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Neuroglobin Functional Network Associated with Cerebral Ischemia

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Many biological signaling pathways involved in acute cerebral ischemia have been discovered in experimental models; however, few potential beneficial biomarkers have successfully translated to humans, including neuroglobin (NGB). NGB directly binds toxic substances; increases oxygen levels, and suppresses the downstream apoptotic biomarkers.

Purpose: Establish a NGB functional network associated with cerebral ischemic mechanisms to develop a better understanding of brain damage.

Design: NGB and associated biomarkers were initiated to define early and late pathophysiological mechanisms following acute cerebral ischemia from 2000-2016 were selected.

Methods: PRIASMA and QUOROM guidelines and English peer-reviewed articles from Medline, Embase, Scopus, and CINAHL were carefully retrieved. STRING, ingenuity IPA, and gene set enrichment analysis software were used. Inter-rater agreement, odds ratio with 95% confidence interval, Cochrane Q/I2, forest, and funnel plots were used to express the pooled effects analyzed with SPSS 21 and RevMan 5.3.

Results: A total of 511 studies were chosen, and final 22 studies were included that reported NGB locations, NGB protein/mRNA expression, and neurological outcomes for meta-analysis. Plasma membrane (G-protein, NMDA, and flottillin-1), endothelial (VEGF), anti-stress (HIF-1α, AIF), mitochondrial (ATP, cAMP, voltage-dependent anion channels, and cytochrome c), and hormone (estrogen) were predicted to be members of a NGB functional network.

Conclusions: Antioxidants, neurotransmitters, inflammation, mitochondria and hormones were associated with NGB intrinsic protective function.

Clinical Relevance: This work expands the knowledge of endogenous NGB in impacting health outcomes. This innovative approach assessed a promising biomarker, NGB, which can be used to detect individuals with critical conditions.

Biography

Chuang earned her PhD and Postdoctoral Fellowship from the University of Pittsburgh. As a Research Fellow at the National Institutes of Health, her research contributed to an understanding of the neuroprotective biomarkers, neuro-immune responses and pathophysiological mechanisms in the brain. She has received research funding and recognition in a specific field of neuroscience. As a critical care nurse, Chuang teaches undergraduate students about patients' management in high acuity settings and medical-surgery clinical care. She continues to use her experiences and abilities to pursue her research/academic strategies and explore a translational research from the bench evidence to bedside practice in neurological populations in both the critical care setting and long-term recovery. The Center for Stroke Disparities Solution of the Langone Medical Center at New York University/Columbia University/SUNY (2014-2015) has selected Chuang in 2014 as a cohort- one Stroke Scholar.

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