

## Sulforaphane prevents cholinergic deficit and cognitive impairment in mice

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Sulforaphane, an organosulfur compound present in cruciferous vegetables, has been shown to exert neuroprotective effects in experimental *in vitro* and *in vivo* models of neurodegeneration. To determine whether sulforaphane can preserve cognitive function, we examined its effects on scopolamine-induced memory impairment in mice using the Morris water maze test. Sulforaphane (10 or 50 mg/kg) was administered to C57BL/6 mice by oral gavage for 14 days (days 1–14), and memory impairment was induced by intraperitoneal injection of scopolamine (1 mg/kg) for 7 days (days 8–14). Mice that received scopolamine alone showed impaired learning and memory retention and considerably decreased cholinergic system reactivity in the hippocampus and frontal cortex, as indicated by a decreased acetylcholine (ACh) level and an increased acetylcholinesterase (AChE) activity. Sulforaphane significantly attenuated the scopolamine-induced memory impairment and improved cholinergic system reactivity, as indicated by an increased ACh level, decreased AChE activity, and increased choline acetyltransferase (ChAT) expression in the hippocampus and frontal cortex. These effects of sulforaphane on cholinergic system reactivity were confirmed *in vitro*. Sulforaphane (10 or 20  $\mu$ M) increased the ACh level, decreased the AChE activity, and increased ChAT expression in scopolamine-treated primary cortical neurons. These observations suggest that sulforaphane might exert a significant neuroprotective effect on cholinergic deficit and cognitive impairment.

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## Plant biopolymers from Boraginaceae family species and their synthetic derivatives: Prospective pharmacological agents

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Extracts from the plants belonging to Boraginaceae family – *Symphytum asperum*, *S. caucasicum* and *Anchusa italica* have been used in folk medicine in the treatment of some kinds of disorders, mainly fractures and wounds. These extracts contain allantoin, claimed to be a cell proliferation-stimulating agent responsible for the wound-healing properties of *Symphytum* and hepatotoxic pyrrolizidine alkaloids, which strongly restrict internal use of Comfrey extracts. Our research group succeeded in obtaining allantoin- and toxic pyrrolizidine alkaloids-free composition containing novel biopolymer from the roots of aforesaid plants – poly[oxy-1-carboxy-2-(3,4-dihydroxyphenyl)ethylene] (BP) and synthesizing its monomer (M-BP). BP and M-BP were studied to appraise their pharmacological properties. Different *in vitro* and *in vivo* experiments revealed that the investigated compounds exhibit: 1) antioxidant activity and anti-complementary activity due to the inhibition of xanthine oxidase and complement convertase, respectively; 2) burn and wound healing properties due to the shortening of the second phase of wound healing-the inflammatory response; 3) inhibition of androgen-dependent and independent prostate cancer (PCA) cells growth *in vitro*. Consistent with *in vitro* results, *in vivo* study showed that BP strongly inhibited 22Rv1 tumors growth without any toxicity; 4) abrogation of melanoma cells adhesion to tumor-conditioned medium and VEGF-activated endothelial cells; 5) significant stimulation of leucopoiesis in mice drug-induced leukopenia. Strong efficacy of BP and M-BP in different experimental models suggests its high therapeutic potential.

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