

¹¹C-methionine and ¹⁸F- fluorodeoxyglucose Positron Emission Tomography in Noninvasive Differential Diagnosis of Anaplastic Astrocytoma and Glioblastoma

N. B. Vikhrova¹, A.A. Postnov^{1,2,3}, D. B. Kalaeva², E. V. Khokhlova¹,
A. B. Balakhonov¹, E. V. Pyzhik¹, P. A. Kostin¹, E. I. Shultz¹, A. I. Batalov¹,
T. A. Konakova¹, A. N. Tuyrina¹, I. N. Pronin¹

¹ N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia

² National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)

³ P. N. Lebedev Physical Institute

Abstract

Purpose of the study is investigation of the possibilities of Positron Emission Tomography – Computed Tomography (PET-CT) with different radiopharmaceuticals in non-invasive differential diagnosis of primary high grade gliomas. 18 patients, 11 with glioblastoma (GB) and 7 with anaplastic astrocytoma (AA), were examined before surgery with magnetic resonance imaging (MRI) and PET-CT with ¹¹C-methionine (MET) and ¹⁸F-fluorodeoxyglucose (FDG). The analysis was carried out according to the standardized uptake value (SUV) in the tumor and healthy brain tissue, and tumor to normal (T/N) ratio. AA and GB groups are significantly different in T/N ratio for ¹¹C-MET ($1,62 \pm 0,71$ in AA versus $3,97 \pm 1,04$ in GB, $p < 0,001$), and for ¹⁸F-FDG ($0,64 \pm 0,11$ in AA versus $1,25 \pm 0,66$ in GB, $p = 0,02$). Levels of accumulation of ¹¹C-MET and ¹⁸F-FDG in intact brain tissue correlate with each other (value of $R^2 = 0,61$). The areas of high accumulation of two radiopharmaceuticals in the tumor stroma do not coincide. Our study demonstrated that the accumulation of ¹⁸F-FDG and ¹¹C-methionine in HGG significantly depends on tumor grade. To improve practical value of this study patients with anaplastic oligodendrogliomas (Gr III), which are metabolically similar to GB, must be added to the comparison group.

Key words: ¹¹C-methionine, ¹⁸F-fluorodeoxyglucose, Positron Emission Tomography, High Grade Gliomas, Anaplastic Astrocytoma, Glioblastoma.

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Сведения об авторах

Vikhrova Nina Borisovna, Ph. D. Med., Radiologist, Department of X-ray and Radioisotope Diagnostic Methods, N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia.
Address: 16, ul. 4th Tverskaya-Yamskaya, Moscow, 125047, Russia.
Phone number: +7 (926) 267-54-40. E-mail: nvikhrova@nsi.ru
ORCID ID 0000-0002-8091-8828

Postnov Andrej Aleksandrovich, Ph. D. Med., Researcher, Department of X-ray and Radioisotope Diagnostic Methods, N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia.
Address: 16, ul. 4th Tverskaya-Yamskaya, Moscow, 125047, Russia.
Phone number: +7 (926) 857-37-39. E-mail: APostnov@nsi.ru
ORCID ID 0000-0002-8091-882

Kalaeva Diana Borisovna, Student at National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)
Address: 31, Kashirskoe Sh., Moscow, 115409, Russia
Phone number: +7 (916) 850-72-18. E-mail: dina.kalaeva@gmail.com
ORCID ID 0000-0001-8719-2225

Khokhlova Ekaterina Vladimirovna, Radiologist, Department of X-ray and Radioisotope Diagnostic Methods, N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia.
Address: 16, ul. 4th Tverskaya-Yamskaya, Moscow, 125047, Russia.
Phone number: +7 (910) 445-78-44. E-mail: ekhokhlova@nsi.ru
ORCID ID 0000-0002-2667-9301

Balakhonov Anton Borisovich, Lead Engineer Department of X-ray and Radioisotope Diagnostic Methods, N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia.
Address: 16, ul. 4th Tverskaya-Yamskaya, Moscow, 125047, Russia.
Phone number: +7 (915) 456-92-93. E-mail: ABalakhonov@nsi.ru
ORCID ID 0000-0002-3666-0911

Пыжик Елена Васильевна, инженер-химик отделения рентгеновских и радиоизотопных методов диагностики, ФГАУ «НМИЦ нейрохирургии им. ак. Н. Н. Бурденко» Минздрава России.

Адрес: 125047, г. Москва, ул. 4-я Тверская-Ямская, д. 16.
Тел.: +7 (903) 146-08-90. Электронная почта: evpyzhik@yandex.ru
ORCID ID: 0000-0001-9951-9213

Pyzhik Elena Vasilievna, Chemical Engineer, Department of X-ray and Radioisotope Diagnostic Methods, N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia.
Address: 16, ul. 4th Tverskaya-Yamskaya, Moscow, 125047, Russia.
Phone number: +7 (903) 146-08-90. E-mail: evpyzhik@yandex.ru
ORCID ID: 0000-0001-9951-9213

Kostin Pavel Aleksandrovich, Physical Engineer, Department of X-ray and Radioisotope Diagnostic Methods, N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia.
Address: 16, ul. 4th Tverskaya-Yamskaya, Moscow, 125047, Russia.
Phone number: +7 (915) 134-75-42. E-mail: PKostin@nsi.ru
ORCID ID 0000-0002-0252-1796

Shults Evgenij Igorevich, Ph. D. Med., Radiologist, Department of X-ray and Radioisotope Diagnostic Methods, N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia.
Address: 16, ul. 4th Tverskaya-Yamskaya, Moscow, 125047, Russia.
Phone number: +7 (916) 607-36-95. E-mail: eshults@nsi.ru
ORCID: 0000-0001-5406-944X

Batalov Artem Igorevich, Ph. D. Med., Department of X-ray and Radioisotope Diagnostic Methods, N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia.
Address: 16, ul. 4th Tverskaya-Yamskaya, Moscow, 125047, Russia.
Phone number: +7 (916) 066-20-50. E-mail: abatalov@nsi.ru
ORCID: 0000-0002-8924-7346

Konakova Tatyana Alexandrovna, Postgraduate of Department of X-ray and Radioisotope Diagnostic Methods, N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia.
Address: 16, ul. 4th Tverskaya-Yamskaya, Moscow, 125047, Russia.
Phone number: +7 (906) 741-14-49. E-mail: tknsipet@gmail.com
ORCID ID 0000-0002-2505-7981

Tuyrina Anastasija Nikolaevna, Junior Scientist, Department of X-ray and Radioisotope Diagnostic Methods, N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia.
Address: 16, ul. 4th Tverskaya-Yamskaya, Moscow, 125047, Russia.
Phone number: +7 (916) 634-25-22. E-mail: aturina@nsi.ru
ORCID ID 0000-0002-2333-7867

Pronin Igor' Nikolaevich, M. D. Med., Professor, Academician of the Russian Academy of Sciences, Head of Department of X-ray and Radioisotope Diagnostic Methods, N. N. Burdenko National Medical Research Center of Neurosurgery, Ministry of Healthcare of Russia.
Address: 16, ul. 4th Tverskaya-Yamskaya, Moscow, 125047, Russia.
E-mail: pronin@nsi.ru
ORSID ID 0000-0002-4480-0275 Scopus 7006011755

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