

Actin Cytoskeleton and Polyphenols: two players for the regulation of Plasma membrane Ca^{2+} -ATPase activity

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The cortical cytoskeleton and the components of the plasma membrane are nowadays recognized as responsible of dynamic interactions that modulate a plethora of cellular responses. Reorganization of actin filaments upon diverse stimuli - among which is the rise in cytosolic Ca^{2+} - is involved in cell motility and adhesion, phagocytosis, cytokinesis, and secretion. The functional interaction between actin and the Plasma Membrane Ca^{2+} -ATPase (PMCA) represents a novel regulatory mechanism of the pump at the time that unveils a new pathway by which the cortical actin cytoskeleton participates in the regulation of cytosolic Ca^{2+} homeostasis [1; 2].

On the other hand, research on polyphenols and more specifically flavonoids from plant sources has recently sparked increasing interest because of their beneficial health properties. Different studies have shown that flavonoids change the intracellular Ca^{2+} homeostasis linked to alterations in the function of mitochondria, Ca^{2+} channels and Ca^{2+} pumps [3].

Our results show that polyphenols inhibited purified and membranous PMCA with different effectiveness. PMCA activity was inhibited in human embryonic kidney cells which transiently overexpress PMCA, suggesting that the effects observed on isolated systems could occur in a complex structure like a living cell. A forerunner report [4] shows that flavonoids exert distinct and partially opposing biological effects: although flavonols inhibit actin functions, the structurally related flavane epigallocatechin promotes actin activity.

In this work we reveals the molecular mechanism and its effects at cellular level through which cortical cytoskeleton and polyphenols interacts and regulate PMCA, which leads to Ca^{2+} homeostasis and signaling alterations in the cell.

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- [3] Natural flavonoids inhibit the plasma membrane Ca^{2+} -ATPase. Ontiveros M, Rinaldi D, Marder M, Espelt MV, Mangialavori I, Vigil M, Rossi JP, Ferreira-Gomes M. *Biochem Pharmacol*. 2019 Aug;166:1-11.
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