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UP-REGULATION OF POLYSIALYLATED NCAM EXPRESSION BY ACTIVITY BLOCKADE IN KITTEN VISUAL CORTEX. G.E. Baker, E.S. Ruthazer, U. Rutishauser and M.P. Stryker. Keck Center for Integrative Neuroscience & Neuroscience Program, Univ. of California, San Francisco, CA 94143; Dept. of Development Genetics, Case Western Reserve Univ., Cleveland, OH 44106.

Polysialylated NCAM (psa-NCAM) on developing axons has been shown to be directly involved in chick limb bud innervation, and the degree of NCAM sialylation is regulated by the level of neural activity (Landmesser et al., *Neuron 4:655*, 1990). In mammals, the organization of retinogeniculate and geniculocortical axonal arbors is profoundly influenced by patterns of neural activity during development. We have therefore studied the expression of psa-NCAM in the visual pathways of cats.

In the normal visual cortex, psa-NCAM was immunohistochemically nearly undetectable at birth and remained low thereafter. Tetrodotoxin (TTX) was chronically infused at 0.5 ul/hr into one visual cortex of kittens beginning at postnatal day 24. One week later, blockade of neural activity in a region extending approximately 7 mm rostral to the infusion site was confirmed using conventional extracellular microelectrode recording. The brains were subsequently fixed, sectioned, and processed for immunoreactivity to psa-NCAM and to total NCAMs. The expression of psa-NCAM was elevated manyfold above normal levels in the region of cortex in which activity was blocked. In the cortical plate, the region in which this elevation was found extended at least 5mm from the site of infusion of TTX in the lateral gyrus. The highest density of staining was found in cortical laminae IV and VI. In addition, staining in the white matter was greatly increased and extended laterally into the suprasylvian and ectosylvian gyri, and medially through the corpus callosum into the contralateral hemisphere.

The finding that TTX blockade of activity results in up-regulation of psa-NCAM on axonal connections of the kitten's visual cortex raises the possibility of a direct causal link between the expression of psa-NCAM and activity-dependent changes in organization of the geniculocortical projection.

Supported by a Kleberg Fellowship (to GEB), a training grant from the NEI (ESR), research grants from the NIH (UR and MPS).