miR-210

Full name: microRNA-210 **Type:** Hypoxia-inducible microRNA (regulated by HIF-1α) **Gene location (human):** Chromosome 11p15.5 **Alias:** “Master hypoxamir”

Key Functions in the Nervous System

Function	Description
Hypoxia regulation	Induced by HIF-1α in low-oxygen environments. Downregulates energy-intensive processes to aid cellular survival.
Apoptosis modulation	Suppresses pro-apoptotic genes such as *Caspase-8*, *E2F3*, and *ISCU1/2*, reducing neuronal cell death.
Neuroprotection	Enhances recovery in models of stroke and intracerebral hemorrhage (ICH) by reducing inflammation and promoting repair mechanisms.
Autophagy regulation	Activates **AMPK** and inhibits **mTOR**, facilitating autophagic flux in damaged neurons.
Mitochondrial control	Regulates mitochondrial metabolism and reduces oxidative stress by targeting iron-sulfur cluster proteins (*ISCU1/2*).

Role in Intracerebral Hemorrhage (ICH)

In murine models of ICH:

- miR-210 upregulates autophagy via **AMPK/mTOR** pathway.
- Reduces neuronal death and release of inflammatory cytokines (e.g., IL-1β, TNF-α).
- Enhances functional recovery and neurological outcomes.
- Potential therapeutic target in brain hemorrhage and hypoxia-related brain injury.

References

- Yao Wang et al. `miR-210 Regulates Autophagy Through the AMPK/mTOR Signaling Pathway…` *Neurochemical Research*, 2025. DOI: https://doi.org/10.1007/s11064-025-04434-7
- Chan SY, Loscalzo J. “MicroRNA-210: a unique and pleiotropic hypoxamir.” *Cell Cycle*. 2010.