

6,8% та 5,5 %. 7. "Wheezing" у грудях під час або після фізичного навантаження протягом останніх 12 місяців було - у 2,0 %; 10,4 % та 4,6 %. 8. Сухий кашель вночі (не пов'язаний із застудою або запальними захворюваннями) за останні 12 місяців відмітили – 6,9 %; 13,7% та 11,9 % дітей. Проаналізовано процент позитивних відповідей на 8 запитань анкети ISAAC у дітей 13-14 років. Результати представлено по запитанням за 2017, 2002 та 1998 рр. відповідно: 1. - 9,9 %; 29,6 %; та 25,3%. 2. - 3,4 %; 20,9 % та 12,9 %. 3. - 0,4 %; 2,5% та 1,2%. 4. - 0,6 %; 1,1 % та 0,8 %. 5. - 0,5%; 2,3% та 1,9%. 6. - 1,6%; 5,5 % та 6,1 %. 7. - 2,8 %; 20,6 % та 13,2 %. 8. - 4,6 %; 19,3% та 12,1 %. Проаналізовані отримані результати та динаміка розповсюдженості у порівнянні як з середніми, так і з окремими даними по різних регіонах та країнах світу. Встановлені сучасна поширеність респіраторних симптомів у дітей м. Харкова – 15,9 % (в молодшому шкільному віці – 10,1 %, в підлітковому віці – 5,8%). Виявлено тенденції щодо зниження як розповсюдженості, так і тяжкості проявів БА в регіоні за останні 20 років. Акцентовано увагу на низькому рівні діагностики БА.

**Ключові слова:** діти, бронхіальна астма, поширеність, ISAAC.

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или после физической нагрузки в течение последних 12 месяцев было - в 2,0%; 10,4% и 4,6%. 8. Сухой кашель ночью (не связанный с простудой или воспалительными заболеваниями) за последние 12 месяцев отметили - 6,9%; 13,7% и 11,9% детей. Проанализирован процент положительных ответов на 8 вопросов анкеты ISAAC у детей 13-14 лет. Результаты представлены по вопросам за 2017, 2002 и 1998 соответственно: 1. - 9,9%; 29,6%; и 25,3%. 2. - 3,4%; 20,9% и 12,9%. 3. - 0,4%; 2,5% и 1,2%. 4. - 0,6%; 1,1% и 0,8%. 5. - 0,5%; 2,3% и 1,9%. 6. - 1,6%; 5,5% и 6,1%. 7. - 2,8%; 20,6% и 13,2%. 8. - 4,6%; 19,3% и 12,1%. Проанализированы полученные результаты и динамика распространенности по сравнению как со средними, так и с отдельными данными по разным регионам и странам мира. Установлены современная распространенность респираторных симптомов у детей г. Харькова - 15,9% (в младшем школьном возрасте - 10,1%, в подростковом возрасте - 5,8 %). Выявлены тенденции по снижению как распространенности, так и тяжести проявлений БА в регионе за последние 20 лет. Акцентировано внимание на низком уровне диагностики БА.

**Ключевые слова:** дети, бронхиальная астма, распространенность, ISAAC.

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## DIAGNOSIS OF GENERAL PHENOTYPIC CHARACTERISTICS OF A PERSON IN THE CONTEXT OF ICPO-INTERPOL REQUIREMENTS

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Topicality of this study is due to the need to find new ways to solve the problem of identifying a person in terms of an integrated approach DVI - Interpol system, and consist in to determine the patterns of manifestation of inter-system relationships and the development of criteria for predictive assessment of phenotypic human features based on phenotypology of the finger, palmar dermatoglyphics and foot dermatoglyphics. Received anthroposcopic and anthropometric parameters, imprints of the ridge patterns of the fingers and feet, the inner surface of the hands and feet, and the smears of peripheral blood from 567 men and women of 18-59 years of age living in the Ivano-Frankivsk region and belonging to the Hutsuls (1 group), Boykos (group 2) and Lemkos (group 3) ethno-territorial groups or do not identify themselves with any (group 4). The following research methods were applied: anthroposcopic, anthropometric, dermatological, one-dimensional and multidimensional statistical analysis, neural network programming (in the package Statistica 12). Reliable differences between phenotypic parameters of male and female persons of Boykos, Lemkos, Hutsuls and control groups were established; on the basis of obtained data using artificial neural networks, a computer identification program Dermatoglyphics For Prediction (DFP) was developed that will increase the effectiveness of the second and fourth stages of the Disaster Victim Identification methodological approach.

**Key words:** forensic medicine, person identification, dermatoglyphics, phenotype.

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In connection with the tendency to exacerbate local armed conflicts in the world and, in particular, in the territory of Ukraine, which causes the appearance of a large number of unidentified, fragmented corpses, there is a problem of identification of bodies of two or more people [3, 5].

In order to identify an unknown person, the DVI-Interpol principle uses a set of identification methods: DNA identification, dermatoglyphics identification, identification of a dental status, identification of a verbal portrait, anthropological identification, etc. However, none of the known methods today is characterized by one hundred percent result. This is why it is practiced to use several identifying algorithms simultaneously, that is, a multidisciplinary approach to identification: the use of all possible lines of evidence to reinforce the identity between human remains and the disappeared person [9].

Detailed information on the possibility of comprehensive use in forensic medicine of the ridge pattern of the fingers and feet and dermatoglyphs of the palms and feet for the diagnosis of general

phenotypic features of man is still absent, so their study may prove useful in medical forensic practice in the identification of dissected or fragmented corpses in cases of mass death of people [10].

Ridge patterns of the fingers and legs and dermatoglyphs of the palms and feet of all external signs are the most convenient for research, since they are easy to determine, subjected to classification and constant throughout their lives. Practice shows that in the process of studying corpses it is not always possible to get the imprints of all areas of ridge patterns and to study their numerous signs [1, 12], so there is a need to predict missing, but diagnostically significant parameters. In situations where parts of the body from which the prints are received are separated from one another (explosive trauma, criminal dismemberment, etc.), one must also resolve the issue of their anatomical localization and belonging to one person. However, the studies conducted do not provide a holistic view of the structure and significance of the interactions between the complexes of the finger, palmar dermatoglyphics and foot dermatoglyphics with constitutional, physical and external signs of a person. In the discussed aspect, this is very important, since, along with the basic identification methods, the resolution of the dermatologic method can become more effective and significant in attracting additional signs systems.

It should be noted that in international practice, the aggregate of all integration professional connections in the field of person identification and forensic medical expertise is regulated by the structure ICPO-Interpol, which united not only the volume of intellectual human resource, but also the system of the elaborated algorithms and protocols adapted to different conditions of occurrence of disasters with corresponding consequences [2].

Especially for emergencies of international and national scale, Interpol has developed a Disaster Victim Identification methodological approach, which consists of four separate phases. The first one provides an overview of the site of the disaster, the identification of the dead in possible cases, determining the required number and specifications of the team involved in the identification process, establishing a clear interaction with the national structures of the country within which the disaster occurred, and international controllers and coordinating structures. The second stage involves the collection of post-mortal information, that is, the amount of data that can be obtained during the study of the bodies of the dead (DNA, fingerprints, characteristics of the dental status, results of dental sighting and panoramic radiography).

Interpol has developed recommendations for the collection of material required for research depending on the physical state of the bodies of the dead, given that the latter can be represented in the form of a holistic research object, fragments of remains without signs of irreversible changes, fragmented residues at the decomposition stage, residues after total combustion. In the third phase, a group of researchers is engaged in the harvest of possible viable material (clinical dental examination data and patient medical records, information from relatives and family) [2].

It should be noted that the Interpol methodological approach Disaster Victim Identification as one of the basic methods includes a dermatological method of identification. The choice of the dermatoglyphics method for identifying an unknown person is the basic method. It is due to the material lack of load, high informativity, and also the ability to get results in short time limits.

**The purpose of the work** is to develop and scientifically substantiate the concept of the prognostic assessment of general phenotypic features of a person (ethnoterritorial and gender identity, anthroposcopic and anthropometric parameters) on the basis of the study of phenotypology of the papillary relief of the fingers and feet, and also the dermatoglyphic patterns of the feet and palms.

**Materials and methods.** Received anthroposcopic and anthropometric parameters, imprints of the ridge pattern of the fingers and legs, the inner surface of the hands and feet, and the smears of peripheral blood from 567 men and women of 18-59 years of age living in the Ivano-Frankivsk region and belonging to the Hutsuls (1 group), Boykos (group 2) and Lemkos (group 3) ethno-territorial groups or do not identify themselves with any (group 4). The volume and methods of research do not contradict the basic principles of the Helsinki Declaration on Biometric Research (1974), adapted at the 41st International Assembly in Hong Kong (1989), in which a person acts as their object. During the study, the following basic principles were observed such as respect for the individual, person's awareness, risk assessment of harm and benefits.

The following research methods have been applied: anthroposcopic, anthropometric, dermatological, one-dimensional and multidimensional statistical analysis, neural network programming. Anthroposcopic and anthropometric parameters were obtained by questioning the subjects and using standard measuring instruments (rostometer, centimeter ribbon and angle meter). The next step was to obtain scans of the dermatological parameters of the middle and proximal phalanges of the fingers and legs, and also the dermatoglyphic drawing of the feet and hands using the Futronic's FS8 scanner. The statistical analysis of the data obtained was performed by calculating the derived parameters and coefficients using

Microsoft®Excel 2007 spreadsheets and Statistica 12 for Windows software package. During the study, the mean arithmetic mean ( $\bar{X}$ ), the mean square error of the arithmetic mean ( $S_{\bar{X}}$ ), the mean square deviation ( $\delta$ ), the Student's t-distribution and the probability of error (P), the Spearman rank correlation coefficient were determined. The obtained results became the basis for the study of artificial neural networks, with the subsequent prediction of external signs of human Dermatoglyphic For Prediction.

**Results of the study and their discussion.** In recent years, works that describe the ethnic characteristics of dermatoglyphic patterns are particularly relevant [8]. In a number of studies, the authors studying the dermatoglyphical complexes of the Ukrainian population, based on its administrative division, by developing discriminatory models based on peculiarities of finger and palmar dermatologic indicators, proved that the highest level of discrimination was established among men of the northern and southern and northern and eastern regions of Ukraine [4, 7, 9, 11]. However, they did not take into account compact and relatively closed settlements of ethnic groups within these regions. For example, in the Precarpathian region, there are compact settlements of ethnic groups (Hutsuls, Boykos, Lemkos), which in genetic terms are so-called "pure lines", that is, they do not practice marriages with representatives of other ethnic groups. Of course, the impact of migration processes, epigenetic factors, etc. should not be discounted. At the same time, the study of phenotypic features of certain ethnic groups (including dermatoglyphic ones) allows answering many questions concerning the origin and evolution of ethnic groups, migration processes and the influence of epigenetic factors on the manifestation of the phenotype.

In studying the group variability of the complex of phenotypic and dermatological features, we have found statistically significant regularities within the ethnoterritorial and sexual groups.

In particular, the average values of absolute anthropometric parameters in individuals of different ethno-territorial and sexual groups within them are not statistically significantly different. Indicative are the relative anthropometric parameters: index of relative length of the body (IRLB), index of relative shoulder width, longitudinal and transverse index of the head, transverse longitudinal head index, facial index, which allowed to form ethnoterritorial phenotypes: Hutsuls - brachymorphs, brachycephales with a narrow face (leptoprosopic); Boykos - brachymorphs, brachi- or mesocephales with a broad face (euryprosopic); Lemkos - dolichomorphs, dolichocephales with a narrow face (leptoprosopic); the control group is characterized by an almost uniform manifestation of all anthropotypes.

Descriptive phenotypic features were also to some extent characterized by ethno-territorial groups without gender identity, although no significant differences were found between the groups.

Thus, the anthroposcopic "portrait" of the inhabitants of the western region of Ukraine is formed, namely: Hutsuls - dark-haired, dark-skinned, with caro-green or light-brown eyes, long and narrow nose, they do not have a rounded face and red hair color; Boykos - light-skinned with dark or light-brown hair, dark or light-brown eyes, wide and straight nose, among them there are no people with a rectangular face; Lemkos are light-skinned, blonde, with bright eyes, narrow and straight nose, among them there are no faces with a rectangular face and redheads.

With regard to such a manifestation of the phenotype as dermatological parameters, we have established that the phenotype of the Hutsuls ethno-territorial group has the following features: in the female persons of the Hutsuls ethnic group there is a high frequency of radial loops and arches on the fingers of both hands; high frequency Lf and W, LW on the third finger of the right leg, W, LW on the IV finger of both legs, Lt on the V finger of the right leg; for Hutsuls men, the value of the total frequency of radial loops on the fingers is characteristic; the factors for the Hutsuls group are the values of the angles Atdl, Atdr, Ctdr, Ctdl.

The phenotype of the Boykos ethno-territorial group is characterized by: a high frequency of radial loops on fingers of both hands is observed in women, a high frequency of their repetition on the same persons on the same fingers, as well as low frequency of arched, whorl and complex patterns; high frequency of tibial loops (Lt) on the I-II-III fingers of both legs, low frequency of fibula loops (Lf), whorl patterns of the loop type (W) and complicated patterns (LW) on the fingers of both legs, high frequency of homolateral symmetry of patterns of the type of tibial loop (Lt) on the I-III fingers of the left foot, on the finger of the right foot only the pattern of the tibial loop (Lt) occurs, the high frequency of heterolateral symmetry of the type of the tibial loop (Lt) on the I-III fingers, the low index of the total ridge account fingers of both legs; men have no characteristic features.

Lemkos dermatoglyphic phenotype is characterized by: in women the high frequency of tibial loops (Lt) on the II-III fingers of both legs, low frequency of patterns of arc (A), loop (W) and complex patterns (LW) on II-III fingers of both legs, low frequency of the fibula loops (Lf), the loops (W) and the complex patterns (LW) on the I, IV and V fingers of both legs, the high frequency of heterolateral symmetry of the

patterns of the tibial loop (Lt) and the arc (A) on the I and III fingers; in men - the values of total whorl and complex patterns on the fingers; values of palm corners - Atdl, Atdr.

However, it should be noted that Boykos and Hutsuls men are difficult to differentiate between themselves, but it is possible to distinguish them from Lemkos and control men according to the values of total whorl and complex patterns and the total frequency of radial loops. In addition, couples Hutsuls-Boykos can be distinguished by the values of the palm corners Atbl, Atbr, Abr, Adtl, Btbl, Btcr; Hutsuls - Lemkos - Atdr, Btcr, Atdl, Ctdr, Adtr; Boykos-Lemkos - Ctdr, Ctdl.

During the study of sexual difference within ethnoterritorial groups, it was found that most of the signs are the same for men and women. Exception is Hutsuls-control couples (male prevalence of W), Hutsuls-Lemkos (prevalence of W in women, unlike LR in men), Boykos-Lemkos (advantage of LR, W in women, unlike LW in men).

The dermatological pattern of the foot does not have gender characteristics, but it allows differentiating ethno-territorial groups: Lemkos have a W-type pattern that practically does not occur in Boykos and Hutsuls, they are characterized by patterns like LR and LU. This may indicate that Lemkos as an ethnographic group formed somewhat later than Hutsuls and Boykos. The ridge account of the foot is the lowest in Hutsuls, the highest in Lemkos and practically does not differ in other groups; the delta feet score is the lowest in the control and Boykos groups, and the highest in Lemkos.

In addition, during the study, we first established the relationship between the dermatoglyphics of the fingers, legs and the palms and feet at the representatives of various ethnoterritorial and sexual groups of the Carpathian region. In the scientific work it was first proved that although the distal phalanges of the fingers and the foot cushions of the feet often encounter simple types of patterns (arches, loops), as previously noted by foreign and domestic authors, but during the study of "local races" there was a tendency to duplication of dermatoglyphic patterns of hands and feet. Also, a higher incidence rate of whorl and complicated patterns on the legs was observed among representatives of the Lemkos ethno-territorial group.

Studying the ridge and delta accounts on the legs was more informative than on the hands. This is probably due to the deformation of the patterns of fingers in the process of human life. After all, as according to other authors, we also found an increase in the frequency of pattern deformation and the appearance of changes in direct proportion to the increase in age of a person.

In the group of women-Hutsuls, we have established moderate correlations between palm length, height of forehead, bigonial width with LU. In Hutsuls men, there is a moderate direct correlation between palm length (0.45) and signs of LW hands. For Boykos women - characterized by the inverse correlation of the head circumference (-0.43) with sign A on the fingers. There is also an inverse correlation between the average width of the face (-0.46), the bigonial width (-0.47), and the manifestation of the sign of LW on the fingers. For male Boykos there is a moderate direct relationship between sign A and nose height (0.45), LR and face height (0.40) and zygomatic diameter (0.44), and feedback between LU and face height (-0.43) and the zygomatic diameter (-0.47), LR and the transverse diameter of the head (-0.44) and the upper face width (-0.46). In female Lemkos there is a direct correlation between the head circumference (0.41) and the manifestation of the sign of LR. In the group of Lemkos men, a moderate direct link between sign A and hand length (0.43), between the sign W and the head circumference (0.40) and the upper face width (0.42) can be traced.

The Dermatoglyphics For Prediction (DFP) artificial neural network computer program developed by us does not require significant budget expenses for data acquisition, training of specialists for its maintenance, and the very construction of the neural network, its training and expertise are short-lived in time.

In the course of the study, the probability of the results was from 73-90% (automatically calculated by the software Dermatoglyphics For Prediction (DFP)), which significantly exceeds the previously obtained results.

## **Conclusions**

1. The complex use of methods of forensic anthropology and dermatoglyphics, allows to expand the register of forensic medical identification systems, taking into account the criteria of DVI-interpol.
2. The Dermatoglyphics For Prediction (DFP) computer identification program and the proposed methods for obtaining and improving the quality of dermatoglyphs confirm their effectiveness along with other identification tests within the framework of the second and fourth stages of the Disaster Victim Identification methodological approach.

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## Реферати

#### ДІАГНОСТИКА ЗАГАЛЬНИХ ФЕНОТИПІЧНИХ ОЗНАК ЛЮДИНИ В РОЗРІЗІ ВИМОГ ІСРО-INTERPOL

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Актуальність даного дослідження зумовлена необхідністю пошуку нових шляхів вирішення проблеми ідентифікації особи з точки зору комплексного підходу за системою DVI – Interpol, і полягає у визначенні закономірностей прояву міжсистемних зв'язків та розробці критеріїв прогностичної оцінки фенотипових ознак людини на основі фенотипології пальцевої, долонної дерматогліфіки та дерматогліфіки стоп. Отримані антропометричні та антропометричні параметри, відбитки гребінцевого малюнка пальців рук та ніг, внутрішньої поверхні кистей та стоп, мазки периферійної крові від 567 осіб чоловічої та жіночої статі віком 18–59 років, які проживають на території Івано-Франківської області та належать до гуцульської (1 група), бойківської (2 група) та лемківської (3 група) етнотериторіальних груп чи не ідентифікують себе з жодною (4 група). Застосовано наступні методи дослідження: антропометричний, антропометричний, дерматогліфічний, одно- та багатомірний статистичний аналіз, нейромережеве програмування (в пакеті STATISTICA 12). Встановлено достовірні відмінності між фенотиповими параметрами осіб чоловічої та жіночої статі бойківської, лемківської, гуцульської та контрольної груп; на основі отриманих даних з використанням штучних нейронних мереж розроблено комп'ютерну ідентифікаційну програму Dermatoglyphics For Prediction (DFP), яка підвищить ефективність другого та четвертого етапів методологічного підходу Disaster Victim Identification.

**Ключові слова:** судова медицина, ідентифікація особи, дерматогліфіка, фенотип.

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#### ДІАГНОСТИКА ОБЩИХ ФЕНОТИПИЧЕСКИХ ПРИЗНАКОВ ЧЕЛОВЕКА В РАЗРЕЗЕ ТРЕБОВАНИЙ ІСРО-INTERPOL

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Актуальність даного дослідження обумовлена необхідністю пошуку нових шляхів рішення проблеми ідентифікації особи з точки зору комплексного підходу по системі DVI – Interpol, і заключається в определении закономірностей проявлення міжсистемних зв'язків та розробці критеріїв прогностичної оцінки фенотипових ознак людини на основі фенотипології пальцевої, ладонної дерматогліфіки та дерматогліфіки стоп. Полученные антропометрические и антропометрические параметры, отпечатки гребенчатого рисунка пальцев рук и ног, внутренней поверхности кистей и стоп, мазки периферической крови от 567 лиц мужского и женского пола в возрасте 18-59 лет, проживающих на территории Ивано-Франковской области и относятся к гуцульской (1 группа), бойковской (2 группа) и лемковской (3 группа) этнотерриториальных групп или не идентифицируют себя с ни одной (4 группа). Применены следующие методы исследования: антропометрический, антропометрический, дерматоглифический, одно- и многомерный статистический анализ, нейросетевое программирование (в пакете STATISTICA 12). Установлено достоверные различия между фенотипическими параметрами лиц мужского и женского пола бойковской, лемковской, гуцульской и контрольной групп; на основе полученных данных с использованием искусственных нейронных сетей разработана компьютерная идентификационная программа Dermatoglyphics For Prediction (DFP), которая повысит эффективность второго и четвертого этапов методологического подхода Disaster Victim Identification.

**Ключевые слова:** судебная медицина, идентификация личности, дерматоглифика, фенотип.

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