UDC: 616-71

THE PARAMETERS OF GAZ DISHARGE VISUALIZATION (KIRLIANOGRAM) APPROPRIATELY ASSOCIATED WITH SOME PSYCHOPHYSIOLOGICAL AND ENDOCRINE PARAMETERS OF HEALTHY MEN

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In 20 physiologic observations of 10 practically healthy men aged 26-56 years analyzed pairwise and canonical correlation between the eight basic parameters of gas discharge visualization (GDV, kirlianogram, elektrophotonic) on the one hand, and trait (TA) and reactive (RA) anxiety, plasma levels of triiodothyronine (T_3), testosterone (T) and cortisol (C), and mineralocorticoid activity (MCA) estimated by Na/K-ratio plasma. Found that T_3 determines the parameters of GDV by 64% (R=0,80), TA - 44% (R=0,66), RA - 23% (R=0,48), T - 23% (R=0,48), MCA - 16% (R=0,40), C - 12% (R=0,35). The most deterministic of psychophysiological and endocrine parameters are entropy of GDV in the left projection with filter (R=0,77) and without filter (R=0,76), symmetry (R=0,74) and area of GDV in the frontal projection with filter (R=0,61) and the coefficient of form in the left projection with filter (R=0,53) and frontal projection without filter (R=0,53). In general endocrine status determines kirlianogram by 90% (R=0,947; $\chi^2_{(40)}$=59; p=0,028). Thus, the parameters of GDV objectively reflect the registered psychophysiological and endocrine parameters of the human body.

***Keywords**: gas discharge visualization, trait and reactive anxiety, triiodothyronine, testosterone, cortisol, sodium and potassium plasma.*

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УДК: 616-71

ПАРАМЕТРИ ГАЗОРОЗРЯДНОЇ ВІЗУАЛІЗАЦІЇ (КІРЛІАНОГРАМИ) ЗАКОНОМІРНО ПОВ'ЯЗАНІ З ДЕЯКИМИ ПСИХОФІЗІОЛОГІЧНИМИ І ЕНДОКРИННИМИ ПАРАМЕТРАМИ ПРАКТИЧНО ЗДОРОВИХ ЧОЛОВІКІВ

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У 20 клініко-фізіологічних спостереженнях за 10 практично здоровими чоловіками віком 26-56 років проаналізовано попарні і канонічні кореляційні зв'язки між вісьмома основними параметрами газорозрядної візуалізації (ГРВ, кірліанограми, електрофотоніки), з одного боку, та особистісною (ОТ) і реактивною (РТ) тривожністю, рівнями в плазмі трийодтироніну (T_3), тестостерону (Т) і кортизолу (К), а також мінералокортикоїдною активністю (МКА), оціненою за Na/K-коефіцієнтом плазми. Виявлено, що T_3 детермінує параметри ГРВ на 64% (R=0,80), ОТ – на 44% (R=0,66), РТ – на 23% (R=0,48), Т – на 23% (R=0,48), МСА – на 16% (R=0,40), К – на 12% (R=0,35). При цьому найбільш детермінованими з боку психофізіологічно-ендокринних параметрів є ентропія GDI у лівій проекції з фільтром (R=0,77) і без фільтра (R=0,76), симетрія (R=0,74) і площа GDI у фронтальній проекції з фільтром (R=0,61) та коефіцієнт форми GDI у лівій проекції з фільтром (R=0,53) і у фронтальній проекції без фільтра (R=0,53). В цілому ендокринний статус детермінує кірліанограму на 90% (R=0,947; $\chi^2_{(40)}$=59; p=0,028). Отже, параметри GDI об'єктивно відображують зареєстровані психофізіологічні і ендокринні параметри організму людини.

***Ключові слова:** газорозрядна візуалізація, особиста і реактивна тривожність, трийодтиронін, тестостерон, кортизол, натрій і калій плазми.*

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ПАРАМЕТРЫ ГАЗОРАЗРЯДНОЙ ВИЗУАЛИЗАЦИИ (КИРЛИАНОГРАММЫ) ЗАКОНОМЕРНО СВЯЗАНЫ С НЕКОТОРЫМИ ПСИХОФИЗИОЛОГИЧЕСКИМИ И ЭНДОКРИННЫМИ ПАРАМЕТРАМ ПРАКТИЧЕСКИ ЗДОРОВЫХ МУЖЧИН

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В 20 клинико-физиологических наблюдениях за 10 практически здоровыми мужчинами в возрасте 26-56 лет проанализированы попарные и канонические корреляционные связи между

восемью основными параметрами газоразрядной визуализации (ГРВ, кирлианограммы, електрофотоники), с одной стороны, и личностной (ЛТ) и реактивной (РТ) тревожностью, уровнями в плазме трийодтиронина (T_3), тестостерона (Т) и кортизола (К), а также минералокортикоидной активностью (МКА), оцененной по Na/K-коэффициенту плазмы. Обнаружено, что T_3 детерминирует параметры ГРВ на 64% (R=0,80), ЛТ - на 44% (R=0,66), РТ - на 23% (R=0,48), Т - на 23% (R=0,48), МКА - на 16% (R=0,40), К - на 12% (R=0,35). При этом наиболее детерминированными со стороны психофизиологически-эндокринных параметров является энтропия ГРВ в левой проекции с фильтром (R=0,77) и без фильтра (R=0,76), симметрия (R=0,74) и площадь ГРВ во фронтальной проекции с фильтром (R=0,61) и коэффициент формы в левой проекции с фильтром (R=0,53) и во фронтальной проекции без фильтра (R=0,53). В целом эндокринный статус детерминирует кирлианограму на 90% (R=0,947; $\chi^2_{(40)}$=59; p=0,028). Итак, параметры ГРВ объективно отображают зарегистрированные психофизиологические и эндокринные параметры организма человека.

Ключевые слова: *газоразрядная визуализация, личностная и реактивная тревожность, трийодтиронин, тестостерон, кортизол, натрий и калий плазмы.*

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INTRODUCTION

In 1996 Korotkov K.G. put beginning to new scientific approach, which is based on digital videotechnic, modern electronics and quantitative computer traitment of parameters, for the estimation of the open as early as 1939 effect married couples of S.D. and V.H. Kirlian is luminescence of surface of body of man, induced him by a brief high-frequency electromagnetic irradiation. A method nominated as gas discharge visualization (GDV, bioelectrography), in parallel the terms of kirlianography and electro-photonics are used [6,7]. Without regard to the wideuse enough of method in medicine, psychology, valeology and others like that, he yields to the just criticizing for an insufficient physiology ground. Therefore we put before itself sweep to analyse relationships between the parameters of GDV - from one side, and by the row of psychophysiological, neurodynamics, endocrine, immune and other parameters - on the other hand. Before we are show existence of meaningful cross-correlation connections between the parameters of GDV and heart rhythm variability and by their changes under act of meditation or unmedicinal therapy [1-4,8,9]. This report touches the analysis of cross-correlation connections between the parameters of GDV and anxiety and endocrine status for practically healthy men. The separate fragments of the article are promulgated at conference [4].

MATERIAL AND RESEARCH METHODS

Under a observations were 10 practically healthy volunteers - men by age 26-56 years. In the morning in basale terms at first registered kirlianogram by the method of GDV by the device of "GDV Chamber" ("Biotechprogress", St-Pb., RF [7], whereupon took from an ulnar vein the test of blood for determination of plasma levels of main adaptive hormones: cortisol, triiodo-thyronine and testosterone- by the ELISA method with the use of analyzer of "Tecan" (Oesterreich) and corresponding sets of reagents of joint-stock company "Alkor Bio" (St-Pb., RF [5] and sodium and potassium (by the method of flaming photometry on the device of ПФМ У 4.2), with the purpose of estimation of mineralocorticoid activity after Na/K-ratio. After it volunteers filled a questionnaire with the purpose of estimation of level of the trait and reactive anxiety [10]. Through 1,5 hours all tests repeated.

Digital material it is traited by the methods of cross-correlation and canonical analyses, using the package of softwares "Statistica 5.5".

RESEARCH RESULTS

According to a formula:

$|r|=\{\exp[2t/(n-1,5)^{0,5}-1\}/\{\exp[2t/(n-1,5)^{0,5}+1\}$,

for a selection from n=20 by the critical size of the module of coefficient of correlation at $p<0,05$ ($t>2,1$) is 0,45.

It is educed (table. 1) that area of gas discharge image (GDI), taken off **without** polyethylene **filter** in a **right** projection, statistically the meaningful does not correlate with any psychophysiological or endocrine parameters.

UDC: 616-71 ***V.Ye. Babelyuk*** The parameters of gaz disharge visualization (kirlianogram) appropriately associated with some psychophysiological and endocrine parameters of healthy men.

Table 1. A matrix of coefficients of correlation between the parameters of gas discharge image in right (R), frontal (F) and left (L) projections and psychophysiological and endocrine parameters

Parameters of gas discharge image in different projections		Area **S**		Coefficient of form C		Entropy **E**		Symmetry **Sym**	
Psychophysiological and endocrine parameters	Projection	without filter	with filter	without filter	with filter	without filter	with filter	without filter	with filter
Trait anxiety	R	*0,26*	*0,04*	*0,16*	-0,37	*0,12*	*0,02*		
	F	0,35	*-0,03*	*-0,07*	*-0,28*	*0,04*	-0,31	0,39	*0,15*
	L	0,36	*0,00*	*-0,24*	*-0,14*	*-0,06*	0,01		
Reactive anxiety	R	*0,27*	0,32	*-0,18*	*-0,20*	*-0,00*	*0,11*		
	F	*0,26*	*0,23*	*-0,05*	*-0,17*	*-0,09*	*-0,15*	*0,22*	*0,00*
	L	*0,16*	*0,27*	*-0,19*	*-0,03*	*-0,24*	*-0,04*		
Triiodo-thyronine	R	*0,25*	**0,47**	*-0,29*	*-0,15*	-0,35	*-0,08*		
	F	0,35	**0,53**	*-0,19*	-0,35	-0,34	*-0,21*	0,40	*0,20*
	L	*0,26*	**0,51**	*-0,29*	-0,35	**-0,52**	**-0,46**		
Testosterone	R	*0,19*	*-0,09*	*-0,19*	*-0,25*	*0,03*	-0,39		
	F	*0,18*	*-0,23*	-0,44	*-0,20*	*-0,06*	**-0,45**	0,30	*0,13*
	L	0,35	*-0,11*	-0,41	*-0,35*	*-0,12*	-0,39		
Cortisol	R	*0,15*	*0,07*	*0,29*	*-0,12*	*-0,17*	*0,06*		
	F	*-0,12*	*-0,10*	*0,13*	*0,15*	*0,07*	*0,09*	*-0,29*	-0,33
	L	*-0,06*	*0,01*	*-0,10*	*0,12*	*0,02*	*0,23*		
Sodium	R	*0,10*	*-0,07*	-0,36	*-0,15*	*0,10*	-0,31		
	F	*0,07*	*-0,02*	*-0,10*	*-0,17*	*0,20*	*-0,21*	*0,13*	*-0,27*
	L	*-0,10*	*-0,07*	-0,31	*0,22*	*-0,23*	*-0,28*		
Potassium	R	*0,11*	*0,22*	*-0,28*	*0,01*	*-0,06*	*0,23*		
	F	*0,16*	*0,25*	*0,12*	*-0,06*	*-0,17*	*0,09*	*0,15*	*-0,15*
	L	*-0,21*	*0,26*	*0,04*	*0,22*	*-0,23*	*0,18*		
Mineralocorticoid activity (Na/K)	R	*-0,11*	*-0,25*	*0,25*	*0,00*	*0,09*	*-0,21*		
	F	*-0,22*	*-0,29*	*-0,11*	*0,10*	*0,24*	*-0,08*	*-0,21*	*0,01*
	L	*0,14*	*-0,29*	*-0,09*	*-0,15*	*0,25*	*-0,17*		

Positive connections are however noteworthy with the levels of the trait (TA) and reactive (RA) anxiety and triiodo-thyronine (T_3). In a result the coefficient of canonical correlation R arrives at 0,43 ($\chi^2_{(3)}$=3,3; p=0,34). At the terms of registration **with the filter** connection of area with T_3 it appears meaningful, with RA some increases, but with TA fades away, at the same time, a loosely-coupled negative interface appears with mineralocorticoid activity (MCA). Accordingly the coefficient of canonical correlation grows to 0,51 ($\chi^2_{(3)}$=5,0; p=0,17).

The second base parameter of GDI is a coefficient of form (attitude of square of length of external contour of GDI toward his area which characterizes the measure of serration/fractality of external contour), being taken off without filter, correlates from TA and PA mildly and poorly negatively, as well as from testosterone. Canonical correlation appears moderate: R=0,43; $\chi^2_{(2)}$=3,6; p=0,17. At the terms of registration with a filter moderate correlation is educed from T_3 and weak - from cortisol, so that R=0,47 ($\chi^2_{(2)}$=4,3; p=0,12).

The third base parameter of GDI is entropy, id est measure of chaos, registered without filter, mildly negatively correlates from testosterone and sodium and poorly positively - from potassium, however canonical correlation with these parameters appeared considerable: R=0,62 ($\chi^2_{(3)}$=7,9; $F_{(3,2)}$=3,3; p=0,048). Equalization of multiple regression looks like :

ER=6,23-0,010•T(nM/l)-0,018•Na(mM/l)+0,101•K(mM/l).

Application of filter does not influence on connection of entropy from sodium, weakens considerably - from testosterone, but assists appearance of connection from cortisol and reverses character of connection from potassium. On the whole canonical correlation some relaxes: R=0,51 ($\chi^2_{(3)}$=5,0; p=0,17).

The area of GDI, taken off **without filter** in a **frontal** projection, correlates straight mildly from T_3 and TA and poorly - from RA. Canonical correlation appears moderate: R=0,59 ($\chi^2_{(3)}$=7,1; p=0,07). Application of filter does not influence on connection from RA, connection takes on it is not from TA, does noticeable connections with testosterone and MCA and substantially strengthens connection from T_3 (Fig. 1).

UDC: 616-71 ***V.Ye. Babelyuk*** The parameters of gaz disharge visualization (kirlianogram) appropriately associated with some psychophysiological and endocrine parameters of healthy men.

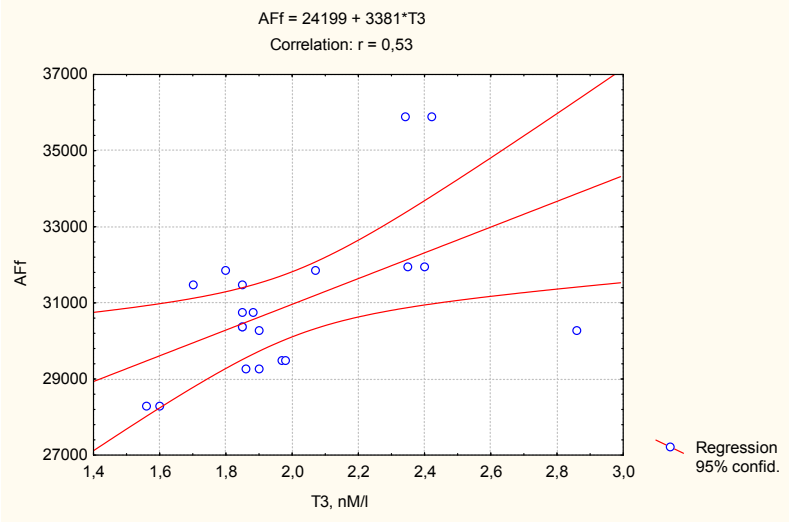

Fig. 1. Cross-correlation connection between a plasma triiodo-thyronine (axis of X) and area of GDI in a frontal projection, taken off with a filter (AFf) (axis of Y).

Thus something grows force of canonical cross-correlation connection: R=0,61 ($\chi^2_{(3)}$=7,6; $F_{(3,2)}$=3,1; p=0,056) (Fig. 2).

Equalization of multiple regression :

AFf=26973+3397•T_3(nM/l)-65,2•T(nM/l)-25,9•MCA.

Connections to the coefficient of form of GDI have negative character and some more weak: R=0,53 ($\chi^2_{(2)}$=5,5; p=0,063), and a filter weakens them yet in a greater degree: R=0,36 ($\chi^2_{(2)}$=2,4; p=0,29). In default of filter entropy of GDI correlates negatively mildly from testosterone and TA: R=0,54 ($\chi^2_{(2)}$=5,7; p=0,056), and a filter, not influences on connection from testosterone, fully levels connection from TA.

In the **left** projection the area of GDI in default of filter correlates mildly from TA and testosterone and poorly - from T_3: R=0,58 ($\chi^2_{(3)}$=7,0; p=0,07). A filter takes on it is not connections with the first two parameters, but does noticeable connections with RA and MCA and considerably strengthens connection from T_3, however it affects substantially force of canonical correlation : R=0,53 ($\chi^2_{(3)}$=5,6; p=0,13). The relationships of coefficient of form are similar after a structure and force, but opposite after character. At presence of filter R=0,53 ($\chi^2_{(3)}$=5,6; p=0,13), at his absence canonical correlation analogical, but some more credible: R=0,53 ($\chi^2_{(2)}$=5,6; $F_{(2,2)}$=3,3; p=0,061) (Fig. 3).

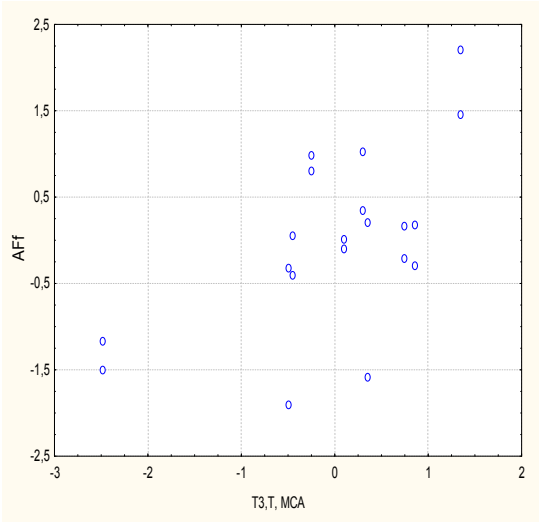

Fig. 2. Canonical cross-correlation connection between a plasma triiodo-thyronine (T_3), testosterone (T) and mineralocorticoid activity (MCA) (axis of X) and by an area GDI in a frontal projection, taken off with a filter (AFf) (axis of Y).

UDC: 616-71 ***V.Ye. Babelyuk*** The parameters of gaz disharge visualization (kirlianogram) appropriately associated with some psychophysiological and endocrine parameters of healthy men.

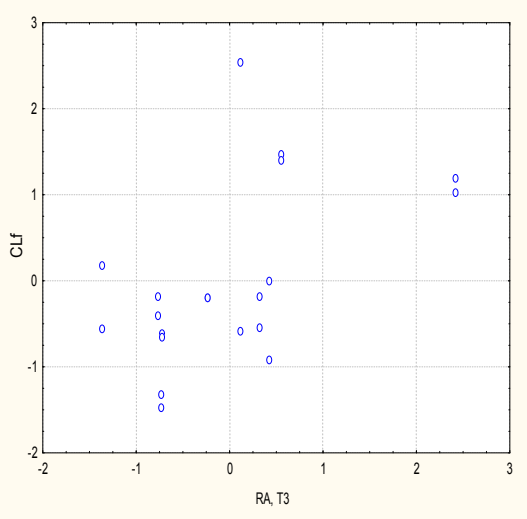

Fig. 3. Canonical cross-correlation connection between a plasma triiodo-thyronine (T_3) and reactive anxiety (RA) (axis of X) and coefficient of form of GDI in the left projection, taken off with a filter (CLf) (axis of Y).

Equalization of multiple regression :

CLf=14,9-1,07•T_3(nM/l)-0,013•RA.

To the investigated parameters entropy of GDI appeared closer in all related in the left projection. In default of filter she correlates negatively mildly from T_3 and testosterone, poorly - from sodium and positively poorly - from cortisol. Her dependence on compatible influence of triiodo-thyronine and testosterone, traced on Fig. 4, described by equalization:

EL=4,61-0,237•T_3(nM/l)-0,007•T(nM/l);

R=0,58; $F_{(2,2)}$=4,2; p=0,032.

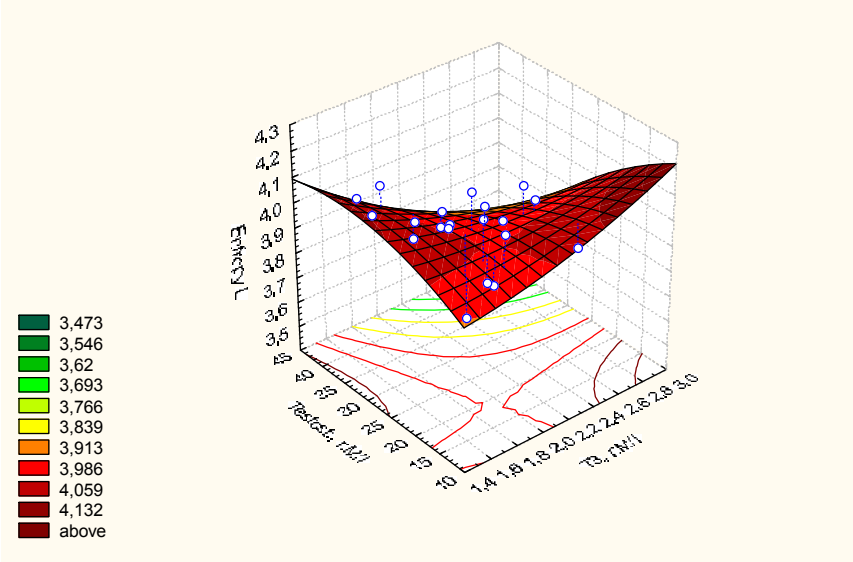

Fig. 4. Cross-correlation dependence of entropy of GDI in the left projection, taken off without a filter (axis of Z) from levels in plasma of triiodo-thyronine (axis of X) and testosterone (axis of Y).

And on Fig. 5. traced dependence of this parameter of GDI on compatible influence of triiodo-thyronine, testosterone, cortisol and sodium, which is described by equalization:

EL=6,79-0,144•T_3(nM/l)-0,03•T(nM/l)+0,00025•C(nM/l)-0,0175•Na(mM/l);

R=0,76; $\chi^2_{(4)}$=13,8; $F_{(4,2)}$=5,1; p=0,008.

A filter, not affecting influences on entropy in left projection from the side of testosterone and sodium, weakens influence on her T_3 and cortisol and strengthens connection with the trait anxiety. In a result force of canonical correlation does not change practically. Compatible influence of testosterone and sodium, traced on Fig. 6, described by equalization:

UDC: 616-71 ***V.Ye. Babelyuk*** The parameters of gaz disharge visualization (kirlianogram) appropriately associated with some psychophysiological and endocrine parameters of healthy men.

ELf=5,62-0,008•T(nM/l)-0,012•Na(mM/l);
R=0,60; $F_{(2,2)}$=4,7; p=0,024.

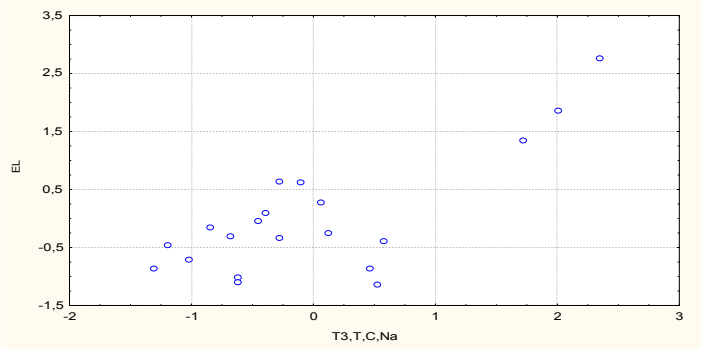

Fig. 5. Canonical cross-correlation connection between a plasma triiodo-thyronine (T_3), testosterone (T), cortisol (C) and sodium (axis of X) and by entropy of GDI in the left projection, taken off without a filter (EL) (axis of Y).

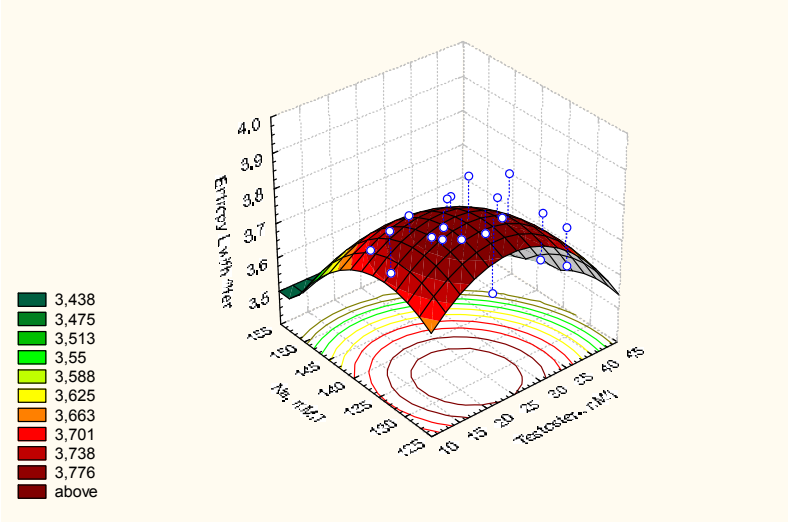

Fig. 6. Cross-correlation dependence of entropy of GDI in the left projection, taken off with a filter (axis of Z) from levels in plasma of testosterone (axis of X) and sodium (axis of Y).

Canonical cross-correlation connection is traced on Fig. 7.

ELf=6,63-0,008•T(nM/l)-0,016•Na(mM/l)-0,148•T_3(nM/l)-0,006•TA;
R=0,77; $\chi^2_{(4)}$=14,5; $F_{(4,2)}$=5,5; p=0,006.

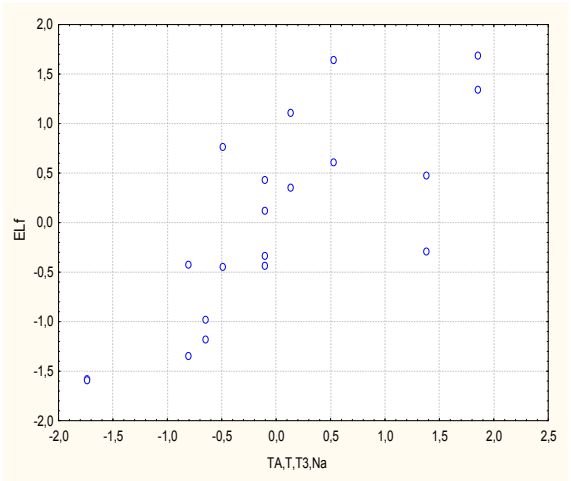

Fig. 7. Canonical cross-correlation connection between the trait anxiety (TA) and level in plasma of testosterone (T), triiodo-thyronine (T_3), sodium (axis of X) and by entropy of GDI in the left projection, taken off with a filter (ELf) (axis of Y).

UDC: 616-71 ***V.Ye. Babelyuk*** The parameters of gaz disharge visualization (kirlianogram) appropriately associated with some psychophysiological and endocrine parameters of healthy men.

Canonical dependence of symmetry (Sym) of GDI appeared the same strong at the terms of absence of filter:

Sym=72,6+0,132•T(nM/l)-0,0042•C(nM/l)+3,95•T_3(nM/l)+0,170•TA;
R=0,74; $F_{(4,2)}$=4,7; p=0,012.

At the same time, a filter considerably weakens this dependence:

Sym f=101,7-0,0011•C(nM/l)-0,051•Na(mM/l);
R=0,41; $F_{(2,2)}$=1,8; p=0,20.

On the next stage of research influence of separate psychophysiologic and endocrine parameters was analysed on GDI on the whole.

It is educed (Fig. 8) that trait anxiety determines the state of GDI on 44% (R=0,66; $\chi^2_{(6)}$=8,7; p=0,19), but reactive anxiety - only on 23% (R=0,48; $\chi^2_{(5)}$=4,2; p=0,53). Compatible influence TA and RA on GDI, judging after the coefficient of canonical correlation, estimated in 59% (Fig. 9).

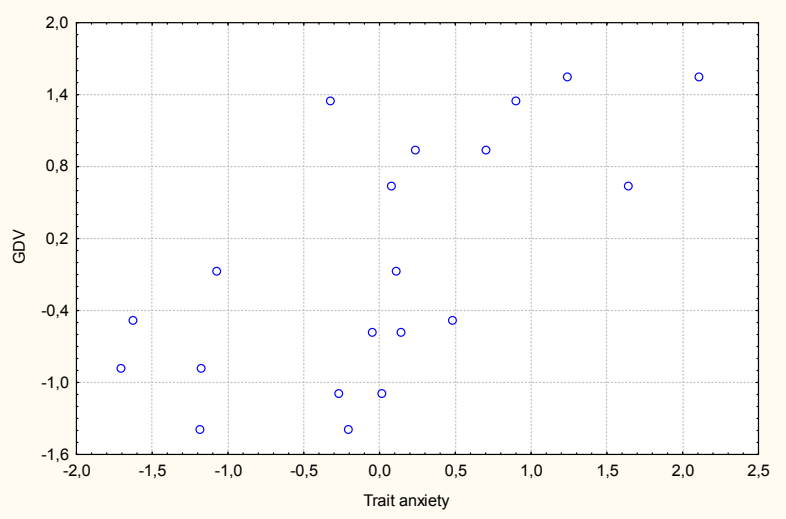

Fig. 8. Canonical cross-correlation connection is between the teat anxiety (axis of X) and parameters of gas disharge visualization (axis of Y).

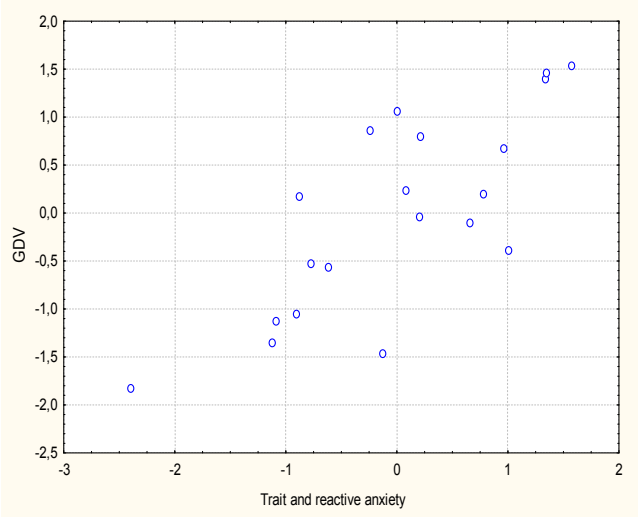

Fig. 9. Canonical cross-correlation connection between the trait and reactive anxiety (axis of X) and parameters of gas disharge visualization (axis of Y).

The level of triiodo-thyronine of plasma determines the integral state of GDI on 64% (R=0,80; $\chi^2_{(6)}$=15,3; p=0,018) (Fig. 10).

A level in plasma of testosterone influences a considerably less measure (on 23%) on the parameters of GDV (R=0,48; $\chi^2_{(3)}$=4,3; p=0,23) (Fig. 11).

UDC: 616-71 ***V.Ye. Babelyuk*** The parameters of gaz disharge visualization (kirlianogram) appropriately associated with some psychophysiological and endocrine parameters of healthy men.

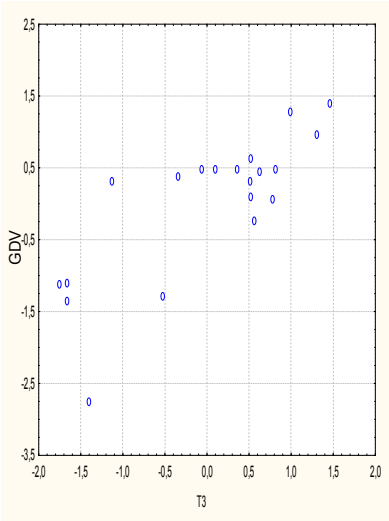

Fig. 10. Canonical cross-correlation connection between a level in plasma of triiodo-thyronine (axis of X) and parameters of gas disharge visualization (axis of Y).

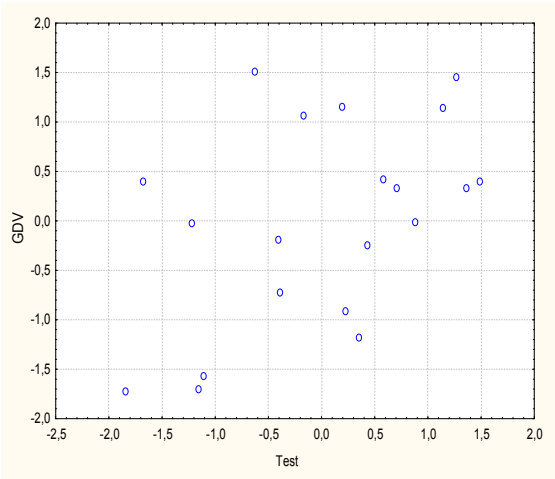

Fig. 11. Canonical cross-correlation connection between a level in plasma of testosterone (axis of X) and parameters of gas disharge visualization (axis of Y).

Yet weaker is determination of parameters of GDI from the side of mineralocorticoid activity (R=0,40; $\chi^2_{(2)}$=2,9; p=0,23) and cortisol (R=0,35; $\chi^2_{(3)}$=2,1; p=0,54).

But the **combined** influence of the transferred four endocrine factors on the integral state of GDI appears very strong: the measure of determination presents 90%: R=0,95; R^2=0,90; $\chi^2_{(40)}$=58,7; p=0,028 (Fig. 12).

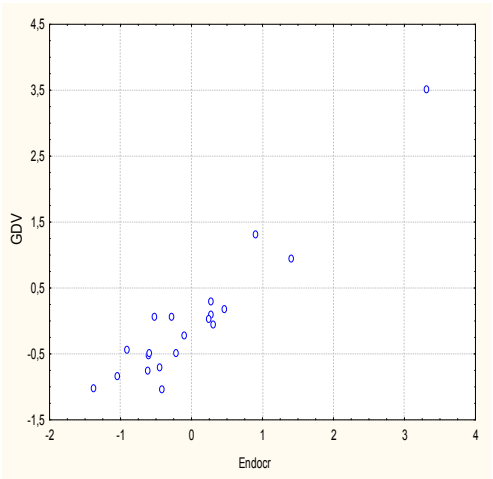

Fig. 12. Canonical cross-correlation connection between endocrine parameters (axis of X) and parameters of gas disharge visualization (axis of Y).

UDC: 616-71 ***V.Ye. Babelyuk*** The parameters of gaz disharge visualization (kirlianogram) appropriately associated with some psychophysiological and endocrine parameters of healthy men.

Thus an endocrine canonical radical gets the positive factor loading from MCA (R=0,82), cortisol (R=0,81) and testosterone (R=0,36) and negative factor loading from a level in plasma of triiodo-thyronine (R=-0,48). On the other hand, a canonical radical of GDV is presented by direct character by entropy of GDI in a right projection, taken off with a filter (R=0,34) and coefficient of form of GDI in the left projection at the same terms (R=0,22) and by reverse character by an area GDI in frontal (R=-0,32), left (R=-0,25) and right (R=-0,18) projections, also at presence of filter.

DISCUSSION OF RESEARCH RESULTS

It is considered that GDI, taken off without filter, characterizes the functional changes of organism, and with a filter - organic changes. Thus a right projection represents the bodily condition of human, and left projection - her emotional state [7]. The results of cross-correlation analysis are got by us ground to us to disagree with these claims of К.Г. Коротков. In fact the level of trait and reactive anxiety mildly correlates with some parameters of GDI both in the left and in right projections. Endocrine parameters also correlate both with a rightprojection and with the leftprojection parameters of GDI, thus with the last even some more frequent and stronger. We can not accept and the first position of author in relation to the role of polyethylene filter during registration of GDI. Moreover, parameters of the functional state of main hemadens closer and more frequent correlate with the parameters of GDI exactly at the terms of presence of filter.

At the same time, it is educed by us, that the parameters of GDI on the whole are appropriately related to the functional state, foremost, thyroid, and also testis and adrenal cortex, which in an aggregate characterize the state of adaptation and heterospecific resistibility of organism. Momentously, that the combined influence of endocrine parameters on the state of GDI considerably prevails them partial influences, that testifies in behalf on GDI as a marker of the integral state of adaptations.

It is known that the level of trait anxiety is predefined by the functional state of such nervous structures as a orbito-frontal cortex, amygdala, hippocampus and others like that [11,12]. The appropriate connection of the state of GDI educed by us with the level of the trait anxiety characterizes GDI and as a marker of processes of neurodynamics.

CONCLUSIONS

For practically healthy men the parameters of gas disharge visualization are appropriately related to their trait and reactive anxiety, by levels in plasma of triiodo-thyronine, testosterone and cortisol, and also by mineralocorticoid activity, appraised after Na/K-ratio of plasma. Most determined from the side of psychophysiological and endocrine parameters is entropy of gas disharge image in the left projection with a filter and without filter, symmetry and area of GDI in a frontal projection with a filter and coefficient of form of GDI in the left projection with a filter and in a frontal projection without filter. On the whole endocrine status determines kirlianogram on 90%. Thus, the parameters of GDI represent the registered psychophysiological and endocrine parameters of organism of human objectively.

PROSPECTS OF FURTHER RESEARCHES

The analysis of parameters of GDI will be conducted with the parameters of heart rhythm variability, electroencephalogram, points of acupuncture, immunity and others like that.

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ACCORDANCE TO ETHICS STANDARDS

Tests in patients are conducted in accordance with positions of Helsinki Declaration 1975, revised and complemented in 2002, and directive of National Committee on ethics of scientific researches. During realization of tests from all participants the informed consent is got and used all measures for providing of anonymity of participants.

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