Title: **Nanomatrix mediated specific neural phenotype differentiation of neuronal stem cells for Parkinson's disease treatment**

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## Abstract

As the rapidly growing of aging population in world, neurodegenerative diseases (ND) have been regarded as the first threats to human health, in which Parkinson's disease (PD) is the second commonest ND. However, the current pharmacotherapy for PD can only alleviate the symptoms without a permanent cure. Many chemical drugs, can cause severe side effects. As the main pathogenesis of PD is loss of function and/or structure of dopaminergic neurons, cell replacement therapy using neuron, through proliferation and specific neural differentiation of neural stem cells (NSCs), become the most and only promising treatment. However, NSCs have limited proliferation and differentiation ability under natural conditions in vitro and need to be induced by growth factors. Therefore, there is an urgent clinic demand on devising new methods to induce swift and efficient NSC proliferation and differentiation with limited usage of growth factors. Herein, to fulfil the urgent clinic demand, we successfully induced specific neuronal phenotype differentiation of NSCs into functional dopaminergic neurons by biocompatible silica extracellular nanomatrices in vitro. The differentiated neurons have significant therapeutic effect after transplantation into PD murine model, providing a promising and novel strategy for PD treatment using NSCs.