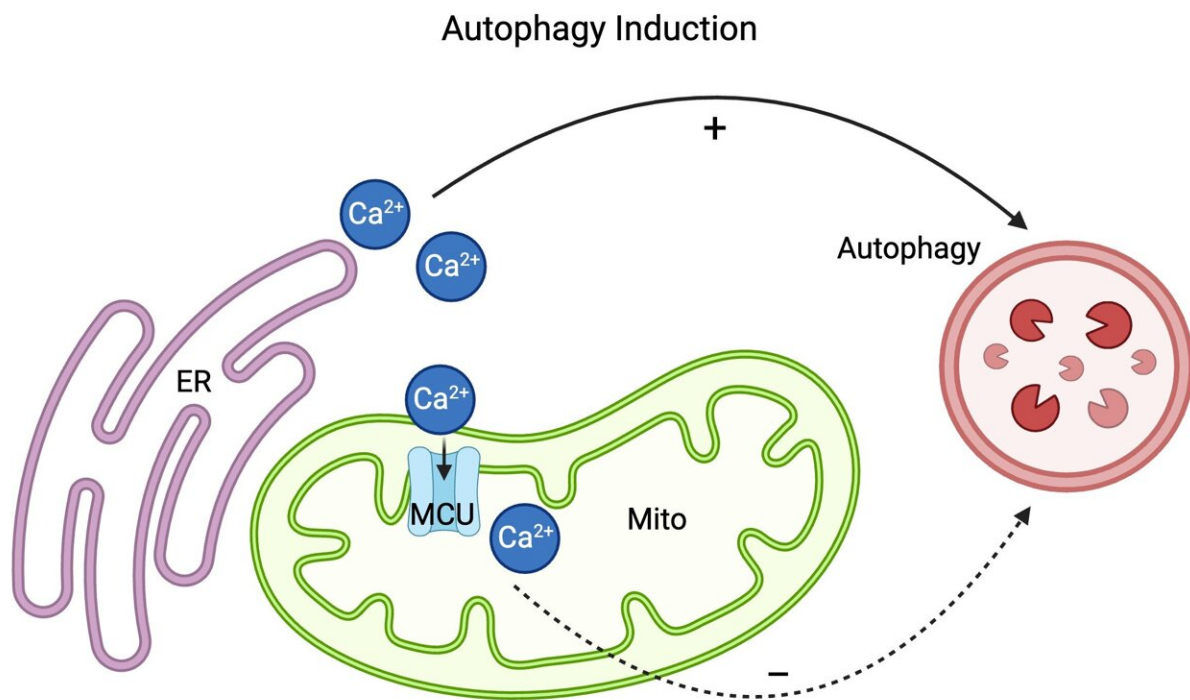


Study sheds light on relationship between mitochondrial calcium dynamics and autophagy

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Calcium dynamics during autophagy initiation. Credit: *Mitochondrial*

Autophagy is a self-eating process for recycling and rejuvenating cellular organelles and components. Intracellular calcium dynamics has been shown to be essential for the initiation of the autophagy process.

Mitochondria are a major calcium store within the cell and mitochondria import cytosolic calcium when its level is elevated. However, whether and how mitochondria import calcium during autophagy initiation and whether the uptake of calcium by mitochondria impinges on the autophagy process are not well explored.

The answers to these questions could have significant physiological and pathophysiological relevance and shed light on disease mechanisms.

In a new study [published](#) in the journal *Mitochondrial Communications*, a team of researchers from Stanford University School of Medicine examined acute mitochondrial and [endoplasmic reticulum](#) (ER) calcium transport responses to various autophagy inducers across different cell types. They aimed to elucidate the relationship between mitochondrial calcium uptake and mitophagy.

Through live monitoring of calcium ions using multiple [imaging techniques](#), the team observed rapid calcium influx into mitochondria upon autophagy induction, coinciding with fluctuations in calcium concentrations at the ER membrane.

"The mitochondrial calcium uniporter (MCU), the primary calcium import channel in the inner mitochondrial membrane, plays a crucial role in mediating mitochondrial calcium uptake triggered by mitophagy inducers," explains Xinnan Wang, senior and corresponding author of

the study.

Additionally, the researchers examined mitochondrial calcium transport in induced pluripotent stem cell (iPSC)-derived neurons from a Parkinson's disease (PD) patient and the corresponding control. They discovered faster mitochondrial calcium influx in neurons from the PD patient upon mitophagy induction.

Wang notes, "Given the known influence of cytosolic and ER membrane calcium dynamics on autophagy initiation, our findings suggest a possibility: [mitochondria](#) import calcium to regulate mitophagy velocity, and inter-organelle calcium signaling may modulate intricate cellular processes."

"Our study sheds light on the nuanced interplay between mitochondrial [calcium](#) dynamics and autophagy, offering insights into potential therapeutic avenues for diseases characterized by dysfunctional [autophagy](#), such as Parkinson's disease," concludes Wang.

More information: Sujyoti Chandra et al, Mitochondrial calcium transport during autophagy initiation, *Mitochondrial Communications* (2024). [DOI: 10.1016/j.mitoco.2024.01.002](https://doi.org/10.1016/j.mitoco.2024.01.002)

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