Mitochondrial Uncoupling Proteins in plants: molecular and functional aspects

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Mitochondrial inner membrane uncoupling proteins (UCP) catalyze a proton conductance that dissipates the proton electrochemical gradient established by the respiratory chain, thus affecting the yield of ATP synthesis. Here, the key findings that have led to our current understanding of the roles of UCP in plants will be presented and discussed. Much of this knowledge is derived from seminal studies from Dr. Vercesi`s lab. Early genetic and biochemical analyses have implicated plant UCPs mainly in oxidative stress tolerance. Additional functional insights, obtained by transgenic overexpression of UCP in model plants, revealed improved abiotic stress tolerance and photosynthetic efficiency as well as increased mitochondrial biogenesis. Exacerbated UCP expression also promoted important transcriptomic adjustments to maintain cell homeostasis, which culminated in the up-regulation of genes involved in different pathways. Recent characterization of arabidopsis insertion mutants demonstrated compensatory expression and differential behavior of the three UCP isoforms under stress.

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