

Luminal pH regulates calcium release kinetics in sarcoplasmic reticulum vesicles

Donoso, Paulina

Beltrán, Marianela

Hidalgo, Cecilia

Calcium binding to triads isolated from rabbit skeletal muscle followed a single hyperbolic function in the pH range 5.5-8.0. Maximal binding was obtained at pH 8.0; decreasing the pH decreased the binding capacity and, at pH \approx 6.0, increased $K(d)$ 2-fold. These results indicate that lowering the pH diminished calcium binding to calsequestrin, since this protein is the primary source of calcium binding sites in triads. Luminal pH had a marked effect on calcium release induced by 2 mM ATP, at pCa 5.0, pH 6.8. At a constant luminal $[Ca^{2+}]$ of 0.1 mM, release rate constants (k) and initial rates of release increased steadily as a function of decreasing luminal pH; at luminal pH 7.5, values of $k < 0.4 \text{ s}^{-1}$ were found, whereas at pH 5.5 values of $k \approx 10 \text{ s}^{-1}$ were obtained. Increasing luminal $[Ca^{2+}]$ from 0.05 mM to 0.7 mM had no effect on the k values measured at luminal pH 5.5. In contrast, at pH 6.8, increasing luminal $[Ca^{2+}]$ produced a marked increase in k values, that reached maximal values