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## IMMUNOMODULATORY AND IMMUNOSTIMULATING PROPERTIES OF GINSENG ROOT IN VARIOUS LIVER DISEASES

**Abstract:** Immunology is one of the rapidly developing disciplines in the modern era. As the efficacy of simple chemical drugs in the treatment of immune diseases is unsatisfactory, the need for traditional medicine drugs to improve immune function is becoming more and more relevant. Which plays an undeniable role as well as, preferentially improving the body's immune function. Ginseng (*Panax ginseng*) is a perennial herbaceous plant of the Araliaceae family and has a wide range of pharmacological activity. It can nourish and fortify the body, regulate the central nervous system, improve heart, liver and kidney function, strengthen the body's immune function and resist cancer and oxidation. Ginsenoside Rg1 is one of the main active ingredients in ginseng. Its steroidal structure is similar to that of sterol hormones and has many pharmacological properties including digestive, nervous, endocrine and immune systems.

**Keywords:** cerebral circulation disorder, atherosclerosis, stroke, cerebral brain.

## INTRODUCTION

In recent years, the "strengthening therapy" of traditional medicine has been unanimously recognized worldwide for the body's immunity. Research and development of immune function products is also one of the main directions of medicine. There are many kinds of traditional medicines that can improve the body's immune function. At the same time, there is no systematic sorting and in-depth analysis of traditional medicines with similar effects.

Immunity is the body's ability to recognize and eliminate foreign invading objects (viruses, bacteria, etc.), and to fight against such cells as aging, damage, death, degeneration, mutation and viral infections. It is the body's physiological response to the exclusion of "foreigners", and it is also its own body. Ginseng has a very significant effect on increasing the body's immunity, improving the hematopoietic function of the bone marrow, increasing the number of leukocytes, and strengthens the body's immunity. Humoral immunity provides immune protection through the above mechanisms and actually plays a role in improving the body's immune function. An American experiment on humoral immunity used the detection of antibody-producing cells and the determination of hemolysin in serum. The study of the American laboratory proved an increase in mouse antibodies as well as the number of cells that doubled the amount of hemolysis, but did not increase the number of hemolytic plaques. It has been proven that ginseng improves immune function and has a certain effect on the "innate immunity" and "acquired immunity" of the human body. Mainly supplements the loss of human substances, increases human functional activity, raises immunity, eliminates the symptoms of weakness and has an obvious activation of phagocytes, the function of the reticuloendothelial system of the body. Increases the viability of macrophages and accelerates the removal of foreign bodies from the blood, which has a significant effect on improving the condition of the body. It can significantly promote the proliferation of lymphocytes in the body, enhance and regulate the humoral immune function of the body, form antigen-antibody complexes, neutralize exotoxins, remove foreign bodies, protect against infections caused by certain pathogens.

In recent years, many pharmacists have conducted many studies on improving the immune function of traditional Chinese medicine, and have achieved fruitful results. American ginseng has the advantages of high safety, few side effects, low price and long-lasting effect in improving the body's immune function, so it has good development prospects and significant social benefits.

## METHODS

Liver disease is a serious disease all over the world, it can be caused by many factors, including hepatitis virus, chemicals (alcohol, drugs, etc.). Metabolic disorders and cholestasis. Since the liver is the most important organ of metabolism and detoxification in the body, it is more seriously damaged by metabolic toxicity than other tissues and organs. At present, many liver-protective drugs are widely used, but some of them may have side effects. Natural products derived from traditional herbal medicines have attracted much attention as effective and safe alternative treatments for liver diseases, one of which is ginseng root, which contains Ginsenoside Rg1, which has significant hepatoprotective effects and can be used as a good anti-inflammatory agent. In recent years, a number of studies have investigated the pharmacological effects of Ginsenoside Rg1 in various liver injury models and liver fibrosis models of liver injury and liver fibrosis.

Nowadays, the phenomenon of alcohol abuse in society is becoming increasingly serious. Various types of acute and chronic alcoholism, alcoholic fatty liver disease, alcoholic hepatitis (AH), liver cirrhosis and even liver cancer caused by alcohol consumption seriously threaten human health. After drinking a large amount of alcohol, the concentration of ethanol in the blood increases significantly. Oxidative metabolism of ethanol in the liver is impaired, and a large number of active free oxygen radicals are produced, causing mitochondria and lipid peroxidation, which leads to severe diseases. liver tissue damage. In addition, the process of ethanol metabolism is accompanied by the formation of acetaldehyde, and acetaldehyde is a toxic substance that can cause energy metabolism disorders in the liver. Metabolites such as acetaldehyde and intestinal lipopolysaccharide (LPS) mediate the release of inflammatory factors "cascade effect", which aggravates hepatocyte necrosis. It is widely accepted that the primary mechanism of alcohol-induced liver damage is through free radical oxidative stress leading to liver damage and inflammation.

## RESULTS

### Alcohol-Induced Liver Injury

Alcoholic liver disease (ALD) is a global disease that is second only to viral hepatitis, so there is an urgent need for a drug that can prevent and treat ALD without toxic side effects. Ginsenoside Rg1 is a monomer derived from ginseng that is used in traditional medicine. The toxic effects of different concentrations of ginsenoside Rg1 were tested on HepG2 and PC12 cell lines, and the results showed that Rg1 has no toxic and side effects in vitro. In vivo experiments also show that Rg1 can improve the survival of liver injury induced by alcohol in mice. Ginsenoside Rg1 is safe and effective.

### Thioacetamide-induced liver injury and liver fibrosis

Ginseng ingredient Ginsenoside Rg1 can also improve the symptoms of thioacetamide (TAA)-induced liver injury in rats and effectively reduce fibrosis indices in serum, hyaluronic acid (HA) and serum precollagen (serum precollagen-III, pCIII), laminin (LN) and transaminases reduce the content of active substrates of thiobarbituric acid in rat liver. Hepatic stellate cells (HSC) play an important role in the process of liver fibrosis. In cultured hepatic stellate cells, ginsenoside Rg1 significantly inhibited the formation of reactive oxygen species and platelet-derived growth factor-BB (PDGF-BB)-

stimulated cell proliferation and activation. In addition, ginsenoside Rg1, by reducing NF- $\kappa$ B – suppresses the expression of B active  $\beta$ - platelet-derived growth factor receptor (PDGFR). According to the American laboratory, studies have shown that HSC in triggering the activity of the PDGFR-beta promoter, the NF- $\kappa$ B signal plays an important role. These results also show that ginsenoside Rg1 has antioxidant and anti-inflammatory effects. Thus, the main mechanisms of action of ginsenoside Rg1 against liver fibrosis:

- ①Increasing the antioxidant and anti-inflammatory abilities of the body to reduce histological abnormalities of the liver and mitochondrial damage;
- ②Promoting the synthesis of nucleic acid and protein to repair liver damage; To prevent excessive deposition of extracellular matrix.

### Acetaminophen Liver Injury

Acetaminophen (APAP), also known as paracetamol (acetaminophen), is an acetanilide antipyretic and analgesic drug with a wide range of clinical applications. At present, APAP-induced liver injury has attracted much attention from researchers. In APAP poisoning, the liver is seriously damaged, the liver lobules are necrotic, and the cellular framework is destroyed. Electron microscopy results also showed that ribosome loss, cytoplasmic matrix swelling and aqueous vacuolar degeneration of the endoplasmic reticulum, loss of mitochondrial function, and a significant increase in serum biochemical parameters. Currently, the most commonly used antidote in clinical practice is N-acetylcysteine (NAC), which can alleviate the symptoms of APAP liver injury. Researchers have shown that Korean red ginseng (KRG) can effectively avoid APAP-induced hepatotoxicity and reduce mortality by regulating metabolism. In addition, the main active ingredient of ginseng, ginsenoside Rg1, can better reduce APAP-induced liver damage. Ginsenoside Rg1 can improve the antioxidant capacity of HepG2 and HEK293 cells after APAP treatment, and significantly increase the activities of antioxidant enzymes GSH-PX, GSH, and CAT; It can inhibit the activity of caspase-3, caspase-8 and caspase-9, and reduce the rate of cell apoptosis and mainly suppress early apoptosis. In addition, by treating cells with Nrf2 siRNA and then using APAP to model, it was found that the expression of antioxidant proteins Nrf2, HO-1, NQO1, GCLC and GCLM was significantly suppressed, while Rg1 could slow down the decrease in protein expression, but when Nrf2 was knocked out. After deletion or knockout, the protective effect of Rg1 was weakened.

## DISCUSSION

### Effect of Ginsenoside Rg1 on Immune-Induced Liver Injury

Concanavalin A (concanavalin A, Con A) in concanavalin A is a plant lectin that mediates cellular liver injury. Con A causes liver injury and leads to a rapid increase in transaminases in mice, accompanied by a large number of immune cells such as T cells, NK cells, and eosinophils that accumulate in the liver and also promote inflammatory cells. Factors (such as IL-6, IFN- $\gamma$ , TNF- $\alpha$ ) and chemokines are released to accelerate liver injury. Rg1 has a natural antioxidant effect and regulates immune function. Rg1 can reduce the levels of inflammatory factors IFN- $\gamma$  and TNF- $\alpha$  in the serum of mice with immune-induced liver injury. Rg1 can also selectively increase the proliferative ability of lymphocytes, as well as the expression and release of IL-2 to mediate immune response. In addition, Rg1 significantly reduced the degeneration and necrosis of liver cells and cell membranes, inflammatory cell infiltration, significantly improved liver tissue pathology, and reduced serum ALT and AST in mice.



**Effect of Ginseng Root on Viral Hepatitis and Liver Cancer**

Ginseng has antitumor effect. Ginsenoside Rg1 can inhibit the invasion and migration of cancer cells, and effectively regulate various oncogenes and tumor suppressor genes, thus exerting anticancer effect. And also, it can improve the immunity of cancer patients by regulating the proportion of lymphocyte subpopulations, increasing the proliferation ability of peripheral blood lymphocytes, etc. It can also promote chemotherapy and enhance the effect of chemotherapeutic drugs. Rg1 has good inhibitory activity against human liver cancer cells. However, there are few studies on ginsenoside Rg1 in vivo in liver cancer, which needs further study. Ginsenoside Rg1 has an immune adjuvant effect on mice immunized with hepatitis B surface antigen (HBsAg). This adjuvant activity enhances Th1 (IgG2b and IFN- $\alpha$ ) and Th2 (IgG1 and IL-4) responses and triggers Th1 and Th2 immune responses through the TLR4 signaling pathway, thus providing a feasible way to develop a new type of hepatitis B virus immune adjuvant.

The ability of herbal preparations such as ginseng root to improve human cognitive activity, long known from the experience of oriental medicine, has not only been confirmed in recent years, but has also been well substantiated at the cellular level using modern methodological approaches.

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