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Are Ginsenosides Differential Modulator of Ion Channels Involved in Synaptic Tansmission?

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The last two decades have shown a marked expansion of publications in evaluation of diverse effects of *Panax* ginseng. Ginsenosides, as active ingredients of *Panax* ginseng, are a kind of saponins that are only found in ginseng. Recently, a line of evidences shows that ginsenosides regulate various types of ion channel activity such as Ca^{2+}, K^+, Na^+, Cl^-, or ligand gated ion channels (i.e., GABA, glycine, 5-HT_3, nicotinic acetylcholine, or NMDA receptor) in neuronal and non-neuronal cells, or in heterologously expressed cells. Ginsenosides inhibit voltage-dependent Ca^{2+} and Na^+ channels, whereas ginsenosides activated Cl^- and K^+ channels. Ginsenosides also inhibit excitatory ligand-gated ion channels such as 5-HT_3 and nicotinic acetylcholine receptors, whereas ginsenosides enhance inhibitory ligand-gated ion channel activity such as GABA and glycine receptors. This presentation will introduce recent findings on the ginsenoside-induced differential regulations of ion channels and will also speculate the possible mechanisms on ginsenoside-induced regulation of synaptic transmission.

Keywords: *Panax* ginseng; ginsenosides; ion channels; ligand-gated ion channels; differential regulation

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