Abstract Title: Monoamines, Mitochondria, Psychopathology and Aging

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Abstract: Mitochondria have emerged as important targets to consider both from the perspective of pathogenesis and treatment of neuropsychiatric and neurodegenerative disorders. Mitochondria contribute to the buffering of stress-associated allostatic load, and mitochondrial dysfunction can hamper stress-adaptation and enhance risk for psychopathology and aging-associated dysfunction. In the context of the nervous system, mitochondrial function is essential to fulfil substantial neuronal metabolic demands, maintain excitability and facilitate synaptic transmission. Mitochondria serve as key signaling platforms, coupling metabolic status to mitochondrial dynamics, biogenesis and function, and influence neuronal metabolism, intracellular signaling and synaptic plasticity. Mitochondrial biogenesis is an adaptive mechanism that responds to cellular energetic demands and oxidative insults, and can promote neuronal viability. We hypothesized that the monoamines, serotonin and norepinephrine, in keeping with their putative trophic and antioxidant-like actions, may serve as upstream modulators of mitochondria in neurons and thus influence stress buffering. In my talk, I will discuss our findings uncovering pathways linking serotonin and norepinephrine, via the metabolism and longevity-associated sirtuin, SIRT1 and PGC1-alpha, to neuronal survival and the amelioration of mitochondrial dysfunction, with important implications for both neurodegenerative and neuropsychiatric diseases. Serotonin and norepinephrine are potent modulators of mitochondrial biogenesis and function in the cortex and hippocampus respectively, and we have identified the signaling cascades via which they regulate mitochondrial biogenesis. The talk will also highlight the possible implications for these findings in the context of psychopathology and aging-associated dysfunction.

Area of expertise: Neuropsychopharmacology