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THE STRUCTURE OF THE SKIN, THE STRUCTURE OF DERIVATIVE ORGANS, HAIR, AND SKIN GLANDS (THE STRUCTURE OF THE UDDER).

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Abstract:
This topic covers the structure of the **skin**, the largest organ of the human body, including its layers (epidermis, dermis, hypodermis) and its main functions. It also discusses the **derivative organs of the skin** such as **hair**, **nails**, **skin glands** (sebaceous and sweat glands), and the **udder** (mammary glands) in animals. The topic provides essential knowledge in the fields of medicine, veterinary science, and biology, focusing on both the morphological and functional aspects of these structures.

Keywords:
Skin, Epidermis, Dermis, Hypodermis, Hair, Skin glands, Sebaceous glands, Sweat glands, Nails, Udder, Mammary glands, Derivative organs, Morphology, Physiology.

Introduction

The skin covering (integumentum commune) is a complex structure that surrounds the body of animals externally. The skin plays an important role in the organism's interaction with the external environment, as the animal body senses and responds to external stimuli. The skin covering also serves as a significant barrier to protect the organism from microbes, bacteria, and other foreign substances. Several important derivatives arise from the changes in the skin covering, which perform various functions in the organism. These derivatives

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include hair, horns, nails, hooves, fur, teeth, mammary glands, soft pads, sweat, sebum, and other glands.

The skin of vertebrates is a complex structure consisting of three layers:

1. The outermost layer – epidermis;
2. The main layer (dermis);
3. The subcutaneous layer (hypodermis).

The epidermis is the most important and complex layer of the skin. It protects the body and the underlying skin from the external environment, and from this layer, various keratinized organs also arise. The epidermis layer produces keratin, which forms the horny substance. It continuously regenerates as the old cells shed and are replaced by new ones.The main skin (derma, cutis, cornea) is so named because it contains a large number of nerves, blood vessels, and lymphatic vessels. The main layer is made up of supportive connective tissue. The fibers of the connective tissue are arranged in all directions and are tightly interwoven. The main skin layer contains several sweat glands, hair follicles, hair roots, and sebaceous glands.The subcutaneous layer (subcutis) lies beneath the main skin and is made up of loose connective tissue. The movement and elasticity of the skin depend on the structure of this layer. The skin on the neck is more mobile, while the skin near the bones is less mobile because the subcutaneous layer is much thinner in this area. For this reason, these areas have mucous sacs, which reduce friction. Many mammals have sebaceous glands (glandula adiposa) beneath their skin.

These glands store fat and are well-developed in pigs and aquatic mammals. The accumulated fat serves as an energy reserve for the animals. During the summer and autumn, mammals accumulate a lot of fat in their subcutaneous layer, which is later used during the winter months. **The skin** covers the external surface of the body, fully protecting it from the effects of the external environment.

Functions of the Skin:

1. **Protective**: The skin protects the body's primary structures. In specific areas (for example, the soft pads of the fingers), it thickens to provide additional protection against physical damage. Additionally, the skin prevents the entry of microbes into the body, while its sebaceous glands have an antiseptic effect. The skin is waterproof.
2. **Sensory**: Various nerve endings on the surface of the skin detect temperature, pressure, and pain, and are sensitive to touch. These qualities help in monitoring the external environment.

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3. **Secretory**: The skin's glands produce sebum and sweat. In dogs and cats, sweat glands are located on the pads of the feet and the tip of the nose. Specialized glands in the skin secrete pheromones.

4. **Production**: Ultraviolet rays convert 7-dihydrocholesterol in the skin into vitamin D, which is then activated by the liver and kidneys. Vitamin D enhances calcium absorption and metabolism in the body.

5. **Storage**: Fat is stored in the subcutaneous tissue of the skin, serving as an energy reserve and insulating layer.

6. **Thermoregulatory**: To reduce heat loss, the skin constricts blood vessels, limiting blood flow to the external surface. The erection of hair slows down air exchange, aided by the fat layer. Sweat is produced to cool the body.

The **epidermis** is composed of multilayered flat epithelium, constantly renewing itself with several layers:

1. **Basal layer**: Made up of a single layer of dividing cells. Pigmented cells contain the pigment melanin.

2. **Prickle layer**: The cells of this layer are relatively flat and infiltrated with the protein keratin.

3. **Stratum Lucidum**: The cells in this layer lose their nuclei.

4. **Horny layer**: This is the outermost layer of the epidermis. Its cells are dead and fully keratinized. There are no blood vessels in the epidermis, so it is nourished by the blood vessels of the dermis.

The **dermis** is the deepest layer of the skin, made of dense, irregularly arranged collagen and elastic fibers of connective tissue.

Dermatitis refers to the inflammation of the skin. It occurs in all animals, but is particularly common in dogs and cats. The disease can be caused by various factors, though identifying the underlying cause is often difficult. **Allergic (atopic) dermatitis** develops due to food allergies and can be triggered by dust mites, fleas, mold, and plant pollen. **Contact dermatitis** occurs when a chemical irritant comes into contact with the skin. Skin Derivatives:

Hair (Pilus) – Hair is a hard, horn-like organ that originates from the changes in the epidermis, composed of elongating and flexible fibers. Hair covers most of the body, and its density varies in different areas. In some places, hair is very dense, while in others, it is sparse. Depending on its location on the skin, hair is classified into several types:

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• **Coating hair** – This hair does not serve as a product for production but solely covers the animal's body. Horses, cattle, and pigs have this type of hair.

• **Coarse hair** – This type is relatively thick and is found in certain areas of the body. Examples include the mane on the head, tail, and long hairs on the legs.

• **Productive hair** – This type is thinner and is found in animals like sheep, goats, and camels.

• **Sensory hair** – This hair is very sparse and is found around the muzzle, nose, and eyes.

The skin also has several glands with different structures and physiological functions, including sebaceous glands, sweat glands, and mammary glands.

Sebaceous glands (glandulae sebaceae) – These are alveolar (sac-like) glands. The secretion of the gland opens into the hair follicle. The thick secretion produced by the gland spreads over the surface of the skin, lubricating it, preventing friction, and keeping the skin elastic.

Sweat glands (glandulae sudoriferae) – These are coiled glands that open into the hair follicle or directly into the epidermis. Sweat glands are located deeper than sebaceous glands. They produce sweat, which contains various salts and proteins. Since sweat contains proteins, it is sticky. Sweating helps the body to get rid of unnecessary substances, moistens the hair, and cools the body.

Mammary glands (glandulae lactiferae) – These are very important organs and are only developed in mammals. Mammary glands are present in both sexes, but they are well-developed in females since they are responsible for producing milk to feed their offspring. Each mammary gland consists of the body of the gland (corpus uberis) and the nipple (papilla uberis).

In cattle, the mammary gland is very well developed. The glands are separated by channels and open into a cistern (s. lactiferus). Each segment of the mammary gland has nipples (teats) that are 6-9 cm in length and cylindrical in shape. Each nipple has one opening.

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