

Mitochondria fine-tune the slow Ca²⁺ transients induced by electrical stimulation of skeletal myotubes

Eisner, Veronica

Parra, Valentina

Lavandero, Sergio

Hidalgo, Cecilia

Jaimovich, Enrique

Mitochondria sense cytoplasmic Ca²⁺ signals in many cell types. In mammalian skeletal myotubes, depolarizing stimuli induce two independent cytoplasmic Ca²⁺ signals: a fast signal associated with contraction and a slow signal that propagates to the nucleus and regulates gene expression. How mitochondria sense and possibly affect these cytoplasmic Ca²⁺ signals has not been reported. We investigated here (a) the emergence of mitochondrial Ca²⁺ signals in response to electrical stimulation of myotubes, (b) the contribution of mitochondrial Ca²⁺ transients to ATP generation and (c) the influence of mitochondria as modulators of cytoplasmic and nuclear Ca²⁺ signals. Rhod2 and Fluo3 fluorescence determinations revealed composite Ca²⁺ signals associated to the mitochondrial compartment in electrically stimulated (400 pulses, 45Hz) skeletal myotubes. Similar Ca²⁺ signals were detected when using a mitochondria-targeted pericam. The fast mitochondrial Ca²⁺ rise induced by stimulation was inhibi