



**THE RELATIONSHIP BETWEEN DIGESTIVE PHYSIOLOGY AND THE CENTRAL
NERVOUS SYSTEM AND ITS MODERN INTERPRETATION**

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ABSTRACT

The digestive system is one of the most complex and essential functions of the human body, including the processes of food intake, digestion, absorption, and waste elimination. This article analyzes the relationship between the digestive system and the central nervous system, reflex mechanisms, the enteric nervous system (ENS), and its interaction with gastrointestinal microbiota, based on modern scientific approaches. The research findings reveal the complex and integrated regulatory mechanisms of digestion and consider the role of stress, emotional state, and microbiota.

Key words: digestive system, central nervous system, enteric nervous system, gastrointestinal microbiota, gut–brain axis, reflex mechanisms, peristalsis.

INTRODUCTION

The digestive system performs the functions of food intake, mechanical and chemical digestion, absorption of nutrients, and elimination of waste in the human body. Traditional interpretations considered digestion mainly as the activity of the gastrointestinal tract. However, modern research demonstrates that the central nervous system, the enteric nervous system (ENS), and gastrointestinal microbiota also play crucial roles in the digestive process.

Studying the relationship between digestion and the central nervous system is important in understanding human physiology, stress conditions, emotional reactions, and the formation of a healthy lifestyle. Therefore, this article analyzes the digestive system, its regulatory mechanisms, and modern scientific approaches.

THEORETICAL BASIS

1. Physiology of Digestion

The digestive process consists of several stages:

- Oral cavity: Mechanical digestion (chewing) and chemical digestion (salivary enzymes such as amylase) begin. Taste and smell stimulate gastric secretion.

- Esophagus and stomach: Pepsin and hydrochloric acid break down proteins. Gastric muscles mix food and move it to the intestines via peristalsis.



- Intestines: In the small intestine, enzymes and the hepatobiliary system ensure absorption of fats, carbohydrates, and proteins. The large intestine absorbs water and electrolytes and forms solid waste.

- Waste elimination: Solid waste is excreted through the large intestine.

2. Relationship Between Digestion and the Central Nervous System

- Central nervous system (CNS): The medulla oblongata and hypothalamus regulate digestion reflexively. Hunger and satiety centers are located in the hypothalamus.

- Autonomic nervous system: Parasympathetic nerves (vagus nerve) enhance peristalsis and gland secretion, while sympathetic nerves slow digestion during stress.

- Reflex mechanisms: Sensory receptors in the mouth, stomach, and intestines send signals to the medulla, adapting digestive processes.

3. Modern Interpretation

- Enteric nervous system (ENS): Neurons in the intestinal wall can regulate digestion independently of the CNS.

- Gastrointestinal microbiota: Intestinal bacteria influence digestion, vitamin synthesis, and immune response.

- Gut–brain axis: Stress and emotional states significantly affect digestion through integrated control involving ENS and microbiota.

PRACTICAL BASIS

The relationship between the digestive system and the central nervous system can be studied through practical research:

- Reflex tests: Gastric secretion is measured after placing a taste stimulus in the oral cavity.

- Monitoring peristalsis: Intestinal peristalsis is observed using electromyography and ultrasound.

- Effects of stress: Psychological tests and gastroscopic observations show that stress slows digestion.

- Microbiota analysis: Genomic and metabolomic methods assess the relationship between microbiota composition and digestive health.

DISCUSSION

Research shows that digestive system activity is not limited solely to the gastrointestinal tract. The central and enteric nervous systems work together through reflex and neuroendocrine mechanisms to regulate digestion. The microbiota and gut–brain axis concepts further clarify the influence of stress and emotional states on digestion. Modern research proves that healthy microbiota and ENS integration optimize digestion and reduce the risk of various gastroenterological diseases.



RESULTS

- The digestive system functions through mechanical, chemical, neural, and hormonal regulation.
- The CNS and ENS regulate digestion reflexively and in an integrated manner.
- Stress, emotional state, and microbiota significantly affect digestion.
- Modern approaches provide a clearer explanation of the complex integrated function of the digestive system.

CONCLUSION

The digestive system possesses complex and integrated regulatory mechanisms and is closely connected with gastrointestinal activity, the central and enteric nervous systems, and microbiota. Modern scientific research highlights the influence of stress and emotional states, as well as the role of microbiota and ENS. This approach is important in promoting a healthy lifestyle and preventing gastroenterological diseases.

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