Pituitary Tumors & Adenoma

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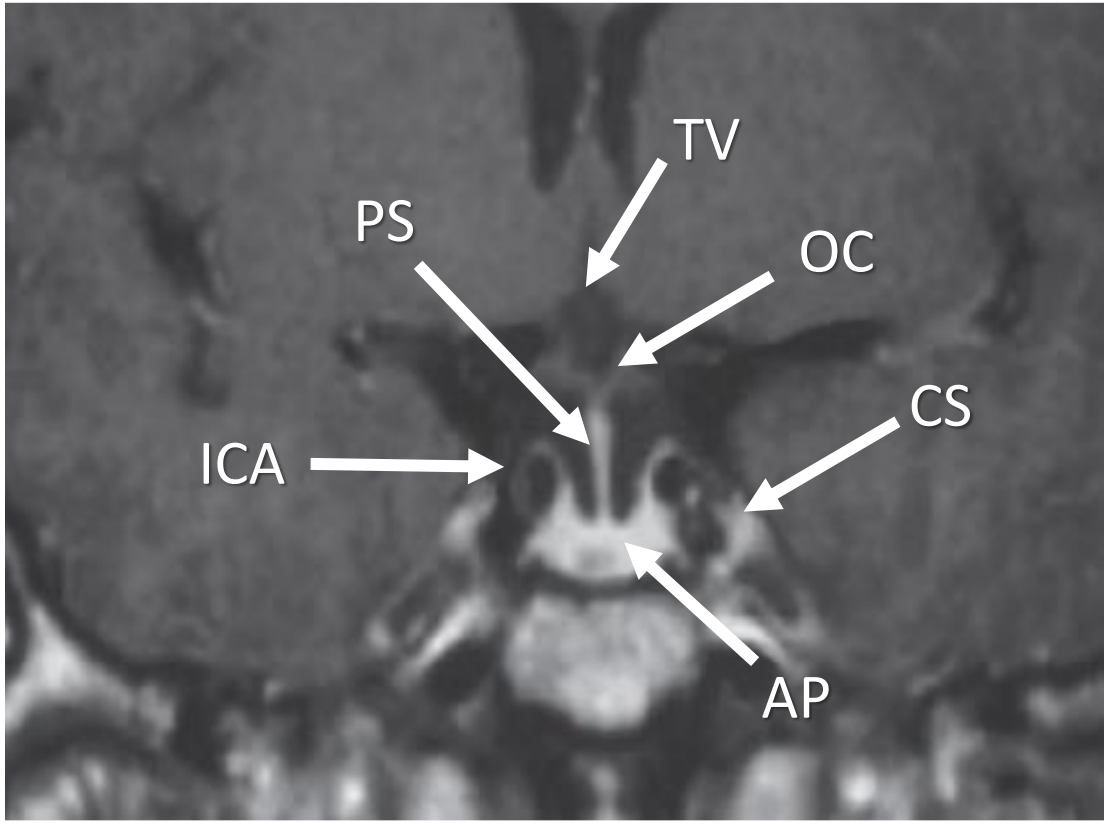
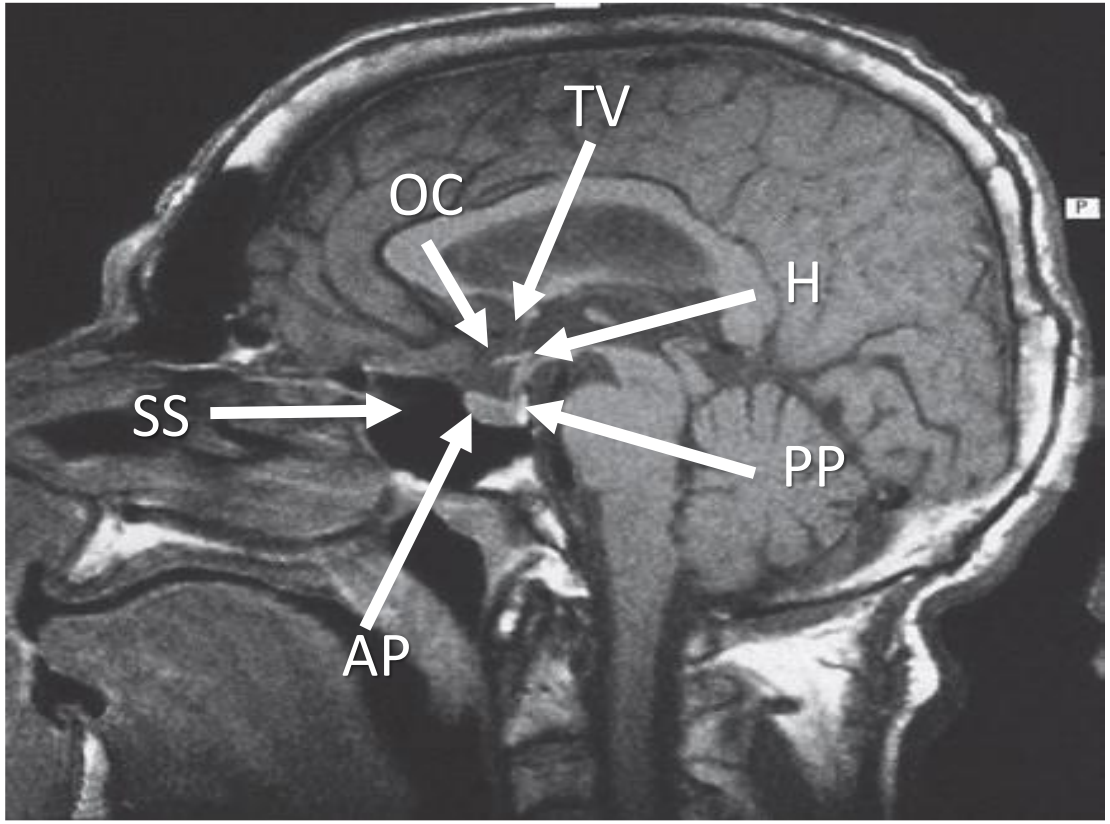
Pituitary anatomy



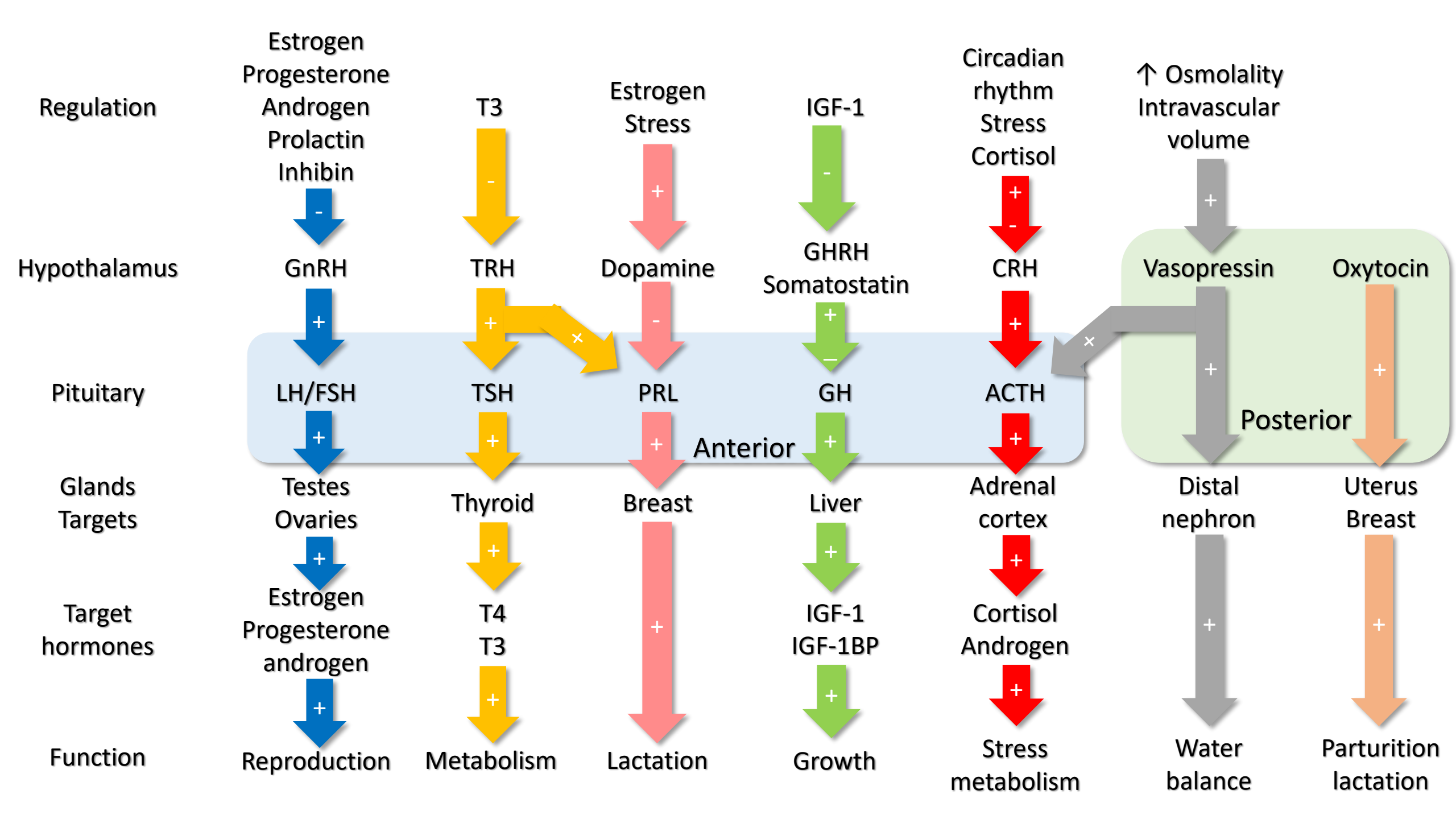
Coronal section



Sagittal section

AP, anterior pituitary; PP, posterior pituitary; ICA, internal carotid artery; CS, cavernous sinus; PS; pituitary stalk; OC, optic chiasm; TV, third ventricle; H, hypothalamus; SS, sphenoid sinus.

Physiology pituitary endocrine function


Regulation
Hypothalamus
Pituitary
Glands
Targets
Target
hormones
Function
Estrogen
Progesterone
Androgen
Prolactin
Inhibin
T3
Estrogen
Stress
IGF-1
Circadian
rhythm
Stress
Cortisol
↑ Osmolality
Intravascular
volume
GnRH
TRH
Dopamine
GHRH
Somatostatin
CRH
Vasopressin
Oxytocin
LH/FSH
TSH
PRL
GH
ACTH
Anterior
Posterior
Testes
Ovaries
Thyroid
Breast
Liver
Adrenal
cortex
Distal
nephron
Uterus
Breast
Estrogen
Progesterone
androgen
T4
T3
IGF-1
IGF-1BP
Cortisol
Androgen
Reproduction
Metabolism
Lactation
Growth
Stress
metabolism
Water
balance
Parturition
lactation

Classification of diseases of the pituitary and hypothalamus

	Primary	Secondary
Non-functioning tumors	Pituitary adenoma Craniopharyngioma Metastatic tumors	
Hormone excess		
Anterior pituitary	Prolactinoma Acromegaly Cushing's disease Rare TSH-, LH- and FSH-secreting adenomas	Disconnection hyperprolactinemia
Hypothalamus and posterior pituitary	Syndrome of inappropriate antidiuretic hormone (SIADH)	
Hormone deficiency		
Anterior pituitary Hypothalamus and posterior pituitary	Hypopituitarism Cranial diabetes insipidus	GnRH deficiency (Kallmann's syndrome)
Hormone resistance	Growth hormone resistance (Laron dwarfism) Nephrogenic diabetes insipidus	

Pituitary tumors (Adenoma)

- Pituitary adenomas are the most common pituitary disorder.
- Pituitary adenomas: up to 10% to 15% of all intracranial neoplasms; 3% to 27% at autopsy series.
- Pituitary adenoma is a benign neoplasm of the anterior lobe of the pituitary that causes symptoms, either by excess secretion of hormones or by a local mass effect as the tumor impinges on other nearby structures (e.g., optic chiasm, hypothalamus, pituitary stalk), or causing hypopituitarism.

Classification

Diameter	Microadenomas are <10 mm in diameter and cause clinical manifestations only if they produce excess hormone. They are too small to produce hypopituitarism or mass effects.
	Macroadenomas are ≥10 mm in diameter and may produce any combination of pituitary hormone excess, hypopituitarism, and mass effects (headache, visual field loss).

Classification

Function	Secretory adenomas produce prolactin, growth hormone, ACTH, or rarely TSH.
	Non secretory microadenomas are common incidental radiographic findings, seen in approximately 10% of the normal population, and do not require therapy. Hypopituitarism or mass effects in larger tumors

Pituitary tumors (adenoma) can be

NFPA	Clinically non-functioning pituitary adenoma 30%
PRL	Prolactinoma 35 %
GH	Acromegaly/Gigantism
GH &PRL	Features of both hormones 7%
ACTH	Cushing’s disease 7%
TSH	TSHoma <1%

Summary of clinical features of pituitary adenoma

Pressure symptoms

Hormone excess

Hypopituitarism

Investigations for pituitary adenoma

<10 mm

- According to patient presentation
- PRL

>10 mm

- According to presentation
- PRL
- Hypopituitarism

Prolactinomas and Hyperprolactinemia

- Prolactinomas: up to 20% in women with unexplained primary or secondary amenorrhea.

- The presentation varies by the tumor size and the patient gender.

Clinical features of Hyperprolactinemia (female)

- Galactorrhea
- Amenorrhea, Oligomenorrhea with anovulation, Infertility
- Estrogen deficiency leading to hirsutism
- Decreased vaginal lubrication
- Osteopenia, osteoporosis

Clinical features of Hyperprolactinemia (male)

- Large tumors more common as a result of delayed diagnosis
- Erectile dysfunction ,decreased libido or hypogonadism.
- Infertility
- Galactorrhea rare because males lack the estrogen-dependent breast growth and differentiation.

Causes of Hyperprolactinemia

1. Physiologic

- Stress (venipuncture?)
- Pregnancy(Commonest cause) and lactation
- Repeated breast self-examination

2. Pharmacologic

- Dopamine antagonist: Anti-emetics (e.g., metoclopramide, domperidone, prochlorperazine), Phenothiazines (e.g., chlorpromazine, thioridazine).
- Dopamine depleting drugs: methyldopa, reserpine
- Estrogens: oral contraceptive pills

Causes of Hyperprolactinemia

3. Pathologic

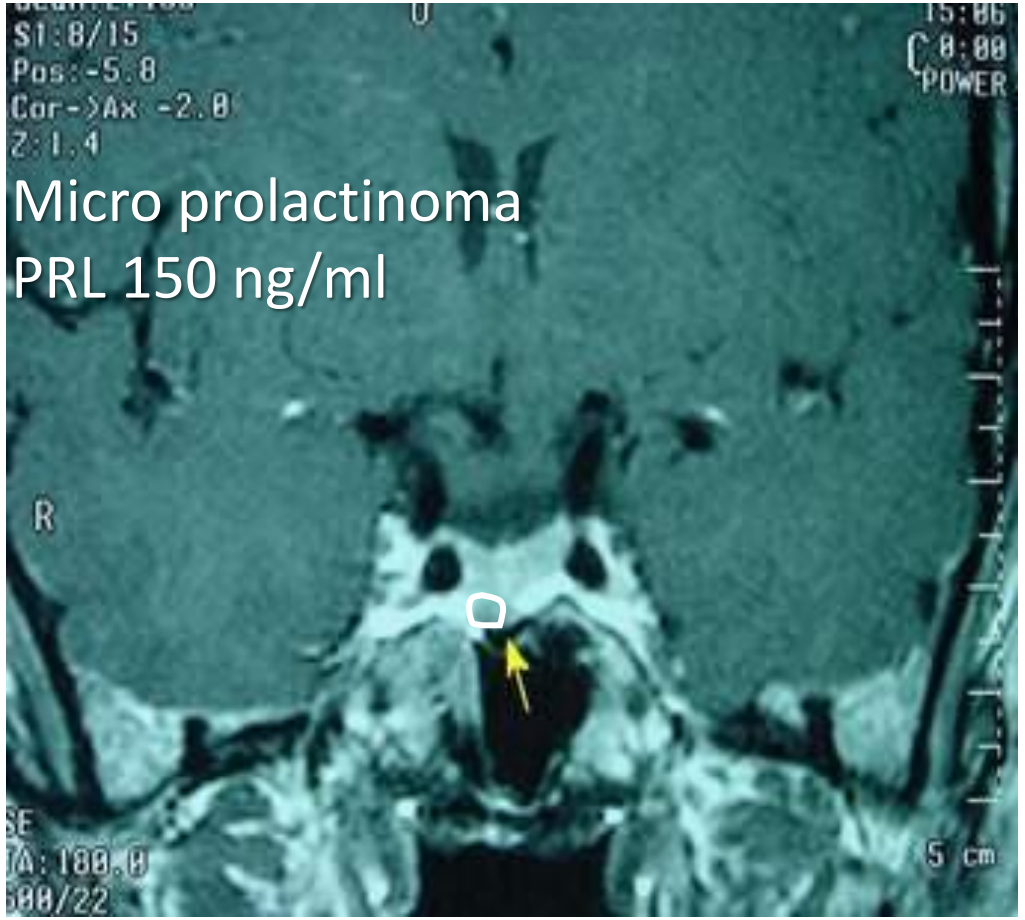
- Prolactinoma (90% Microadenoma)
- Primary hypothyroidism
- Pituitary tumors, Nonfunctioning (stalk pressure or disconnection hyperprolactinemia)
- GH-secreting (30% of people with acromegaly)
- Polycystic ovarian syndrome (10% of people with polycystic ovary syndrome)
- Hypothalamic lesions (rare)
- Liver or renal failure
- Chest wall stimulation, Post-herpes zoster.

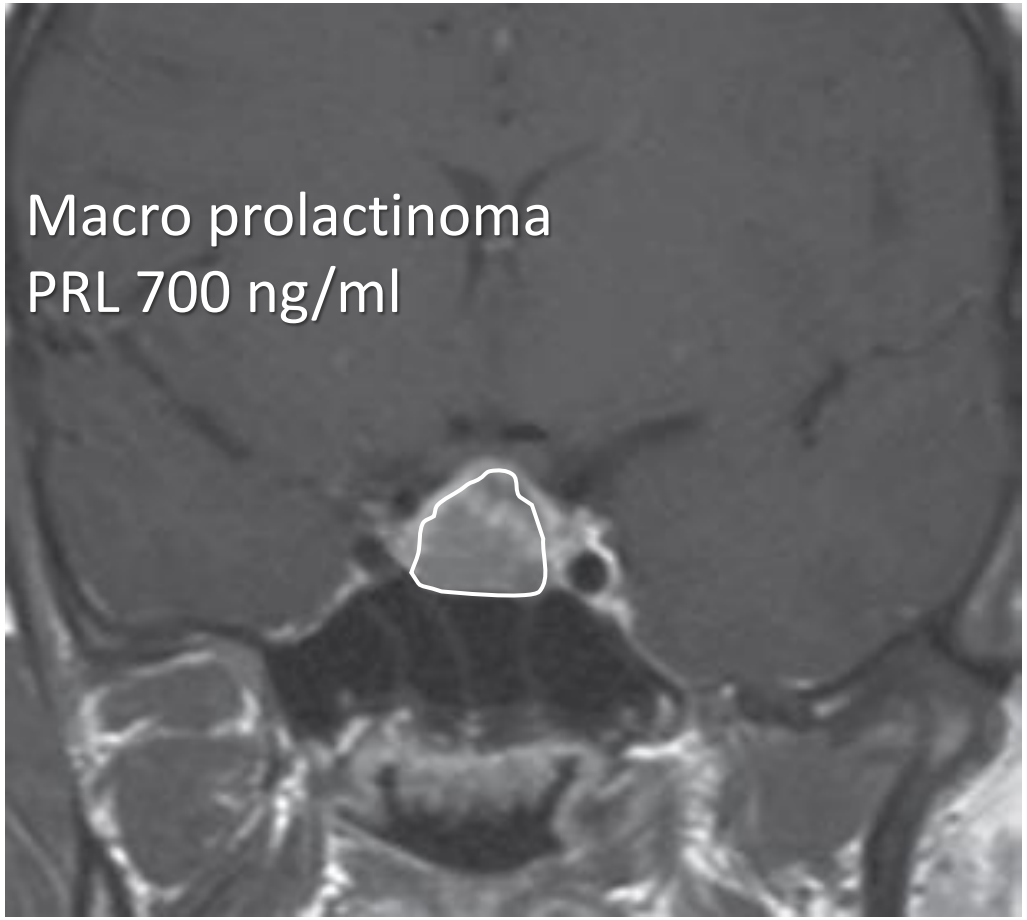
Investigations

- **Exclude pregnancy ,Renal failure, and Drugs**
- Measurement of basal Prolactin levels (fasting, morning)
- Elevated Prolactin levels are correlated with tumor size.

- Level >200 ng/ml is diagnostic for prolactinoma.
- Levels of 100 to 200 ng/ml being equivocal.
- Basal level <20 ng/ml is usually considered normal.

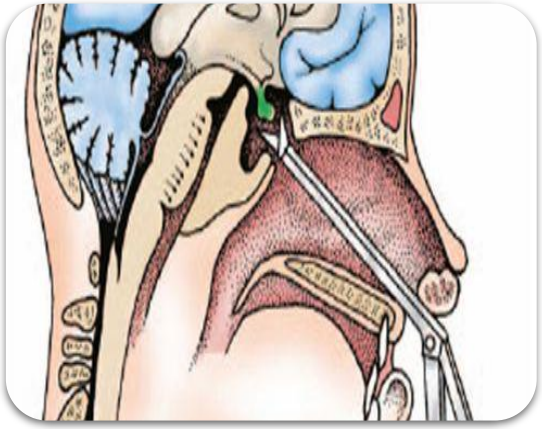
Imaging (pituitary MRI)





Treatment

Dopamine agonists (cabergoline and bromocriptine) are followed typically by a rapid fall in serum Prolactin (within hours) and tumor shrinkage (within days or weeks).



Selective transsphenoidal resection of the adenoma

Less commonly used

Stereotactic radiosurgery

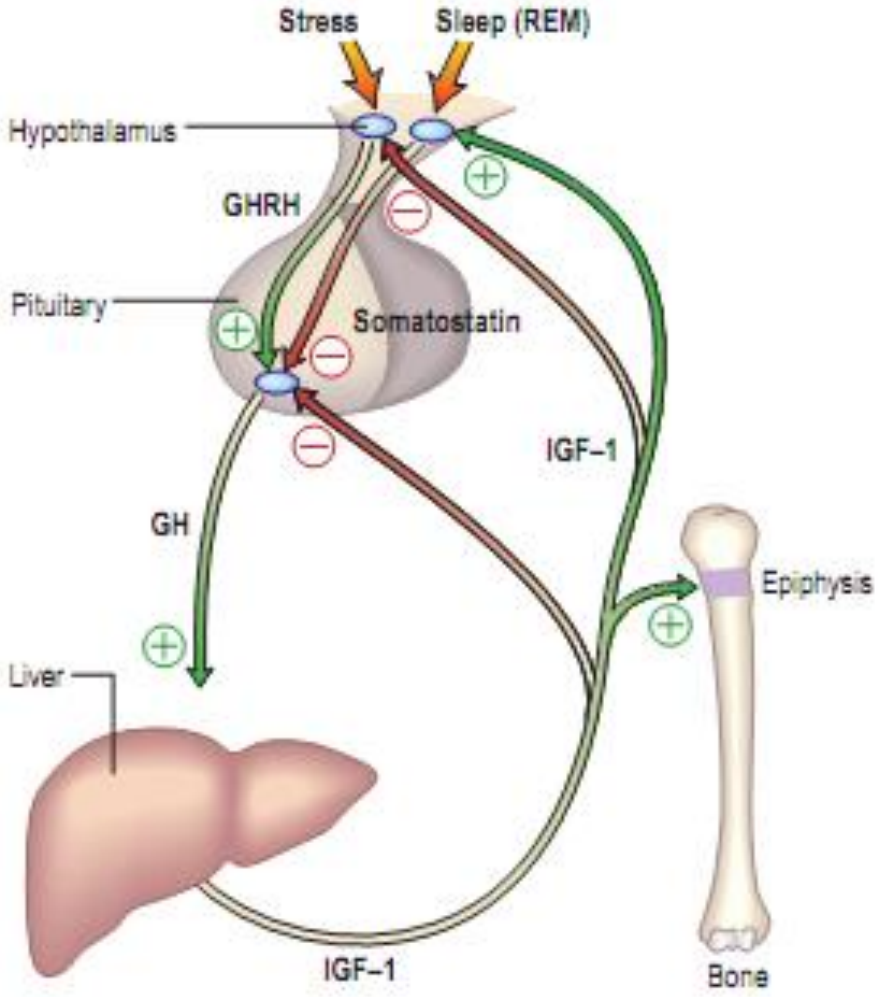
GH-secreting pituitary adenoma(Acromegaly)

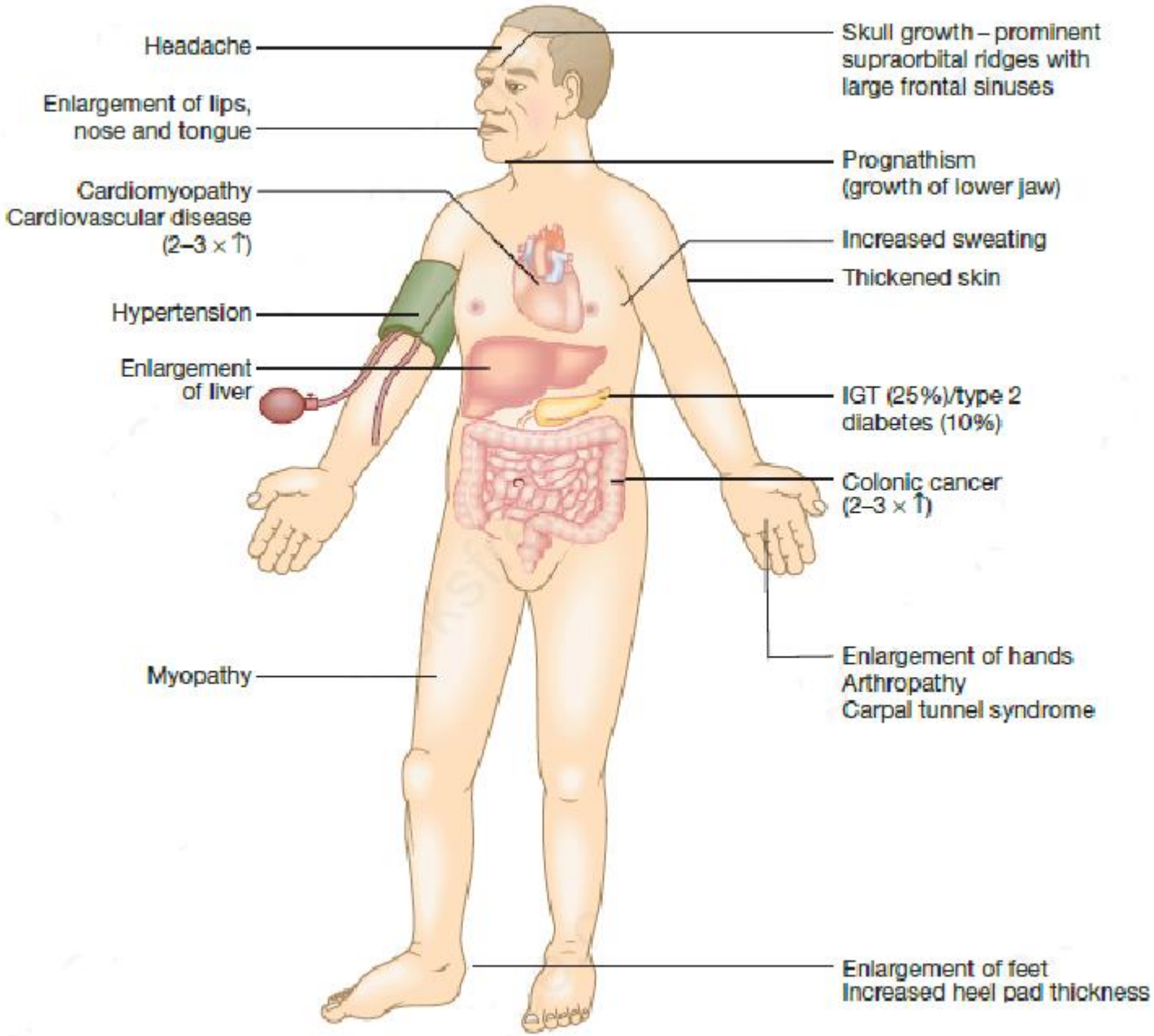
- Incidence: Three to four new cases per 1 million persons annually
- Prevalence: 50 to 60 cases per 1 million persons, with some estimates as high as 90 cases per 1 million persons
- No sexual predominance
- Mean age at diagnosis: Males: 40 yr; females: 45 yr

- About 70% of patients with acromegaly have macroadenomas. The majority of patients with acromegaly have symptoms of the disease for 7 to 8 yr before the diagnosis is ascertained.

Pathophysiology

- GH stimulates ↑ production and secretion of IGF-1 in the liver. Over time, exposure to excessive levels of IGF-1 may lead to growth and enlargement of somatic tissues.
- Gigantism before epiphyseal closure
- Acromegaly after epiphyseal closure





Davidson's Principles and Practice of Medicine, 23th edition 2018

Risk of untreated Acromegaly

- Increased mortality rate, primarily from cardiovascular and respiratory causes.
- Death in 50% of untreated patients by age 50 yr.
- Increased prevalence of colon carcinoma and other malignancies

Investigations (Hormonal)

Serum insulin-like growth factor I level(IGF-1)

A useful indicator of GH hypersecretion because this level does not fluctuate throughout the day.

GH level under 75g oral glucose tolerance test

Failure to suppress serum GH to < 1 ng/ml with an oral load of 75 g glucose is considered positive).

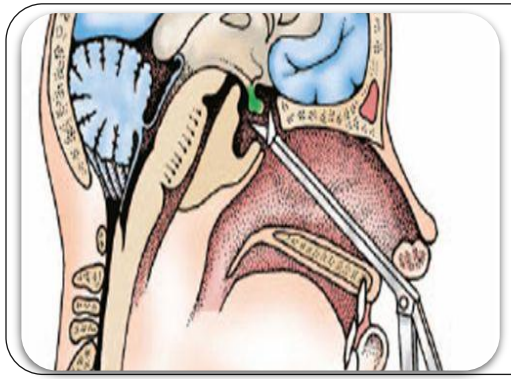
GH is secreted in a pulsatile manner, and thus dynamic GH testing is more valuable than the measurement of a single random GH level.

Moreover, cirrhosis, starvation, anxiety, type 1 diabetes mellitus, and acute illness can be associated with GH hypersecretion.

Imaging

- Pituitary MRI is the imaging test of choice

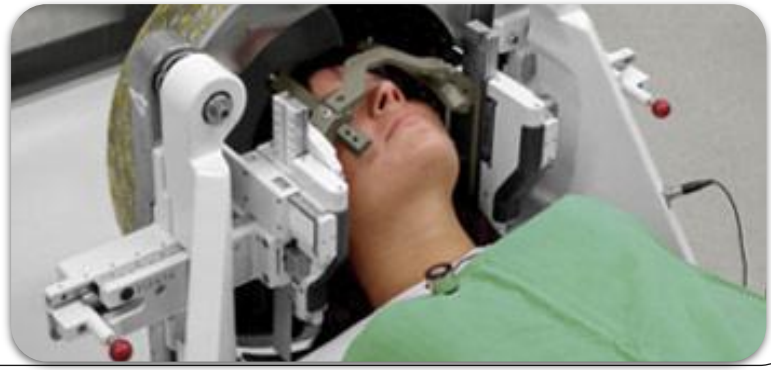
Treatment



Transsphenoidal resection of the adenoma is the treatment od choice

Octreotide and lanreotide

Patients have not responded to surgical therapy, surgery is contraindicated, patients waiting for the effects of radiotherapy to begin, preoperative shrinkage of pituitary tumors and softening of adenomatous tissue.



Stereotactic radiosurgery

Tumor recurrence or persistence after surgery, patients with resistance to or intolerance of medical treatment

Major complication: hypopituitarism, in up to 50% of patients; this is more likely in patients who had surgery.

Thanks for your listening