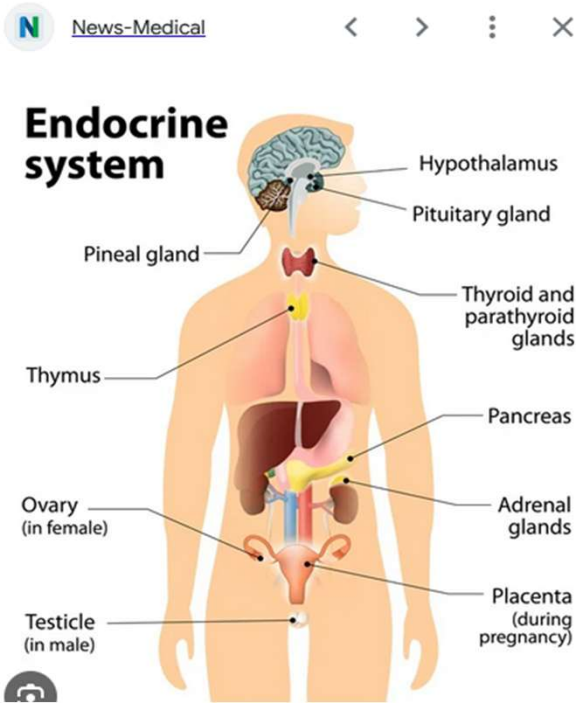
Betty Malanowski
06/04/2025

FCDS Florida Statewide Cancer Registry
Florida Cancer Data System

ENDOCRINE SYSTEM

A network of **glands** and **organs** that produce hormones and release them directly into the blood stream which target and regulate distant organs and functions of the human body.

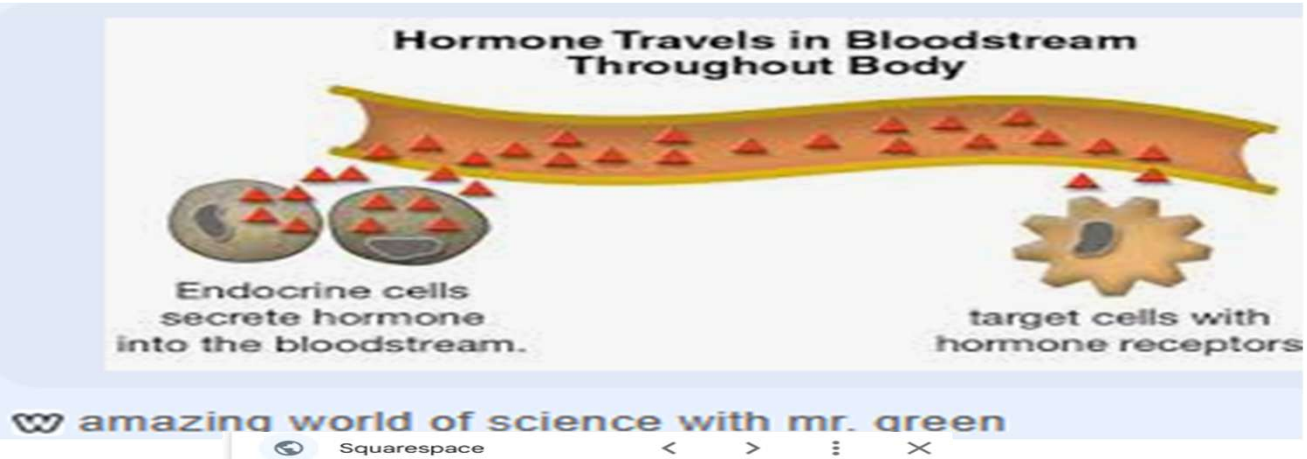


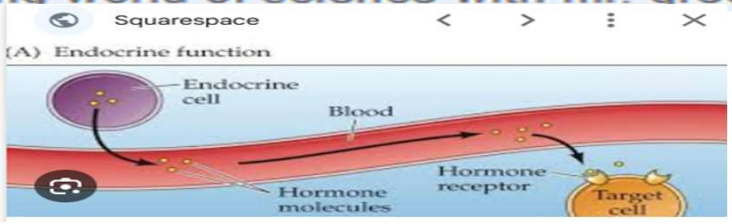
Endocrine Glands

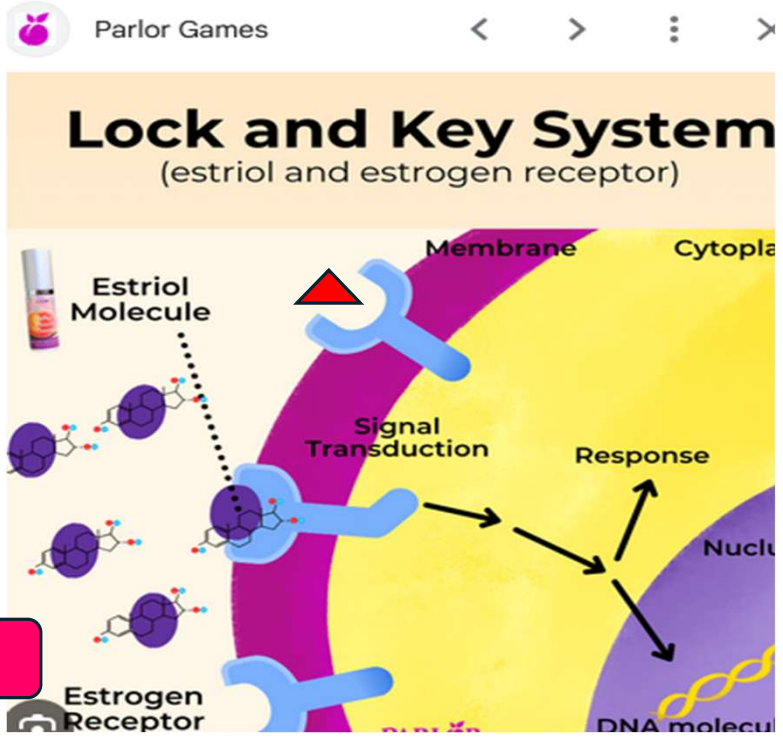
The secretory products of endocrine glands are called hormones and are secreted directly into the blood and then carried throughout the body where they influence only those cells that have **receptor sites** for that hormone. Seer.cancer.gov

-Hormones are carried by the blood throughout the entire body.

-They find a receptor; they attach to the receptor and exert their action.



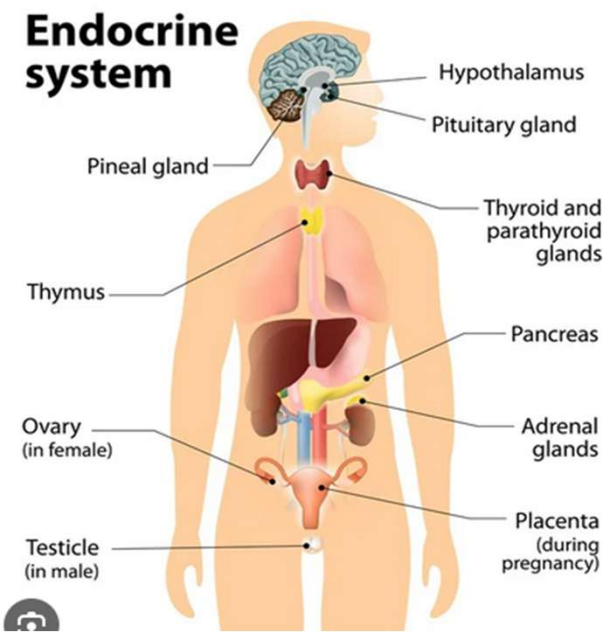




DIFFERENCE between ENDOCRINE system and **NEURO**ENDOCRINE system

The endocrine system is made up of **glands**, while the neuroendocrine system is made up of **nerves** and **glands**.

News-Medical



. The endocrine system is **SLOW** and LONG **LASTING**. Responsible for long-term bodily functions like growth, metabolism, and reproduction.

Slight Edge Performan...

•A system of nerves and gland cells that produce and release hormones

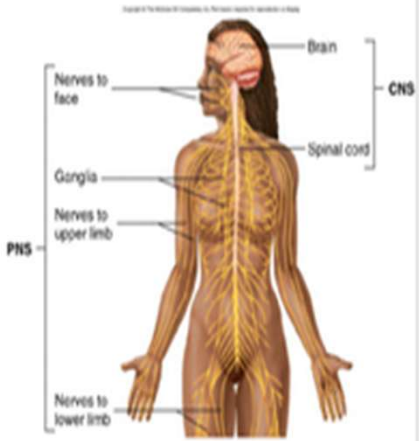
The Neuroendocrine System

(homeostasis control)

Nervous system (rapid & transient)

- Central
- Peripheral
  - Somatic: voluntary
  - Autonomic: involuntary

Endocrine system (slow & long lasting)

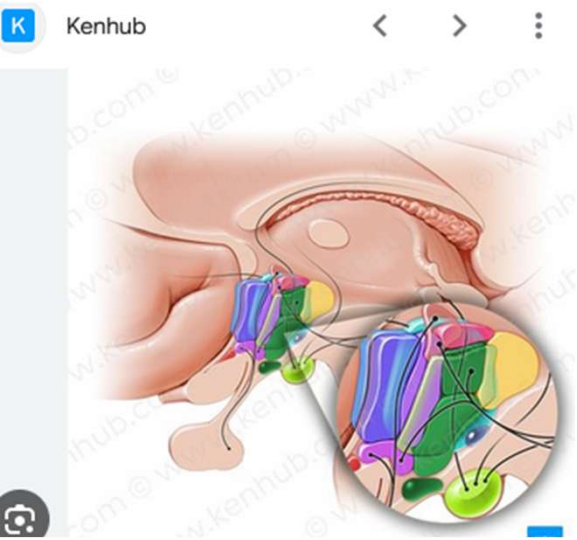


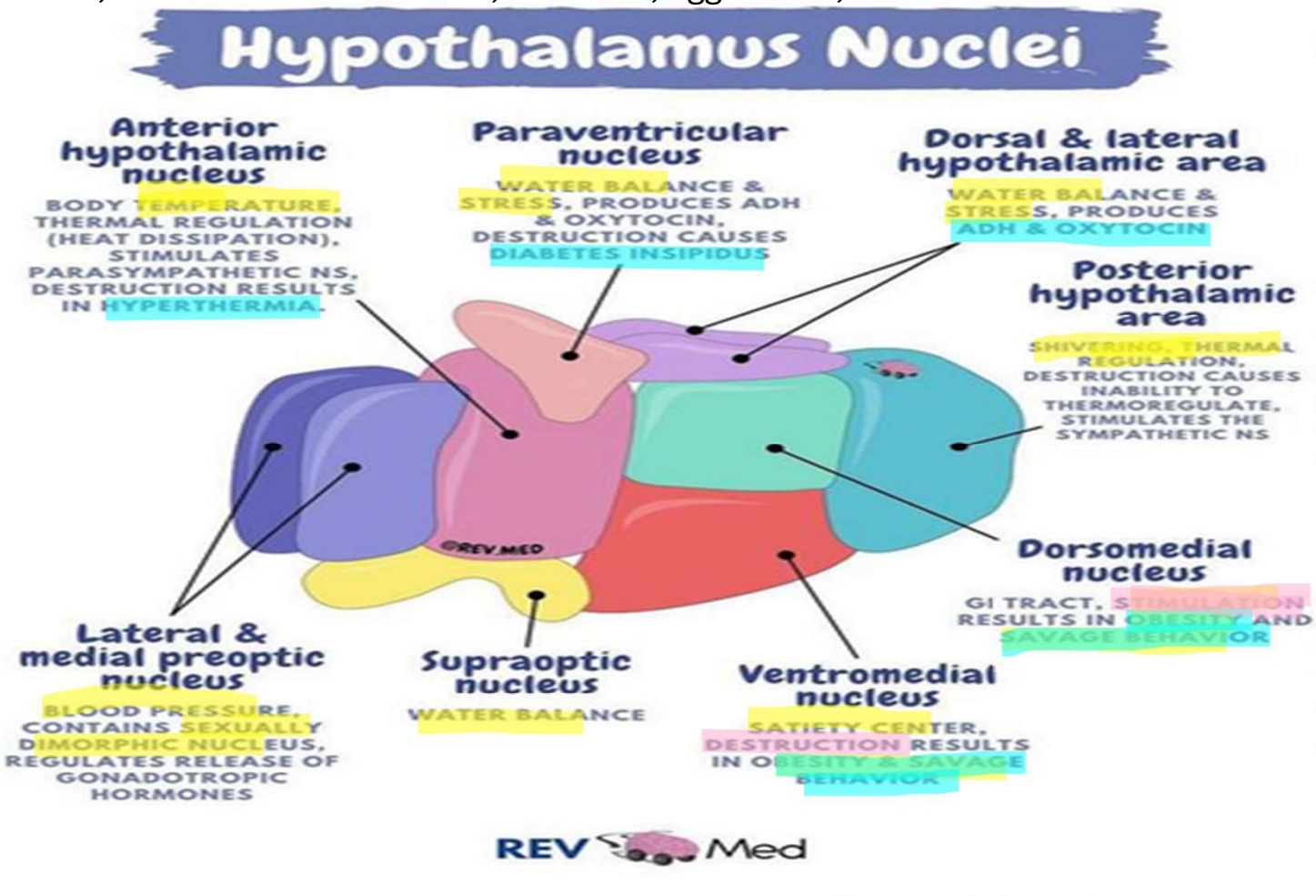
HYPOTHALAMUS

The HYPOTHALAMUS is the **neural control center** for all the **endocrine** system. It is also considered a major endocrine organ because it produces several hormones.

The hypothalamus regulates temperature, water balance and thirst, sex drive , aggression,...

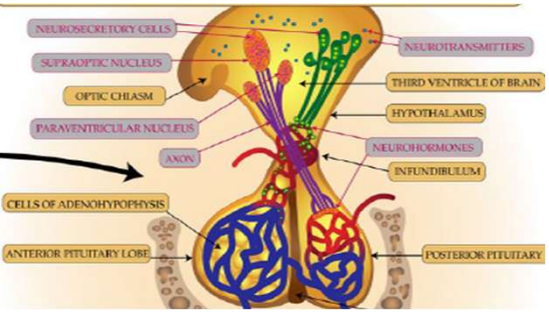
Full assessment of pituitary is needed in all patients with a **pituitary hypothalamic tumor**, evaluating hormone hypersecretion and hypopituitarism with insufficient hormones.

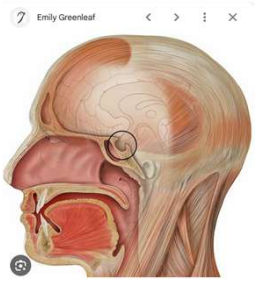




HYPOTHALAMUS

The HYPOTHALAMUS is the **neural control center** for all **endocrine** systems. It is also considered a major endocrine organ because it produces several hormones.





(GHRH)

Oxytocin

Oxytocin helps the uterus contract and the cervix to dilate in childbirth. It is also important for breastfeeding, where it causes milk to move into the breast, commonly known as the "let-down" response. Oxytocin also plays roles in helping a mother and baby bond, social interaction and anxiety. Oxytocin is made in the hypothalamus and transported to the back part (posterior) of the pituitary gland, where it is stored until needed.

Anti-Diuretic Hormone (ADH) (or Vasopressin)

ADH signals the kidneys to pass less water into the urine. This helps keep enough water in the body to function normally and avoid dehydration. ADH also narrows (constricts) the blood vessels, which causes an increase in blood pressure. ADH is made in the hypothalamus and transported to the back part (posterior) of the pituitary gland where it is stored until needed.

somatostatin, and **dopamine** are released from the hypothalamus into the blood and travel to the anterior pituitary.

Gonadotrophin Releasing Hormone (GRH)

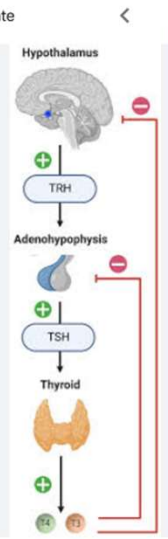
Gonadotrophin Releasing Hormone (GRH) signals the pituitary gland to make Follicle Stimulating Hormone (FSH) and Luteinising Hormone (LH).

Corticotrophin Releasing Hormone (CRH)

Corticotrophin Releasing Hormone (CRH) signals the pituitary gland to make adrenocorticotrophic hormone (ACTH).

Thyrotrophin Releasing Hormone (TRH)

Thyrotrophin Releasing Hormone (TRH) signals the pituitary gland to make thyroid stimulating hormone (TSH).



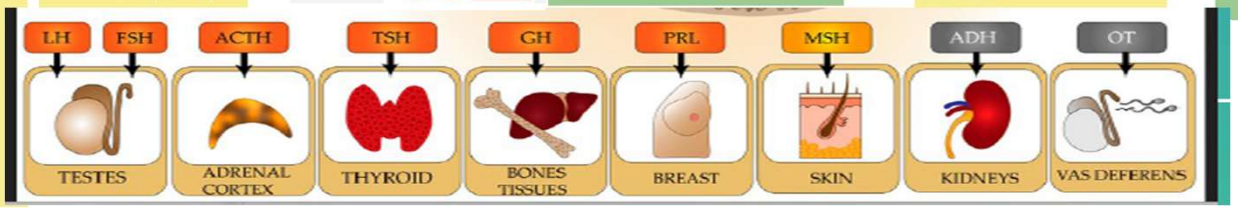
Growth Hormone Releasing Hormone

Growth Hormone Releasing Hormone signals the pituitary gland to make growth hormone (GH).

Somatostatin

Somatostatin signals the pituitary gland to make less growth hormone (GH).

Dopamine signals he pituitary gland to stop releasing prolactin.



Organs in the ENDOCRINE system

- Hypothalamus function may overlap with NEUROENDOCRINE system because of the neuro fibers involved.

- Pituitary gland (the master gland)

-Pineal gland (sleep and wake cycles, circadian cycleMelatonin)

-**Thyroid** gland (Regulates Metabolism)

-**Parathyroid** glands

-**Adrenal** glands (Response to stress)

-**Pancreas**

-**Ovaries, Testes** (Reproduction)

-**Thymus** Produces hormones:

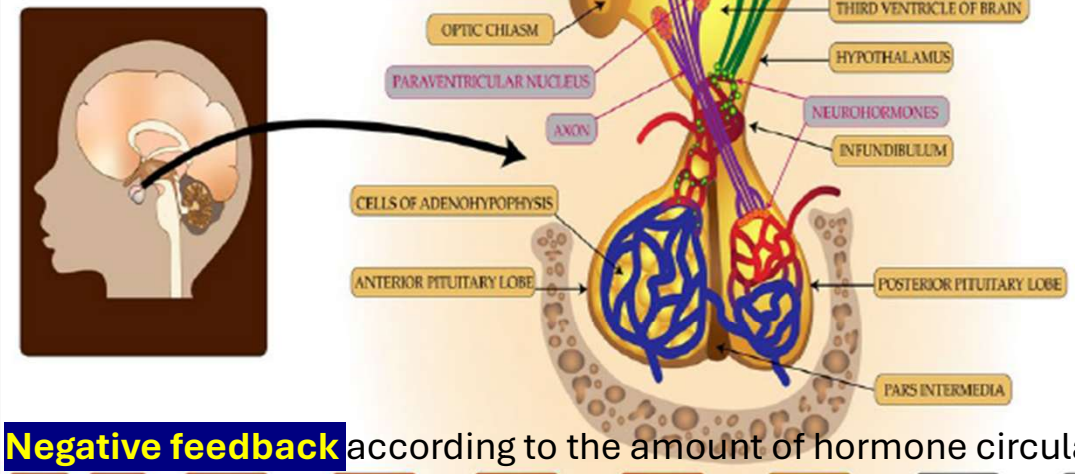
thymosin (T cell maturation, role in the development of immune system)
thymulin (T cell function and development)
Thymopoietin signals the pituitary gland to release hormones ACTH and β-endorphin.

Bones and tissues (targets of GH. Growth)

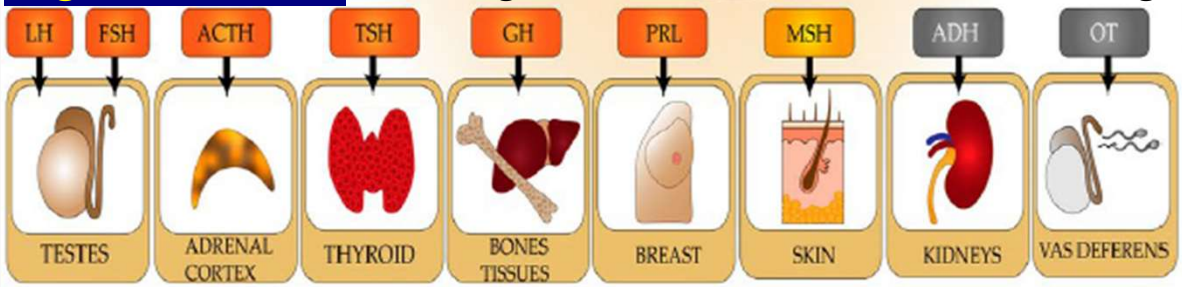
Placenta

Hypothalamic-pituitary axis

It is a communication system which receives signals from various regions of the brain and in return, releases both **releasing** and **inhibiting** hormones which act on the master pituitary gland to direct the functions of the thyroid gland, adrenal glands, ovaries or testis ...



Negative feedback according to the amount of hormone circulating



Other Endocrine Organs

Other Endocrine ORGANS

In addition to the major endocrine organs, other organs have some hormonal activity like the stomach, small intestines, heart.

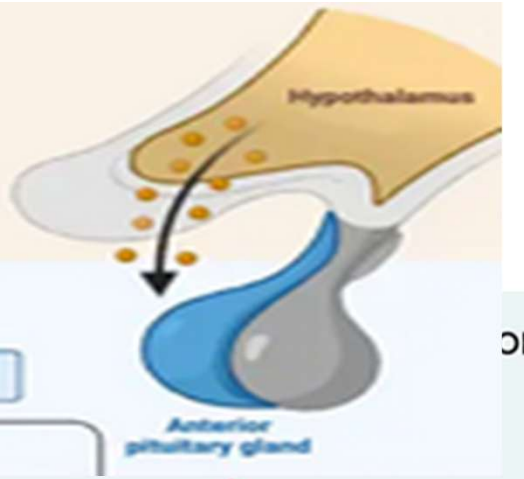
The stomach produces **gastrin** hormone in response to the presence of food in the stomach. This hormone stimulates the production of ***hydrochloric acid*** and the enzyme ***pepsin***, which are used in digestion.

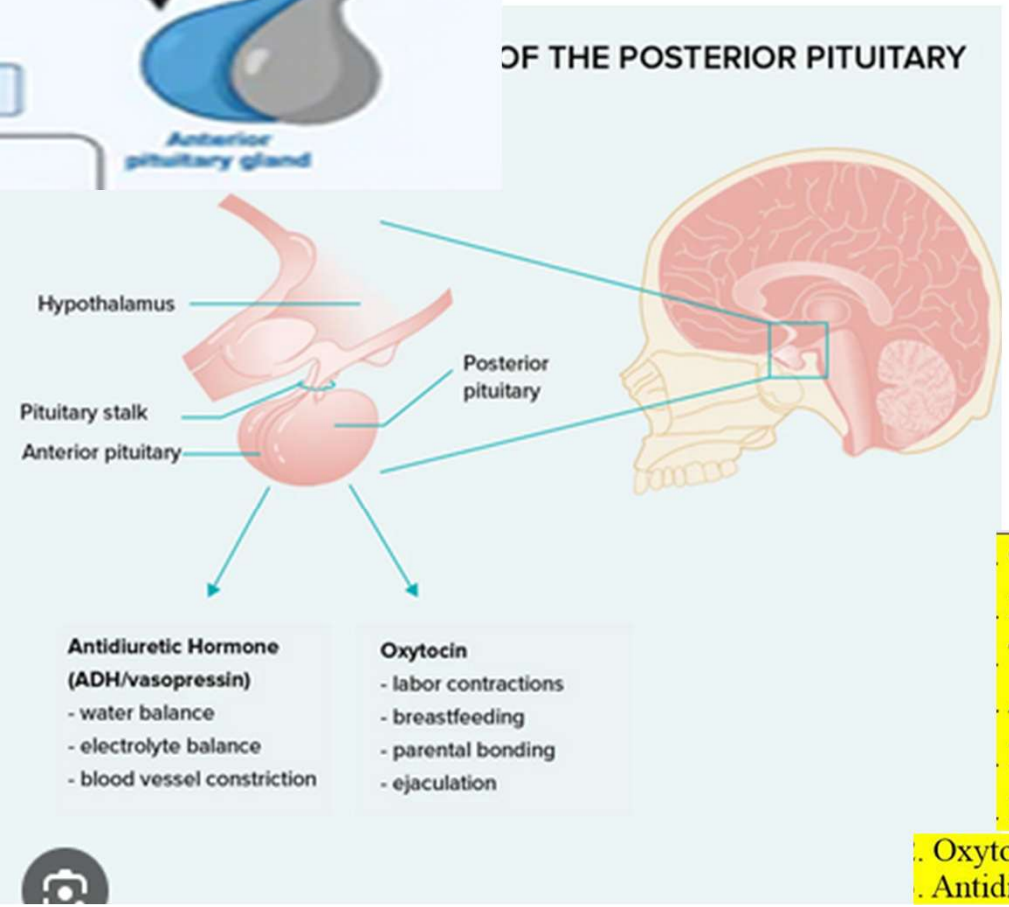
The small intestine secretes the hormones **secretin** and **cholecystokinin**.
Secretin stimulates the pancreas to produce a bicarbonate-rich fluid that neutralizes the stomach acid.
Cholecystokinin stimulates contraction of the gallbladder to release bile. It also stimulates the pancreas to secrete digestive enzyme.

The heart also acts as an endocrine organ. Atria produce a hormone called **Atriopeptin** aka **Atrial Natriuretic Peptide (ANP).**

- The placenta during pregnancy also serves as a temporary endocrine gland. It secretes human chorionic gonadotropin (Hcg), which signals the ovaries to secrete hormones to maintain the pregnancy: ESTROGENS, PROGESTERONE, HUMAN PLACENTAL LACTOGEN (hPL) and HPGH –Human Placental Growth Hormone (for glucose utilization, insulin resistance), RELAXIN.
- SEER TRAINING.

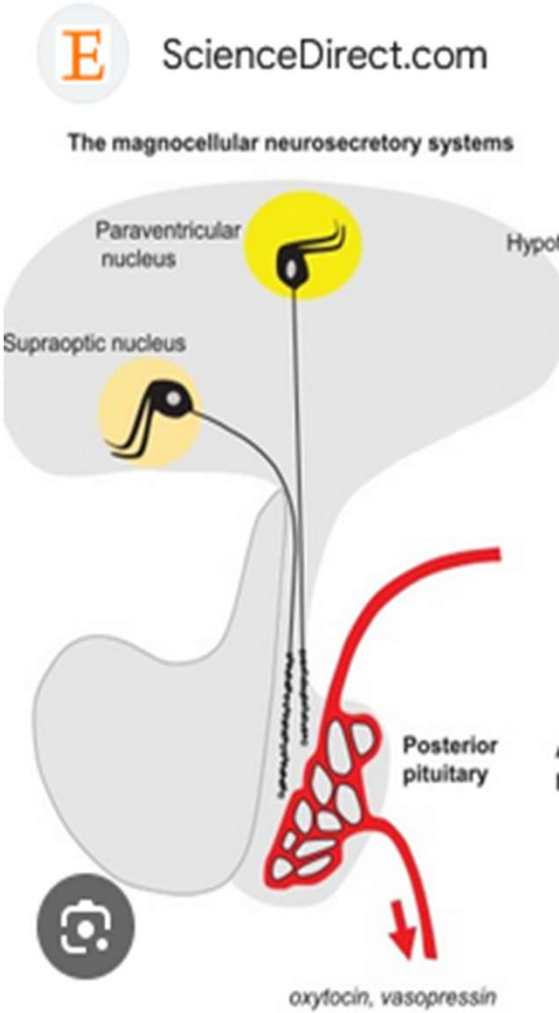
HYPOPHYSIS



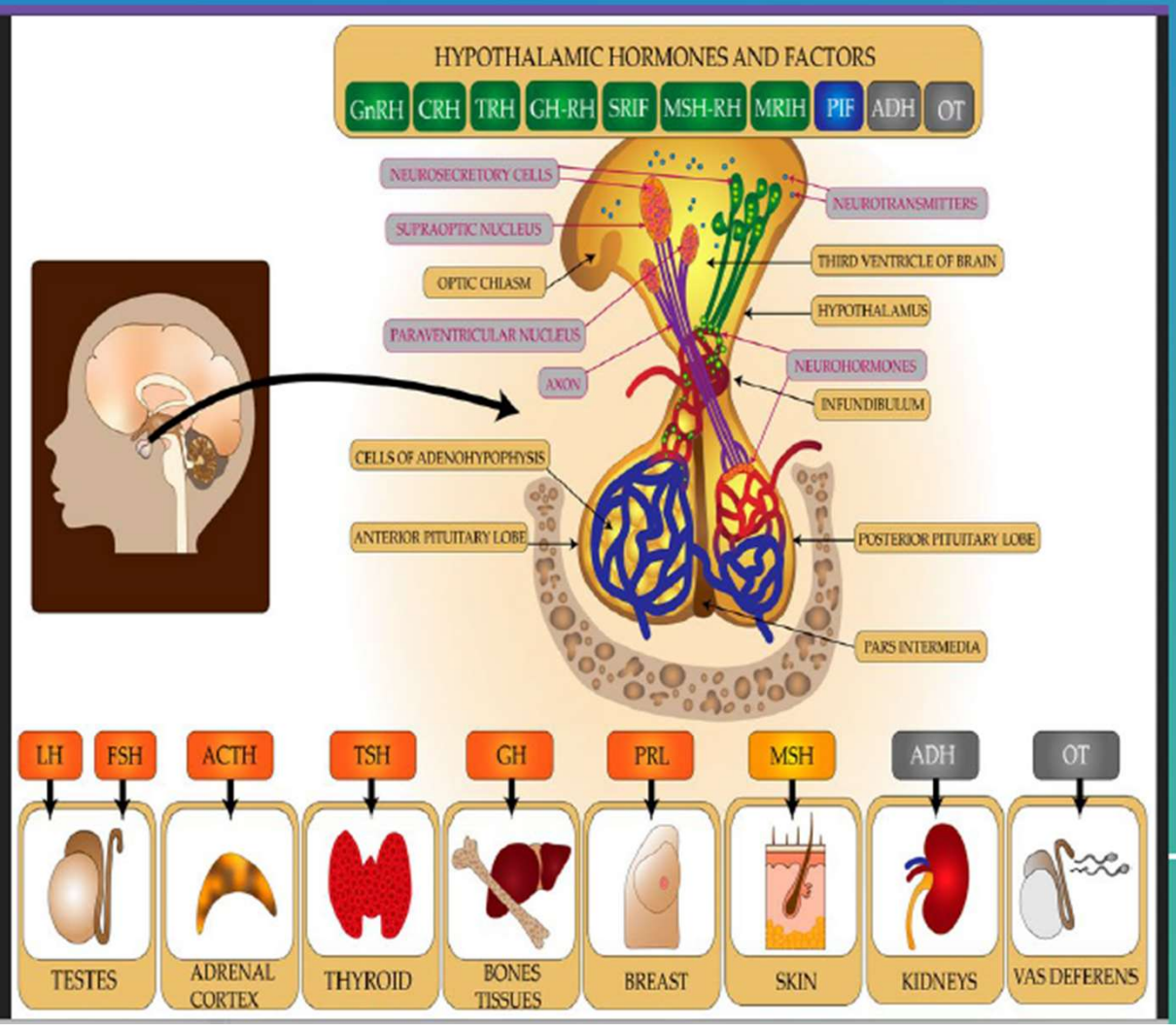


The posterior pituitary stores and releases the hormones **oxytocin** and vasopressin (**ADH** antidiuretic hormone).

. Growth hormone (GH)
. Prolactin (PRL)
. Thyrotropin (TSH)
. Adrenocorticotropin (ACTH)
. Follicular stimulating hormone (FSH)
. Leutinizing hormone (LH)
. Oxytocin
. Antidiuretic hormone (ADH)



HYPOTHALAMIC-HYPOPHYSIS AXIS



- **PITUITARY MICROADENOMAS**: tumors smaller than 10 millimeters are called often secrete anterior pituitary hormones. These smaller, functional adenomas are usually detected earlier because the increased levels of hormones cause abnormal changes in the body: Endocrine Dysfunction. Approximately 50 percent of pituitary adenomas are diagnosed when they are smaller than 5 millimeters in size.
- **PITUITARY MACROADENOMAS**

Adenomas larger than a dime coin size (10 milimeters) are usually do not secrete hormones. These tumors often produce symptoms by "mass effect," compressing nearby brain or cranial nerve structures.

The functioning (endocrine-active) tumors include almost 70% of pituitary tumors which produce 1 or 2 hormones that are measurable in the serum and cause definite clinical syndromes, that are classified based on their secretory product(s).

Non-functioning adenomas are endocrine-inactive tumors.

Tumors may cause no symptoms, or TOO much of a hormone or may cause HORMONE levels to drop.

PITUITARY **MICROADENOMAS**:

Endocrine dysfunction.

-Growth hormone: Gigantism, acromegaly.

-Prolactin excess: Galactorrhea.

-LH, FSH : fertility, menstrual periods.

-ACTH (Adrenocorticotropic hormone) hormone EXCESS: Secondary hypercortisolism.

-TSH: underproduction of thyroid hormone, as in Hypothyroidism (cold intolerance, weight gain, constipation) or excess as in Hyperthyroidism (heat intolerance, weight loss, diarrhea, fast heart beat).

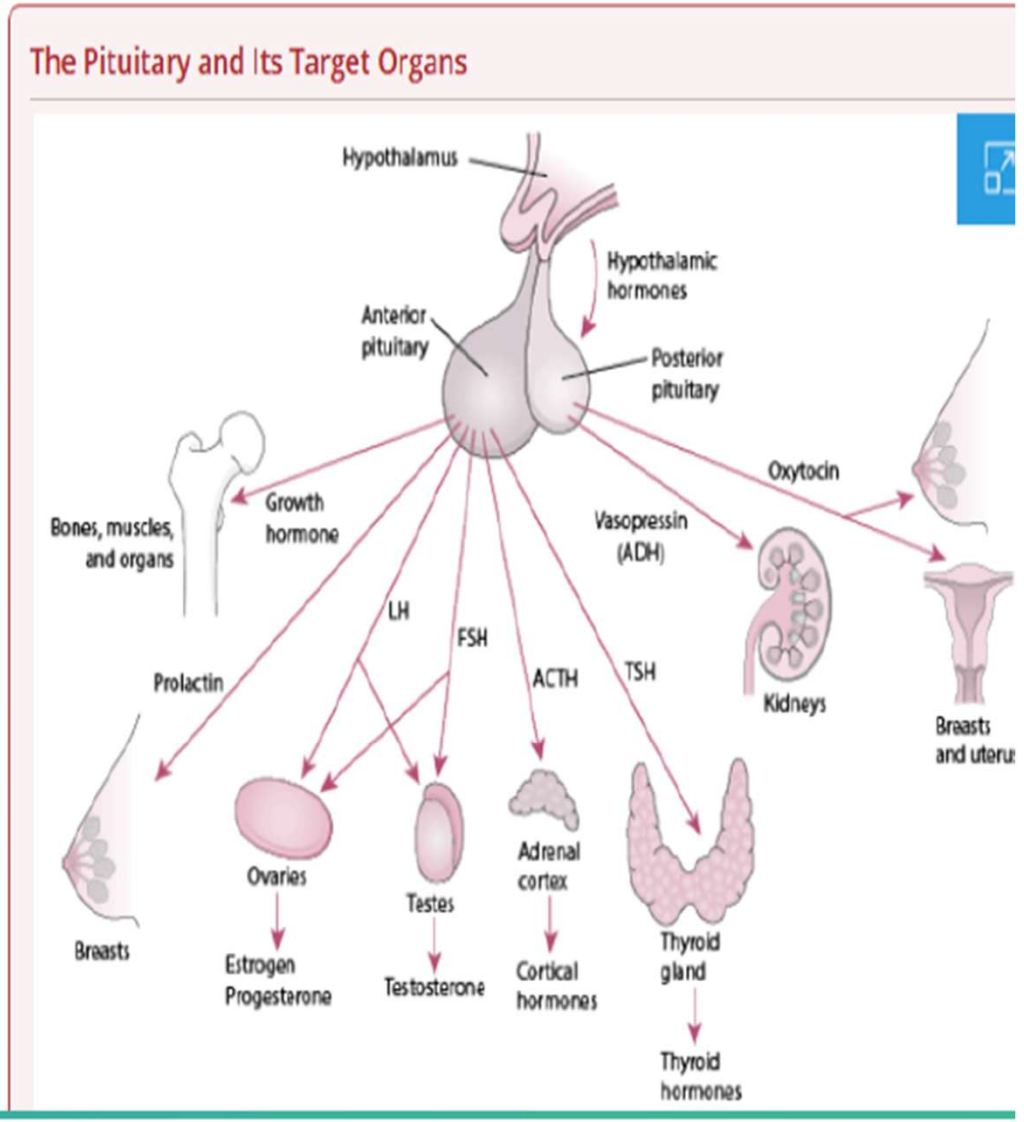
-Oxytocin (oxytocin hormone initiates labor, uterine contractions, and milk ejection in mothers.)

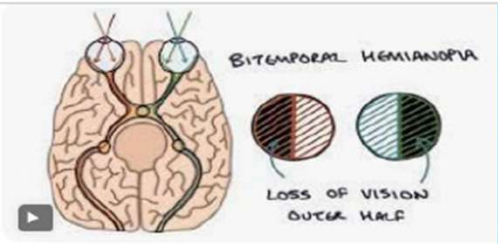
-Vasopressin (ADH): may produce DIABETES INSIPIDUS (Is different than Diabetes Mellitus)

PITUITARY **MACROADENOMAS**:

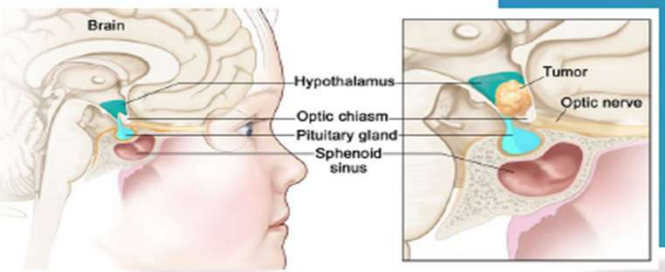
Mass effect.

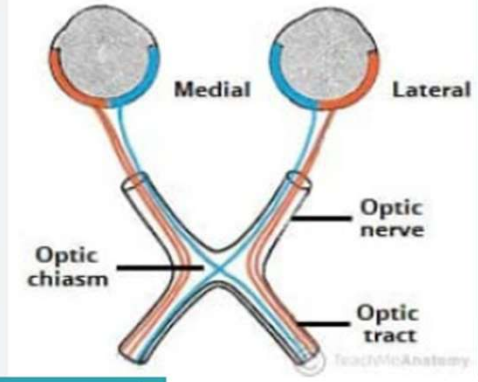
-Visual problems (double vision, bitemporal hemianopsia

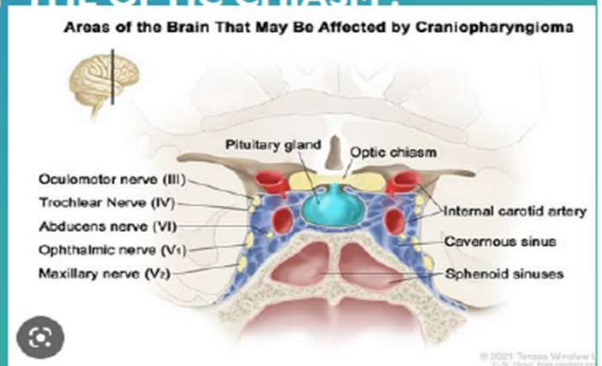




CHILDREN CAN HAVE ACCIDENTS AT CROSSING THE STREET OR WHEN RIDING A BICYCLE FOR EXAMPLE.
ADULTS CAN HAVE CAR ACCIDENTS BECAUSE OF LOSS OF PERIPHERAL VISION DUE TO COMPRESSION OF THE OPTIC CHIASM .

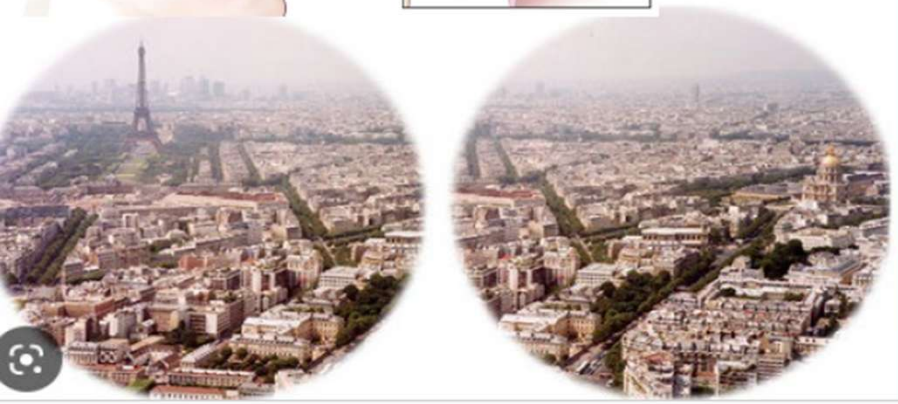




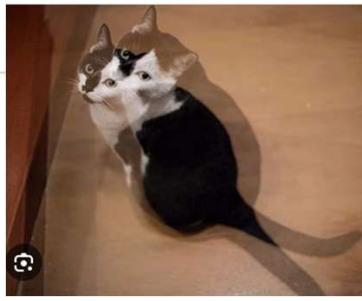


Craniopharyngioma, Child, HP: Image

Visit



All About Vision



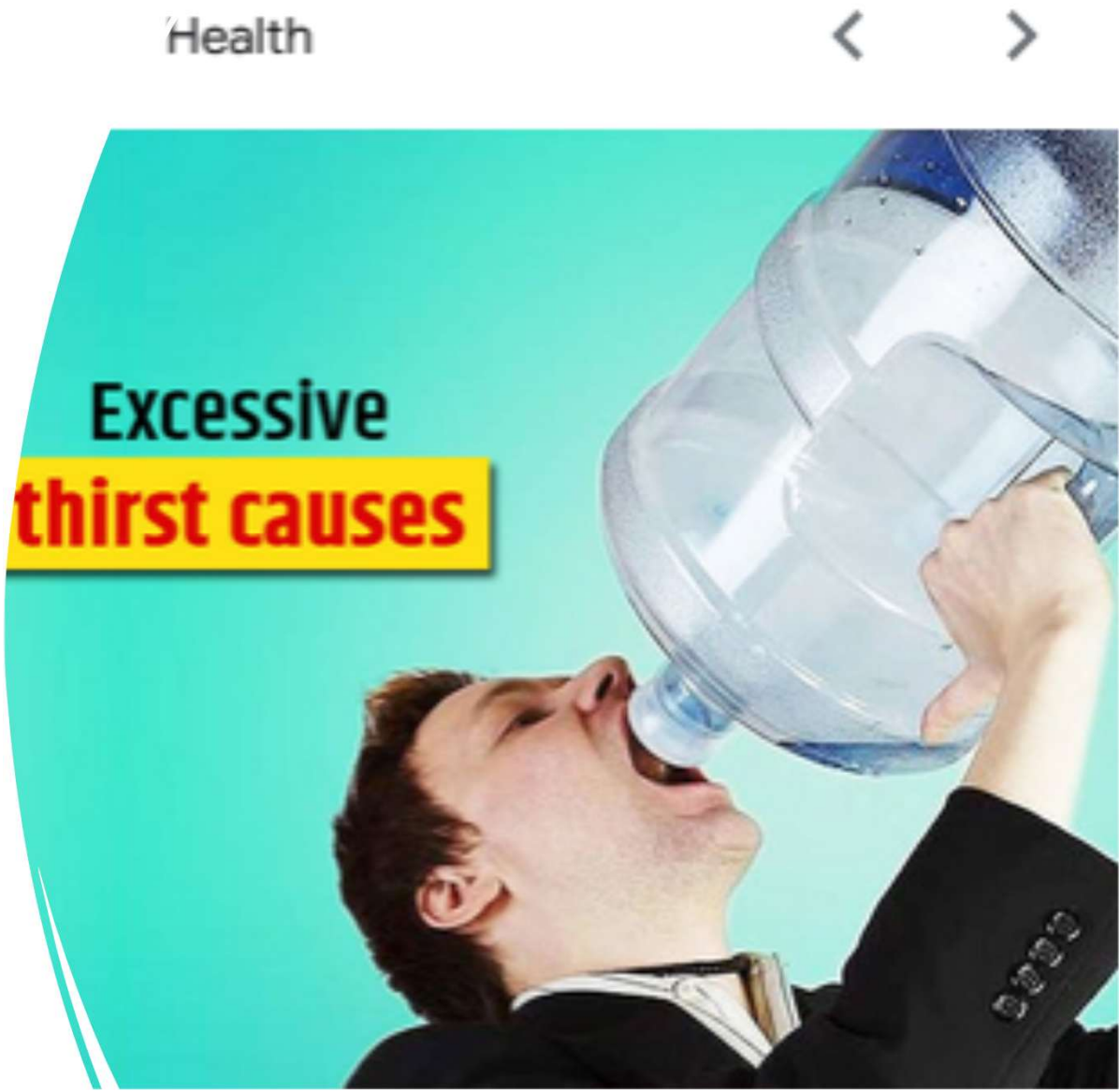
Pituitary MACROADENOMAS: MASS effect!

If you see **Bitemporal Hemianopsia** can be documented in the PE (Physical Exam).
Temporal field (outer part) are affected, and only the nasal fields (inner part of the visual field) are perceived. Also, these tumor may cause **double vision** or **DIPLOPIA.**

Hypothalamus or Pituitary tumor

May produce Diabetes INSIPIDUS.

Insipidus means "without taste" in Latin.



DIABETES INSIPIDUS for a pituitary/ hypothalamic source vs DIABETES Mellitus from Pancreas

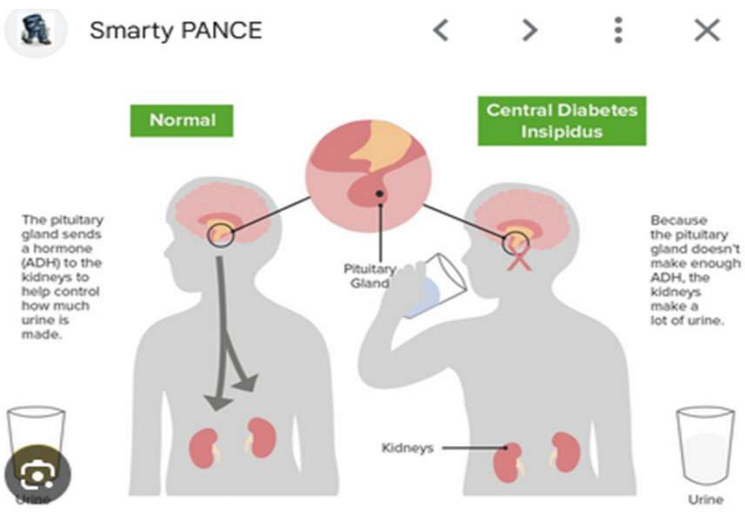
the sweetness of urine was reported as a characteristic of diabetes mellitus in the 17th century.

Instagram

Yes, in the past, physicians did distinguish between diabetes mellitus and diabetes insipidus by tasting the urine. Diabetes mellitus, which affects blood sugar levels, was identified by its sweet-tasting urine, while diabetes insipidus, which affects fluid balance, had tasteless or "insipid" urine. This method was used before modern diagnostic techniques were available.

Latin word **mellitus** meaning **sweet**. (*Honey* translated to Spanish is **Miel)**.

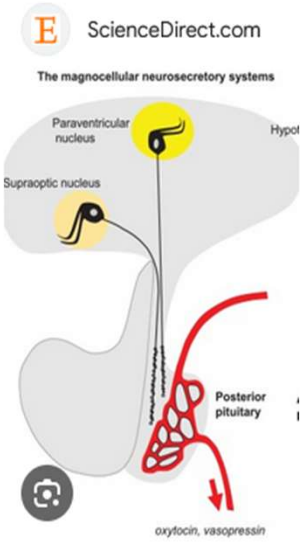
Insipidus means "without taste" in Latin.



Polydipsia (excessive thirst), Polyuria (excessive urination).

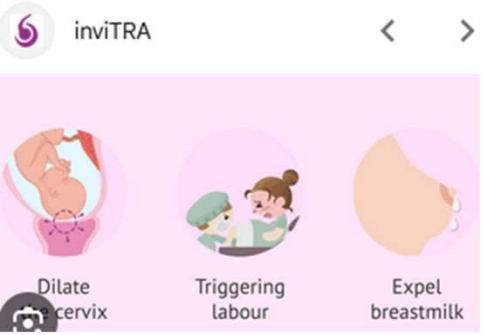
Diabetes insipidus can be caused by a hypothalamus **tumor** or a pituitary **tumor** **Central Diabetes Insipidus**. Also, by trauma to the head.

Diabetes insipidus can be caused by the kidney too, but **NOT** by a kidney tumor.



Can a tumor in the kidney cause Diabetes Insipidus? NO, but a problem in the kidney (Nephrogenic DI) like lack of response to the hormone ADH can!

OXYTOCIN is produced by the hypothalamus and released by the pituitary gland.



oxytocin means "quick birth" in Greek.

Role not limited to the uterine contractions and milk ejection in lactation

Role of Oxytocin in Cancer

-Recent studies have linked oxytocin as a **promoter** of cancer in **prostate** through cell proliferation.
-Also in recent studies, oxytocin may **inhibit** cancer in carcinogenesis. Breastfeeding may reduce the risk of **esophageal cancer, gastric and pancreatic** in women who breastfed for over 12 months.

More studies are needed!

Oxytocin

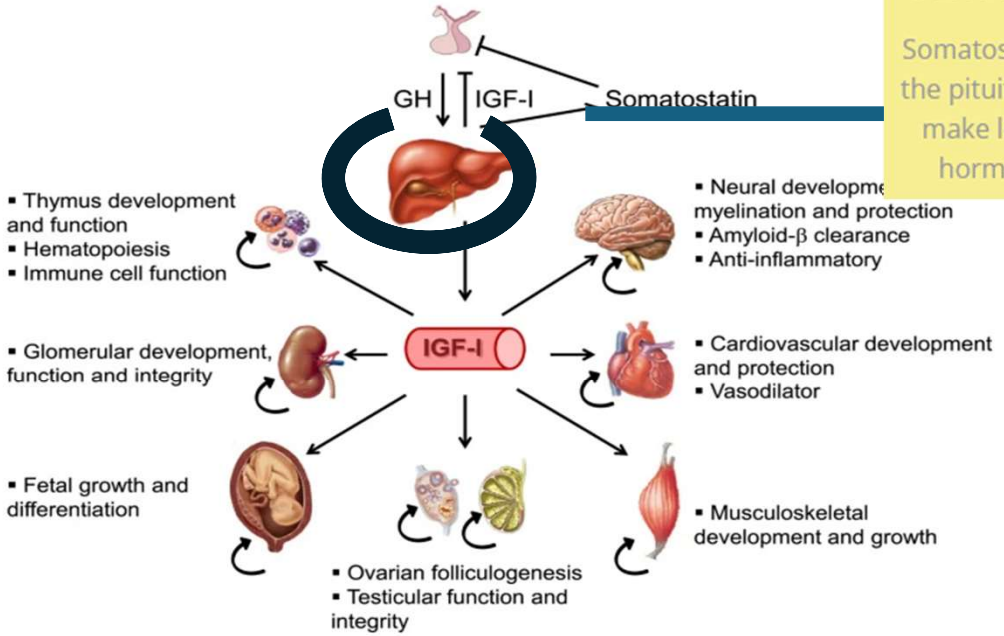
Oxytocin helps the uterus contract and the cervix to dilate in childbirth. It is also important for breastfeeding, where it causes milk to move into the breast, commonly known as the "let-down" response. Oxytocin also plays roles in helping a mother and baby bond, social interaction and anxiety. Oxytocin is made in the hypothalamus and transported to the back part (posterior) of the pituitary gland, where it is stored until needed.

GROWTH HORMONE

GH from the anterior pituitary affects the **liver** by stimulating it to produce IGF-1 (insulin-like Growth Factor 1) which is the mediator of growth hormone. It promotes tissue and bone growth

There is a relationship between IGF-1 and both insulin and diabetes. IGF-1, a hormone produced by the liver in response to growth hormone, can impact insulin sensitivity and glucose metabolism.

Figure 2



Somatostatin

Somatostatin signals the pituitary gland to make less growth hormone (GH).

GH/IGF-I axis and targets. Pituitary GH interacts with GH receptors in hepatocytes increasing IGF-I secretion for endocrinological purposes in different organs, although an autocrine/paracrine IGF-I production by those organs is also present.

Full size image >

tps://translational-medicine.biomedcentral.com/articles/10.1186/1479-5876-10-224/figures/2

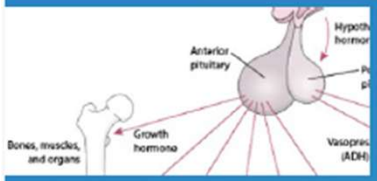
Figure 3

Lifelong physiological properties of IGF-I	Growth	Bone metabolism	Lipid and glucose metabolisms	Neuroprotection	References
	Neurogenesis and synaptogenesis	Anabolizing	Antioxidant and antiinflammatory	Antiapoptotic	15,16, 22, 23, 26-28, 55-88,101-108, 121-133, 156-175, 169, 206, 225-233, 270-275, 290, 295-306, 357-359,398
	Genital development	Proliferative	Hepato- and cardioprotection	Mitochondrial protection	
Processes involved in longevity	Genetic stability	Stress resistance	Metabolic control	Telomere shortening	238

IGF-I

Lifelong beneficial properties of IGF-I. Evolution of IGF-I circulating levels and its pluripotent roles along different stages of human development and aging.

GROWTH HORMONE EXCESS



GIGANTISM

File:Acromegaly classic woman.

Acromegaly is what the condition is called when excessive GH production develops in an adult after he or she has reached their final height. It comes from the Greek words **akron (extremity)** and megas (big). Continued stimulation of tissue growth causes large hands and feet, nose, jaw and forehead, which are the most noticeable features.

[No Title]

Growth plates typically close around the end of puberty:

*girls' plates closing between 13 and 15 years old

*boys' plates closing between 15 and 17 years

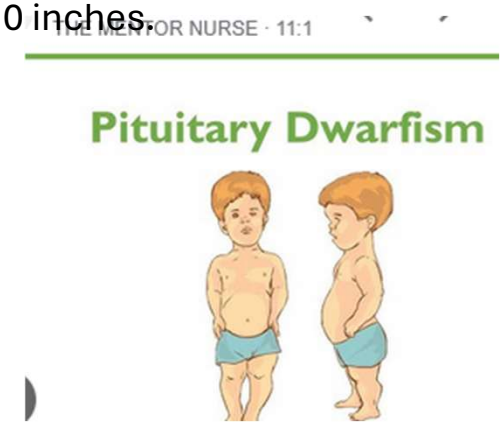
PITUITARY DWARFISM

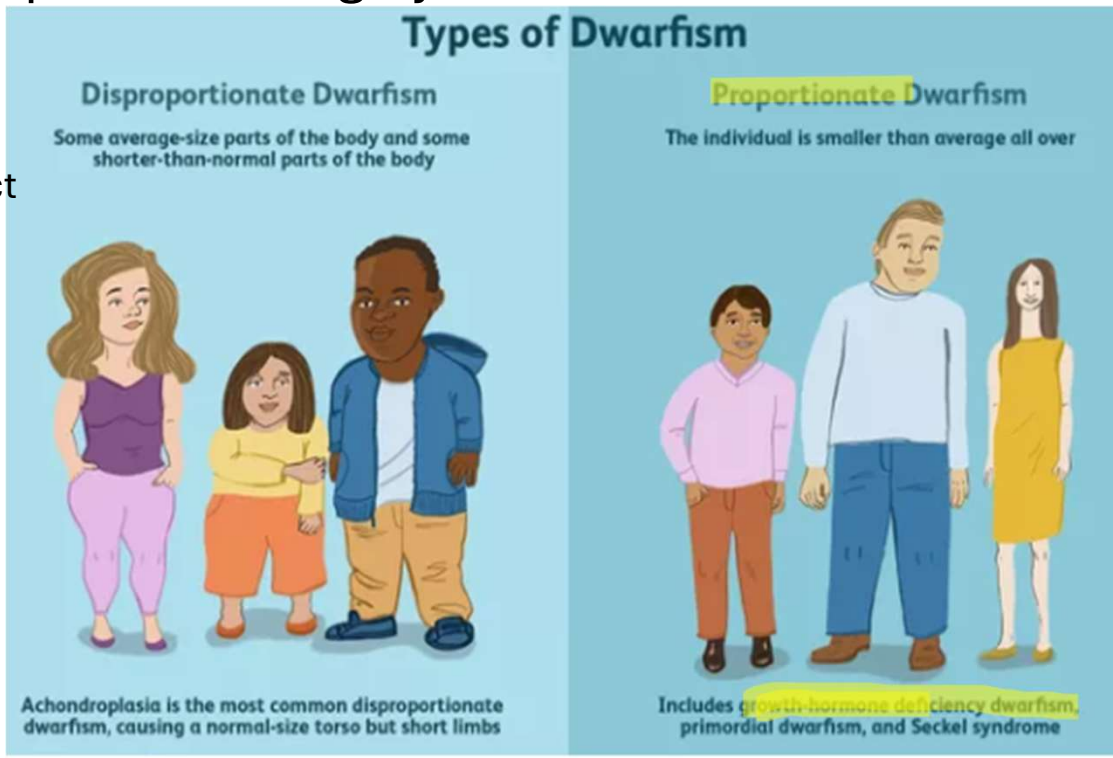
GROWTH HORMONE INSUFICIENCY

There are several kind of dwarfism, but Pituitary DWARFISM are

Generally, of **proportionate** size . Body parts are roughly the same size relative to their height.

Short stature in children or dwarfism may also be the effect of a pituitary tumor by suppressing the release of growth hormone although other causes are more common as congenital or brain injury or radiation.
Dwarfism is a person with an adult height of less than 4 feet, 10 inches.





https://www.verywellhealth.com/how-many-types-of-dwarfism-are-

Prolactinoma

Pituitary gland benign **tumor** that produces excess amounts of the hormone prolactin.

Imaging (CT scan, MRI)

High prolactin levels in blood

Milk production (Galactorrhea)

Amenorrhea/infertility, low libido, hypogonadism, erectile dysfunction.

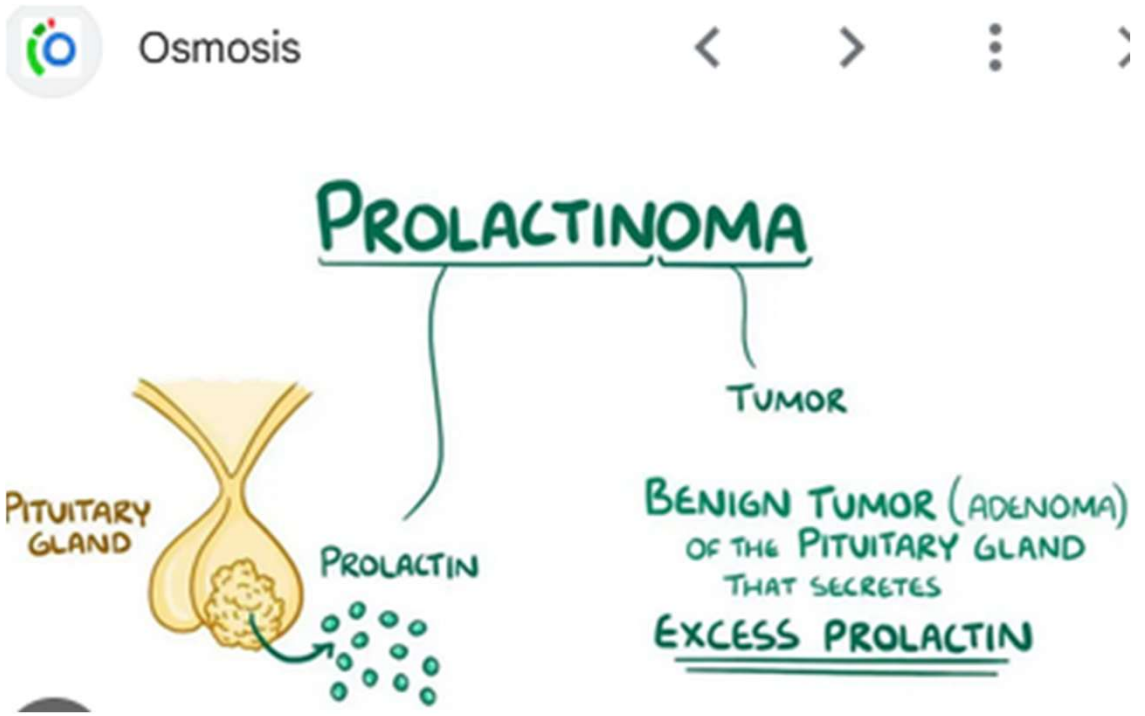
TX: Dopamine **agonist**: BROMOCRIPTINE or CABERGOLINE

A dopamine receptor agonist is a molecule that can interact with the **dopamine receptor** and activates the receptor.

It is like giving Dopamine.

somatostatin, and **dopamine** are released from the hypothalamus into the blood and travel to the anterior pituitary.

Dopamine signals he pituitary gland to stop releasing prolactin.



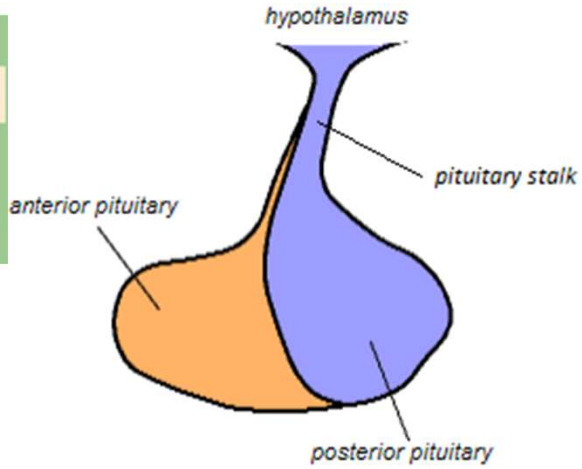
Prolactinoma	8271/0	Pituitary gland C751

PROLACTINOMA

According to the National Institutes of Health , Prolactinomas are the most common secretory tumors of the pituitary gland.

Account for up to 40 % of pituitary adenomas.

Dopamine signals he pituitary gland to stop releasing prolactin.



-Microprolactinoma (< 10 mm)

-Macroprolactinoma (> 10 mm)

-**Giant** prolactinoma (> 4 cm).

Hyperprolactinemia is not always due to prolactinoma.

Other causes: pregnancy, medications, hypothyroidism, and pituitary stalk effect due to other pituitary tumors compressing the stalk and **avoiding release of inhibitory dopamine.**

MASS EFFECT: visual field deficits (most commonly), hypopituitarism (hyposecretion of one or more pituitary hormones), and hyperprolactinemia.

Prolactinoma

Signs and Symptoms:

-Galactorrhea

-Irregular menstrual periods.

-Amenorrhea (absence of menstrual periods)

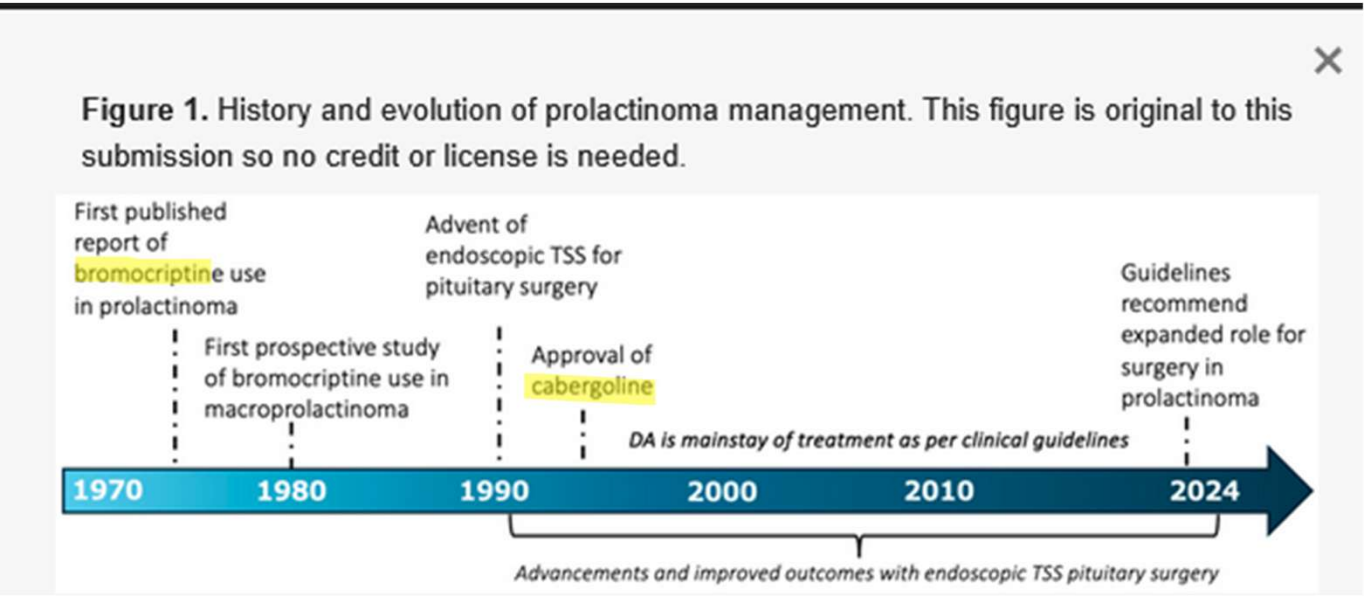
-Reduced libido

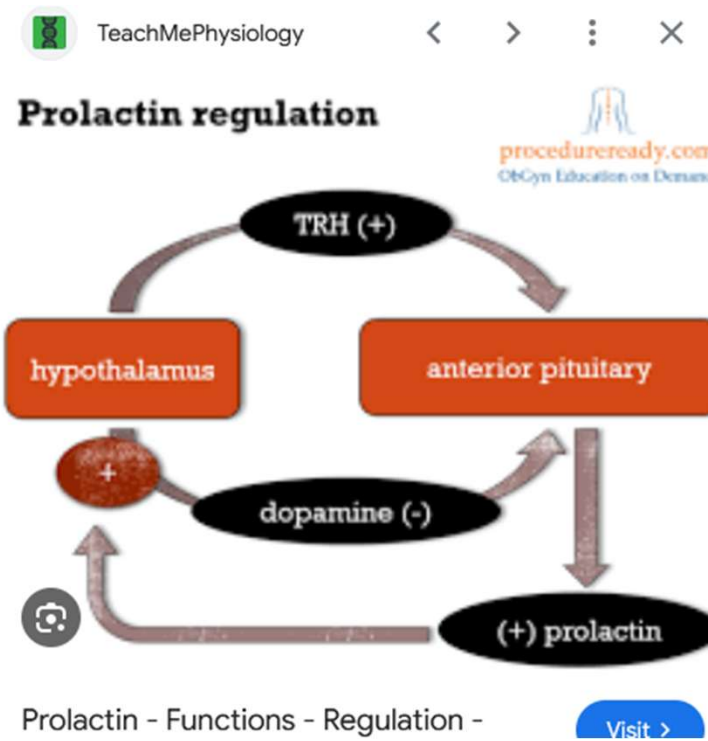
-Erectile dysfunction

PROLACTINOMA

Dopamine inhibits the release of prolactin.

Inhibiting the release of prolactin makes the milk production to stop.





Higher than normal blood prolactin levels causes milk discharge from the breasts. Also, It may cause infertility, absence of menstrual periods

PROLACTINOMA

with galactorrhea (milk production) is possible in men.

GOOD Physical Examination Text:

A 26-year-old man presented with a one-year history of decreased libido and erectile dysfunction. He had no breast tenderness, but he had noticed a white discharge from his nipples after gentle manipulation (Figure 1). He had no history of visual abnormalities or headache and was not taking any medications or illicit drugs.

Dx Confirmation:

Most accurate:

CLINICAL

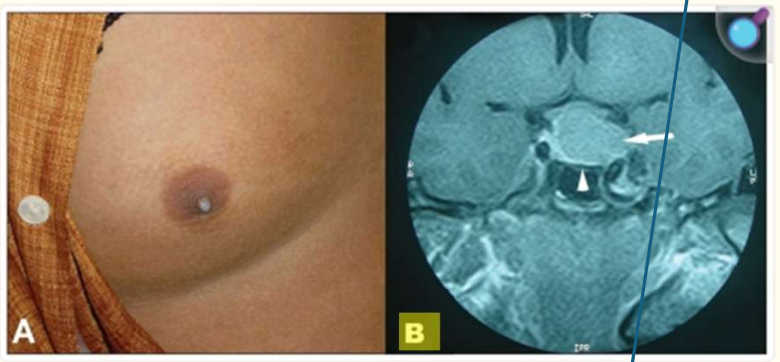
Because it has to correlate with clinical signs galactorrhea (milk production) in this case

Acceptable:

IMAGING

Imaging report will never tell you it is a prolactinoma.

Figure 1. Medications can be a cause of galactorrhea



Bitemporal Hemianopsia

Diplopia

Benign tumor in pituitary gland causing galactorrhea (milk production).

Open in a new tab

(A) White discharge from the right breast of a 26-year-old man after gentle manipulation of the nipple. (B) Magnetic resonance imaging of the head shows a pituitary tumour with suprasellar and parasellar extensions (arrow) and the pituitary fossa (arrowhead).

THYROID cancer

It is the Most common type of Endocrine cancer.

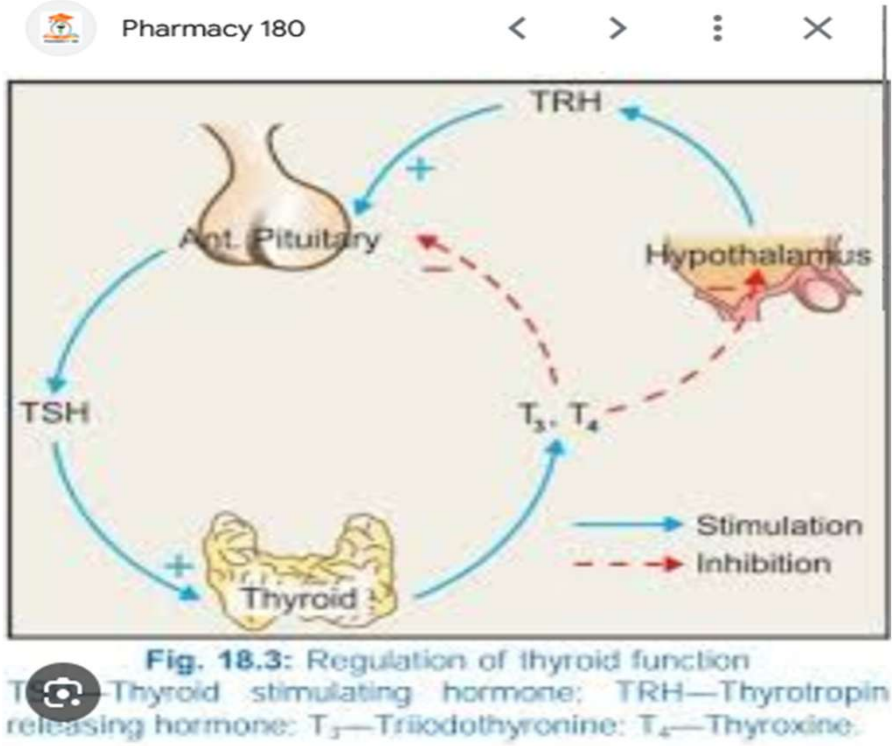
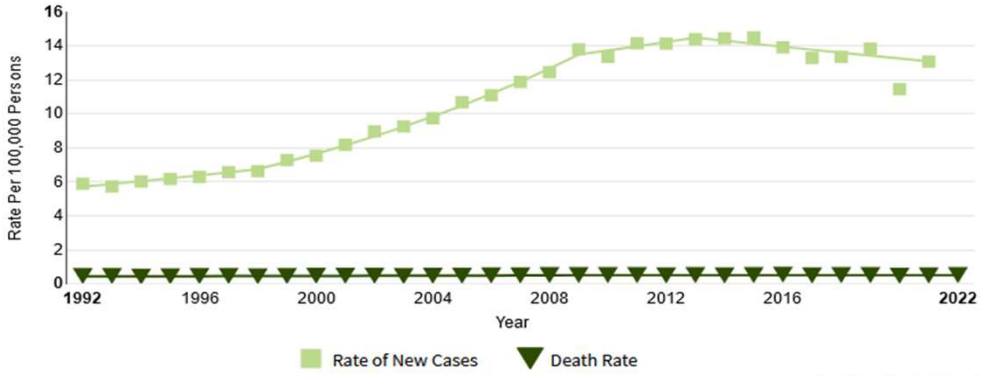


Fig. 18.3: Regulation of thyroid function
TSH—Thyroid stimulating hormone; TRH—Thyrotropin releasing hormone; T_3—Triiodothyronine; T_4—Thyroxine.

Estimated New Cases in 2024	44,020
% of All New Cancer Cases	2.2%
Estimated Deaths in 2024	2,170
% of All Cancer Deaths	0.4%

5-Year Relative Survival
98.4%
2014–2020



New cases come from SEER 12. Deaths come from U.S. Mortality.
All Races, Both Sexes. Rates are Age-Adjusted.
Modeled trend lines were calculated from the underlying rates using the Joinpoint Trend Analysis Software.

Thyroid gland controls growth and how the body uses energy (metabolism).
While thyroid cancer can affect hormone production, elevated T3 and T4 levels are more commonly associated with conditions like Graves' disease (an autoimmune hyperthyroidism) rather than thyroid cancer itself.
Too many active thyroid hormone, your metabolism speeds up.

5-year relative survival rates for Thyroid Cancer

Data from studies 2012 - 2018

Localized PTC:

Survival rates for localized PTC can be extremely high, with some reports indicating a 20-year survival rate above 99%.

Papillary thyroid cancer

SEER Stage	5-Year Relative Survival Rate
Localized	>99.5%
Regional	99%
Distant	74%
All SEER stages combined	>99.5%

Follicular thyroid cancer

SEER Stage	5-Year Relative Survival Rate
Localized	>99.5%
Regional	98%
Distant	67%
All SEER stages combined	98%

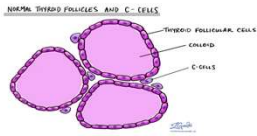
Medullary thyroid cancer

SEER Stage	5-Year Relative Survival Rate
Localized	>99.5%
Regional	92%
Distant	43%
All SEER stages combined	91%

Anaplastic thyroid cancer

SEER Stage	5-Year Relative Survival Rate
Localized	39%
Regional	11%
Distant	4%
All SEER stages combined	8%

THYROID GOITER ...Thyroid cancer?



A goiter is an enlargement of the thyroid gland,

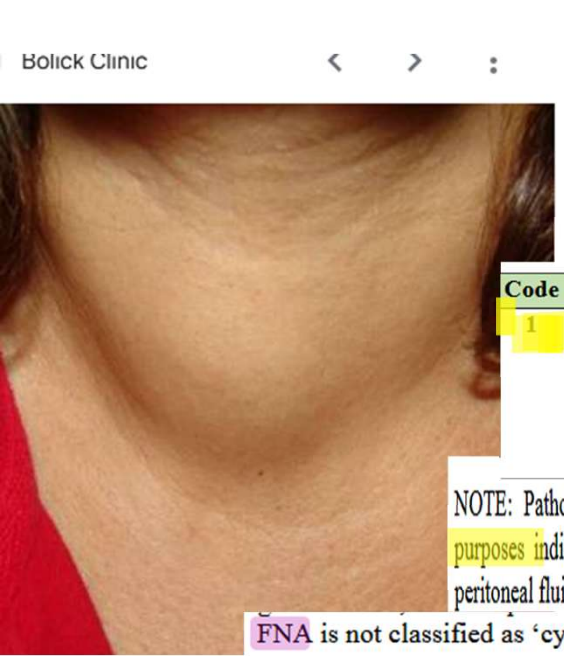
A Goiter can be cancerous.

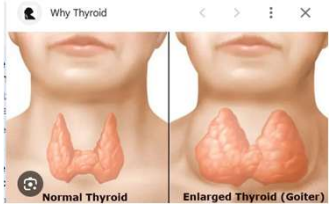
-Needs a neck and thyroid **Ultrasound** and **TSH** (Thyroid stimulating Hormone) measurement in blood to assess proper thyroid function.

-If a suspicious nodule is found (especially 1 cm or greater), FNA may be needed.

-Fine Needle Aspiration (**FNA**) follows!
-FNA should be coded as 1 Histology (Dx Confirmation)

Thyroid **follicles** produce thyroxine (T4) and triiodothyronine (T3) hormones. T3 and T4 require **iodine** for their synthesis. If there is an **iodine deficiency**, the thyroid cannot make sufficient hormone. This stimulates the anterior pituitary to secrete thyroid-stimulating hormone, which causes the thyroid gland to increase in size in a vain attempt to produce more hormones. But it cannot produce more hormones because it does not have the necessary raw material, iodine. This type of thyroid enlargement is called
iodine deficiency goiter





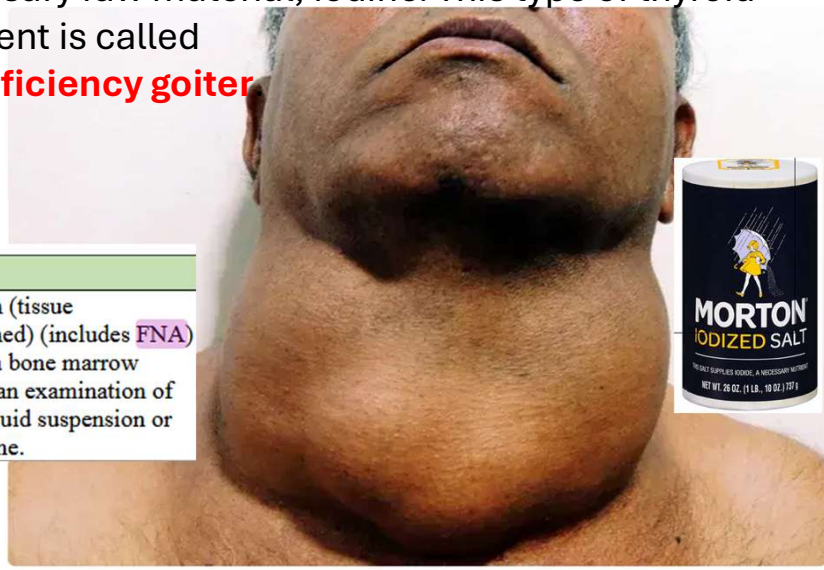
DIAGNOSTIC CONFIRMATION

Code	Description	Definition
1	Positive histology – INCLUDES FNA, bone marrow, peripheral blood smear, CBC, WBC, tissue, core biopsy	Histologic confirmation (tissue microscopically examined) (includes FNA) FNA is comparable to a bone marrow aspiration/bx. It is not an examination of body cavity fluid or a fluid suspension or washings or cells in urine.

NOTE: Pathologists may refer to FNA as 'FNA Cytology' – however, 'cytology' for cancer registry purposes indicates cells suspended in body fluids such as washings, spinal fluid, pleural fluid or peritoneal fluid. FNA does not meet this definition.

DAM 2024 FCDS p.96

FNA is not classified as 'cytology' in cancer registry. FNA is treated as a biopsy Code 1.

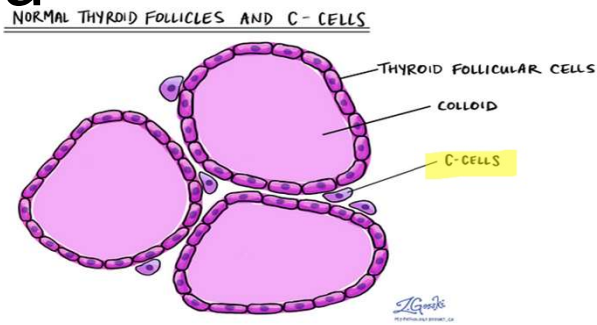


SOURCE: https://www.webpathology.com/images/endocrine/thyroid/thyroid-hyperplasia/4137

Multinodular goiter presenting as a **non-tender swelling** on the anterior aspect of the **neck** in a **60 y/o ma**

Medullary **Thyroid** Carcinoma

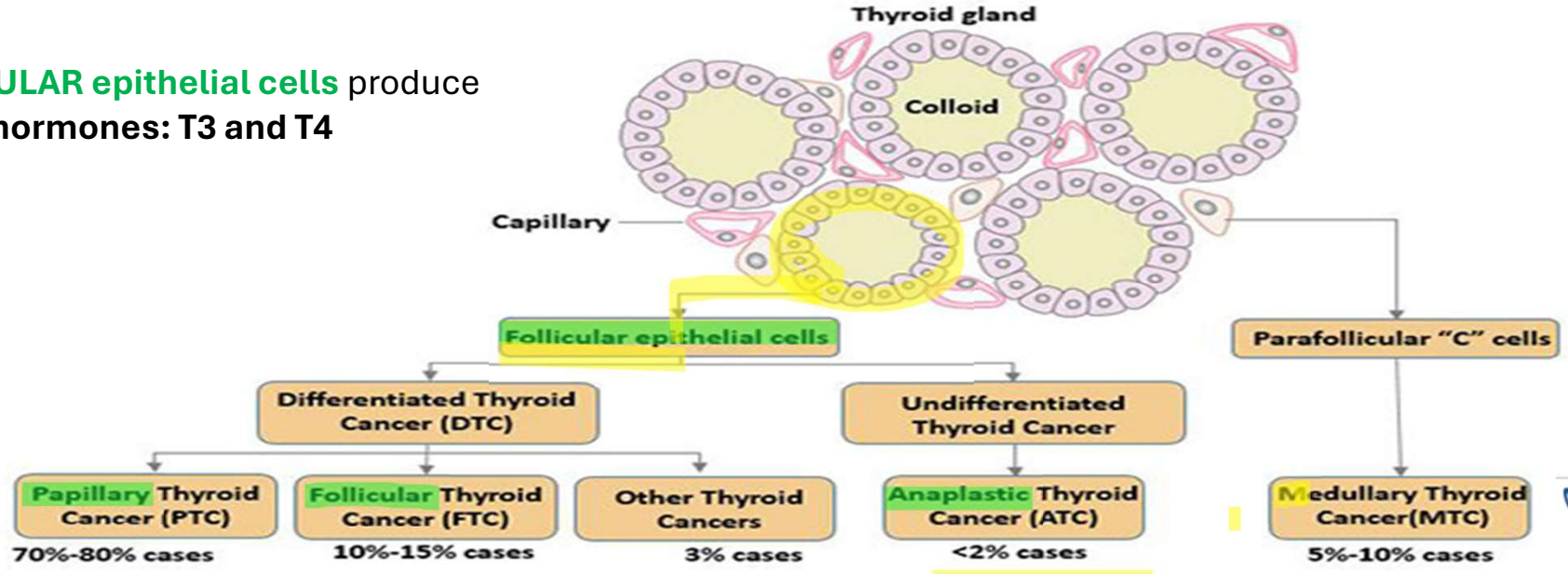
Tumor	Origin	Hormone
Medullary Thyroid	Parafollicular (C-cells) Thyroid	Calcitonin



It is a **Neuroendocrine** tumor, but it is also considered an **ENDOCRINE** tumor because it produces hormones and is part of the endocrine system.

Origin: Thyroid parafollicular C-cells which secrete CALCITONIN (Calcium lowering hormone).

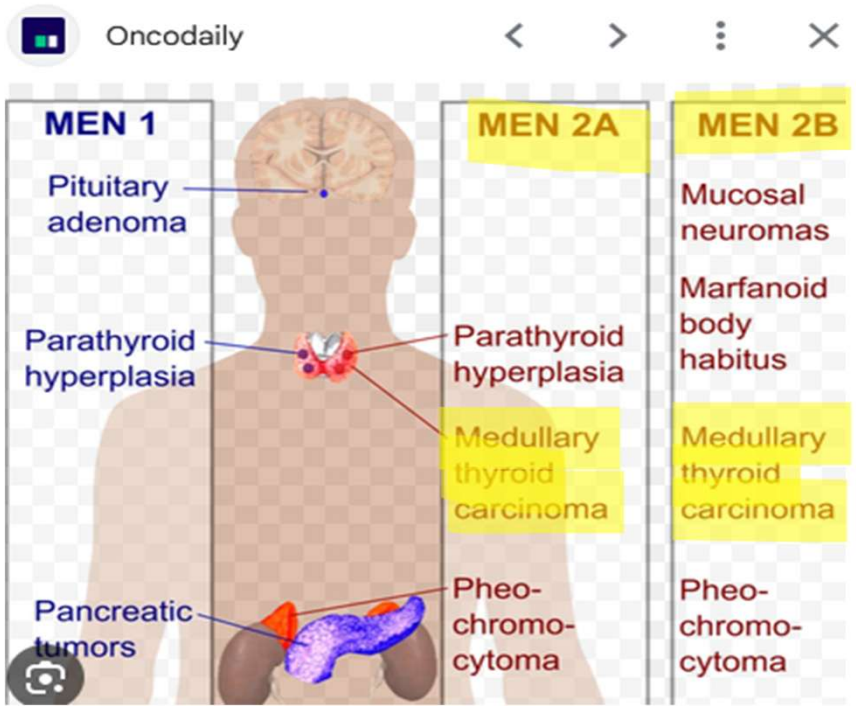
FOLLICULAR epithelial cells produce thyroid **hormones: T3 and T4**

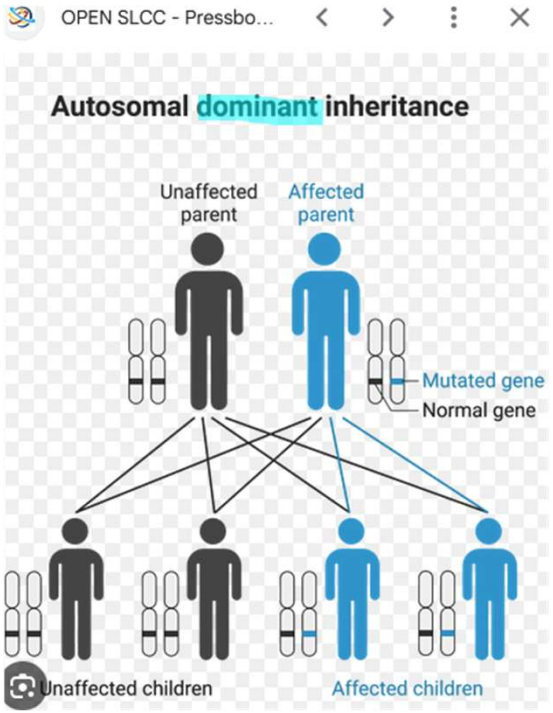


Medullary Thyroid Cancer

- **Sporadic**: Up to **75%** of cases.
  Average 45–55 y/o.
- **Hereditary** **20–25%** of cases. Alterations in the *RET* proto-oncogene.
  Associated with **Multiple Endocrine Neoplasia** type 2 (MEN2) syndrome.
  Age10–20 y/o in MEN2B (formerly known as MEN3)
  Age 25–35 y/o in MEN2A
  Autosomal DOMINANT inheritance.

Surgical removal of the thyroid gland to treat cancer often results in the need for thyroid hormone replacement therapy to manage hypothyroidism.





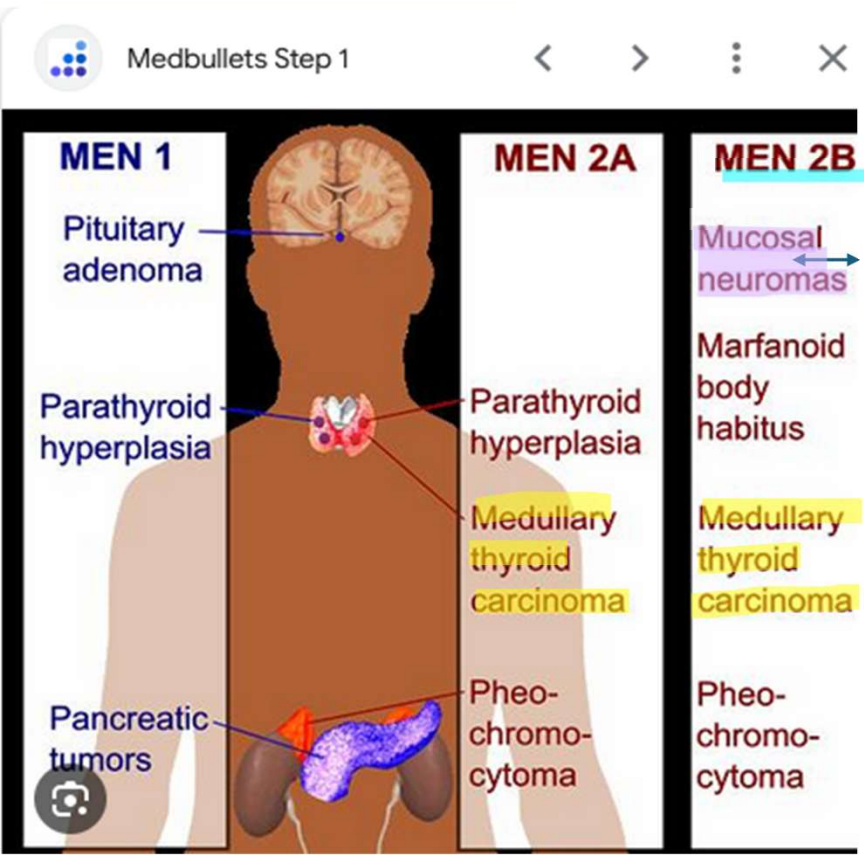
50% chance of passing the mutated gene to each child.

MEN Syndromes

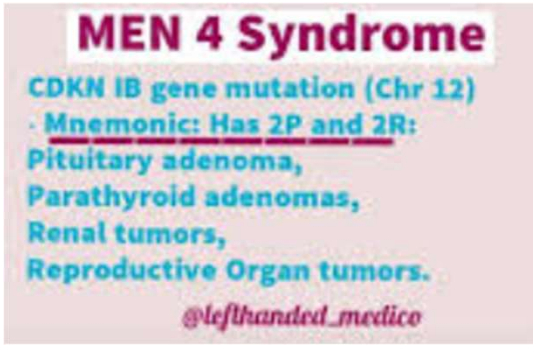
Multiple Endocrine Neoplasia (MEN)

The main characteristic of these syndromes is the development of tumors in multiple endocrine organs. It is a genetic disease caused by mutations of genes that are passed from parents to children with 50% probabilities (Autosomal Dominant)

Medullary thyroid carcinoma is present in MEN 2A and MEN 2B



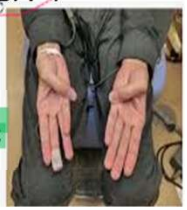
Other names: MEN 3 Sx or Sipple's SX or Mucosal neuroma Sx.



Mutations in **RET proto-oncogene** cause MEN2B (A PROTO-ONCOGENE: normal genes which regulate cell division of living cells)

-Medullary thyroid carcinoma in infancy or childhood
-Pheochromocytoma (Tumor originates from adrenal glands, secrete catecholamines epinephrine, norepinephrine. High B/P)
-Marfanoid habitus (Tall, thin, increased joint laxity)
-Mucosal neuromas (tongue, eyelids, GI tract).

Early recognition of MEN 2B is key in preventing metastatic medullary thyroid.



THYROID coding tip

Do **not** code Papillary Thyroid Microcarcinoma to 8641/3

Code Papillary Microcarcinoma of thyroid to 8260/3

8340/3	8340	3	Related	Papillary and follicular carcinoma	(C73.9)
8341/3	8341	3	Preferred	Papillary microcarcinoma	(C73.9)
8342/3	8342	3	Preferred	Papillary carcinoma, oncocytic variant	(C73.9)

8260/1	8260	1	Preferred	Aggressive papillary tumor	
8260/3	8260	3	Preferred	Papillary adenocarcinoma, NOS	
8260/3	8260	3	Related	Papillary carcinoma of thyroid	(C73.9)
8260/3	8260	3	Related	Papillary renal cell carcinoma	(C64.9)

Rule H19 Code **papillary microcarcinoma of thyroid to papillary adenocarcinoma NOS (8260).**

Note: For thyroid primaries only, the term micropapillary/papillary microcarcinoma does not refer to a specific histologic type. In North America, it means the papillary component of the tumor is minimal or occult.

STR 2025

PARATHYROID glands

Parathyroid hormone **increases** serum <u>calcium</u>.

THYROID gland

Calcitonin hormone from the **thyroid** gland **lowers** <u>calcium</u>

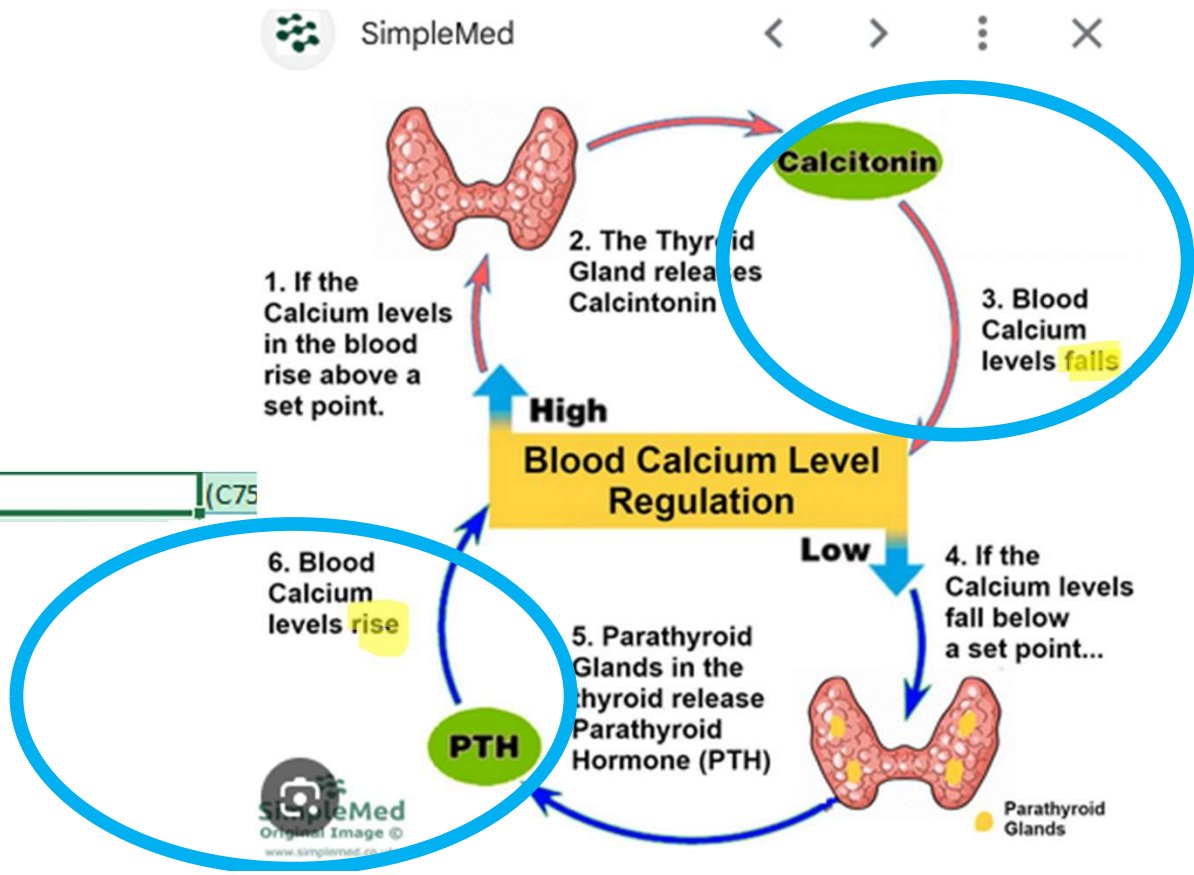
Both regulate blood calcium levels. They act in opposing ways

Parathyroid CARCINOMA.

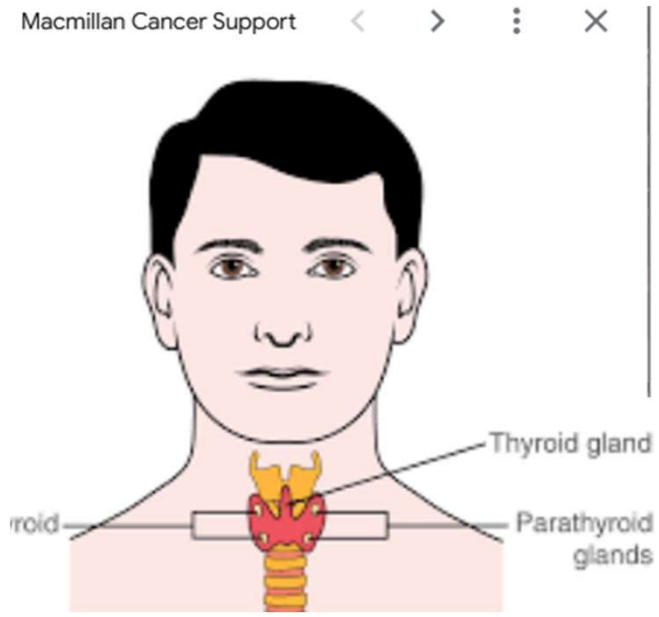
Rare, aggressive. Gives hyperparathyroidism with hypercalcemia (**high** serum **<u>calcium</u>** levels), bone pain, osteoporosis, fractures, kidney stones/damage.

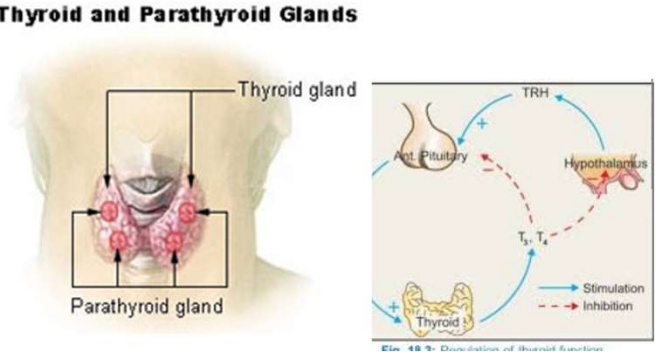
A palpable mass in the neck is present in approximately 50% of patients

8140/3	Parathyroid carcinoma	(C75



PARATHYROID Carcinoma





Parathyroid Carcinoma is an Aggressive cancer. It may metastasize to lung, liver and bones. It has a high recurrence rate.

On Physical Examination, up to 76% of pts have a palpable neck mass.

- **Functional Parathyroid Carcinoma:**
  - -The more common type.
  - The Cancer cause the parathyroid glands to produce excessive parathyroid hormone (PTH), leading to excess of calcium in the blood.
  - •Symptoms related to hypercalcemia: fatigue, gastrointestinal problems, kidney stones, kidney failure, bone pain and pathologic fractures.

- **Non-Functional Parathyroid Carcinoma:**
  - -Less common. < 10% of cases.

8153/3	8153	3	Preferred	Gastrinoma, NOS
8153/3	8153	3	Synonym	G cell tumor, NOS
8153/3	8153	3	Synonym	Gastrin cell tumor

GASTRINOMA (Pancreas, Duodenum, Stomach)

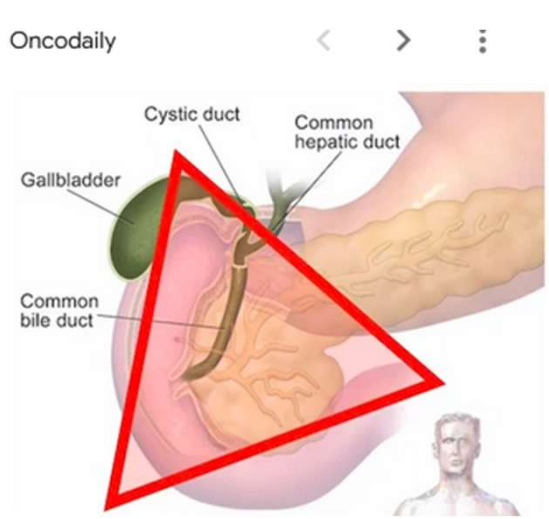
GASTRINOMAS: Endocrine or Neuroendocrine tumor that produces excess of the hormone GASTRIN which elevates gastric acid. Excessive gastrin production causes excessive HCl and promotes the formation of ulcers.

G-cells are endocrine cells in the stomach and duodenum that secrete the hormone Gastrin. Gastrin stimulates the release of hydrochloric acid (HCl).

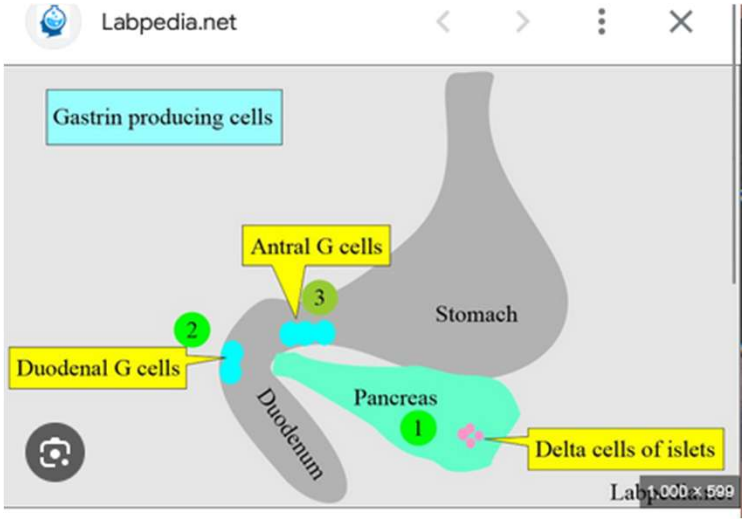
Normally, the **Delta cells** of the **pancreas** secrete **somatostatin**, a hormone that **inhibits acid** production.

However, when there is a **gastrinoma** present in the pancreas, these delta cells transform into malignant cells and start secreting **Gastrin instead**, leading to excess of HCL

Complications: Stomach or duodenal ulcers, GI bleeding, ulcer perforation…



The gastrinoma triangle is an **anatomical region where a majority of gastrinomas are found.** It's roughly defined by the confluence of the cystic and common bile ducts superiorly, the second and third portions of the duodenum inferiorly, and the neck of the pancreas medially. About **80% to 90% of gastrinomas are located within this area.**

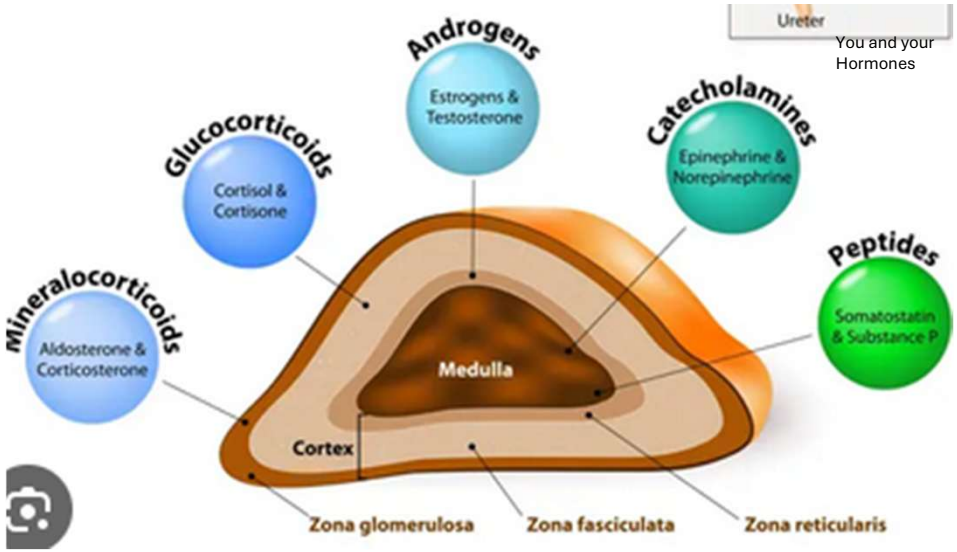


ADRENAL GLAND
CORTEX AND MEDULLA
Hormones

Adrenal **CORTEX** (Essential to life)

The adrenal cortex consists of three different regions: GFR.
Chemically, all the cortical hormones are **steroid**.

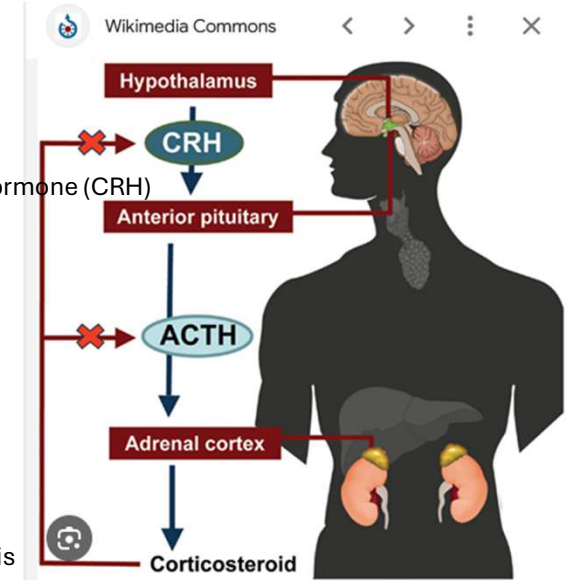
- **Mineralocorticoids** are secreted by the zona glomerulosa. The principal mineralocorticoid is aldosterone, which acts to conserve sodium and water in the body.
- **Glucocorticoids** are secreted by the zona fasciculata. The principal glucocorticoid is cortisol, which increases blood glucose levels.
- **Gonadocorticoids, or sex hormones**. These are secreted by the Zona Reticularis. Male hormones, androgens, and female hormones, estrogens, are secreted in minimal amounts in both sexes, but their effect is usually masked by the hormones from the testes and ovaries. In females, the masculinization effect of androgen secretion may become evident after menopause, when estrogen levels from the ovaries decrease.



Adrenal **MEDULLA** (may be removed with no life-threatening effects)

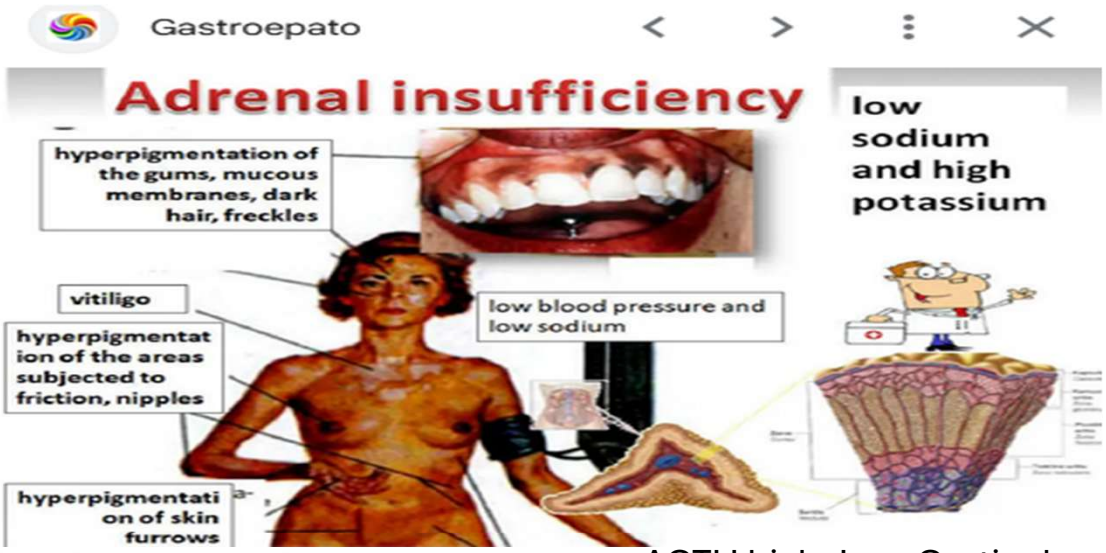
This area secretes two hormones, **epinephrine and norepinephrine**.
Secreted during stressful situations.
Hypersecretion, usually from a tumor, causes prolonged or continual sympathetic responses.

Corticotropin-releasing hormone (CRH)



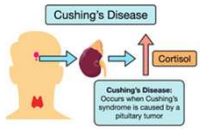
Hypothalamic-Pituitary-Adrenal (HPA) axis

Adrenal Insufficiency (**Addison's disease**) may be a consequence of Cancer or a tumor.



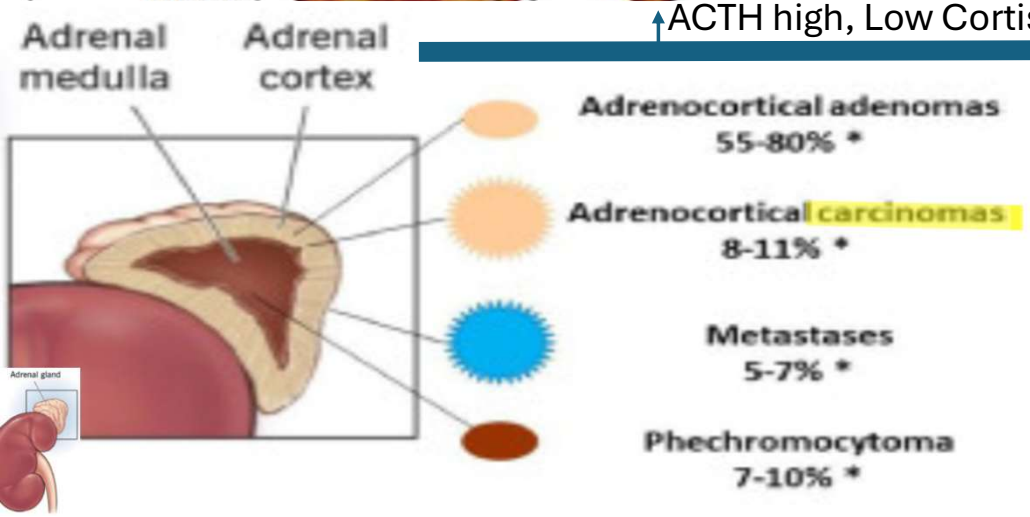
↑ACTH high, Low Cortisol

Cushing's pituitary adenoma tumor make too much ACTH and adrenal gland too much cortisol



Cushing disease: Pituitary adenoma producing excess of Cortisol

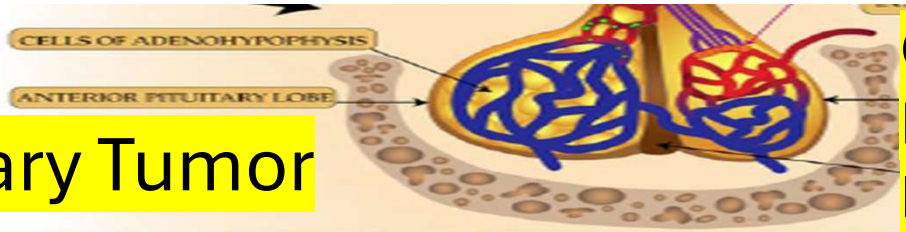
Also, Ectopic Cushing's SYNDROME as lung cancer(**small** cell) can raise ACTH levels and overstimulate the adrenal glands.



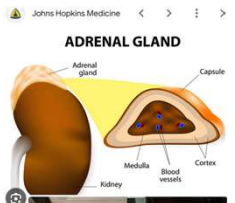
-May be caused by **Adrenal** benign or malignant cancer. The tumor may be **big** enough to **compress** the gland and lead to **hormone disruption** potentially causing insufficiency.

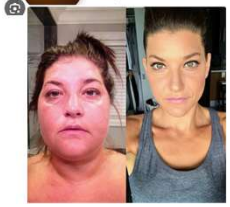
-May be cause by **metastasis** to the adrenal glands from another primary.

Pituitary Tumor



CLINICAL DIAGNOSIS or Imaging?

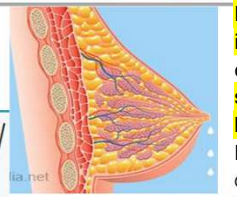




Cushing disease: Pituitary adenoma producing excess of Cortisol

HYPERTHYROIDISM
Thyroid tumor
Accelerated metabolism:
-Tachycardia
-Diarrhea
-Heat intolerance
-Weight loss...

Aldosterone producing Adenomas: Hypertension and low potassium .

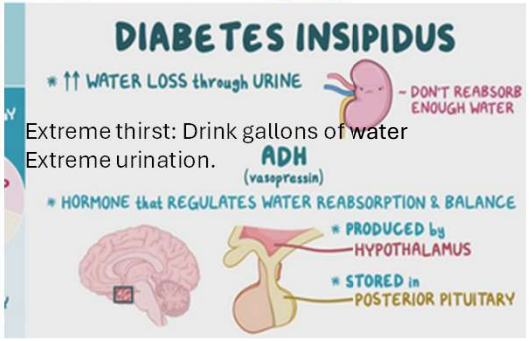


- Milky Nipple

Galactorrhea

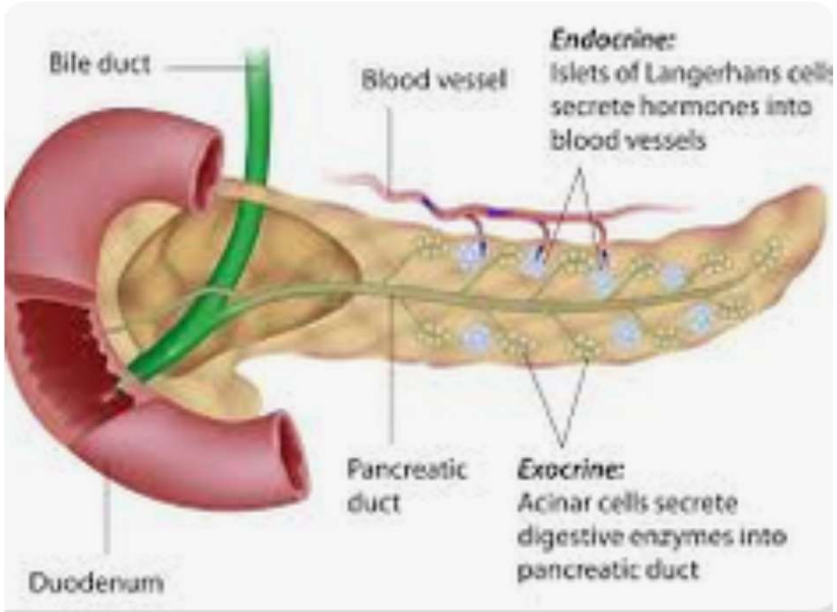
More **ACTH** leads to increased production of **MSH Melanocyte stimulating hormone**.
Hyperpigmentation of skin in Adrenal Insufficiency in some adrenal tumors, Always craving salt bc sodium is low

Oxytocin stimulates contractions for sperm transport.



Extreme thirst: Drink gallons of water
Extreme urination.

PANCREAS



Neuroendocrine Cancer UK

-**EXOCRINE** portion that secretes digestive enzymes (amylase, lipase, protease as trypsin and chymotrypsin) that are carried through a duct to the duodenum. Also, secretes bicarbonate.

-**ENDOCRINE** portion consists of the pancreatic islets, which secrete glucagon, insulin and other hormones.

Beta cells in the pancreatic islets secrete the hormone insulin in response to a high concentration of glucose in the blood.

Alpha cells in the pancreatic islets secrete the hormone glucagon in response to a low concentration of glucose in the blood.

SEER EDUCATION

Glucagon injection is an emergency medicine used to treat severe hypoglycemia (low blood sugar) in diabetes patients treated with insulin who have passed out or cannot take some form of sugar by mouth.

Mayo Clinic

Pancreas

Neuroendocrine tumor NOS 8240 *Note:* Pancreatic neuroendocrine tumor, non-functioning has the following synonyms (they are not subtype/variants): • Clear cell neuroendocrine tumor, non-functioning pancreatic • Cystic neuroendocrine tumor, non-functioning pancreatic • Oncocytic neuroendocrine tumor, non-functioning pancreatic • Pleomorphic neuroendocrine tumor, non-functioning pancreatic	Neuroendocrine tumor, grade 1 PanNET	ACTH-producing tumor 8158 Enterochromaffin-cell carcinoid / Serotonin-producing tumor 8241 Gastrinoma 8153 Glucagonoma 8152 Insulinoma 8151 Neuroendocrine tumor grade 2 / neuroendocrine tumor grade 3 8249 Pancreatic neuroendocrine tumor, non-functioning 8150 (see note for synonyms) Somatostatinoma 8156 VIPoma 8155

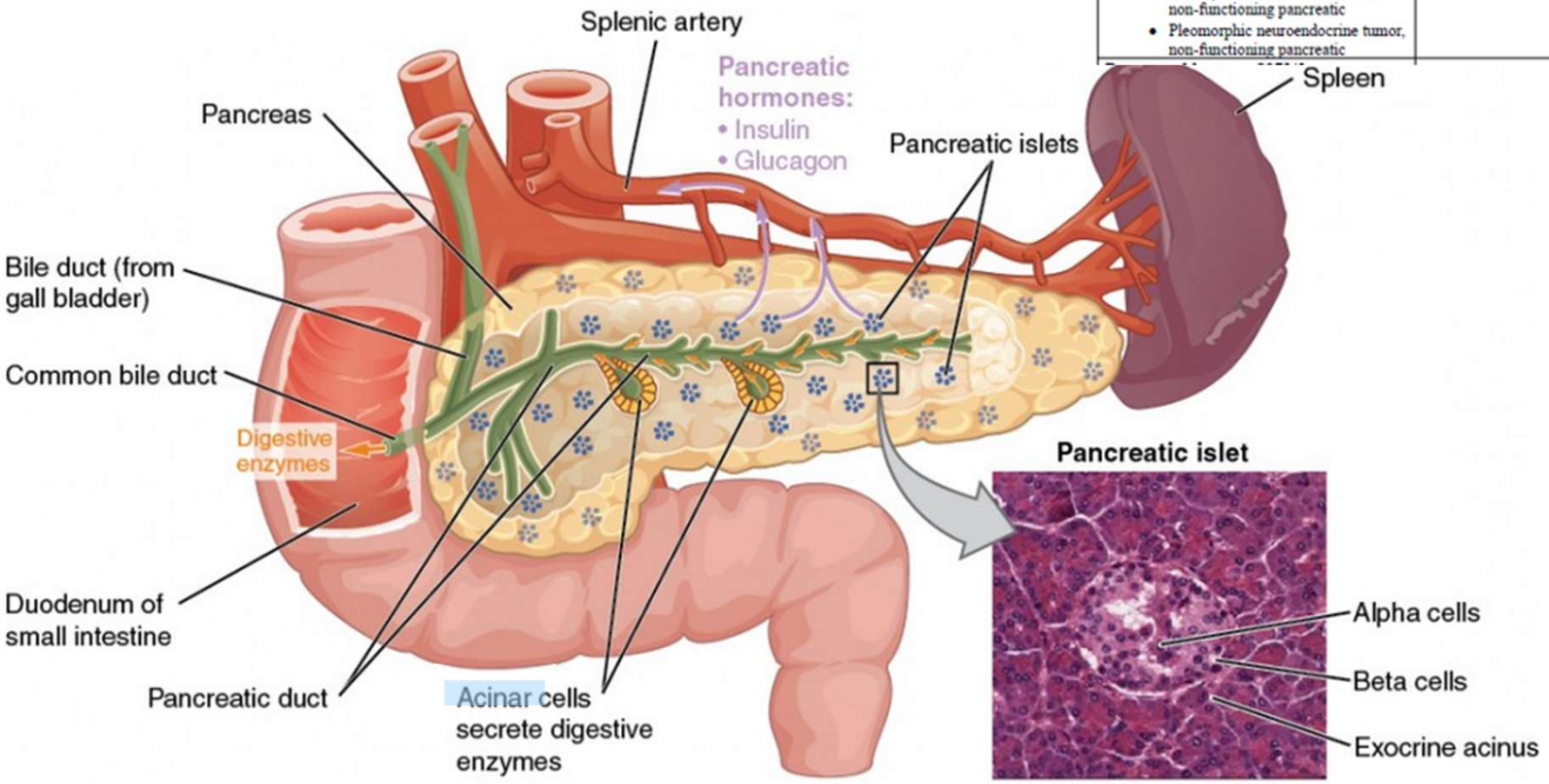


Figure 1. The pancreatic exocrine function involves the acinar cells secreting digestive enzymes that are transported into the small intestine by the pancreatic duct. Its endocrine function involves the secretion of insulin (produced by beta cells) and glucagon (produced by alpha cells) within the pancreatic islets. These two hormones regulate the rate of glucose metabolism in the body. The micrograph reveals pancreatic islets. LM × 760. (Micrograph provided by the Regents of University of Michigan Medical School © 2012)

C25.4 Islets of Langerhans
Islands of Langerhans
Endocrine pancreas

Glucagon. **Glucagonoma**

Insulin. **Insulinoma**

VIPoma. **VIPoma**

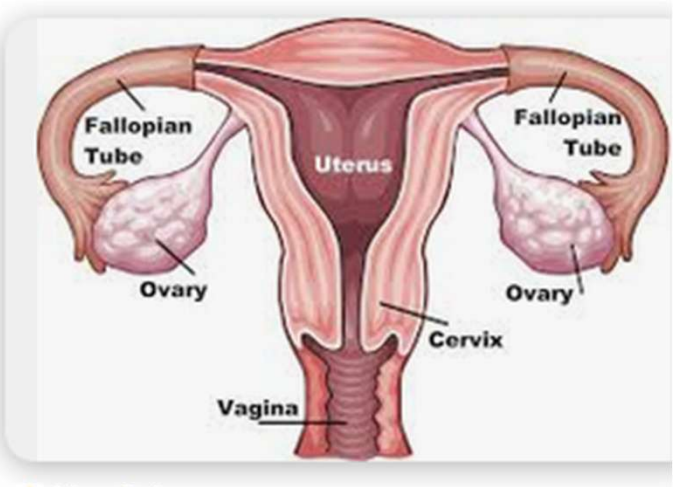
Gastrinoma, Somatostinoma…

OVARIES

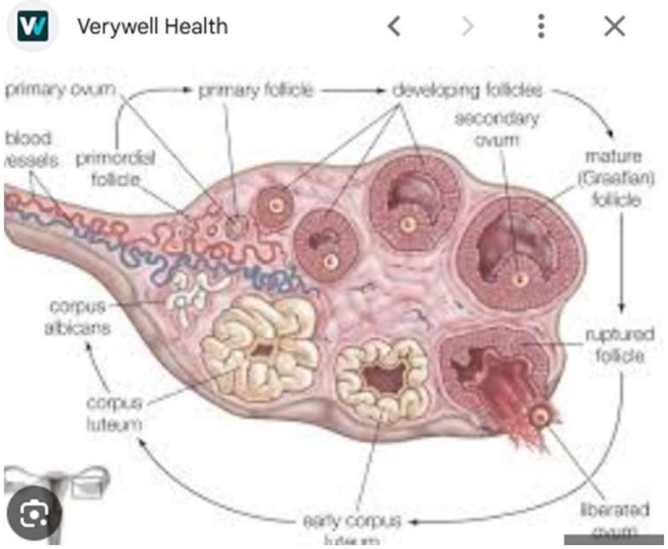
C56 OVARY

C56.9 Ovary

Source of **hormones**: Estrogens, Progesterone, relaxin, inhibin, prostaglandins…



Live Science



Corpus luteum, Latin for "Yellow body"

In a positive pregnancy (HcG +), **HcG hormone** maintains the corpus luteus alive for 3 months to supply estrogens and progesterone while the placenta takes over at 3 months!

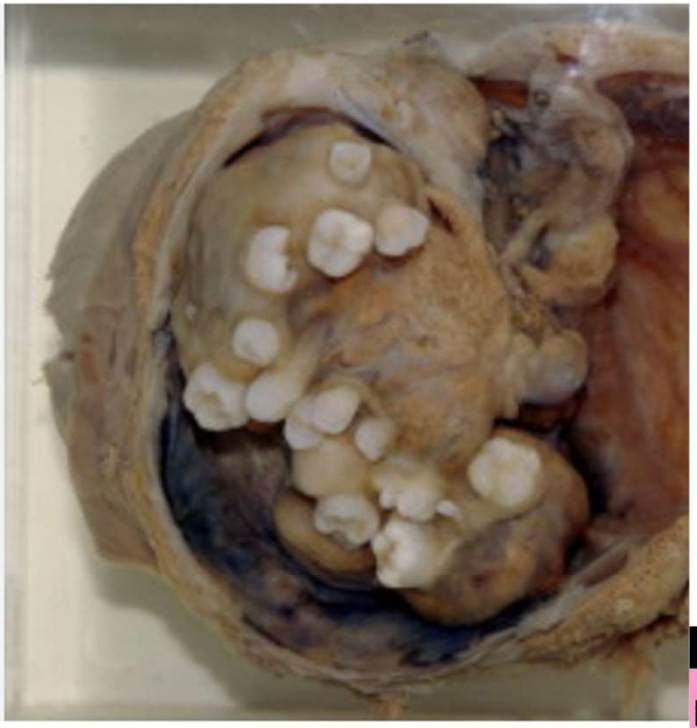
Please code it correctly!

Mistakes in abstracts with Ovary High grade serous carcinoma coded to 8441/3 when the correct code is 8461/3

8441/3	8441	3	Preferred	Serous carcinoma, NOS	
8461/3	8461	3	Preferred	High grade serous carcinoma	(C56.9)

OVARIES, part of Endocrine system

ScienceDirect.com



Ovary Teratoma - an overview |

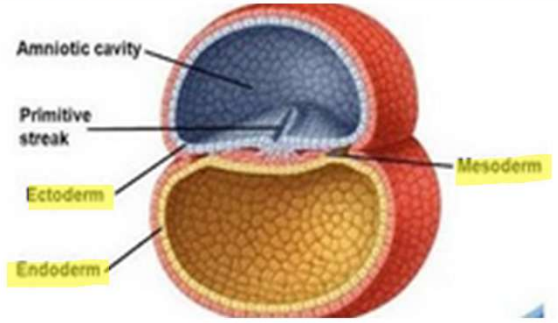
Teratomas in females are usually benign.

Teratomas in males tend to be malignant

For Cases Diagnosed 1/1/2023 Forward

Table 13: Ovary Histologies

Specific and NOS Terms and Code	Synonyms
Steroid cell tumor, malignant 8670/3	
Struma ovarii, malignant 9090/3	
Teratoma with malignant transformation 9084/3	
Undifferentiated carcinoma 8020/3	Dedifferentiated carcinoma

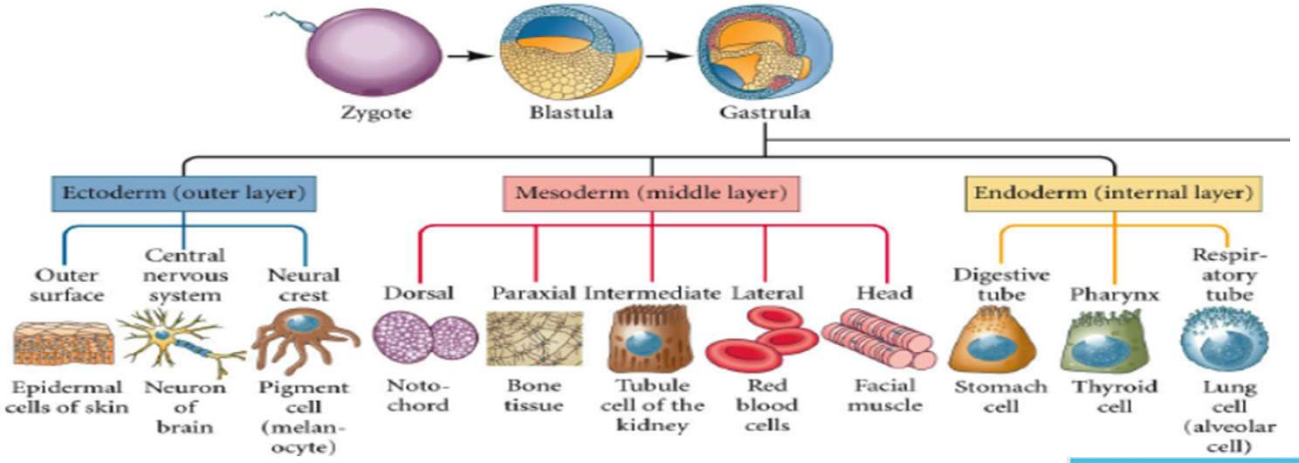


TERATOMA means “monster tumor”

The word "teratoma" is derived from Greek

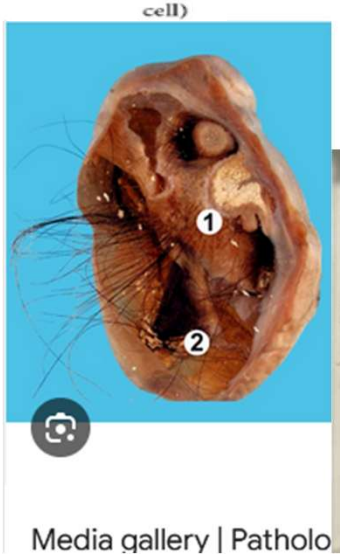
- **Teratos:** Meaning "monster" or "abnormality"

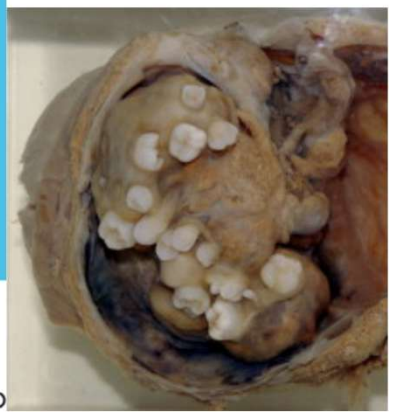
Teratomas develop from the 3 embryonic germ layers: Ectoderm, mesoderm and endoderm.



They may contain bone, cartilage, fat, muscle, hair, teeth, skin.
Teratomas tend to be found in ovaries, testicles and sacrum (tailbone).

0	9080/3	Preferred	Teratoma, malignant, NOS
1	9080/3	Synonym	Embryonal teratoma
2	9080/3	Synonym	Teratoblastoma, malignant
3	9080/3	Related	Immature teratoma, malignant
4	9080/3	Synonym	Immature teratoma, NOS
5	9081/3	Preferred	Teratocarcinoma
6	9081/3	Synonym	Mixed embryonal carcinoma and teratoma
7	9081/3	Related	Teratocarcinosarcoma
8	9082/3	Preferred	Malignant teratoma, undifferentiated
9	9082/3	Synonym	Malignant teratoma, anaplastic
0	9083/3	Preferred	Malignant teratoma, intermediate
5	9084/3	Preferred	Teratoma with malignant transformation
6	9084/3	Synonym	Teratoma with somatic type malignancies
7	9084/3	Synonym	Dermoid cyst with malignant transformation
8	9084/3	Synonym	Dermoid cyst with secondary tumor
9	9085/3	Preferred	Mixed germ cell tumor
0	9085/3	Related	Mixed teratoma and seminoma





-Not to be confused with Spina Bifida-

Partners in Care
Sacrococcygeal teratomas ...

OVARY… Teratomas and serous carcinomas

Schema ID#	Schema ID Name	Active years
00551	Ovary	2018+
00552	Primary Peritoneal Carcinoma	2018+
00553	Fallopian Tube	2018+

Note 1: Grade Clinical must not be blank.

Note 2: Assign the highest grade from the primary tumor assessed during the clinical time frame.

Note 3: If there are multiple tumors with different grades abstracted as one primary, code the highest grade.

Note 4: The grading system for this Staging System is based on histology

- Immature teratomas and serous carcinomas: Use codes L, H, or 9. This include the following ICD-O-3 codes: 8441/2, 8441/3, 8460/3, 8461/3, 8474/3, 9080/3
- All other histologies: Code 1-3 if a nuclear grade is documented, otherwise code 9
- If your registry collects ovarian borderline tumors (/1), code "B" for grade

Note 5: G3 includes anaplastic.

Code	Grade Description
1	G1: Well differentiated
2	G2: Moderately differentiated
3	G3: Poorly differentiated, undifferentiated
B	GB: Borderline Tumor
L	Low grade
H	High grade
9	Grade cannot be assessed (GX); Unknown

8441/3	Serous Carcinoma
8460/3	Low Grade Serous Carcinoma
8461/3	High Grade Serous Carcinoma
9080/3	Teratoma, malignant, NOS

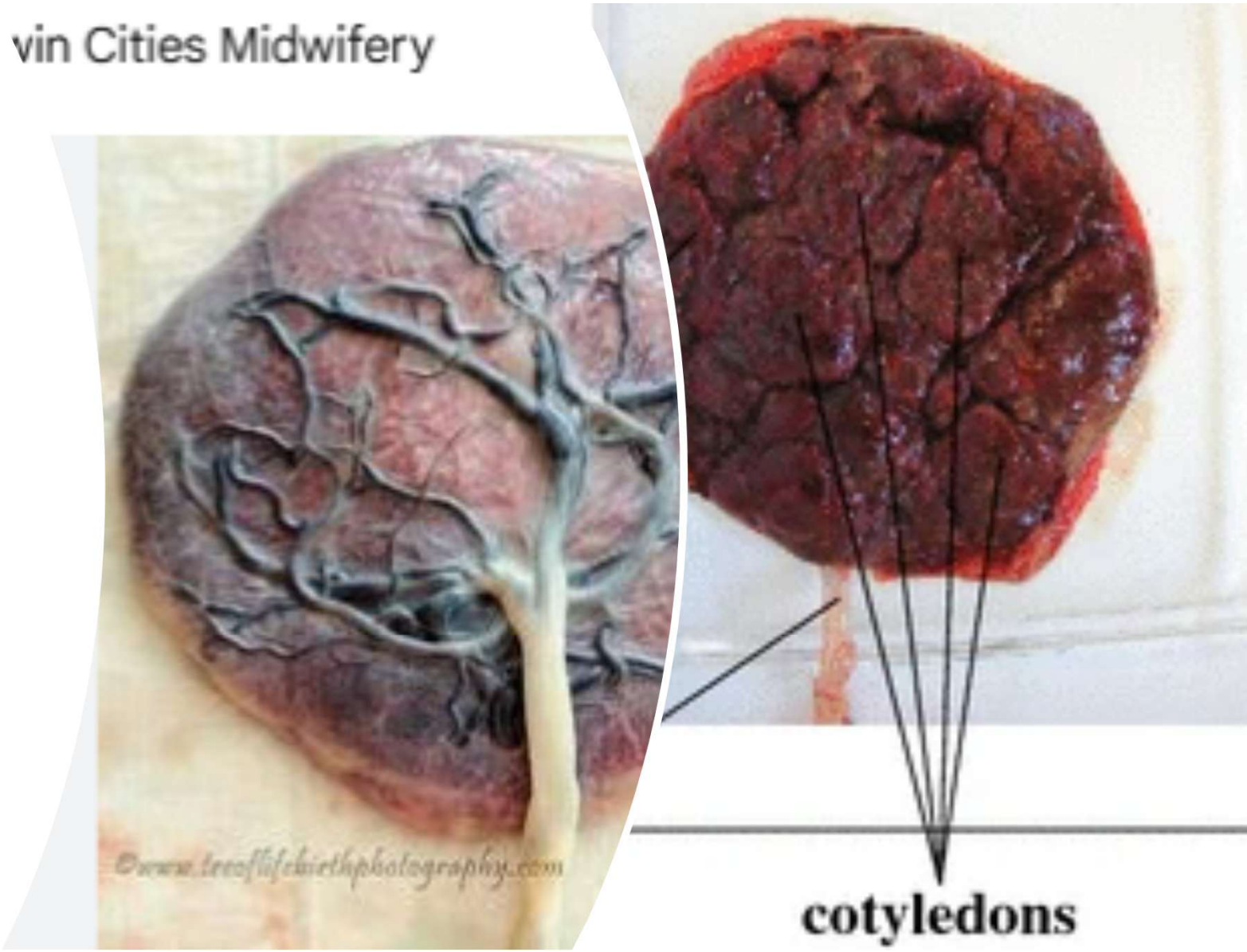
PLACENTA

Why is the placenta an endocrine organ?

Produces **hormones** necessary to maintain the pregnancy: **Estrogen**, **Progesterone**, **hcG**, Human Chorionic Gonadotropin, Human Placental Lactogen (hPL), Placental Growth Hormone PGH.

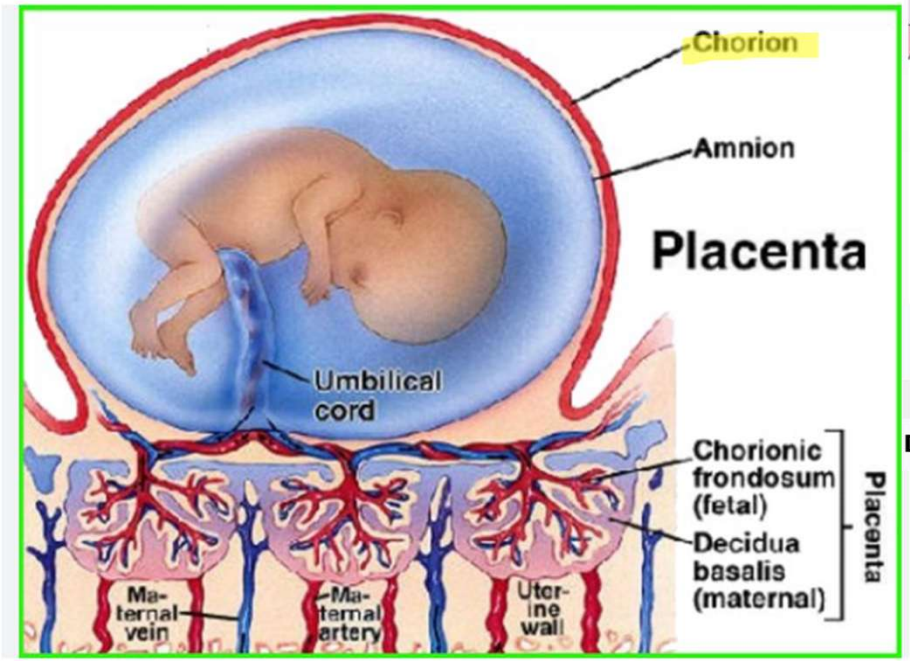
Cancers from placental tissue are known as GESTATIONAL TROPHOBLASTIC DISEASE:

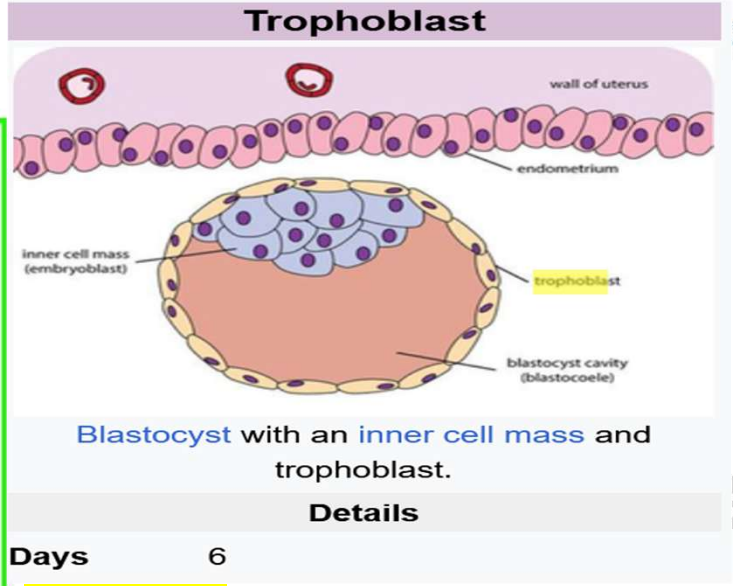
-Choriocarcinoma is the most common.

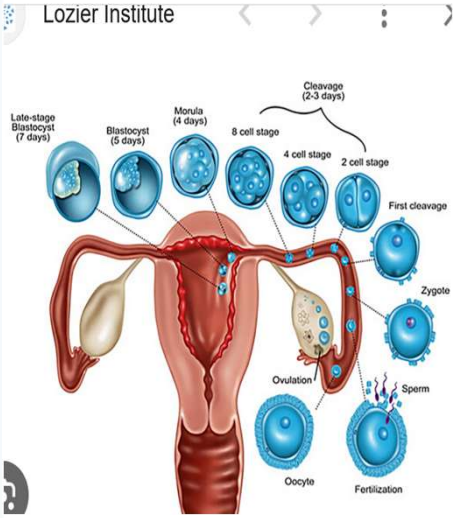


Choriocarcinoma

Dictionary Oxford ·**Cho·ri·on** The outermost membrane surrounding an embryo, it contributes to the formation of the placenta







Trophoblast A thin layer of cells that helps an embryo attach to the wall of the uterus, protects the embryo, and forms a part of the **placenta**.

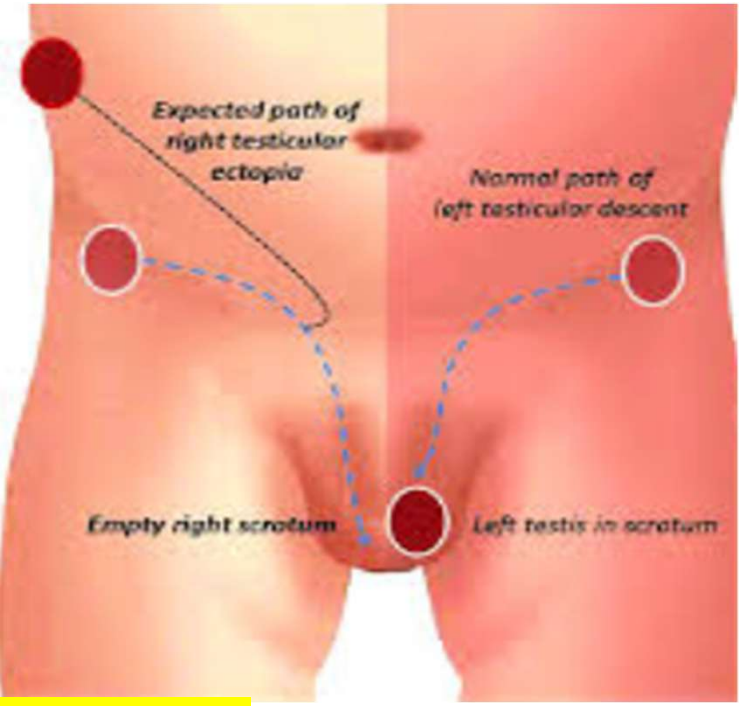
C58 PLACENTA

C58.9 Placenta
Fetal membranes

9100/1	Synonym	Malignant hydatidiform mole
9100/3	Preferred	Choriocarcinoma, NOS
9100/3	Synonym	Chorioepithelioma
9100/3	Synonym	Chorionepithelioma
9101/3	Preferred	Choriocarcinoma combined with other germ cell elements
9101/3	Synonym	Choriocarcinoma combined with embryonal carcinoma
9101/3	Synonym	Choriocarcinoma combined with teratoma
9102/3	Preferred	Malignant teratoma, trophoblastic
9103/0	Preferred	Partial hydatidiform mole
9104/1	Preferred	Placental site trophoblastic tumor
9105/3	Preferred	Trophoblastic tumor, epithelioid

Choriocarcinoma in MEN usually in TESTES

Men can develop choriocarcinoma. A **NON-GESTATIONAL FORM**, because it originates from pluripotent germ cells, not just from placenta forming cells.



Cryptorchidism: a condition in which one or both of the testes fail to descend from the abdomen into the scrotum.

Pathophysiology and Etiology

Choriocarcinoma recapitulates placental tissue development. For unknown reasons, it metastasizes early via hematogenous routes to the lung, liver, and brain, among others. [3, 5]

Patients with a history of cryptorchidism are at a greatly increased risk of testis cancer (by a factor of 10-40 times). Abdominal undescended testis is associated with a greater risk than the inguinal form. An abdominal testis cancer is more likely to be seminoma, while cancer in a testis that was surgically brought to the scrotum via orchiopexy is more likely to be an NSGCT. Orchiopexy allows for earlier detection by physical examination but does not alter the risk of GCT. Ten percent of patients with a GCT have a history of cryptorchidism. In a series of 125 patients with a history or clinical evidence of cryptorchidism and testis tumor, 3 (2%) were pure choriocarcinoma, which is similar to the overall incidence of choriocarcinoma among GCTs. [6]

SOURCE: https://emedicine.medscape.com/article/435577-overview#a9

C62 TESTIS

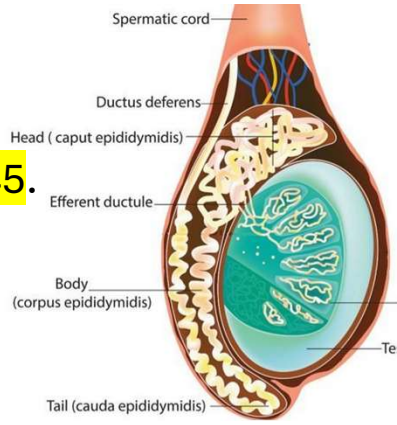
C62.0 **Undescended testis** *(site of neoplasm)*
Retained testis *(site of neoplasm)*
Ectopic testis *(site of neoplasm)*

C62.1 **Descended testis**
Scrotal testis

Testis are part of the endocrine system as they secrete **testosterone**
Testicles ideal temperature, 93.2°F (34°C).
Orchiopexy: a surgical procedure used to move an undescended testicle into the scrotum.

Testicular Cancer

Alpha-fetoprotein (AFP) and human chorionic gonadotropin (**HCG**)↑ When these tumor markers are in the blood, it suggests that there's a **testicular** CANCER Age 15-year-old to 45. Peak incidence 20-34 y/o. American Cancer Society



- **Non-seminomas** often raise AFP and/or **HCG** levels. **Choriocarcinoma** is a non-seminoma.
- Pure **seminomas** occasionally raise **HCG** levels but never AFP levels.
- **Germ cell tumors** of the ovary and **testicle**

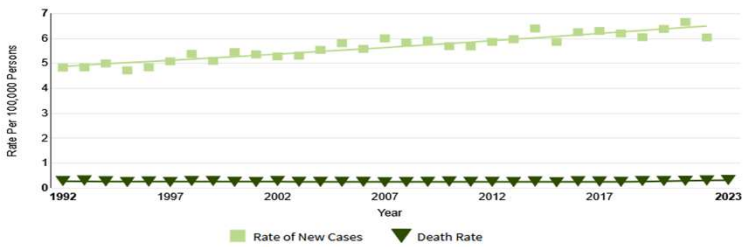
At a Glance

Estimated New Cases in 2025	9,720
% of All New Cancer Cases	0.5%
Estimated Deaths in 2025	600
% of All Cancer Deaths	0.1%

5-Year Relative Survival

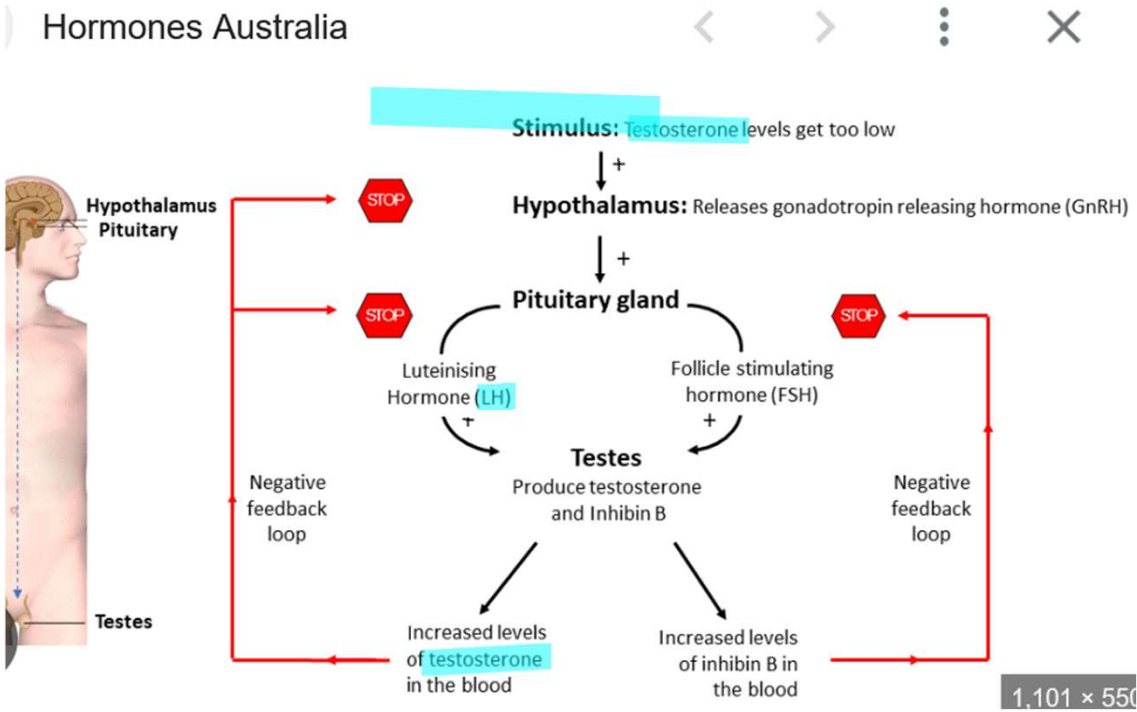
94.9%

2015–2021



Testicular germ cell tumors represent the most common malignancy among young men. While 5-year overall survival and cure for this population is greater than 95%, choriocarcinoma is an aggressive subtype of this disease with far worse prognosis--5-year survival for choriocarcinoma is less than 80%.

https://pubmed.ncbi.nlm.nih.gov/25645112/



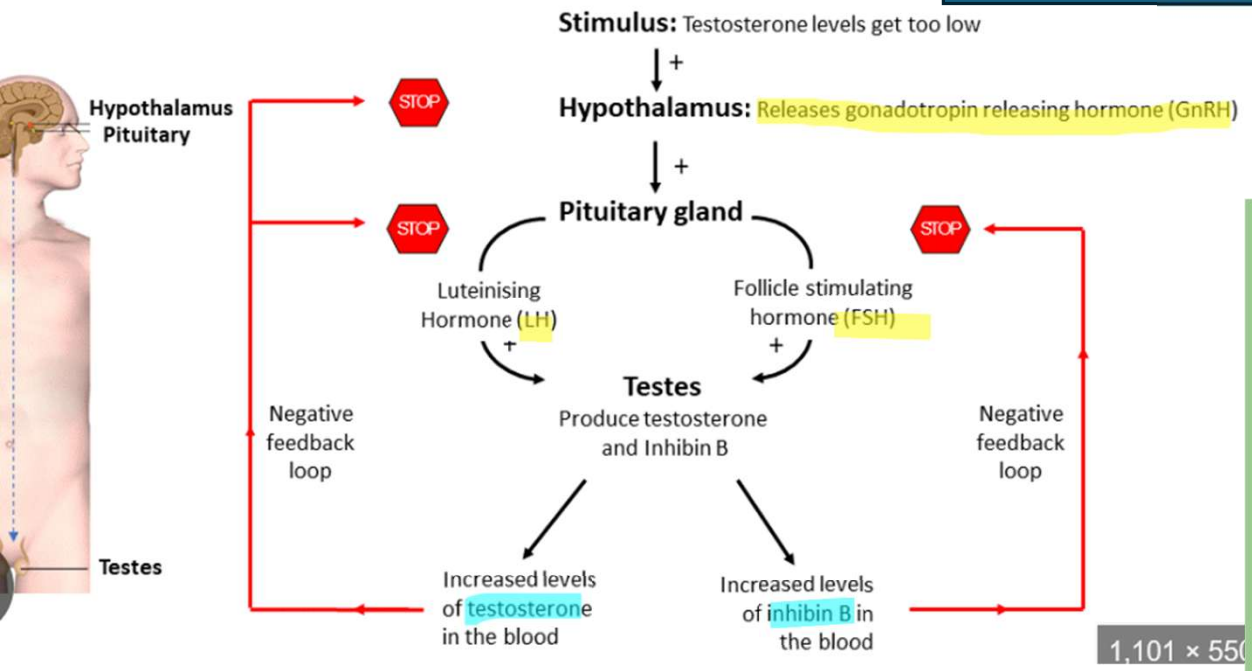
TESTES, part of the Endocrine system

They produce and release hormones into the blood stream:

- Testosterone
- Inhibin B
- Anti-Mullerian hormone

Hormones Australia

FSH: Regulate Spermatogenesis (sperm production).
LH: Stimulate Leydig cells to produce Testosterone



Inhibin B

Inhibin B is released from the Sertoli cells in the seminiferous tubules of the testes. It plays a key role in regulating follicle stimulating hormone (FSH) release from the pituitary gland.

Anti-Mullerian hormone (AMH)

is important for sex differentiation in the unborn baby during early pregnancy. It is produced in male babies by the testes, where it shuts down the development of Mullerian (female) ducts. These ducts would otherwise develop into parts of the female reproductive tract (fallopian tubes, uterus and vagina). This allows the development of the epididymis, vas deferens and the seminal vesicles of the testes. (Hormones Australia)

Persistent Mullerian duct syndrome: **Males with uterus**, fallopian tubes...

Persistent Mullerian duct syndrome with ectopic testis

The Müllerian ducts are paired tubes that grow into female reproductive organs early in fetal development. The ducts form the uterus, cervix, fallopian tubes and upper vagina.

8950/3 Mullerian mixed tumor (C54._)

In males, the MULLERIAN DUCT typically regresses under the influence of male hormones: ANTI-Mullerian hormone AMH

C62 TESTIS

C62.0 Undescended testis *(site of neoplasm)*
Retained testis *(site of neoplasm)*
Ectopic testis *(site of neoplasm)*

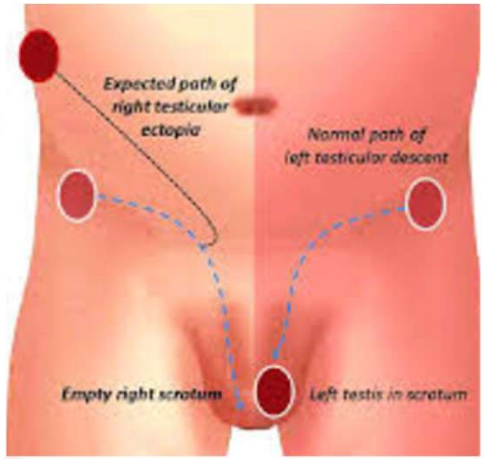
C62.1 Descended testis
Scrotal testis

C62.9 Testis, NOS
Testicle, NOS

Case presentation

27 years male, married with a baby presented with history of swelling and pain in left inguinal region. On examination, there was reducible swelling in left inguinal region. External genitalia examination showed normal secondary sexual character development. Right testis was not palpable. USG showed normal left testis with inguinoscrotal hernia in left side, with right undescended testis in right inguinal region. Right inguinal exploration was done but we could not find the testis in right side. Left inguinal exploration showed uterus like tissue with tubal structures (Fig. 1). Testis like structure was also present in the left inguinal region which was the ectopic testis from right side. Normal left testis was present in left scrotum (Fig. 2). Removal of the inguinal testis with uterus and its tubal structures was done preserving the vas deferens of left testis. Left orchidopexy was done.

https://www.sciencedirect.com/science/article/pii/S2214442019300877

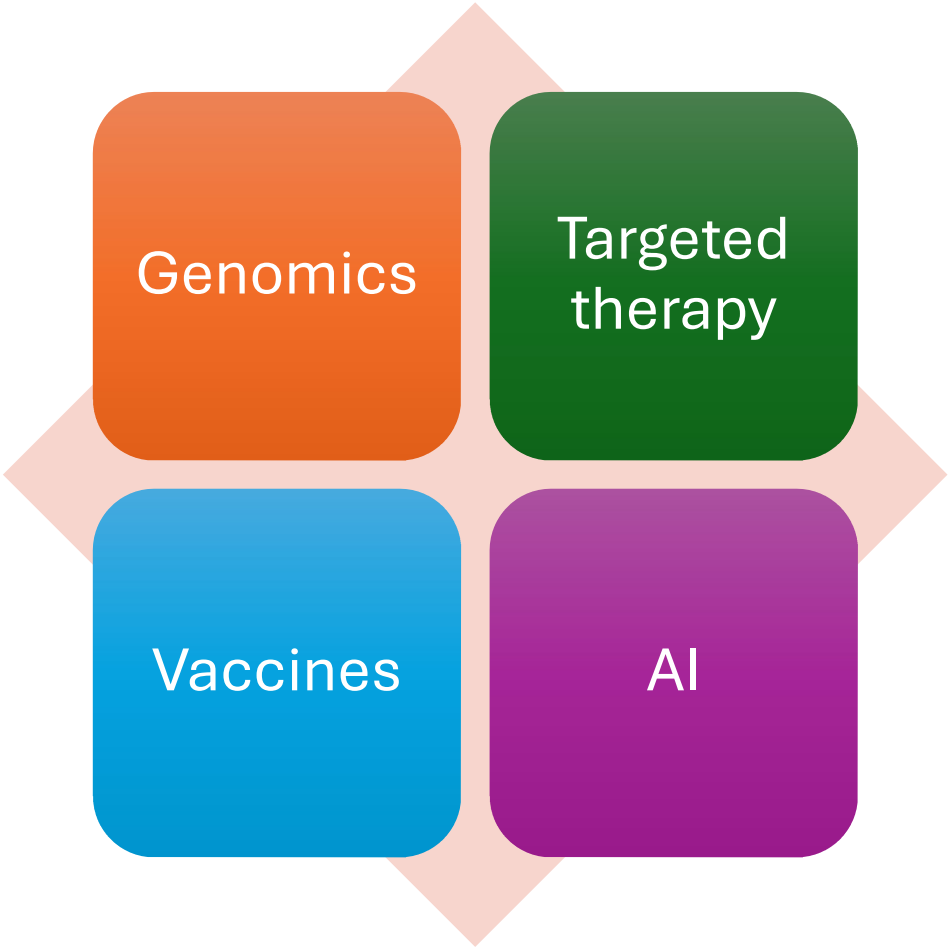


Anti-Mullerian hormone (AMH)

is important for sex differentiation in the unborn baby during early pregnancy. It is produced in male babies by the testes, where it shuts down the development of Mullerian (female) ducts. These ducts would otherwise develop into parts of the female reproductive tract (fallopian tubes, uterus and vagina). This allows the development of the epididymis, vas deferens and the seminal vesicles of the testes. (Hormones Australia)

We do not know if the pathologist reported a testicular cancer or not. However, even if it was not cancer at the time, this person has a history of cryptorchidism and he is at an increased **risk of developing cancer by a factor of 10 to 40 times** in the future. Cryptorchidism = Undescended testicle

Better Biomarkers
Better Treatment
Better Technology



Better BIOMARKERS

ANALYTE definition: A substance whose chemical constituents are being identified and measured.

-Limitations of Classic Biomarkers
-New biomarkers has focused on molecular methods that measure multi-analyses through statistical algorithms.
- Analytes are genomic and proteomic biomarkers that can be detected in peripheral blood by liquid biopsy.
Proteomic Analysis of tumor cells or tumor cell products obtained from the liquid biopsy.

Liquid Biopsy: Blood sample or other bodily fluid. Separation of the blood cells from the plasma in case of blood. Then, pathologist look for CTCs (Circulating Tumor Cells) or ctDNA (Circulating Tumor DNA fragments) in the plasma / or other bodily fluid.

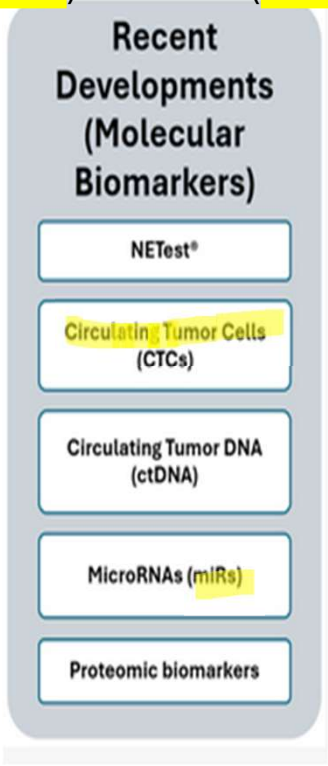
Table 1. This table highlights the types of specific markers and their clinical utility in the diagnosis and treatment of various neuroendocrine neoplasms and illustrates their significance in linking clinical symptoms to tumor activity and guiding treatment strategies.

Marker	Associated Syndrome	Utility
Gastrin	Zollinger-Ellison syndrome (ZES)	Diagnosis and monitoring of gastrinomas, crucial for identifying ZES.
Insulin	Insulinoma	Confirming insulinoma presence, particularly through the 72-h fasting test.
Serotonin and 5-HIAA	Carcinoid syndrome	Key in diagnosing and managing carcinoid syndrome, reflecting serotonin production.
Glucagon	Glucagonoma	Identifying glucagonoma through elevated plasma glucagon levels.
Somatostatin	Somatostatinoma	Diagnosing somatostatinomas, monitoring elevated somatostatin levels.
VIP	VIPoma (Verner-Morrison syndrome)	Essential for diagnosing VIPoma, indicated by severe watery diarrhea and elevated VIP levels.
ACTH	Cushing's syndrome	Diagnosing ACTH-dependent forms of Cushing's syndrome.
CRH	Ectopic CRH syndrome	Important in differentiating ectopic CRH syndrome from ectopic ACTH syndrome.
GHRH	Acromegaly	Useful in diagnosing acromegaly caused by GHRH-secreting tumors.
Calcitonin	Medullary thyroid cancer (MTC)	Suggestive of MTC, particularly in patients with elevated calcitonin levels.

Limitations of Classic Biomarkers

Table 2. This table highlights the role of molecular markers in the diagnosis, prognosis, and treatment of NENs, providing new opportunities for personalized medicine.

Marker	Description	Clinical Utility
NETest®	A multianalyte liquid biopsy measuring 51 different genes' expression related to NEN activity.	High diagnostic accuracy, predictive of treatment response, and disease monitoring.
CTCs	Neoplastic cells in the bloodstream, indicative of tumor grades and burden.	Potential in tumor detection and prognosis, though with variability in detection and outcomes.
ctDNAs	Short nucleic fragments in body fluids, providing insights into the genetic composition of NENs.	Allows real-time monitoring of tumor development, with levels correlating with disease stages.
MiRs	Small non-coding RNAs regulating gene expression, linked to specific NEN types.	Offers diagnostic and prognostic value, with specific miRs associated with different NEN types.
Proteomic biomarkers	Identified via mass spectrometry, including cytokines and receptors like VEGF and its receptors.	Potential diagnostic markers and therapeutic targets, though further studies are needed.



The NETest® is an advanced multianalyte liquid biopsy that quantifies gene expression in blood samples

CTCs are neoplastic cells found in the bloodstream, providing a minimally invasive avenue for detecting and characterizing cancer.

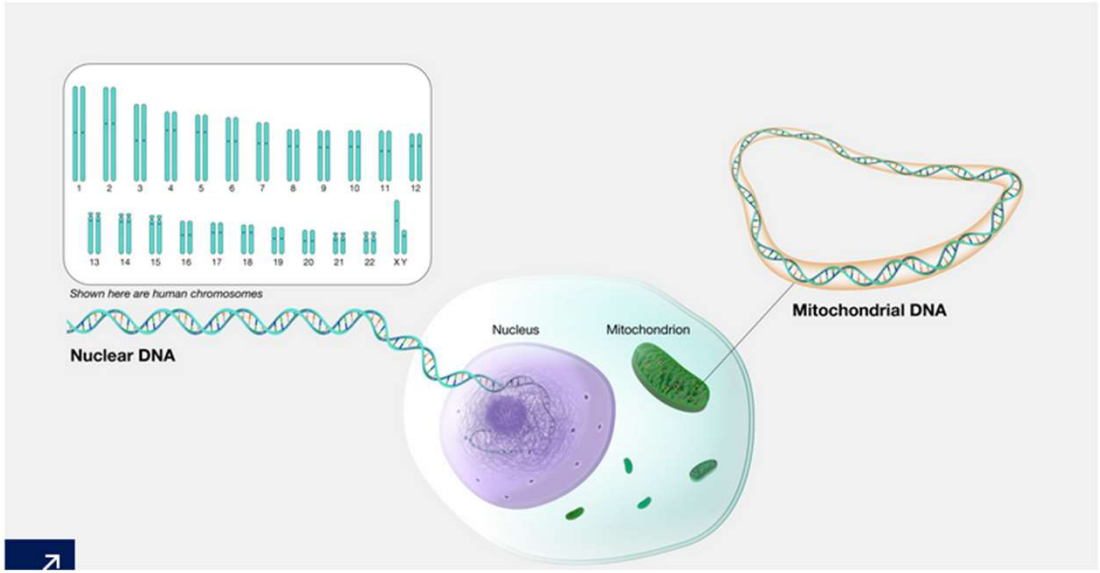
ctDNA comprises short nucleic acid fragments with a length of about 150 base pairs that are released into the bloodstream by apoptotic, necrotic, and autophagic cell processes. Detectable in body fluids as free DNA, protein-bound, or extracellular vesicles, ctDNA provides a non-invasive insight into the genetic and epigenetic composition of Endocrine /NEN.

MiRs are small, non-coding RNAs that play an important role in the post-transcriptional regulation of gene expression and influence various cellular processes, including carcinogenesis

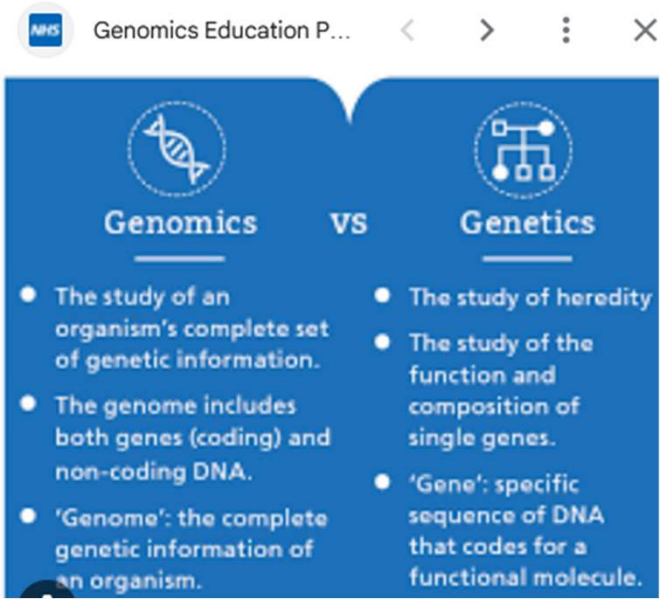
SOURCE: https://www.mdpi.com/2075-4418/14/12/1289

GENOMICS

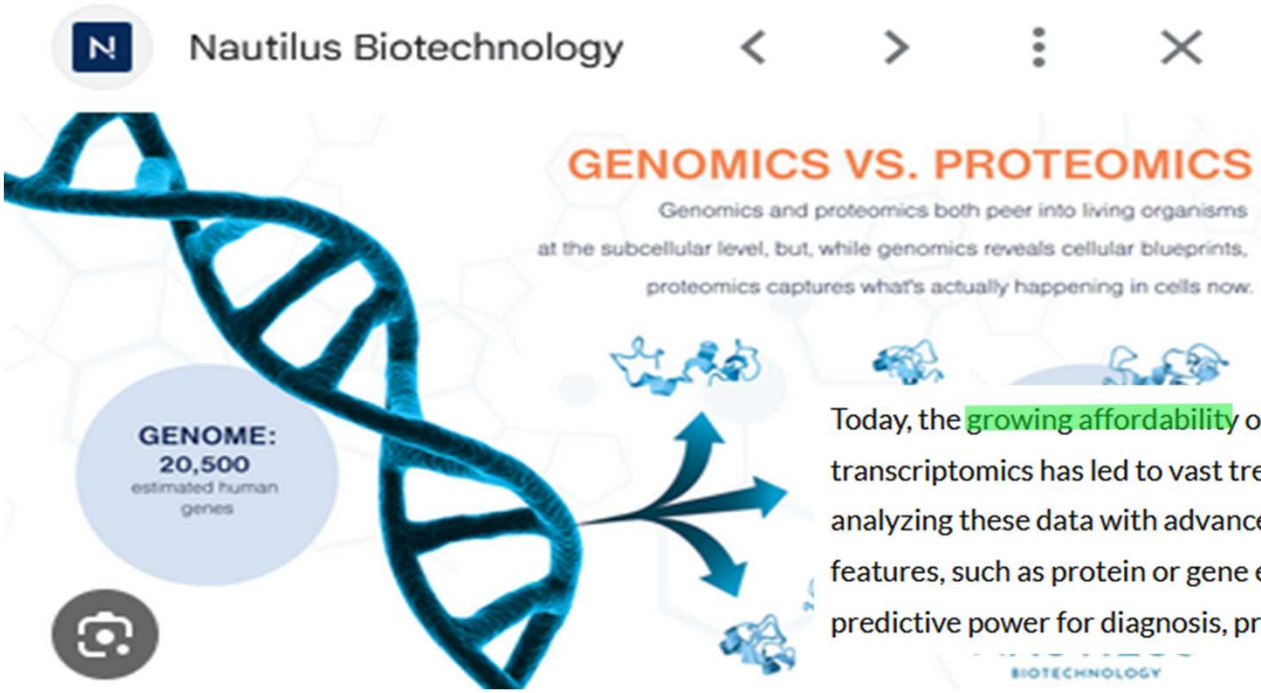
The genome is the entire set of DNA instructions found in a cell. In humans, the genome consists of 23 pairs of chromosomes located in the cell's nucleus, as well as a small chromosome in the cell's mitochondria. A genome contains all the information needed for an individual to develop and function.



"Branch of Molecular Biology concerned with the structure, function, evolution and mapping of genomes".



Genomics plays a crucial role in understanding the development, progression, and treatment of endocrine-related cancers. By analyzing the genetic makeup of these tumors, researchers can identify specific mutation, gene expressions patterns, and signaling pathways that contribute to disease initiation and resistance to therapy. This **knowledge is vital for developing targeted therapies** and **personalized treatment** strategies.



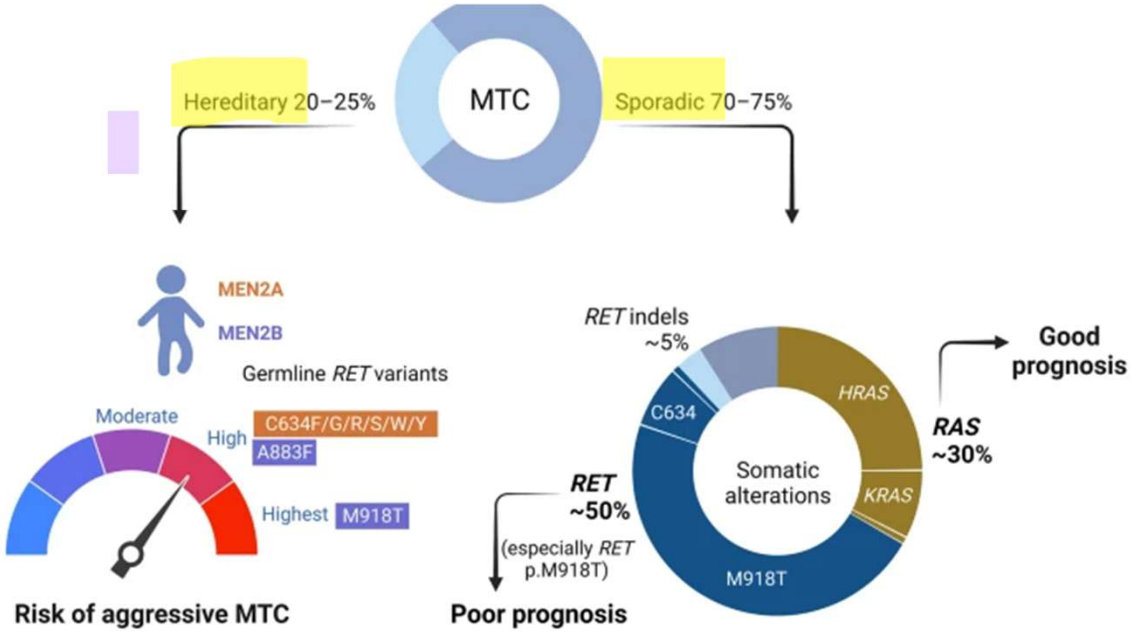
TRANSCRIPTOMICS

Transcriptomics is **the study of all the RNA molecules (the "transcriptome") present in a cell, tissue, or organ at a given time**. It helps researchers understand how genes are expressed and how proteins are produced, providing insights into cellular processes and how they can go wrong in diseases like cancer.

Today, the growing affordability of large-scale, data-rich omics technologies like proteomics and transcriptomics has led to vast treasure troves of data that are primed for biomarker analyses. By analyzing these data with advanced machine learning approaches, researchers have identified features, such as protein or gene expression signatures, associated with disease and showing predictive power for diagnosis, prognosis, or response to therapeutics (1,2).

The discovery of new molecular biomarkers with robust, computational, and statistical biomarker analysis approaches has unparalleled potential for application in personalized medicine approaches for patient care.

Endocrine-driven malignancies, including breast and prostate cancer, are among the most common human cancers. The relationship between sex steroid hormones (eg, androgen, estrogen, and progesterone), their cognate receptors, and genomic stability lie at the center of endocrine-driven cancer development, progression, and therapeutic resistance. A variety of direct and indirect mechanisms have been described that link steroid hormone signaling to the loss of genomic integrity that drives early carcinogenesis. These effects are often enriched within endocrine receptor cistromes,



Risk stratification of hereditary and sporadic medullary thyroid carcinoma (MTC) according to the molecular profiles. Current American Thyroid Association guidelines classify patients with pathogenic germline *RET* variants into 3 groups based on the aggressiveness of the MTC: highest risk includes patients with *RET* p.M918T variant, high risk includes patients with *RET* p.C634F/G/R/S/W/Y variants or p.A883F alteration, moderate risk includes patients with other pathogenic *RET* variants. Germline *RET* p.M918T and p.A883F variants mainly occur in multiple endocrine neoplasia type 2B (MEN2B), whereas germline *RET* alterations at codon C634 occur in MEN2A. In sporadic MTCs, patients with somatic *RET* p.M918T variant have the worst prognosis, whereas those with somatic *RAS* mutations have the best prognosis

https://link.springer.com/article/10.1007/s12022-023-09753-5

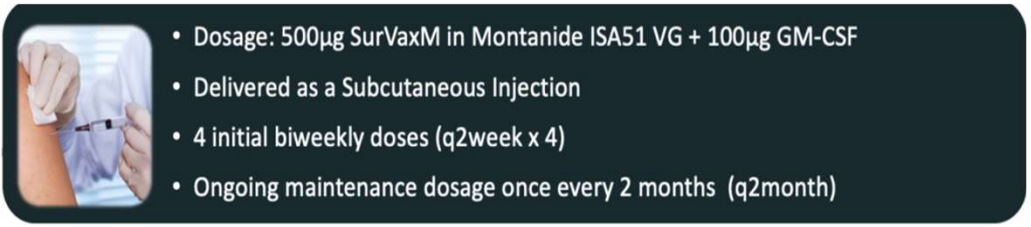
Target Therapy

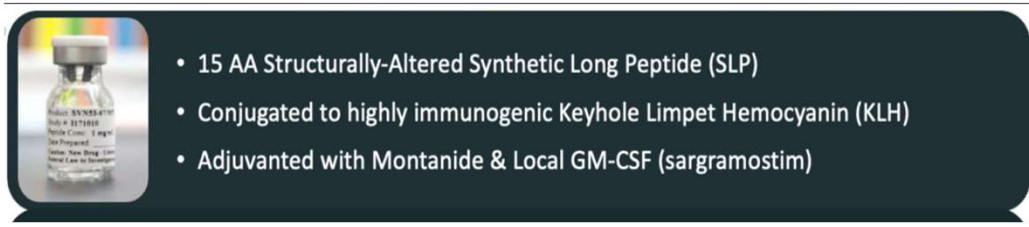
Targeted therapies for medullary thyroid cancer (MTC) focus on blocking specific signals that promote cancer growth and spread. Two main types of targeted therapies are used: **tyrosine kinase inhibitors (TKIs)**, which target proteins involved in cell growth and survival, and **RET inhibitors**, which target a specific gene mutation in MTC.

RET Inhibitors:
- **Selpercatinib (Retevmo)**
- **Pralsetinib (Gavreto)**

SurVaxM VACCINE

While vaccines are typically thought of as ways to prevent diseases, vaccines can also be used in a therapeutic mode as an **immunostimulant** (e.g., to treat cancer).





Vaccine in **Clinical Trials** for Glioblastoma Multiforme, Multiple Myeloma and Metastatic Neuro**ENDOCRINE** Tumors.

Immunotherapy that targets survivin, a protein present in most cancers. The vaccine is engineered to recognize survivin-expressing **cancer** cells **as foreign** and **stimulate patients' own immune** response to control tumor growth and recurrence.

Neuroendocrine Tumors (NET)

This phase I trial studies the side effects of survivin long peptide vaccine and how it works with the immune system in treating patients with neuroendocrine tumors that have spread to other parts of the body (metastatic). Tumor cells make proteins that are not usually produced by normal cells. The body sees these proteins as not belonging and sends white blood cells called T cells to attack the tumor cells that contain these proteins. By SurVaxM, the immune system can be made to kill tumor cells. Giving SurVaxM to patients who have survivin expression in their tumors may create an immune response in the blood that is directed against neuroendocrine tumors

Artificial Intelligence and Genomics

AI is revolutionizing cancer research by enabling the analysis of massive genomic datasets

AI algorithms (machine learning and deep learning) can identify complex patterns and correlations within genomic data that might be missed by traditional methods.

APPLICATIONS:

-**Earlier cancer detection**: Analyzing genomic data and medical images to identify early signs of cancer.

-**Better personalized treatment**: By analyzing a patient's unique genomic profile, AI can help determine the most effective treatment, including targeted therapies and drug combinations.

-**Drug response prediction**: AI models can predict how a tumor will respond to specific drugs, reducing the risk of ineffective treatments and optimizing therapeutic outcomes.

-**Treatment monitoring and relapse prediction**:
AI can track changes in genomic data over time to monitor treatment, identify early signs of resistance or relapse, and adjust treatment.

-**Improved accuracy and efficiency in genomics research**.

-**Discovery of new Biomarkers** :

Examples:

"Stanford Medicine researchers: Developed an AI tool that can predict the activity of thousands of genes in tumors based on standard microscopy images of biopsies, potentially reducing the need for costly genetic tests.

New York Presbyterian and Weill Cornell Medicine: Developed an AI-powered system to detect tumor DNA in blood with high sensitivity, enabling better monitoring of treatment response and predicting cancer recurrence.

USC-led study: Analyzed genetic mutations in over 78,000 cancer patients across 20 cancer types and identified 95 genes significantly associated with survival, helping to personalize treatment strategies.

Researchers at the National Cancer Institute (NCI): Developed an AI model that combines histopathology data and molecular data to predict outcomes for patients with brain cancer, exceeding the accuracy of models using single data types".

EXTRAS

Coding

Every code entered must be justified by text.

Middle Name	A	Birth Place - State	ZZ-Unknown
Name - Alias		Birth Place - Country	ZZU-Unknown
Birth Surname		Sex	2-Female
Race 1	01-White	Hispanic Origin	0-Non-Spanish/Non-Hispanic
Race 2	88-No Further Race Documented	Marital Status	4-Divorced
Race 3	88-No Further Race Documented	Patient Height at Dx (Inches)	99
Race 4	88-No Further Race Documented	Patient Weight at Dx (Pounds)	999
Race 5	88-No Further Race Documented		

Text - Dx Procedures - Physical Exam - PE

78Y/O LADY W/HX OF BREAST CA PRESENTED TO VH FOR IMAGING.

Missing: **White, Non-Spanish Divorced Female.**

Also, missing additional information relevant to Cancer or reportable abstract. No irrelevant information as arthritis, hyperlipidemia, or fracture unless that is the reason they went to the facility.

PROLACTINOMA

A 26-year-old man presented with a one-year history of decreased libido and erectile dysfunction. He had no breast tenderness, but he had noticed a white discharge from his nipples after gentle manipulation (Figure 1). He had no history of visual abnormalities or headache and was not taking any medications or illicit drugs.

+

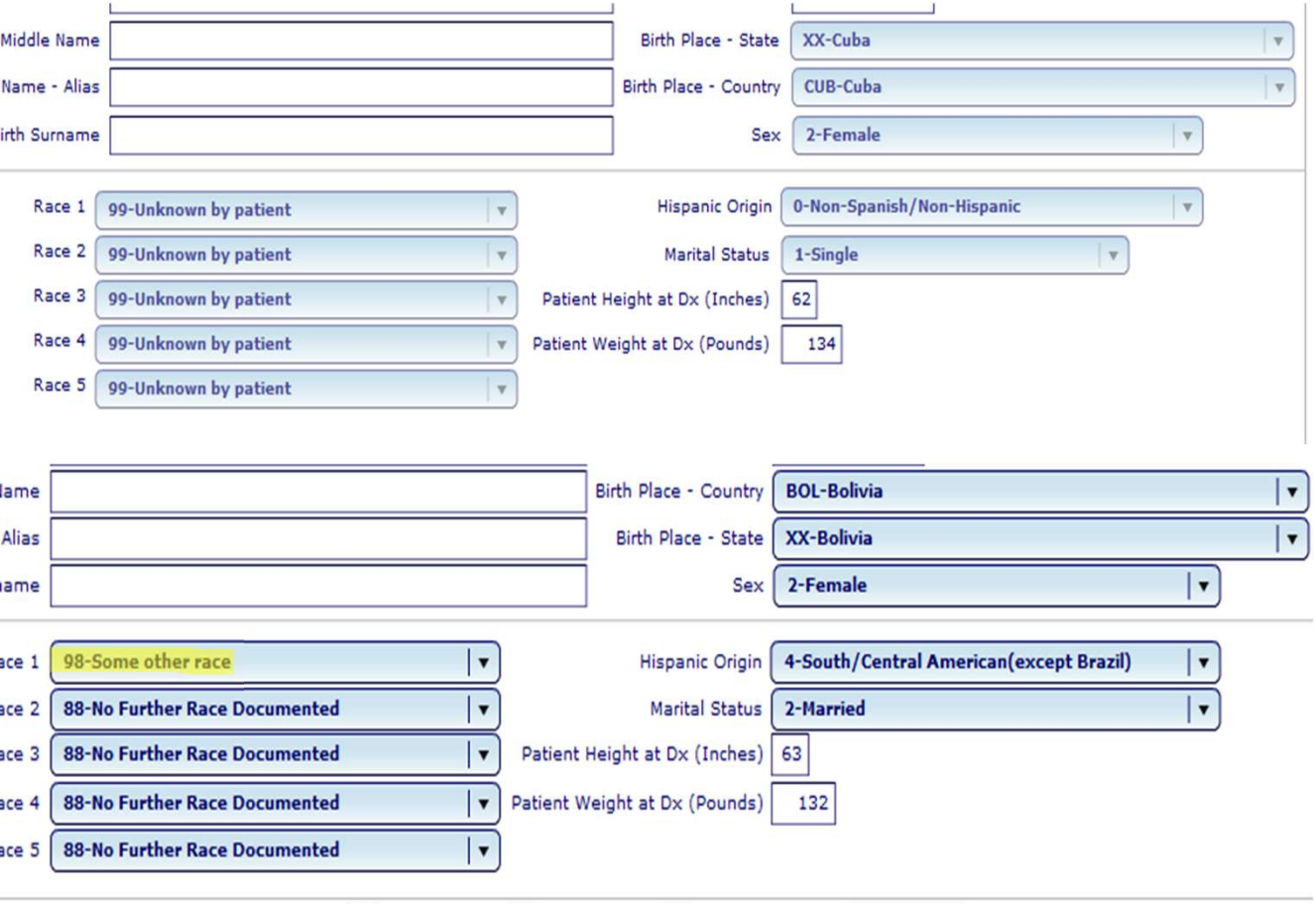
06/04/2025 White, Hispanic, single male
Comes to our medical facility due to white discharge from his nipples. No family history of cancer.

APPENDIX L – 2024 FCDS TEXT DOCUMENTATION REQUIREMENTS

Text Data Item Name **NAACCR Item #** **Field Length**	**Text Documentation Source and Item Description** *FCDS Required Text Documentation – description of the minimum text required for this text field* **Example:**
Text - Physical Exam H&P NAACCR Item #2520 Field Length = 1000	Enter dates and text information from history and physical exams. *History and* physical examination findings related to family history or personal history of cancer diagnosis, physical findings on examination, type, and duration of symptoms, and reason for admission. Every abstract should include a statement as to the reason for the patient encounter at your facility.

Coding errors

Appendix D: Race and Nationality



https://seer.cancer.gov/manuals/2024/SPCSM_2024_Appendix_D.pdf

Code 01 White

Afghanistani
Afrikaner
Albanian
Algerian*
Amish*
Anglo-Saxon*
Arab, Arabian
Argentinian*†
Armenian
Aryan*
Assyrian
Australian*
Austrian*
Azores*
Basque*
Bavarian*
Blanc*
Bolivian*†
Bosnian
Brava/Bravo*
Brazilian†
Bulgarian
Cajun
Californio
Canadian*

Appendix D: Race and N

SEER Program Coding an

Caucasian*
Central American†
Chechnyan
Chicano*
Chilean†
Colombian*
Costa Rican*†
Creole*
Croatian
Crucian*
Cuban (unless specified as Black or African American)*

VERIFY HISPANIC ORIGIN - INCLUDED IN **APPENDIX E** OF FCDS DAM

FCDS Data Acquisition Manual 2024

Table of Contents

Appendix E: Census List of Spanish Surnames

Spanish Surnames

Patient Demographics

Last Name	GONZALEZ PEREZ	Social Security #	999-99-9999	Medicare Beneficiary ID	
First Name	CLEOPATRA	Date of Birth	- -		
Middle Name	MARIA	Birth Place - Country	ZZU-Unknown		
Name - Alias		Birth Place - State	ZZ-Unknown		
Birth Surname		Sex	2-Female		

Race 1	01-White	Hispanic Origin	0-Non-Spanish/Non-Hispanic
Race 2	88-No Further Race Documented	Marital Status	1-Single
Race 3	88-No Further Race Documented	Patient Height at Dx (Inches)	99
Race 4	88-No Further Race Documented	Patient Weight at Dx (Pounds)	999
Race 5	88-No Further Race Documented		

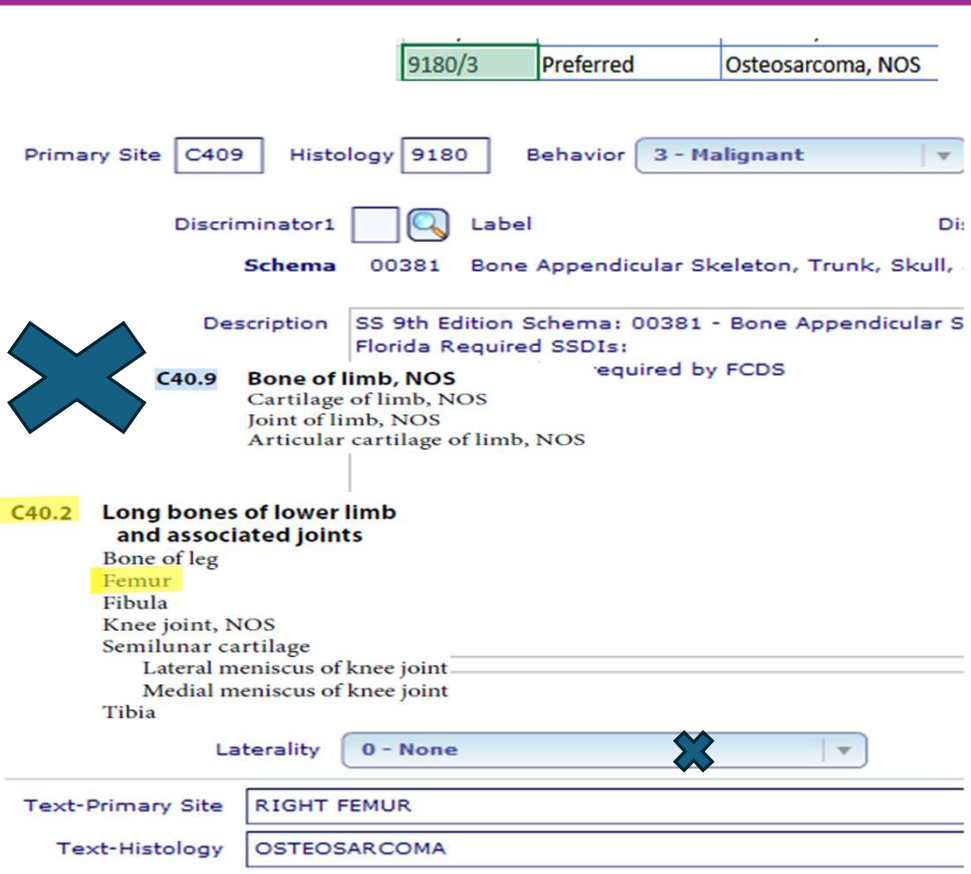
APPENDIX E

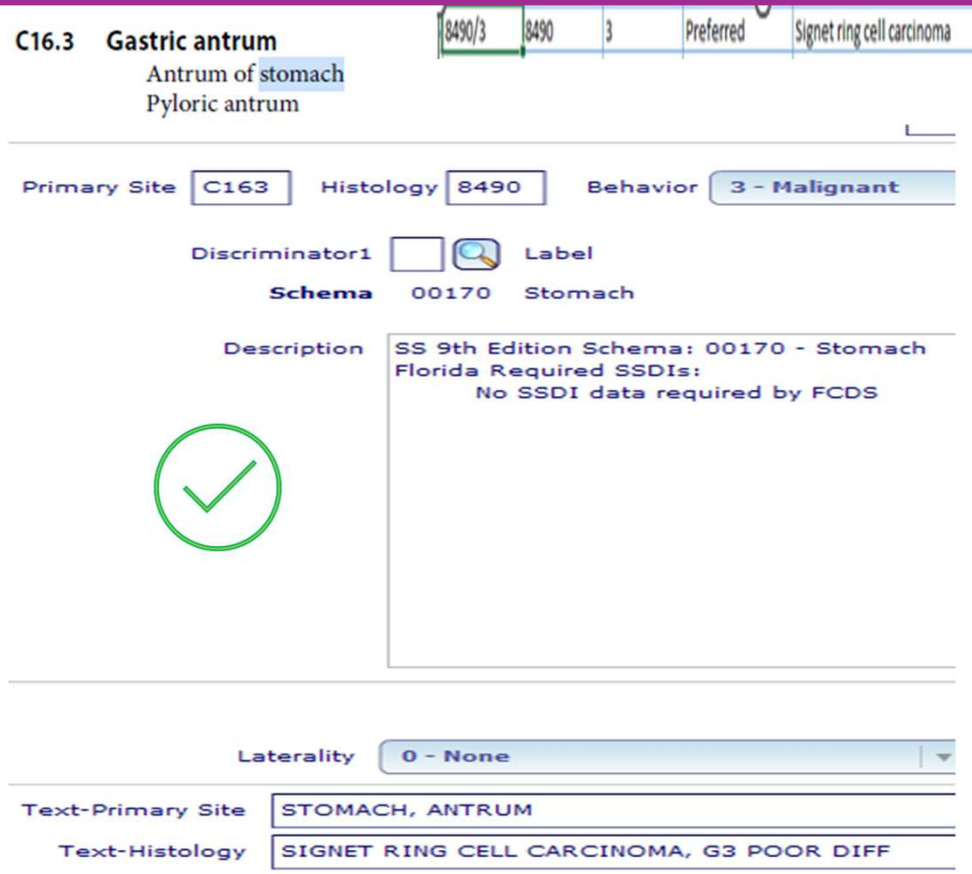
2020 CENSUS LIST OF SURNAMES

PERDOMO	PERRES	PICON
PEREA	PERRIRAZ	PICOS
PEREDA	PERTIERRA	PIEDAD
PEREDIA	PERU	PIEDRA
PEREDO	PERUMEAN	PIEDRAHITA
PEREGRINA	PERUSINA	PIEDRAS
PEREGRINO	PERUSQUIA	PIELAGO
PEREIDA	PERUYERA	PIERAS
PEREIRO	PERUYERO	PIJUAN
PERELES	PERVEZ	PILA
PERERA	PERYATEL	PILAR
PERES	PESANTE	PILARTE
PEREYDA	PESANTES	PILLADO
PEREYO	PESANTEZ	PILOTO
PEREYRA	PESCADO	PIMIENTA
PEREZ	PESCADOR	PIMIENTO
PEREZA	PESINA	PIMINTEL
PEREZCANO	PESQUEDA	PINA
PEREZCHICA	PESQUEIRA	PINADEARCOS
PEREZCOLON	PESQUERA	PINAL
PEREZDEALEJO	PESQUIERA	PINALES
PEREZDELRIO	PEYDRO	PINALEZ
PEREZDIAZ	PEYNADO	PINARES
PEREZGONZALEZ	PEYRO	PINCAY
PEREZJIMENEZ	PEZA	PINEDA

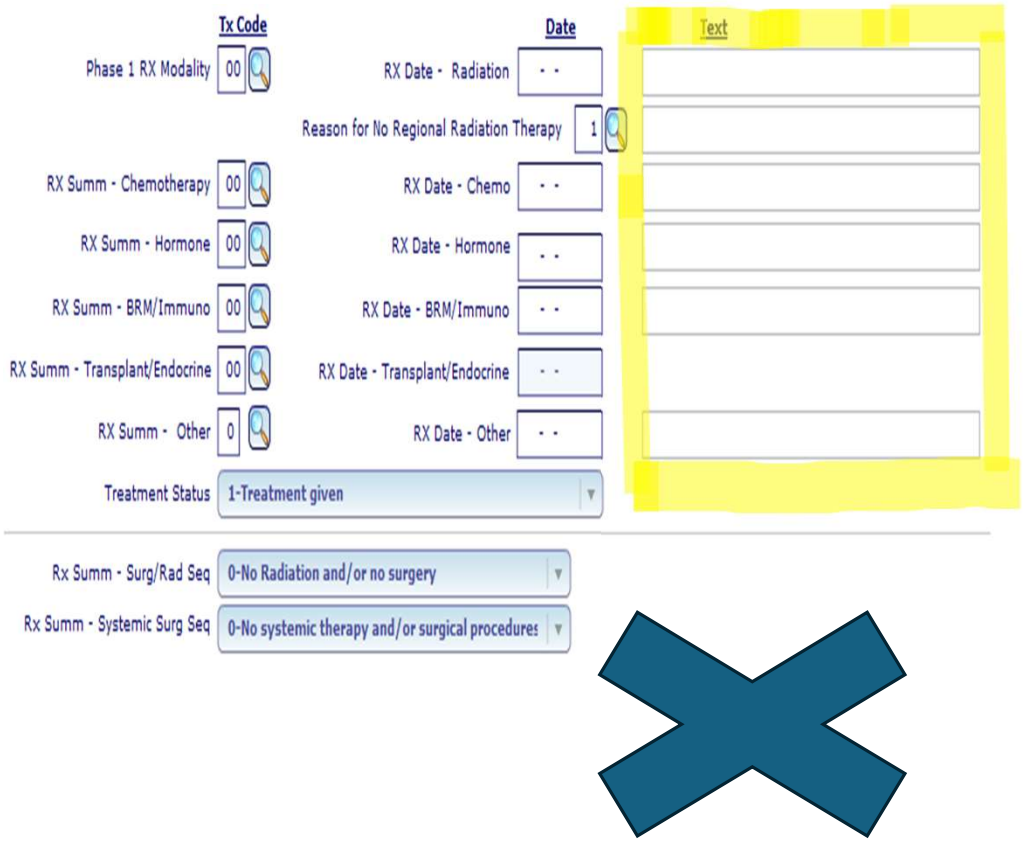
Primary site CODE = Text-Primary Site

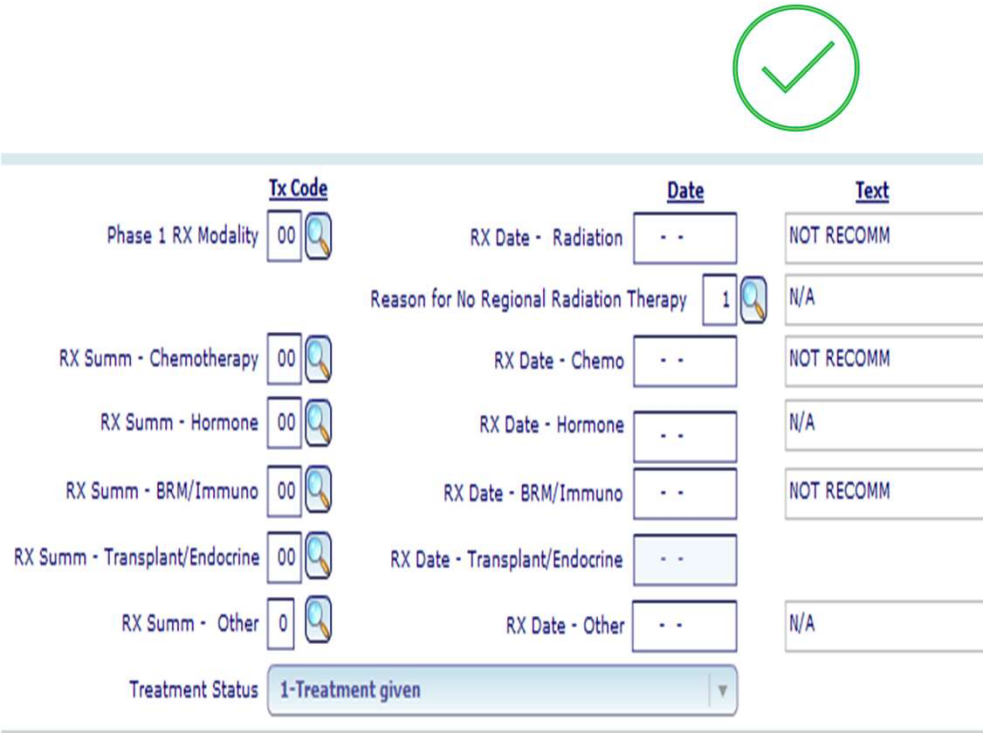
Text Histology CODE = Text-Histology





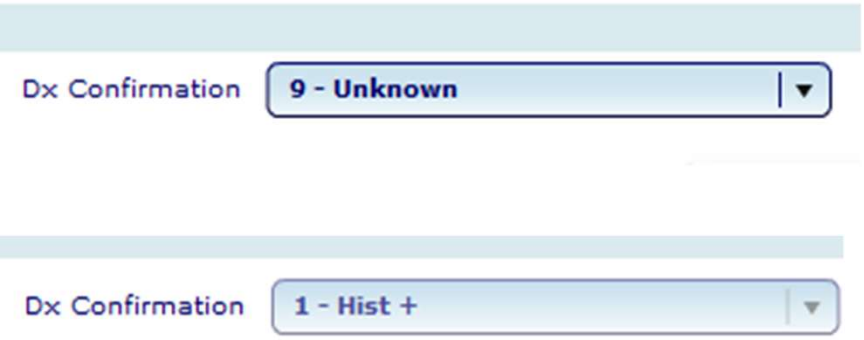
Text should NOT be blank





“NONE” is acceptable too!

Diagnostic Confirmation should not be UNKNOWN



Code	Description	Definition
1	Positive histology – INCLUDES FNA, bone marrow, peripheral blood smear, CBC, WBC, tissue, core biopsy	Histologic confirmation (tissue microscopically examined) (includes FNA) FNA is comparable to a bone marrow aspiration/bx. It is not an examination of body cavity fluid or a fluid suspension or washings or cells in urine.

Code	Description	Definition
2	Positive cytology – NOT FNA – body fluid	Cytologic confirmation (no tissue microscopically examined; fluid suspension with cells microscopically examined – urine, washings, body cavity fluids).
4	Positive microscopic confirmation, method not specified	Microscopic confirmation is all that is known. It is unknown if the cells were from histology or cytology.
5	Positive laboratory test/marker study Note: DO NOT USE THIS CODE	A clinical diagnosis of cancer is based on laboratory tests/marker studies which are clinically diagnostic for cancer. Examples include alpha-fetoprotein for liver cancer and abnormal electrophoretic spike for multiple myeloma. Elevated PSA is not diagnostic of cancer. If the physician uses the PSA as a basis for diagnosing prostate cancer with no other workup, record as code 5.
6	Direct visualization without microscopic confirmation	The tumor was visualized during a surgical or endoscopic procedure only with no tissue resected for microscopic examination.
7	Radiography and other imaging techniques without microscopic confirmation	The malignancy was reported by the physician from an imaging technique report only.
8	Clinical diagnosis only, other than 5, 6 or 7	The malignancy was reported by the physician in the medical record.
9	Unknown whether or not microscopically confirmed Note: DO NOT USE THIS CODE	A statement of malignancy was reported in the medical record, but there is no statement of how the cancer was diagnosed (usually nonanalytic).

SEER Summary STAGE

SEER Program Coding and Staging Manual 2025

Summary Stage 2018

Item Length: 1
NAACCR Item #: 764
NAACCR Name: Summary Stage 2018
XML NAACCR ID: summaryStage2018

Summary Stage 2018 stores directly assigned Summary Stage 2018. This data item is effective for cases diagnosed 01/01/2018 and later. Refer to SEER*RSA for additional information.

Code	Description
0	In situ
1	Localized only
2	Regional by direct extension only
3	Regional lymph nodes only
4	Regional by BOTH direct extension AND regional lymph nodes
7	Distant site(s)/node(s) involved
8	Benign, borderline*
9	Unknown if extension or metastasis (unstaged, unknown, or unspecified) Death certificate only (DCO) case

*Applicable for the following Summary Stage 2018 chapters: Brain, CNS Other, Intracranial Gland, Medulloblastoma.

Please do not forget to **enter** the SEER Summary Stage text once you code the stage. **We need the text to justify** your coding. Not just enter the text for the TNM stage in text box.

Go to the Organ of Origin and stage the case using the specified criteria for that anatomic site.

One of the most common errors

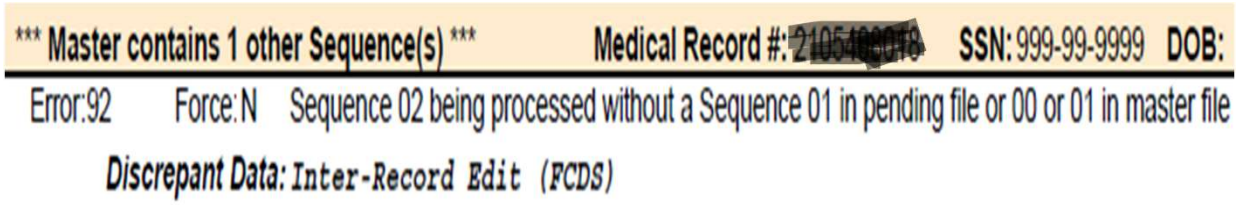
Coding High Grade Serous carcinoma as 8441/3 

8441/3	Serous Carcinoma
8460/3	**Low Grade** Serous Carcinoma
8461/3	High Grade Serous Carcinoma

Historical cases

Once you mention a Historical case in your abstract; you need to send the historical case at the same time as we need to keep track of the sequences.

If you only send 1 abstract which is a sequence 02, we have a problem. We get an edit where we cannot process a sequence 02 without a previous sequence.



Resend them together if needed! But we need to keep track of the cancer sequences for research purposes.

Lymphovascular Invasion

CODE O Not Present	CODE 8 Not Applicable	CODE 9 Unknown/Indeterminate
-IN SITU	-Benign/Borderline (Brain and CNS) -GISTs (2021) -Hematopoietic -Lymphoma	

Coding Lymphovascular Invasion with Neoadjuvant Therapy

STORE page 146

LVI on pathology report PRIOR to neoadjuvant (preoperative) therapy	LVI on pathology report AFTER neoadjuvant (preoperative) therapy	Code LVI to
0 – Not present/Not identified	0 – Not present/Not identified	0 – Not present/Not identified
0 – Not present/Not identified	1 – Present/Identified	1 – Present/Identified
0 – Not present/Not identified	9 – Unknown/Indeterminate	9 – Unknown/Indeterminate
1 – Present/Identified +	0 – Not present/Not identified =	1 – Present/Identified
1 – Present/Identified	1 – Present/Identified	1 – Present/Identified
1 – Present/Identified	9 – Unknown/Indeterminate	1 – Present/Identified
9 – Unknown/Indeterminate	0 – Not present/Not identified	9 – Unknown/Indeterminate
9 – Unknown/Indeterminate	1 – Present/Identified	1 – Present/Identified
9 – Unknown/Indeterminate	9 – Unknown/Indeterminate	9 – Unknown/Indeterminate

Thank you!

Send your questions or inquires

https://www.hopkinsmedicine.org/health/conditions-and-diseases/pituitary-adenoma
Johns Hopkins Medicine
Aaron Cohen-Gadol, MD
https://seer.cancer.gov/statfacts/html/thyro.html
https://www.ncbi.nlm.nih.gov/books/NBK519038/
https://my.clevelandclinic.org/health/body/23016-thymus
www.endocrine.org
https://www.majordifferences.com/2014/04/difference-between-vasopressin-and.html
https://www.gastroepato.it/en_surrene_2.htm
https://www.uptodate.com/contents/high-prolactin-levels-and-prolactinomas-beyond-the-basics/print
https://jamanetwork.com/journals/jama/fullarticle/1104780
https://www.braintumour.ca/stories/living-and-fighting-with-cushings-disease-danielles-story/
https://www.youtube.com/watch?v=DvhLi6nNFu8
https://ojrd.biomedcentral.com/articles/10.1186/s13023-016-0516-x
https://pituitary.mgh.harvard.edu/ThyrotropeAdenoma.htm
Mount Sinai
https://uvahealth.com/services/benign-brain-tumor/tsh-secreting-adenoma
https://my.clevelandclinic.org/health/diseases/6182-parathyroid-cancer
https://www.ncbi.nlm.nih.gov/books/NBK519038/
https://www.ncbi.nlm.nih.gov/books/NBK441842/
AI
https://training.seer.cancer.gov/anatomy/endocrine/glands/pituitary.html
https://braintumorcenter.ucsf.edu/condition/pineal-region-tumors
National Institutes of Health (NIH)(.gov)
https://www.mypathologyreport.ca/diagnosis-library/medullary-thyroid-carcinoma/

https://www.mypathologyreport.ca/diagnosis-library/medullary-thyroid-carcinoma/
Wikipedia
https://www.ncbi.nlm.nih.gov/books/NBK535380/
https://www.hormones-australia.org.au/the-endocrine-system/hypothalamus/#:~:text=Dopamine%20is%20a%20chemical%20released%20from%20neurons,the%20pituitary%20gland%20to%20stop%20releasing%20prolactin
https://www.ncbi.nlm.nih.gov/books/NBK551501/
https://staging.seer.cancer.gov/eod/news/3.2/
https://www.mdpi.com/2077-0383/14/4/1089
https://www.ncbi.nlm.nih.gov/books/NBK459347/
https://www.ncbi.nlm.nih.gov/books/NBK278946/#:~:text=An%20enlarged%20pituitary%20fossa%20may,patients%20with%20primary%20pituitary%20tumours.
https://www.sciencedirect.com/science/article/pii/S2468294223000813
https://seer.cancer.gov/statfacts/html/testis.html
https://courses.lumenlearning.com/suny-ap2/chapter/the-endocrine-pancreas/
https://www.ncbi.nlm.nih.gov/books/NBK278978/
https://seer.cancer.gov/seertools/seerrx/rx/53c44b00102c1290262dc7ef/?drug_direction=UP&regimen_direction=UP&rx_type=drug&drug_field=score&regimen_field=score&drug_offset=0&regimen_offset=0&limit=25&search_mode=&q=somatostatin&mode=
https://youngbonesclinic.com/dwarfism-all-you-need-to-know/
https://www.uptodate.com/contents/physiology-of-insulin-like-growth-factor-1
https://translational-medicine.biomedcentral.com/articles/10.1186/1479-5876-10-224
YouTube ·
Neuroendocrine Cancer UK
Cancer Research UK
https://training.seer.cancer.gov/anatomy/endocrine/review.html
https://bigomics.ch/blog/how-to-find-biomarkers-biomarker-analysis-methods-and-practical-examples/
https://www.mdpi.com/2075-4418/14/12/1289

https://www.ncbi.nlm.nih.gov/books/NBK551501/
https://pubmed.ncbi.nlm.nih.gov/33260197/
https://pmc.ncbi.nlm.nih.gov/articles/PMC6153127
https://www.merckmanuals.com/professional/endocrine-and-metabolic-disorders/pituitary-disorders/prolactinoma#Treatment_v981006/
en.wikipedia.org/wiki/Pituitary_stalk#/media/File:Pituitary_Stalk.pnghttps://pmc.ncbi.nlm.nih.gov/articles/PMC6153127/
Research gate image testes location
Pituitary stalk. Pituitary gland illustration by Diberri
https://www.mdpi.com/2075-4418/14/12/1289
https://labpedia.net/hypothalamus-and-pituitary-gland-hormones
https://www.merckmanuals.com/professional/endocrine-and-metabolic-disorders/pituitary-disorders/prolactinoma#Treatment_v981006
https://www.webpathology.com/images/endocrine/thyroid/thyroid-hyperplasia/41375
https://pubmed.ncbi.nlm.nih.gov/33260197/
https://www.genome.gov/genetics-glossary/Genome
https://www.ncbi.nlm.nih.gov/books/NBK279163/
https://pmc.ncbi.nlm.nih.gov/articles/PMC3276344/
https://www.mdpi.com/2075-4418/14/12/1289
tsa
https://www.roswellpark.org/cancertalk/201810/how-fast-does-leukemia-develophttps://medicine.uiowa.edu/iowaprotocols/men-2b-multiple-endocrine-neoplasia-2b-sippels-syndrome
https://www.cancer.org/cancer/types/thyroid-cancer/detection-diagnosis-staging/survival-rates.html
https://www.mayoclinic.org/drugs-supplements/glucagon-injection-route/description/drg-20064089
https://partnersincare.health/conditions/sacrococcygeal-teratoma
https://jb004.k12.sd.us/my%20website%20info/biology%202/animal%20kingdom/Intro%20to%20Germ%20Layers.htm
https://pubmed.ncbi.nlm.nih.gov/32683679/
https://my.clevelandclinic.org/health/body/23956-mullerian-duct