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Catecholamines in mutant mouse cerebellum: Fluorescence microscopic and chemical studies

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Summary

Catecholamine-containing fibers have been examined in the cerebella of normal and hypocerebellar mutant mice using Falck-Hillarp and glyoxylic acid histo-fluorescence techniques. The amounts of norepinephrine and dopamine were also determined chemically in the same mutants. Green fluorescent fibers in cerebella of normal mice are similar in size and distribution to those described in the rat. Weanling and adult weaver, reeler and staggerer mice all manifest greatly increased specific catecholamine fluorescence per unit area in cerebellar cortex, but the patterns of fluorescent fibers are distinctive. In weaver, the fibers are of normal diameter, surround Purkinje cell bodies and appear to climb along major dendrites. In reeler, similar fibers form a plexus around cortical and non-cortical Purkinje cells; relatively normal fluorescent fiber patterns are present in well-organized cortical regions, while stouter disoriented fibers course

through the shallow molecular layer in disorganized regions. Staggerer cerebellar cortex exhibits the greatest fluorescence with most terminals appearing as matted tangles adjacent to cell bodies. Clearly defined fibers, however, can be distinguished in the molecular layer running perpendicular to the pia or for long distances in the coronal plane parallel to the pia. The major catecholamine determined chemically is norepinephrine. Reeler cerebella contain normal absolute levels and a doubled concentration of norepinephrine. In contrast, and despite the fluorescence findings, the total norepinephrine content of weaver and staggerer cerebella is significantly reduced and concentrations are not significantly different from normal.



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