RESPIRATORY SYSTEM PHYSIOLOGY

Komilova Maftuna Ergash kizi
Asaka Abu Ali ibn Sino College of Public Health
Lecturer of the Department of "Nursing"

Abstract: *Respiratory system is a vital part of human physiology responsible for gas exchange between the organism and the external environment. This article discusses the structure and function of the respiratory system, mechanisms of breathing, regulation of respiration, and the physiological adaptations under different conditions. Understanding respiratory physiology is crucial for the diagnosis and treatment of respiratory diseases and for advancing clinical and experimental research.*

Keywords: *Respiratory system, Breathing mechanism, Gas exchange, Lung physiology, Pulmonary ventilation, Hemoglobin, Oxygen transport, Carbon dioxide removal, Respiratory regulation, Homeostasis.*

INTRODUCTION

The respiratory system plays a critical role in maintaining homeostasis by ensuring oxygen supply to tissues and removal of carbon dioxide. It consists of upper and lower respiratory tracts, lungs, and accessory muscles of respiration. Physiological understanding of this system is essential for medicine, sports science, and physiology research.

Anatomy of the Respiratory System

The respiratory system includes the nasal cavity, pharynx, larynx, trachea, bronchi, and lungs. The alveoli are the primary sites of gas exchange, surrounded by capillaries allowing efficient oxygen uptake and carbon dioxide

removal. The lungs are divided into lobes and are covered by the pleura, which reduces friction during breathing.

Mechanism of Breathing (Ventilation)

Breathing is divided into inhalation (inspiration) and exhalation (expiration).

Inhalation: Diaphragm contracts downward, intercostal muscles lift the ribs, creating negative pressure.

Exhalation: Diaphragm relaxes, thoracic cavity volume decreases, air is expelled.

Pulmonary ventilation can be measured using spirometry, and parameters include tidal volume, vital capacity, and residual volume.

Gas Exchange and Transport

Oxygen diffuses from alveoli into the blood, binds to hemoglobin, and is transported to tissues. Carbon dioxide is produced as a metabolic waste and transported back to the lungs for exhalation. Gas exchange is governed by partial pressure gradients (Henry's Law) and facilitated by respiratory pigments like hemoglobin.

Regulation of Respiration

Respiration is regulated by the respiratory center in the medulla oblongata and pons, responding to CO2, O2, and pH levels in blood. Chemoreceptors in the carotid and aortic bodies detect these changes and modulate the respiratory rate. Emotional and voluntary control can influence breathing via the cerebral cortex.

Respiratory Physiology Under Special Conditions

Exercise: Increases respiratory rate and tidal volume to meet oxygen demand.

High altitude: Hypoxia stimulates erythropoietin production and increases ventilation.

Pathological conditions: COPD, asthma, and pulmonary fibrosis alter normal respiratory physiology.

Clinical Relevance

Understanding respiratory physiology is essential for treating respiratory disorders, designing ventilators, and monitoring patient oxygenation. Blood gas analysis and spirometry are important diagnostic tools.

CONCLUSION

The respiratory system ensures vital gas exchange and homeostasis. Its physiology is complex, integrating structural, biochemical, and neurological mechanisms. Comprehensive knowledge aids in medical diagnostics, therapeutic interventions, and physiological research. Breathing is one of the most important functions of human life. Its regularity and quality ensure the healthy functioning of the body. Therefore, maintaining clean air, leading a healthy lifestyle, and maintaining the health of the respiratory tract are important tasks for every person. We breathe - that is, we breathe.

REFERENCES

1. Guyton, A. C., Hall, J. E. Textbook of Medical Physiology. 14th Edition. Philadelphia: Elsevier, 2021.

2. West, J. B. Respiratory Physiology: The Essentials. 10th Edition. Philadelphia: Lippincott Williams & Wilkins, 2020.

3. Levitzky, M. G. Pulmonary Physiology. 9th Edition. McGraw-Hill, 2018.

4. Boron, W. F., Boulpaep, E. L. Medical Physiology. 3rd Edition. Elsevier, 2017.

5. Hall, J. E. Guyton and Hall Physiology Review. 2nd Edition. Elsevier, 2019.

6. West, J. B., Luks, A. M. High Altitude Medicine and Physiology. 6th Edition. CRC Press, 2019.

7. Levitzky, M. G., Respiratory Physiology: A Clinical Approach. 8th Edition. McGraw-Hill, 2016.

8. West, J. B. Best & Taylor's Physiological Basis of Medical Practice. 14th Edition. Williams & Wilkins, 2015.

9. Abdullaev A. X. Odam va hayvonlar fiziologiyasi. - Toshkent: O'qituvchi, 2019.

10. Karimov M. A., Soliyev B. B. Biologiya (Abituriyentlar uchun qo'llanma). - Toshkent: Iste'dod, 2020.

11. Jalilov S. A. Odam anatomiyasi va fiziologiyasi. - Toshkent: Fan va texnologiya, 2021.

12. Axmedov H. Umumiy biologiya. - Samarqand: Zarafshon, 2018.

13. G'aniyev S. Tibbiyot fiziologiyasi asoslari. - Buxoro: Tibbiyot nashriyoti, 2020.

14. Tortora G. J., Derrickson B. H. Principles of Anatomy and Physiology. - Wiley, 2021.

15. Marieb E. N., Hoehn K. Human Anatomy & Physiology. - Pearson, 2020.

16. Guyton A. C., Hall J. E. Textbook of Medical Physiology. - Elsevier, 2021.

17. Ganong W. F. Review of Medical Physiology. - McGraw-Hill Education, 2022.

18. Saladin K. S. Anatomy & Physiology: The Unity of Form and Function. - McGraw-Hill, 2020.

19. Sheremet A. V. Fiziologiya dlya meditsinskikh vuzov. - Moskva: GEOTARMedia, 2019.