



RESEARCH ARTICLE | Molecular Pathways in Cell Signaling

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

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High-resolution respirometry of mouse skeletal muscle

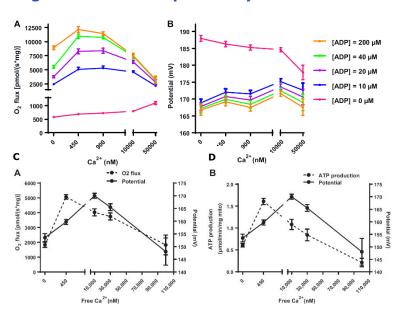


Figure 1

A. High-resolution respirometry in mouse muscle isolated mitochondria, 5 mM glutamate, 1 mM malate. Mean \pm SE; N=8 (each data point), N=5for 50,000 nM Ca²⁺. **B.** Membrane potential measured in parallel with a electrode. C. O₂ flux and membrane potential measured with electrode different in concentrations of Ca2+, 5 mM glutamate, 1 mM malate, 20 µM ADP with a 2-deoxyglucose-hexokinase clamp. **D.** ATP production was measured from samples acquired the O2k chambers deoxyglucose phosphate detected by NMR).

Ca²⁺ effect over membrane potential and ATP production

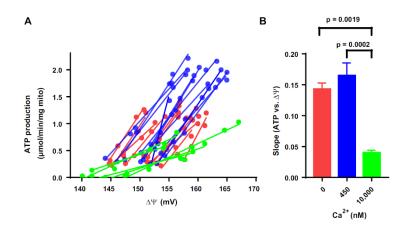


Figure 2.

A. Membrane potential measured with the O2k/TPP $^+$ electrode in different concentrations of glutamate and malate to reach different ΔΨ 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. ΔΨ, mean \pm SE; n = 11 (Ca $^{2+}$ 0 and 450 nM), n = 5 (10,000 nM Ca $^{2+}$), one-way ANOVA.

Free Ca²⁺ 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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