Streszczenie w języku angielskim (wraz z angielską wersją tytułu rozprawy)

Predictive values of [^{68}Ga]Ga-PSMA-11 PET/CT in patients with suspected brain tumours of glial origin.

Brain tumours of glial origin are a significant clinical problem. They account for approximately one-third of brain tumours; unfortunately, up to 80% of these are malignant. The diagnosis of a high-grade tumour of glial origin is associated with a negative prognosis. Surgery, followed by radio- and/or chemotherapy, remains the main method of treatment. Accurate pre-operative diagnosis is necessary to plan optimal therapy. The standard diagnostic test is magnetic resonance imaging (MRI), which, despite its high resolution, is difficult to interpret, and its results may not be consistent with the final histopathological diagnosis. Consequently, it is necessary to search for new diagnostic methods.

Positron emission tomography (PET) is a study that involves the use of tracers labelled with special isotopes to visualize metabolic processes, often in combination with computed tomography (CT). Within the diagnosis of brain tumours, tracers are used to show glucose metabolism, amino acid usage or the process of angiogenesis. Each of the markers previously used has its advantages as well as disadvantages. The easily accessible fluorine-18 labelled glucose has a high affinity for healthy brain tissue. Amino acid markers selectively accumulate in the tumour; however, their cost is very high. An alternative tracer may be prostate cancer-specific antigen (PSMA), which accumulates not only on prostate cancer cells, but also in a number of other tumours such as brain tumours, renal cell carcinoma, breast cancer or hepatocellular carcinoma through a mechanism of angiogenesis. Considering the possibility of labelling with different isotopes, this tracer is available and quite cheap, and previous studies show a lack of accumulation in normal brain tissue.

For tumours of glial origin, the diagnostic feasibility of assessing disease recurrence and/or progression by PET/CT with [^{68}Ga]Ga-PSMA-11 is well described in the available literature. For the diagnosis of primary lesions, the amount of scientific evidence is limited, and the findings are inconsistent. Prospective clinical studies evaluating the diagnostic and prognostic potential of PET/CT with [^{68}Ga]Ga-PSMA-11 in patients with suspected brain tumours of glial origin are lacking.

A prospective clinical study comparing qualitative and semi-quantitative PET/CT findings with [^{68}Ga]Ga-PSMA-11 in patients with suspected brain tumours of glial origin, compared to histopathological examination, was performed. A final diagnosis of adult-type diffuse glioma was given to 44 of the operated patients. Of these, 20 had increased tracer accumulation on [^{68}Ga]Ga-PSMA-11 PET/CT, while the remaining 24 had morphological lesions without tracer accumulation. In the qualitative evaluation of the study - there was a remarkably high specificity for the diagnosis of high-grade gliomas and a high sensitivity for the diagnosis of glioblastoma multiforme. In the evaluation of semi-quantitative parameters, the tumour-to-background accumulation ratio with a cut-off value of 42.2 was selected as the best parameter with the highest sensitivity for the diagnosis of glioblastoma multiforme. The [^{68}Ga]Ga-PSMA-11 PET/CT result correlated with patient overall survival and progression-free time at 2 years after surgery. Patients with positive PET/CT with [^{68}Ga]Ga-PSMA-11 had a significantly worse prognosis than those without tracer accumulation. This correlation is found in patients with glioblastoma multiforme as well.

The study presented confirms the feasibility of using PET/CT with [^{68}Ga]Ga-PSMA-11 in patients with suspected brain tumours of glial origin. To date, it is the largest prospective clinical study performed for this purpose to date. It may provide a background for further analysis - the usage of [^{68}Ga]Ga-PSMA-11 PET/CT in planning surgical treatment or radiotherapy.