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Synaptogenesis in the Mouse Cerebral Cortex Studied with Monoclonal Antibody mabQ155

A. V. PLIOPLYS and R. HAWKES (Quebec, Quebec)

As witnessed in abnormalities of dendritic spine morphology and number, such as in Down's syndrome, aberrations of synaptogenesis may underlie a number of human neuropathological conditions. MabQ155 selectively recognizes synaptic vesicles and thus is a useful probe of synaptogenesis in the developing mammalian nervous system. We have mapped the development of mabQ155-immunoreactivity in ventral frontal (area 13), anterior cingulate (area 24), motor (area 6), sensory (area 3), visual (areas 17 and 18a) and piriform cortical areas of C57 mice from birth through adulthood. This was done as a prelude to investigating cortical synaptogenesis in mouse mutant strains, as well as serving as a basis for comparative studies of human and other species material. At birth the intermediate zone is densely labeled by mabQ155 with slight labeling of the marginal zone and almost no labeling of the cortical plate. Already at birth there is a regional cortical variation such that the marginal zone of the piriform cortex is thicker and more deeply stained. At postnatal days P2 and P3 there is rapid spread of immunoreactivity into the cortical plate of the rostral neocortical areas such that by P4 and P5 the density of mabQ155-immunoreactivity is uniform, a pattern maintained through adulthood. Similar spreading takes place in visual cortical areas but is delayed, starting on days P3 and P4 and becoming uniform by P6. Another regional cortical variation appears during development of the marginal zone (subsequently layer I) in area 24. Here layer I becomes thicker than in other cortical areas, a pattern maintained through adulthood, but unlike the piriform cortex is not more intensely labeled.

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Selective Staining of a Subset of Purkinje Cells in the Human Cerebellum with Monoclonal Antibody mabQ113

A. V. PLIOPLYS, J. THIBAUT and R. HAWKES (Québec, Québec)

MabQ113 is a monoclonal antibody raised against rat cerebellum which selectively stains Purkinje cells. Likewise, in mabQ113-immunoperoxidase stained sections of human cerebellum, deposits of reaction product are found only in Purkinje cells. The dendritic arborizations, cell body, and axonal processes are immunoreactive. In rat, mabQ113 reveals a series of parasagittal bands which run throughout the cerebellar cortex. The staining distribution in human cerebellar cortex likewise reveals heterogeneous staining but the pattern is a complex one and seems to be unlike the parasagittal banding found in the rat. In a number of human diseases Purkinje cell degeneration is not uniform throughout the vermis and cerebellar hemispheres. This is intriguing because it is possible that mabQ113+ and mabQ113- subsets of Purkinje cells may respond differentially to various pathological conditions, such as cerebellar dysgenesis, toxin exposure, and hereditary cerebellar atrophies.

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