THALLIUM SCINTIGRAPHY VERSUS CONTRAST-ENHANCED MAGNETIC RESONANCE IMAGING IN THE ASSESSMENT OF VIABLE MYOCARDIUM

J. Dolcila1, R. Uher1, M. Sibor1
1Department of Nuclear Medicine, 2Department of Internal Medicine, University Hospital Hradec Kralove, Czech Republic

Background: The aim of the study was to compare 201Tl SPECT to contrast-enhanced magnetic resonance imaging CMR in detection of viable myocardium. Gadobutrol contrast is increasingly accumulated in the areas of scar tissue.

Material and methods: Thirty-eight patients underwent revascularization (number of vessels revascularized 2–3, EF on admission was evaluated in 1360 segments before revascularization). In 9.3% of 201Tl SPECT viable segments there were no signs of viability on CMR. On the other hand 19% (60%) of 201Tl SPECT nonviable segments were viable on CMR. This finding was more frequent in inferior and interlobalar segments, where 40% of 201Tl SPECT nonviable segments were viable on CMR (p = 0.001). The viability index for 201Tl SPECT was 0.76 – 0.203 versus 1.00 – 0.25 for CMR.

Results: Concordant results were noted in the total number of 1 065 (78%) of the 1 360 examined segments.

Conclusions: Concordant results were noted in the total number of 1 065 (78%) of the 1 360 examined segments.

CEREBRAL BLOOD FLOW SPECT IMAGING IN POST-STROKE APHASIA

D. Gapciuc1, K. Jozefczak2, P. Last1, W. M. Nika2
1Department of Neurology, 2Department of Nuclear Medicine, Medical University, Gdańsk, Poland

Background: Aphasia is usually the result of cerebrovascular diseases and occurs in 19–38% of stroke patients. Aphasic syndromes can be correlated to relatively specific brain lesions (e.g. left dominant hemisphere). Comparisons of reduced cerebral perfusion between patients with different types of aphasia were performed, as well as between patients with good and with poor recovery from aphasia.

Material and methods: Multispect-3 (Siemens, Erlangen, Germany) with Tc-99m-labeled ECD (FAM, Łódź, Poland). Comparisons of reduced cerebral perfusion between patients with different types of aphasia were performed, as well as between patients with good and with poor recovery from aphasia.

Results: The psychomotor development of children with craniosynostosis can be improved by means of BMC transplantation. The presence of residual perfusion (MIBI uptake) in the non-responders consisted only of the pts with very low MIBI uptake (0–30% of maximum).

Conclusions: Our results suggest the capability of MIBI gated SPECT/FDG PET imaging for prediction of repair of infarcted myocardium by autologous mononuclear bone marrow cell transplantation.

THE ROLE OF QUANTITATIVE MIBI SPECT AND FDG PET CARDIAC IMAGING IN THE MONITORING OF THERAPY BY MONONUCLEAR BONE MARROW CELL TRANSPLANTATION

M. Kaminkeć1, J. Meńszak1, P. Przeździecki1, L. Groch1, S. Janoušek1, J. Mayer1, M. Klabusay1, J. Staniek1, Z. Rehák1, M. Myśliwiec1
1Palacký University, Ostrava, 2Masaryk Memorial Cancer Institute, Brno, Czech Republic

Background: The aim of this study was to assess the role of MIBI gated SPECT/FDG PET imaging in the prediction of repair of infarcted myocardium by autologous mononuclear bone marrow transplantation (BMC) transplantation.

Material and methods: We analyzed a total of 43 patients (pts) with acute myocardial infarction with irreversible injury after primary coronary intervention (PCI) to receive BMC. Pre PCI reserve on dobutamine echocardiography and both MIBI and FDG uptake <50% of maximum. In addition to standard therapy, 27 of them were treated by BMC, while 16 pts were randomly integrated into the control group. Using 4D MSPECT software, we quantified MIBI/FDG uptake and gated SPECT left ventricular ejection fraction, end-diastolic/end-systolic volumes (LVEF, EDV/ESV) before BMC therapy and 3 months later.

Results: In the control group, the baseline LVEF was 39.9% ± 11.6% versus 44.0% ± 10.3% (p = NS); EF at 3 months in the BMC group was the average LVEF improved from 41.0% ± 9.6% to 45.2% ± 10.5% (p < 0.05); however, the average ESV remained equal (95 ml versus 93 ml), and EDV enlarged from 156 ml to 163 ml. Among BMC pts, we identified 13 responders to therapy with significant improvement of the average LVEF from 43.3% ± 11% to 51.4% ± 10.4% and the ESV/EDV from 145 ml/84 ml to 133 ml/67 ml (p < 0.05). The remaining 14 pts were non-responders with no change in the LVEF (39.1% ± 8.1% versus 39.8% ± 7.4% (p = NS), the EDV/EDV increased from 166 ml/105 ml to 188 ml/16 ml. Among responders to therapy, the presence of dysfunctional segments with residual perfusion (MIBI uptake 31–50% of maximum) was observed dominantly. The subgroup of non-responders consisted only of the pts with very low MIBI uptake (0–30% of maximum).

Conclusions: Our results support the capability of MIBI gated SPECT/FDG PET imaging for prediction of repair of infarcted myocardium by BMC transplantation. The presence of residual MIBI uptake (31–50% of maximum) in the non-viable myocardium was the best predictor of LV function improvement after BMC therapy.

The timing of surgery treatment of craniosynostosis in children by spect cerebral perfusion imaging (lecture for technologist)

M. Netkova1, J. Dolcila1, J. Vesta1, M. Matysova1, J. Jakubeč1
1Department of Nuclear Medicine, 2Department of Neurosurgery, University Hospital Hradec Kralove, Czech Republic

Background: Craniosynostosis (the early closing of one or more of sutures) is relatively frequent during development of bone and cartilage. It is detected in early infancy age on the basis deformity skull and face. The treatment is only surgical. The timing of surgery depends on single photon emission computed tomography (SPECT) cerebral perfusion imaging or positron emission tomography that can detect cerebral hyperfusion under closing sutures. The cerebral hyperfusion requires surgery treatment that has positive effect to the next development of child.

Material and methods: Four children have been examined by SPECT cerebral perfusion imaging repeatedly for 12–18 months. SPECT was started 20 minutes after intravenous application 185-370 MBq of 99mTc-methyl cysteinate dimer (by course of patient’s body weight).

Results: The psychomotor development of children with craniosynostosis can be improved by means of BMC transplantation. The presence of residual perfusion (MIBI uptake) in the non-responders consisted only of the pts with very low MIBI uptake (0–30% of maximum).

Conclusions: Our results suggest the capability of MIBI gated SPECT/FDG PET imaging for prediction of repair of infarcted myocardium by autologous mononuclear bone marrow cell transplantation. The presence of residual MIBI uptake (31–50% of maximum) in the non-viable myocardium was the best predictor of LV function improvement after BMC therapy.
EXPERIENCES WITH 99mTc-DEPREOTIDE SCINTIGRAPHY IN PATIENTS WITH LUNG CANCER (LECTURE FOR TECHNOLOGIST)

I. Dusova, M. Koutnikova, J. Dolezal

Department of Nuclear Medicine, University Hospital, Hradec Kralove, Czech Republic

Background: The non-small cell lung cancer (NSCLC) is very frequent malignant disease. The early assessment of diagnosis and the accurate staging improves prognosis and determines the way of treatment of patient. 99mTc-depreotide is used for differential diagnostics of solitary lung nodules in combination with CT or X-ray. 99mTc-depreotide imaging can be used for the precising of staging in patients with suspicion for metastases in hilar lymphnodes too.

Material and methods: Whole body planar scintigraphy (matrix 1024 × 256, velocity 10 cm/min) in anterior and posterior views was started 2–4 hours after intravenous application of 600–900 MBq 99mTc-depreotide (by course of patient’s body weight). The chest single photon emission computer tomography (matrix 128 × 128, 3(35) s) was added to improve sensitivity, specificity and better spatial specification. The rolling, digital, double-head gamma camera, Helix (Elscint) or Varicam (Elscint) with infrared body contouring and large field of view were used. Gamma camera was fitted with low-energy, high resolution, parallel-hole collimators. As necessary a static 1 000 000 counts image (matrix 256 × 256, zoom 1–1.5) of chest in anterior and posterior views was made 6 and 22 hours after application. Images were evaluated by conventional processing system Xpert-Pro (Elscint).

Results: Metastases in hilar lymphnodes were detected newly in most of patients and therefore the way of treatment was changed. The planned radical surgery was replaced by systemic chemotherapy.

Conclusion: 99mTc-depreotide scintigraphy speeded up and put more precisely the staging in patient with NSCLC and changed the way of treatment.

VETERINARY NUCLEAR MEDICINE — SCANNING SARCOMAS IN SMALL ANIMALS

P. Lass, M. Kozieniski, J. Teodorczyk, S. Kanuka

Department of Nuclear Medicine, Medical University, Gdansk, Poland

Background: Radiouclide studies in veterinary sciences date back to sixties of XIX century, but grow dynamically in last decade. It is essentially limited to mammals: cats, dogs, horses, in rare cases cows, camels and birds. An important issue of those studies is veterinary oncology. The results of veterinary studies might have some implications in human oncology and human diagnostic imaging due to the similarities of pathological background.

Aims: To study a series of animals with osteo-, chondro- and fibrosarcomas for assessing the extent of the tumour, detecting distant metastases, evaluating the accumulation of radiotracer in primary tumour.

Material and methods: We studied 8 animals with primary sarcomas — 7 dogs and 1 cat. Those were 4 cases of osteosarcoma, 2 chondrosarcoma, 2 fibrosarcoma proven by pathological background. Average age of the animals was 7.8 ± 3.1 years, average time of the disease 4.1 ± 2.2 months. In 6 animals the primary focus was localised in the bones; in 2 cases it was soft tissue sarcoma. Bone scintigraphy has been performed 2 hours post-injection of 99mTc-MDP of average activity 370 MBq and gammacamera Multispect-3 (Siemens, Erlangen, Germany).

Results: All sentinel nodes visible in pre-operative scanning were also detected by intra-operative gamma probe. After deep injection sentinel nodes were showed in 27 patients (90%) on both sides, in 3 pts. on one side; only 40% of sentinel nodes were detected using blue dye technique. Following sub-epithelial injection of radiosotope sentinel nodes were found in all 30 patients (100%), after blue dye injection in 28 patients (90%).

Conclusions: Radiosotope sentinel node detection seems to be slightly superior as compared to blue dye technique. Sub-epithelial administration provides better sensitivity of sentinel node detection, probably due to differences in lymphatic vessels architecture.

LYMPHOSCINTIGRAPHY IN CERVICAL CANCER PATIENTS

D. Wydra, S. Sawicki, J. Emrich, T. Bandurski, P. Lass

1Department of Gynaecology
2Department of Nuclear Medicine, Medical University, Gdansk, Poland

Background: regional lymph nodes surgical management is an integral part of cervical cancer therapy. In gynaecological oncology, recent studies have confirmed the utility of the sentinel node concept in vulvar and cervical cancer. The method of marker’s administration is considered to play an important role in sentinel node detection. The aim of the study was to assess the sensitivity of sentinel node detection by the use of pre- and intra-operative radiodetection versus blue dye method in patients with cervical cancer, as well as the influence of sub-epithelial versus deep way of tracer administration.

Material and methods: We studied 60 patients with cervical cancer (stage IB-IIA) using a blue dye injection technique and radionuclide studies with a pre-operative scintigraphy utilising a nanocolloid tracer/ blue dye gammacamera and intra-operative gamma-probe technique during radical abdominal hysterectomy. In 30 randomly chosen patients the tracer was administered using deep (0.5–1.0 cm) injection technique, in 30 by sub-epithelial injection.

Results: all sentinel nodes visible in pre-operative scanning were also detected by intra-operative gamma probe. After deep injection sentinel nodes were showed in 27 patients (90%) on both sides, in 3 pts. on one side; only 40% of sentinel nodes were detected using blue dye technique. Following sub-epithelial injection of radiosotope sentinel nodes were found in all 30 patients (100%), after blue dye injection in 28 patients (90%).

Conclusions: radionuclide sentinel node detection seems to be slightly superior as compared to blue dye technique. Sub-epithelial administration provides better sensitivity of sentinel node detection, probably due to differences in lymphatic vessels architecture.
Background: Bone is a common site of metastatic disease and it is the most common site of involvement in patients with bone cancer and prostate cancer. The bone pain appears in majority of patients with bone metastases. The bone pain considerable impairs the patient’s life, its mobility and also a negative effect on his psychoemotional state, and in some cases, it is impossible to reduce or to remove this pain is the administration of radiotherapy to the place of metastases. The present medicine proposes two ways how to administer radiotherapy in the place of metastases: the external irradiation or intravenous administration of radiotherapeutic diopharmaceuticals as is ¹⁵³Samarium-EDTMP. This radiotherapeutic produces beta radiation and is concentrated in areas of enhanced osteoclastic activity.

Material and methods: We introduced intravenous administration of ¹⁵³Samarium-EDTMP in 61 patients (32 prostate cancer, 29 breast cancer, aged 41–63, mean 66 years) for painful bone metastases in years 2000–2004. Mean applied activity was 40 MBq/kg. Before ¹⁵³Samarium-EDTMP therapy bone scintigraphy with ⁹⁹mTc-MDP was performed. Range and character of metastases was assessed. Before and one or three months after ¹⁵³Samarium-EDTMP therapy Karolinsky mobility index, pain score (Numeric Rating Scale 0–10), analgesic score (WHO scale) full blood count, ALP, bone ALP and tumor serum markers (PSA, ACP, CA 15–3) were monitored. Bone marrow toxicity was evaluated 1 month and 3 months after ¹⁵³Samarium-EDTMP therapy by course of NCI CTC.

Results: A significant pain relief was observed in 43% and 36% of patients, mild relief in 32% and 36% and no effect in 25% and 28% of patients one and three months after administration. The pain palliation was joint with an improvement of the mobility and with the decrease of the necessity dose of analgetics. The side effect of ¹⁵³Samarium-EDTMP treatment was mild and transient bone marrow suppression. No patient had grade 4 and only two patients had grade 3 haematological toxicity one month after treatment. Majority of patients had haematological toxicity grade 1 or 2. Infections or bleeding complications were not observed during three months after ¹⁵³Samarium-EDTMP therapy.

Conclusion: After single administration of ¹⁵³Samarium-EDTMP we observed analogous efficacy of various degree in 72% of patients for three months. The bone marrow suppression after ¹⁵³Samarium-EDTMP was mild and transient.

QUALITATIVE SALIVARY GLAND SCINTIGRAPHY CHANGES MAY PRECEDE SYMPTOMATIC FINDINGS IN SJÖGREN’S SYNDROME
A. Czackiewska-Lass1, G. Romanowicz2, B. Kochanowska1
1Conservative Dentistry Medical University, Gdańsk, Poland
2Nuclear Medicine Department Medical University, Gdańsk, Poland

Background: The aim of the study was to assess the degree of saliva secretion impairment in patients with Sjögren’s Syndrome by salivary scintigraphy as compared with sialometry i.e. collecting and measuring the saliva amount.

Material and methods: 37 patients aged 23 do 68 years (mean 47.6 years) with Sjögren’s Syndrome and 40 age-matched controls were enrolled in the study. Salivary scintigraphy was performed utilizing a single-head gammacamera Diacam (Siemens, Erlangen, Germany) following the application of 99m-technetium as pertechnetate (185 MBq). Stimulation of saliva was performed utilizing a single-head gammacamera Diacam (Siemens, Erlangen, Germany) following the application of 99m-technetium as pertechnetate (185 MBq). Stimulation of saliva scintigraphy was performed utilizing a single-head gammacamera Diacam (Siemens, Erlangen, Germany) following the application of 99m-technetium as pertechnetate (185 MBq). Stimulation of saliva secretion has been achieved by applying the lemon juice on the tongue 30 min after starting the scanning. Scintigraphic curves were qualitatively classified as normal, flattened, flat or descending. Sialometry has been performed in all patients by collecting the saliva into a calibrated syringe and measured for 10 min. The following thresholds for sialometry of unstimulated saliva secretion were applied: 1. Normal — ≥ 0.3 ml of saliva secretion/min; 2. Oligosiala — < 0.3 ml/min; 3. Xerostomia — very low saliva secretion — < 0.1 ml/min, and for stimulated secretion reduction of uptake in vascular phase (1 min); b maximal uptake in secretory (parenchymal) phase.

Results: Unstimulated saliva secretion: in 13 patients (35.1%) very low secretion of saliva was determined. In 9 of these patients flat or descending scintigraphic curves were seen; in 13 of patients with 35.1% with oligosiala most frequent was flattened (10 persons). In 11 patients with normal saliva secretion (29.1%) most often was the flattened type of the curve (6 patients), but no normal curves were seen. Assessing the stimulated saliva secretion in 17 patients (49.1%) with very low stimulated saliva 6 had flat or descending curves. In 19 patients (51.3%) with oligosiala most had flattened or flat scintigraphic curves. In 11 patients (29.1%) with normal secretion of stimulated saliva only in 1 patient the curve was normal, in 5 patients flattened, in 5 flat or descending.

Conclusions: In most patients the type of scintigraphic curves was in agreement with sialometry; however, in patients with normal sialometry most of scintigraphic findings were abnormal and probably indicated more advanced pathology of salivary glands than this assessed by sialometry. It seems that scintigraphic results may precede sialometry as a dental assessment and therefore be an early indicator of salivary pathology in Sjögren’s Syndrome; it’s a sensitive albeit unsatisfactorily specific tool.

Particular types of scintigraphic curves versus sialometric data: unstimulated saliva

<table>
<thead>
<tr>
<th>Sialometry</th>
<th>No. of patients</th>
<th>Duration of disease (years)</th>
<th>No of patients with particular scintigraphic curves</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.1 (xerostomia)</td>
<td>13</td>
<td>6.8 ± 4.9</td>
<td>2 2 2</td>
</tr>
<tr>
<td>0.1-0.3 ( oligosiala)</td>
<td>13</td>
<td>6.8 ± 7.2</td>
<td>0 1 1 2</td>
</tr>
<tr>
<td>≥ 0.3 (normal)</td>
<td>11</td>
<td>8.4 ± 7.8</td>
<td>0 6 3 2</td>
</tr>
</tbody>
</table>

LYMPHOEDEMA: LYMPHOSCINTIGRAPHY VERSUS OTHER DIAGNOSTIC TECHNIQUES — A CLINICIAN’S POINT OF VIEW
Hanna Tomczak1, Wiesława Nylia2, Piotr Liss2
1Department of Rehabilitation Medicine, Medical University, Gdańsk, Poland
2Department of Nuclear Medicine, Medical University, Gdańsk, Poland

The presentation overviews the problem of clinical basis, diagnosis and available therapy modalities for lymphoedema. Regarding diagnostics the measurement of circumference, volume and thickness of the limb are presented, as well as diagnostic imaging modalities. These include direct and indirect lymphography, MRI, CT, ultrasound imaging and lymphoscintigraphy, which are currently considered to be a leading technique in the primary diagnosis of lymphoedema and its follow-up. The paper discusses treatment of lymphoedema and the role of lymphoscintigraphy in the follow-up in patients with lymphoedema.