

Development of bioradiography method for metabolic and functional imaging using positron emission tracers in living brain slices

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Abstract

The uptake of choline for the synthesis and release of acetylcholine under the anoxic condition was investigated in brain slices by bioradiography method using [¹¹C]choline and [¹⁸F]fluorodeoxyglucose (FDG). [¹¹C]Choline uptake decreased with anoxic treatment, on the contrary, FDG uptake increased with the same treatment. The decrease of [¹¹C]choline uptake and the ¹¹C radioactivity accumulated as acetylcholine in hippocampal slice were recovered by the acetyl-L-carnitine, as an acetyl-donor. However, this effect was not seen in cerebral cortex. These results indicate that choline uptake for the synthesis and release of acetylcholine in brain is energy sensitive. The decrease of acetylcholine metabolism in ischemic brain might be improved by the compensating treatment for energy loss.