

Pharmacology. 1983;26(2):61-72.

Changes in enzymes of the cholinergic system and acetylcholine release in the cerebra of aging male Fischer rats.

Sastry BV, Janson VE, Jaiswal N, Tayeb OS.

#### Abstract

The functional decline of memory in the aging human brain has been partially attributed to defects in cholinergic transmission. Therefore, we have investigated various components of the cholinergic system in cerebra of Fischer 344 male rats, ages 3-33 months. Choline acetyltransferase (ChA), acetylcholinesterase (AChE), and butyrylcholinesterase (BChE) activities were determined in homogenates of the cerebra using specific radiometric assays. For measuring the release of acetylcholine (ACh), cerebral slices were incubated for one hour in Krebs buffer containing 3H-choline chloride to label ACh formed in situ, washed, and transferred to a microbath for superfusion. 3H-ACh released into the superfusate was determined. The levels of ChA in the cerebra of 9- to 27-month-old rats were lower (33%) than those in 3-month-old rats. Only 1% of these rats survive to the age of 33 months. In rats of this age, there was no decrease in ChA levels. AChE decreased while BChE increased with advancing age. The rate of spontaneous release of 3H-ACh decreased gradually by 63% from 3 to 33 months of age. The evoked release of ACh decreased by 50% in 33-month-old rats. Alterations in the levels of ChA, AChE (or BChE) and cholinergic receptors are not large enough to account for losses in cholinergic transmission in the cerebrum. The large decreases in the rates of spontaneous or evoked release of ACh in the aging cerebrum indicates that the functional defect in the cholinergic transmission of the aging cerebrum is possibly due to a defective release mechanism of this transmitter