EDUCATIONAL AND METHODICAL COMPLEX OF DISCIPLINE
MiF1202 «Morphology and human physiology»
Course – 1 Semester – 2
Number of credits – 11
Almaty 2022

Lecture 2 The integumentary system

Outcomes:

1. List the functions of the skin and relate them to its structure;
2. Identify and name the following skin structures: epidermis, dermis (papillary and reticular layers), hair and hair follicle, sebaceous gland, and sweat gland.
3. Describe the distribution and function of the epidermal appendages—sebaceous and ceruminous glands, sweat glands, hair, and nails.
4. Describe the normal and pathological colors that the skin can have, and explain their causes;
5. Describe the role of dermal circulation;

The integumentary system refers to the skin and its accessory structures, and it is responsible for much more than simply lending to your outward appearance. In the adult human body, the skin makes up about 16 percent of body weight and covers an area of 1.5 to 2 m2. In fact, the skin and accessory structures are the largest organ system in the human body. As such, the skin protects your inner organs and it is in need of daily care and protection to maintain its health.

Accessory structures of the skin include hair, nails, sweat glands, and sebaceous glands. Hair is made of dead keratinized cells, and gets its color from melanin pigments. Nails, also made of dead keratinized cells, protect the extremities of our fingers and toes from mechanical damage. Sweat glands and sebaceous glands produce sweat and sebum, respectively. Each of these fluids has a role to play in maintaining homeostasis. Sweat cools the body surface when it gets overheated and helps excrete small amounts of metabolic waste. Sebum acts as a natural moisturizer and keeps the dead, flaky, outer keratin layer healthy.

The skin is composed of two major layers: a superficial epidermis and a deeper dermis. Melanocytes, cells that produce melanin, the pigment primarily responsible for giving skin its color. Melanin is transferred to keratinocytes in the stratum spinosum to protect cells from UV rays.The dermis connects the epidermis to the hypodermis, and provides strength and elasticity due to the presence of collagen and elastin fibers. The hypodermis, deep to the dermis of skin, is the connective tissue that connects the dermis to underlying structures; it also harbors adipose tissue for fat storage and protection.

The skin plays important roles in protection, sensing stimuli, thermoregulation, and vitamin D synthesis. It is the first layer of defense to prevent dehydration, infection,

and injury to the rest of the body. Sweat glands in the skin allow the skin surface to cool when the body gets overheated. Thermoregulation is also accomplished by the dilation or constriction of heat-carrying blood vessels in the skin. Immune cells present among the skin layers patrol the areas to keep them free of foreign materials. Fat stores in the hypodermis aid in both thermoregulation and protection. Finally, the skin plays a role in the synthesis of vitamin D, which is necessary for our well-being but not easily available in natural foods.

Review questions

1.Why do teenagers often experience acne?
2.Why do scars look different from surrounding skin?
3.Explain your skin's response to a drop in body core temperature.

Basic literature:

1. Saladin, Kenneth S: Essentials of Anatomy & Physiology. (2018, McGraw-Hill Education)
2. Costanzo, Linda S.: BRS Physiology. Board Review Series.7 edition. -Wolters Kluwer Health, 2018.- 307p. - ISBN 1496367693, 9781496367693
3. Leslie P. Gartner: Color Atlas and Text of Histology. - 7th Edition. - Wolters Kluwer, 2017. ISBN 1496346734, 9781496346735
4. Russell K. Hobbie, Bradley J. Roth: Intermediate Physics for Medicine and Biology. - Springer, 2015. - ISBN 3319126822, 9783319126821
5. Andersson D, Medical Terminology: The Best and Most Effective Way to Memorize, Pronounce and Understand Medical Terms: Second Edition, ISBN-13 : 978-1519066626, 2016