## Development and Congenital Anomalies of Endocrine Glands

<table>
<thead>
<tr>
<th>Endocrine Organ</th>
<th>Germinal Layer</th>
<th>Fetal Origin</th>
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| **Pituitary Gland** | Adenohypophysis | Rathke’s Pouch | Rathke’s Pouch moves dorsally towards Infundibulum | Pharyngeal Hypophysis  
  o Remnant of Rathke’s Pouch in the Pharyngeal Mucosa  
  Craniopharyngiomas  
  o Remnant of Rathke’s Pouch along the Craniopharyngeal duct  
  o May cause  
    - Hydrocephalus  
    - Pituitary dysfunction |
|                  | • Pars Distalis  
                  • Pars Tuberalis  
                  • Pars Intermedia | Ectoderm | Detached from from oral cavity during 2nd month | Fuse with Infundibulum |
| **Neurohypophysis** | Neurohypophysis | Infundibulum | Pharyngeal Arches  
  o Externally form deep clefts  
  o Internally form pouches Typical Arches comprised of  
    - Cartilage  
    - Muscle  
    - Nerve  
    - Artery  
    o Connect Ventral Aortic Sac with Dorsal Aorta | Depends on the corresponding structures** |
|                  | • Pars Nervosa  
                  • Pituitary stalk | Neuroectoderm | Caudal to Stomodeum  
  o Oral pit on the Buccopharyngeal Mucosa (breaks during 4th week) |  |
|                  |                  |              | Cephalic to Respiratory Diverticulum |  |
| **Primitive Pharynx** | Primitive Pharynx | Externally  
  o 1st pouch  
    o Tubotympanic pouch | Caudal to Stomodeum  
  o 2nd pouch  
    o Palatine Tonsil |  |
|                  |                  | Internally  
  o 3rd pouch  
    o Dorsal wing  
      • Inf Parathyroid gland  
    o Ventral wing  
      • Thymus | Cephalic to Respiratory Diverticulum |  |
|                  |                  |              | Pharyngeal Arches  
  o Externally form deep clefts  
  o Internally form pouches Typical Arches comprised of  
    - Cartilage  
    - Muscle  
    - Nerve  
    - Artery |  |
|                  |                  |              | Descends downward on the midline in front of  
  o Hyoid bone  
  o Laryngeal cartilage  
  o Until the stops at the Trachea |  |
|                  |                  |              | Remains connected with the Tongue through Thyroglossal duct, regress eventually |  |
| **Thyroid Gland** | Thyroid Gland | Ventral diverticulum of Pharynx | Thyroglossal Cyst  
  o Remnant of Thyroglossal Duct  
  o Always located at the midline instead of lateral compared to Cervical Cyst  
  o 50% cases located inf to the body of Hyoid bone  
  o Can also be in  
    - Base of Tongue  
    - Close to Thyroid cartilage |  |
|                  | Forms the definitive Thyroid gland during 7th week  
  o Median Isthmus  
  o 2 lateral lobes  
  3rd month it starts to function, as follicles start to develop | Foreman Cecum, between  
  o Tuberculum Impar  
  o Copula |  |  |
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<tr>
<td>Adrenal Glands</td>
<td>Cortex</td>
<td>Mesothelium</td>
<td>• 1st wave cells&lt;br&gt;  o Gonad proliferate and penetrate Mesothelium&lt;br&gt;  o Form the 1st primitive Cortex; large Acidophilic cells&lt;br&gt; • 2nd wave cells&lt;br&gt;  o Cells from Mesothelium surround the Acidophilic cells&lt;br&gt;  o Smaller in size, forms the definitive Cortex&lt;br&gt;  • Medulla arise from migrating Neural Crest cells into the medial aspect of Fetal Cortex</td>
<td>• Congenital Adrenal Hyperplasia&lt;br&gt;  o Deficiency of 21-Hydroxylase enzyme&lt;br&gt;  o Postnatal virilization&lt;br&gt; • Pheochromocytoma&lt;br&gt;  o Catecholamine producing tumor&lt;br&gt;  o If outside Adrenal Medulla called as Paraganglioma</td>
</tr>
<tr>
<td></td>
<td>Medulla</td>
<td>Mesoderm</td>
<td>Neural Crest cells</td>
<td></td>
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<tr>
<td>Pancreas</td>
<td>Parenchyma</td>
<td>Dorsal and Ventral Buds of Pancreas</td>
<td>• Buds project and expand into the corresponding Mesenteries&lt;br&gt;  • When the Duodenum rotates to the right to form the “C” shape, the Ventral bud comes to lie immediately under Dorsal bud&lt;br&gt;  • They fuse together during the 2nd week&lt;br&gt;  • Duct&lt;br&gt;   o Wirsung duct &lt;br&gt;      ▪ Distal part of Dorsal bud duct&lt;br&gt;      ▪ Entire ventral bud duct&lt;br&gt;   o Santorini duct&lt;br&gt;      ▪ Proximal part of Dorsal bud duct</td>
<td>• Anular Pancreas&lt;br&gt;  o Ventral bud splits into 2&lt;br&gt;      ▪ Right one migrates normally&lt;br&gt;      ▪ Left migrates to abnormal route&lt;br&gt; • Accessory Pancreatic tissue&lt;br&gt;   • Distal end of Esophagus&lt;br&gt;   • Tip of Intestinal loop&lt;br&gt;   • Meckel’s diverticulum</td>
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