Special elements in epithelia

Non-epithelial structures sometimes occur within an epithelium:

1. Capillaries - very rarely; only in cochlear stria vascularis.

2. Nerve axons - common in skin, oral mucosa; less common elsewhere.

3. Neural crest derivatives - as melanocytes, and accessory glial-type cells associated with receptors.

4. Lymphocytes - common in gut and airway; less common elsewhere.

5. Langerhans cells - contributors to immune defence in stratified squamous epithelia.

6. Globular leukocytes - a special granular leukocyte of some epithelia

Renewal of Epithelial Cells

In stratified and pseudostratified epithelial tissues, mitosis takes place within the germinal layer, closest to the basal lamina, which contains the stem cells.

Glandular Tissue

The body contains a variety of glands. They are classified as either **exocrine glands** or **endocrine glands**. The cells or parenchyma of these glands develop from epithelial tissue. Exocrine glands secrete their products into **ducts**, whereas endocrine glands deliver their secretory products into the **circulatory system**.

Exocrine Glands

Exocrine glands are either **unicellular** or **multicellular**. Unicellular glands consist of single cells. The mucus-secreting **goblet cells** found in the epithelia of the small and large intestines and in the respiratory passages are the best examples of unicellular glands. Multicellular glands are characterized by a **secretory portion**, an end piece where the epithelial cells secrete a product, and an epithelium-lined **ductal portion**, through which the secretion from the secretory regions is delivered to the exterior of the gland. Larger ducts are usually lined by stratified epithelium.

Simple and Compound Exocrine Glands

Multicellular exocrine glands are divided into two major categories depending on the structure of their ductal portion. A **simple exocrine gland** exhibits an unbranched duct, which may be straight or coiled. Also, if the terminal secretory portion of the gland is shaped in the form of a tube, the gland is called a **tubular gland.** An exocrine gland that shows a repeated branching pattern of the ducts that drain the secretory portions is called a **compound exocrine gland.** Furthermore, if the secretory portions of the gland are shaped like a flask or a tube, the glands are called **acinar (alveolar) glands** or **tubular glands,** respectively. Certain exocrine glands exhibit a mixture of both tubular and acinar secretory portions. Such glands are called **tubuloacinar glands.**

Exocrine glands may also be classified on the basis of the secretory products of their cells. Glands that contain cells that produce a viscous secretion that lubricates or protects the inner lining of the organs are **mucous glands.** Glands with cells that produce watery secretions often rich in enzymes are **serous glands.** Certain glands in the body contain a mixture of both mucous and serous secretory cells; these are **mixed glands.**

Merocrine and Holocrine Glands

Exocrine glands may also be classified according to the method by which their secretory product is discharged. **Merocrine glands,** such as pancreas, release their secretion by exocytosis without any loss of cellular components. Most exocrine glands in the body secrete their product in this manner. In **holocrine glands,** such as the sebaceous glands of the skin, the cells themselves become the secretory product. Gland cells accumulate lipids, die, and degenerate to become **sebum,** the secretory product. Another type of gland, called apocrine glands (mammary glands), discharge part of the secretory cell as the secretory product.However, almost all glands once classified as apocrine are now regarded as merocrine glands.

Endocrine Glands

Endocrine glands differ from exocrine glands in that they do not have ducts for their secretory products. Instead, endocrine glands are highly vascularized, and their secretory cells are surrounded by rich **capillary networks.** The close proximity of the secretory cells to the capillaries allows for efficient release of the secretory products into the **bloodstream** and their distribution to different organs via the systemic circulation. The endocrine glands can be either **individual cells** (unicellular glands) as seen in the digestive organs as enteroendocrine cells, **endocrine tissue** in mixed glands (both endocrine and exocrine) as seen in pancreas and male and female reproductive organs, or as separate **endocrine organs** as the pituitary gland, thyroid glands, parathyroid glands, and adrenal glands.

Individual endocrine cells, called enteroendocrine cells, are found in the digestive organs. Endocrine tissues are seen in such mixed glands as the pancreas and the reproductive organs of both sexes.

Summary

Exocrine Glands

• Can be unicellular or multicellular

• Multicellular glands contain secretory portion and ductal portion

• Secretions enter the ductal system

• Simple tubular glands exhibit unbranched duct; found in intestinal glands

• Coiled tubular glands seen in sweat glands

• Compound glands exhibit repeated ductal branching with either acinar (alveolar) or tubular secretory portions

• Compound acinar glands seen in mammary glands

• Compound tubuloacinar glands seen in salivary glands

• Mucous glands lubricate and protect inner linings of organs

• Serous glands produce watery secretions that contain enzymes Mixed glands contain both serous and mucous cells

• Merocrine glands, like pancreas, release secretion without cell loss

• Holocrine glands, like sebaceous skin glands, release secretion with cell components

Endocrine Glands

• Are individual cells as enteroendocrine cells in digestive organs

• Are endocrine portions in organs such as pancreatic islets in pancreas

• Are endocrine glands such as pituitary, thyroid, or adrenal glands

- Do not have ducts
- Are highly vascularized

• Secretory products enter bloodstream (capillaries) for systemic distribution