Another mechanism for the initiation and progression of Parkinson's disease?

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Video Abstract

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Abstract

A recent study published in *Acta Neuropathologica Communications* has found a potential mechanism for the initiation and development of Parkinson's disease and it appears red blood cells may be partly to blame. Parkinson's is a chronic and progressive neurodegenerative disorder commonly associated with tremors, muscle stiffness, and impaired movement. While these symptoms are caused by the deterioration of nerve cells in the brain, the precise cause of the disease is still not fully understood. What is known is that the development of Parkinson's is associated with the aggregation of toxic forms of a protein named alpha-synuclein (or alpha-syn, for short) in the brain. Recent evidence, however, suggests alpha-syn found in the blood can also be problematic and this has been implicated as a contributor to brain-cell breakdown. While red blood cells are a major source of this protein in the body, they are normally cut-off from the brain by the blood-brain barrier – the system that regulates the movement of molecules between the circulatory and nervous systems. So how are these proteins getting into the brain? To investigate this, a team of researchers working in the US and China attached fluorescent labels to molecular transporters called vesicles and tracked their movements in mice. They found that, while rare under normal conditions, vesicles can easily pass through the blood-brain barrier under conditions of systematic inflammation, carrying the toxic proteins with them. Once inside the brain, these proteins can trigger responses in cells that are also activated in Parkinson's disease patients. Importantly, these vesicles from Parkinson's patients appear to be more potent in mediating such responses. Although these results are still preliminary and need to be validated, they suggest that peripheral insults that induce inflammation, such as sepsis or tissue trauma, can increase the transfer of alpha-syn from the blood into the brain. This has profound (and potentially long-term) consequences for brain function and, ultimately, the development of Parkinson's disease. Whether Parkinson's blood vesicles are “contagious” remains to be investigated. Parkinson's affects millions of people world wide. While many questions remain, this study provides a new viewpoint for better understanding the mechanisms underlying this debilitating disorder.