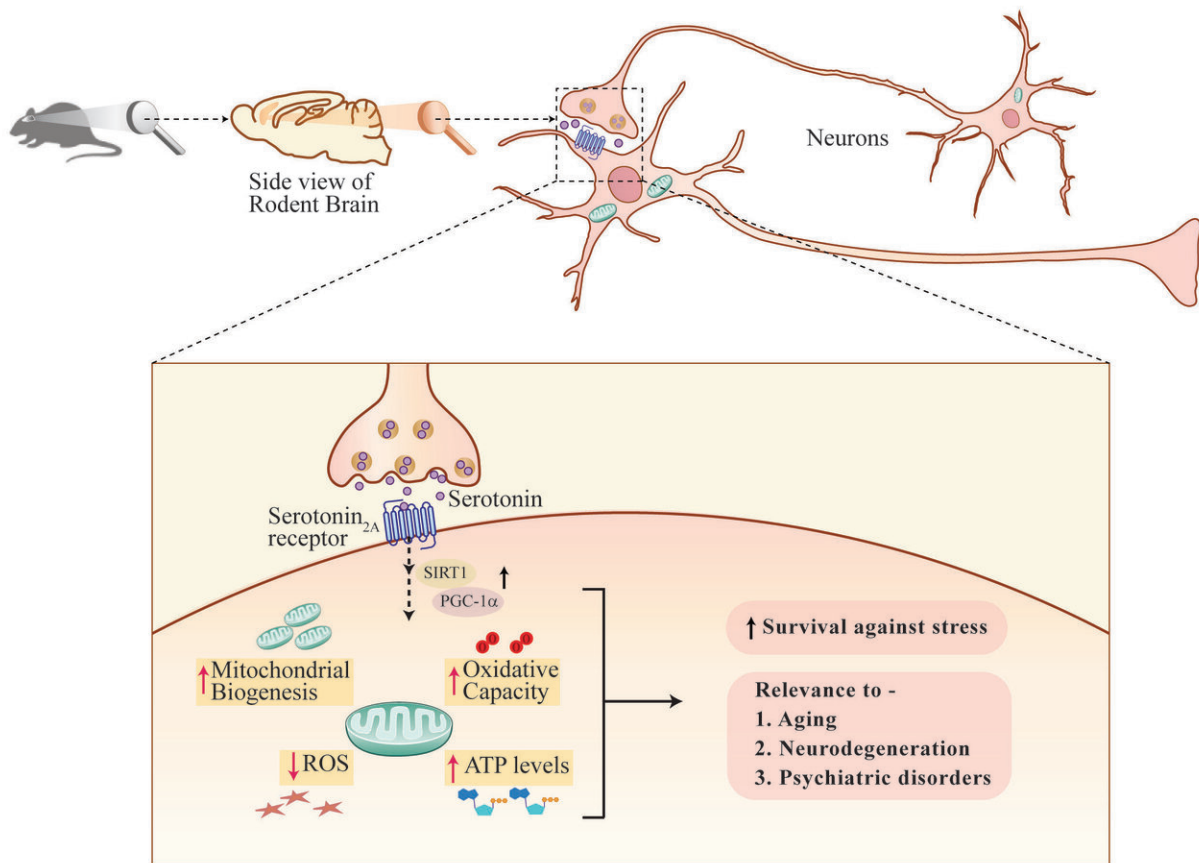


Serotonin boosts neuronal powerplants protecting against stress

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Serotonin action on neuronal mitochondria. Credit: Vidita A. Vaidya and Ullas Kolthur-Seetharam

Mitochondria in neurons are the powerhouses that generate energy to

execute cellular functions and regulate neuronal survival under conditions of stress. Collaborative research by Prof. Vidita Vaidya and Prof. Ullas Kolthur-Seetharam groups at TIFR, along with Dr. Ashok Vaidya, at the Medical Research Centre, Kasturba Health Society, has demonstrated an unusual function for the neurotransmitter serotonin, in the generation of new mitochondria—a process called mitochondrial biogenesis—in neurons, accompanied by increase in cellular respiration and ATP, the energy currency of the cell.

These effects of [serotonin](#) involve the serotonin_{2A} receptor and master regulators of mitochondrial biogenesis, SIRT1 and PGC-1 α . Serotonin reduces toxic reactive oxygen species in neurons, boosts anti-oxidant enzymes and buffers neurons from the damaging effects of cellular stress. This study appearing in *PNAS* uncovers an unprecedented role for serotonin in energy production in neurons directly impacting how neurons handle stress. Mitochondrial function in neurons is vital in determining how neurons cope with stress and the trajectory of aging.

This work provides exciting evidence that the neurotransmitter serotonin can directly influence neuronal powerplants, thus impacting the manner in which neurons grapple with stress. This work identifies novel drug targets for treating [mitochondrial dysfunction](#) in neurons, with therapeutic potential for neurodegenerative and psychiatric disorders.

More information: Sashaina E. Fanibunda et al. Serotonin regulates mitochondrial biogenesis and function in rodent cortical neurons via the 5-HT_{2A} receptor and SIRT1–PGC-1 α axis, *Proceedings of the National Academy of Sciences* (2019). [DOI: 10.1073/pnas.1821332116](https://doi.org/10.1073/pnas.1821332116)

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