

Sodium-calcium exchange in transverse tubules isolated from frog skeletal muscle

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Transverse tubule vesicles isolated from frog skeletal muscle display sodium-calcium exchange activity, which was characterized measuring ^{45}Ca influx in vesicles incubated with sodium. The initial rates of exchange varied as a function of the membrane diffusion potentials imposed across the membrane vesicles, increasing with positive intravesicular potentials according to an electrogenic exchange with a stoichiometry greater than 2 sodium ions per calcium ion transported. The exchange activity was a saturable function of extravesicular free calcium, with an apparent $K_{0.5}$ value of $3 \mu\text{M}$ and maximal rates of exchange ranging from 3 to 5 nmol/mg protein per 5 s. The exchange rate increased when intravesicular sodium concentration was increased; saturation was approached when vesicles were incubated with concentrations of 160 mM sodium. The isolated transverse tubule vesicles, which are sealed with the cytoplasmic side out, had a luminal content of 112 ± 39 nmol calcium per mg protein. In the