

Regulation of ATP production: dependence on calcium concentration and respiratory state

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High-resolution respirometry of mouse skeletal muscle

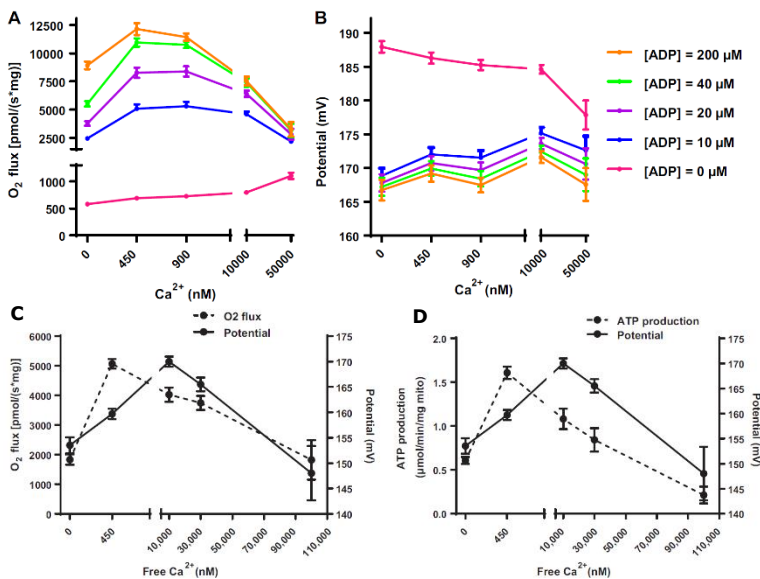


Figure 1.

A. High-resolution respirometry in mouse muscle isolated mitochondria, 5 mM glutamate, 1 mM malate. Mean \pm SE; $N = 8$ (each data point), $N = 5$ for 50,000 nM Ca^{2+} . **B.** Membrane potential measured in parallel with a TPP^+ electrode. **C.** O_2 flux and membrane potential measured with TPP^+ electrode in different concentrations of Ca^{2+} , 5 mM glutamate, 1 mM malate, 20 μM ADP with a 2-deoxyglucose-hexokinase clamp. **D.** ATP production was measured from samples acquired from the O2k chambers (2-deoxyglucose phosphate detected by NMR).

Ca^{2+} effect over membrane potential and ATP production

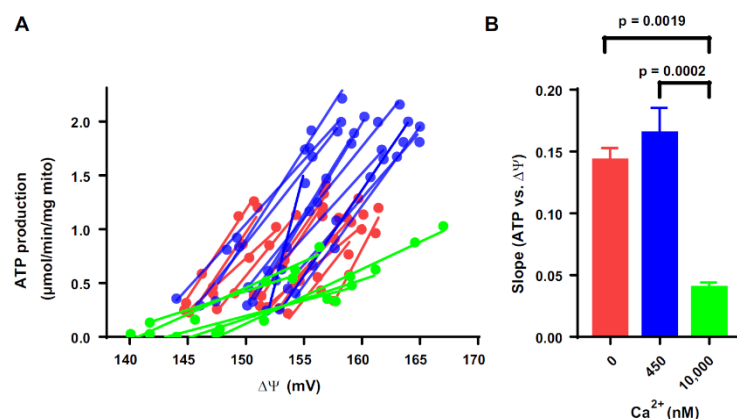


Figure 2.

A. Membrane potential measured with the O2k/ TPP^+ electrode in different concentrations of glutamate and malate to reach different $\Delta\Psi$ values, with 0, 450 and 10,000 nM free Ca^{2+} . ATP production was measured from samples acquired from the O2k chambers. **B.** Slope of ATP vs. $\Delta\Psi$, mean \pm SE; $n = 11$ (Ca^{2+} 0 and 450 nM), $n = 5$ (10,000 nM Ca^{2+}), one-way ANOVA.

Free Ca^{2+} induced changes on mitochondrial respiration and ATP production irrespective to the changes in membrane potential and without promoting the opening of the mPTP (no decrease in $\Delta\Psi$)

Reference: Fink BD, Bai F, Yu L, Sivitz WI (2017) Regulation of ATP production: dependence on calcium concentration and respiratory state. *Am J Physiol Cell Physiol* 313(2): C146-C153.

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