КЛІНІЧНА МЕДИЦИНА

CLINICAL MEDICINE

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MODELING USING DISCRIMINATION ANALYSIS, PRIORITY OF PRACTICALLY HEALTHY MEN TO NORTHERN OR OTHER ADMINISTRATIVE-TERRITORIAL REGIONS OF UKRAINE ON THE BASIS OF DERMATOGLYPHIC INDICATORS FEATURES

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In the article, the analysis of discriminatory models of the affiliation of practically healthy men to the northern or other administrative-territorial regions of Ukraine on the basis of peculiarities of finger and palmar dermatologic indices was constructed and analyzed. The highest level of discrimination was found among the men of the northern and southern and northern and eastern regions of Ukraine. Most often discriminant variables between men of the northern and other regions of Ukraine are the type of pattern on the fingers of the right hand and the asymmetry of the comb account of the lines a-b and c-d. The largest contribution to discrimination between northern and other administrative-territorial regions of Ukraine has the asymmetry of the comb account of the lines a-b and c-d.

Key words: discriminatory analysis, dermatoglyphic, practically healthy men.

Dermatoglyphics is a section of human morphology that studies skin relief (papillary lines) of palmar and plantar surfaces of the skin. The special value of the dermatoglyphic method of research is that the papillary pattern is a direct reflection of the human genotype and is not exposed to the external environment, that is, does not change with age. This feature, in fact, has resulted in increased interest in the human skin figure among the police, as an opportunity to identify a person. However, in the future, scientists suggested that there might be a link between the genes that cause the human skin pattern and the genes responsible for a variety of diseases. Currently, there are clear regularities between the features of dermatological patterns and specific lesions of certain systems and organs [2, 12, 16-18]. There are separate works that examined the relationship between the features of the skin pattern and anthropometric indicators of the head and body in general, the blood group, gender identity [1, 4, 6, 14, 15]. Of particular interest are the works in which the interrelations between the indices of palmar and plantar dermatoglyphic and ethnic, racial affiliation of a person are investigated [9, 10]. In the light of recent events - when escalation of military conflicts took place in different parts of the world, migration processes intensified, there was a need to apply a simple, cheap and reliable method of verifying ethnic, or even better, administrative-territorial belongings of a person or its remnants. In Ukraine, this topic has not been studied sufficiently [8-10], which pushes us to find a solution to this problem.

The purpose of the work is to construct and analyze discriminant models of the affiliation of practically healthy men to northern or other administrative-territorial regions of Ukraine on the basis of peculiarities of indicators of finger and palmar dermatoglyphic.

Material and methods. From the database of research center of the National Pirogov Memorial Medical University, Vinnytsya primary dermatological figures were taken from 410 practically healthy men between the ages of 19 and 35 in the third generation of inhabitants of the respective administrative-territorial regions of Ukraine [5]: 72 from the northern (Zhytomyr, Kyiv, Chernihiv and Sumy regions), 47 - from the south (Odesa, Mykolaiv, Kherson, Zaporizhian regions and Autonomous Republic of Crimea), 165 from the central (Vinnytsia, Cherkasy, Kirovograd, Poltava and Dnipropetrovsk regions), 71 - from the western (Volyn, Rivne, Lviv, Chernivtsi, Ternopil, Khmelnytskyi, Zakarpattia and Ivano-Frankivsk regions), 45 - from the eastern (Kharkiv, Lugansk and Donetsk regions). Conducted, with the help of a special questionnaire, analysis of the medical and social factors of the living conditions of all those surveyed, indicates a fairly high homogeneity of samples of somatic healthy men from different regions of Ukraine [19]. Imprints of the palmar surfaces of the brushes and the individual fingers of the right and left hands were obtained using a printing ink on a sheet of paper [7]. The obtained dermatoglyphic material was analyzed by H. Cummins and Ch. Midlo [3] methods according to T. D. Gladkova [7]. The construction of discriminatory models of the possible assignment of men to northern or other regions of Ukraine, based on the specifics of dermatological indicators, was carried out in the license package "STATISTICA 6.1".

Results and its discussion. It is established that, taking into account the indexes of finger and palmar dermatoglyphic, the discriminatory function covers 88.2% of practically healthy men from the *northern* region of Ukraine and 69.1% from the *southern* region of Ukraine. In general, a model that takes into account the

index of finger and palmar dermatoglyphics in practically healthy men from the northern and southern regions of Ukraine correctly covers the representatives of these regions of Ukraine in 80.9% of cases.

Between practically healthy men from the northern and southern regions of Ukraine discriminant variable there is an asymmetry of comb account of line a-b (RL_AB), type of the pattern of the 4th finger of the right hand (TF_R4), comb account of the 3rd finger of the right hand (FRC_R3), asymmetry of comb account of line c-d (RL_SD), the asymmetry of angle atb (RL_ATB), the value of angle btc of left palm (BTC_L) and the frequency of the intermediate axial three-radius of the left palm (T1_R) (Table. 1). Moreover, the greatest contribution to discrimination between practically healthy men from the northern and southern regions of Ukraine has the asymmetry of the comb account of line a-b. All other discriminant variables are less significant, but in most cases isolated credible impact of discrimination between sets (except intermediate frequency axial three-radius of left hand). In general, the set of all variables has almost medial (statistics Wilks lambda = 0,665; F = 7,310; □<0,001) discrimination between men from the northern and southern regions of Ukraine (see Table. 1).

Table 1

Report of discriminatory analysis in practically healthy men of the northern and southern regions of Ukraine in dependence on features of indicators of finger and palmar dermatoglyphic

Wilks' Lambda 0,665; F (7,102) = 7,310; □<0,0000

Discriminant variables	Wilks' Lambda	Partial Lambda	F-remove (1,102)	p-level	Toler.
RL_AB	0,795	0,838	19,70	0,0000	0,704
TF_R4	0,711	0,937	6,838	0,0103	0,966
FRC_R3	0,706	0,944	6,066	0,0155	0,960
RL_CD	0,720	0,925	8,241	0,0050	0,949
RL_ATB	0,723	0,922	8,689	0,0040	0,674
BTC_L	0,701	0,949	5,443	0,0216	0,819
T1_R	0,682	0,977	2,392	0,1251	0,847

Note: here and in similar tables Wilks' Lambda – Wilks Lambda statistics; Partial Lambda – Wilkes Lambda statistics for a single variable contribution to discrimination between populations; F-remove – standard F-test for the corresponding Partial Lambda; p-level – p- level associated with the corresponding F-remove; Toler. – tolerance of a variable (measure of redundancy of a variable).

The established coefficients of classification of discriminant functions allow us to calculate the classification index (Df), by which one can be predict the relevance of the indicators to "typical" for men northern or "typical" for men in the southern regions of Ukraine. Definition Df is given in the form of equations, where the attribution to men of the northern region of Ukraine is possible at a value of Df close to 17.72, and to men of the southern region of Ukraine - with the value of Df, close to 16.29:

Df (*for men in the northern region of Ukraine*) = RL_AB × 0,081 + TF_R4 × 2,017 + FRC_R3 × 0,274 − RL_CD × 0,092 − RL_ATB × 0,100 + BTC_L × 1,125 + T1_R × 12,27 − 17,72;

Df (*for men in the southern region of Ukraine*) = −RL_AB × 0,189 + TF_R4 × 1,473 + FRC_R3 × 0,184 + RL_CD × 0,024 + RL_ATB × 0,260 + BTC_L × 1,375 + T1_R × 10,70 − 16,29.

To determine the significance of all discriminant functions, criterion χ^2 (Table 2) was used. The table below shows that the function is statistically significant. That is, a reliable interpretation of the classification indices obtained by practically healthy men from the northern and southern regions of Ukraine, taking into account the above dermatological indicators are possible.

Table 2

Report of incremental criterion with inclusion of all canonical roots in practically healthy male northern and southern regions of Ukraine while taking into account features dermatoglyphics indices

	Eigenvalue	Canonicl R	Wilks' Lambda	Chi-Sqr.	Df	p-level
0	0,502	0,578	0,666	42,49	7	0,0000

Note: here and in similar tables Eigenvalue – the value of the roots for the discriminant function; Canonicl R – canonical value R for different roots; Chi-Sqr. – standard criterion χ^2 of consecutive roots; Df – the number of degrees of freedom; p-level – p- level associated with the corresponding χ^2.

With regard to the indicators of finger and palmar dermatoglyphics, discriminant function covers 39.7% of practically healthy men from the *northern* region of Ukraine and 89.5% of the *central* region of Ukraine. In general, a model that takes into account the indicators of finger and palmar dermatoglyphics in practically healthy men from the northern and central regions of Ukraine correctly covers the representatives of these regions of Ukraine in 74.1% of cases.

Between the practically healthy men in the northern and central regions of Ukraine, the discriminant variables are the asymmetry of the comb account of the c-d line (RL_CD), the type of the 2nd left-hand finger pattern (TF_L2) pattern, the type of the 2nd right-hand finger pattern (TF_R2), the asymmetry of the comb 3rd finger count (RL_FRC3), 3rd right hand finger pattern type (TF_R3), asymmetry of comb account line a-b (RL_AB) asymmetry magnitude of the angle atb (RL_ATB) (Table 3). Moreover, the greatest contribution to discrimination between practically healthy men from the northern and central regions of Ukraine has the

asymmetry of the comb account of the c-d line. All other discriminant variables are less significant, but in the majority of cases, there is a significant single effect on discrimination between populations (with the exception of the asymmetry of the 3rd finger comb account). In general, the totality of all variables has negligible (Wilks Lambda statistics = 0,801; F = 7,481; ⬚<0,001) discrimination between men from the northern and central regions of Ukraine (Table 3).

Table 3

Report of discriminatory analysis in practically healthy men of the northern and central regions of Ukraine, depending on features of indicators of finger and palmar dermatoglyphics

Wilks' Lambda: 0,801; F (7,212) = 7,481; ⬚<0,0000					
Discriminant variables	Wilks' Lambda	Partial Lambda	F-remove (1,212)	p-level	Toler.
RL_CD	0,866	0,926	16,95	0,0001	0,959
TF_L2	0,826	0,971	6,278	0,0130	0,800
TF_R2	0,831	0,965	7,676	0,0061	0,798
RL_FRC3	0,814	0,985	3,243	0,0731	0,977
TF_R3	0,824	0,974	5,727	0,0176	0,878
RL_AB	0,834	0,961	8,572	0,0038	0,734
RL_ATB	0,824	0,973	5,921	0,0158	0,752

The classification indices (Df) for men from the northern and central regions of Ukraine, depending on the features of finger and palmar dermatoglyphics, have the form of the following equations:

Df (*for men in the northern region of Ukraine*) = –RL_CD × 0,013 + TF_L2 × 1,836 + TF_R2 × 1,524 – RL_FRC3 × 0,022 + TF_R3 × 2,357 + RL_AB × 0,157 – RL_ATB × 0,190 – 10,04;

Df (*for men in the central region of Ukraine*) = RL_CD × 0,107 + TF_L2 × 1,401 + TF_R2 × 2,012 – RL_FRC3 × 0,084 + TF_R3 × 1,921 + RL_AB × 0,044 + RL_ATB × 0,003 – 8,197.

In determining the significance of all discriminatory functions using criterion χ^2 it is established that a reliable interpretation of the classification indices obtained between practically healthy men in the northern and central regions of Ukraine is possible (Table 4).

Table 4

Report of incremental criterion with inclusion of all canonical roots in practically healthy male northern and central regions of Ukraine while taking into account features dermatoglyphics indices

	Eigenvalue	Canonicl R	Wilks' Lambda	Chi-Sqr.	Df	p-level
0	0,247	0,445	0,802	47,35	7	0,0000

Taking into account the indicators of finger and palmar dermatoglyphics, the discriminatory function covers 76.5% of practically healthy men from the <u>*northern*</u> region of Ukraine and 72.7% from the <u>*western*</u> region of Ukraine. In general, a model that takes into account the index of finger and palmar dermatoglyphics in practically healthy men from the northern and western regions of Ukraine correctly covers the representatives of these regions of Ukraine in 74.6% of cases. Between practically healthy men from the northern and western regions of Ukraine, discriminant variables are the asymmetry of the comb count of the c-d line (RL_CD), the type of the right-hand palm pattern of 1st finger (TF_R1), the right palmar btc angle (BTC_R), the asymmetry of the comb line a-b count (RL_AB) and the asymmetry of the magnitude of the angle atb (RL_ATB) (Table 5).

Table 5

Report of discriminatory analysis in practically healthy men of the northern and western regions of Ukraine, depending on features of indicators of finger and palmar dermatoglyphics

Wilks' Lambda: 0,747; F (5,128) = 8,651; ⬚<0,0000					
Discriminant variables	Wilks' Lambda	Partial Lambda	F-remove (1,128)	p-level	Toler.
RL_CD	0,868	0,861	20,72	0,0000	0,865
TF_R1	0,802	0,932	9,333	0,0027	0,943
BTC_R	0,781	0,957	5,798	0,0175	0,835
RL_AB	0,793	0,943	7,757	0,0062	0,788
RL_ATB	0,778	0,961	5,243	0,0237	0,803

Moreover, the greatest contribution to discrimination between practically healthy men from the northern and western regions of Ukraine has the asymmetry of the comb account of the line c-d. All other discriminatory variables have a less significant but credible single effect on discriminating between aggregates. In general, the totality of all variables has insignificant (Wilks Lambda statistics = 0.747; F = 8.651; ⬚<0.001) discrimination between men from the northern and western regions of Ukraine (see table 5).

Classification indices (Df) for men from the northern and western regions of Ukraine, depending on the features of finger and palmar dermatoglyphics, have the form of the following equations:

Df (*for men in the northern region of Ukraine*) = RL_CD × 0,242 + TF_R1 × 2,221 + BTC_R × 1,766 + RL_AB × 0,259 – RL_ATB × 0,224 –12,80;

Df (*for men in the western region of Ukraine*) = RL_CD × 0,409 + TF_R1 × 1,648 + BTC_R × 1,989 + RL_AB × 0,112 – RL_ATB × 0,006 –13,29. In determining the significance of all discriminatory functions using criterion χ^2 it is established that a reliable interpretation of the classification indices obtained between practically healthy men in the northern and western regions of Ukraine is possible (Table 6).

Table 6

Report of incremental criterion with inclusion of all canonical roots in practically healthy male northern and western regions of Ukraine while taking into account features dermatoglyphics indices

	Eigenvalue	Canonicl R	Wilks' Lambda	Chi-Sqr.	Df	p-level
0	0,338	0,503	0,747	37,70	5	0,0000

When taking into account the indexes of finger and palmar dermatoglyphics, the discriminatory function covers 86.1% of practically healthy men from the *northern* region of Ukraine and 66.7% of the *eastern* region of Ukraine. In general, a model that takes into account finger and palmar dermatoglyphic indices in practically healthy men from the northern and eastern regions of Ukraine correctly covers the representatives of these regions of Ukraine in 78.6% of cases.

Between practically healthy men from the northern and eastern regions of Ukraine, discriminant variables are the type of the first finger of right hand pattern (TF_R1), asymmetry of comb account line a-b (RL_AB), the type of the 3rd finger left hand pattern (TF_L3), comb account of the 3rd left finger left hand (FRC_L3), comb account of the 1st finger of right hand (FRC_R1), pattern on the 4th interdigital pillow of the left palm (IV_L) and pattern on the 2nd interdigital pillow of the right palm (II_R) (Table 7). Moreover, the greatest contribution to discrimination between practically healthy men from the northern and eastern regions of Ukraine have the type of the first-finger pattern of the right hand and the asymmetry of the comb account of the line a-b.

All other discriminatory variables have a less significant but credible single effect on discriminating between aggregates. In general, the totality of all variables has almost average (Wilks Lambda statistics = 0.658; F = 8.092; □<0.001) d□s□r□m□n□t□□n b□tw□□n m□n fr□m th□ n□rth□rn □nd □□st□rn regions of Ukraine (see Table 7).

Table 7

Report of discriminatory analysis in practically healthy men of the northern and eastern regions of Ukraine, depending on features of indicators of finger and palmar dermatoglyphics

Wilks' L□mbd□: 0,658; F (7,109) = 8,092; □<0,0000					
Discriminant variables	Wilks' Lambda	Partial Lambda	F-remove (1,109)	p-level	Toler.
TF_R1	0,721	0,912	10,49	0,0016	0,800
RL_AB	0,718	0,916	9,999	0,0020	0,954
TF_L3	0,693	0,950	5,721	0,0185	0,963
FRC_L3	0,707	0,931	8,088	0,0053	0,766
FRC_R1	0,698	0,942	6,694	0,0110	0,724
IV_L	0,713	0,923	9,035	0,0033	0,746
II_R	0,694	0,948	6,023	0,0157	0,815

The classification indices (Df) for men from the northern and eastern regions of Ukraine, depending on the features of finger and palmar dermatoglyphics, have the form of the following equations:

Df (*for men in the northern region of Ukraine*) = TF_R1 × 3,847 + RL_AB × 0,298 + TF_L3 × 3,079 – FRC_L3 × 0,041 + FRC_R1 × 0,382 + IV_L × 9,941 + II_R × 3,411 – 22,89;

Df (*for men in the eastern region of Ukraine*) = TF_R1 × 3,044 + RL_AB × 0,128 + TF_L3 × 2,382 + FRC_L3 × 0,074 + FRC_R1 × 0,281 + IV_L × 7,989 + II_R × 4,729 – 18,57. In determining the significance of all discriminatory functions using criterion χ^2 it is established that a reliable interpretation of the classification indices obtained between practically healthy men in the northern and eastern regions of Ukraine is possible (Table 8).

Table 8

Report of incremental criterion with inclusion of all canonical roots in practically healthy male northern and eastern regions of Ukraine while taking into account features dermatoglyphics indices

	Eigenvalue	Canonicl R	Wilks' Lambda	Chi-Sqr.	Df	p-level
0	0,520	0,585	0,658	46,66	7	0,0000

In our previous studies [13] we found the highest variability of qualitative signs of finger dermatoglyphics of somatically healthy men in the northern and southern regions of Ukraine. Finger

dermatoglyphics does not differentiate between administrative and territorial local groups of men between the northern and central regions, and palmar - between northern and central, northern and western, as well as northern and eastern regions of Ukraine.

The high taxonomic value for intra-population differentiation of the local level have: types of patterns with high intensity of comb formation, capacity of the pattern, pattern of hypothenar, thenar, II and III interdigital intervals, size of angles atd, ati and dat, index of Cummins, additional axis three radius and length of segment ct.

Using the method of discriminant analysis in the research N.M. Kozan [11] analyzed dermatological figures on the hands of individuals who are representatives of the Hutsuls and Boykos ethno-territorial groups living on the territory of the Ivano-Frankivsk region. It is shown that the defining feature of the person's belonging to these groups is the Ab angle on the right palm (the total value of Wilks' Lambda statistics is 0.309). We have set twice as bigger value of the Wilks' Lambda statistics and, accordingly, the lower level of discrimination due to the entry of various ethnic groups into the various administrative-territorial regions of Ukraine.

Conclusion

1. Built on the base of performance characteristics of finger and palmar dermatoglyphics significant discriminant models of belonging practically healthy men to the northern or other administrative-territorial regions of Ukraine set the highest level of discrimination between men of north and south and the north and east regions.

2. Discriminant variable between men of the north and other regions of Ukraine most often is the type of pattern on the fingers of the right hand and asymmetry of comb counting lines a-b and c-d. The largest contribution to discrimination between the northern and other regions of Ukraine gives the asymmetry of the comb account of the lines a-b and c-d.

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Реферати

МОДЕЛЮВАННЯ, ЗА ДОПОМОГОЮ ДИСКРИМІНАНТНОГО АНАЛІЗУ, ПРИНАЛЕЖНОСТІ ПРАКТИЧНО ЗДОРОВИХ ЧОЛОВІКІВ ДО ПІВНІЧНОГО АБО ІНШИХ АДМІНІСТРАТИВНО-ТЕРИТОРІАЛЬНИХ РЕГІОНІВ УКРАЇНИ НА ОСНОВІ ОСОБЛИВОСТЕЙ ДЕРМАТОГЛІФІЧНИХ ПОКАЗНИКІВ
Гунас В. І.

В статті побудовані і проведено аналіз дискримінантних моделей приналежності практично здорових чоловіків до північного або інших адміністративно-територіальних регіонів України на основі особливостей показників пальцевої і долонної дерматогліфіки. Найвищий рівень дискримінації встановлено між чоловіками північного і південного та північного і східного регіонів України. Найчастіше дискримінантними змінними між чоловіками північного та інших регіонів України є тип візерунку на пальцях правої кисті і асиметрія гребінцевого рахунку ліній a-b та c-d. Найбільший внесок у дискримінацію між північним та іншими адміністративно-територіальними регіонами України має асиметрія гребінцевого рахунку ліній a-b та c-d.

Ключові слова: дискримінантний аналіз, дерматогліфіка, практично здорові чоловіки.

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МОДЕЛИРОВАНИЕ С ПОМОЩЬЮ ДИСКРИМИНАНТНОГО АНАЛИЗА ПРИНАДЛЕЖНОСТИ ПРАКТИЧЕСКИ ЗДОРОВЫХ МУЖЧИН К СЕВЕРНОМУ ИЛИ ДРУГИМ АДМИНИСТРАТИВНО-ТЕРРИТОРИАЛЬНЫМ РЕГИОНАМ УКРАИНЫ НА ОСНОВАНИИ ОСОБЕННОСТЕЙ ДЕРМАТОГЛИФИЧЕСКИХ ПОКАЗАТЕЛЕЙ
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В статье построены и проведен анализ дискриминантных моделей принадлежности практически здоровых мужчин к северному или другим административно-территориальным регионам Украины на основании особенностей показателей пальцевой и ладонной дерматоглифики. Наиболее высокий уровень дискриминации установлено между мужчинами северного и южного, а также северного и восточного регионов Украины. Чаще всего дискриминантными переменными между мужчинами северного и других регионов Украины является тип узора на пальцах правой кисти и асимметрия гребневого счета линий a-b и c-d. Наибольший вклад в дискриминацию между северным и другими административно-территориальными регионами Украины имеет асимметрия гребневого счета линий a-b и c-d.

Ключевые слова: дискриминантный анализ, дерматоглифика, практически здоровые мужчины.

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СПОСІБ ФОРМУВАННЯ ІНДИВІДУАЛЬНИХ ПРОФІЛАКТИЧНИХ ПРОГРАМ ІЗ ВИКОРИСТАННЯМ УДОСКОНАЛЕНОЇ АНАМНЕСТИЧНОЇ АНКЕТИ В УМОВАХ РОБОТИ ЄДИНОЇ МЕДИЧНОЇ ІНФОРМАЦІЙНОЇ СИСТЕМИ ЗАКЛАДУ ОХОРОНИ ЗДОРОВ'Я

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У статті наведено результати імплементації в єдину медичну інформаційну систему закладу охорони здоров'я удосконалених анамнестичних анкет з метою формування індивідуальних профілактичних програм. Впровадження даної розробки дозволить запровадити моніторинг і оцінку факторів ризику розвитку неінфекційних захворювань та переліку обґрунтованих діагностичних обстежень, що є підґрунтям для планування необхідних обсягів профілактичних втручань. Широке використання можливостей медичної інформаційної системи дозволить приймати обґрунтовані управлінські рішення, проводити їх аналіз та раціонально використовувати ресурси закладу охорони здоров'я.

Ключові слова: медична інформаційна система, профілактичні медичні огляди, анамнестичні анкети, моніторинг і оцінка, управління профілактикою.

В умовах реформування сфери охорони здоров'я гостро стоїть необхідність поглибленого науково-практичного підходу до вивчення питань, що стосуються планування та проведення профілактичних медичних оглядів дорослого населення з урахуванням кращого світового досвіду та даних доказового менеджменту охорони здоров'я, посилення ролі та функції лікаря первинної ланки. Саме з професійними компетенціями лікарів первинної ланки (сімейними лікарями, дільничними терапевтами) пов'язана можливість раціонально мінімізувати витрати на кожний конкретний випадок (звернення з профілактичною метою), оскільки вони повинні вирішити переважну більшість медичних потреб пацієнта на своєму рівні. Важливою є і необхідність більш ретельного відбору тестів та профілактичних заходів, зокрема, необхідність обов'язкового обліку віку, статі, індивідуальних факторів ризику, щоб, якнайбільше, знизити ризик побічних ефектів пов'язаних з виконанням процедури обстеження та знизити частоту хибно позитивних результатів. Основою профілактики НІЗ є визначення найбільш істотних ФР, їх профілактика, моніторинг і контроль на основі поетапного