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НЕЙРОННІ МЕРЕЖІ І ПЕРСПЕКТИВИ ЇХ ВИКОРИСТАННЯ У СУДОВІЙ МЕДИЦИНІ

Козань Н.М.

Резюме. У даній роботі представлено напрямки та тенденції розвитку сучасної комп'ютерної обробки даних, отриманих при судово-медичних дослідженнях. Розглянуто систему штучних нейронних мереж, принципи та особливості їх роботи. Визначено перспективи застосування штучних нейронних мереж при обробці даних дерматогліфічних досліджень.

Ключові слова. Судова медицина, нейронні мережі

НЕЙРОННЫЕ СЕТИ И ПЕРСПЕКТИВЫ ИХ ИСПОЛЬЗОВАНИЯ В СУДЕБНОЙ МЕДИЦИНЕ

Козань Н. Н.

Резюме. В данной работе представлены направления и тенденции развития современной компьютерной обработки данных, полученных при судебно-медицинских исследованиях. Рассмотрена система искусственных нейронных сетей, принципы и особенности их работы. Определены перспективы применения искусственных нейронных сетей при обработке данных дерматоглифических исследований.

Ключевые слова. Судебная медицина, нейронные сети.

SYSTEMATIZATION OF DERMATOGLYPHICS PATTERNS MEDIUM AND PROXIMAL PHALANGES OF FINGERS

©**Kotsyubunska Yu. Z.**

SHEE «Ivano-Frankivsk National Medical University»

Summary: In the article presents the methods obtaining and systematizing dermatoglyphics parameters of medium and proximal phalanges of the fingers. Displayed possibility of using supplemented and improved classification of dermatoglyphics parameters of medium and proximal phalanges of the fingers during forensic identification of the person.

Key words: dermatoglyphics, fingerprinting, dermatoglific parameters of identification the person.

Introduction. Dermatoglyphics parameters of fingers and toes and hands and feet, are unique morphogenetic phenomenon that for a long time attracted the attention of researchers of various fields of science. The above parameters are used to resolve issues of neurophysiology, forensic science, clinical medicine, anthropology, ethnology, criminology, biology, above the development of computer methods for recognition ,fixacion and processing of acquired images of the objects. [1, 2,3,4].

In humans there are several tens of dermatoglific specific differences that can be used as diagnostic markers during forensic identification of the person. Dermatorhlific parameters is highly susceptible to individual and group variability expressed polymorphism, and at the same time, can be traced the high level of inheritance. The complex of these properties determine the scope of the analysis of dermatoglyphic analisys in practical purposes: in genetics *[5,6,7]*, in anthropology *[8,9,10]*, in criminalistic, criminology and forensic medicine [8,11,12,13].

In the practice of forensic medicine and criminalistics the dermatoglyphics and fingerprinting are used to identify the person at a mass incoming unrecognized bodies, in the commission of experts the disputed paternity, analysis of relationships between populations and people [14].. The most profound forensic developments on this issue aimed at classic program whether slightly modified program that focuses on the study of dermatoglyphics parameters of the distal phalanges of the fingers (Cammins H., Midlo Ch. 1943; 1961) [15] and the study of dermatoglyphics features of palms and feet [3,13,14].

Enough little at this time studied dermatoglific parameters of medium and proximal phalanges of the fingers, which also can be incorporated into the system and identifying parameters and used during the identification of an unknown person at the level of dermatoglyphics parameters of distal phalanges. The study of dermatoglyphics patterns of medium and proximal phalanges of hands was engaged Shpak LY [16] She was one of the first researchers in anthropology, which

sudying the combined dermatoglific parameters distal, medium and proximal phalanges of the hand. In her works are presented data relating to sexual dimorphism bilateral and dygital variability, symmetry of skin relief of phalanges. For the first time identified patterns of inheritance patterns of medium and proximal phalanges of the fingers.

The first attempts to classify the dermatoglific parameters of medium and proximal phalanges of the fingers were made by Pincus (1923) [17], which mention heterogeneity of course of papillary lines on these phalanges: at 1-3 fingers are combs his phalanxes are tilted in the ulnaris direction and at the 4-5 - in a radial. Cammins H. i Midlo C., exploring the papillary relief of medium and proximal phalanxes of fingers hand, concluded that the direction of papillary combs in medium and proximal phalanges retains certain regularity, such as the orientation of papillary combs on fingers 1,2,3-performed in the proximal-radial direction, and at 4, 5 fingers - in ulnar-proximal direction.

Papillary patterns of medium and proximal phalanxes of fingers , first time have been allocated by M. Ploetz-Radman (1937) [19].She described the types of papillary patterns, which were divided into classes: simple patterns (straight semilunar, wavelike, arched), the combined patterns (angle, angle in combination with the arc), complex patterns (double angle, double arc and angle, double arc) patterns that are rarely found (closed and featherlike) and random.

In the future long time, researchers who have been studying fenotyphology of dermatoglyphics parameters medium and proximal phalanges of the fingers, the basis used the classification of skin patterns of medium and proximal phalanges proposed by M. Ploetz-Radman (1937). Skin patterns classification scheme proposed by Kumbani H. (1963), generally did not differ from classification of M. Ploetz-Radman (1937), it also provides for the division of skin patterns into subtypes depending on orientation. Proposed, Hungarian researchers Gyenis G. Lada M. Papai J. (1972), the classification of dermatoglyphics parameters of medium and proximal phalanges of the fingers, also based on the classification of M. Ploetz-Radman (1937). However, the scientists have made some changes that, in general, expanded above higher recall classification, namely, they were detailed and complemented by new subtypes wavelike patterns and semilunar patterns and was isolated new combination of pattern that did not meet earlier.

Classification of skin patterns of medium and proximal phalanges of the fingers proposed by Shpak L.Y., based on the above classification schemes, currently remains the most complete. It included such classification moment as orientation of papillary lines, namely ulnaris and radialis (papillary lines oriented according to the minimus or thumb) and also proximal and distal (papillary lines are oriented toward the proximal or distal interphalangeal folds). All known to the author skin patterns were systematized by dividing them as follows: for classes - slabodyferentsiyovani patterns, semilunaris with slope, arc (symmetric), a combination of arcs whith slope (asymmetric arch), double arc; combination of double arches of the slope (asymmetric double arcs) wave, semilunaris arc; featherlike; closed; angles; double angles, corners combination of arcs, random; into types - distal and proximal and to form - ulnaris and radialis.

Materials and methods. The material for the study serve the dermatoglific parameters of the proximal and medium phalanges of the fingers of people male and female ages 18, belonging to Boiko, Hutsul, Lemko ethno-territorial groups and residing in the Ivano-Frankivsk regionand also male and female, living in the Ivano-Frankivsk region and does not belong to any of the above ethno-territorial groups.

These indicated dermatoglifics parameters were obtained using the digital methods, such as scanning the dermatoglifics options of medium and of the proximal phalanges of the fingers by using a scanner Futronic's FS80 USB 2.0. Described scanner uses advanced technologies such as CMOS-sensor and exactly balanced optical system for removal of high-quality fingerprint image, and is compatible with all modern operating systems (Windows, Linux, MAC OS), it connects via a standard USB-port. Scanner Software can be installed by using the CD or by downloading from the manufacturer's website. The software that comes bundled with the scanner allows to prowe the capture operation, storage and invertation of colors scans. The scanner capable of to capture the fingerprint images and create 480x320 pixels (500 DPI). The size of the surface on which data is read is 16x24mm. The thickness of scanner glass is 14mm that proves its reliability and gives it advantages over other similar sensors for fingerprinting semiconductor type. To remove the image scanner uses four different directs infrared LED-lights that automatically change the intensity of radiation depending on the characteristics of the scanned finger (wet, dry, dirty, etc.) to optimize the quality of the fixed fingerprint image. The materials, which were obtained by the study were divided into two groups: I group -250 persons, male and female belonging to Boiko, Hutsul, and Lemko ethno-territorial groups residing in the Ivano-Frankivsk region; II group - 100 people, male and female, also residing in the Ivano-Frankivsk region, but does not belong to any of the above ethno-territorial groups (control group). Data processing performed by method , during which studied the qualitative and quantitative characteristics obtained scans of papillary patterns. In a subsequent performed statistical analysis of the data by calculating the derived parameters and coefficients using electronic tables Microsoft® Excel 2003. Calculations were performed on PC Windows 7®, Intel Core2Duo 2, ATI Radeon HD4650, RAM 3GB, HDD 500GB. The basic software package was used for statistical analysis STATISTICA 10 for Windows. During the study determined:the average arithmetical meaning ($\overline{X}$),average quadratic fault of the arithmetic mean $S_{\overline{x}}$, the average quadratic declination (δ), t- Student allocation and the probability of error (P), in order to obtain reliable results.

Results: During conducting the survey used the classification of of papillary patterns of the proximal and medium phalanges of the fingers , developed Shpak L.Yu. (2003).

According to this classification the papillary images of distal and proximal phalanges of the fingers are divided into (Figure 1): 1) direct(S). 2) With slope (L). 3) Semilunars distalis (Hd). 4) Semilunars proximalis (Hp). 5) Arcus distalis (Ad). 6) Arcus proximalis (Ap). 7) Arcus distalis/with slope (L/Ad). 8) Arcus promixalis/with slope (Ap/L). 9) Double

arcus (Da). 10) Double arcus/with slope (Da/L). 11) Wawe (V). 12) Double semilunar (Dh). 13) Arcus semilunaris (Ah). 14) Featherlike (F). 15) Close image (Cl). 16) Angle distalis (Nd). 17) Angle proximalis (Np). 18) Double angle (Dn). 19) Arcus distalis/angle (Nd/Ad). 20) Arcus proximalis/angle (Ap/Np). 21) Randome. The above patterns can be ulnar (ulnar) and radial (radial) oriented.

1) direct(S). 2) With slope (L). 3) Semilunars distalis (Hd). 4) Semilunars proximalis (Hp). 5) Arcus distalis (Ad). 6) Arcus proximalis (Ap). 7) Arcus distalis/with slope (L/Ad). 8) Arcus promixalis/with slope (Ap/L). 9) Double arcus (Da). 10) Double arcus/with slope (Da/L). 11) Wawe (V). 12) Double semilunar (Dh). 13) Arcus semilunaris (Ah). 14) Featherlike (F). 15) Close image (Cl). 16) Angle distalis (Nd). 17) Angle proximalis (Np). 18) Double angle (Dn). 19) Arcus distalis/angle (Nd/Ad). 20) Arcus proximalis/angle (Ap/Np). 21) Randome.

Classification of of papillary patterns of the proximal and medium phalanges of the fingers by Shpak L.Yu. (2003)
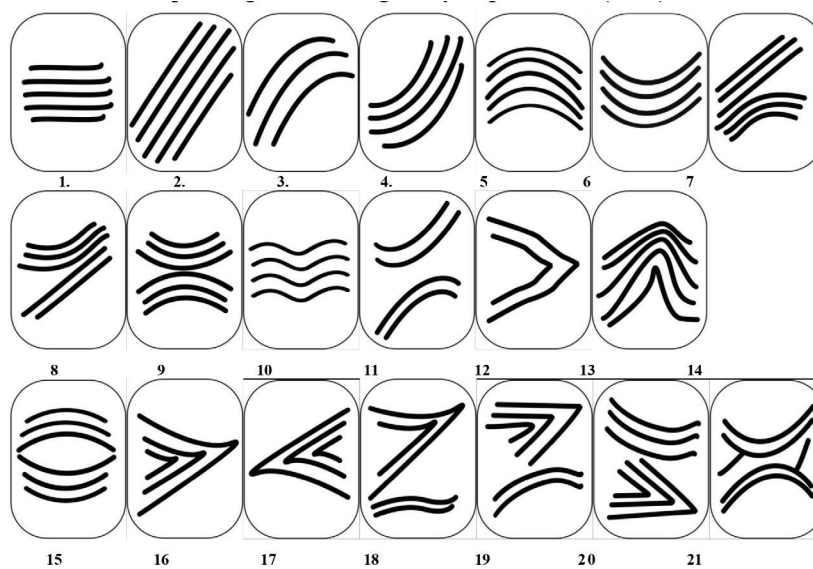

Figure 1

The study found that at the level with other patterns encountered complex patterns, such as a combination of simple linear patterns as «straight (S)» and «with a slope (L)», as well as the a combination of "wave (V)" and «direct (S)» patterns and «arcs distal, proximal (Ad, Ap)» and « direct (S)»patterns. These patterns not found in the classification proposed Shpak LY (2003) [16]. It was therefore decided to add these types of patterns to the classification, namely «combined linear (LS)», «wave/straight (Vs)», «distal arc/straight (Ads)» and « the proximal arch straight (Aps)». That in turn can be ulnary and radially oriented (Figure 2)
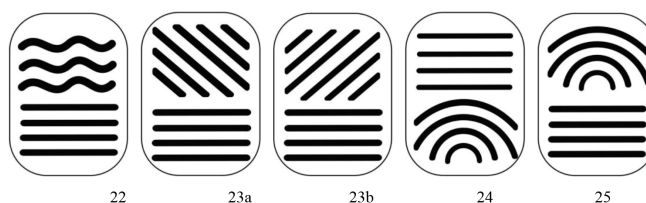

Figure 2

22) wave/straight (Vs) 23)a combined linear (LS) ulnar 23b combined linear (LS) radial 24) distal arc/straight (Ads) 25) the proximal arch straight (Aps).

Conclusion.After analyzing the data, it can be concluded that dermatoglific parameters of medium and the proximal phalanges of the fingers , are informative value, subjects to quantifiable and qualitative study. Studying the dermatoglific constitution of investigated persons was established the correlation of parameters of medium and proximal phalanges of the fingers with manifestations of the phenotype (antroposcopic, anthropometric parameters) as well as the gender, ethno-territorial belonging. Based on the above, can reach the conclusion that the dermatoglific parameters of medium and proximal phalanges of the fingers , are one of the most stable parameters of the body that can be applied at the level with of dermatoglyphics parameters of the distal phalanges of the fingers in studying of dermatoglyphics constitution of unknown person, and thus complement and confirm, a number of known identifying methods.

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ОНКОПАТОЛОГИЯ В СУДЕБНО-МЕДИЦИНСКОЙ ПРАКТИКЕ

©Л. М. Туманская[1], В. А. Туманский [1], А. В. Куртев[2]

Запорожский государственный медицинский университет МЗ Украины[1],
КП «Запорожское областное бюро судебно-медицинской экспертизы»
Запорожского областного совета[2]

Резюме. В статті викладена структура онкопатологіï за даними гістологічного дослідження злоякісних пухлин, які стали причиною ненасильної раптової смерті людей, що померли «вдома».

Ключові слова: судова медицина, пухлина, рак, смерть.

ВВЕДЕНИЕ. В последние годы наблюдается значительный рост онкологической патологии в структуре заболеваемости и смертности населения нашей планеты. По последним данным глобальной статистики