

**Brain uptake and metabolism of [1-<sup>11</sup>C]octanoate in rats:  
Pharmacokinetic basis for its application as a radiopharmaceutical  
for studying brain fatty acid metabolism**

Yuji KUGE, Kazuyoshi YAJIMA, Hidefumi KAWASHIMA, Hiroyoshi YAMAZAKI,\*  
Naoto HASHIMOTO and Yoshihiro MIYAKE

*Institute for Biofunctional Research Co., Ltd.*

The uptake of octanoate in rat brain and its metabolism were investigated by means of intravenously injecting [1-<sup>11</sup>C] or [1-<sup>14</sup>C]octanoate as a tracer. The radioactivity in the cerebrum was increased by an injection of [1-<sup>11</sup>C]octanoate, and reached its peak level (0.33% ID/g) in about 2 to 5 min, and then decreased slowly. The cerebrum-to-blood ratio of the radioactivity increased with time over a period of 30 min. At 30 sec, [1-<sup>11</sup>C]octanoate that remained unchanged in the cerebrum accounted for only 8% of the total radioactivity, in spite of there being about 90% in the blood. By means of an injection of [1-<sup>14</sup>C]octanoate, more than 70% of the total radioactivity in the cerebrum was found to be attributable to radiolabeled glutamate and glutamine at each time point measured between 30 sec and 30 min. The results show that [1-<sup>11</sup>C]octanoate enters rat brain easily and is trapped in the cerebrum, probably in the form of glutamate and glutamine, and the usefulness of [1-<sup>11</sup>C]octanoate as a radiopharmaceutical for studying brain fatty acid metabolism by positron emission tomography is therefore suggested.

**Key words:** [1-<sup>11</sup>C]octanoate, radiopharmaceutical, brain, metabolism, rat