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[Review](#) [Rev Neurosci](#). 2020 May 26;31(4):363-390. doi: 10.1515/revneuro-2019-0086.

Brain energetics, mitochondria, and traumatic brain injury

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Abstract

We review current thinking about, and draw connections between, brain energetics and metabolism, and between mitochondria and traumatic brain injury. Energy is fundamental to proper brain function. Its creation in a useful form for neurons and glia, and consistently in response to the brain's high energy needs, is critical for physiological pathways. Dysfunction in the mechanisms of energy production is at the center of neurological and neuropsychiatric pathologies. We examine the connections between energetics and mitochondria - the organelle responsible for almost all the energy production in the cell - and how secondary pathologies in traumatic brain injury result from energetic dysfunction. This paper interweaves these topics, a necessity since they are closely coupled, and identifies where there exist a lack of understanding and of data. In addition to summarizing current thinking in these disciplines, our goal is to suggest a framework for the mathematical modeling of mechanisms and pathways based on optimal energetic decisions.

Keywords: ATP; astrocytes; glia; synapses.

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