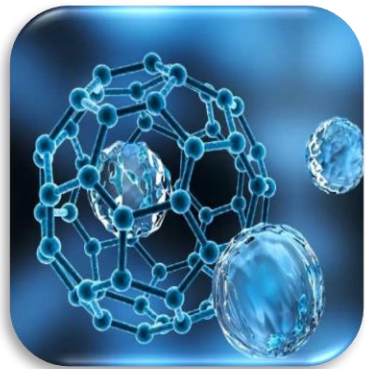


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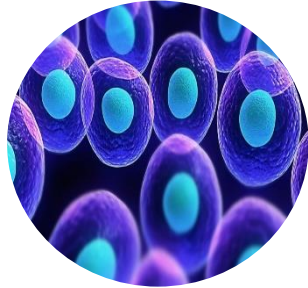
Mehr&Mah Pharmaceutical Company



The Advantages of
Encapsulated Garlic

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Diabetes

The effect of garlic on diabetes

Preliminary clinical research suggests some compounds in garlic, such as S-methylcysteine sulfoxide and S-allylcysteine sulfoxide, might have some antidiabetic activity, S-allyl cysteine sulfoxide stimulate insulin secretion from beta-cells (1,2).

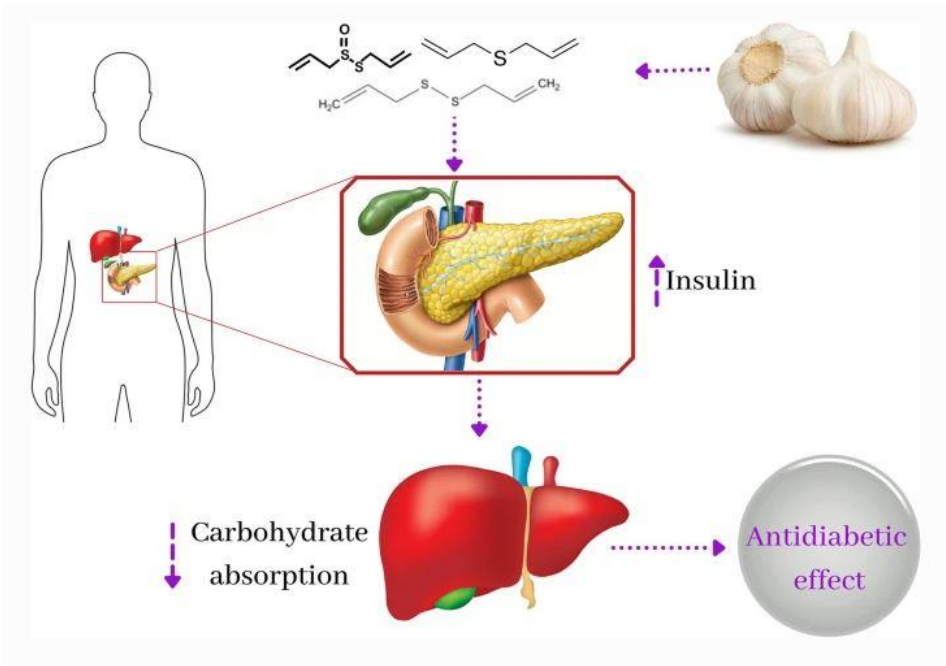


Fig1. The effect of garlic on diabetes (3)

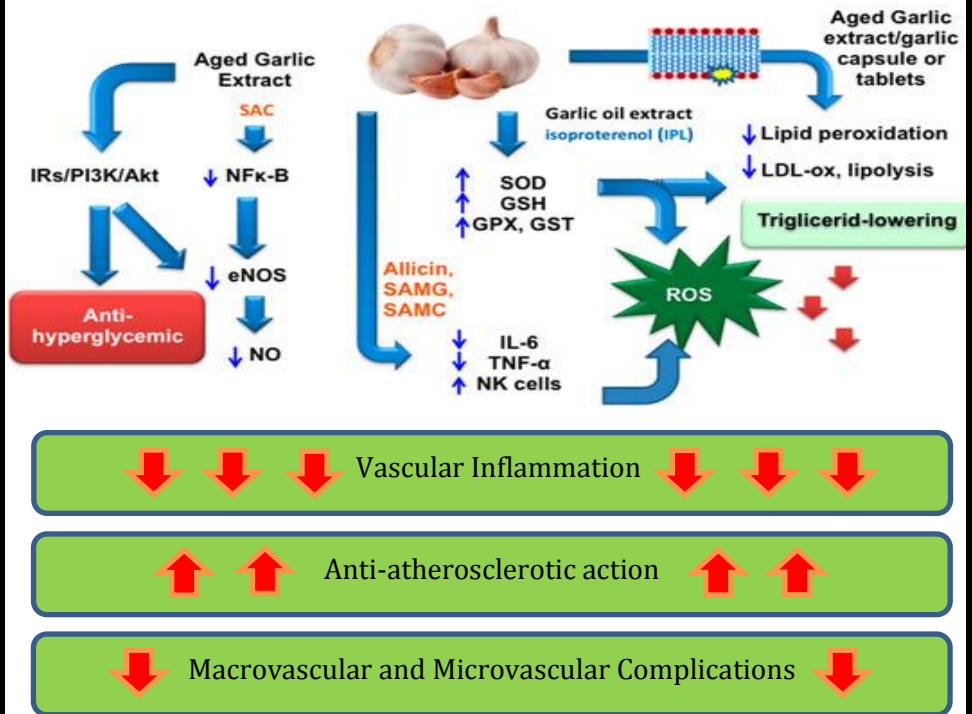


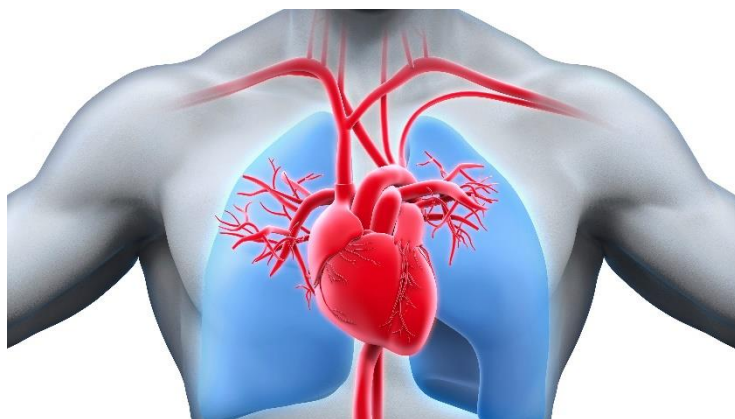
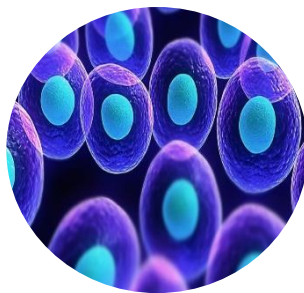
Fig2. Scheme of the inter-relationship between hyperglycemia, hyperlipidemia, oxidative stress, vascular inflammation, and the ability of garlic extract to modulate macrovascular and microvascular complication in type 2 DM (4)

Reference:

1-www.naturalmedicines.therapeuticresearch.com/
 2-Ali, A., Khan, J. and Alshehri, B., 2022. Diabetes--a metabolic disorder: Herbal medicines on rescue. In *Herbal Medicines* (pp. 223-237). Academic Press.
 3- Saikat, A.S.M., Hossain, R., Mina, F.B., Das, S., Khan, I.N., Mubarak, M.S. and Islam, M.T., 2021. Antidiabetic effect of garlic. *Revista Brasileira de Farmacognosia*, pp.1-11.
 4-Melino, S., Leo, S. and Toska Papajani, V., 2019. Natural hydrogen sulfide donors from *Allium* sp. as a nutraceutical approach in type 2 diabetes prevention and therapy. *Nutrients*, 11(7), p.1581.

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Cardiovascular

The effect of garlic on Cardiovascular

Human research shows that high-dose garlic powder reduces arteriosclerotic and age-dependent plaque volume in both carotid and femoral arteries (1,2). For age-related vascular changes and atherosclerosis, garlic is thought to be beneficial and protect vascular endothelial cells from injury by reducing oxidative stress, inhibiting low-density lipoprotein (LDL) oxidation, and through antithrombotic effects. Some evidence in humans suggests that garlic inhibits inflammatory compounds, including C-reactive protein (CRP) and inflammatory cytokines. In human research, garlic reduced blood viscosity. garlic supplementation increased blood flow. The improvement was associated with and possibly mediated by increased plasma levels of interleukin-6 (IL-6). Garlic have antiplatelet properties, antithrombotic properties and can increase fibrinolytic activity, decrease platelet aggregation and adhesion, increase the prothrombin time (PT), and inhibit metabolic enzymes in platelets responsible for the conversion of arachidonic acid into prostaglandins and other products (1,4).

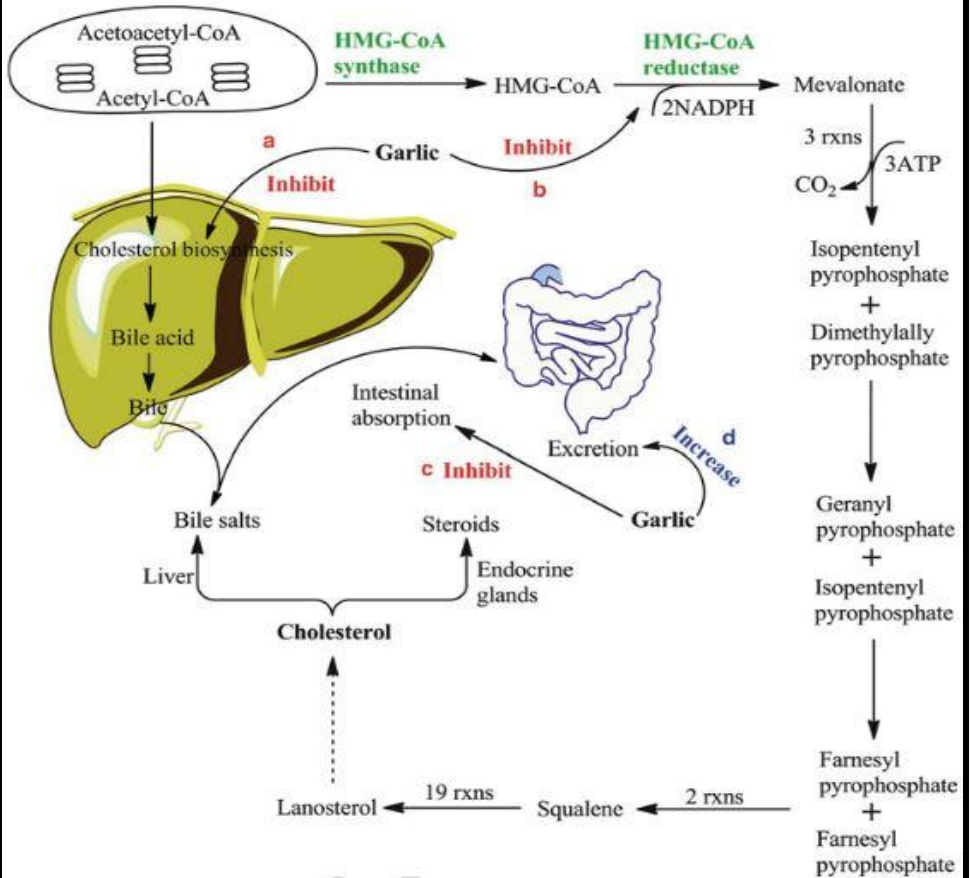


Fig1. Hypolipidemic mechanism of garlic. (a) Inhibit the cholesterol biosynthesis in liver; (b) Inhibit the rate limiting enzyme HMG-CoA reductase; (c) Inhibit intestinal absorption; (d) Induces the rate of cholesterol excretion (4)

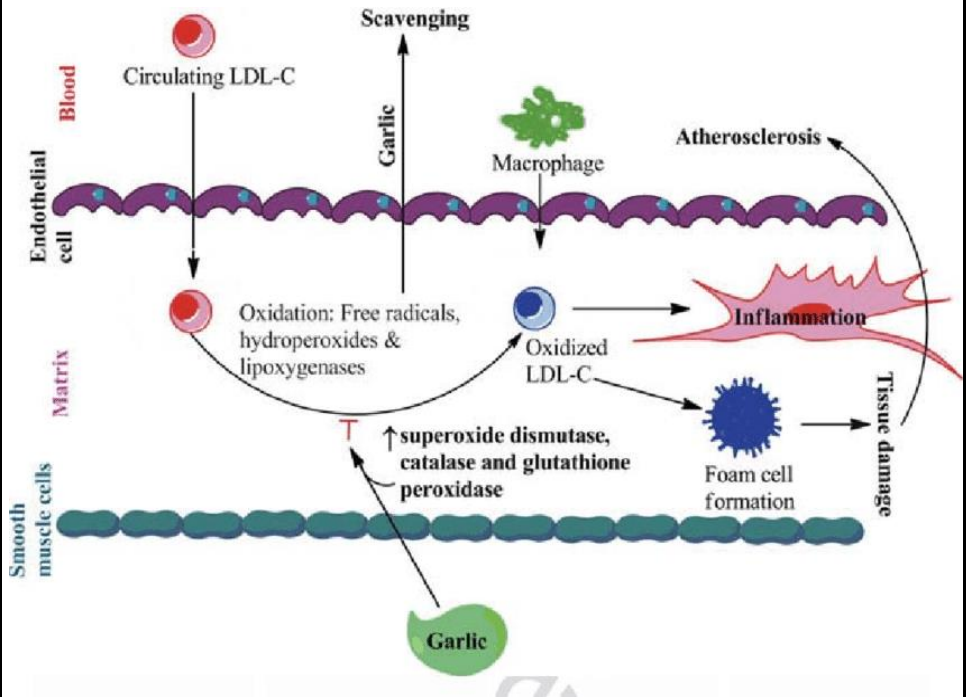
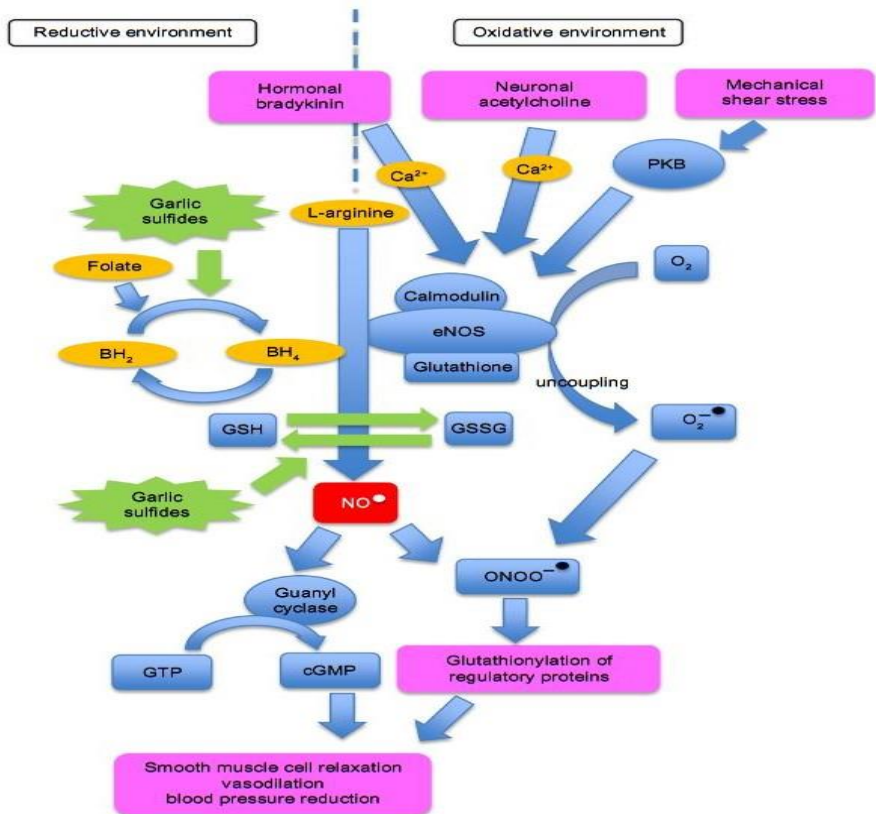


Fig2. Antioxidant mechanism: garlic inhibiting oxidative modification of LDL-C, scavenging ROS, enhancing the cellular antioxidant enzymes superoxide dismutase, catalase and glutathione peroxidase and glutathione in the cells, thus protecting endothelial cells from the injury by the oxidized molecules (4)



The effect of garlic on blood pressure via the hydrogen sulfide (H₂S) pathway (5).



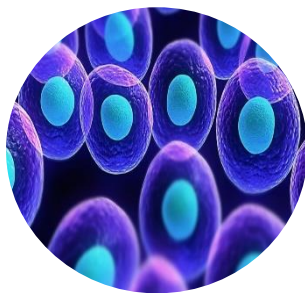
The effect of garlic on blood pressure via the NO pathway (5)

Reference:

- 1-www.naturalmedicines.therapeuticresearch.com/
- 2-Breithaupt-Grogler, K., Ling, M., and Belz, G.G., 1997. Protective effect of chronic garlic intake on elastic properties of aorta in the elderly. *Circulation*, 96(8), pp.2649-2655.
- 4-Ribeiro, M., Alvarenga, L., Cardozo, L.F., Chermut, T.R., Sequeira, J., Moreira, L.D.S.G., Teixeira, K.T.R., Shiels, P.G., Stenvinkel, P. and Mafra, D., 2021. From the distinctive smell to therapeutic effects: Garlic for cardiovascular, hepatic, gut, diabetes and chronic kidney disease. *Clinical Nutrition*, 40(7), pp.4807-48195- Ried, K. and Fakler, P., 2014. Potential of garlic (*Allium sativum*) in lowering high blood pressure: mechanisms of action and clinical relevance. *Integrated blood pressure control*, 7, p.71.
- 5-Ried, K., 2014. Potential of garlic (*Allium sativum*) in lowering high blood pressure: mechanisms of action and clinical relevance. *Integrated blood pressure control*, 7, p.71.

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Endometriosis

The effect of garlic on Endometriosis

Garlic extract can reduce pelvic and back pain, dysmenorrhea, and dyspareunia which are important symptoms of endometriosis. garlic improved pain associated with endometriosis, as the overall pain score was 73% lower in the garlic group than placebo after the intervention. The authors hypothesized that there may be four ways through which garlic might relieve pain in endometriosis, including garlic's ability to decrease oxidative stress, reduce prostaglandin production (which decreases inflammation), decrease endometrial cell proliferation, and increase estrogen elimination, as estrogen stimulates growth and sensitization of endometrial cells (1).

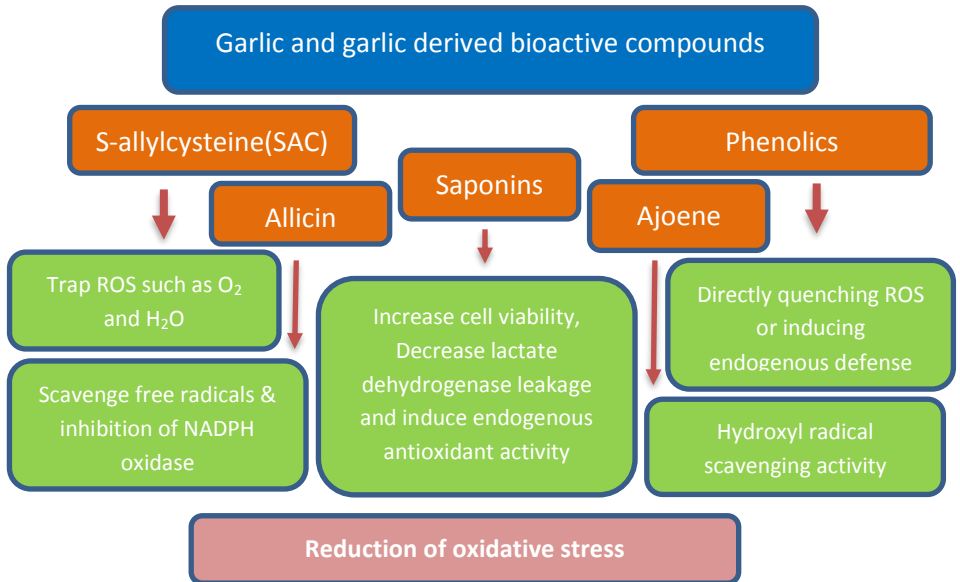


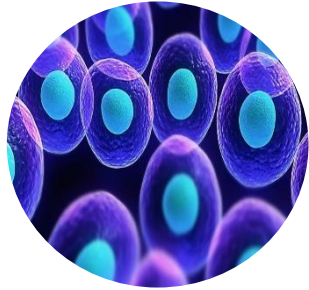
Fig1. Reduction of oxidative stress by garlic and bioactive components in hypertension and associated cardiovascular complications.

Reference:

1-Ahmed, N., Research Update: The Effect of Garlic Tablets on the Endometriosis-Related Pains: A Randomized Placebo-Controlled Clinical Trial.

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weight loss

The effect of garlic on weight loss

The allyl-containing polysulfides in garlic have been found to be responsible for increasing thermogenesis. These compounds enhance thermogenesis by increasing noradrenaline secretion via beta-adrenergic stimulation, enhance noradrenaline and adrenaline excretion, and reduce body fat accumulation by increasing triglyceride catabolism by the elevation of thermogenesis in brown adipose tissue (BAT) and increasing uncoupling protein (UCP) (1,2).

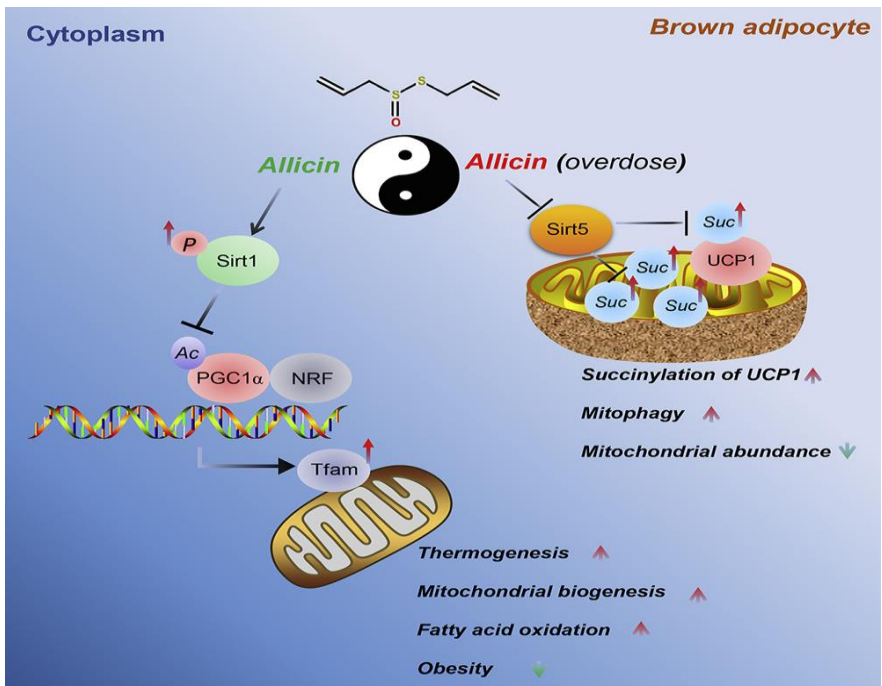


Fig1. Allicin Regulates Energy Homeostasis through Brown Adipose Tissue (2).

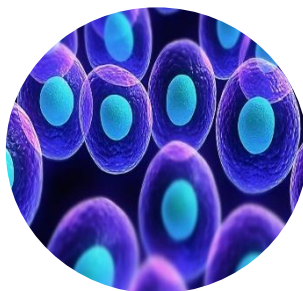
Reference:

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2-Zhang, C., He, X., Sheng, Y., Xu, J., Yang, C., Zheng, S., Liu, J., Li, H., Ge, J. ang, M. and Zhai, B., 2020. Allicin regulates energy homeostasis through brown adipose tissue. *IScience*, 23(5), p.101113.

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Fatty Liver

The effect of garlic on Fatty Liver Disease

Some preliminary evidence of hepatoprotective effects of garlic. preliminary evidence suggests S-allyl cysteine might ameliorate doxorubicin-induced cardiac and hepatic toxicity (1). S-allylmercaptocysteine is an effective and safe hepato-protective complimentary agent against Alcoholic liver disease partly through the direct binding of INSR and partial regulation of the IRS-1/AKT/GSK3b pathway (2). The pooled results showed that garlic significantly decreased hepatic triglyceride and cholesterol, ALT, AST, and liver weight (3).

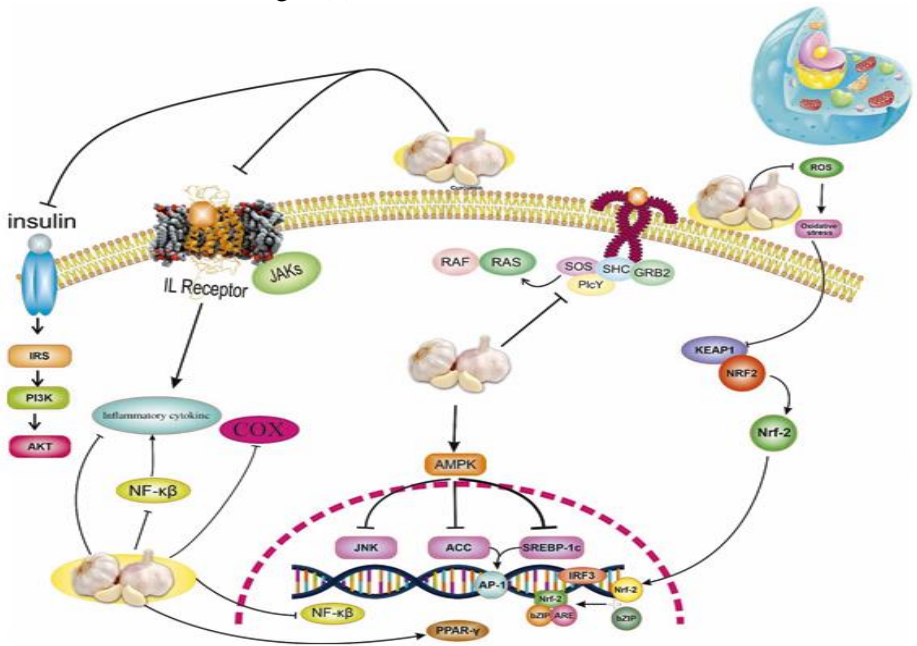


Fig1. Mechanism of action garlic on a biochemical pathway in NAFLD

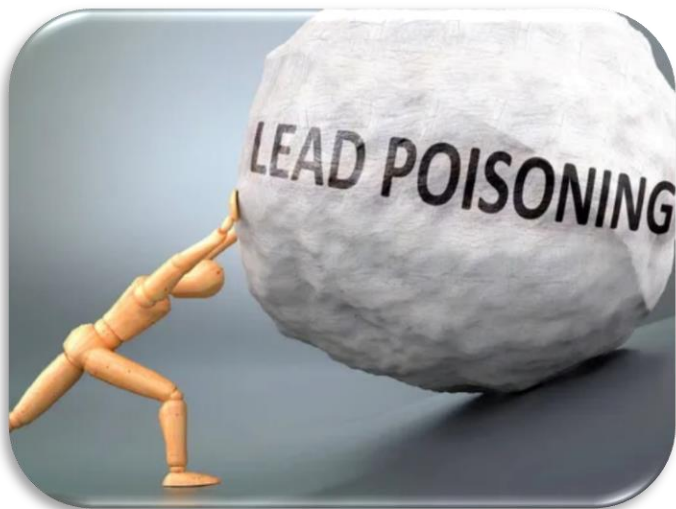
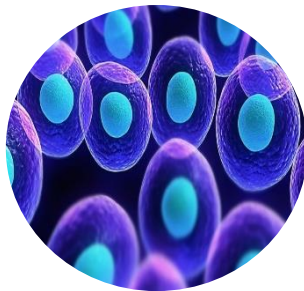
1- www.naturalmedicines.therapeuticresearch.com/

2- Luo, P., Zheng, M., Zhang, R., Zhang, H., Liu, Y., Li, W., Sun, X., Yu, Q., Tipoe, G.L. and Xiao, J., 2021. S-Allylmercaptocysteine improves alcoholic liver disease partly through a direct modulation of insulin receptor signaling. *Acta Pharmaceutica Sinica B*, 11(3), pp.668-679.

3- Xiao, J., Ching, Y.P., Liang, E.C., Nanji, A.A., Fung, M.L. and Tipoe, G.L., 2013. Garlic-derived S-allylmercaptocysteine is a hepato-protective agent in non-alcoholic fatty liver disease in vivo animal model. *European Journal of Nutrition*, 52(1), pp.179-191

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lead poisoning

The effect of garlic on reducing lead and lead poisoning in the body

Garlic is recommended as an active antioxidant against heavy metal-induced toxicities. It might act as a lead chelator and enhance the excretion of lead and other heavy metals from the body. Garlic is a phytoantioxidant that can counteract the deleterious effects of lead nitrate.

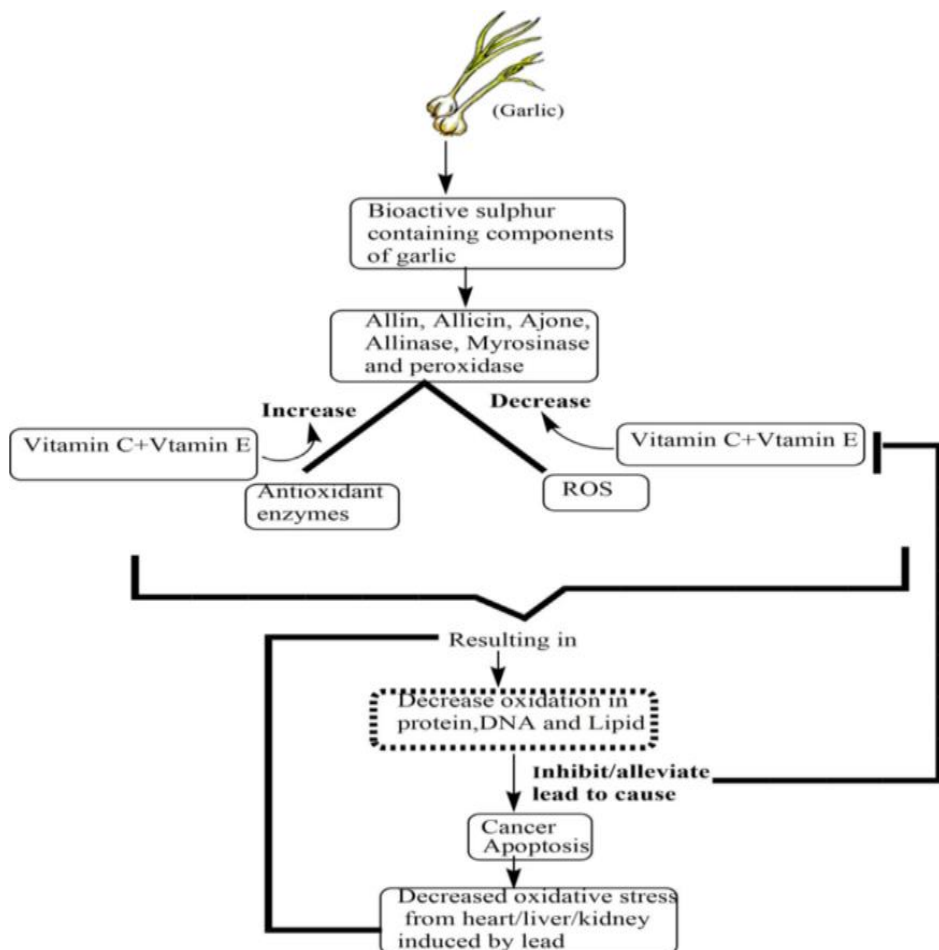
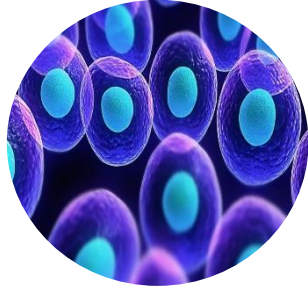


Fig1. Mechanism for alleviation of lead toxicity through garlic

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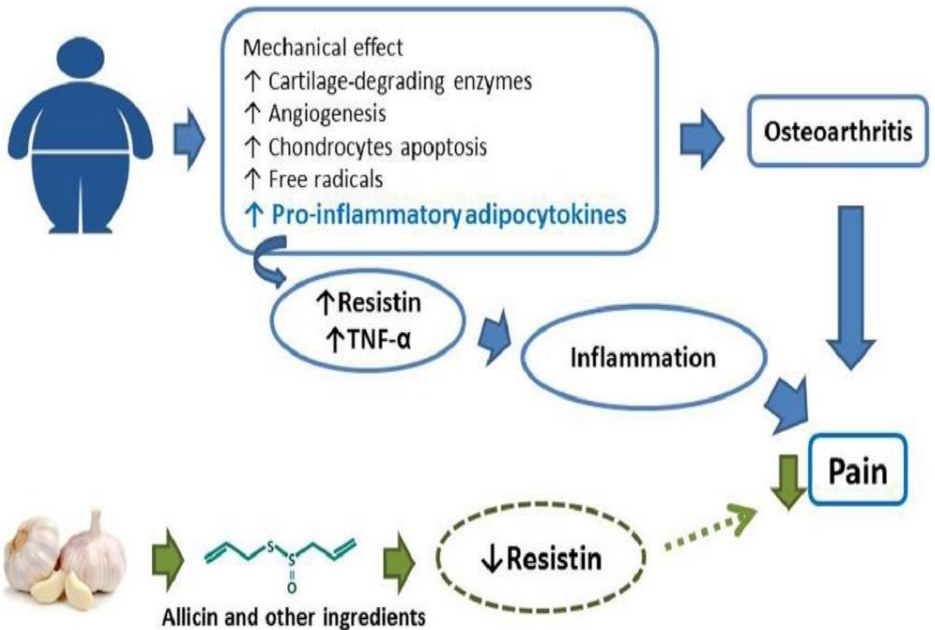
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Bone health

The effect of garlic on bones and cartilages

Garlic may reduce pain intensity in overweight or obese women with knee osteoarthritis, possibly through reduction of pro-inflammatory adipocytokines. In addition, garlic supplementation significantly improves joint symptoms in obese women with knee OA (1,2,3).



Mechanism of reduce pain intensity in overweight or obese women (1)

Reference:

- 1-Victor Preedy, R.W., 2019. Bioactive food as dietary interventions for arthritis and related inflammatory diseases.
- 2-Chen, Y., Xue, R., Jin, X. and Tan, X., 2018. Antiarthritic activity of diallyl disulfide against Freund's adjuvant-induced arthritic rat model. *Journal of Environmental Pathology, Toxicology and Oncology*, 37(4).
- 3-Aghamohammadi-Dawood,2020, Nutraceutical supplements in management of pain and disability in osteoarthritis: a systematic review and meta-analysis of randomized clinical trials. *Journal of scientificreports, nature*