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AGE-DEPENDENT DOPAMINE-2 RECEPTOR (D_2R) PLASTICITY IN MOUSE MOTOR CORTEX AND HIPPOCAMPUS

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ABSTRACT

Dopamine-2 receptor (D_2R) is shown to be important in motor and memory consolidation. Some neuropsychiatry disorders are said to arise as developmental problems hence age-dependent D_2R was studied in mice. The study was designed to show if there is the presence of D_2R in mice motor cortex and hippocampus and if it changes as the animals grow with age. Four adult male and female mice were used for breeding pups used for the experiments. The animals were allowed to mate freely. At birth (P0) three pups were sacrificed by decapitation, brain was excised rinsed in normal saline and transferred to specimen bottle containing formal saline solution. Three pups sacrificed by cervical dislocation at postnatal day 14, 28 and 42 respectively were fixed transcardially using formal saline. The brain was excised immersion-fixed in formal saline. The brains were processed immunohistochemically to identify D_2R in the motor cortex and hippocampus. Number of D_2R expressing cells were counted using ImageJ software, and data were represented on a line graph to show age-related changes using GraphPad software V.5.0. D_2R was expressed in the motor cortex from birth, hippocampus from P14 till P42. Expression of D_2R peaks at P28 in the motor cortex and hippocampus and decline at P42.

Key words: *Dopamine-2 receptor, plasticity, hippocampus, motor cortex*

INTRODUCTION

Postnatal brain development is important in attaining the functional circuitry of the brain (Rakic et al. 1986), and involves synaptogenesis, synaptic pruning, receptors rearrangement and controlled cell death (Zangen et al. 2001). Postnatal development occurs at different stages in different species and different regions undergo a different process in attaining adult morphology (Andersen et al. 1997).

Dopamine a neurotransmitter produced mainly in the substantia nigra is shown to be responsible for motor coordination (Barnes and Sharp 1999). It has been shown anatomically that the basal ganglia receive inputs and send efferents to the cortex to mediate its functions (MacLean et al. 1985). The action of dopamine on the brain is mediated by dopamine receptors which have been classified as dopamine-1 (D_1R) and dopamine-2 receptors (D_2R) (Pearson et al. 1990). Another subtype has been identified ranging from D_3, D_4 and D_5 (Bouthenet et al. 1991). Dopamine projections to the motor cortex is responsible for the basal ganglia inputs for cortex coordination of movement (Garraux et al. 2007) and to the hippocampus for emotional learning (Torres et al. 2003). The dopaminergic neurons projected will

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