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Expression of Monoclonal Antibody Q113 Immunoreactivity in the Rat Cerebral Cortex: Unique Differential Sublayering of Layer I; Staining of Radial Glia

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Monoclonal antibody mabQ113 recognizes a 120-kilodalton polypeptide which, in the cerebellar cortex, is confined exclusively to a subset of Purkinje cells which are organized in parasagittal bands (Hawkes et al.: *Brain Research* 333:359–365, 1985). In all other areas of the adult rat brain examined the localization of the mabQ113 epitope was marked by regional neuronal and glial co-expression (Plioplys and Hawkes: *Brain Research* 375:1–12, 1986).

Similar neuronal-glial co-expression was characteristic of the adult rat cerebral cortex. Intriguingly, mabQ113 revealed a unique differential sublamination of layer I. In the neocortex, layer I was split into two sublayers, with the more superficial sublayer weakly stained and the deeper sublayer stained more intensely, whereas in the pyriform cortex, layer I was split into three. These sublaminations do not correspond to previously described subdivisions of layer I.

In the developing cortex, the mabQ113 epitope is found in radial glial fibers. Stained radial fibers are first seen beginning at E17, reach a maximum at P4 and finally disappear between P12 and P14. The laminar distribution of mabQ113-immunoreactivity emerges earlier in the pyriform cortex than the neocortex: the sublamination of layer I is seen at P4 in the pyriform cortex but not until P8 in the neocortex.

The significance of these observations is discussed.

Key words: cerebral cortex, development, immunocytochemistry, monoclonal antibodies, radial glia

INTRODUCTION

Monoclonal antibody mabQ113 recognizes a 120-kilodalton (Kd) polypeptide which, in the cerebellar cortex, is confined exclusively to a subset of Purkinje cells (Hawkes et al., 1985; Plioplys et al., 1985; Hawkes and Leclerc, 1987). In the rat, immunoreactive cells are organized into prominent parasagittal bands which are disposed symmetrically about the midline and are separated by similar bands of nonreactive cells. In light of the striking antigenic topography and cell specificity in the cerebellar cortex, mabQ113 immunoreactivity was mapped in other brain regions of the rat. In contrast to the cerebellar distribution, the localization of the mabQ113 epitope was marked by regional neuronal and glial co-expression (Plioplys and Hawkes, 1986). Reaction product was associated typically with the neuropil and electron microscopy showed that most immunoreactive processes were astroglial with a significant minority of stained neuronal processes intermixed. A pattern of regional rather than cell-type specificity was seen in the habenular nuclei. The lateral habenula is intensely mabQ113 reactive whereas the medial habenula is unstained (Plioplys and Hawkes, 1986).

Because a complex topographic map exists in the cerebral cortex, it was natural to look for regional and temporal cerebral cortical differences in the expression of the mabQ113 epitope. This manuscript describes the distribution of the mabQ113 epitope in various regions of the adult and developing rat cerebral cortex.

Two intriguing findings emerged. One was a unique differential sublamination of the adult rat cerebral cortical layer I. The paralaminar thalamic nuclei have a widespread distribution within neocortical layer I and may be an anatomic substrate for widespread integrative effects of thalamic activity on cortical functioning (Herkenham, 1979). Also, layer I may play an inductive role during cerebral corticogenesis (Marin-Padilla, 1984). The sublamination revealed by mabQ113 may be useful in further delineating the physiologic role of cerebral cortical layer I.

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