus.

Study I evaluated the diagnostic value of the SSTRS with ^{99m}Tc-depreotide in 99 patients with suspected lung cancer. The sensitivity to detect malignancy was 94%, and to detect lung cancer 98%. The specificity was calculated on two sets of data. When all cases are used, the specificity was 52%. If the 12 pneumonias are excluded, the specificity was 77%.
Study II was performed on 19 patients with histologically proven non-small-cell lung cancer (NSCLC), where the expression of SSTR subtype 2 was looked for and found by immunochemical methods. The quantitative evaluation of ^{99m}Tc-depreotide was performed using region-of-interest analysis and includes tumour counts/cm^3, background counts/cm^3, and the ratio between tumour and background counts. SSTR subtype 2 expression was positively correlated to the degree of the tumour's differentiation ($p < 0.05$). ^{99m}Tc-depreotide uptake in tumour cells did not correlate with tumour grade or SSTR subtype 2, MIB-1, or p53 expression.
Study III showed the feasibility of imaging oesophageal carcinoma with SSTRS with ^{99m}Tc-depreotide and optimal time intervals for imaging. None of the 13 cancer-free Barrett's oesophagus patients in this study showed an increased ^{99m}Tc-depreotide uptake.
Study IV investigated the expression of SSTRs of subtype 2A, 2B, 3, and 5 in 28 patients with suspected oesophageal cancer, where expression was detected in small amount in adenocarcinoma and was absent in squamous cell carcinoma. There was no correlation between the ^{99m}Tc-depreotide uptake and the amount of SSTRs, and no correlation between the amount of SSTRs and the differentiation grade of the tumour.

Conclusion: SSTRS with the labeled somatostatin receptor analogue ^{99m}Tc-depreotide has a very high sensitivity for detecting lung cancer. A negative scintigraphy strongly suggests a benign lesion, and the method is useful in decision making with respect to surgery.

There is an expression of SSTRS subtype 2 in NSCLC with a positive correlation between tumour differentiation and presence of SSTR subtype 2. There is no correlation between ^{99m}Tc-depreotide uptake compared to tumour differentiation, presence of SSTR subtype 2, p53, or MIB-1, and SSTRS cannot be used as a prognostic factor in patients with lung cancer.

SSTRS with ^{99m}Tc-depreotide of oesophageal cancer is feasible, but not suitable, for either screening or primary diagnosis, because of the method's modest sensitivity. However, this method has a high specificity. The majority of patients with adenocancer of the oesophagus have a low amount of SSTRs, while most of the patients with squamous cell cancer do not have any of SSTRs.

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