

Deprivation of Na⁺, Ca²⁺ and Mg²⁺ from the extracellular solution increases cytosolic Ca²⁺ and stimulates catecholamine secretion from cultured bovine adrenal chromaffin cells

Luxoro, Mario

Nassar-Gentina, Verónica

Rojas, Eduardo

We report here that exposing cultured chromaffin cells to a low ionic strength medium (with sucrose in place of NaCl to maintain osmolarity) can induce a marked elevation in cytosolic Ca²⁺ concentration ([Ca²⁺]_i) and catecholamine (CA) release. To determine the underlying mechanism, we first studied the effects of low [Na⁺]_o on single cell [Ca²⁺]_i (using fluo-3 as Ca²⁺ indicator) and CA release from many cells. In a Mg²⁺ and Ca²⁺-deficient medium, lowering the external concentration of Na⁺ ([Na⁺]_o) evoked CA secretion preceded by a transitory [Ca²⁺]_i rise, the amplitude of which was inversely related to [Na⁺]_o. By contrast, in the presence of either [Ca²⁺]_o (2 mM) and [Mg²⁺]_o (1.4 mM) or [Mg²⁺]_o alone (3.4 mM), lowering the ionic strength was without effect. Furthermore, in a physiologic [Na⁺]_o, [Ca²⁺]_o and [Mg²⁺]_o medium, two or three consecutive applications of the cholinergic agonist oxotremorine-M (oxo-M) consistently evoked a substantial [