

Abstract

Choline acetyltransferase (EC 2.3.1.6) catalyzes the biosynthesis of acetylcholine according to the following chemical equation: acetyl-CoA + choline in equilibrium to acetylcholine + CoA. In addition to nervous tissue, primate placenta is the only other animal source which contains appreciable acetylcholine and its biosynthetic enzyme. Human brain caudate nucleus and human placental choline acetyltransferase were purified to electrophoretic homogeneity using ion-exchange and blue dextran-Sepharose affinity chromatography. The molecular weights determined by Sephadex G-150 gel filtration and sodium dodecyl sulfate gel electrophoresis are 67000 plus or minus 3000. N-Ethylmaleimide, p-chloromercuribenzoate, and dithiobis(2-nitrobenzoic acid) inhibit the enzyme. Dithiothreitol reverses the inhibition produced by the latter two reagents. The pKa of the group associated with N-ethylmaleimide inhibition is 8.6 plus or minus 0.3. A chemically competent acetyl-thioenzyme is isolable by Sephadex gel filtration. The enzymes from the brain and placenta are thus far physically and biochemically indistinguishable.