

Anatomy

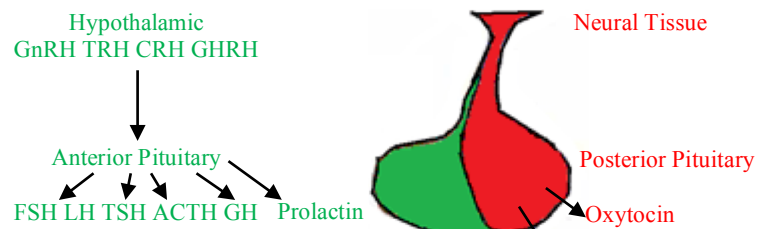
The pituitary is divided into two structures: 1) the **adenohypophysis** (anterior pituitary), which receives **endocrine** signals from the hypothalamus 2) the **neurohypophysis** (posterior pituitary), which has axon terminals from neurons of the hypothalamus in it. The pituitary's a **small endocrine gland** that regulates **endocrine** and **metabolic function** throughout the body. There can be problems with overproduction or underproduction of just one or all hormones. Because of its location within the **optic chiasm**, tumors of the pituitary can present with **bitemporal hemianopsia**. We'll discuss the typical hyper and hypo secretory disease here.

1) Prolactinoma

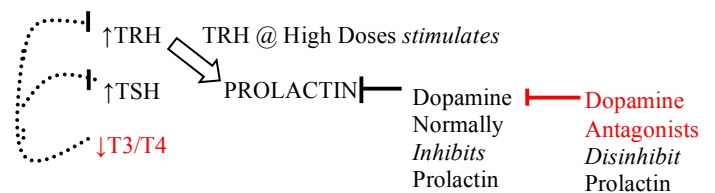
A benign tumor that **autonomously secretes Prolactin** will cause a prolactinemia. Prolactinemia presents differently in men than women. They're caught early in women as **microadenomas**, because women tend to notice **galactorrhea** and **amenorrhea**. There's been no time for the tumor to grow; it's small and presents **without field cuts**. In **men**, who don't lactate or have periods, there's nothing to tip them off that something's wrong (decreased libido may be the only symptom). Thus, the tumor grows. As it becomes a **macroadenoma** it digs into the **optic chiasm** to produce a **bitemporal hemianopia**. In the case of field cuts it's easy to be pretty sure there's a tumor. But in the case of a microadenoma other causes of prolactinemia must be ruled out. For example, **dopamine antagonists** (antipsychotics) disinhibit Prolactin while $\uparrow\uparrow$ TRH (from **hypothyroidism**) stimulates its production. So, before getting an MRI test, get **Prolactin levels** and a **TSH** after looking over their med list. Treat by using **dopamine agonists** (cabergoline > bromocriptine). Consider surgery only after medical therapy fails; unlike most tumors Prolactinomas are very sensitive to medical therapy. Follow prolactinomas with prolactin levels q3months and an MRI annually until stable.

2) Acromegaly

A benign tumor that **autonomously secretes Growth Hormone** will cause things that can grow to grow. In a **child**, before the closure of the growth plates, that means the long bones - resulting in **gigantism**. But in an **adult** it means the **hands, feet, face**, and **visceral organs**. It also induces **gluconeogenesis** and causes the patient to present with **glucose intolerance** or even **frank diabetes**. The thing that kills these patients is the **cardiomegaly** and subsequent diastolic heart failure. The diagnosis is made biochemically. However, GH is pulsatile, and so it **can't be used to make the diagnosis**. Instead, because GH exerts its effects through the liver via **ILGF-1** (somatomedin); the diagnosis begins there. A **failure to suppress GH levels** in a **glucose tolerance test** (next page) is a \oplus finding and should prompt the confirmatory **MRI**. The only treatment is **surgery**. However, radiation or medical therapy with **octreotide** (somatostatin) can be used for residual tissue to \downarrow GH production which will \downarrow ILGF effects.

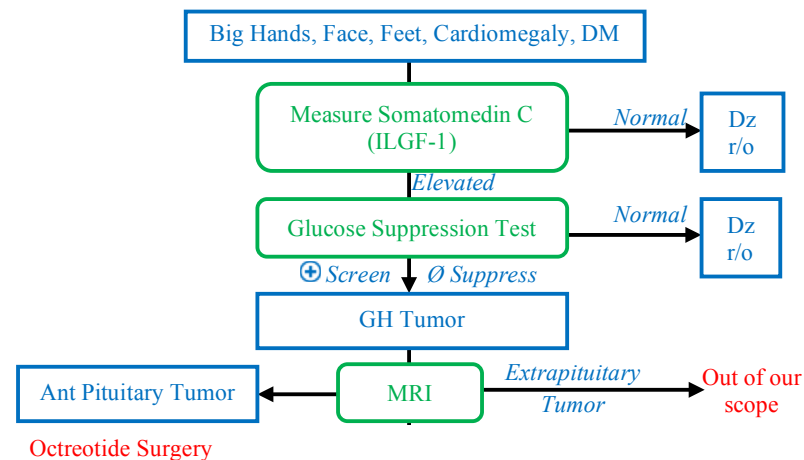
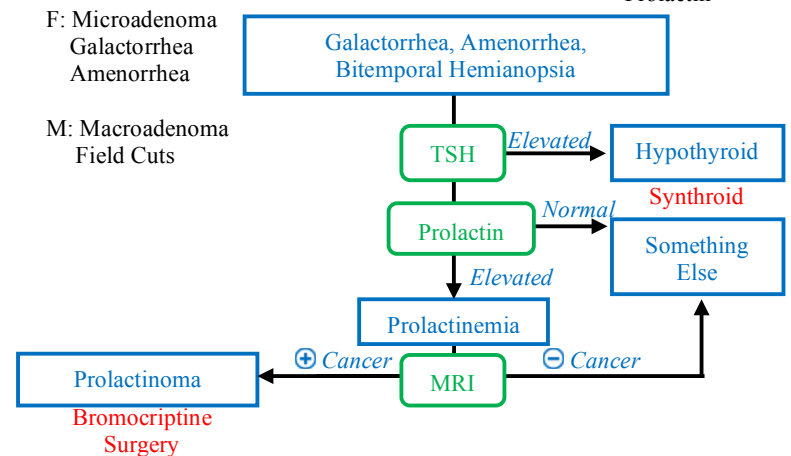
**3 Levels of Feed Back and Endocrine Regulation of the Ant Pituitary**

| (1) Hypothalamus | GnRH | TRH | CRH | GHRH |
|----------------------|--------------------------|------------|----------|--------|
| Portal Circulation | | | | |
| (2) Pituitary | FSH/LH | TSH | ACTH | GH |
| Systemic Circulation | | | | |
| (3) Target Organ | Ovaries | Thyroid | Adrenals | Liver |
| Metabolic Effect | Estrogen Progesterone | T3 T4 | Cortisol | ILGF |
| | Ovulation | Metabolism | Stress | Growth |



F: Microadenoma
Galactorrhea
Amenorrhea

M: Macroadenoma
Field Cuts



3) Cushing's Disease

Autonomous secretion of **ACTH** causes \uparrow **cortisol**. This is covered in the adrenal disorders.

4) Central Hyperthyroidism

An incredibly rare secretion of **TSH** causes \uparrow **T4/T3**. This is covered in thyroid disorders.

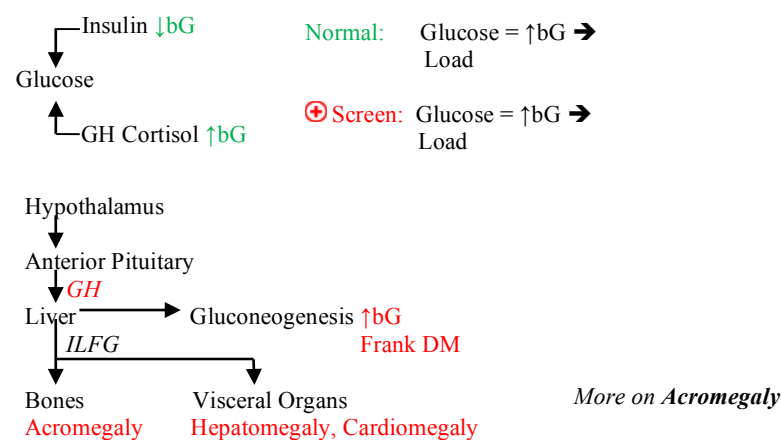
5) Hypopituitarism

The lack of one or all pituitary hormones can cause some problems for the body. There are a variety of ways pituitary function can be lost. There are acute losses that usually present as really sick (**coma, hypotension, death**) and **chronic** losses that result in losing lesser hormones first. Let's start with **chronic** then go over some specific syndromes that need to be known about acute diseases. Because the less important hormones are lost first (FSH and GH before TSH), **screening** can be done with an **insulin stimulation test** - the reverse of the glucose suppression test. If hypoglycemia **fails to stimulate** GH then it's hypopituitarism. Confirm with an **MRI** and **replace deficient hormones**. If possible, reverse the underlying cause if there is one.

Acute loss of function is much worse. Specific syndromes to be aware of are Sheehan's and Apoplexy. **Sheehan's** is a post-partum hypopituitarism after prolonged labor, usually with some blood loss. The pituitary becomes ischemic and dies. This can typically be detected by the inability to lactate as the first sign. **Apoplexy** is a medical emergency; a pre-existing pituitary tumor outgrows its blood supply and bleeds into the pituitary. The patient rapidly decompensates with stupor, nuchal rigidity, headache, nausea and vomiting, etc.

6) Empty Sella Syndrome

This is an **incidental finding** in a patient who has **no endocrine abnormalities** but is found to have an "absent pituitary" on an MRI they had for **some other reason**. If it ain't broke, don't fix it. They have a pituitary - it's just not in the sella.



Infection

Infarction

Surgery

Radiation

ACUTE

\downarrow TSH = Lethargy, Coma, Death

\downarrow ACTH = Hypotension, Coma, Death

\downarrow FSH/LH = Not Felt

GH

Hypopituitarism

Tumor

Infiltration

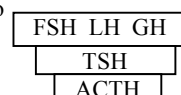
Autoimmune

CHRONIC

1st To go

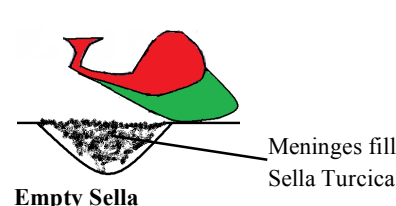
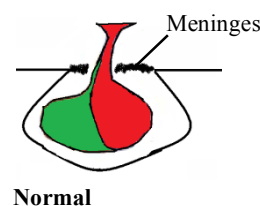
\downarrow

Last to go



Normal: Insulin = \downarrow bG \rightarrow \downarrow Insulin \rightarrow \uparrow GH \uparrow Cortisol \uparrow Glucagon

\oplus Screen: Insulin = \downarrow bG \rightarrow \downarrow Insulin \rightarrow \emptyset Δ GH (early disease) \uparrow Glucagon \emptyset Δ Cortisol (late disease)



| | Patient Presentation | Pathology | Dx | Tx |
|-----------------------------|--|--|--|--|
| Prolactinoma | F: Amenorrhea, Galactorrhea, \emptyset Vision Δ s, Microadenoma M: Vision Δ s, Macroadenoma | Dopamine Antagonists Hypothyroid Pituitary Tumor \uparrow Prolactin | 1 st : Prolactin Then: TSH/T4 Best: MRI | Start: Bromocriptine Best: Surgery when pregnancy, field cuts, medication failure |
| Acromegaly | Children: Gigantism Adults: Big hands, Big Feet, Big Heart and DM | \uparrow GH | 1 st : Glucose Suppression Test Best: MRI | Start: Octreotide Best: Surgery |
| Hypopituitary | Acute: Coma, Lethargy, Hypotension Chronic: Less important go first | Infection, Infarction, Surgery, Radiation | 1 st : Glucose Stimulation Test Best: MRI | Start: Replace Missing Hormones |
| Sheehan's Apoplexy | Post-partum after a long labor Previous Tumor Bleeds, Stupor Nuchal Rigidity, Nausea/Vomiting | Tumor, Infiltration, Autoimmune | | Best: Treat underlying disease if possible |
| Empty Sella Syndrome | Asx | Not pathological | 1 st and Best: MRI | \emptyset : Needs no treatment |