

Search for PET probes for imaging the globus pallidus studied with rat brain *ex vivo* autoradiography

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We have evaluated the feasibility of using four positron emission tomography (PET) tracers for imaging the globus pallidus by *ex vivo* autoradiography in rats. The tracers investigated were [¹¹C]KF18446, [¹¹C]SCH 23390 and [¹¹C]raclopride for mapping adenosine A_{2A}, dopamine D₁ and dopamine D₂ receptors, respectively, and [¹⁸F]FDG. The highest uptake by the globus pallidus was found for [¹¹C]SCH 23390, followed by [¹⁸F]FDG, [¹¹C]KF18446 and [¹¹C]raclopride. The receptor-specific uptake by the globus pallidus was observed in [¹¹C]KF18446 and [¹¹C]SCH 23390, but not in [¹¹C]raclopride. Uptake ratios of globus pallidus to the striatum for [¹⁸F]FDG and [¹¹C]KF18446 were approximately 0.6, which was twice as large as that for [¹¹C]SCH 23390. In a rat model of degeneration of striatopallidal γ -aminobutyric acid-ergic-enkephalin neurons induced by intrastriatal injection of quinolinic acid, the uptake of [¹¹C]KF18446 by the striatum and globus pallidus was remarkably reduced. To prove the visualization of the globus pallidus by PET with [¹⁸F]FDG and [¹¹C]KF18446, PET-MRI registration technique and advances in PET technologies providing high-resolution PET scanner will be required. The metabolic activity of the globus pallidus could then be measured by PET with [¹⁸F]FDG, and [¹¹C]KF18446 may be a candidate tracer for imaging the pallidal terminals projecting from the striatum.

Key words: [¹¹C]KF18446, FDG, globus pallidus, adenosine A_{2A} receptor, PET, ARG