

INTRODUCTION TO ORGANOLGY

Organology means the study of organs. It is the knowledge of how organs are packaged or the “**basic architectural plan of organs**”. All organs of the body are formed by a combination of one or more of the 4 basic tissues.

Organs are characterized by specific cells but apart from this cellular characteristic, amount, distribution and types of the cells and of the various tissues all help to typify the organ.

For purposes of efficient discussion, it is important to become familiar with certain terms used to classify and categorize components of tissues and organs.

The term **PARENCHYMA** is used to denote collectively the cells of the organ which carry out the main function of the organ.

The terms **INTERSTITIAL TISSUE** or **STROMA** are used to denote the supporting tissues in an organ. **LOOSE AREOLAR** connective tissue (C.T) is by far the most prevalent stromal tissue.

TERMINOLOGIES: The following terms need be noted:

Hypertrophy: increase in cell size

Hypotrophy: decrease in cell size

Hyperplasia: increase in cell number

Hypoplasia: decrease in cell number

Trabeculae, Septa, Muralia are all descriptive terms for structures which help to compartmentalize parenchymatous organs. They are composed of C.T cells, fibres, membranes and at times bone.

Follicles is like a bag, normally without an outlet, lined by epithelium. This time, the epithelium is peripheral.

Anastomoses are communicating links between two hollow passages.

Plexus (Plexi) (e.g. brachial plexus) is a network of tubes or fibre bundles.

Organs can be subdivided into **lobes**. Lobes are well visible, relatively large subdivisions of an organ. **Lobules are further subdivisions.**

TUBULAR ORGANS

Most tubular organs consist of 4 concentric layers called Tunics. These are from lumen to outside:

Tunica mucosa,

Tunica Submucosa,

Tunica muscularis

Tunica Serosa (adventitia)

All may be present. One or more may be reduced or absent or modified to meet specific local needs.

These variations together with other factors permit identification of an organ.

The tunica mucosa is the innermost or luminal coat and has 4 layers:

- lamina epithelialis (epithelium)
- lamina membrana propria (b.m)
- lamina propria mucosae
- lamina muscularis mucosae

The lamina epithelialis is the epithelial layer, it consists of one or more types of epithelial cells depending on function. It is a constant lamina of the tunica mucosa. You cannot speak of mucosa without mentioning epithelium.

The lamina propria – the basement membrane serves as a constant separation between CT and epithelial tissues.

Lamina propria mucosae – This is the CT which underlies the epithelial layer. It is usually Areolar/Reticular C.T. Small vessels, nerves and in-folding of the epithelia may be found here (e.g skin and sweat glands). This area may contain large number of protective cells either free or as lymph nodules. Apart from defensive function, this layer is the means by which the epithelium is nourished and controlled.

The Lamina muscularis mucosa is one or more layers of smooth muscle cells. An inner circular and an outer longitudinal layer may be present. Its presence is of variable occurrence, but when present, it serves as a means whereby local mobility is achieved. It also serves to express secretory products from the glands which may invaginate into the lamina propria mucosa. It serves as a line of demarcation between mucosa and sub mucosa. When absent, mucosa and sub-mucosa blend insensibly.

The tunica sub-mucosa – consists of areolar C.T which is more coarsely arranged than that of the lamina propria mucosae. Larger blood vessels, nerves, nerve plexi and autonomic ganglia are present. In some organs glands may be present too. In the absence of a lamina muscularis mucosa the lamina propria mucosa and tunica submucosa are usually referred to simply as lamina propria mucosa or lamina propria submucosa.

The tunica muscularis – is usually well developed and consists of 2 layers of muscle. In some organs, however, it may be absent. It usually consists of smooth muscle but in some cases, skeletal muscle may be present. It is commonly arranged into inner circular and outer longitudinal fibers. Vessels and nerves, autonomic ganglia, usually separate the two layers. This tunic is responsible for the tone of the organ, size of lumen and movement of materials through the hollow organ.

The tunica Adventitia- is a collection of loose C.T over the periphery of an organ. Blood vessels, nerves, ganglia and adiposa may occur in this tunic. Organs that are intimately associated with the coelomic cavities are surrounded by a layer of mesothelium in which case the most peripheral unit is called tunica serosa. It is composed therefore of mesothelium and C.T. It is through the adventitia or serosa that

nerves, blood vessels, lymphatics gain access to the organ. Also this tunic is responsible for suspending the organ within its environment either in the coelum or in the surrounding C.T. In this case it is called **mesenteries**.

Although there are numerous variations, this arrangement is basic scheme for tubular organs.

In blood vessels and lymph vessels the following terminologies are used

Tunica intima,
Tunica media,
Tunica adventitia.

MUCOUS AND SEROUS MEMBRANES

Mucous membranes include some or all of the components of the tunica mucosa. These membranes are kept moist by secretions from cells within the lamina epithelialis and or from glands located within the lamina propria mucosae. The epithelia may consist of stratified squamous as in esophagus, columnar or cuboidal as in G.I.T. columnar or pseudostratified columnar as in respiratory epithelia. Those lined by transitional epithelium occur in the urinary system.

Serous membranes consist of layer of mesothelium and associated C.T. They line the coelomic spaces and are moistened by fluids contained within these spaces.

PARENCHYMATOUS ORGANS

These are also composed of one or more of the basic tissues. The organizational pattern is different from that described for tubular or hollow organs.

The components of solid organs may be divided into two different subgroups.

The parenchyma – the specific functional component of an organ.

The stroma – this includes those tissues (C.T, vasculature nerves, lymphatics) that metabolically and or structurally support as well as control the parenchyma.

In simple form, the following scheme is applicable to these organs whether they are muscle, nerve trunks or glands.

Small groups of parenchyma are surrounded by a fine meshwork of areolar or reticular C.T in which vessels and nerves are located. Small groups of parenchyma may be grouped as a unit and surrounded by a more coarse areolar C.T or the C.T of these small groups may be continuous with coarse areolar C.T trabeculae. In either case, the C.T is progressively more dense and is continuous with the dense white fibrous CT of the

capsule. This type of C.T. continuity affords structural support and facilitates the entry and or exit of vessels and nerves. This scheme or minor variations of it typify the organization of solid organs.

PRACTICALS

- (i) Examine slides 97, 98, 99 for the different tissues of tubular organ.
- (ii) Examine slide 112 for L.S of tubular organ noting what is observable from lumen outwards.
- (iii) Examine slide 113 (Peyers patch) for protective cells that can be found in sub mucosa.
- (iv) Examine slide 101 as related in your handout
- (v) Examine slide 141 (bladder) and compare with slide 98.