

THE JOURNAL OF PHYSIOLOGY

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March 1991

Volume 434

JPHYA7 434 1-660 (1991) ISSN 0022-3751

CAMBRIDGE UNIVERSITY PRESS

14P

PROCEEDINGS OF THE PHYSIOLOGICAL SOCIETY

NGF prevents the change in ocular dominance distribution induced by monocular deprivation in the rat visual cortex

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We tested the hypothesis that Nerve Growth Factor (NGF) could play a role in the plasticity of the developing mammalian visual cortex. In particular we asked whether an exogenous supply of NGF could prevent the changes in ocular dominance distribution induced by monocular deprivation (MD). Eighteen hooded rats were monocularly deprived for one month, starting at two weeks of age, immediately before eye opening. In 8 rats only MD was performed. In 10 rats the deprivation was combined with repeated intraventricular injections of 2 μ l of either β -NGF (1.6 μ g/ μ l in buffered saline, 10 rats) or cytochrome c (1 μ g/ μ l in buffered saline, 2 rats). Injections were performed one every other day for a period of one month. The eyelids were sutured and the injections were performed under chloral hydrate anaesthesia (0.42 g/kg, i.p.). Single units were recorded under continuous urethane anaesthesia (1.2 g/kg, i.p.) by means of a micropipette inserted in the binocular portion of area 17. The ocular dominance was estimated recording the cell firing rate in response to light bars or gratings.

We found that in NGF-treated rats the ocular dominance distribution (Fig. 1C) was very similar to the normal (Fig. 1B). By contrast, MD caused a striking change in the ocular dominance distribution both in untreated rats (Fig. 1A) and in cytochrome c-treated rats. NGF treatment did not affect such functional properties of cortical cells as the spontaneous discharge and the selectivity for the stimulus parameters. We conclude that NGF is effective in preventing MD effects in the rat visual cortex.

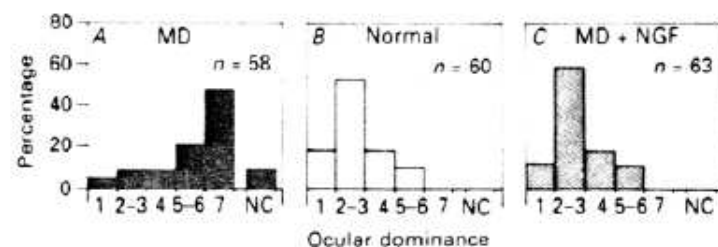


Fig. 1. Ocular dominance histograms. Ocular dominance class 1 = cells driven only by the contralateral, deprived eye; 7 = cells driven only by the ipsilateral, non-deprived eye; NC = unresponsive cells. *n* refers to the number of cells.