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Role of ^{99m}Tc-Technetyle in diagnosis of cancer. Pharmacokinetic data and clinical experience from first 300 cases.

Clinical use of ^{99m}Tc-metoxisobutilisonitryle (MIBI) is a proven technique for visual diagnosis of coronary heart disease. Recently ^{99m}Tc-MIBI also has been reported useful in cancer (c.) diagnosis. Here we tested pharmacokinetic properties and usefulness of ^{99m}Tc-Technetyle (MIBI obtained from Diamed Ltd) for scintigraphic and emission tomography (SPET) diagnosis of various cancer (c) diseases.

Technique. Overall 300 persons were referred for the study comprising lung c. (n = 46), mammary c. (n = 152), thyroid c. (n = 34), bone sarcomas (n = 27) and lymphogranulematosis (n = 18), and also 30 various ungrouped cases. Most of the mammary c. patients (n=56) also were followed-up by the method in the course of radiation and chemotherapy treatment.

We acquired dynamic frames of local uptake of ^{99m}Tc-Technetyle after bolus injection of the agent and thereafter did planary scans and, and if necessary, also SPET of ^{99m}Tc-Technetyle uptake in investigated organ or region. Extraction fraction was determined from local time-activity curve deconvolved with input curve obtained from arterialised blood samples. ^{99m}Tc-Technetyle extraction fraction was corrected for tissue background using intravascular reference tracer assumed to have extraction fraction equal to zero. In 5 patients the technique was validated using ^{99m}Tc labelled macroaggregates of albumin (MAA). Local accumulation of ^{99m}Tc-TechnetyleI was reported as pathologic if separated visually from tissue background and was > 1.39 when quantified as [nodule/background] ratio of ^{99m}Tc-MIBI uptake per voxel.

Results. In all clinical groups of various primary cancer metastases' location the sensitivity as well as specificity were over 85 %. In lung cancer the ^{99m}Tc-Technetyle uptake provided the sensitivity over 90%. In three patients nodular ^{99m}Tc-Technetyle uptake in lung was the earliest sign of cancer, was then followed-up for 3-5 months and verified during the time later using other techniques. Surgery revealed in all cancer cases tumours smaller than 2.5 cm in diameter.

In mammary cancer when the agent was used for medical treatment follow-up the results were as .

Indices	Control subjects n = 7	Patients with mammary cancer n = 56	
		pre-treatment	post-treatment
^{99m} Tc-MIBI extraction fraction in mamma	0.04, sd 0.02	0.87, sd 0.11	0.43, sd 0.07 p < 0.05
[Mamma/Myoc] ratio	0.06, sd 0.04	0.19, sd 0.05	0.10, sd 0.05 p < 0.02
[Lymph node/ Myoc] ratio	0.07, sd 0.08	0.17, sd 0.06	0.12, sd 0.04 p < 0.05

p are given in comparison with pre-treatment values

In bone sarcomas ^{99m}Tc-MIBI provided 98% sensitive discrimination of the pathology from various benign conditions (osteoid osteoma, trauma etc).

Thus quantitative ^{99m}Tc-Technetyle planar or/and SPET study strongly argue in favour of use of it as cancer-avid radiopharmaceutical.