

SKIN RESEARCH IN MODERN MEDICINE

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Abstract: *In modern medicine, skin research is conducted not only to treat skin diseases, but also to gain a deeper understanding of the biological activity, regeneration, and rejuvenation processes of the skin. New approaches and studies on the structure, genetic composition, development of diseases, regeneration, and aging processes of the skin are creating new opportunities in the field of skin care and treatment. The main areas of skin research in modern medicine are presented below.*

Аннотация: *В современной медицине исследования кожи проводятся не только с целью лечения кожных заболеваний, но и для более глубокого понимания биологической активности, процессов регенерации и омоложения кожи. Новые подходы и исследования структуры кожи, генетического состава, развития заболеваний, регенерации и процессов старения открывают новые возможности в уходе за кожей и ее лечении. Ниже приведены основные направления исследований кожи в современной медицине.*

Keywords: *cell, genetics, skin, disease, dermatology, cosmetic, strategy, blood, vessel, inflammation*

Ключевые слова: *клетка, генетика, кожа, болезнь, дерматология, косметика, стратегия, кровь, сосуд, воспаление*

In modern medicine, many studies are being conducted to study the skin, its structure, functions and diseases in depth. New scientific advances are being made in the field of biological activity of the skin, diseases, anti-aging changes and cosmetic treatments. The following are the main areas of skin research in modern medicine.

1. Skin Cells and Genetics

- Genetic studies: Genetic studies are being conducted to understand the structure and functions of the skin. In-depth information is being collected about genetic factors in the aging process of the skin, melanin production and pigmentation processes in the skin.
- Stem cells and skin regeneration: The role of stem cells and their pores in skin regeneration, wound and burn treatment is being studied. This is opening up new opportunities for accelerating skin regeneration and cosmetic treatments.

2. Skin Diseases

- **Dermatology and New Treatments:** In the field of modern dermatology, new approaches such as biologics and gene therapy are being used to treat skin diseases. For example, new treatment protocols and drugs are being developed for diseases such as psoriasis, eczema, acne, and vitiligo.

- **Immunotherapy:** Immunotherapy is used to treat certain skin tumors and diseases (such as advanced stages of melanoma). This method helps the body's own defense system fight cancer cells.

3. Skin Aging Process

- **Mechanisms of skin aging:** Skin aging is mainly associated with a decrease in collagen and elastin and a slowdown in cell renewal processes. Modern research is focused on finding ways to slow down the skin aging process and restore skin elasticity. For example, substances such as antioxidants, vitamin C, and retinoids delay skin aging.

- **Anti-aging technologies:** Modern cosmetics are developing technologies that are used to slow down skin aging, such as laser therapy, microdermabrasion, and ultrasound treatments.

4. Cosmetic and Dermatological Products

- **Nanotechnology:** Nanotechnology is being used in cosmetic products, especially in the production of skin creams and lotions. Nanoparticle technologies allow active ingredients to penetrate deeper into the skin and have a more effective effect.

- **New skin care products:** Research is ongoing to improve the effectiveness of cosmetic and dermatological products, regardless of the skin. New formulations are currently being developed to fill in gaps, stimulate collagen production, protect against sunlight, and accelerate skin renewal.

5. Sensory Functions of the Skin

- **Skin and the Nervous System:** Research is ongoing into the sensory functions of the skin and its relationship with the nervous system. Research in this area aims to understand how the skin senses pain and stimuli, as well as how they interact with other systems in the body.

- **Neuroensors and the skin:** New treatments are being developed by studying the skin's connection to the nervous system and how it transmits nerve impulses. Sensors in the skin and treatments that affect them (such as stimulation that affects the nervous system) are showing positive results in this regard.

6. Healthy Skin and Environmental Exposure

- **Sunlight and UV Exposure:** The relationship between skin and sunlight continues to be studied. Effective protection methods are needed to prevent UV exposure to the skin, skin cancer, and other skin diseases.

• Environmental Pollution and Skin: Modern research is investigating the effects of environmental pollution on the skin. New research is being conducted on the effects of air pollution, chemicals, and stress on skin changes, which will help create new strategies for skin care and protection.

7. Skin Transplantation and Regeneration

• Skin Transplantation: Skin transplantation techniques are improving in cases such as wounds and burns. New techniques are used to multiply skin cells and prepare them for transplantation.

• Skin Regeneration and Stem Cells: Stem cells are being used to regenerate skin. They are being used to renew skin cells, improve skin quality, and solve problems related to wounds.

8. Skin and Genomics

• Skin genomics: Research into the genetic makeup of the skin and how it responds to disease is expanding. Genetic mutations help identify factors that influence skin diseases. This scientific field helps develop new treatments.

In modern medicine, skin research is creating new opportunities not only in the treatment of skin diseases, but also in skin regeneration, rejuvenation, cosmetic care, and minimizing environmental exposure. Genetic and biological research is developing new treatments using skin cells and stem cells. Modern technologies, such as nanotechnology and immunotherapy, are also playing an important role in restoring and protecting the skin.

The skin is the largest organ of the human body and performs a variety of biological activities. It performs not only physical protection, but also organic, metabolic, and immunological functions. The biological activity of the skin is being understood more deeply by studying its structure, cellular composition, and genetic aspects. Modern research is providing new opportunities to improve the biological processes of the skin and treat skin diseases. The following is a review of the biological activity of the skin and the role of skin cells, as well as the importance of genetic research.

The skin is composed of three main layers: the epidermis, the dermis, and the hypodermis (or subcutaneous layer). Each layer contains different types of cells, each of which plays an important role in the biological activity of the skin.

a) Epidermis (Surface of the Skin)

The epidermis is the outermost layer of the skin and its main cells are keratinocytes. These cells produce a protein called keratin, which provides the skin with firmness and strength.

- **Keratinocytes:** These are the main cells of the epidermis, which produce keratin in the uppermost layer of the skin. Keratin helps protect the skin from external influences and provides stability to the epidermis.

- **Melanocytes:** Another important type of cell located in the epidermis, they produce melanin. Melanin determines the color of the skin and protects it from the harmful effects of sunlight.

- **Langerhans cells:** These cells function as part of the immune system and play an important role in fighting skin infections.

b) Dermis (Middle Layer of Skin)

The dermis is located deeper than the upper layer of the skin and is mainly composed of collagen, elastin, and other connective tissues.

- **Fibroblasts:** These cells produce collagen and elastin, which provide elasticity and strength to the skin. As the skin ages, fibroblast activity decreases, causing the skin to wrinkle.

- **Endothelial cells:** Form blood vessels and provide nourishment to the skin.

c) Hypodermis (Subcutaneous Layer)

The hypodermis is the lowest layer of the skin and consists mainly of fat cells, which protects the body from heat loss, acts as a shock absorber and stores energy reserves.

The skin is the first barrier through which the body interacts with the external environment. Its biological activity is very large and includes various processes.

a) Protective Function

The skin protects against harmful factors of the external environment, including microorganisms, chemicals, sunlight, water and heat. Keratinocytes located in the epidermis create a strong protective barrier on the surface of the skin.

b) Immune Function

Langerhans cells and other immune system cells protect the skin from the effects of harmful microorganisms and infections. The skin is also involved in the control of inflammatory processes.

c) Sensory Function

Through the skin, the body perceives influences from the environment. The skin communicates with nerve cells and the nervous system, allowing it to sense pain, heat, cold, and other stimuli. This helps the body respond quickly and effectively to the environment.

d) Metabolism and Thermoregulation

The skin plays an important role in the production of vitamin D and maintaining fluid balance in the body. The skin's thermoregulatory function provides heat release and cooling through sweating through sweat glands.

Modern genetic research helps to better understand the structure and functions of the skin. By studying the activity of skin cells and the genetic structure of the organism, the following areas are being identified:

a) Genetic Structure of the Skin

Genetic research is aimed at studying the structure of skin cells, genetic predispositions to skin diseases, and skin aging processes. The genetic structure of the skin plays an important role in the development of skin diseases, such as psoriasis, vitiligo, and dermatitis.

b) Melanin and Skin Color Control

The production of melanin by melanocytes determines skin color. Genetic research provides information on how melanin production is controlled and how to reduce the skin's exposure to sunlight.

c) The Aging Process of Skin

Genetic research is helping to identify the biological basis of skin aging. Changes in collagen and elastin production, as well as the effects of oxidative stress, lead to skin aging. Genetic research is helping to develop methods to slow down skin aging and rejuvenate it.

d) Stem Cells and Regeneration

Skin regeneration processes are being studied using stem cells. Stem cells can accelerate skin repair, which is why they are important in developing new treatments for skin wounds, burns, and other damage.

Modern science has made great strides in studying the biological activity of the skin. Genetic research is making it possible to develop new methods for treating skin diseases. For example, approaches such as gene therapy and stem cells can be effective in increasing the skin's ability to repair itself. In the future, it is expected that new innovative approaches will be developed to slow down the aging process of the skin, prevent and treat skin diseases.

The biological activity of the skin plays an important role in the defense system, immunity and general health of the human body. Genetic research is helping to improve methods of treating skin diseases and regenerating the skin by studying the function of skin cells and the genetic structure of the organism. A deep understanding of the biological processes of the skin will lead to significant advances in maintaining its health and effectively treating skin diseases.

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