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Vasorelaxation as a mechanism of procyanidin B2 cardioprotective effect

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Introduction: Findings from epidemiological studies indicate that polyphenols, widespread in human diet and with numerous biological activities, act cardioprotectively. Procyanidins are subclass of polyphenols with high content in commonly consumed foods and beverages, such as grapes, tea, chocolate, nuts and apples. Cardioprotective abilities of procyanidins, might, at least in part, attribute to their vasodilator properties.

Purpose: Because the exact mechanisms by which procyanidin B2 causes vasorelaxation are unclear, we aimed to investigate relaxant effect of procyanidin B2 on the isolated human internal mammary artery (HIMA) and its underlying mechanisms.

Methods: The HIMA segments were collected from patients suffering from coronary artery disease who were undergoing coronary artery bypass surgery and studied in organ bath.

Results: Procyanidin B2 induced strong concentration-dependent relaxation of HIMA rings pre-contracted by phenylephrine. Pretreatment with L-NAME, a NO synthase inhibitor, hydroxocobalamin, a NO scavenger, and ODQ, an inhibitor of soluble guanylate cyclase, significantly inhibited procyanidin B2-induced relaxation of HIMA, while indomethacin, a cyclooxygenase inhibitor, considerably reduced effects of low concentrations. Among K+ channel blockers, iberiotoxin, a selective blocker of large conductance Ca2+-activated K+ channels (BKCa), abolished procyanidin B2-induced relaxation, glibenclamide, a selective ATP-sensitive K+ (KATP) channel blocker, induced partial inhibition, while 4-aminopyridine, a blocker of voltage-gated K+ (KV) channels, and TRAM-34, an inhibitor of intermediate-conductance Ca2+-activated K+ (IKCa) channels, slightly reduced maximal relaxation of HIMA.

Conclusion: Our results demonstrate that, in HIMA, procyanidin B2 produces strong endothelium-dependent vasorelaxant effect. It seems that this relaxation is primarily the result of an increased NO synthesis and secretion by endothelial cells and partially of prostacyclin, although it involves activation of BKCa and KATP, as well as KV and IKCa channels in high concentrations of procyanidin B2.