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Features of 18-FDG PET/CT application for recurrence detection, radiation therapy planning and its effectiveness monitoring in patients with tumors of the anorectal localization

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Background. Experience of 18f-FDG PET/CT clinical application confirms the usefulness of this imaging in oncology, namely: for the differential diagnosis, staging before surgery or radiation therapy, restaging after treatment. Also 18-FDG PET/CT showed high sensitivity for the efficacy monitoring of chemotherapy and radiotherapy. The numerous studies on the use of 18-of FDG PET/CT images for further dynamic control and radiotherapy planning proved higher results' accuracy of systemic and loco-regional staging compared with conventional CT and MRI techniques. It was found that the macroscopic tumor volume determined by PET/CT is statistically significantly larger in the CT MPO with mean difference of 25%.

Materials and methods. Between 11/2011 and 01/2016 the 18 FDG PET/CT was performed in 277 patients with colorectal cancer. Of them men were 154, women - 123; patients age was from 24 to 82 years. In overall 388 examinations were performed in 277 patients, including 94 without contrast and 294 with contrast. Average activity per injection was 373.98 MBq; in men - 402.75 MBq, in women - 332.62 MBq. We used Cyclotron Siemens Eclipse RDS for obtaining radiopharmaceuticals 18-FDG; and PET/CT Scanner Siemens Biograph 64.

Results. Functional 18-FDG PET/CT images were used during planning of radiotherapy for rectum and anal canal carcinomas (Fig. 1). It is found that the PET/CT by sensitivity and specificity is more informative compared with conventional structural imaging techniques. Mean sensitivity and specificity of 18-FDG PET/CT for the main focus were 83% and 91%, respectively, while the corresponding indices for the basic CT method were respectively 64% and 74%. The sensitivity of lymph node involvement evaluation using CT method was 65% and PET/CT - 53%. It should also be taken into account the risks of false-negative results of PET/CT for lesions in the lungs less than 1.0 cm, small lesions in the upper sections of liver, located predominantly subcapsularly, and in histological tumor type - mucinous adenocarcinoma. It was found that applying PET/CT for staging caused changes of the treatment tactics in 55.4% of patients, of them in 15 - due to higher disease stage, and in 5 - scheduled surgery was not performed.

Fig. 1. Planning of radiotherapy for rectum and anal canal carcinomas.

Conclusions.

1. It was found that the 18 FDG PET/CT method possesses significant advantages concerning the disease recurrence detection and restaging in the cases when CT and MRI data are inconclusive.
2. It was proved that by sensitivity and specificity the PET/CT method is more informative for planning radiotherapy compared with conventional structural imaging techniques.

Country

Ukraine

Institution

National institute of cancer

Primary author: SOLODYANNIKOVA, Oksana (National institute of cancer)

Presenter: SOLODYANNIKOVA, Oksana (National institute of cancer)

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