

## Binding kinetics of $^{11}\text{C}$ -*N*-methyl piperidyl benzilate ( $^{11}\text{C}$ -NMPB) in a rhesus monkey brain using the cerebellum as a reference region

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The binding kinetics of  $^{11}\text{C}$ -*N*-methyl piperidyl benzilate ( $^{11}\text{C}$ -NMPB) in rhesus monkey brain were studied using animal positron emission tomography (PET) (SHR2000). This study is intended to assess the validity of the method using the cerebellum as a reference region, and to evaluate the effects of anesthesia on  $^{11}\text{C}$ -NMPB binding. Two monkeys, anesthetized with ketamine, received intravenous  $^{11}\text{C}$ -NMPB alone (370–760 MBq,  $<1\ \mu\text{g}/\text{kg}$ ) or mixed with varying doses of nonradioactive NMPB (3  $\mu\text{g}/\text{kg}$ , 10  $\mu\text{g}/\text{kg}$ , 30  $\mu\text{g}/\text{kg}$ ) and were subjected to PET scans for 60 minutes. Regions of interest (ROI) were drawn on reconstructed PET images and a time-activity curve was obtained for each region.  $^{11}\text{C}$ -NMPB accumulated densely in the striatum and cerebral cortex with time. In contrast, the tracer accumulation significantly decreased with increased doses of nonradioactive NMPB. In the cerebellum, on the other hand, the accumulation of  $^{11}\text{C}$ -NMPB remained low and the tracer was slowly eliminated from the brain following the injection.  $^{11}\text{C}$ -NMPB binding in the cerebellum was barely affected by the increased dose of nonradioactive NMPB. We thus concluded that the specific  $^{11}\text{C}$ -NMPB binding was negligible in the cerebellum, and performed simplified evaluation of  $^{11}\text{C}$ -NMPB binding in each brain region by a graphical method using the cerebellum as a reference region. PET was conducted 26 times, in total both in ketamine-anesthetized and awake monkeys ( $n = 3$  each). Measurements of  $^{11}\text{C}$ -NMPB binding showed good run-to-run reproducibility within individual animals. When  $^{11}\text{C}$ -NMPB binding was compared between ketamine-treated and awake animals, a significant increase in  $^{11}\text{C}$ -NMPB binding was observed in the striatum but not in other brain regions of ketamine-treated animals.

**Key words:**  $^{11}\text{C}$ -NMPB, rhesus monkey, cerebellum, reference region, conscious