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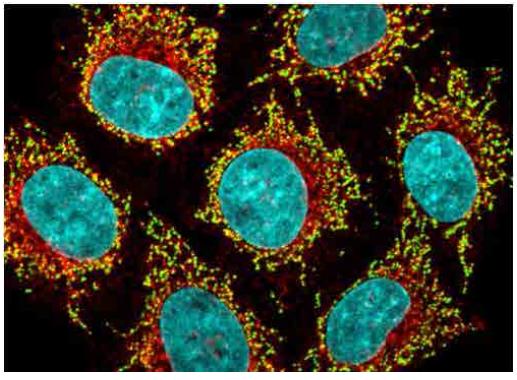
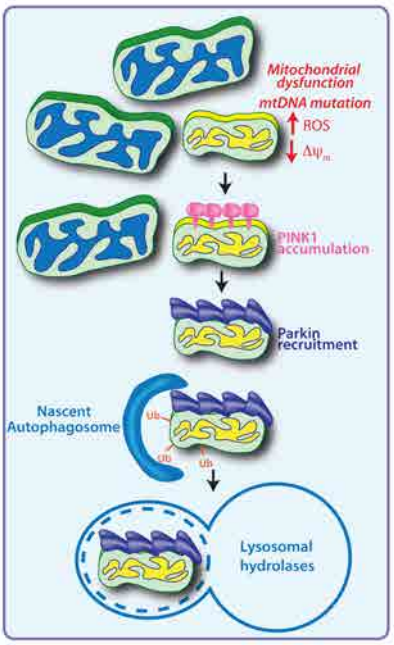
Parkinson's disease (PD) is one of the most common of the neurodegenerative disorders, affecting 1-2% of the population worldwide. Multiple lines of evidence place mitochondrial dysfunction as a central player in the pathogenesis of sporadic PD, and studies of genes associated with familial PD demonstrate convergent pathways involving oxidative stress and mitochondrial dysfunction. Two proteins commonly mutated in familial PD, PINK1 and Parkin, play a key role in maintaining mitochondrial integrity by identifying damaged mitochondria and degrading them through a selective form of autophagy termed mitophagy. Our lab investigates the molecular mechanisms of PINK1/Parkin mitophagy and how it works together with the mitochondrial unfolded protein response to maintain healthy mitochondria.

Research Projects

1. **PINK1/Parkin mitophagy**
2. **Mitochondrial quality control**
3. **Autophagy mechanisms**



Cells with mitochondrial DNA nucleoids stained (green), the mitochondrial marker Tom20 (red), and the nucleus stained blue.



Basic model of PINK1/Parkin mitophagy.

Selected significant publications:

1. **Lazarou M**, Sliter DA, Kane LA, Sarraf SA, Wang C, Burman JL, Sideris DP, Fogel AI, Youle RJ. 2015. The ubiquitin kinase PINK1 recruits autophagy receptors to induce mitophagy. *Nature* 524(7565):309-14
2. Kane LA, **Lazarou M**, Fogel AI, Li Y, Yamano K, Sarraf SA, Banerjee S, Youle RJ. 2014. PINK1 phosphorylates ubiquitin to activate Parkin E3 ubiquitin ligase activity. *J Cell Biol.* 205 (2), 143-53.
3. **Lazarou M**, Narendra DP, Jin SM, Tekle E, Banerjee S, Youle RJ. 2013. PINK1 drives Parkin self-association and HECT-like E3 activity upstream of mitochondrial binding. *J Cell Biol* 200 (2), 163-72.
4. **Lazarou M**, Jin S.M, Kane LA, Youle RJ. 2012. Role of PINK1 binding to the TOM complex and alternate intracellular membranes in recruitment and activation of the E3 ligase Parkin. *Dev. Cell*, 22 (2), 320-33.
5. **Lazarou M**, McKenzie M, Ohtake A, Thorburn DR, Ryan MT. 2007. Analysis of the assembly profiles for mitochondrial and nuclear encoded subunits into complex I. *Mol Cell Biol.* 12, 4228-37.