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Vasodilation as a mechanism of cardio-protection induced by epicatechin

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Introduction: Epicatechin, along with catechin and procyanidins, belongs to flavanols, a major group of flavonoids in human diet. As many studies have demonstrated an inverse relationship between cardiovascular risk and consumption of flavanols, it has been suggested that epicatechin is likely a major bioactive constituent of flavanol-rich foods and beverages. One of its cardioprotective effect mechanisms is vasodilation. However, the exact mechanisms by which epicatechin causes vasodilation are unclear.

Objectives: The present study aimed to investigate relaxant effect of epicatechin on the isolated human internal mammary artery (HIMA) and its underlying mechanisms.

Methods: Discarded segments of HIMA were collected from patients undergoing coronary artery bypass grafting and studied in organ baths.

Results: Epicatechin induced a concentration-dependent relaxation of HIMA rings pre-contracted by phenylephrine. Among the K⁺ channel blockers, 4-aminopyridine and margatoxin, blockers of voltage-gated K⁺ (KV) channels, and glibenclamide, a selective ATP-sensitive K⁺ (KATP) channels blocker, partly inhibited the epicatechin-induced relaxation of HIMA, while iberiotoxin, a most selective blocker of large conductance Ca²⁺-activated K⁺ channels (BKCa), almost completely inhibited the relaxation. In rings pre-contracted by 80 mM K⁺, epicatechin induced partial relaxation of HIMA, whereas in Ca²⁺-free medium, epicatechin completely relaxed HIMA rings pre-contracted by phenylephrine and caffeine. Finally, thapsigargin, a sarcoplasmic reticulum Ca²⁺-ATPase inhibitor, slightly antagonized epicatechin-induced relaxation of HIMA pre-contracted by phenylephrine.

Conclusions: These results suggest that epicatechin induces strong endothelium-independent relaxation of HIMA pre-contracted by phenylephrine whilst 4-aminopyridine- and margatoxin-sensitive KV channels, as well as BKCa and KATP channels, located in vascular smooth muscle, mediate this relaxation. In addition, it seems that epicatechin could inhibit influx of extracellular Ca²⁺, interfere with intracellular Ca²⁺ release and re-uptake by the sarcoplasmic reticulum.

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