

## **Prospects for the creation of drugs with *Echinacea purpurea***

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The search for new medicines that affect the immune system led to the fact that scientists were able to isolate biologically active substances with immunostimulating effects from various herbs, seaweeds, animals, microorganisms. Herbal immunostimulants became very popular at the beginning of the 20th century. They were used as antibacterial, wound-healing, anti-inflammatory and immunostimulating agents for infectious-inflammatory and dermatological diseases. Currently, immunotropic drugs are classified by origin into three types: natural exogenous (microbial and plant origin); natural endogenous (cytokines, immunoregulatory peptides); synthetic. Species of the genus *Echinacea* (*Echinacea*) belong to natural exogenous herbal remedies that stimulate the body's nonspecific defense. But the most famous and widely used species in medicine is *Echinacea purpurea*.

*Echinacea purpurea* (*Echinacea purpurea* (L.) Moench) is a perennial herb of the Asteraceae family. The species is native to the Northern United States and Southern Canada. For medical purposes, the root and grass and inflorescences are used. Roots, leaves and inflorescences of the plant contain biologically active substances belonging to various classes of natural compounds [1].

It was found that the medicinal properties of echinacea drugs 3 main groups of biologically active substances determine - alkaloids, arabinogalactones and glucoproteins:

- alkaloids stimulate phagocytic activity, block cyclooxygenase and 5-lipoxygenase, which provides an anti-inflammatory effect;

- arabinogalactones induce interferon of macrophages, have antiviral and antifungal effects, are active against some protozoa (*Listeria*, *Leishmania*);

- glucoproteins stimulate the activity of  $\beta$ -cells, which is accompanied by an increase in the secretion of interleukin-1.

In addition, the pharmacological activity of echinacea is determined by the polysaccharide echinacin, which has antimicrobial, antifungal and cortisone-like effects, promotes wound healing and suppresses inflammation; sesquiterpene esters, which have an immunostimulating effect; inulin, which increases complement activity; lectins with properties to selectively and reversibly interact with carbohydrates and carbohydrate-containing polymers.

The roots and herb of *Echinacea purpurea* also contain betaine, rutin, phytosterol, resins, flavonoid glycosides, enzymes (peroxidase and oxygenase), saturated and unsaturated fatty acids, tannins, vitamin C, essential oils, amino acids, including essential ones: valine, threonine, methionine, isoleucine, leucine, phenylalanine, histidine, lysine and arginine, macro- and microelements (iron, zinc, selenium, potassium, calcium, molybdenum, silver, cobalt, nickel, barium, beryllium, vanadium and manganese). The leading group of biologically active compounds of the herb echinacea are phenylpropanoids, namely, derivatives of cinnamic acids: chicoric acid, caffeic acid and chlorogenic acid [4].

The definitive pharmacological action of echinacea preparations has not yet been studied. Recently, data on the antioxidant effect of echinacea have been obtained, which opens up prospects for the use of this plant for obtaining drugs with anti-inflammatory, antitumor, hepatoprotective, antioxidant and anti-aging activities. The identification of the coumarins that are part of echinacea

indicates the possibility of obtaining drugs with antiarrhythmic, antispasmodic and radioprotective properties. Currently, more than 70 allopathic and homeopathic preparations are obtained from plants of the Echinacea genus, which are used for the treatment and prevention of respiratory, skin, gynecological, urological diseases, septic processes, leukopenia caused by radiation or the use of cytostatics [6].

Echinacea medicines have an immunostimulating, antiallergic, antitumor effect, stimulate the synthesis of interferon, interleukin, accelerate the restoration of microcirculation, promote the healing of wounds, burns, ulcers [2].

Despite the variety of pharmacological effects of echinacea, priority is given to stimulating the body's immune responses. Studies have shown that plants of the genus Echinacea can prevent infection in conditions of weakened immunity and increase resistance to infections, especially viral ones. It is also important that they are effective in case of immune deficiency that occurs during chemotherapy, etc.

First of all, echinacea medicines are used in immunodeficiency states, as well as in diseases characterized by suppression of the functions of the immune system, including secondary immunodeficiencies, in particular, acute respiratory viral diseases, influenza, etc. Echinacea medicines are especially widely used for the treatment and prevention of respiratory infections and the genitourinary system [3].

There is information about the stimulating effect of echinacea medicines on the central nervous system, which makes it possible to recommend them for use in depression, physical and nervous exhaustion, and a decrease in sexual potency. The effectiveness of the use of echinacea in the complex therapy of heart failure has been experimentally proved. All herbal immunostimulants derived from echinacea have general pharmacological effects such as immunostimulating, anti-inflammatory and antiviral. Echinacea medicines also reduce the activity of hyaluronidase, which is produced by microbes and viruses [5].

Thus, in recent years, interest in herbal medicines, including echinacea medicines, has noticeably increased. Phytomedicines are gaining special relevance, first of all, due to their high efficiency and safety, in contrast to synthetic ones, therefore, the expansion of the range of medicinal products due to suppositories based on the herb Echinacea is very promising.

### References

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