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## The role of Nrf2 signaling pathways in nerve damage repair

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### Abstract

The protein, Nuclear factor-E2-related factor 2 (Nrf2), is a transitory protein that acts as a transcription factor and is involved in the regulation of many cytoprotective genes linked to xenobiotic metabolism and antioxidant responses. Based on the existing clinical and experimental data, it can be inferred that neurodegenerative diseases are characterized by an excessive presence of markers of oxidative stress (OS) and a reduced presence of antioxidant defense systems in both the brain and peripheral tissues. The presence of imbalances in the homeostasis between oxidants and antioxidants has been recognized as a substantial factor in the pathogenesis of neurodegenerative disorders. The dysregulations include several cellular processes such as mitochondrial failure, protein misfolding, and neuroinflammation. These dysregulations all contribute to the disruption of proteostasis in neuronal cells, leading to their eventual mortality. A noteworthy component of Nrf2, as shown by recent research undertaken over the last decade, is to its role in the development of resistance to OS. Nrf2 plays a pivotal role in regulating systems that defend against OS. Extant research offers substantiation for the protective and defensive roles of Nrf2 in the context of neurodegenerative diseases. The purpose of this study is to provide a comprehensive analysis of the influence of Nrf2 on OS and its function in regulating antioxidant defense systems within the realm of neurodegenerative diseases. Furthermore, we evaluate the most recent academic inquiries and empirical evidence about the beneficial and potential role of certain Nrf2 activator compounds within the realm of therapeutic interventions.