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Inhibition of Protein Tyrosine Phosphatase 1B by Polyphenol Natural Products: Relevant to Diabetes Management

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Et al.

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Many biologically active polyphenols have been recognized for their beneficial effects in managing diabetes and their complications. However, the mechanisms behind their functions are poorly understood. As protein-tyrosine phosphatase 1B (PTP1B) has been identified as a target for anti-diabetic agents, the potential inhibitory effects of a dozen structurally diverse polyphenol natural products have been investigated. Among these polyphenols, potent inhibitory activities have been identified for 6 of them with IC_{50} in micromolar range, while the other polyphenols showed very weak inhibition. A structure-activity relationship (SAR) study and molecular ducking results suggest that both a rigid planar 3-ring backbone and appropriate substitutions of hydroxyl groups benefit the inhibitory activity. The mechanism of inhibition of PTP1B was further investigated by Michaelis-Menten kinetics and the inhibition mode for PTP1B was determined along with the inhibition constant.