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# Astaxanthin: A Mechanistic Review on its Biological Activities and Health benefits

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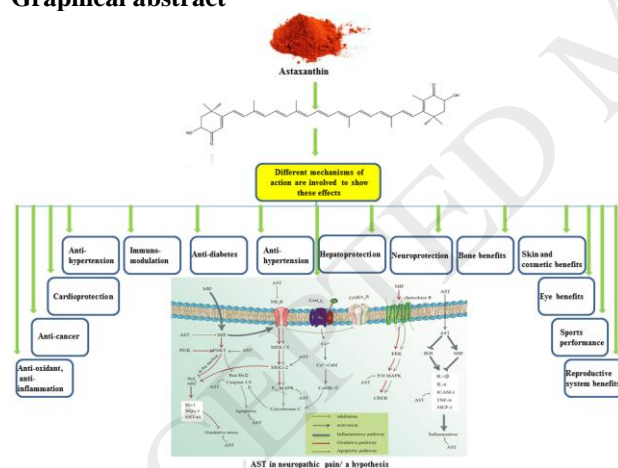
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## Graphical abstract



## Abbreviations

AST: Astaxanthin, TLC: thin-layer chromatography, HPLC: high-performance liquid chromatography, PDA: photodiode array, SFC: supercritical fluid, NP: neuropathic pain, SCI: spinal cord injury, OS: oxidative stress, ROS: reactive oxygen species, NMDA: n-methyl-d-aspartate, LPO: lipid peroxidation, PI3K: phosphoinositide 3-kinase, ARE: anti-oxidant response elements, HO-1: heme oxygenase-1, GST- $\alpha$ 1: glutathione-S-transferase- $\alpha$ 1, NQO-1: NAD(P)H quinone oxidoreductase-1, SOD: superoxide dismutase, CAT: catalase, TBARS: thiobarbituric acid reactive substances, IL-1 $\beta$ : interleukin-1 $\beta$ , IL-6: interleukin-6, TNF- $\alpha$ : tumor necrosis factor- $\alpha$ , I $\kappa$ B: NF- $\kappa$ B inhibitor, IKK $\beta$ : I $\kappa$ B kinase  $\beta$ , COX-1: cyclooxygenase-1 enzyme, NO: nitric oxide, p38 MAPK: mitogen-activated protein kinase/p38, STAT3: signal transducer and activator of transcription 3, PPAR $\gamma$ : peroxisome proliferator-activated receptor gamma, TS: thymidylate synthase, NSCLC: non-small-cell lung carcinoma, NOS: nitric oxide synthases, LPS: lipopolysaccharide, HUVEC: human umbilical vein endothelial cells, IFN- $\gamma$ : interferon- $\gamma$ , NWKR: normotensive Wistar Kyoto rats, SHR: spontaneously hypertensive rats, SPSHR: stroke-prone spontaneously hypertensive rats, SBP: systolic blood pressure, NK: natural killer, CRP: c-reactive protein, DM: diabetes mellitus, GPx: glutathione peroxidase, IRS: insulin receptor substrate, XO: xanthine oxidase, XDH: xanthine dehydrogenase, HSCs: hepatic stellate cells, ECM: extracellular matrix, TIMP1: tissue inhibitor of metalloproteinase-1, BBB: Blood Brain Barrier, OA:

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