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| ***Folliate*** | ***Circumvallate*** | ***Fungiform*** | ***Filiform*** |  |
| Rudimentary in man and well developed in the rodents | 6-14 | Few | Most numerous | ***Number*** |
| Large, rectangular and there is trenches where ducts of serous glands pour their secretion | **Largest**, triangular, flattened upper surface and narrower base, embedded within the substance of the tongue and surrounded by trench where Von Ebner's gland pour their secretion in it | Small, club shaped, summit is rounded and broader than the base, highly vascular core | **Longest** , slender, conical, with inclination anteroposteriorly | ***Shape*** |
| In the deep cleft at the junction between anterior and posterior parts of the tongue | In front of the gustatory line | Tip and edges | In rows parallel to the gustatory line | ***Distribution*** |
| Non keratinized stratified squamous | Non keratinized stratified squamous | Non keratinized stratified squamous | Keratinized stratified squamous  In fever and GIT disturbances: coated tongue | ***Covering epithelium*** |
| Long and occupy 3/4 of the length | Short | Short | ----- | ***2ry papillae*** |
| Numerous – on the sides of the papillae | Numerous – on the sides of the papillae | Few -on the upper surface | ----- | ***Taste buds*** |

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|  | ***Parotid salivary gland*** | ***Submandibular salivary gland*** | ***Sublingual salivary gland*** |
| ***Capsule and septa*** | Thick and well developed | Moderately thick | Capsule in thin but septa is well developed |
| ***Fat cells*** | Large number | Present but less numerous than parotid | ---- |
| ***Secretory acini*** | Purely serous | Serous 80% - mucous 20% | Mucous 99% - serous 1% in form of serous demilunes in mixed acini |
| ***Intercalary: secretory striated*** | 50%:50% | Intercalary 20% - secretory 80% | Intercalary 1% - secretory 99% |

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|  | ***Mucous acini*** | ***Serous acini*** | ***Mixed acini*** |
| ***Secretion*** | Mucous  Rich in mucin glycoprotein | Watery secretion  Rich in salts, protein and enzymes eg. amylase, lysozyme, peroxidase, DNA and RNA nuclease | Both types of secretion |
| ***Found mainly in*** | Sublingual and palatine | Parotid and Von Ebner's gland | Submandibular and sublingual |
| ***Acini*** | Large, pale, rounded or ovale with large lumen | Small, deeply stained, rounded with narrow lumen | Mucous cells surrounded by deeply stained serous one called serous demilunes or crescents of Gianuzzi |
| ***Cells that line the acini*** | \****cells:*** Irregular, broad cuboidal or pyramidal with **distinct boundaries**  \****Nuclei:*** flattened and basal  \****Cytoplasm:*** pale and vacuolated  At the base 🡪 **few rER - few mitochondria and well developed golgi**  At the apex 🡪 mucigen granules | \****cells:*** Short pyramidal with **indistinct boundaries**  \****Nuclei:*** eccentric  \****Cytoplasm:***  At the base 🡪 **abundant rER- few ribosomes - few mitochondria and well developed golgi**  At the apex 🡪 secretory zymogen granules | (write the description of both acini)  +  Mucous secretion if poured directly into the lumen, while serous secretion reach the lumen through channels between mucous cells |
| ***Basket cells*** | Present | few | Present |

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|  | ***Parotid gland*** | ***Pancreas exocrine portion*** |
| ***Capsule and septa*** | Well developed  Reticular fibers rich in lymphocytes and plasma cells | Very thin and poorly developed  Reticular fibers rich in capillary supply |
| ***Type of the gland*** | Serous compound tubuloalveolar | Serous compound tubuloalveolar |
| ***Secretion*** | Serous secretion rich in salts, protein and enzymes eg, amylase, lysozyme, peroxidase and DNA and RNA nuclease | Serous secretion rich in pancreatic digestive enzymes containing water, electrolytes, and proenzymes eg trypsinogen, chymotrypsinogen, peptidase, nuclease, lipase and amylase |
| ***Serous acini*** | Small with narrow lumen | Larger with narrower lumen and they are overcrowded (back to back) |
| ***Fat cells*** | Present | Absent |
| ***Cells lining the acini*** | ***\*cells:*** Short pyramidal with **indistinct boundaries**  \****Nuclei:*** eccentric  \****Cytoplasm:***  At the base 🡪 **abundant rER- few ribosomes - few mitochondria and well developed golgi**  At the apex 🡪 secretory zymogen granules | ***\*cells:*** pyramidal with **indistinct boundaries**  \****Nuclei:*** eccentric, rounded and nearer to the base  \****Cytoplasm:***  At the base 🡪 **abundant rER- few ribosomes – many filamentous mitochondria (striated appearance) and well developed golgi** (supranuclear)  At the apex 🡪 secretory zymogen granules – short microvilli  Lateral membrane 🡪 well developed junctional complexes |
| ***Duct system*** | ***\*Intercalary 🡪*** long -flat or low cuboidal (add HCO3 – absorb Cl)  ***\*Secretory striated 🡪*** cuboidal or low columnar with indistinct boundaries – basal cell membrane contain many regularly arranged mitochondria- large eosinophilic with wide lumen (pump Na and add water)  ***\*interlobular ducts 🡪*** tall columnar  ***\*interlobar 🡪*** pseudostratified columnar  \****main duct 🡪*** beginning : stratified columnar then non keratinized stratified squamous | ***\*Intercalary 🡪*** very short – 1st part is telescoped inside the acini and called centriacinosal cells lined by flat cells – remaining part in lined by flat cuboidal  ***\*Secretory striated 🡪*** ----  ***\*interlobular ducts 🡪*** simple cuboidal  ***\*interlobar 🡪*** simple columnar  ***\*main duct 🡪*** simple columnar with goblet cells and occasionally neuroendocrine cells |

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|  | ***Esophagus*** | ***Stomach*** | ***Small intestine*** | ***Large intestine*** |
| ***Mucosa:***   1. ***Lining Epithelium*** | Non keratinized stratified squamous with Ag presenting cells (Langerhans cells) | Lined by: simple columnar surface mucous cells with short microvilli and prominent glycocalyx (thick insoluble mucous with neutral or slightly alkaline pH: visible mucous)  Invaginate into the mucosa forming gastric pits  ***Fundus and body 🡪*** short and narrow  ***Pylorus 🡪*** wide and occupy > 1/2 length of the mucosa | Mucosa + submucosa = plica circularis  Lining epithelium+ core of CT = villi  (***duodenum 🡪*** short , broad and leaf like  ***Jejunum 🡪*** longest, thinner and finger like  ***Ileum 🡪*** leaf like)  \*lining epithelium in ileum over the payer's patches is flattened and lacking villi  **Villi are lined with:**   1. Absorptive columnar cells 2. Goblet cells 3. Enteroendocrine 4. M cells | Smooth- no villi   1. Absorptive columnar cells 2. Goblet cells 3. Enteroendocrine |
| 1. ***Lamina propria*** | Loose CT rich in blood vessels and lymphatics  +  Upper most and at the junction with the stomach: **mucosal esophageal glands**  (tubular- secret neutral mucus- lined with columnar cells) | Scanty amount of loose vascularized CT  +  Well developed **gastric glands**  (pyloric glands are shorter than the body with larger amount of CT)  +  ***Fundus and body 🡪*** lenticulate nodules | Loose CT  +  **Crypts of Lieberkuhn**  ( simple branched tubular – open at the base of the villi)  +  ***Ileum 🡪*** **payer's patches**  **Crypts of Lieberkuhn are lined with:**   1. Undifferentiated stem cells 2. Few absorptive cells 3. Goblet cells 4. Paneath cells 5. Enteroendocrine cells | Loose CT  +  **Crypts of Lieberkuhn**  ( simple tubular)  With minimal CT in between  **Lined with:**   1. Numerous goblet 2. Few absorptive 3. Enteroendocrine 4. Stem cells   +  Solitary lymphoid nodules |
| 1. ***Muscularis mucosa*** | ***Upper 1/3 🡪*** absent and represented by elastic fiber and scattered bundles of smooth muscles  ***Level of cricoids cartilage 🡪*** longitudinal only  ***Lower 1/3 🡪*** inner circular outer longitudinal | Inner circular outer longitudinal | Inner circular outer longitudinal | Inner circular outer longitudinal |
| 1. ***Submucosa*** | Dense irregular CT with large BV and lymphatics  +  **Submucosal esophageal glands**  (compound tubular alveolar- along the entire length- lined by tall columnar cells – secret acidic mucous) | Moderately thick dense CT containing bundles of collagen fibers, elastic fibers, lymphocytes, plasma cells, mast cells | Dense irregular CT with large BV and lymphatics  +  ***Duodenum 🡪*** **Brunner's glands**  (compound tubular alveolar-secret alkaline mucous)  ***Ileum 🡪*** extensive of payer's patches | Loose CT containing BV, lymphatics and nerves |
| 1. ***Musculosa*** | Inner circular outer longitudinal  ***Upper 1/3 🡪*** striated muscles  ***Middle 1/3 🡪*** both striated and smooth  ***Lower 1/3 🡪*** smooth | ***Fundus and body 🡪***Spirally oriented smooth muscle: inner oblique, middle circular and outer longitudinal  ***Pylorus 🡪*** thick inner circular smooth muscle forming the pyloric sphincter and moderately thick outer longitudinal | Inner circular outer longitudinal | Complete inner circular  Outer longitudinal is incomplete and represented by 3 bands of taenia coli connected by thick fibrous tissue |
| 1. ***Serosa/ adventitia*** | Adventitia  Loose areolar CT  Terminal part become serosa | Serosa | Serosa | Serosa  Loose CT with large no. of fat cells called appendices epiploaciae |

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|  | ***Fundic glands*** | ***Cardiac glands*** | ***Pyloric glands*** |
| ***Type*** | Simple branched tubular | Simple branched tubular  Lower part is highly coiled  Wide lumen | Simple branched tubular  Secretory portion is coiled and tortuous  Seldom seen in continuity  Wide lumen |
| ***Lined by*** | Isthmus 🡪 surface mucous cells  Neck 🡪 mucous neck cells - stem cells and oxyntic cells  Base 🡪 peptic cells- oxyntic cells- occasional mucous neck cells and isolated neuroendocrine cells | Mucous secreting cells  Few parietal cells  Few undifferentiated cells  Occasional neuroendocrine cells | Mucous secreting cells  Some neuroendocrine cells particularly G cells – few D and EC cells  Occasionally peptic and oxyntic cells |