UDC: 615.322.015:615.27

**THEORETICAL JUSTIFICATION OF THE SEARCH FOR POTENTIAL MEDICINAL PRODUCTS CONTAINING FOOD PLANT BIOLOGICALLY ACTIVE SUBSTANCES**

T.I. Iermolenko, N.S. Chorna, O.M. Shapoval

Kharkiv National Medical University

**Keywords:** biologically active substances, vegetable substances, raw materials from plants of celery genus, carrot roots (CR), parsnip roots (PR)

Currently it has been proved that products of natural (plant, animal, etc.) origin, although sometimes inferior to synthetic products in efficiency, but they predominate in safety. According to I.S. Chekman, et al. (2014) [1] and T.Ie. Morozova, et al. (2015) [2], and taken into account polypragmasy and application of off-label medicinal products (MP), the issue of drug safety is one of the top priorities of modern medicine.

Scientists Iu.Ie. Shymorova, et al. think that the share of food plant-based drugs in the structure of the modern pharmaceutical market is increasing steadily [3]. The wide spectrum of their action is explained by the composition of biologically active substances, the simultaneous presence of compounds of different structures (essential oils, phenols, coumarins, alkaloids, etc.). It is also important that some natural substances do not have synthetic analogues yet. Public demand for medicinal products of natural origin is not fully met due to a shortage of medicinal plant materials. Many medicinal plants, which are applied in domestic traditional medicine, have not formed industrial underbrushes for long period of time, and some of them are rare or endangered.

Therefore, in order to search and create new medicinal products it is appropriate to select the raw materials of food plants. This is due to the fact that food plants have a stable raw material base and proved harmless to the human body, because they have been applied for food for a long time and in quantities that far exceed the permissible amount in toxicology. Therefore, the use of raw material of cultivated food plants to create new MP is relevant and has several advantages: sufficient raw material base, meaningful efficiency and high safety level.

Taking into account the foregoing, the **purpose** of this work is the theoretical justification of the search for potential medicinal products based on the food plant row materials, in particular, carrot roots (CR) and parsnip roots (PR).

**Materials and methods.** Clinical and pharmacological analysis of the databases of scientific information of Ukraine and the world was conducted for the purpose of this work. Internet electronic resources were applied as sources of information: National Center for Biotechnology Information ([PubMed](https://www.ncbi.nlm.nih.gov/pubmed/), [MedGen](https://www.ncbi.nlm.nih.gov/medgen), [MEDLINE (Leasing)](http://www.nlm.nih.gov/databases/journal.html), [PubMed Central](https://www.ncbi.nlm.nih.gov/pmc/), [BLAST](https://blast.ncbi.nlm.nih.gov/), [Nucleotide](https://www.ncbi.nlm.nih.gov/nucleotide/), [Genome](https://www.ncbi.nlm.nih.gov/genome/), [SNP](https://www.ncbi.nlm.nih.gov/snp/), [Gene](https://www.ncbi.nlm.nih.gov/gene/), [Protein](https://www.ncbi.nlm.nih.gov/protein/), [PubChem](https://pubchem.ncbi.nlm.nih.gov/)), V.I. Vernadsky National Library of Ukraine, Google Scholar, Google Academy, and others. The following keywords were used as a search query: carrot roots, parsnip roots, Celery family, ethnopharmacology, folk medicine, traditional medicine, therapeutic effect. The sources of scientific information were analyzed in the form of articles in professional journals of Ukraine and the world, monographs, abstracts of theses, which contain data on the search, development, preclinical research, clinical trials, application in officinal medical practice on the basis of plant-based material with CR and PR, use of CR and PR as medicinal products in ethnomedicine and ethnopharmacology.

**Results and discussion.** The conducted study allowed to obtain results, which testify to the relevance, timeliness, expediency and prospect of search of new promising medicinal products on the basis of raw materials of food plants of the Celery genus of carrot roots and parsnip roots.

It has been shown that medicinal plants are used the most in officinal medicine for the production of medicinal products of natural origin. According to O.V. Garnaya O.V. et al. [4] it is due to the fact that the medicinal plant material contains the sum of biologically active substances, which belong to different chemical classes, subclasses, groups, and each group is represented by more than one compound with different degrees of pharmacological activity. The polyvalence of the therapeutic effect of medicinal plants is their advantage, whereas for synthetic drugs the most valuable feature is the narrow orientation, uniqueness, selectivity of action.

Herbal medicinal products occupy almost one third of the world market of medicines [5, 6]. Quite often they are special and it is almost impossible to replace them with synthetic drugs, both because of the complexity of the structure, and because the medicinal plant material contains a complex system of biologically active substances (BAS), which collectively give the biological activity of a particular direction [6]. In most cases, plant-based medicinal products are preferred in comparison to synthetic drugs of predominantly to the prevention and treatment of early stages of the disease, with chronic course of the disease, as well as in dermatology and cosmetology [7].

Degtiariova K.O., et al. consider that herbal medicinal products (HMP) are time-proved and applied in the medicine for improvement and prevention of human diseases [8]. People have been applying plants as the only and most effective way of folk treatment for a long time. Currently, herbs are replaced by phytopreparations, which occupy a prominent place in modern pharmacotherapy. Phytopreparations contain substances isolated from plants, purified complexes of natural substances, infusions, decoctions, tinctures, extracts. Pure substances of plant origin, which contain phytopreparations, and their characteristics are fully consistent with synthetic agents. Natural substances that contain phytopreparations are close to the human body, from which the peculiarities, which are taken into account in the process of their experimental and clinical research. In addition, HMP have low toxicity at a rather high efficiency, have a wide range of therapeutic effects, minimum side effects, relatively cheap cost compared with synthetic drugs [8].

Therefore, in order to expand the nomenclature of Ukrainian herbal medicinal products, pharmacographists of National University of Pharmacy have created from the raw materials of from plants of celery genus the dense extract from carrot roots and dense extract from parsnip roots, and have provided the extracts to the scientists of the Department of Pharmacology and Drug Prescription of Kharkiv National Medical University for pharmacological study.

Dense extract products are applied as medicinal products due to the fact that extracts are one of the oldest forms of folk medicine [8]. The process of plant material extracting shall be considered as a variety of physical and chemical processes that take place both inside the cell and on its surface. Along with the dissolution processes there are phenomena of diffusion, osmosis, adsorption, etc. All these processes affect the composition of BAS contained in the extract, and, accordingly, their pharmacological properties.

The choice of CR for the purpose of creating a potential medicinal product is conditioned due to the specific composition of BAS, which explains the widespread application of CR not only in food as a nutritional culture, but also with the therapeutic purpose in folk medicine [9]. The work of Paziuk D.M.V. et al. [9] contain the data that carrot seed (*Daucus carota L. subsp. sativus* (Hoffm.) Roehl.) of the celery family (*Apiaceae*) is rich in different classes of biologically active substances, among which there are carotenoids (α-, β-, γ-, ξ-carotin), vitamins (thiamine, riboflavin, niacin, folic acid, vitamin C and E), minerals (potassium, calcium, phosphorus, ferrum, magnesium, zinc, etc.), pectin substances, volatile and phenolic compounds , etc. [9]. The application of carrots is prescribed for diseases of the cardiovascular system (myocardial infarction, atherosclerosis), urinary tract, with diseases associated with mineral metabolism disorders (polyarthritis, osteochondrosis), for the prevention of certain forms of cancer. Сarrots are used as an auxiliary therapeutic agent for conjunctivitis, keratitis, blepharitis, for the treatment of chronic skin diseases, purulent wounds, burns, for enhancing the resistance of the body to colds, etc. [9].

The work of Chandra P. et al. [10] confirms that plants were a valuable foundation for the creation of new drugs and were considered as an alternative strategy for the search for new drugs. The data shows that in Indo-China carrots are used to regulate the functions of the stomach and intestines. Scientists have shown that the extract derived from *Daucus carota* has analgesic, anti-inflammatory, antifermental, antitumor, hepatoprotective, antihypertensive, antispasmodic, antibacterial and hypoglycemic properties, inhibits monoamine oxidase and enzyme cyclooxygenase [10, 11].

The study of Sodimbaku V. et al. [12] was aimed at studying the nephroprotective properties of alcoholic extract from carrot roots under conditions of gentamicin-induced nephropathy in white rats. It was found that intoxication with gentamicin induced a significant (P <0,01) increase in urea concentration in serum, blood urea nitrogen, uric acid and creatinine. In groups receiving alcoholic extract from carrot roots, a dose-dependent decrease in the concentration of these parameters was observed, which was confirmed by histological studies. This indicates a significant dose-dependent nephroprotective effect of alcoholic extract from carrot roots under conditions of gentamicin-induced nephropathy [12].

In the publication [13] scientists Shebaby W.N. et al. prove that their previous studies have shown that the oil extract from wild carrots has in vitro and in vivo antitumor activity. According to the published study the carbohydrate carboxy pentane-diethyl ether fraction (F2) shows improved selective cytotoxicity against the oncogenic variants of NaCaTa-Ras compared to neoconogenic НаСаТом by human keratinocytes by inducing caspase-dependent cell death through activation of apoptosis. The antitumor activity of F2 was also confirmed in vivo using a DMEC/TPA carcinogenesis model in mice. The data show that F2 fraction of pentane-diethyl ether of carrot has a significant anti-tumor activity against DMBA/TPA-induced carcinogenesis of the skin [13].

The purpose of the study of Soares GR [14] was assessment of the preventive potential of the carrot extract against carcinogenesis in the tongue of rats induced by 4-nitroquinoline-1-oxide (4NQO). It has been proved that the carrot extract is capable of protecting the tissues of the oral cavity of rats from the damage induced by 4NQO due to antioxidant, anti-inflammatory, antiproliferative and anti-mutagenic activity [14].

Scientists Blando F., Calabriso N., Berland H. investigated the in vivo biological activity of anthocyanins from different types of plant row materials, including carrot roots, their effect on human endothelial cells [15]. It has been found that anthocyanins reduce the expression of endothelial inflammatory antigens, which indicate their potential positive effect on cardiovascular protection and anti-inflammatory activity. Also, their antiradical and antioxidant effects have been proved [15].

Scientists Attiq A. et al. analyzed literary data on the effects of natural drugs on the processes of inflammation [16]. In this work, it has been shown that the high content of essential oils present in the carrot roots, is responsible for most of their pharmacological effects. The results of the study of determination of the mechanisms of anti-inflammatory activity of essential oils isolated from carrot roots have shown that 2,4,5-trimethoxybenzaldehyde, oleic acid and trans-azarone inhibit the activity of COX-2 by 52,69, 68,41 and 64,39% and did not show significant activity against COX-1 [16].

Parsnip roots have been chosen to obtain a dense extract and further pharmacological studies given that the parsnip contains the following BASes: fatty oil (0.5%), essential oils (up to 3.5%), uronic acids, pectin substances (7, 3%), starch (4%), carbohydrates (arabinoza, galactose, xylose, mannose, rhamnose, sucrose, fructose) (8.6-10.6%), ascorbic acid (5.40 mg%), nicotine (0, 94 mg%) and pantothenic acid (0.5 mg%), riboflavin, thiamine, carotene (0.03 mg%), mineral salts: potassium (342 mg%), phosphorus (69 mg%) [17, 18]. The presence of the named BASes in CR leads to their use in folk medicine as means of sexual stimulation, increases appetite, with hallucinations, as an analgesic with renal, hepatic and gastric colic, as an antitussive and for softening and sputum production. Infusion and broth of root crops are prescribed with cough to soften it and sputum production, as well as for edema and as a painkiller. Aqueous infusion of planted parsnip roots with sugar is used to excite appetite and as a tonic during rehabilitation after severe diseases [17, 18].

According to Shymorova Iu.Ie. et al. in phytochemical terms, the most valuable active substances of planted parsnip (*Pastinaca sativa*) are furocoumarins and essential oils [3,18]. Along with furocoumarins, which exhibit photosensitizing properties, one can distinguish a complex having antispasmodic activity (bergapten, osthol, sphondin, isopimpinellin, imperatorin), which has prospects for further study and production of new drugs in the cardiological profile. In recent decades, polyacetylene compounds of the family of celery, with which many researchers attribute the anticancer, anti-inflammatory, antibacterial and other types of pharmacological action, are actively studied. These compounds include falcarinol (C17-polyacetylene), which is contained in the roots and leaves of planted parsnip [3,18]. An analysis of the data conducted by Shymorova Iu.Ie. et al. [3], suggests that the planted parsnip is capable of maintaining the potential for the accumulation of sufficient concentrations of biologically active compounds (xanthotoxin, bergapten, imperatorin, psoralen) and to be the raw material producer of new drugs for the treatment of skin diseases. It is shown that the Ukrainian market of dermatological products of plant origin is in acute need of photosensitizing medicinal products. Antimicrobial and fungicidal properties of essential oils of planted parsnip, which require further detailed study, are also of interest [3].

“Ethnopharmacology of Love” article by Leonti Marco and Laura Casu contains data about the fact that parsnips were used in the field of ethnomedicine as aphrodisiacs and for the treatment of erectile dysfunction [19].

Scientists Degerli S. et al. have proved that the aqueous extract of parsnip 32.00 mg/ml in vitro destroys 40.3% and 23.0% of trophozoites and cysts of amoebae, respectively, and exhibits amebicidal activity [20].

Mahdizadeh S. et al. have published the results of the study of The Canon of Medicine by Avicenna with the purpose to find anti-inflammatory and analgesic drugs presented in this encyclopedia [21]. The authors state that parsnip raw materials were used as an anti-inflammatory and anesthetic for oral and topical use for the treatment of headache, fever, dermatitis, stomatitis, conjunctivitis [21].

Palamarchuk O.P. [22] has presented the results of a comprehensive study of morphobiological and biochemical characteristics of 6 species of the genus of *Pastinaca L*. and their antimicrobial activity is determined.

By virtue of the data above, it would be more useful to make an analysis of scientific works of domestic scientists that characterize the current state of search in Ukraine of new drugs, in particular, drugs with reparative action, based on plant material, which are promising for the treatment of skin lesions of diverse etiology. Therefore, a search was made in domestic bases of scientific information on the search, creation and application in medical practice of plant-based medicinal products for the treatment of skin lesions.

Thus, Rekhletska O.V. has worked upon the composition, technology and study of phytopreparations from common birch (*Betula verrucosa*) to treat infectious skin diseases [23]. It has been established that liquid extracts of kidneys and leaves of common birch and lotion based on them are active against strains of *S. aureus, S. epidermidis, Str. faecalis, Candida albicans* microorganisms, and their application are microbiologically and toxicologically safe [23].

Scientist Ruban O.A. has developed scientific and methodical approach to the development of medical forms based on black currant polysaccharides [24]. The composition and technology of “Glucuronic” ointment on the emulsion basis for the treatment of skin diseases of allergic genesis have been developed [24].

Chorna N.A. has justified theoretically and experimentally the composition and rational technology of manufacturing a new homeopathic ointment formulation containing matrix infusions of bee venom and propolis, as well as volatile nut oil [25]. In the experiment in laboratory animals, she proved the promising use of a homoeopathic ointment of combined action under the conventional name “Api-derma” for the treatment of allergic contact dermatitis [25].

Kovalev V.V. has justified theoretically and experimentally the composition and technology of manufacturing a new medicinal product in the form of an ointment “Phyletol” containing plant antiseptics (dense chlorophyll extract) and synthetic (ethacridine lactate) origin and reparant - dexpanthenol [26]. Scientist Soleiman A. conducted a pharmacological study of the combined ointment “Phyletol” [27]. The experiments have established wound healing, antimicrobial and anti-inflammatory effects of the ointment “Phyletol”. By the established spectrum of pharmacological action, “Phyletol” ointment can be recommended for local treatment of wounds and superficial skin burns of the first and second stages of the wound process, non-allergic contact dermatitis [27].

Garkavtseva O.A. has justified the composition and technology of the “Dermalik” ointment for the treatment of atopic dermatitis [28]. Pharmacological and microbiological studies have established anti-inflammatory, antiallergic and antimicrobial effects of the drug [28].

Bezditko K.P. has studied “Estan” ointment, which contains an extract of horse chestnut (*Aesculus hippocastanum*) seed, an oak bark extract, and lidocaine hydrochloride, which was created to treat hemorrhoids [29]. It has been shown that “Estan” ointment has anti-inflammatory, analgesic, reparative, locally anesthetizing, antimicrobial, vessel-protective effect. The ointment has a high degree of safety, does not show allergic and anti-dandruff effects. According to the spectrum of pharmacological action, “Estan” ointment corresponds to the directions of pharmacotherapy for hemorrhoids [29].

Pavkh O.I., on the basis of the analysis of the results of technological, physical and chemical, biopharmaceutical, microbiological and biological researches, has developed the optimal composition and justified the rational technology of soft nasal form in the form of emulsifier with herbal infusions and essential oils [30]. According to the results of pharmacological studies antimicrobial, anti-inflammatory and reparative activity of “Rhynitistop” ointment has been established [30].

Havkaliuk M.I. has developed the optimal composition and justified the rational technology of an anti-cellulite medicinal cosmetic agent on an emulsely basis with plant extracts and essential oils [31]. Pharmacological studies have established the anti-edema and capillary-protective properties of the ointment, which will have an impact on the main pathways of cellulite pathogenesis [31].

Nazen B.M. has found that the oil of grapes seeds has clear anti-inflammatory and reparative effect [32]. It has been shown that the oil of grapes seeds has a high degree of safety, does not exhibit locally irritating and allergic action [32].

Burd N.B. has conducted systematic phytochemical, pharmacological and anatomical study of some representatives of the genus Amaranthus of flora of Ukraine [33]. The optimum conditions for obtaining a complex of lipophilic substances from the above-ground part of the amaranthus have been justified. It has been established that the lipophilic fraction of amaranthus and cream on its basis have anti-inflammatory and wound healing effects [33].

The thesis of Kuchynska I.V. is dedicated to the study of pharmacological activity of new ointments based on chloroform and freon extracts of the lipophilic complex from aspen bark “Tremulin” [34]. For the first time anti-inflammatory, antimicrobial, analgesic, reparative effects of the ointments under study were justified theoretically and proved experimentally [34].

The work of Khalavka M.V. is devoted to the development of soft compound medicinal product based on the dry extract of licorice root, anesthetic and nitazolum “Glitacid” ointment [35], and the study of Berezniakov A.V. is devoted to the pharmacological study of anti-inflammatory and reparative properties of this medicinal product [36]. “Glitacid” ointment is safe, exhibits pronounced reparative and anti-inflammatory properties, which are confirmed by increased durability of postoperative scars of aseptic and infected linear wounds, accelerated processes of cleaning of full-wound skin wounds, increased speed of epithelization of the plane wound, inhibitory action on the activity of nutrient amines, cyclooxygenase and lipooxygenase metabolism of arachidonic acid [36].

Serdiuk Ie.V. has developed a scientific and methodical approach to the creation of an ointment complex action with the content of plant-based row materials for the treatment of wounds in the first phase of the wound process [37]. The composition of “Phraxyd” ointment with the contents of a thick extract of ash tree bark and benzoin has been justified theoretically and experimentally. Preclinical studies of the developed ointment have been carried out and the specific reparative activity and harmlessness of the preparation have been proved [37].

Scientist Khokhlenkova N.V. on the basis of physical and chemical, technological, biopharmaceutical, pharmacological and microbiological studies of a thick extract of oak bark has conducted a pharmaceutical development of “Biotanin” and “Bioflorin” ointments on its basis, and “Algi-Cord” napkins for complex treatment of wound process. The stability and pharmacological activity of the developed drugs have been proved [38].

The work of Tkachova O.V. is devoted to pharmacological study of new combined preparations with active components of natural origin and justificationof their application in different phases of the wound process (WP) [39]. It has been established that the spectrum of pharmacological action substantiates the use of “Prolidoxid” ointment for the treatment of purulent wounds and superficial skin burns in the first phase of the WP and in the transition in the second phase, “Bioflorin” ointment is for pharmacotherapy in the II-III phases of the WP, “Zhyvitan” gel - in ІІ-ІІІ phases of WP and venous trophic ulcers affected by chronic venous insufficiency [39].

The thesis of Horlachova V.I. is devoted to the search and development of technology of a new cream with wild carrot seeds lipophilic extract (WCSLE) for the treatment of mild burn wounds [40]. Preclinical pharmacological studies have shown wound healing activity and safety of WCSLE and cream from WCSLE [40].

The thesis of Kran O.S. is devoted to the creation of a new combined drug for local wound healing in the second phase of the gel-shaped wound process for use in therapy and surgery [41]. Pharmacological and microbiological studies have established the antiallergic, reparative and antimicrobial effects of the drug [41].

Scientist Esam Zurgani Ahmed Zeghdani has conducted a pharmacological study of a new combined “Allergolic” ointment on the basis of a dry extract of licorice root intended for the pharmacocorrection of allergic dermatitis, including those complicated by secondary fungal infection, and established anti-inflammatory, antiallergic, immunotropic and antimicrobial activity and some mechanisms of it therapeutic action [42]. Toxicological studies have proved that the combined “Allergolic” ointment is safe, does not show locally irritating, allergic and toxic skin resorptive action [42].

Therefore, taking into account the above results of the analysis of the results of the research of Ukrainian scientists, we can conclude that the search and pharmacological study of new potential medicinal products for the treatment of skin lesions containing biologically active substances from plant-based raw materials continues. But the presented data indicate that the use of food plants as a source of BAS is very limited and does not correspond to their high potential.

**Conclusion.**

1. Within the process of theoretical justification by the analysis of domestic and world databases of scientific information the expediency and relevance of the search for potential medicinal products containing biologically active substances of natural origin, among the raw materials of food plants of the celery family, in particular, planted carrots and planted parsnip have been proved.
2. It has been established that plants of celery genus planted carrot and planted parsnip, having powerful, affordable and cheap raw material base, are the sources of substances containing the amount of biologically active substances promising to create on their basis new drugs with cytoprotective, anti-inflammatory, nephroprotective, wound healing, reparative action.
3. It has been proved that the search, creation and pharmacological study of new drugs based on food plant raw materials, in particular planted carrot roots and planted parsnip roots, for the purpose of introduction into medical practice for the treatment of skin lesions, are relevant, expedient and timely.

References

1. Chekman I.S., Matveieva E.V., Zagorodny M.I., Grebelnik A.I., Replianchuk N.D. “Benefit-risk” in pharmacotherapy: state of the problem, method of solution. Rational pharmacotherapy. 2014. No. 4 (33). P. 5-9.
2. T.E. Morozova, Khoseva E.N., Andrushchyshyna T.B., Vartanova A.A. Control of security funds in terms of medical preventive institutions: problems and prospects of development. Consilium medicum. 2015. Vol.17 No.1. P. 50-53.
3. Shimorova Yu.E., Kislichenko V.S., Kuznetsova V.Yu. *Pastinaca sativa* - perspectives of phytochemical study and use in medicine. Materials of the Republican Scientific and Practical Conference (with international participation) “Actual issues of education, science and production in pharmacy”. Tashkent. 2016. P. 121-122.
4. Modern herbal medicine: manual / S.V. Harna, I.M. Vladymyrova, N. B. Burd et al. - Kharkiv: “Madrid Publisher”, 2016 - 580 p.
5. Horlachova V.I. Development of technology and lipophilic cream with wild carrot seed extract to treat burn wounds: Thesis. ... Candidate of Pharmacy: 15.00.01. V.I. Horlachova. Kharkiv, 2016. p. 18-33.
6. Martindale: The Complete Drug Reference. Thirty–sixth edition. Edited by Sean C. Sweetman / Published by the Pharmaceutical Press. – 2009. – 3709 p.
7. Sahoo, W. Herbal Drugs: Standards and regulation . W. Sahoo, P. Manchi-canti, S. Dey. Fitoterapia. 2010. Vol. 81, № 6. Р. 462–471.
8. Degtyariova K.O., Horlachova V.I., Bavykina M.L. Prospects for the development of new drugs based on plant extracts. Pharmacy of the ХХI Century: Trends and Prospects: Materials of VIII National Congress of Pharmacists of Ukraine, Kharkiv, September, 13-16, 2016. Kh., 2016. V. 1. P. 249.
9. Paziuk D.M.V., Velma V.V., Kyslychenko V.S. Research hydroxycinnamic acids in carrot seed. Collection of scientific works of P.L. Shupyk NMAPE. 2015. No.24 (5). P. 172-176.
10. Chandra P, Kishore K, Ghosh AK. Assessment of Antisecretory, Gastroprotective, and In-vitro Antacid Potential of Daucus carota in Experimental Rats. Osong Public Health and Research Perspectives. 2015;6(6):329-335. doi:10.1016/j.phrp.2015.10.006.
11. Gupta L, Garg RP, Sharma RC, Arora RB. Monoamine oxidase inhibiting activity of Daucus carota. Indian J Exp Biol. 1973;11:342–3.
12. Sodimbaku V, Pujari L, Mullangi R, Marri S. Carrot (Daucus carota L.): Nephroprotective against gentamicin-induced nephrotoxicity in rats. Indian Journal of Pharmacology. 2016; 48(2):122-127. doi:10.4103/0253-7613.178822.
13. Shebaby W.N., Mroueh M.A., Boukamp P. et al. Wild carrot pentane-based fractions suppress proliferation of human HaCaT keratinocytes and protect against chemically-induced skin cancer. BMC Complement Altern Med. 2017;17(1):36. Published 2017 Jan 10. doi:10.1186/s12906-016-1531-0
14. Soares GR, de Moura CFG, Silva MJD, Vilegas W, Santamarina AB, Pisani LP, Estadella D, Ribeiro DA.[Protective effects of purple carrot extract (Daucus carota) against rat tongue carcinogenesis induced by 4-nitroquinoline 1-oxide.](https://www.ncbi.nlm.nih.gov/pubmed/29546679) Med Oncol. 2018 Mar 15; 35(4):54. doi: 10.1007/s12032-018-1114-7.
15. Blando F, Calabriso N, Berland H, et al. Radical Scavenging and Anti-Inflammatory Activities of Representative Anthocyanin Groupings from Pigment-Rich Fruits and Vegetables. Int J Mol Sci. 2018; 19(1):169. Published 2018 Jan 6. doi:10.3390/ijms19010169
16. Attiq A, Jalil J, Husain K, Ahmad W. Raging the War Against Inflammation With Natural Products. Front Pharmacol. 2018;9:976. Published 2018 Sep 7. doi:10.3389/fphar.2018.00976
17. Krutov P.V., Tsitsilin A.N., Chuparina E.V., Martynov A.M., Pupykina K.A., Fayzullina R.R. Study of the elemental composition of parsnip (*Pastinaca Sativa L.*) Medical Bulletin of Bashkortostan, vol. 12, no. 6 (72). 2017. pp. 67-70.
18. Shymorova Yu.Ye., Kyslychenko V.S., Kuznetsova V.Yu. Study of fatty acid composition of root cultures Pastinaca sativa L. Phytotherapy. Journal 2017. No.1. P. 46-49.
19. Leonti Marco and Laura Casu. Ethnopharmacology of Love.  Frontiers in pharmacology. Vol. 9.Р. 567. 3 Jul. 2018, doi:10.3389/fphar.2018.00567
20. Degerli S, Berk S, Malatyali E, Tepe B. Screening of the in vitro amoebicidal activities of *Pastinaca armenea* (Fisch. & C.A. Mey.) and *Inula oculus-christi* (L.) on *Acanthamoeba castellanii* cysts and trophozoites. Parasitol Res. 2011; 110:565–570. doi: 10.1007/s00436-011-2524-z.
21. Mahdizadeh S, Khaleghi Ghadiri M, Gorji A. Avicenna's Canon of Medicine: a review of analgesics and anti-inflammatory substances. Avicenna J Phytomed. 2015;5(3):182-202.
22. Palamarchuk O.P. Biological features and comparative estimation of active substances of genus species Pastinaca L.: Author's abstract. Thesis ... Candidate of Biology: 03.00.05; National Academy of Sciences of Ukraine. M. M. Gryshko Botanist Garden. Kyiv, 2004. - 23 p.
23. Rekhletska O.V. Working out of the composition, technology and research of phytopreparations from common birch for treatment of dermatological diseases: author's abstract. Thesis ... Candidate of Pharmacy: 15.00.01. Danilo Galytsky Lviv National Medical University. Lviv. 2007. 18 p.
24. Ruban O.A. Scientific substantiation of the composition and technology of drugs against allergic action on the basis of black currant polysaccharides: author's abstract. Thesis ... PhD of Pharmacy: 15.00.01. O.A. Ruban. National University of Pharmacy. Kh., 2009. 39 p.
25. Chorna N.A. Development of the composition and technology of homeopathic ointment for use in dermatology: author's abstract. Thesis ... Candidate of Pharmacy: 15.00.01. National University of Pharmacy. Kh., 2009. 23 p.
26. Kovaliov V.V. Development of the composition and technology of a soft dosage form with an extract of chlorophyllite: author's abstract. Thesis ... Candidate of Pharmacy: 15.00. National University of Pharmacy. Kh., 2009. 23 p.
27. Soleiman A. Experimental substantiation of clinical application of a new ointment “Philetol” for the treatment of wounds and burns: author's abstract. Thesis ... Candidate of Pharmacy: 14.03.05. Kh., 2012. 24 p.
28. Garkavtseva O.A. Development of the composition and technology of “Dermalik” ointment for the treatment of dermatological diseases: author's abstract. Thesis ... Candidate of Pharmacy: 15.00.01. . National University of Pharmacy. Kh., 2010. 21 p.
29. Bezditko K.P. Experimental substantiation of the possibility of using a new combined ointment based on plant components for the treatment of hemorrhoids: author's abstract. Thesis ... Candidate of Pharmacy:14.03.05. National University of Pharmacy. Kh., 2009. 20 p.
30. Pavkh O.I. Development of composition and technology of nasal ointment on the basis of vegetable tinctures and essential oils: author's abstract. Thesis ... Candidate of Pharmacy: 15.00.01. P.L. Shupyk National Medical Academy of Postgraduate Education. K., 2010. 23 p.
31. Havkaliuk M.I. Theoretical and experimental substantiation of the composition and technology of ointment on the basis of plant extracts and essential oils for the treatment of cellulite: author's abstract. Thesis ... Candidate of Pharmacy: 15.00.01 P.L. Shupyk National Medical Academy of Postgraduate Education. K., 2011. 24 p.
32. Nazen B.M. Experimental study of the use of seed oil of grapes as a wound-healing agent: author's abstract. Thesis ... Candidate of Pharmacy: 14.03.05. National University of Pharmacy. Kh., 2011. 18 p.
33. Burd N.B. Pharmacognostic study of some representatives of the genus amaranth: Author's abstract. Thesis ... Candidate of Pharmacy: 15.00.02/N.B. Burd; National University of Pharmacy. Kh., 2006. 19 p.
34. Kuchynska I.V. Pharmacological study of a new ointment of the lipophilic complex from the aspen crust: author's abstract. Thesis ... Candidate of Pharmacy: 14.03.05 Kh., 2011. 22 p.
35. Khalavka M.V. Development of ointment composition with licorice extract for the treatment of wound process and infectious-allergic skin diseases: author's abstract. Thesis ... Candidate of Pharmacy: 15.00.01. Kh., 2016. 24 p.
36. Berezniakov A.V. Pharmacological study of a new combined ointment “Glitacid” on the basis of licorice dry extract: author's abstract. Thesis ... Candidate of Pharmacy: 14.03. Kh., 2012. 21 p.
37. Serdiuk Ie.V. Development of composition and technology of ointment with a thick extract of ash tree bark: author's abstract. Thesis ... Candidate of Pharmacy: 15.00.01. Kh., 2012. 26 p.
38. Khokhlenkova N.V. Theoretical and experimental substantiation of pharmaceutical development of medicinal preparations on the basis of oak bark for complex therapy of wound process: author's abstract. Thesis ... PhD of Pharmacy 15.00.01. Kh, 2013. 42 p.
39. Tkachova O.V. Pharmacological study of new medicinal preparations, created on the basis of natural substances and intended for local treatment of wound process: author's abstract. Thesis ... PhD of Pharmacy: 14 03.05. Kh. 2014. 45 p.
40. Gorlachova V.I. Development of composition and technology of cream with lipophilic extract of wild carrot seeds for the treatment of burn wounds: author's abstract. Thesis ... Candidate of Pharmacy: 15.00.01. National University of Pharmacy. Kharkiv. 2016. 24 p.
41. Kran O.S. Development of the composition and technology of gel for the treatment of wounds in the second phase of the wound process: author's abstract. Thesis ... Candidate of Pharmacy: 15.00.01. Kh. 2016. 24 p.
42. Esam Zurgani Ahmed Zeghdani. Experimental study of ointment on the basis of extract of licorice root for the treatment of allergic dermatitis: author's abstract. Thesis ... Candidate of Pharmacy: 14.03.05. National University of Pharmacy, 2018. 23 p.

UDC: 615.322.015:615.27

***T.I. Iermolenko, N.S. Chorna, O.V. Kryvoshapka, O.M. Shapoval***

Kharkiv National Medical University

**Theoretical Justification of the Search for Potential Medicinal Products Containing Food Plant Biologically Active Substances**

Considering that food plants have a stable raw material base and proved harmless to the human body, the use of raw materials of food plants to create new MP is relevant and has several advantages: sufficient raw material base, meaningful efficiency and high safety level.

**Purpose**. Theoretical justification of the search for potential medicinal products based on the food plant row materials, in particular, carrot roots and parsnip roots.

**Materials and methods.** Clinical and pharmacological analysis of the databases of scientific information (articles, monographs, abstracts of theses, etc.) was conducted from Ukraine and worldwide (NCBI, Vernadsky National Library of Ukraine, Google Scholar, Google Academy). This information includes contain data on the search, development, preclinical research, clinical trials, application in officinal medical practice on the basis of plant-based row materials, in particular, carrot roots and parsnip roots.

**Results**. The conducted study allowed to prove the relevnce, timeliness, expediency and prospect of search of new promising medicinal products on the basis of raw materials of food plants of the Celery genus of carrot roots and parsnip roots.

**Conclusion**. Within the process of the study if has been justified that plants of celery genus planted carrot and planted parsnip, having powerful, affordable and cheap raw material base, are the sources of substances containing the amount of biologically active substances promising to create on their basis new drugs with cytoprotective, anti-inflammatory, nephroprotective, wound healing, reparative action, and they are prospective in terms of the introduction into medical practice for the treatment of skin lesions.

**Keywords:** biologically active substances, vegetable substances, raw materials from plants of celery genus, carrot roots (CR), parsnip roots (PR).

УДК: 615.322.015:615.27

***Т.І. Єрмоленко, Н.С. Чорна, О.М.Шаповал***

Харківський національний медичний університет

**Теоретичне обґрунтування пошуку потенційних лікарських засобів, що містять біологічно активні речовини з сировини харчових рослин**

Зважаючи на те, що харчові рослини мають стабільну сировинну базу й доказану нешкідливість для організму людини, використання сировини харчових рослин для створення нових ЛЗ є актуальним та має низку переваг: достатню сировинну базу, значущу ефективність та високий ступінь безпечності.

**Мета.** Теоретичне обґрунтування пошуку потенційних лікарських засобів на основі сировини харчових рослин, зокрема – корнеплодів моркви та пастернака.

**Матеріали та методи**. Клініко-фармакологічному аналізу підлягали джерела наукової інформації (статті, монографії, автореферати дисертаційних робіт та тощо) з баз України та світу (NCBI, НБУ ім В. І. Вернадського, Google Scholar, Google Академія), в яких наведені дані про пошук, розробку, доклінічні дослідження, клінічні випробування, застосування у офіцінальній та народній медицині лікарських засобів на основі рослинної сировини, зокрема – з корнеплодів моркви та пастернака.

**Результати.** Проведене дослідження дозволило довести актуальність, своєчасність, доцільність та перспективність пошуку нових лікарських засобів на основі сировини харчових рослин роду Селерових коренеплодів моркви та пастернака.

**Висновки.** В процесі дослідження доведено, що рослини роду Селерових морква посівна та пастернак посівний, маючи потужну, доступну та дешеву сировинну базу, є джерелами субстанцій, що містять суму біологічно активних речовин, перспективних для створення на їх основі нових лікарських засобів з цитопротекторною, протизапальною, нефропротекторною, ранозагоювальною, репаративною дією та є перспективними для впровадження в медичну практику з метою лікування пошкоджень шкіри.

**Ключові слова:** біологічно активні речовини, субстанції рослинного походження, сировина з рослин роду селерових, коренеплоди моркви (КМ), коренеплоди пастернаку (КП).

УДК: 615.322.015:615.27

***Т.И. Ермоленко, Н.С. Чорна, О.Н.Шаповал***

Харьковский национальний медицинский университет

**Теоретическое обоснование поиска потенциальный лекарственных средств, содержащих биологически активные вещества из сырья пищевых растений**

Учитывая то, что пищевые растения имеют стабильную сырьевую базу и доказанную безвредность для организма человека, использование сырья пищевых растений для создания новых лекарственных средств является актуальным и имеет ряд преимуществ: достаточную сырьевую базу, значимую эффективность и высокую степень безопасности.

**Цель.** Теоретическое обоснование поиска потенциальных лекарственных средств на основе сырья пищевых растений, в частности – корнеплодов моркови и пастернака.

**Материалы и методы.** Клинико-фармакологическому анализу подлежали источники научной информации (статьи, монографии, авторефераты диссертаций и т.п.) из баз Украины и мира (NCBI, НБУ им В. И. Вернадского, Google Scholar, Google Академия), в которых приведены данные о поиске, разработке, доклинических исследованиях, клинических испытаниях, применении в официнальний и народной медицине лекарственных средств на основе растительного сырья, в частности - корнеплодов моркови и пастернака.

**Результаты.** Проведенное исследование позволило доказать актуальность, своевременность, целесообразность и перспективность поиска новых лекарственных средств на основе сырья пищевых растений рода сельдерейных корнеплодов моркови и пастернака.

**Выводы.** В процессе исследования доказано, что растения рода сельдерейных морковь посевная и пастернак посевной, имея мощную, доступную и дешевую сырьевую базу, являются источниками субстанций, содержащих сумму биологически активных веществ, перспективных для создания на их основе новых лекарственных средств с цитопротекторным, противовоспалительным, нефропротекторным , ранозаживляющим, репаративным действием и являются перспективными для внедрения в медицинскую практику с целью лечения повреждений кожи.

**Ключевые слова:** биологически активные вещества, субстанции растительного происхождения, сырье из растений рода сельдерейных, корнеплоды моркови (КМ), корнеплоды пастернака (КП).

**Відомості про авторів:**

Єрмоленко Т. І.

д. фарм. наук, професор, зав. кафедри фармакології та медичної рецептури

Харківського національного медичного університету

E-mail: [ermolenko\_tamara65@ukr.net](mailto:ermolenko_tamara65@ukr.net) ORCID – <http://orcid.org/0000-0002-7775-0147>

Чорна Н.С.

к. фарм.н., асистент кафедри фармакології та медичної рецептури

Харківського національного медичного університету

E-mail: farmakologia@ ukr.net

Шаповал О.М.

к. фарм.н., доцент кафедри фармакології та медичної рецептури

Харківського національного медичного університету

E-mail: olana666@ ukr.net ORCID:– <https://orcid.org/0000-0002-1971-2863>

**Information about authors**

Iermolenko T.I.

(Pharm. D) – Professor, Head of the Department of Pharmacology and Prescription writing, Kharkiv National Medical University

E-mail: [ermolenko\_tamara65@ukr.net](mailto:ermolenko_tamara65@ukr.net) ORCID – <http://orcid.org/0000-0002-7775-0147>

Chorna N.S.

(Philosophy Doctor), Assistant of the Department of Pharmacology and

Prescription writing, Kharkiv National Medical University

E-mail: farmakologia@ ukr.net

Shapoval O.M.

(Philosophy Doctor), Associate professor of the Department of Pharmacology and Prescription writing, Kharkiv National Medical University

E-mail: olana666@ ukr.net ORCID: – <https://orcid.org/0000-0002-1971-2863>

**Сведения об авторах**

Ермоленко Т. И.

д. фарм. наук, профессор, зав. кафедры фармакологии и медицинской

рецептуры Харьковского национального медицинского университета

E-mail: [ermolenko\_tamara65@ukr.net](mailto:ermolenko_tamara65@ukr.net) ORCID – <http://orcid.org/0000-0002-7775-0147>

Чорна Н.С.

к. фарм. наук, ассистент кафедры фармакологии и медицинской

рецептуры Харьковского национального медицинского университета

E-mail: farmakologia@ ukr.net

Шаповал О.Н.

к. фарм.н., доцент кафедри фармакологии и медицинской

рецептуры Харьковского национального медицинского университета

E-mail: olana666@ ukr.net ORCID:– <https://orcid.org/0000-0002-1971-2863>

**Address for correspondence:**

4, Nauky boul., Kharkiv, 61022, Ukraine

Tel. (57) 702-72-01

Е-mail: farmacologia@ukr.net

Kharkiv National Мedical University