UDC 616.248.1-085-084.001.5

Y.I. Feshchenko, N.A. Primushko, N.A. Parhomenko, L.M. Kuryk,
A. A. Kanarskyi, I. P. Turchyna
SO «National Institute Phthysiology and pulmonology named after F. G. Yanovsky NAMS of Ukraine»

Restoration of physical activity in patients with asthma

Key words: *bronchial asthma, ginkgolides and bilobalides.*

The human body – complex multifunctional system, the regulation of which is subject to certain laws and mechanisms of interactions that affect the functioning of the whole organism. Today, the modern medicine actively raises the question of improving physical activity of patients with bronchial asthma (BA), because the 90,0 % quality of life is determined by it. [1] The main function of physical activity – mobility and ability to adapt to perform, if necessary, stress limiting physical efforts to the achievement of anaerobic threshold (AP) – since during exercise, when a lack of oxygen to the working muscles launches anaerobic energy mechanisms of formation of lactic acid, which leads to increased production of carbon dioxide (CO2) and nonlinear increase ventilation [2]. Most of muscle physiology based on a coordinated functioning of the respiratory, cardiovascular and muscular systems. There is a proven fact that patients with asthma, with reduced respiratory function supports physical activity is excessive activation of anaerobic metabolism and increase energy cost of work performed. Established, that the maximum physical exertion in patients with asthma of moderate severity, regardless of the phase of the disease, there is no effective functioning of the muscular system by limiting the supply of oxygen to it, resulting in increase in muscle power inputs, the accumulation of surplus dairy acid homeostasis and body landslide [3].

As with other inflammatory diseases, asthma is increased production of reactive oxygen species (oxidative stress) inflammatory cells (macrophages, eosinophils, neutrophils). Oxidative stress contributes to the activation of inflammation, increase the severity of asthma, reducing the answers to glucocorticoid treatment. Changing the intensity of lipid peroxidation (LPO) is a general mechanism for the regulation of the functional state of biological membranes and membranozalezhnyh processes.

The functioning of the system in the body with high biological activity and residual intermediate products regulated antioxidant system (AOS), which implements its effect in certain levels of the chain peroxidation. Normally, half-AOC system (the system peroxide homeostasis) is well balanced and works on the principle of feedback. Prolonged activation of LPO above the physiological norm leads to the depletion of the antioxidant defense of «syndrome of chronic lipid peroxidation.» As part of the mechanism to support homeostasis of the body, LP processes play an important role in the pathogenesis of many pathological conditions. In other words, the effect on the respiratory various factors leads to increased concentrations of reactive oxygen species and lipid peroxidation initiation as a defensive reaction, which in turn is accompanied by activation AOC inhibits lipid peroxidation is at an optimum level. AOC depletion leads to uncontrolled significant increase in lipid peroxidation, accumulation of peroxidation products, damage to biological membranes [4].

Given that the intensification of LPO on the background of exhaustion AOC is one of the major mechanisms of pathogenesis of asthma, it is appropriate to include in the treatment of this disease antioxidants. Etylmetylhidroksypirydin succinate is a modern and highly effective antioxidant. antihypoxants with direct action. It inhibits the synthesis of thromboxane, leukotrienes, improves the rheological properties of blood. As a «trap» for free radicals, it has a distinct antihy and antiischemic action has the ability to stabilize biomembranes cells activate enerhosyntes mitochondrial function, modulate receptor complexes work and passage of ion current. In addition, inhibits platelet aggregation, which is caused by collagen, thrombin, ADP and arachidonic acid, inhibits cyclic nucleotide phosphodiesterase platelet membrane stabilizing resistance of erythrocytes to hemolysis and accelerates the process of hematopoiesys [5, 6].. In addition, it reduces the enzymatic toxemia and endogenous intoxication in acute inflammation, anti-inflammatory and bactericidal action, inhibits proteases, enhances drainage function of the lymphatic system, increases microcirculation and stimulates the regenerative processes reparative, has also immunotropic action. According to some authors, including etylmetylhidroksypirydyn succinate in complex therapy

of patients with asthma provides a strong antioxidant effect, significant anti-inflammatory effect, improvement in the short term FDD speed performance, increase oxygen saturation of hemoglobin, reducing the length of stay of patients in hospital, reduce the frequency of exacerbations. However, data on its complex effects on the cardiorespiratory system in patients with asthma found in the literature. That formed the basis of the survey, as the development and implementation of new methods of recovery of physical activity to improve the quality of life of patients with asthma.

The main goal of this work was to study the possibility of recovery of physical activity in patients with bronchial asthma by application etylmetylhidroksypirydin succinate on the background of standard treatment period of remission.

Materials and methods

The study was conducted at the department of pulmonology at SI «State Institution» National Institute of tuberculosis and pulmonology named after F. G. Yanovsky National Academy of Medical Sciences of Ukraine». To solve the problems of the research object of study were patients with bronchial asthma (BA). The study included patients only if their voluntary consent for the purpose and amount of planned inspections. According to these criteria in the study included 30 patients with asthma in remission from 21 to 65 years on average (31,5 ± 5,6 years), including 12 men and 18 women. All patients were divided into groups: group (15 patients) received within 60 days of daily drug, which includes etylmetylhidroksypirydin succinate, 125 mg 2 times a day. All patients received standard basic therapy remission, which included the use of inhaled corticosteroids and β2-agonist long and short-term action to purchase asthma symptoms; the second group (15 patients) received inhaled steroids and β2-agonists long-term and short-term performance and prolonged theophylline within one month. These patients included in a prospective randomized controlled study. When the diagnosis of asthma was taken into account history, clinical symptoms, indicators of lung function, reversibility of obstruction in the sample with bronchodilators. Selection of patients by severity of asthma was conducted in accordance with the criteria Order number 128 MOH Ukraine from 19.03.2007 g. «On approval of clinical protocols of medical care in the specialty» Pulmonology «and the order number 868 of the Ministry of Health of Ukraine from October 8, 2013» Unified clinical protocol of primary, secondary (specialized) medical care. Asthma» [13]. As controls were examined 15 healthy volunteers had no clinically significant severe pathology. The study was divided into an initial visit to the clinic, visit the second – once received treatment and the third visit in 3 months.

All patients underwent spirometric study to define basic parameters of respiratory function (ERF):

- FEV1 – forced expiratory volume in 1 sec;
- FEV1/FVC – index Gensler;
- FVC – forced vital capacity;
- PEF – peak expiratory volume velocity.

To determine the status of indirect provision of oxygen defined «life index Skibinski». Evaluation of functional state took place in points 1 – critical, 2 – very bad, 3 – bad, 4 – satisfactory, 5 – and 6 - perfectly well. With an index score held Ruf'ye speed recovery rate. Evaluation pulse rate of recovery also took place in points 1 – critical, 2 – very bad, 3 – bad, 4 – satisfactory, 5 – and 6 – perfectly well. With Stange hypoxic tests defined resistance to hypoxia. Assessment tests conducted by Stange point scale: 1 – critical, 2 – very bad, 3 – bad, 4 – satisfactory, 5 – and 6– perfectly wel l.

Aerobic capacity was determined using maximal oxygen consumption (IPC) – as an integral value, and is recommended by experts of the World Health Organization as the most reliable method of estimating human physical performance. Individual IPC value accurately reflects the functional state of the cardiovascular and respiratory systems [7–9]. Assessment of maximum oxygen consumption when performing exercise conducted by quantitative scoring system (see. Table 1).

Physical activity (test PWC) – one of the most important components of human health. In world practice, developed a wide variety of test programs for integrated assessment of these options. The most accurate and advanced programs are realized in the laboratory using veloergometry tredmilu and automatic power adjustment of the load and measuring the reaction of functional systems [10, 11]. Evaluation of physical capacity rights at the pulse of 130, 150 or 170 beats / min, and determine the maximum aerobic capacity by measuring the maximal consumption of oxygen allows accurately assess the state of physiological systems, the availability of reserve capacity (or lack thereof), primarily heart vascular, respiratory and neuromuscular systems.

The study used dev'yatyhvylynnyy stepping test sequential rise for 3 minutes on each of the three high steps 20, 30 and 40 cm. For women under the height of steps was 10, 20 and 30 cm. Calculation of power load at nashahuvanni to step performed by the formula proposed by Mr. Amosov [12]. Statistical, statistical processing of material is conducted via licensed software products that are included in the package Microsoft Office Professional 2000 license Russian Academic OPEN NO LEVEL № 17016297 a personal computer IBM Atlon program Excel. To test the normality of data distribution method used Lapacho SN et al. (2001) (Function NORMSAMP-1, which is embedded in the environment of Excel) [14, 15]. Work carried out at state expense.

The results

At the beginning of the observation volume forced expiratory volume in 1 second in patients with I-st group was 63.5 %, forced vital capacity of the lungs was 75.2 %, peak expiratory flow rate 81.2 %, the ratio of forced expiratory volume in 1 second to forced vital lung capacity 83.2 %. After treatment in this group of patients significant changes in terms spirographic happened. Namely forced expiratory volume in 1 second was 69.5 %, forced vital capacity of the lungs was 75.7 %, peak expiratory flow rate

82.6 %, the ratio of forced expiratory volume in 1 second to forced vital capacity pulmonary 88.3 %. Three months observation volume forced expiratory volume in 1 second in patients I-th group remained unchanged and amounted to 66.3 %, forced vital capacity of the lungs was 78.1 %, peak expiratory flow rate 82.3 %, the ratio of forced expiratory volume 1 second to forced vital capacity pulmonary 82.5 %. In the second group of patients at the beginning of the observation volume forced expiratory volume in 1 second was 68.2 %, forced vital capacity of the lungs was 75.6 %, peak expiratory flow rate 85.1 %, the ratio of forced expiratory volume in 1 second to forced vital capacity pulmonary 83.1 %. During the observation period of significant changes in estimated rates also were observed: on the second visit – forced expiratory volume in 1 second was 71.5 %, forced vital capacity of the lungs was 74.8 %, peak expiratory flow rate 83.5 %, the ratio of forced expiratory volume in 1 second to forced vital capacity of lung 87.3 %, the third visit – forced expiratory volume was 72.3 %, forced vital capacity of lung 72.3 %, peak expiratory flow rate 83.4 %, the ratio of forced expiratory volume in 1 second to forced vital capacity pulmonary 87.5 %. Functional testing of the first group of patients showed that early observation in 100 % of patients Stange test was within «3» points – the «bad», the numeric value indicator was (47,6 ± 1,7) s. On the second visit in 36.8 % of patients the indicator was within «4» points – «satisfactory», the remaining 63.2 % – within «3» points – the «bad» numerical value – (43,8 ± 1 3) seconds. On the third visit in 47.4 % of patients the indicator was within «4» points – «satisfactory», the remaining 52.6 % – within «3» points – the «bad» numerical value was – (45,8 ± 1.5) seconds. The group rate was significantly different from the group of healthy subjects at all visits (Table. 2). At 100.0 % of patients II group treated by the process claimed Stange test was to stay and «3» points – «bad» numerical value was (46,9 ± 1,5) s. On the second visit in 78.9 % of patients the indicator was within «4» points – «satisfactory», the remaining 21.1 % within «3» points – the «bad» numerical value was – (61,3 ± 1 5) seconds. On the third visit in 5.3 % of patients the indicator was within «3» points – the «bad», the remaining 78.9 % within the '4' points – «satisfactory», with 15.8 % within the «5» points – «good» numerical value was – (60,8 ± 2,2) s. Under this figure was significantly different from the group of healthy persons only on the first visit and after treatment was observed a significant improvement compared to the beginning of treatment, significant difference compared with the group of healthy individuals in group II patients were not.

The level of reserve capacity of the cardiovascular system when performing a test load test Ruf'ye dependent on the stroke volume of blood due to increased heart rate and slowing heart rate recovery after exercise (see. Table 3). Patients in Group I stay and sample values significantly different from the rate of healthy and was (13,2 ± 1,1) s – «Very bad» on the second visit – (14,6 ± 1,2) s – «very bad», to visit III – (14,4 ± 1,1) s –»Very bad», during the observation period between visits to significant changes in the group were not observed. Patients second group in early follow-up (and visit) also observed significant changes in comparison with a group of healthy individuals – (12,7 ± 1,8) s – «Bad», the second visit – (5,4 ± 1,5) s – «good», so there has been a significant improvement compared to the beginning of the treatment, but kept significant difference compared with

Table 1

Table Normative estimated maximum oxygen consumption IPC (l / min)

Quantifying	Up to 25	26–34	35–44	45–54	55–64	> 64
	Years					
	Men					
Perfectly	> 55	> 52	> 50	> 47	> 45	> 43
Fine	49–54	45–52	43–50	40–47	37–45	33–43
Satisfactorily	39–48	38–44	36–42	32–39	29–36	27–32
Badly	33–38	32–37	30–35	27–31	23–28	20–26
Very bad	31–32	29–31	28–29	24–26	21–22	18–19
Critically	< 30	< 28	< 27	< 23	< 20	< 17
	Women					
Perfectly	> 45	> 42	> 40	> 37	> 35	> 33
Fine	38–44	36–41	35–39	31–36	29–34	27–32
Satisfactorily	31–37	30–35	28–34	25–30	23–28	21–26
Badly	24–30	23–29	22–27	20–24	18–22	16–20
Very bad	22–23	21–22	20–21	18–19	16–17	14–15
Critically	< 21	< 20	< 19	< 17	< 15	< 13

Table 2

Values samples stange (points) in patients with asthma and II of the disease of moderate severity, (M ± m)

Visits	Delay in breathing (s)		
	Healthy (n = 15)	Group I (n = 15)	Group II (n = 15)
I	67,6 ± 3,1	47,6 ± 1,7*	46,9 ± 1,5*
II	63,8 ± 3,2	43,8 ± 1,3*	61,3 ± 1,5#
III	67,5 ± 2,5	45,8 ± 1,5*	60,8 ± 2,2#

Notes: * – statistically significant difference from the group of healthy individuals ($p < 0,05$); # – statistically significant difference compared to the treatment ($p < 0,05$).

Table 3

The value of the sample Ruf'ye in patients with asthma and II of the disease of moderate severity, (M ± m)

Visits	Indicator Value samples Ruf'ye					
	Healthy (n = 15)		Group I (n = 15)		Group II (n = 15)	
	сек	бали	сек	бали	сек	бали
Visits I	2,1 ± 0,5	6	13,2 ± 1,1*	3	12,7 ± 1,8*	3
Visits II	1,8 ± 0,1	6	14,6 ± 1,2*	3	5,4 ± 1,5*#	5
Visits III	1,4 ± 0,2	6	14,4 ± 1,1*	3	6,8 ± 1,2*#	5

Notes: * – statistically significant difference from the group of healthy individuals ($p < 0,05$); # – statistically significant difference compared to the treatment ($p < 0,05$).

the group of healthy individuals, and the picture remained the third visit hardly variable – (6,8 ± 1,2) s – «fine».

Patients of group was significant difference in the value of BMD compared with a group of healthy individuals throughout the observation period, the dynamics of the group during the study occurred. On the visit and – (33,3 ± 2,3) l / min – «bad», on the second visit – (35,1 ± 2,5) l / min – «bad», to visit III – (37.6 ± 2,8) l / min – «bad» (see. table 4).

Patients II of the early observations MIC values were significantly worse than in the healthy group – (32,4 ± 1,6) l / min – «bad», but after treatment by the process claimed was a significant difference compared to the treatment – (49,6 ± 1,8) l / min – «Good», which is kept and after 3 months of observation – (46,7 ± 1,6) l / min. – «fine».

When assessing the provision of oxygen to all patients underwent determination index Skibinski.

Table 4

Value of IPC in patients with asthma and II of the disease of moderate severity, (M ± m)

Visits	Value MPK					
	Healthy (n = 15)		Group I (n = 15)		Group II (n = 15)	
	l/min	points	л/хв	points	l/min	points
Visits I	43,8 ± 2,2	satis-factorily	33,3 ± 2,3*	badly	32,4 ± 1,6*	badly
Visits II	48,6 ± 2,5	fine	35,1 ± 2,5*	badly	49,6 ± 1,8#	fine
Visits III	46,8 ± 2,8	fine	37,6 ± 2,8*	badly	46,7 ± 1,6#	fine

Notes: * – statistically significant difference from the group of healthy individuals ($p < 0,05$); # – statistically significant difference compared to the treatment ($p < 0,05$).

Table 5

Skibinski index in patients with asthma and II of the disease of moderate severity, (M ± m)

Visits	IC					
	Healthy (n = 15)		Group I (n = 15)		Group II (n = 15)	
	мл/кг	бали	мл/кг	бали	мл/кг	бали
Visits I	41,3 ± 3,1	3	31,3 ± 1,8*	1	32,5 ± 1,5*	1
Visits II	58,3 ± 3,5	5	34,8 ± 1,5*	1	43,2 ± 1,4#	3
Visits III	55,8 ± 3,2	5	34,2 ± 1,5*	1	48,6 ± 1,2#	3

Notes: * – statistically significant difference from the group of healthy individuals ($p < 0,05$); # – statistically significant difference compared to the treatment ($p < 0,05$).

It is established that the application of the method of treatment prototype index remained Skibinski not interchangeable, and as soon as 3 months after treatment. Early observation IP was (31,3 ± 1,8) ml / kg 1 point – «critical», immediately after treatment – (34,8 ± 1,5) ml / kg 1 point – «critical» and through 3 months – (34,2 ± 1,5) ml / kg 1 point – «critical». Patients in group II, which were treated by the process claimed IS early observation was (32,5 ± 1,5) ml / kg 1 point – «critical», once received treatment had significant improvement to it (43, 2 ± 1,4) ml / kg (3 points – «good»), which is being stored and after 3 months of observation – (48,6 ± 1,2) l / min. – (3 points – «good») (see. Table 5).

Conclusion

Application etylmetylhidroksypirydin succinate, against standard treatment period of remission asthma to resume physical activity in these patients can:

– Improve cardiorespiratory endurance VO2max 19.1 % immediately after treatment and 18.0 % after 3 months of observation, the metabolic cost of work performed (MET) 1.9 times immediately after treatment and twice after 3 months of observation compared with the beginning observation;

– Stabilize enerhoriven (index Skibinski) 32.9 % immediately after treatment and at 49.5 % after 3 months of treatment received compared with the beginning of supervision, improve cardiorespiratory reserve to 46.4 % immediately after treatment and 57.5 % after 3 months after treatment obtained compared with the beginning of supervision, improve aerobic endurance (IPC) to 44.1 % immediately after treatment and 53.0 % after 3 months of treatment received in comparison with the beginning of observation;

– Improve the load performed in 75.0 % immediately after treatment and at 100.0 % at 3 months after treatment obtained compared with the beginning of observation;

– To increase the oxygen cost of work performed on average 57.0 % immediately after treatment and 71.4 % after 3 months of treatment received in comparison with the beginning of observation;

– To improve the performance of oxygen consumption (O 2) average: V'O2 58.4 % immediately after treatment and 56 % after 3 months of treatment received, V'O2p 14.7 % immediately after treatment and 20 % after 3 months after treatment obtained compared with the beginning of observation;

– Reduce hyperventilation, improve the cardiovascular system by increase the oxygen pulse (VO2/HR) 58.4 % immediately after treatment and 56 % after 3 months of treatment received compared with the start-up.

Список літератури

1. Фещенко, Ю.І. Бронхіальна астма, хронічне обструктивне захворювання легень: перспективна глобальна стратегія ведення, новітні методи діагностики, сучасні підходи до терапії [Текст] / Фещенко Ю.І. // Астма та алергія. – 2015. – № 4. – С. 38–42.
2. Hul, A. Decreased physical activity in adults with bronchial asthma [Text] / A. Hul, S. Frouws, R. Lummel // Respir Med. – 2016. – № 114. – P. 72–77.
3. Uchmanowicz, B. Clinical factors affecting quality of life of patients with asthma [Text] / B. Uchmanowicz [et al.] // J Patient Preference and Adherence. – 2016. – № 10. – P. 579–589.
4. Hsiao, H. Comprehensive risk factors, asthma control, and life quality pathways in adults with asthma: A structural equation modeling analysis [Text] / H. Hsiao [et al.] // Allergy Asthma Proc. – 2016. – № 3. – P. 31–40.
5. A Randomized Trial of Changing Exercise and Physical Activity Behavior in Asthma Patients [Text] / C.A. Mancuso [et al.] // J. Asthma. – 2009. – № 8 – P. 21–29.
6. Patients' expectations of asthma treatment [Text] / C.A. Mancuso [et al.] // J. Asthma. – 2003. – № 8. – P. 73–81.
7. Григус, І.М. Фізична реабілітація хворих на бронхіальну астму (монографія) [Текст] / І.М. Григус. – Рівне, 2008. – 240 с.
8. Григус, І.М. Підвищення рівня фізичного здоров'я хворих на легку персистуючу бронхіальну астму [Текст] / І.М. Григус // Педагогіка, психологія та медико-біологічні проблеми фізичного виховання і спорту: наукова монографія за редакцією проф. Єрмакова С.С. – Харків: 2009. – № 1. – С. 54–59.
9. Артеменков, А.А. Динамика вегетативных функций при адаптации к физическим нагрузкам [Текст] / А.А. Артеменко // Теория и практика физической культуры. – 2006. – № 4. – С. 59–61.
10. Белевский, А.С. Реабилитация больных с патологией легких [Текст] / А.С. Белевский // Пульмонология и аллергология. – 2007. – № 4. – С. 14–17.
11. Белевский, А.С. Реабилитация больных с патологией легких [Текст] / А.С. Белевский // Хроническая обструктивная болезнь легких / под ред. А.Г. Чучалина. – М.: Атмосфера, 2008. – С. 397.
12. Експрес-скринінг рівня соматичного здоров'я населення при профілактичних оглядах [Текст] / Г.Л. Апанасенко [та ін.]. – Київ. – 2000. – 8 с.
13. Наказ МОЗ України №128 від 19.03.2007 р. «Про затвердження клінічних протоколів надання медичної допомоги за спеціальністю «Пульмонологія» [Текст]. — Київ: ТОВ «Велес», 2007. — 148 с.
14. Бабич, П.Н. Применение современных статистических методов в практике клинических исследований. Сообщение третье. Отношение шансов: понятие, вычисление, интерпретация [Текст] / П.Н. Бабич, А.В. Чубенко, С.Н. Лапач // Укр. мед. часопис. – 2005. – № 2. – С. 113–119.
15. Лапач, С.Н. Статистические методы в медико-биологических исследованиях с использованием Excel [Текст] / С.Н. Лапач, А.В. Чубенко, П.Н. Бабич. – Киев: Морион, 2001. – 320 с.

References

1. Feshchenko YuI. Bronkhial'na astma, khronichne obstruktivne zakhvoryuvannya legen': perspektivna global'na strategiya vedennya, novitni metodi diagnostiki, suchasni pidkhodi do terapiï (Bronchial asthma, chronic obstructive pulmonary disease: prospective global strategy of managing, new diagnostic techniques, new approaches to therapy). Astma ta alergiya. 2015;4:38–42.
2. Hul A, Frouws S, Lummel R. Decreased physical activity in adults with bronchial asthma. Respir Med. 2016;114:72–77.
3. Uchmanowicz B, et al. Clinical factors affecting quality of life of patients with asthma. J Patient Preference and Adherence. 2016;10:579–589.
4. Hsiao H, et al. Comprehensive risk factors, asthma control, and life quality pathways in adults with asthma: A structural equation modeling analysis. Allergy Asthma Proc. 2016;3:31–40.
5. Mancuso CA, et al. A Randomized Trial of Changing Exercise and Physical Activity Behavior in Asthma Patients. J. Asthma. 2009;8:21–29.
6. Mancuso CA, et al. Patients' expectations of asthma treatment. J. Asthma. 2003;8:73–81.
7. Grigus IM. Fizichna reabilitatsiya khvorikh na bronkhial'nu astmu (monografiya) (Physical rehabilitation of patients with asthma (monograph). Rivne, 2008. 240 p.
8. Grigus IM. Pidvishchennya rivnya fizichnogo zdorov'ya khvorikh na legku persistuyuchu bronkhial'nu astmu (Improving physical health of patients with mild persistent asthma). Pedagogika, psikhologiya ta mediko-biologichni problemi fizichnogo vikhovannya i sportu: naukova monografiya za redaktsieyu prof. Yermakova S.S. (Pedagogy, psychology and medical-biological problems of physical training and sports, scientific monograph, edited by Prof. Yermakova SS). Kharkiv, 2009;1:54–59.
9. Artemenkov AA. Dinamika vegetativnykh funktsiy pri adaptatsii k fizicheskim nagruzkam (Dynamics of autonomic functions in adaptation to physical stress). Teoriya i praktika fizicheskoy kul'tury. 2006;4:59–61.
10. Belevskiy AS. Reabilitatsiya bol'nykh s patologiey legkikh (Rehabilitation of patients with lung pathology). Pul'monologiya i allergologiya. 2007;4:14–17.
11. Belevskiy AS. Reabilitatsiya bol'nykh s patologiey legkikh (Rehabilitation of patients with lung pathology). Khronicheskaya obstruktivnaya bolezn' legkikh / pod red. AG Chuchalina. Moscow: Atmosfera, 2008. P. 397.
12. Apanasenko GL, et al. Ekspres -skrining rivnya somatichnogo zdorov'ya naselennya pri profilaktichnikh oglyadakh (Express screening of somatic health of population in preventive examinations). Kiïv, 2000. 8 p.
13. Nakaz MOZ Ukraïni № 128 vid 19.03.2007. «Pro zatverdzhennya klinichnikh protokoliv nadannya medichnoï dopomogi za spetsial'nistyu «Pul'monologiya» (Order of MOH of Ukraine № 128 dated 19.03.2007. «On approval of clinical protocols of medical care in» Pulmonology»). Kiïv: TOV «Veles», 2007. 148 p.
14. Babich PN, Chubenko AV, Lapach SN. Primenenie sovremennyy statisticheskikh metodov v praktike klinicheskikh issledovaniy. Soobshchenie tret'e. Otnoshenie shansov: ponyatie, vychislenie, interpretatsiya (Application of modern statistical methods in the practice of clinical research. The third message. The odds ratio: concept, calculation, interpretation). Ukr. med. chasopis. 2005;2:113–119.
15. Lapach SN, Chubenko AV, Babich PN. Statisticheskie metody v medico-biologicheskikh issledovaniyakh s ispol'zovaniem Excel (Statistical methods in biomedical research using Excel). Kiev: Morion, 2001. 320 p.

Theoretical and practical J. «Asthma and Allergy», 2017, 1
Y.I. Feschenko, academician of NAMS of Ukraine, professor
Director of SO «National Institute of phthisiology and pulmonology named after F.H. Yanovskyi NAMS of Ukraine»
M. Amosova str., 10, Kyiv, Ukraine, 03680;
tel.: +38 (044) 275-04-02; +38 (044) 275-21-18;
e-mail: admin@ifp.kiev.ua