Seniv T S, Seniv R A, Flyunt I S, Uhryn M R, Zukow W. Some neural and hemato-immune factors correlated with lysozime saliva level in children living on territories polluted by radionucleides. Journal of Education, Health and Sport. 2015;5(5):275-282. ISSN 2391-8306. DOI 10.5281/zenodo.17737
http://ojs.ukw.edu.pl/index.php/johs/article/view/2015%3B5%285%29%3A275-282
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http://dx.doi.org/10.5281/zenodo.17737
Formerly Journal of Health Sciences. ISSN 1429-9623 / 2300-665X. Archives 2011 – 2014 http://journal.rsw.edu.pl/index.php/JHS/issue/archive

Deklaracja.
Specyfika i zawartość merytoryczna czasopisma nie ulega zmianie.
Zgodnie z informacją MNiSW z dnia 2 czerwca 2014 r., że w roku 2014 nie będzie przeprowadzana ocena czasopism naukowych; czasopismo o zmienionym tytule otrzymuje tyle samo punktów co na wykazie czasopism naukowych z dnia 31 grudnia 2014 r.
The journal has had 5 points in Ministry of Science and Higher Education of Poland parametric evaluation. Part B item 1089. (31.12.2014).

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 15.02.2015. Revised 27.04.2015. Accepted: 08.05.2015.

SOME NEURAL AND HEMATO-IMMUNE FACTORS CORRELATED WITH LYSOZIME SALIVA LEVEL IN CHILDREN LIVING ON TERRITORIES POLLUTED BY RADIONUCLEIDES

T S Seniv[1], R A Seniv[1], I S Flyunt[2], M R Uhryn[2], W Zukow[3]

[1]Clinical Sanatorium "Moldova", Truskavets', Ukraine
san_moldova@mail.ru
[2]Faculty of Physical Education Ivan Franko University, Drohobych, Ukraine
[3]Faculty of Physical Education, Health and Tourism, Kazimierz Wielki University, Bydgoszcz, Poland

Summary

Objective. We know that children who live on territories polluted by radionucleides, characterized, among other things, increased prevalence diseases to caries and periodontitis. On the other hand, for the rest of this contingent characterized by dysfunction of the neuroendocrine-immune complex. We set a goal to find out the relationships saliva lysozyme activity - a key factor in antibacterial protection of the oral cavity - with some blood-neural and immune factors. **Methods.** The study involved 80 children aged 10-17 years, who arrived to the spa Truskavets' from territories polluted by radionucleides. In addition to the activity of lysozyme in saliva, recorded parameters of immune status I-II levels of WHO, HRV, Stange and Hench tests, and conducted routine clinical tests. **Results.** Normal activity of saliva lysozyme pronounced only in 17 (21%) children. Regarding immunity parameters detected significant positive correlation activity of lysozyme with the intensity (r=0,49) and activity (r=0,34) phagocytosis by neutrophils blood Staph. aureus and concentration of serum IgM (r=0,34) and circulating immune complexes (r=0,30), whereas a negative correlation with the levels of IgA (r=-0,46), $CD19^+$ B lymphocytes (r=-0,32) theophilinsensitive T lymphocytes (r=-0,26) and $CD8^+$ T lymphocytes (r=-0,23). Among the HRV parameters with the activity of lysozyme only weakly correlated markers vagal tone RMSSD (r=-0,19) i PSD HF (r=-0,19). The observed negative correlation lysozyme activity of inspiratory test Stange (r=-0,47) and expiratory test Hench (r=-0,27). Among hemogram parameters significantly correlated with the activity of lysozyme only platelet level (r=-0,22). The canonical correlation between saliva lysozyme activity and registered blood-neural and immune factors proved strong (R=0,82). **Conclusion.** Reduced activity of lysozyme in saliva of children, who live on territories polluted by radionucleides, is one of the manifestations of dysfunction neuroendocrine-immune complex.

Keywords: saliva lysozyme, immunity, HRV, Stange and Hench tests, children.

INTRODUCTION

We know that children, who live on territories polluted by radionucleides, characterized, among other things, increased prevalence diseases to caries and periodontitis [3]. On the other hand, for this group characterized of dysfunction by neuroendocrine-immune-complex [3,5,11]. According to modern concepts, chronic inflammatory disease of the digestive, urinary, reproductive and respiratory systems accompanied by immunodysfuntion and the

weakening nonspecific protection, and the causal relationships between microbes, inflammation and antibacterial protection mechanisms are bilateral [4,5,11,12,14]. The foregoing also applies to oral diseases infectious-inflammatory nature [3,8].

We have shown previously [13] in patients spa Truskavets' with chronic cholecystitis, combined with periodontitis, deeper than patients without periodontitis, inhibition of lysozyme activity saliva and less pronounced trend towards normalization under the influence of balneotherapy in the resort.

In this study we set a goal: to find out relations saliva lysozyme activity - a key factor in antibacterial protection of the oral cavity - with some blood-neural and immune factors.

MATERIALS AND METHODS

The study involved 80 children aged 10-17 years, who arrived to the spa Truskavets from territories polluted by radionucleides. The main subject of research lysozyme activity saliva was evaluated in the test bakteriolysing Micrococcus lysodeicticus (nephelometric method [7]). However, the recorded parameters of immune status I-II levels according to the memorandum WHO, using standardized techniques [4,7,9,14].

Status of the phagocytic link of immunity judged by phagocytic index, microbial counr and the index digestion museum culture Staphylococcus aureus. We determined the following parameters of T-cell link: blood levels of highly subpopulation (for test "active" Rosette formation), theophillineresistance and theophillinesensitive subpopulations (for test sensitivity rosette to theophylline) and $CD3^+CD4^+$ and $CD3^+CD4^+$ T lymphocytes. B cell link of immunity evaluated the contents of $CD19^+$ B lymphocytes and serum concentration immunoglobulines G, A, M and circulating immune complexes.

Status of the autonomic nervous system judged on parameters HRV [1], recorded by hardware-software complex"CardioLab+HRV" (company "KhAI-MEDICA", Kharkiv).

In addition, the recorded breath delay duration (Stange and Hench tests), and conducted routine clinical tests.

Results processed by methods of correlation and canonical analysis using the software package "Statistica 5.5".

RESULTS AND DISCUSSION

Normal activity of saliva lysozyme (163÷199 mg/l [3,11]) pronounced only in 17 (21%) children, the majority of it to some extent reduced, consistent with previous studies of this population [3,5,11]. Reduced saliva lysozyme activity in whole combined with low intensity of phagocytosis (normal 6÷8 microbes/phagocyte) (Fig. 1).

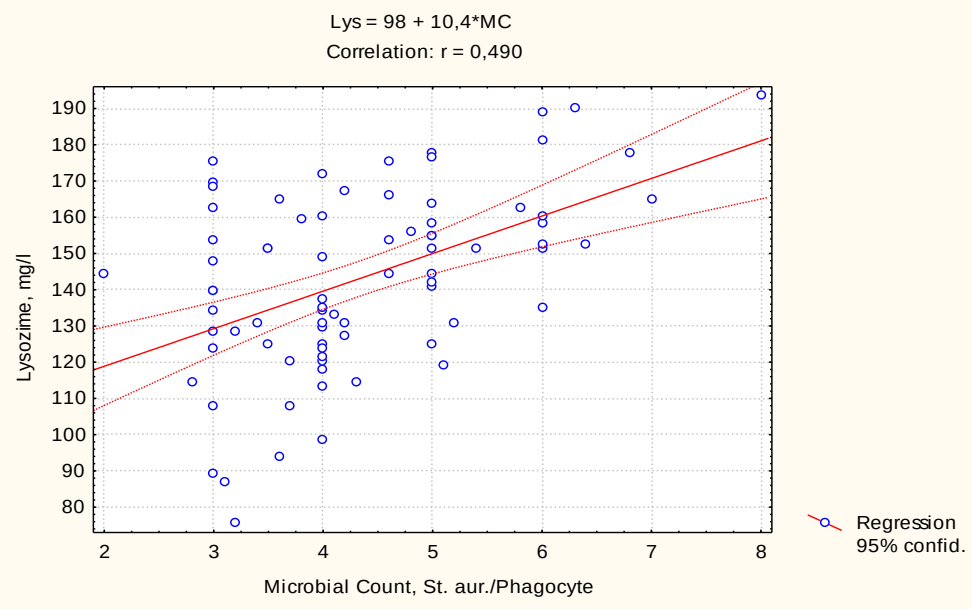

Fig. 1. Relationship between the microbial count of neutrophils and activity of saliva lysozyme

Weaker correlated with lysozyme activity other parameters phagocytosis: phagocytic index (r=0,34), digestion index (r=0,19) and bactericidal ability of neutrophils (r=0,35), calculated by the formula IL Popovych [12]:

Bactericidity=Leukocytes•Neutrophiles•Phagocytose Index•Microbial Count•Killing Index/10^4.

Regarding immunity parameters detected significant negative correlation lysozyme activity with the levels of IgA (r=-0,46) (Fig. 2), $CD19^+$ B lymphocytes (r=-0,32), theophillinesensitive T lymphocytes (r=-0,26) and $CD8^+$ Tlymphocytes (r=-0,23), whereas a positive correlation with the concentration of serum IgM (r=0,34) and circulating immune complexes (r=0,30).

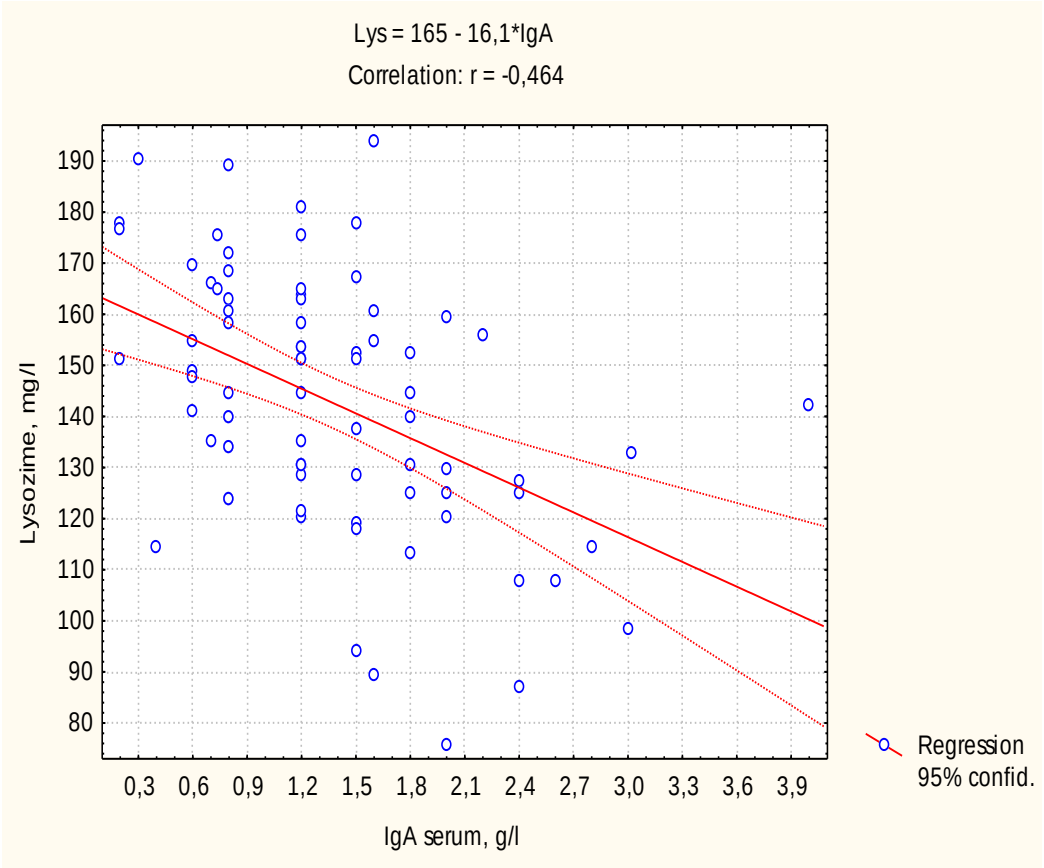

Fig. 2. The relationship between serum IgA and saliva lysozyme activity

This microbial count of phagocytes and IgA levels together determine the saliva lysozyme activity by 42% (Table 1, Fig. 3).

Table 1. Regression Summary for Dependent Variable: Lysozime

R=0,65; R^2=0,42; Adjusted R^2=0,41; $F_{(2,8)}$=28; $p<10^{-5}$; Std.Error of estimate: 19

	Beta	St. Err. of Beta	B	St. Err. of B	$t_{(77)}$	p-level
Intercpt			121,5	9,51	12,8	10^{-6}
Microbial count	0,454	0,087	9,61	1,84	5,22	10^{-5}
IgA	-0,426	0,087	-14,82	3,03	-4,89	10^{-5}

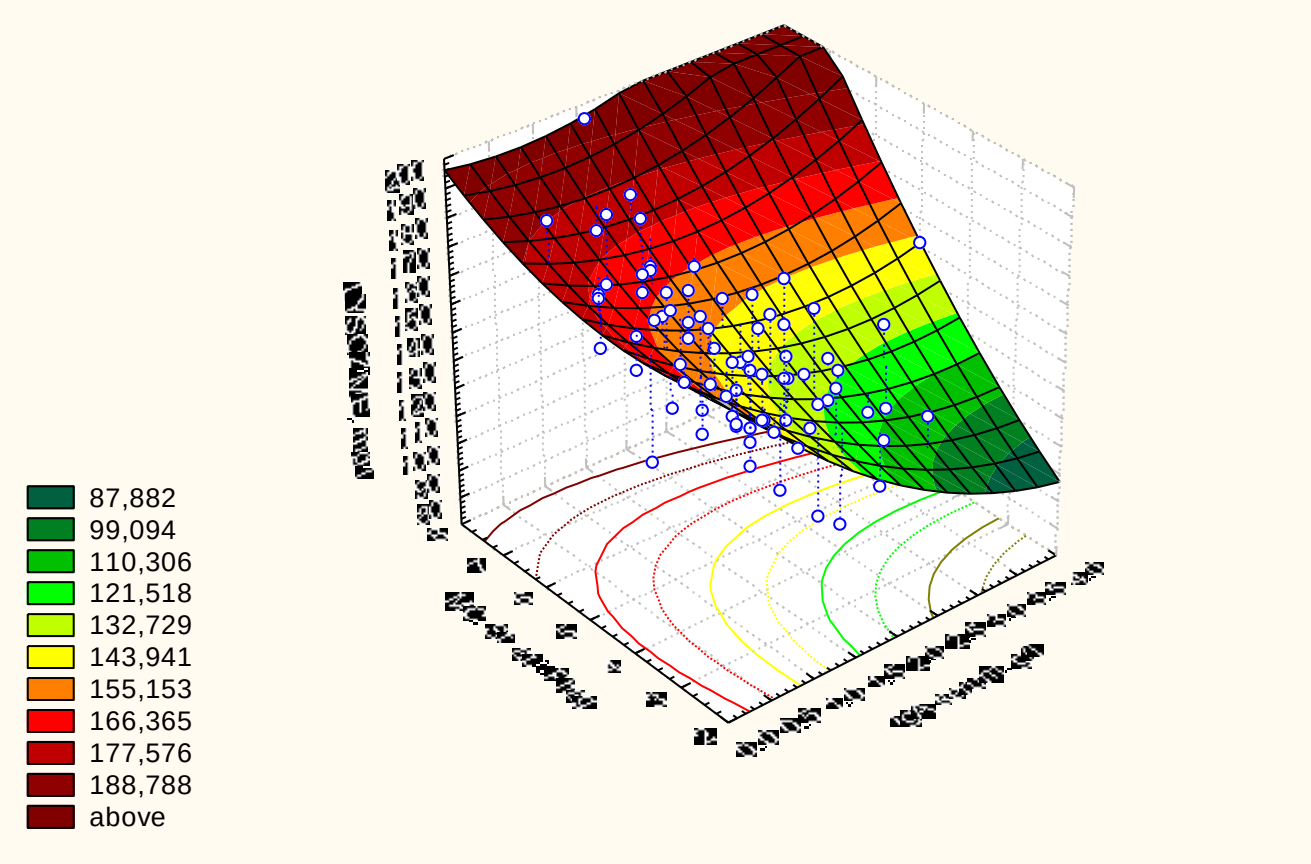

Fig. 3. The relationship between the level of serum IgA (axis X), microbial count neutrophils (axis Y) and saliva lysozyme activity (axis Z)

The inclusion in equation of regression other immune parameters increases determination as their saliva lysozyme activity to 51% (Tabl. 2).

Table 2. Regression Summary for Dependent Variable: Lysozime

R=0,71; R^2=0,51; Adjusted R^2=0,48; $F_{(5,7)}$=15,4; $p<10^{-5}$; Std.Error of estimate: 18

	Beta	St. Err. of Beta	B	St. Err. of B	$t_{(74)}$	p-level
Intercpt			73,8	20,9	3,52	0,001
Microbial count	0,371	0,111	7,845	2,352	3,34	0,001
IgA	-0,430	0,088	-14,97	3,06	-4,90	10^{-5}
Phagocytose Index	0,341	0,131	0,956	,368	2,60	0,011
Bactericidicy	-0,202	0,144	-2,275	1,625	-1,40	0,165
IgM	0,253	0,099	9,626	3,755	2,56	0,012

Among the parameters of HRV lysozyme activity correlated very poorly only markers of vagal tone RMSSD (r=-0,19) and PSD HF (r=-0,19). This can be explained rationally only in line with the concept that stress is not only sympatotonic but vagotonic option [2].

Given the well-known positive correlation with vagal tone resistant to hypoxia expected negative correlation discovered lysozyme activity of inspiratory test Stange (r=-0,47) (Fig. 4) and expiratory test Hench (r=-0,27).

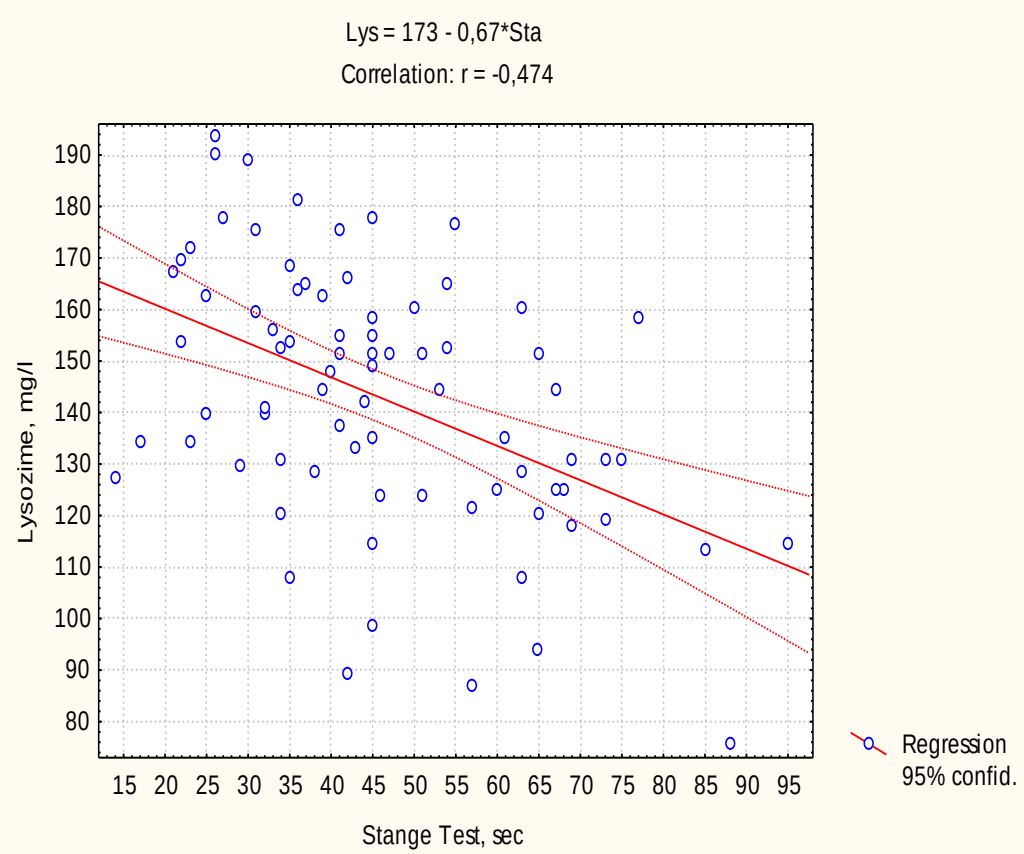

Fig. 4. The relationship between duration of breath delay for a breath and saliva lysozyme activity

Among hemogram parameters significantly correlated with the activity of lysozyme only platelet level (r=-0,22). We can assume that platelets secrete into the blood some agents that inhibit the activity of lysozyme. Alternatively, a common factor inhibits platelet formation as well as the activity of lysozyme.

The canonical correlation between saliva lysozyme activity and 4 factors proved moderately (Table 3, Fig. 5).

Table 3. Regression Summary for Dependent Variable: Lysozime

R=0,52; R^2=0,27; Adjusted R^2=0,23; $F_{(4,8)}$=7,0; $p<10^{-4}$; Std. Error of estimate: 22

	Beta	St. Err. of Beta	B	St. Err. of B	$t_{(75)}$	p-level
Intercpt			210	18,4	11,4	10^{-6}
Stange Test	-0,385	0,112	-0,541	0,158	-3,43	0,001
Hench Test	-0,113	0,111	-0,224	0,221	-1,01	0,314
Trombocytes	-0,173	0,101	-0,107	0,062	-1,72	0,090
RMSSD HRV	-0,117	0,100	-0,168	0,143	-1,17	0,245

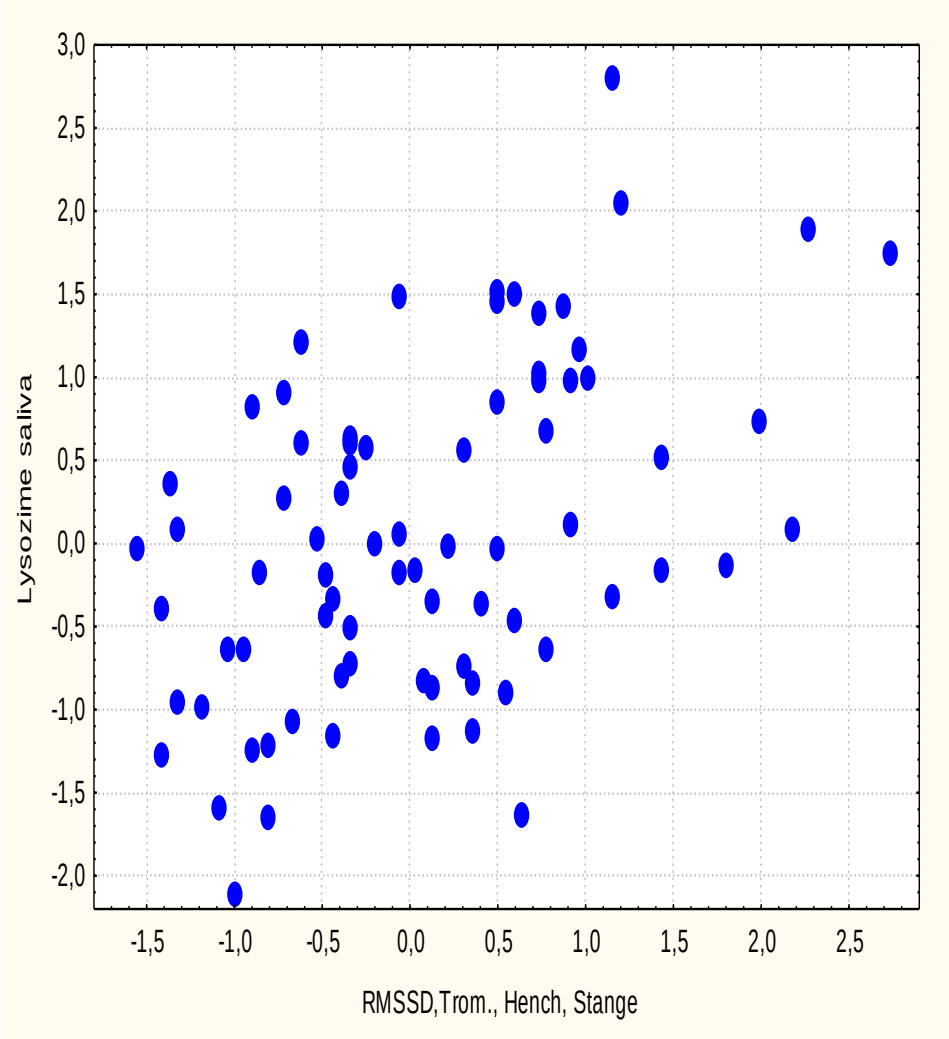

Fig. 5. Canonical relationship between vagal tone, thrombocytosis and breath delay tests (X axis) and saliva lysozyme activity (axis Y)

Overall, the five parameters that reflect the state of immunity and neurodynamics, determine saliva lysozyme activity by 66% (Table 4, Fig. 6).

Table 4. Regression Summary for Dependent Variable: Lysozime

R=0,81; R^2=0,66; Adjusted R^2=0,64; $F_{(5,7)}$=29,2; $\chi^2_{(6)}$=83; $p<10^{-6}$; Std. Error of estimate:15

	Beta	St. Err. of Beta	B	St. Err. of B	$t_{(74)}$	p-level
Intercpt			131	15,1	8,66	10^{-6}
Microbial count	0,310	0,081	6,57	1,71	3,84	10^{-3}
Phagocytose Index	0,117	0,073	0,329	0,204	1,61	0,111
IgA	-0,409	0,072	-14,2	2,52	-5,65	10^{-6}
IgM	0,252	0,081	9,60	3,10	3,10	0,003
Stange Test	-0,418	0,069	-0,587	0,097	-6,06	10^{-6}

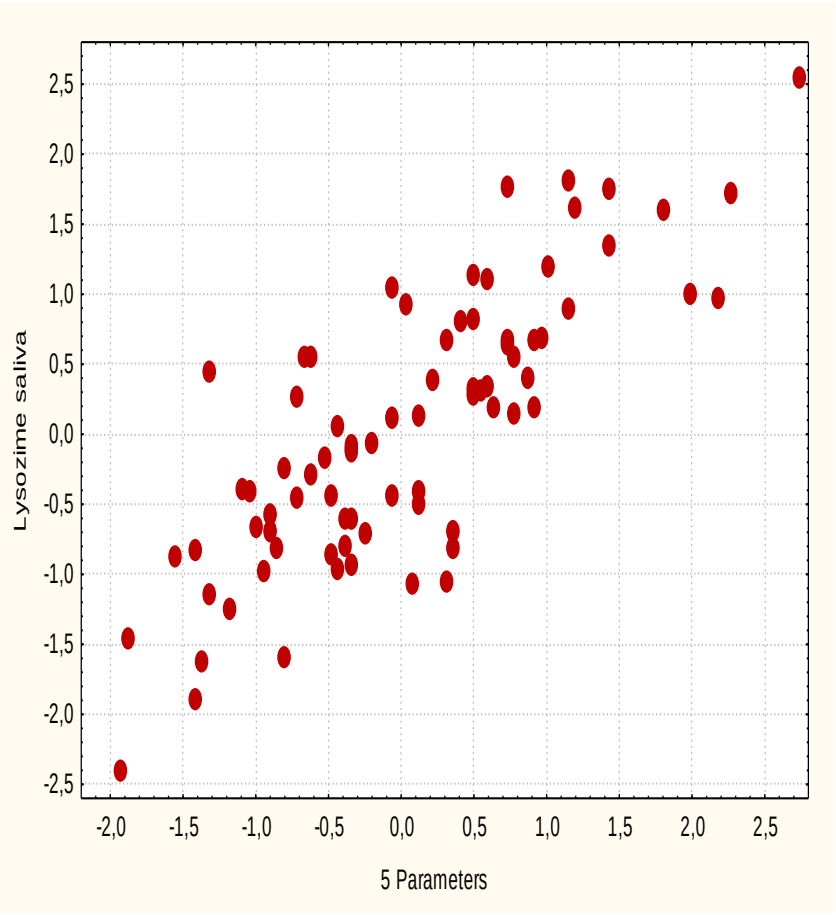

Fig. 6. Canonical relationship between neuro-immune parameters (X axis) and saliva lysozyme activity (axis Y)

The overall conclusion is to ensure that the reduced activity of lysozyme in saliva of children, who live on territories Ukraine, polluted by radionucleides, is one of the manifestations of dysfunction neuroendocrine-immune complex.

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