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Renal accumulation and excretion of radioiodinated 3-iodo-α-methyl-L-tyrosine

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Objective: We investigated mechanisms of renal accumulation of radioiodinated 3-iodo-α-methyl-L-tyrosine (IMT), which has been used clinically for tumor imaging and as an amino acid transport marker in studies of brain and pancreas function. ***Methods:*** In this study, we used ^{125}I- or ^{123}I-labeled IMT ([^{125}I]IMT or [^{123}I]IMT) as the transport marker. Partition coefficients of [^{125}I]IMT were determined for hypothetic urine at pH ranging from 5 to 8. The examination of uptake and inhibition of [^{125}I]IMT was performed using normal human renal proximal tubule epithelial cells (RPTEC), which are characteristic of the proximal convoluted tubule. The plasma protein binding ratio of [^{125}I]IMT was determined using rats. In the *in vivo* experiments using mice, we examined biodistribution and excretion inhibition, and performed whole body autoradiography. Also, renal SPECT using [^{123}I]IMT was performed using a normal canine. ***Results:*** Very low lipophilicity of [^{125}I]IMT in hypothetic urine suggests that a carrier-mediated pathway contributes to its marked kidney accumulation. [^{125}I]IMT uptake into RPTEC was significantly inhibited by 2-aminobicyclo[2,2,1]heptane-2-carboxylic acid (BCH) in a sodium-dependent manner, suggesting reabsorption mainly via system B^0 in apical membrane of proximal tubule. Plasma protein binding ratio of IMT was 45.4 ± 5.6%. At 6 hr after administration of IMT to mice, excretion via urinary tract was 77.51% of injected dose, and excretion into feces was 0.25%. Furosemide, ethacrynic acid and probenecid inhibited tubular secretion of [^{125}I]IMT in mice. We obtained very clear autoradiographs of mouse renal cortex and a canine renal SPECT image (S2-like region). ***Conclusions:*** We believe that [^{123}I]IMT is useful for kidney imaging. In future studies, we plan to examine the use of [^{123}I]IMT in diagnosis of disease.

Key words: amino acid transport, artificial amino acid, renal cortex, 3-iodo-α-methyl-L-tyrosine