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## Nicotinamide: A Key Player in the Developmental Origins of Parkinson's Disease? (I1.001)

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### Abstract

**OBJECTIVE:** To investigate the role of vitamin B<sub>3</sub> (nicotinamide) on midbrain dopaminergic neuron development. **BACKGROUND:** The active forms of vitamins A & C are linked to optimal development of neurons . Little is known regarding the role of vitamin B3 even though poor cognitive development and parkinsonism were features of pellagra .

**DESIGN/METHODS:** Monolayer mouse embryonic stem cell cultures (mESC; *Sox1*GFP knock-in 46C cell line) were treated with nicotinamide for different durations and immunocytochemistry/ fluorescence microscopy was performed to assess the expression of stem cell, neural progenitor (NP) and neuronal subtype markers. **RESULTS:** Nicotinamide accelerated the conversion process of mESCs to neurons with a catecholaminergic phenotype. Specifically, the proportion of proliferating cells was significantly reduced in nicotinamide-treated cultures - that is, nicotinamide regulates the proliferation-to-differentiation switch from NPs to neurons during development. Nicotinamide drives dopamine neuron differentiation (10mM) as effectively as known cocktails of signalling factors, and acts in a dose-dependent manner in a defined time-window - with high doses (20mM) however causing toxicity. **CONCLUSIONS:** Nicotinamide aids the conversion of stem cells to dopaminergic neurons increasing efficiency and safety of the cells produced, and reducing cost; important as we progress towards patient-specific cell replacement therapy for Parkinson's . Our data also suggest that nicotinamide is a key signalling factor required in a definable dosage range at key times for the formation of a healthy population of dopamine neurons. An optimal maternal to foetal dietary dosage of nicotinamide - neither too low nor too high - could be linked to Parkinson's disease later in life.

**Disclosure:** Dr. Williams has nothing to disclose. Dr. Griffin has nothing to disclose. Dr. Pickard has nothing to disclose. Dr. Fricker has nothing to disclose.

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