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**Dopaminergic development of prenatal ventral mesencephalon and striatum in organotypic co-cultures**

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Organotypic tissue culture techniques allow neuronal tissue to be maintained for weeks in vitro while maintaining the three-dimensional tissue architecture observed in vivo. These cultures maintain fundamental neuronal circuitries, neuronal and glial interactions, and they have the ability to form new neuronal synapses with other brain regions. To model the developing nigro-striatal pathway, the system affected in Parkinson's disease, we have used co-cultures of rat embryonic day 14 (E14) ventral mesencephalon (VM) and E21 striatum. We show that developmental changes in dopamine (DA) neurochemistry, numbers of DA neurons, and protein expression of tyrosine hydroxylase (TH), DA transporter (DAT), and glutamic acid decarboxylase (GAD 65/67), over 17 days in vitro (DIV) are very similar to those measures observed in vivo. The numbers of VM DA neurons remained relatively constant, while levels of DA progressively increased through 10 DIV. Western blot analysis of TH protein expression revealed large increases in VM TH after only 3 DIV, followed by a decline in levels through 17 DIV; levels of striatal TH, in contrast, increased through this period. Additionally, DAT and GAD 65/67 expression increased, in both the VM and striatum, over 17 DIV. By 17 DIV, many measures of DA function had decreased from those assessed at 10 DIV, thus providing an approximate limit to the effective duration of this co-culture model. Our results provide a much-needed description of the neurochemical changes that occur during the maturation of VM and striatum co-cultures and provide a foundation for future studies of neuronal development and toxicological challenges to this system. This work was supported by the NIEHS/USEPA Grants ES11263 and 829390. (Published: Brain Research (2007) 1133, 1-9)