CD24 expression does not affect dopamine neuron survival in a mouse model of Parkinson's disease

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Parkinson’s disease (PD) is a neurodegenerative condition that is characterised by the loss of specific populations of neurons in the brain, including nigral dopaminergic cells. The mechanisms underlying this selective cell death are unknown. We identified the glycoprotein CD24 as a potential marker of those neurons that are affected in PD and decided to investigate whether it had any role in PD. Using immunohistochemistry and in situ hybridization on sections of adult mouse brain, we found that CD24 is robustly expressed by many of the specific subsets of cells affected by PD, such as the dorsal motor nucleus of the vagus, locus coeruleus, substantia nigra, and amygdala. In order to determine any functional role that CD24 may have in the disease course, we modelled PD in CD24 mutant mice using striatal delivery of 6-OHDA. The CD24 mutant mice had a normal midbrain dopamine system, suggesting that the absence of CD24 does not affect the development or maintenance of this population of neurons. When 6-OHDA was delivered to the striatum of these mice, we found no difference in the loss of striatal fibre innervation or cell loss in the midbrain. There was a significant reduction in the number of dividing cells in the substantia nigra one week post surgery, but this had no long-term impact on the dopamine cell survival (at 70 days post surgery). Immunohistochemistry and in situ hybridization on sections of healthy adult human brain suggested that CD24 is expressed by the dorsal motor nucleus of the vagus, locus coeruleus, and amygdala, but not the substantia nigra. Expression analysis suggested a reduction of CD24 in many regions of the PD brain, but no difference in the substantia nigra. These results led us to conclude that the expression of CD24 does not affect the survival of dopamine neurons in mice and may not necessarily play a direct role in PD. Despite this conclusion, we still believe that CD24 is worthy of further investigation in both the dopamine system and PD.

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