

GLYCYRRHIZIC ACID AND ITS PRODUCTION

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Summary. It is well known that the plant of *licrisa* (Russian *salodka*, Uzbek *buyan* (or *kizilmiya*)), which is widely spread in the Middle Asia region, is dominated by biological activity against infectious (influenza, herpes, hepatitis, chlamydia) diseases. It is determined that glycyrrizic acid is responsible for this biological activity, which is included in the constituent part of licorice (especially in its roots). It has been studied that glycyrrhizic acid with other preparations, for example with *Megosin*, has a supramolecular complex, a new preparation of *Megoferon*, which induces interferon biosynthesis several times more (5120 units/ml) than *Megosin* itself.

Key words. Glycyrrhizic acid, licorice, virus, interferon, capsid, toxic, megoferon, megosin, hyporeactivity, licorice root, carbohydrate, licorice extract, licorice root syrup, medicine.

Licorice, or licorice nude, or licorice smooth, or Licorice (Latin *Glycyrrhiza glabra*, uzb. *Bo'yon* or *Qizilmiya*) - perennial herbaceous plant; species of the genus *Licorice* (*Glycyrrhiza*) family of legumes (*Fabaceae*). Licorice is widely used as a medicinal, food and technical plant, as a foaming agent.

It grows wild in France, Italy, South-Eastern Europe, North Africa, Western and Central Asia. Cultivated in many areas with a temperate climate.



Roots and rhizomes contain carbohydrates and related compounds (glucose, fructose, sucrose, maltose), polysaccharides (starch up to 34%, cellulose up to 30%, pectic substances), organic acids (succinic, fumaric, citric, apple, wine), essential oil, triterpenoids (glycyrrhizic acid), resins, steroids (β -sitosterol), phenolcarboxylic acids and their derivatives (ferulic, sivine, salicylic), coumarins (herniarin, umbelliferone), tannins (8.3-14.2 %), flavonoids (liquidoritin, isolikviritin, liquidoritoside, quercetin, kemferol, apigenin), higher aliphatic hydrocarbons and alcohols, higher fatty acids, alkaloids.

In the aerial part, carbohydrates (up to 2.13 %), polysaccharides, organic acids (up to 2.5), essential oil (0.02), triterpenoids (glycyrrhizic acid, glycyrrhetic and other steroids, β -sitosterol, glycestrone), saponin triterpenes, coumarins (1.9-2.4), tannins (5.5), flavonoids (isoquercetin, quercetin, kaempferol, etc.), lipids (6.26 %), nitrogen

compounds (choline, betaine), vitamins (ascorbic acid, carotene).

Essential oil includes aldehydes, ketones, alcohols and their derivatives, terpenoids, aromatic compounds, higher aliphatic hydrocarbons, esters of higher fatty acids.

Preparations from licorice irritate the mucous membranes, strengthening the secretion of the glandular apparatus, in connection with which it is part of the expectorant, diuretic and laxatives. This action is due to the content of saponins in the raw material, which exert an expectorant, emollient and enveloping action. Suppresses the production of testosterone [1].

Experiments on animals show that licorice preparations contribute to the healing of ulcers.

On the medicinal use of licorice is said in the ancient monument of Chinese medicine "Treatise on herbs." Chinese doctors attributed the licorice root to first-class drugs and tried to include it in the composition of all medicinal mixtures. In Tibet, it was believed that the roots of licorice "contribute to longevity and a better departure of the six senses." Plant roots were widely used in Middle Asia Avitsena.

It is used as a foaming agent in industry, in particular, for froth flotation in metallurgy and as a part of mixtures for filling fire extinguishers.

In the Caucasus and Central Asia, a decoction of the roots is colored with wool and koshmy. Liquorice is used in the manufacture of ink, carcass and rubber, in the textile industry for fixing paints.

In the tobacco industry - for flavoring and flavoring of chewing, smoking and snuff; in Japan - in the production of non-nicotine surrogate cigarettes.

Roots and rhizomes of plants in the food industry are used in the form of extracts, syrups, as a surrogate of sugar and a foaming agent in soft drinks, beer, kvass, tonic beverages; for better whipping of egg whites.

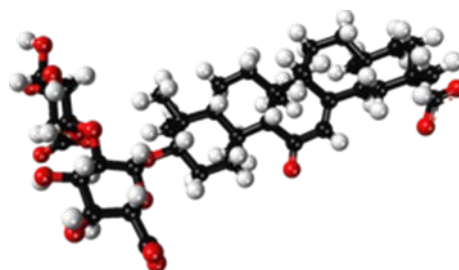
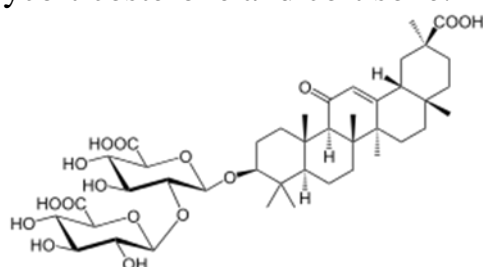
The plant is used for making coffee, cocoa, marinades, compotes, jelly, flour products, halva, caramel, pastille and chocolate; as well as as a flavoring aid in the processing of fish, when cabbage is sour, apples and cranberries are drunk, as an additive to green tea and tea; in Kyrgyzstan - as a substitute for tea, in Japan - as a food antioxidant supplement, in Japan and Egypt - among the components of additives with bactericidal and fungicidal properties for food and beverages [2].

The medicinal value has roots and rhizomes. They are part of the drugs recommended for diseases of the upper respiratory tract as expectorant, emollient, anti-inflammatory, in the composition of diuretic and laxatives, as antacid and enveloping in hyperacid gastritis, peptic ulcer of stomach and duodenum ("Lycviriton", "Flacarbin"), with bronchial asthma, neurodermatitis, allergic and occupational dermatitis, eczema ("Glitsira"), rheumatism, gout, hemorrhoids. Licorice powder is also used in pharmaceutical practice as a basis for pills and for improving the taste and smell of medicines [3].

Antiviral for external and local use. Glycyrrhizic acid is active against DNA and RNA-containing viruses, including various strains of the viruses Herpes simplex, Varicella zoster, human papillomaviruses [4], cytomegaloviruses. Antiviral action is associated, apparently, with the induction of the formation of interferon. Interrupts

the replication of viruses in the early stages, causes the virion to emerge from the capsid, thereby preventing its penetration into the cells. This is due to selective dose-dependent inhibition of phosphorylating kinase P. It interacts with virus structures, changing the different phases of the viral cycle, which is accompanied by irreversible inactivation of virus particles (in a free state outside cells), blocking the introduction of active viral particles through the cell membrane inside the cell, viruses to the synthesis of new structural components.

Glycyrrhizic acid, which contains up to 23% in licorice roots, gives them a sweet taste. This made it possible to use glycyrrhizic acid in the therapeutic diet of diabetic patients, for example, in Japan, where saccharin is forbidden. However, the corticosteroid-like action of glycyrrhizic acid seems to limit its use as a sugar substitute. Glycyrrhizic acid has an action reminiscent of the action of deoxycorticosterone and cortisone.



Glycyrrhizic acid is found in licorice roots (licorice). It is used as a food sweetener and as a part of licorice preparations, as a medicinal product. The chemical name is 20 β - carboxy- 11- oxo- 30- norolean- 12- ene- 3 β - yl- 2- O- β - D- gluco- pyranuronosyl- α - D- glucopyranosiduronic acid. Formula $C_{42}H_{62}O_{16}$. Molar mass 822.93 g/mol. [4].

From licorice a number of medicinal preparations are obtained:

- chest elixir (Latin Elixir pectorale or Elixir cum extracto Glycyrrhizae) - used as an expectorant;
- licorice root extract thick, extract of licorice root dense (Extractum Glycyrrhizae spissum);
- liquorice root extract dry, licorice root extract dry (Extractum Glycyrrhizae siccum);

Liquorice syrup (Sirupus Glycyrrhizae) - is a part of the drops of the Danish king;

- complex licorice powder (Pulvis Glycyrrhizae compositus)

In traditional medicine of the countries of the East and folk medicine of different nations, licorice is used, as in scientific medicine and, in addition, in diabetic patients, impotence, nephritis, prostatitis and prostate adenoma, whooping cough (decoction in milk), angina pectoris, cholelithiasis, hypertension, rhinitis, in the treatment of lymphogranulomatosis, leprosy. Inhibits viruses in concentrations that are non-toxic to normally functioning cells.

It also has an anti-inflammatory, analgesic and tissue regeneration-improving effect, both with early manifestations of viral infection and with ulcer forms.

We studied the biological activity of the drug Megoferon - supramolecular complex, which consists of glycyrrhizic acid and Megosin in a ratio of 2:1,

respectively. Megoferon has a high interferon-inducing activity.

In Central Asia, the plant lacritsa (Russian солодка, Uzbek – bo`yon (or qizilmiya)) is widespread, which has biological activity against viral infections like influenza, herpes, hepatitis, chlamydia. This biological activity is responsible for glycyrrhizic acid, which accumulates in lacritsa (especially in its roots). The chemotherapeutic drug Megosin is a derivative of Gossypol, which is extracted from cotton seeds.

High interferon induction of Megoferon in embryonic tissue in mice, human, and chicken has been studied. As a result, a mixture α , β and γ of interferon was obtained (Table 1).

Table 1.
Interferon inducing drug activity in fibroblast cell culture embryos of chick, mice and humans

Preparation	Interferon inducing drug activity in fibroblast cell culture embryos of, units/ml		
	chick	mice	humans
Glycyrrhizic acid, 10 mcg/ml	80	80	160
Megosin, 10 mcg/ml	128	256	128
Megoferon, 10 mcg/ml	5120	5120	2560

Potentiates the effect of gozolidone when taken together, the interferon titer in the blood of experimental animals increases to 5120 units/ml and overcomes the state of hyporeactivity of the organism.

In conclusion, Megoferon can be used in vivo and in vitro to prevent the condition of hyperactivity of an organism, as well as manage supernatant and duodenal antimicrobial activity, high levels of activity against viruses in different strains, and high levels of prophylaxis and treatment. have proven to be effective in experiments and have developed methods that are essential for medical practice [5].

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Rezyume. O'rta Osiyo mintaqasida keng tarqalgan lakritsa (ruscha – solodka, o'zbekcha – bo'yon (yoki shirinmiya)) o'simligining infeksiyon (gripp, herpes, gepatit, xlamidiya) kasalliklariga qarshi biologik faolligi borligi oldindan malum edi. Bunday biologik faollikni aynan lakritsada (ayniqsa, uning ildizi tarkibida) bo'ladigan glitsirrizin kislota namoyon etishi aniqlandi. Glitsirrizin kislota boshqa preparatlar, masalan, Megosin bilan supramolekulyar kompleks h'osil qilishi natijasida yaratilgan yangi preparat – Megoferonning interferon biosintezini induktsiya qilish darajasi (5120 bk/ml) Megosinning o'zi sintez qilgan interferonga nisbatan bir necha o'n barobarga ortiq bo'lishi o'rganildi.

Резюме. Хорошо известно, что растение лакрица (рус. солодка, узб. буян (или ширинмия)), который широко распространено в регионе Центральной Азии, преобладают биологическая активностью против инфекционных (грипп, герпес, гепатит, хламидиоз) заболеваний. Определено, что на эту биологической активности отвечает глицирризиновая кислота, который включено в составной частью лакрицы (особенно в ее корне). Изучено, что глицирризиновой кислоты с другими препаратами, например с Мегосином имеет супрамолекулярный комплекс – новый препарат Мегоферон, который индуцирует биосинтез интерферона несколько раз больше (5120 ед/мл), чем сам препарат Мегосин.

Kalit so'zlar. Glitsirrizin kislota, shirin miya, virus, interferon, kapsid, zah'arli, megoferon, megoferon, megosin, giporeaktivlik, shirin miya ildizi, uglevod, shirin miya ildizi ekstrakti, shirin miya ildizi siropi, tibbiyot.

Ключевые слова. Глицирризиновая кислота, лакрица, вирус, интерферон, капсид, токсичный, мегоферон, мегосин, гипореактивность, лакричный корень, углевод, экстракт солодкового корня, сироп солодкового корня, медицина.