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## ИСПОЛЬЗОВАНИЕ МЕТОДОВ ТОМОГРАФИЧЕСКИХ ИССЛЕДОВАНИЙ С ЦЕЛЬЮ ИДЕНТИФИКАЦИИ ЛИЦ ПО СТОМАТОЛОГИЧЕСКОМУ СТАТУСУ: АНАЛИЗ ЕВРОПЕЙСКОГО ОПЫТА

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**Резюме.** Использование методов томографических исследований, в частности компьютерной томографии, является перспективным как в одиночных случаях идентификации, так и при идентификации жертв массовых катастроф. Результаты послойной диагностики структур зубочелюстного аппарата позволяют провести процедуры идентификации скелета человека согласно критерию пола, способствуют уточнению показателей дентального возраста, оптимизируют возможности сопоставления рентгенологических признаков стоматологического статуса данным стоматологических карт, таким образом расширяя абсолютное количество перспективно идентичных признаков и повышая качество доказательств. Однако учитывая специфику построения изображений при использовании компьютерной томографии, необходимо минимизировать влияние артефактов и природы графической дисторсии, которые осложняют процесс идентификации, и требуют коррекции путем унификации алгоритма исследования и использования адаптированного программного обеспечения.

**Ключевые слова:** идентификация, стоматологический статус, томографические методы исследования.

## THE USE OF TOMOGRAPHIC METHODS WITH THE PURPOSE OF PERSON IDENTIFICATION BY DENTAL STATUS: ANALYSIS OF THE EUROPEAN EXPERIENCE

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**Resume.** The use of tomographic research methods, particularly computed tomography, is promising both in individual cases of person identification and during mass disaster victims identification. The results of slice-diagnostics of the tooth-jaw structures allow to conduct procedures for identifying a human skeletal by gender, help to clarify the indicators of the dental age, optimize the possibility of comparing the radiological signs of dental status with the data of dental cards, thereby expanding the absolute number of perspective identical features and increasing the quality of evidence. However, taking into account the specificity of constructing images using computer tomography, it is necessary to minimize the influence of artifacts and the nature of graphical distortion, which complicate the identification process, and require correction by unifying the research algorithm and use of adapted software.

**Key words:** identification, dental status, tomographic methods of research.

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## FORENSIC CRITERIA OF UNDEFINED PERSONAL IDENTIFICATION USING THE COMPLEX STUDY OF PHENOTYPICAL AND DERMATOGLIPIC SIGNS

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**Resume.** In this paper data is presented which obtained during the study of the interconnections of anthropometric and dermatological parameters of distal phalanges the fingers of hands from persons belonging to the Hutsul, Boyko and Lemko ethnoterritorial groups, and proposed the possibility of using the data to identify an unknown person.

**Keywords.** Forensic medicine, person identification, dermatoglyphics, anthropometric parameters

**Introduction.** The development of criteria for the identification of an unknown person is currently one of the top trends in forensic medicine and criminology. The most important criteria that the identification method must possess is high reliability,

maximum simplicity of execution and material non-availability. All these criteria correspond to the dermatological method [1,2,3].

Uniqueness of skin patterns of man and the features of their inheritance were studied by Galton F. and Wilder. In particular, Galton F. established the fundamental provisions of dermatoglyphics [4]: the patterns of fingers of the person do not change under the influence of the environment; the patterns of fingers do not change with age; finger patterns are transmitted by inheritance from parents to children; finger patterns are virtually unique in all their details, even in relatives.

Mazur E.S. [5] was the first in forensic medicine and criminology, who conducted a multi-faceted study of finger and palmar dermatology using an original program that includes the assessment of the crest score in arched, swirling and complex (atypical) finger patterns and the study of qualitative dermatological characteristics for further analysis by their multidimensional statistics method. Based on the features of the dermatological signs of the hands was formed the full apprehension about the depth and variety of constitutional, physical and external-recognizable human parameters and demonstrated statistically significant interrelation between them. Was created the new models for diagnosing gender and body length, also for the first time was created the criteria of prognostic assessment of physiognomic peculiarities of a person. Was shown the significant correlations and created high-precision diagnostic models of the prediction of absolute somatometric parameters of a person on the basis of nonlinear integration transformations of dermatological features.

In the work of Abramova T.F. [6] for the first time formed a holistic view of the depth and diversity of intersystem connections phenotypology of finger dermatoglyphics and neuromiodynamics in the structure of the general constitution of the human body; discovered classification of signs of digital dermatoglyphics with differentiation of their relative profile specifics of sports activities (groups of sports, sports, a separate role); shown the correlation of general and separate signs of digital dermatoglyphics with manifestations of basic physical qualities - strength, speed, endurance, coordination; presented the phenotypological characteristics of finger dermatoglyphics, which mark the manifestation of the dominant physical qualities, including limitations of the definitive level of physical abilities; determined sexual specificity of marking possibilities of digital dermatoglyphics for assessment of physical abilities; was detected the significance of the bimanual asymmetry of the main features of finger dermatoglyphics and defined the priority categories «symmetry - asymmetry» in the forecast of physical abilities; shown the variability of human energy capabilities within the phenotypic diversity of finger dermatoglyphics, which allows to distinguish informative criteria for predictive assessment of human abilities.

Pyrozhekov D.V. and Mazur E.S. [7] conducted a study of the correlation of finger and palmar dermatoglyphics with constitutional and external-distinctive features in persons of the male and female without taking into account the ethnoterritorial affiliation (people were classified as a European apoid race). Based on the received data was scattered three main groups of parameters for forecasting personality traits, such as constitutional indicators; physical development; external signs. Authors in order to establish differentiation manifestations of constitutional, physical, external-recognizable and dermatological features in the identification of personality created 59 models of prediction, aimed at establishing gender, types of body proportions, physical development and external-recognition features. In the assessment of sexual affiliation the accuracy of the correct classification was 87.00%, in the estimation of the types of body proportions accuracy - 90.00% in men and 94.00% in women, in the assessment of physical development, preliminary analysis showed that the creation of diagnostic models using the initial data can not be satisfactory results. Therefore, iterative nonlinear transformations of the primary indicators were performed for acceptable predictive equations. The most significant indicators of the diagnosis of physical development were found in assessing the length of the body (men 97.00%, women 98.00%), transverse diameter of the head (94.00% in men and women), the height of the upper sternum point (97.00 and 98.00% for men and women respectively), vertebral point (97.00 and 99.00% for men and women respectively), shoulder point (96.00% for men and 99.00% for women), the radius point (97.00% for men and 98.00% for women), styloideus point (96.00 and 95.00% for men and women respectively), finger point (96.00% for men and 97.00% for women), upper femur point (95.00% for men), chest circumference (97.00 and 98.00% for men and women respectively), the shin circumference (93.00 and 96.00% for men and women respectively). Badly be predicted the following indicators: longitudinal head diameter (67.00% in both genders), the lowest width of the forehead (73.00% and 71.00% for men and women respectively), zygomatic diameter (73.00 and 70.00% in men and women respectively), height from nose to eyebrows in men (66.00%). Practically not exposed the following indicators for prediction: in women, the height of the nose from the eyebrows and verrucous width, in both genders the height from the nose to glabella, nose width, height the anteroposterior point. Other indicators, especially circles, have average confidence levels ranging from 78.00 to 90.00% for both men and women. It should be noted that in the diagnosis of physical development involved all the dermatological indicators that were considered in the work. According to the results of this work, 33 diagnostic models for predicting human physical development have been compiled. To assess foreign signs 24 diagnostic models have been developed for both male and female. Also, the authors found that the highest percentage of diagnostic quality is observed in the analysis of high-dimensional dimensions, and a low prognostic factor is found in the assessment of the size of the upper half of the face. It is also established that in women, in comparison with men, the number of features that play a direct role in forecasting, is higher and the percentage of reliability they have significantly higher.

Thus, the development of diagnostic criteria for external signs of a person based on dermatological parameters is an urgent problem that needs solution.

**The purpose of our research** is to study the complex of signs of comb on the fingers of females of the Boyko ethnic group for further use of the obtained data in the practice of forensic examination in identifying an unknown person.

**Material and methods.** The object of the study was internal and external relationships between anthroposcopic, anthropometric and dermatological parameters that were obtained from 567 persons of the male and female population aged 18-59 who live in the Ivano-Frankivsk region and belong to the Hutsul (1 group), Boyko (group 2) and Lemko (3group) ethno-

territorial groups or identify themselves with none (4 group). Specially designed questionnaires included information about gender, age, ethno-territorial affiliation, anthropometric parameters (height, length of foot and hand, length of arm and leg, body length, shoulder width, transverse and longitudinal head diameters, head circumference, height of forehead, height, upper and middle face width, zygomatic diameter, bigonial width and height of the nose).

The height (body length) was measured in a standing position using the metal anthropometer R. Martin. In the same position with a centimeter tape, the length of the body length, shoulder width, length of foot and hand, length of arm and leg, and circumference of the head were determined. The transverse and head diameters, forehead height, face height, upper and middle face width, zygomatic diameter, bigonial width and nose height were measured by sliding compass.

Finger print fingerprints were obtained by scanning the Futronic's FS80 USB 2.0 Fingerprint Scanner using the ftrScanApiEx.exe program. with the subsequent transfer of data to a personal computer. The processing of the data was carried out according to the standard method [8], when the macro-regime studied qualitative and quantitative indicators of dermatoglyphics of the toes. The mathematical processing of the data was conducted through one-dimensional and multidimensional statistical analysis [9].

**Results of the research and their discussion.** As a result of the processing of input data correlation matrices were obtained, which shows the dependence of anthropometric data on dermatological (Table 1, 2, 3, 4).

Analyzing the data presented in Table 1, it can be argued that for the selected group there is a moderate positive correlation between the length (0.40) of the leg and signs of LW in the hands. Also, there is a correlation between the width of the shoulders and the manifestation of the sign A on the hands, and this connection is negative.

Interpreting the data can be said that for Hutsuls, with an increase in the manifestation of the sign of LW with a large proportion of the probability, one should expect an increase in the length of the leg (that is, if the subject is detected a large number of these characteristics, it is assumed that the length of his leg exceeds the average). Similarly, for sign A, the assertion that the width of the shoulders will be less than the average in the group is valid.

Table 1

**Level of correlation between anthropometric and dermatological parameters in the Hutsul ethnic-territorial group**

Anthropological sign	Dermatological characteristic	Level and direction of correlation
Leg length	LW	0,40
Shoulder width	A	-0,35
Zygomatic Diameter	LU	-0,32
Nose height	LW	0,32
Height of the forehead	LU	0,36
Palm length	LU	0,31

Analyzing the data presented in Table 2, it can be argued that that for a Boyko group there is a moderate positive correlation between the bigonial width (0.33) and the sign A in their hands, a negative correlation between the average width of the face and the bigonial width and the manifestation of the sign of the LW in the hands.

Table 2

**The level of correlation between the anthropometric and dermatological parameters in the Boyko ethno-territorial group**

Anthropological sign	Dermatological characteristic	Level and direction of correlation
bigonial width	A	0,45
bigonial width	LW	-0,50
zygomatic diameter	A	-0,33
average width of the face	LW	-0,42

Analyzing the data presented in Table 3, it can be argued that for the Lemko group there is a moderate positive correlation between the width of the shoulders, the height of the nose and the sign W in the hands, length of the palm, leg length with a circle and a transverse diameter of the head and sign of LR, forehead height and sign A, transverse diameter of the head, average width of the face and sign of LW; negative correlation between the upper face width, the length of the foot and the manifestation of the sign A on the hands, the height of the nose and the manifestation of the sign of LR, the transverse diameter of the head and the height of the forehead and the sign W.

Table 3

**The level of correlation between the anthropometric and dermatological parameters in the Lemko ethno-territorial group**

Anthropological sign	Dermatological characteristic	Level and direction of correlation
Foot length	A	-0,36
Height of the forehead	A	0,35
Upper face width	A	-0,40
Circumference of the head	LR	0,33
Transverse diameter of the head	LR	0,33
Length of the palm	LR	0,32
Length of the leg	LR	0,32
Height of the nose	LR	-0,47
Transverse diameter of the head	LW	0,38
Average width of the face	LW	0,43
Nose height	W	0,40
Shoulder width	W	0,32
Transverse diameter of the head	W	-0,39
Nose height	W	-0,32

Analyzing the data presented in Table 4, it can be argued that for the control group there is a moderate positive correlation between the shoulder width, the circumference of the head and the sign of LU in the hands; a negative correlation between the width of the shoulders, the length of the hand and the manifestation of the sign of the LW in their hands.

Table 4

**The level of correlation between the anthropometric and dermatological parameters in the Lemko ethno-territorial group**

Anthropological sign	Dermatological characteristic	Level and direction of correlation
Shoulder width	LU	0,36
Shoulder width	LW	-0,33
Circumference of the head	LU	0,33
Length of hand	LW	-0,35

**Conclusions.** Thus, as a result of the study, it was found that anthropometric and dermatological parameters, as manifestations of the phenotype, are in a moderate positive or negative correlation relationship. This allows us to predict that when increasing or decreasing the manifestation of one sign of a sign with a high probability, one should expect an increase or decrease of the other. Based on this, using developed by us the Dermatoglyphics For Prediction (DFP) program, which is created on the basis of the use of artificial neural networks, it is possible to predict anthropometric parameters on the basis of dermatoglyphic signs, which will greatly facilitate the identification of an unknown person.

**Prospects for further research.** Given the relevance of the topic under study, in the future it is planned to expand the list of studied anthroposcopic, anthropometric and dermatological parameters.

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## СУДОВО-МЕДИЧНІ КРИТЕРІЇ ІДЕНТИФІКАЦІЇ НЕВІДОМОЇ ОСОБИ ШЛЯХОМ КОМПЛЕКСНОГО ДОСЛІДЖЕННЯ ФЕНОТИПІЧНИХ ТА ДЕРМАТОГЛІФІЧНИХ ОЗНАК

**Козань Н. М.**

**Резюме.** У даній роботі представлено дані, отримані у ході вивчення взаємозв'язків антропометричних та дерматогліфічних параметрів дистальних фаланг пальців рук у осіб, що належать до гуцульської, бойківської та лемківської етнотериторіальних груп, а також, запропоновано можливість використання отриманих даних з метою ідентифікації невідомої особи.

**Ключові слова:** судова медицина, ідентифікація особи, дерматогліфіка, антропометричні параметри.

## СУДЕБНО-МЕДИЦИНСКИЕ КРИТЕРИИ ИДЕНТИФИКАЦИИ НЕИЗВЕСТНОГО ЛИЦА С ПОМОЩЬЮ КОМПЛЕКСНОГО ИССЛЕДОВАНИЯ ФЕНОТИПИЧЕСКИХ И ДЕРМАТОГЛИФИЧЕСКИХ ПРИЗНАКОВ

**Козань Н. М.**

**Резюме.** В данной работе представлены данные, полученные в ходе изучения взаимосвязей антропометрических и дерматоглифических параметров дистальных фаланг пальцев рук у лиц, принадлежащих к гуцульской, бойковской и лемковской этно-территориальным группам, а также возможности использования полученных данных для идентификации неизвестного лица.

**Ключевые слова:** судебная медицина, идентификация личности, дерматоглифика, антропометрические параметры.