

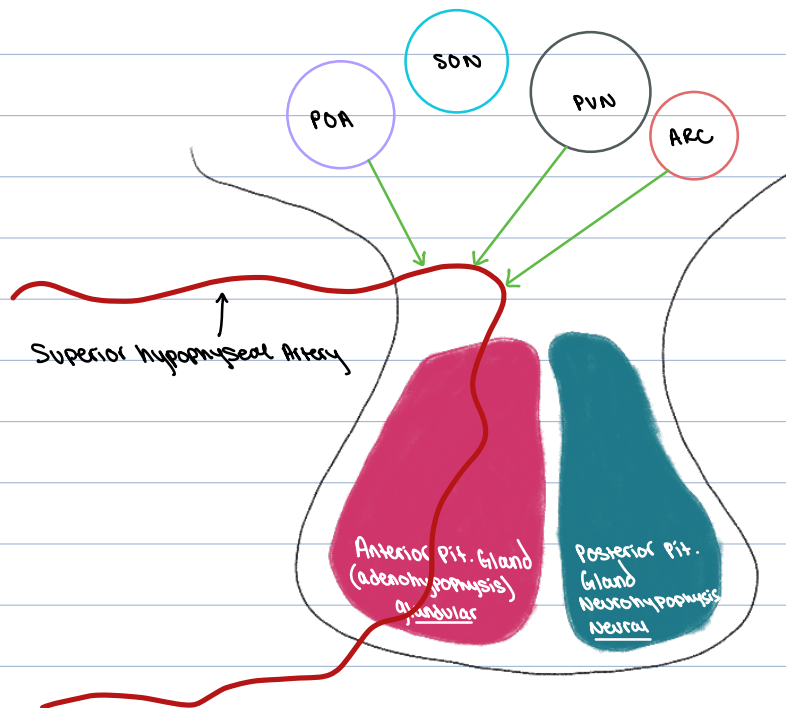
Pituitary Gland

Basics: 2 lobes (glandular and neural)

Hypothalamus has nuclei these nuclei project to portions of the pituitary gland

Supraoptic Nucleus (SON) and Paraventricular nucleus (PVN) have magnocellular neurons that project to the posterior pituitary gland

Paraventricular Nucleus (PVN), Preoptic Area (POA), and Arcuate Nucleus (ARC) have parvocellular neurons that project to the median eminence to release hypothalamic hormones that travel via the hypothalamic-hypophyseal portal system to regulate hormone production from the AP.



Anterior Pituitary Hormones!

Growth hormone (GH)

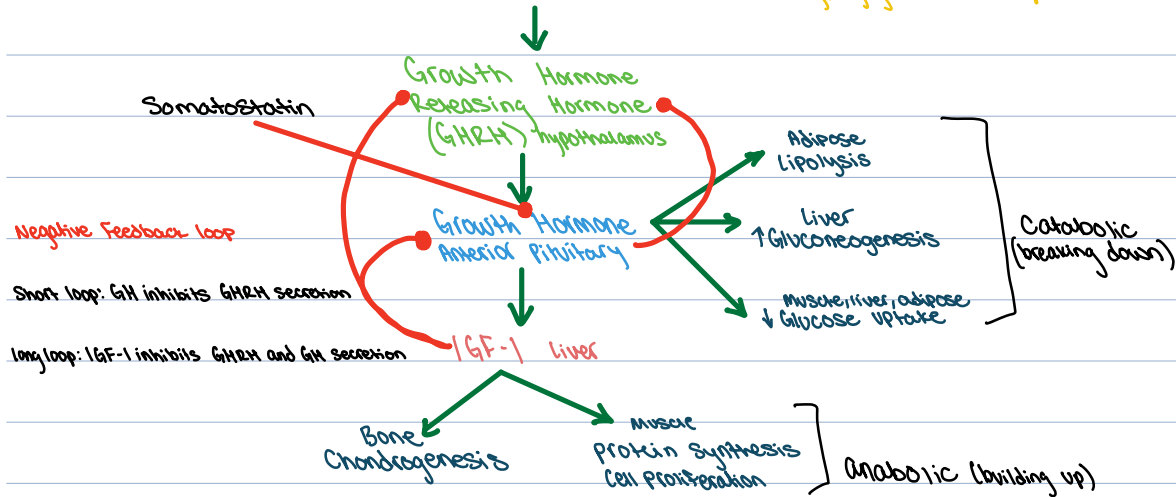
Prolactin (PRL)

Thyroid Stimulating Hormone (TSH)

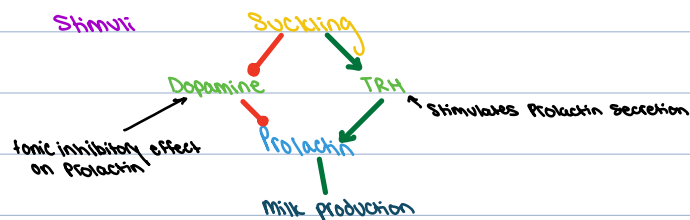
Adrenocorticotrophic Releasing Hormone (ACTH)

Regulation of Growth Hormone (GH)

Stimuli Sleep Stress Exercise Starvation Hypoglycemia High Protein meal

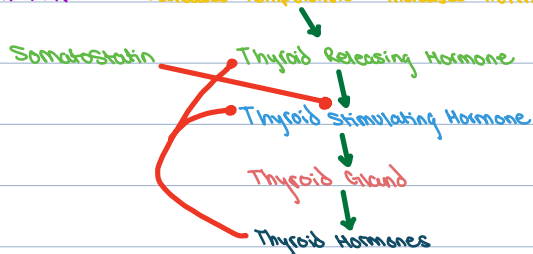


Regulation of Prolactin



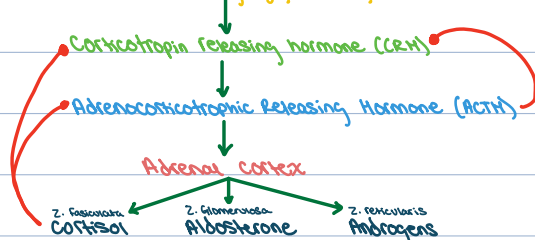
Regulation of Thyroid Stimulating Hormone

Stimuli Decreased Temperature Increased nutritive status Light cycle



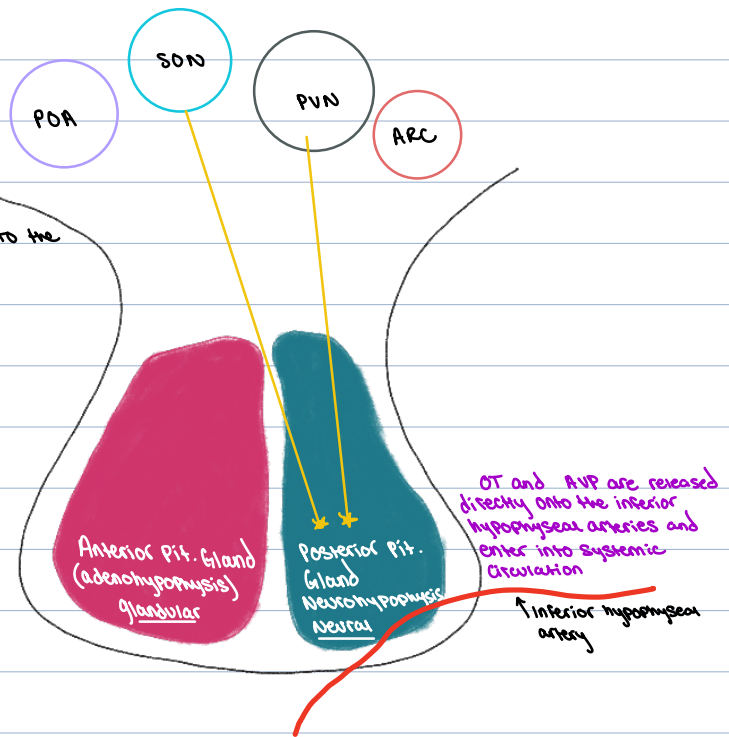
Regulation of Adrenocorticotrophic Releasing Hormone

Stimuli Stress: hypoglycemia, hypotension, traumatic injury, infection

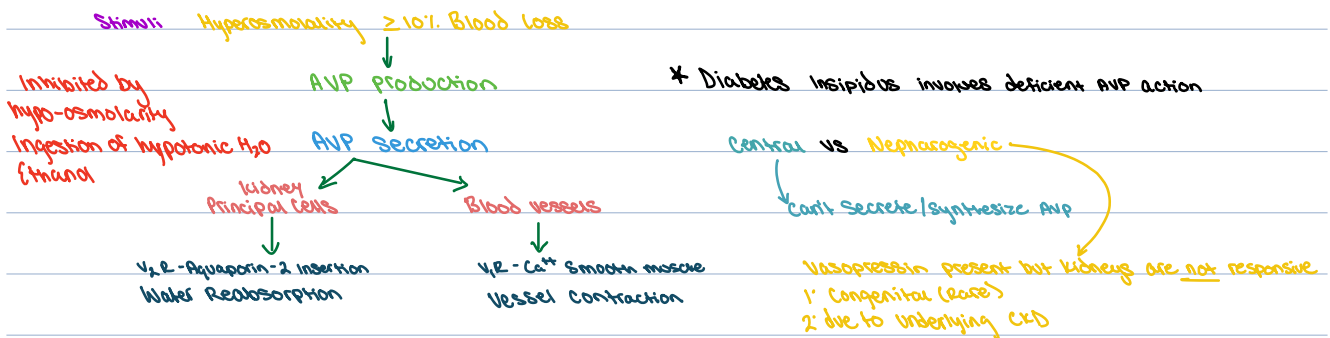


Posterior Pituitary

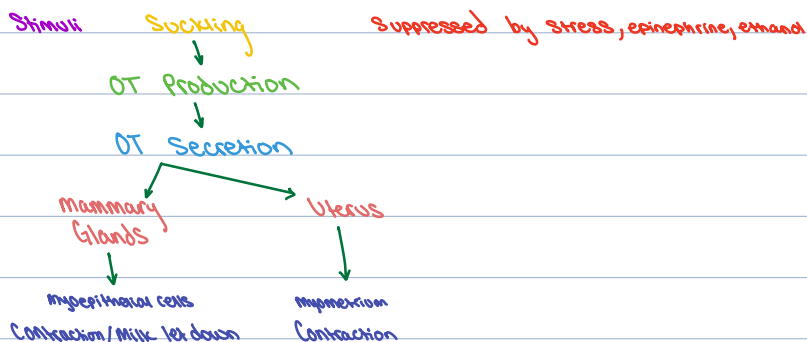
magnoencephalic neurons produce vasopressin (AVP) and oxytocin (OT) in the Supraoptic Nucleus (SON) or Paraventricular nucleus (PVN) and then pass down to the posterior pituitary via the neuronal projections of the hypophyseal tract (infundibular stalk)



Regulation of Vasopressin

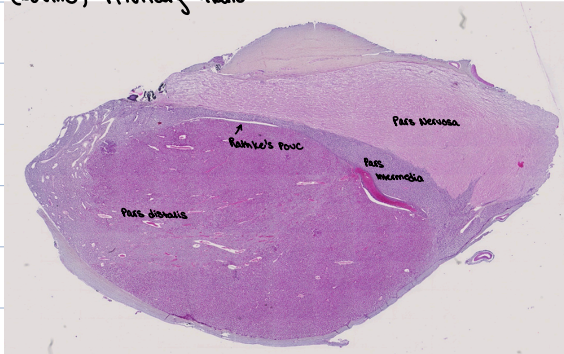


Regulation of Oxytocin



Pituitary Gland Histology + Pathology

(Bovine) Pituitary Gland



Pars distalis - Anterior pituitary gland (Adenohypophysis)

Acidophils

Secretes GH, PRL, TSH, ACTH, FSH, LH

Pars intermedia - Anterior pituitary gland (Adenohypophysis)

Basophils

Secretes ACTH/MSH

Pars Nervosa - Posterior Pituitary Gland (Neurohypophysis)

releases ADH and Oxytocin (made in hypothalamic nuclei)

Rathke's Pouch - Separates pars distalis from pars nervosa (not in horses)

Juvenile Panhypopituitarism * Congenital Pituitary Dysfunction in Dogs

- Oral ectoderm fails to differentiate into the mature tropic hormone secreting cells of the pars distalis

- Cystic Rathke's Pouch → Failure of PI and PD development

* German Shepherds w/ autosomal recessive inheritance pattern

- Deficiency of GH (dwarf) but TSH, Prolactin, FSH and LH are also decreased

- Plasma ACTH and Cortisol are WNL



Failure of Fetal Endocrine Function

Genetic, infectious and toxicologic mechanisms can injure the fetal pit. gland → hypoplasia/aplasia

Seen in ruminants

Commonly see prolonged gestation and large fetus

Viral causes: Bluetongue virus, bovine viral diarrhoea virus, Border disease virus, Hog cholera virus, Akabane virus,

Catch Valley virus, Schmallenberg virus

Toxic causes: Veratrum spp. (Wild/swink colic) during days 9-14 of gestation loss of hypothalamic-triggering release of ACTH

Cyclophosphamide blocks Sonic hedgehog-mediated (SHH) signaling

Plays a role in pit. gland development

Diabetes Insipidus

2 Types ^{→ Pass nervosa}
Neurogenic - Inadequate levels of ADH → Magnocellular neurons in the SON and PVN are dysfunctional or damaged

Nephrogenic - target cells in the kidney lack the ability to respond to ADH secretion

Clinical Signs: Hypotonic urine w/ serious PU/PD

Causes: Large pit. tumors, Congenital cysts, Inflammatory lesions, Traumatic injury, defect in ADH synthesis in the supra-optic nucleus

Vit. A deficiency can lead to a ↓ in the size of the sella turcica causing 2° compression of the pituitary gland

Acquired diseases of the pituitary gland

- Pituitary neoplasia can result in hyperpituitarism, hypopituitarism or have no effect on pituitary function
- Pituitary disorders of growth commonly affect dogs, horses, cats, pigs, parakeets and rats
- Unregulated production of GH in a feline acromioma adenoma can result in acromegaly and diabetes mellitus

ACTH Secreting Adenomas (Pituitary-dependent Cushing's Disease)

- 80-90% of non-iatrogenic Cushing's is pituitary dependent

- Proliferative lesion in the pars distalis

↳ Autonomously secretes excessive amounts of their trophic hormones (corticotropin, ACTH-secreting)

Clinical Signs: Polyuria, Polydipsia, Polyphagia, Panting, Potentuous abdomen, endocrine alopecia bilateral non-pruritic frontal alopecia, telogen hair follicles, thin skin, hyperpigmentation...

Hepatomegaly, suppressive bronchopneumonia

Lab Abnormalities: Steroid leukocytosis, ↑ ALP or AST

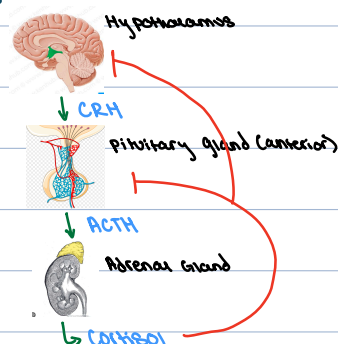
↳ Monocytosis, Neutrophilia, Lymphopenia, Eosinopenia

Serum [Cortisol] ↑

Urine [Cortisol] ↑

Adrenal Gland Size ↑ bilaterally

Hypothalamic-Pituitary Adrenal Axis (HPA)



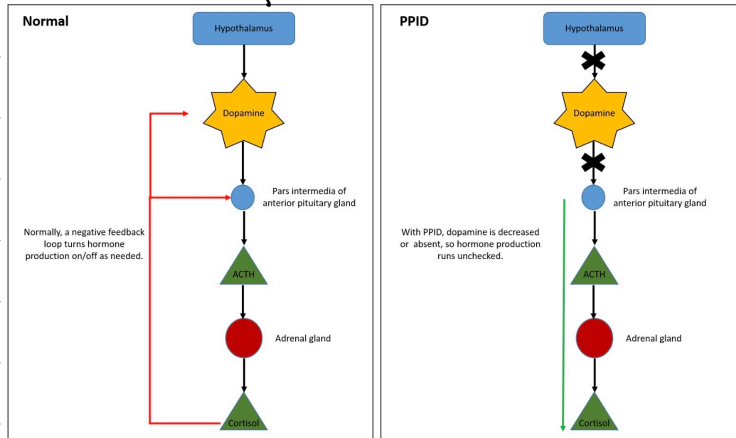
Too much ACTH secretion w/ pit.-dependent Cushing's

Equine Pituitary Pars Intermedia Dysfunction (EPPID)

Hyperplasia → Adenoma → carcinoma

- Very large mass projecting dorsally from the sella turcica causing pressure atrophy of the overlying hypothalamus
- cells express ACTH and MSH
- Pathologic dopaminergic regulation, loss of dopaminergic inhibition results in pathology of the pituitary intermedia

UC Davis Vet med diagram



Clinical Signs: Hypertrichosis, PU/PD

laminitis

Tx: dopamine agonist (pergolide)