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STATE PULMONARY VENTILATION IN YOUNG PEOPLE

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Abstract: The article deals with the assessment of lung ventilation in smoking and non-smoking young people of both sexes and spirometric pnevmotahometricheskim methods in terms of static and dynamic indicators of lung ventilation on automated multifunction spirometer. Purpose of the study is to assess pulmonary ventilation in smoking and non-smoking young people of both sexes. A study of ventilation function was carried out in 62 young people aged 19-24 years with normal body weight, including 34 boys (27 non-smokers and 7 smokers with a smoking history of 1 to 5 years), as well as 48 girls (40 non-smokers). and 8 – smokers with 1-2 years of experience) using spirometric and pneumotachometer methods based on static and dynamic indicators of pulmonary ventilation on an automated multifunctional spirometer. When conducting research, it was revealed that in males there was a decrease in the static indicators of the ventilation function of the lungs by 36%, inspiratory reserve volume by 14%, expiratory reserve volume by 33%, vital capacity lungs by 12% and dynamic volumes and flows recorded during forced maneuvers using the pneumotachographic method by recording the flow-volume curve forced vital capacity by 3%, minute respiratory volume by 15%, forced volumetric flow rate during exhalation of 25%, 50% of FVC by 19% and 12%, respectively.
Keywords:smoking, ventilation, spirometry, young people

Recently, the problem of smoking, which is common not only among boys, but also among girls, has become acutely important, due to the desire of young people to be modern. However, it is known that smoking leads to the early onset of diseases of the cardiovascular system, diseases of the respiratory system, including cancer, digestive organs, liver, immunodeficiency states, etc[1,3,7].

According to countries and territories of the world reporting relevant data to WHO, the prevalence of tobacco smoking among adults varies from 4% to 54%[11,12,13]. The top ten countries in which tobacco smoking is most widespread include, in addition to Nauru, Guinea, Namibia, Kenya, Bosnia and Herzegovina, Mongolia, Yemen, Sao Tome and Principe, Turkey, Romania[2,4,6,11].

According to the World Health Organization, on average, one person dies every eight seconds worldwide from diseases associated with tobacco smoking, and five million people die from this cause every year. "If trends in smoking prevalence continue unabated, 10 million people are projected to die prematurely each year by 2020, and tobacco smoking is projected to be one of the largest causes of premature death by 2030."

Metabolic Rate oxygen consumption and carbon dioxide production effect alveolar ventilation by mechanisms that are not well understood. The tracking of ventilation to metabolic rate is very precise. For example, during exercise, ventilation increases in a linear manner related to metabolic rate. When an animal was placed on a membrane oxygenator, which allowed the removal of metabolic carbon dioxide production, ventilation was reduced to apnea by removing increasing amounts of carbon dioxide[14].

Thus, it is known and definitively proven that the cause of chronic obstructive pulmonary disease in 86-90% of cases is smoking, as well as in 80-85% of cases of lung cancer[5,8,9,10].

Purpose of the study:to assess pulmonary ventilation in smoking and non-smoking young people of both sexes.

Research methods:A study of ventilation function was carried out in 62 young people aged 19-24 years with normal body weight, including 34 boys (27 non-smokers and 7 smokers with a

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smoking history of 1 to 5 years), as well as 48 girls (40 non-smokers). and 8 – smokers with 1-2 years of experience) using spirometric and pneumotachometer methods based on static and dynamic indicators of pulmonary ventilation on an automated multifunctional spirometer.

Ventilatory control is regulated by a feedback system that allows only small changes in arterial Po2, Pco2, and pH under physiological states such as rest, exercise, and sleep. Likewise, reflexes from the airways and lung also influence respiration. The respiratory system maintains homeostasis by integrating chemical, metabolic, and mechanical input during complex physiological states and adjusting ventilatory motor output to meet ventilatory demands [14] (Fig 1).

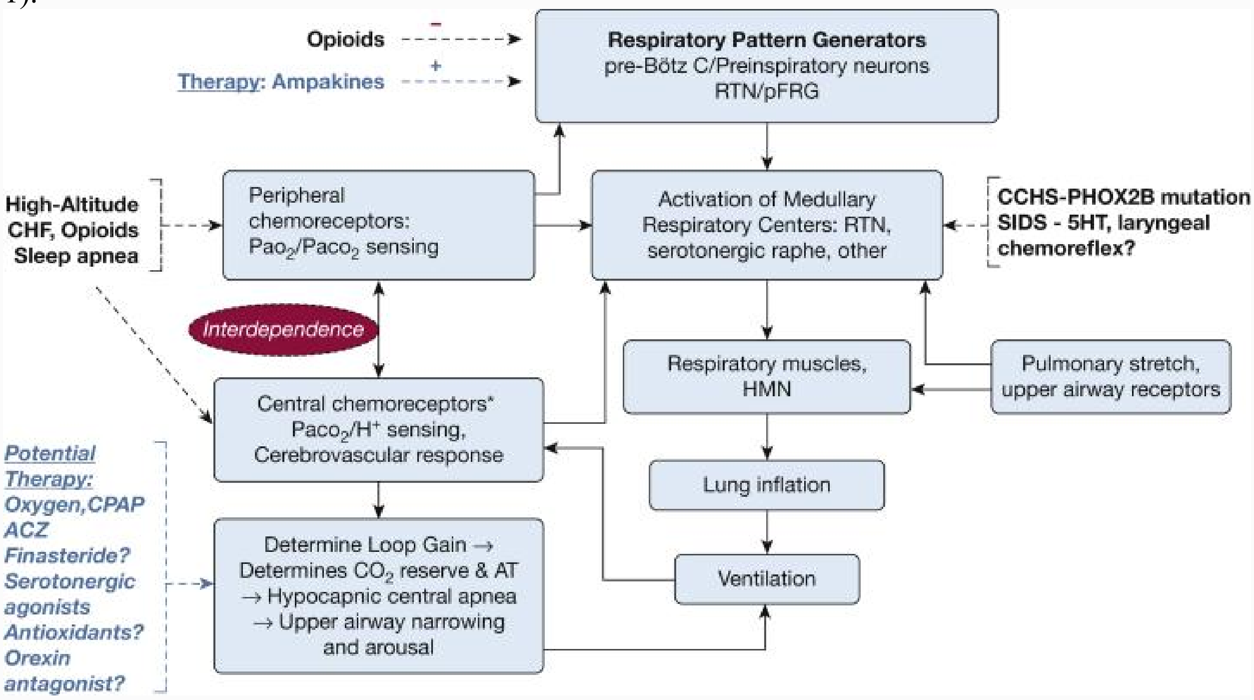

Figure 1

Ventilatory control of breathing, starting with inspiration/expiration at the respiratory-pattern generators, with ongoing modulation of ventilation through a feedback mechanism by the peripheral and central chemoreceptors and cerebrovascular responsiveness (CVR) as well as by airway/pulmonary receptors. Chemoreceptor sensitivity can be measured through loop gain, a measure of ventilatory responsiveness to $Paco_2$ levels, which in turn determines the AT and carbon dioxide reserve during sleep and eventually the propensity for developing a hypocapnic central apnea. See text for full explanation. Potential underlying pathophysiological mechanisms that predispose to sleep apnea, including chemoresponsiveness, CVR, and opioid-induced inhibition of the pre-Bötz C are depicted by black dashed lines. Therapeutic interventions that may target potential mechanisms are denoted by blue dashed lines. – denotes "inhibition"; + denotes "activation." 5HT = serotonin related; ACZ = acetazolamide; AT = apneic threshold; CCHS = congenital central hypoventilation syndrome; CHF = congestive heart failure; CVR = cerebrovascular responsiveness to CO_2. HMN = hypoglossal motor nucleus; pFRG = parafacial respiratory group, Pre-Bötz C = pre-Bötzinger complex; RTN = retrotrapezoid nucleus.

Results: When conducting research, it was revealed that in males there was a decrease in the static indicators of the ventilation function of the lungs (tidal volume (TI) by 36%, inspiratory reserve volume (IR in) by 14%, expiratory reserve volume (ER ex) by 33%, vital capacity lungs (VC) by 12%) and dynamic volumes and flows recorded during forced maneuvers using the pneumotachographic method by recording the flow-volume curve (forced vital capacity (FVC)

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by 3%, minute respiratory volume (MVR) by 15%, forced volumetric flow rate during exhalation of 25%, 50% of FVC by 19% and 12%, respectively).

These indicators indicate the presence of changes of both an obstructive nature (decrease in PO output and indicators characterizing the maximum volumetric flow rate at the expiratory level) and restrictive nature (decrease in vital capacity). A decrease in MVL and vital capacity indicates the development of a latent stage of insufficiency of external respiration function in young men who smoke.

In girls, the nature of the detected changes in the studied indicators was less pronounced, the differences in the studied indicators were not significant, with the exception of a decrease in MVL by 20% and volumetric velocities at the level of exhalation of 25% and 50% by 24% and 18%, respectively. These changes may be associated with neuromuscular weakness that develops in girls when smoking and the presence of obstructive pulmonary ventilation function disorders.

Conclusions: In young people who smoke, changes in some indicators of the pulmonary ventilation function of an obstructive and restrictive nature were detected, indicating the development of the initial stage of respiratory failure. The reason for less pronounced deviations in girls who smoke may be due to a shorter duration of smoking experience, as well as a smaller number of cigarettes smoked.

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