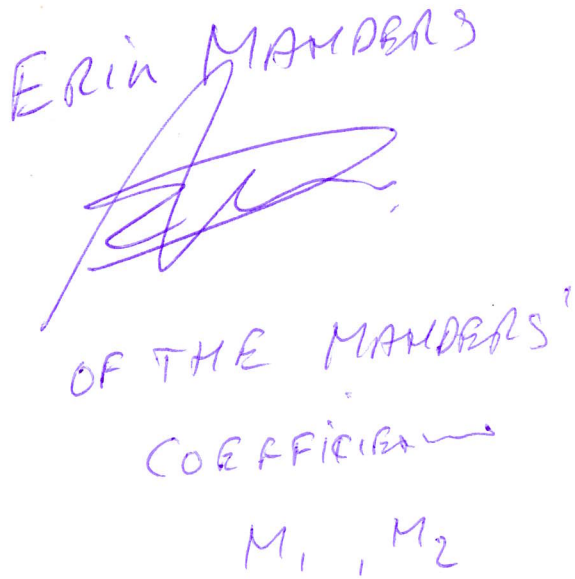
POSTER ABSTRACTS



Imaging of the dynamic mitochondrial phenomena in vivo

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Revolutionary improvements in fluorescence microscopy for the last decades are considered to be a key driver for functional imaging of fundamental processes in living cells. It was recent achievements of higher spatiotemporal resolution and much-improved sensitivity that allowed visualizing such striking events in mitochondria as reactive oxygen species (ROS) flashes ('mitoflashes') and flickers or pulsing of membrane potential (Δψm). They both represent a highly localized and transient, over the second ranges, phenomena that are detectable only at the single-mitochondrion level, in most cases for animal samples, whereas plant-adjusted imaging approaches are still seriously limited due to plant cell intrinsic structural and functional features (e.g., cell wall, plastids, intensive cyclosis, etc). Moreover, at present the interpretations of the data, particularly received by using cpYFP, are disputed because the fluorescent proteins seem to reflect rather matrix alkalization than ROS burst. Using Zeiss LSM META 510, we clarified whether the dynamic phenomena could be detected in living plant cells by means of appropriate fluorescent dyes for mitochondrial ROS and Δψm monitoring, mostly in a real-time manner. For elucidation of the relationships, dynamics of the quantal events were investigated after sample double-labeling and subsequent multi-tracking analysis. In epidermal cells of different species seedlings, we first obtained a strong experimental evidence of reproducible mitochondrial flash and pulsing incidences in vivo and found out their relationships, compared to animal analogs. Despite different manipulations, the causal mechanisms of initiations of these processes remain obscure. Nonetheless, the universal and evolutionary conserved dynamic events, being quintessence of bioenergetics and ROS signaling system, may serve as optical readouts reflecting both mitochondrial and cellular energy metabolism and oxidative status, and their stress modulations.

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