STILBENE DERIVATIVES INHIBIT THE ACTIVITY OF THE INNER MITOCHONDRIAL MEMBRANE CHLORIDE CHANNELS

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Ion channels selective for chloride ions are present in all biological membranes, where they regulate the cell volume or membrane potential. The aim of our study was to characterize the effect of stilbene derivatives on single-chloride channel activity in the inner mitochondrial membrane. The measurements were performed after the reconstitution into a planar lipid bilayer of the inner mitochondrial membranes from rat skeletal muscle, rat brain and heart mitochondria. After incorporation in a symmetric 450/450 mM KCl solution (*cis/trans*), the chloride channels were recorded with a mean conductance of 155 ± 5 pS (rat skeletal muscle) and 120 ± 16 pS (rat brain). The conductances of the chloride channels from the rat heart mitochondria in 250/50 mM KCl (*cis/trans*) gradient solutions were within the 70–130 pS range. The chloride channels were inhibited by two stilbene derivatives: 4,4'-diisothiocyanostilbene-2,2'-disulfonic acid (DIDS) and 4-acetamido-4'-isothiocyanostilbene-2,2'-disulfonic acid (SITS). The skeletal muscle mitochondrial chloride channel was blocked after the addition of 1 mM DIDS or SITS, whereas the brain mitochondrial channel was blocked by 300 μM DIDS or SITS. The chloride channel from the rat heart mitochondria was inhibited by 50–100 μM DIDS. The inhibitory effect of DIDS was irreversible. Our results confirm the presence of chloride channels sensitive to stilbene derivatives in the inner mitochondrial membrane from rat skeletal muscle, brain and heart cells.

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