Mechanism Study of SH3P2 in Plant Mitophagy

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Mitophagy is a selective form of autophagy in which mitochondria are selectively targeted and degraded in response to certain signals. This process is essential for development regulation, stress resistance and intracellular homeostasis maintenance in eukaryotes. In mammals, the Parkin-mediated mitophagy pathway is well described. Parkin, an E3 ligase, is translocated to the outer mitochondrial membrane (OMM) of damaged mitochondria to activate the ubiquitination of a bulk of OMM proteins, which ultimately leads to the recruitment of the core autophagy proteins (ATGs) and mitophagy. In addition, it is shown that several OMM-localised receptors contain an AIM/LIR (ATG8 interacting motif/LC3- interacting region) to mediate the parkin-independent pathways, such as ATG32 in yeast and FUNDC1 in human.

In plant, however, the underlying pathways of mitophagy remain to be elucidated as several key mitophagy players, for instance, homologues of yeast ATG32 and human FUNDC1, have not been found in plant. Previously, we reported a BAR-domain protein SH3P2 interacts with ATG8 and functions in autophagosome formation in Arabidopsis thaliana. Our preliminary results suggested, under normal condition, SH3P2 displays a mitochondrial-like pattern. But during mitophagy, SH3P2 forms a cup-like structure to engulf mitochondria, suggesting a possible role in mitochondria homeostasis. In order to identify novel regulators interacting with SH3P2 to regulate the selectivity in mitophagy, here I will use the tandem affinity pull down methods to purify the SH3P2 complex and to study their functional roles in mitochondria dynamics and mitophagy.

Broda, M.; Millar, A.; Van Aken, O. Trends In Plant Science, 2018, 23(5), 434-450.
2. Lazarou, M; et al. Nature, 2015, 524, 309– 31.

Liu L; Feng D; Chen G; et al. Nat. Cell Biol., 2012, 14, 177–185.

Okamoto, K; et al. Dev. Cell, 2009, 17, 87–97

Zhuang, X.; et. al. The Plant Cell, 2013, 25(11), 4596-4615.