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Synthesis and preliminary evaluation of [1-^{11}C]hexanoate as a PET tracer of fatty acid metabolism

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The potential of [1-^{11}C]hexanoate (^{11}C-HA) as a radiopharmaceutical assessing fatty acid metabolism of the myocardium and brain tissues by PET studies was evaluated. ^{11}C-HA was synthesized by the Grignard reaction of pentylmagnesium bromide and $^{11}CO_2$. ^{11}C-HA, [1-^{14}C]acetate and [^{3}H]deoxyglucose were simultaneously injected i.v. into mice, and the tissue distribution of the three radionuclides was measured. In the heart, high uptake and rapid clearance of ^{11}C and ^{14}C was found. The brain uptake of ^{11}C was twice as high as that of ^{14}C, and both ^{11}C and ^{14}C decreased slowly compared to the heart. The level of ^{3}H increased with time in both the heart and brain. In fasting conditions, the uptake of ^{11}C by the heart was enhanced and the level of ^{3}H decreased with time. The brain uptake of ^{11}C and ^{3}H was also enhanced. The fasting conditions did not affect the distribution of ^{14}C. The radiation absorbed dose of ^{11}C-HA was also estimated.

Key words: [1-^{11}C]hexanoate, heart, brain, oxidation, PET