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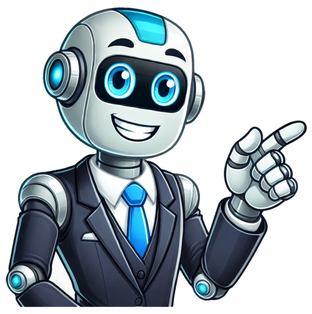

Epithelium is one of only four human body tissues formed by tightly packed cells within an extracellular matrix (ECM). It covers internal and external surfaces and secretes organs, playing multiple roles such as secretion, protection, absorption, transportation, and sensory reception. The cell structure in epithelial tissue varies into three types: squamous, cuboidal, and columnar. Epithelial tissue can also be classified into simple, stratified, pseudostratified, or transitional layers. The main features of this tissue include contiguous cells, polarity with apical, lateral, and basal surfaces, intercellular junctions, basement membrane, and lamina propria. Epithelial tissues have several specializations, including apical structures like microvilli, cilia, stereocilia, and modified stereocilia. Microvilli increase the surface area for absorption, while stereocilia facilitate absorption and mechanosensory reception in specific organs. Cilia vary in motility and function, such as removing foreign particles or transporting substances. Epithelial cells have distinct membrane domains with different structures and functions, including apical, lateral, and basal regions. Each region has unique features like receptors, channels, and membrane specializations. The apical pole projects towards the external surface or lumen, while lateral surfaces are connected to adjacent cells forming contiguous layers. Basal surfaces are in contact with the underlying basement membrane. Intercellular junctions facilitate communication and connection between adjacent epithelial cells across the basolateral cell membranes. These protein complexes establish membrane polarity, anchor tissue to connective tissue underneath, and facilitate transfer of small molecules between cells. There are five main types: tight junctions, adhering junctions and desmosomes, communicating junctions, anchoring junctions (hemidesmosomes), and apical junctions. Epithelial cells align into one or more rows separated by thin extracellular matrix layers, with the deepest row producing a specialized basement membrane. Cell-to-extracellular matrix junctions, including hemidesmosomes, anchor epithelial cells to the underlying basement membrane. Epithelial tissue is tightly packed and held together by intercellular junctions, with the deepest layer sitting on a basement membrane and the surface layer being free. This avascular tissue receives nutrients through diffusion from blood vessels in the lamina propria. Epithelia contain stem cells in their basement membranes for continuous renewal. Epithelial tissue classification is based on cell shape (squamous, cuboidal, columnar) and number of cell layers (simple or stratified). Cell shape is defined by the most superficial surface cell layer. Squamous epithelial cells appear flattened, cuboidal cells are square-shaped, and columnar cells have a rectangular or column shape. Simple epithelial tissues are classified into squamous, cuboidal, and columnar types based on cell shape. Simple squamous epithelium is a single layer of thin, flat cells that allows for diffusion and filtration. This type provides a smooth surface for fluids to pass through with low friction but may shed cells in certain environments. It can be found lining blood vessels, lungs, kidneys, heart, and serous membranes. Simple cuboidal epithelium is composed of cube-shaped cells offering greater protection due to its thickness. It has secretory, absorptive, and excretory functions and is found in organs with these functions, such as salivary glands, liver, pancreas, and exocrine glands. Simple columnar epithelium is a single layer of column-shaped cells that can have protection, secretion, absorption, and excretion functions. This type often includes apical specializations to enhance its absorptive function or offer motility. It can be found in the walls of the stomach, intestines, and gallbladder. Pseudostratified epithelium is a type of simple columnar epithelium that appears to have multiple layers due to different cell heights and irregularly located nuclei. It has various apical specializations and can be found in upper respiratory pathways, uterine tubes, epididymis, and ductus deferens. Stratified epithelial tissues consist of two or more cell layers. They are classified into squamous, cuboidal, and columnar based on the shape of their most apical layer. Stratified squamous epithelium provides protection against abrasion and water loss and can be found lining oral cavity, esophagus, larynx, vagina, anal canal, and cornea. Stratified cuboidal epithelium also functions as a protective tissue layer and is found lining sweat glands, excretory ducts, anorectal junction, and ovarian follicles. Stratified columnar epithelium has secretion and protective functions and can be found covering ovarian surfaces. This text explains various types of epithelium found in the human body. Epithelial cells in the ducts of exocrine glands and certain sensory organs are modified to detect different stimuli. In some areas like the retina, tongue, and inner ear, these cells have specialized structures such as microvilli or stereocilia for sensing. Stratified epithelium is a type that forms in regions exposed to mechanical stress, with dead cells on top and living ones below. This helps protect against water loss and provides a barrier. The epidermis of the skin is an example of keratinized epithelium, where cells are filled with waterproof keratin protein. Transitional epithelium is found in organs that can expand, such as parts of the urinary tract. It has flexible cells that change shape according to the organ's size. Glandular cells are modified epithelial cells that collect substances from blood and modify them into a product for release. Glands are classified based on their function (endocrine or exocrine) and cellular structure (unicellular or multicellular). Exocrine glands release their products onto the skin or into cavities, while endocrine glands secrete directly into the bloodstream. Multicellular exocrine glands have both secretory units and excretory ducts, with some having branched structures. Within multicellular glands, there are simple and compound types based on their duct structure, and tubular, acinar, and tubuloacinar subtypes based on their secretory unit structure. The mode of secretion is also classified as merocrine (exocytosis), holocrine (cell apoptosis), or apocrine (detached membrane). Endocrine cells diffuse into capillaries and travel through the bloodstream to reach target organs, modifying their functions. These cells can be organized in three ways: forming endocrine glands, incorporated in other organs, or dispersed within autonomic neurons. There is no uniform structure for all endocrine cells; instead, they're classified by their secretion type as protein- or lipid-producing cells. Many epithelial cells secrete macromolecules, with glandular epithelium being a prime example. Endocrine glands release hormones regulating various bodily functions, such as blood sugar levels and cardiac cycles. Exocrine glands maintain body surfaces and support organ functions through secretion. Epithelial cells can absorb substances from the digestive tract or transport them into circulation via channels and pumps on their apical and basal surfaces. Epithelial tissue forms a selective barrier, protecting underlying organs from mechanical and chemical insults. This is why epithelia don't have blood vessels to avoid bleeding after injury. Some epithelial tissues receive sensory information, translating it into neural signals through apical cilia or other specialized structures. Epithelial tissue comes in various forms, mainly classified by the number of layers and cell shape. Types include squamous, cuboidal, or columnar, with further subcategories like pseudostratified, ciliated, or transitional. Glands can be either endocrine or exocrine, depending on how they release their products, and are single or multicellular. Epithelial cells produce macromolecules and form protective layers over body surfaces, lining cavities and organs. This tissue is a vital first line of defense against external factors. 1. **Simple Squamous Epithelium**: A thin layer of flat cells that allows substances to pass through easily, crucial in areas like lungs and blood vessels. 2. Simple Cuboidal Epithelium: A single layer of cube-shaped cells involved in secretion. The information provided is grounded on academic literature and peer-reviewed research. All content published on Kenhub is reviewed by medical and anatomy experts. Your kidneys are covered with simple cuboidal epithelium, which is key to producing urine efficiently - just think of that sudden urge to find a restroom after a long drive! This tissue plays a crucial role in filtering blood and facilitating urination. Now, let's explore other types of epithelial tissues: 1. **Simple Cuboidal Epithelium**: A single layer of tall, column-like cells that excel at absorption and secretion - think of your intestines digesting pasta and absorbing nutrients. 2. **Stratified Squamous Epithelium**: Multiple layers of squamous cells provide protection against wear and tear, just like your skin shields you from pathogens every day. 3. **Transitional Epithelium**: This remarkable tissue can stretch to accommodate varying volumes of urine in the bladder, which is especially useful during long road trips. 4. **Pseudostratified Columnar Epithelium**: Although it appears multi-layered due to cell height differences, this single layer of cells is vital for secretion and movement, particularly in mucus production - think of a runny nose when you catch a cold! Understanding epithelial tissue is essential because it helps us appreciate our body's intricate systems. Next time you eat, breathe, or get a minor cut, remember the incredible work these tissues do to keep you functioning smoothly! To maintain healthy epithelial tissues, stay hydrated, eat a balanced diet, and practice good skin care - your skin and organs will thank you! Epithelial tissue may seem like a straightforward term in biology textbooks, but it encompasses an array of critical functions that make our daily lives possible. From digestion to protection, these tissues are unsung heroes working tirelessly behind the scenes. Next time you think about health and wellness, remember the remarkable structures within your body that deserve appreciation!