A Histological Comparison of Different Staining Methods for Acetylcholinesterase

*Zurhellen, C., Tipton, B., Baun, J., Switzer III, R.C.

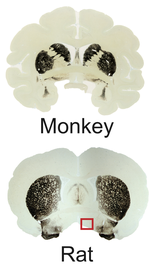
NeuroScience Associates, 10915 Lake Ridge Drive, Knoxville, TN 37934

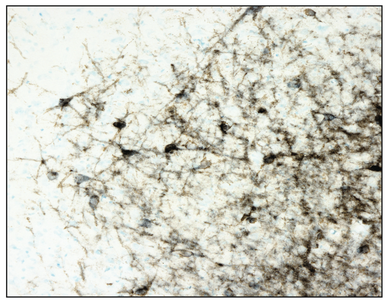
Abstract

Acetylcholinesterase (AChE) is a neurochemical synaptic transmitter at neuromuscular junctions and cholinergic brain synapses to hydrolyze the neurotransmitter acetylcholine and thereby terminates acetylcholine synaptic action. Numerous histological methods have been developed to reveal AChE positive zones in neurological tissue specimens, as well as muscle tissue. The substrate for AChE that is in common for all methods is acetylthiocholine iodine. The differences between methods include different incubation times and developing solutions. The degree between the different staining techniques varies as well as the complexity of the stain. Shorter incubation times permit visibility of such subtle features as the 'patch-matrix' complex striosomes in the caudate-putamen, while longer incubation times permit visualization of AChE positive fibers in cortex. Sections of fixed brains from monkey, rat, mouse and sheep were obtained by freeze-cutting on a sliding microtome and stored in "antigen preserve" (buffered 50% ethylene glycol). The results of several methods show a range of definition and staining intensity.

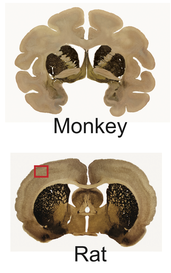
Methods

Hardy, et al.

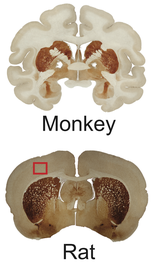


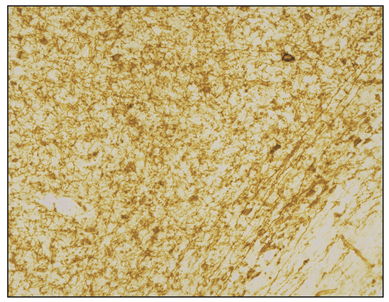


Hedreen, et al.

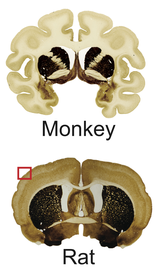


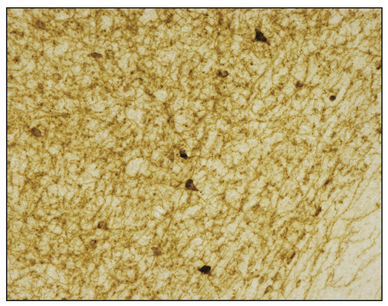
Tago, et al.



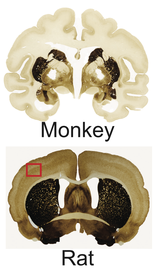


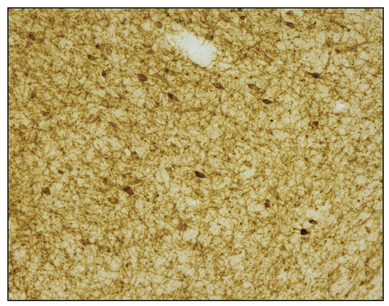
Koelle, et al.





Naik, et al.





Conclusions

	Hardy, et al.	Hedreen, et al.	Modified Tago, et al.	Koelle, et al.	Naik, et al.
Cell Bodies	XX	XXX	XX	XXX	XXX
Axons/Fibers	(X)	XXXX	X	XX	XXX
Terminal Areas	XX	XXX	XX	XXX	XXX
Sharpness of Features	X	XXXX	XX	XX	XXX

Where X = Inferior and XXXX = Superior

By our rating, the method by Hedreen et.al. displayed the sharpest and most complete details and quality of stained features.

References

Hardy, H.; et.al, *NeuroScience Letters*, 1976, 3(1):1-5; Hedreen,J.C.; et. al, *J.Histochem. and Cytochem*. 1985, 33(2): 134-140; Tago, H; et. al, *J. Histochem. and Cytochem.* 1986, 34(11): 1431-1438; Koelle, G.B., Friedenwald, J.S., *Proc. Soc. Exp. Biol. Med.,* 1949, 70: 617-22; Naik, N.T.; et. al, *Quart. J. Med.Sci*, 1963, 104:89-100.