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Isolation and purification of superoxide dismutase from cultivated plant cells

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Abstract

Superoxide dismutase (SOD) is among the key enzymes that compose antioxidant enzymatic systems of living organisms. Together with other antioxidant enzymes (catalase, myeloperoxidase, paraoxonase, glutathione peroxidase, etc.), this compound protects aerobic organisms from constantly generated highly reactive toxic oxygen radicals, and thus plays the key role in combating oxidative stress. To date, the role of toxic active oxygen forms in development of more than 100 pathologies has been confirmed. The studies of molecular mechanisms of the reactions involving active forms of oxygen have indicated the need for development of novel antioxidant preparations intended for use in medicine, pharmaceuticals and cosmetics. Since SOD is one of the most powerful natural antioxidants, this enzyme is of great interest to researchers. It can be used in practical medicine for purposes of reducing adverse effect of free radicals and decreasing oxidative stress in cells. Thus, the search for available sources of raw materials for isolating antioxidant substances still remains an actual problem as well as the subsequent design of new medicinal preparations on the basis of these substances for use in combination with basic therapy. The aim of the present work was development and optimization of isolation and purification techniques for superoxide dismutase from medicinal plants (serpentlike rauwolfia, *Rauwolfia serpentine (L.) Benth*. from the family *Apocynaceae*, and ginseng *Panax Ginseng C.A. Mey*), which are constantly stored in the collection of plant tissue cultures of Saint Petersburg State Chemical Pharmaceutical University. For comparison, we have used both the traditional methods and methods that are employed in preparation of high-purity proteins and enzymes that contain metal ions as prosthetic groups. Metal affinity chromatography (IDA-sepharose 6B sorbent) was used to prepare plant SOD with degree of purification 128-131; the yield reached 81%.

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