

## MITOCHONDRIAL HEXOKINASE ACTIVITY MODULATES REACTIVE OXYGEN SPECIES PRODUCTION IN POTATO TUBER MITOCHONDRIA.

**Juliana Camacho Pereira**<sup>1</sup> Laudiene Evangelista Meyer<sup>1</sup>, Lilia Bender Machado<sup>1</sup>,  
Marcus F. Oliveira<sup>1</sup>, Antonio Galina<sup>1</sup>

<sup>1</sup> Instituto de Bioquímica Médica, Universidade Federal do Rio de Janeiro, Brazil.

Potato tuber mitochondria (PTM) present a tightly bound hexokinase (mt-HK). The relationship between mitochondrial membrane potential ( $\Delta\Psi_m$ ) and the reactive oxygen species (ROS) production with the mt-HK activity was evaluated in PTM. The mt-HK activity is inhibited by the ADP produced from the reaction. This inhibition can be reversed when the PTM respiration is activated. Oxygen consumption rate is stimulated by glucose after reaching the state 4 rate. A small depolarization in  $\Delta\Psi_m$  (less than 3 %) was detected and ROS formation was completely abolished. The mt-HK inhibitors, mannoheptulose or N-acetylglucosamine, stimulated ROS production by PTM in the presence of glucose. The blockage of ROS production by mt-HK activity is comparable to that of plant uncoupling protein (PUMP) activated by linolenic acid. The localization of mt-HK is fifty times more efficient to impair the  $H_2O_2$  production than the yeast HK. The rate of  $H_2O_2$  production and  $O_2$  consumption in potato tuber slices were modulated by glucose and mt-HK inhibitors. Together, these results indicate that mt-HK activity is involved in the local mitochondrial ADP recycling mechanism, leading to a decrease in  $\Delta\Psi_m$  and ROS production acting as a preventive antioxidant defense in plants.

Supported by: FAPERJ, CNPq