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THE ROLE OF FDG PET/CT IN RADIOTHERAPY PLANNING

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Background: Modern oncologic care utilize FDG-PET/CT imaging not only in cancer detection, diagnosis and staging, but also during radiation therapy planning. Furthermore FDG-PT/CT may also play a role in monitoring response to therapy. Aims of the current study were to compare radiotherapy targeted tumor volume based on conventional topoCT and FDG-PET/CT imaging and to determine weather additional metabolic information leads to a modification of previously devised therapeutic regimens.

Material and methods: 85 oncologic patients with primary head-neck, esophagus and lung cancer were enrolled in the current study. Age 35–75. Within 3 weeks difference CT and FDG-PET/CT image acquisition was completed in regards to the planned irradiation position. During radiotherapy planning delineation of target volume and organs at risk were carried out both on conventional CT based topometric slices and FDG-PET/CT images. Radiotherapy target volume was calculated (V-cm^3) by using both modalities.

Results: In regards to the total population radiotherapy target volume assessed by FDG-PET/CT differed in 92% from target volumes calculated by topoCT. According to metabolic information the planned irradiation field was greater in 14 cases (16%) (of which in 5 cases involved other regions as well) and smaller in 65 cases (76%). Previously devised oncologic therapeutic regimen was altered in 18% of the patients based on the FDG PET/CT examination results.

Conclusion: FDG-PET/CT imaging may allow for better radiation therapy target volume planning and viable tumor mass definition, while sparing organ at risk radiation exposure. Radiotherapy planning based on the combination of structural and metabolic information with implementation of modern radiotherapy techniques (IMRT, SIB) may improve the efficacy of cancer therapy.

ROLE OF 11C-ACETATE PET/CT IN THE MANAGEMENT OF TREATED GLIOMA PATIENTS FIVE-YEAR FOLLOW-UP

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Background: 11C-acetate PET/CT (ACE) is mainly used to investigate early prostatic and liver cancer. Only limited data are available concerning the application of ACE to study brain tumours. The aim of our work was an investigation of the prognostic role of ACE in treated glioma cases.

Material and methods: Nine patients with brain gliomas (7 men, 2 women; mean age: 37.2 years, age range: 34.9–67.1 years) underwent ACE examination between March and July 2007. All these patients had previously been operated on (time range between surgery and ACE: 0.47–7.47 years, mean: 3.62 years), and had received 125I-brachytherapy. The histological diagnosis was grade II astrocytoma in 4, grade III astrocytoma in 3, grade II oligodendroglioma in 1 and astrocytoma of the corpus pineale in 1 patient. The 11C-labelled acetate was injected intravenously in a dose of 5.55–9.25 MBq per body weight kg. Acquisition started between 6 and 15 min after injection, in a Biograph HD 6 PET/CT scanner, and lasted for 10 min. The attenuation correction was carried out during iterative reconstruction, using the low-dose, non-enhanced CT part of the scan. The ACE findings were analysed visually. A 5-year clinical follow-up was possible in all patients. The prognostic roles of the ACE and the MRI results were analysed retrospectively.

Results: The ACE examinations were negative in 2 patients, in one of whom the MRI examination was negative, while in the other patient doubtful. Both these patients are tumour-free after 5 years. Seven patients gave positive ACE results. MRI clearly showed recurrent disease in 3 of them (all these patients have since died), was negative in 2 (1 has died, and the other is living with a viable tumour) and doubtful in 2 patients (both living with an active disease).

Conclusions: A positive ACE result has a bad prognosis, whereas negative ACE result is a good prognostic sign for 5-year tumour-free survival. The prognostic role of ACE in predicting the outcome of treated gliomas is better than that of MRI.

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PHYSIOLOGICAL AND BENIGNANT UPTAKE IN THE HEAD AND NECK REGION (OUR EXPERIENCE)

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Head and neck region is one of the areas that are difficult to evaluate on PET/CT images. Besides having knowledge of the regional anatomy, the reporting physician has to be familiar with the physiological tracer distribution of the area. There are many factors causing difficulties of evaluation in everyday practice, e.g. inhomogenous uptake of particular anatomical structures or benignant lesions. The aim of this study is to introduce these difficulties through our cases and to point out the characteristics which can help to exclude malignancy.

At our institute F18-FDG PET/CT images are evaluated by experienced radiologists and nuclear medicine specialists. We chose the cases retrospectively from the examinations made at our institute to illustrate the difficulties which are not just described in literature but also eventually occure in everyday practice.

F18-FDG uptakes of benignant or physiological origin in the head and neck area can be identified by experienced physicians with extensive knowledge of the normal anatomy and lesions frequently appearing in this area.

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IMPACT OF FDG PET/CT IN THERAPY OF PAEDIATRIC LYMPHOMA: IN SEARCH FOR A POSSIBLE CLINICAL VALUE OF "NON-SPECIFIC" UPTAKE

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Our study is based on the observation that "non-specific" uptake of FDG is frequently observed in paediatric patients referred for PET/CT due to lymphoma, either on the initial FDG PET/CT or on the interim one. The criterion to predict the response to chemotherapy is based on the decrease of FDG uptake in the lymphomatous lesions, but at the same time the actual incidence and the clinical significance of the "non-specific" uptake have been overlooked. It could be a loss of