The birth and death of dopamine neurons: A new model for neurodegeneration

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The gradual loss of dopamine neurons is a hallmark of many neurodegenerative diseases - Parkinson's Disease chief among them. Stem cell biology and regenerative medicine offer novel therapies for the restoration of dopamine neurons.

This week in the online open-access journal PLoS Biology Dr. Raja Kittappa, Dr. Wendy Chang, Dr. Rajeshwar Awatramani, and Dr. Ronald McKay show that the transcription factor FOXA2 plays a central role in the birth and death of dopamine neurons in the midbrain.

By defining precursors of dopamine neurons in the ventral midbrain, Kittappa et. al. have discovered that dopamine neurons are derived from organizer cells in the floor plate (the ventral cells of the neural tube and the embryonic foundation of the central nervous system). They also show that FOXA2 specifies the floor plate and actually induces the birth of dopamine neurons.

Mice with only a single copy of the foxa2 gene acquire motor deficits and a late-onset degeneration of dopamine neurons. This spontaneous cell death preferentially affects neurons associated with Parkinson disease. This work provides new strategies to generate neurons in the laboratory and to block their death in old age.

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