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Hemicholinium-3-resistant Choline Uptake System Linked to Acetylcholine Synthesis in the Rat Hippocampus*

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Extracellular choline-dependency of acetylcholine (ACh) synthesis was examined in rat hippocampal slices. In the presence of hemicholinium-3 (HC-3, $5\ \mu\text{M}$), extracellular choline-dependent ACh synthesis appeared to consist of two different components. The first component (saturated at up to $50\ \mu\text{M}$ choline) was dependent on the HC-3-resistant choline uptake system having a low capacity for choline in comparison with the high-affinity choline uptake system (HACU). The second component, observed in the presence of more than $50\ \mu\text{M}$ choline, was considered due to competitive inhibition of HACU by HC-3. HACU-dependent ACh synthesis seemed to be saturated in the presence of up to $2\ \mu\text{M}$ choline. These results indicate that both the HACU and HC-3-resistant choline uptake systems are linked to ACh synthesis in the hippocampus

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