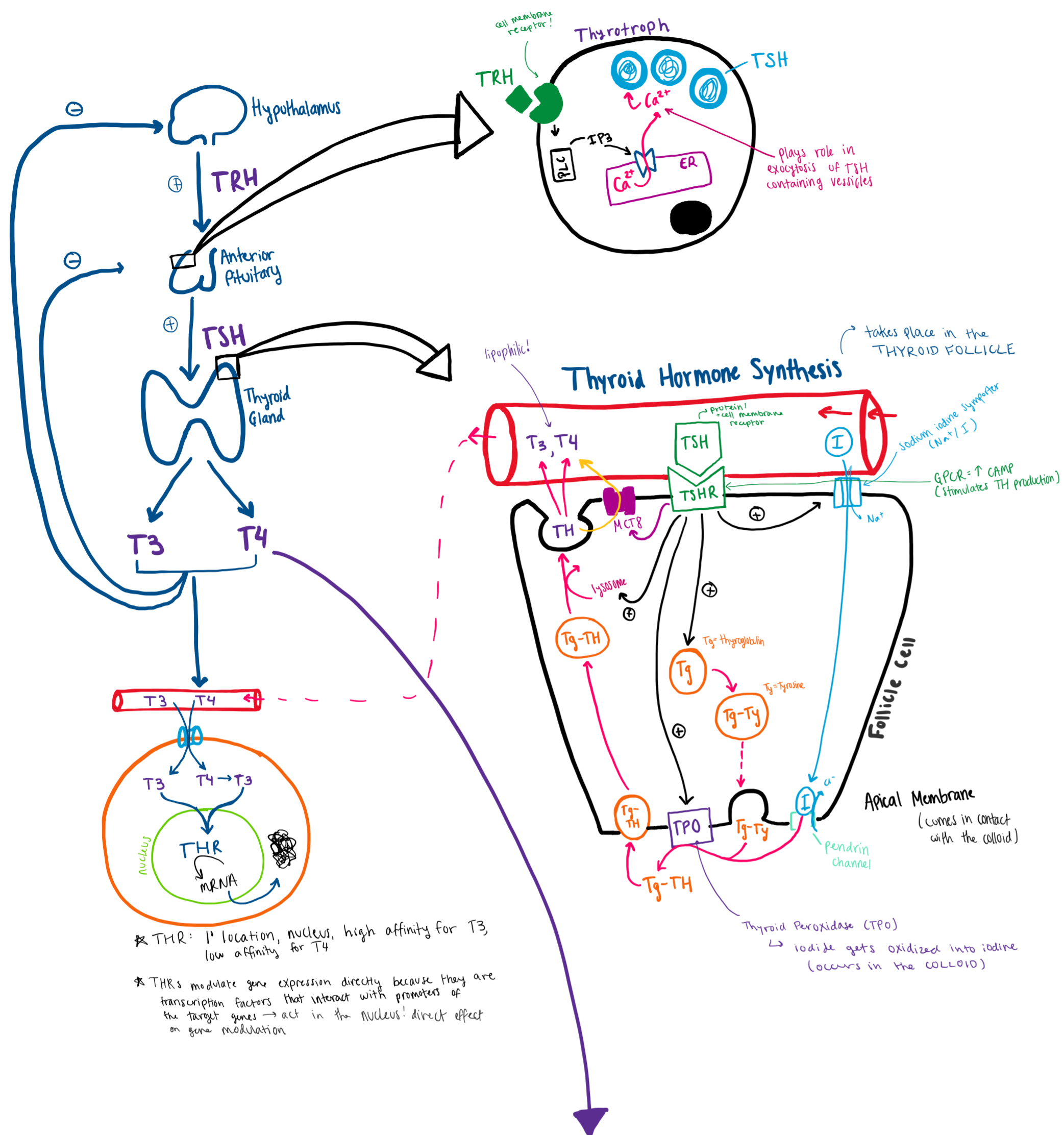


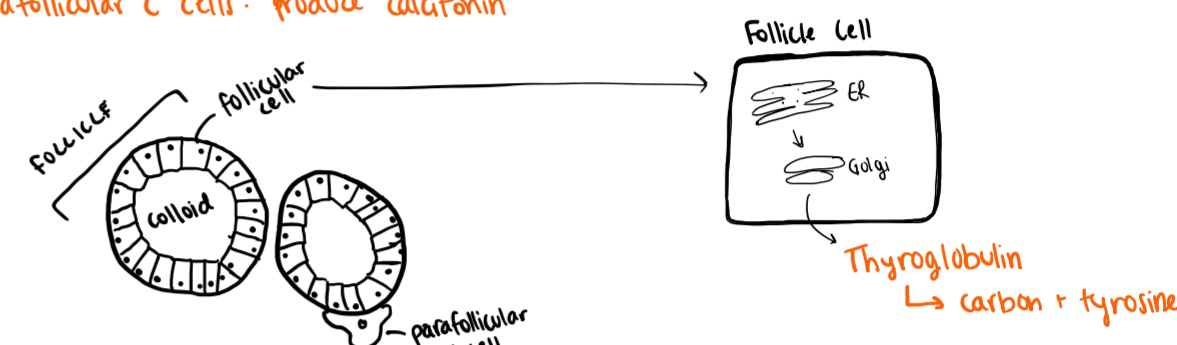
# HPT AXIS

## Hypothalamic-Pituitary-Thyroid Axis



# THYROID ANATOMY

- Thyroid gland = 2 large lateral lobes connected by an isthmus
- Thyroid follicles = functional unit of the gland
- Embryonic origin
  - ↳ median outgrowth of part of the pharyngeal floor - from endodermal cell
- Vasculature:
  - **ARTERIES**
    - main supply = cranial thyroid artery
      - ↳ comes off the common carotid
    - caudal thyroid artery supplies small portion of the gland
  - **VEINS**
    - venous drainage = internal jugular vein
  - **LYMPH**
    - lymph drainage = drains to cranial deep cervical nodes
- **cells + things!**
  - follicular cells: produce thyroid hormones (TH) (T<sub>3</sub>, T<sub>4</sub>)
  - Parafollicular c cells: produce calcitonin



- colloid
  - made up mostly of thyroglobulin (inactive storage form of thyroid hormones)

# T3 + T4

T<sub>3</sub> = Triiodothyronine  
T<sub>4</sub> = Thyroxine

- \* Free T<sub>3</sub> = most biologically active (lowest amount circulating) (high affinity for TH receptors)
- \* Bound T<sub>4</sub> = most biologically available (highest amount circulating)

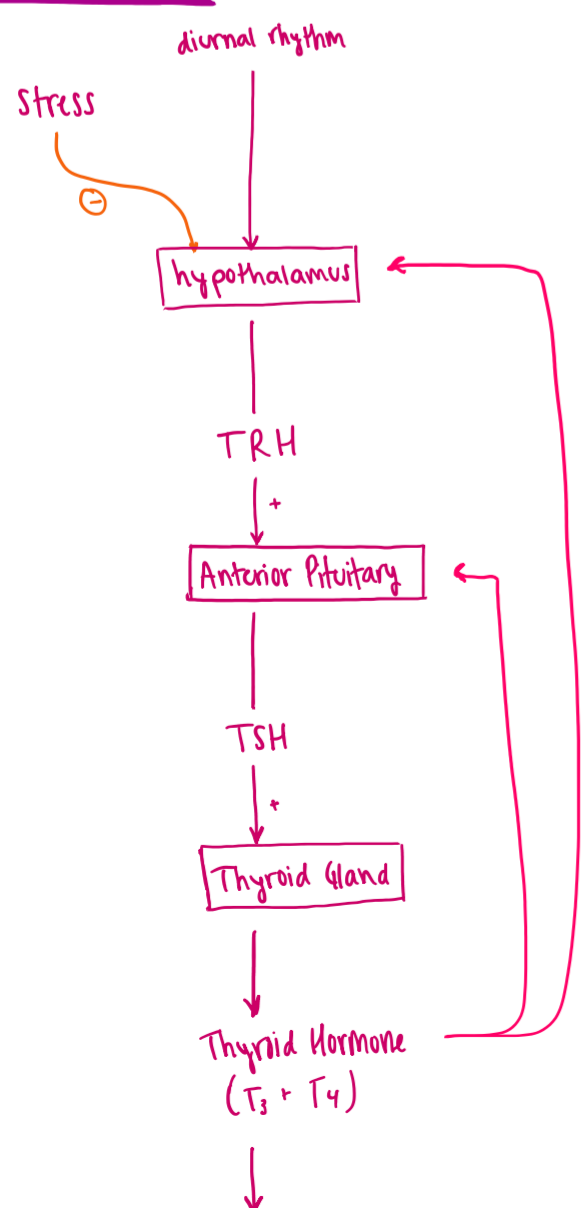
## SERUM TRANSPORTERS

- Thyroxine-binding protein / globulin → high affinity for T<sub>4</sub>, low quantities (\* low to none in felines)
- Transferrin → high affinity for T<sub>4</sub>, specific for thyroid hormones, species wide is most common
- Albumin → most abundant

# THYROID DISORDERS

- **Too LITTLE (HYPO)**
  - Primary
    - Acquired
      - Thyroiditis
      - Iodine deficiency
    - Congenital
      - Central
        - Acquired
          - ↳ Hypothalamus or Pituitary
- **Too MUCH (HYPER)**
  - Hyperthyroidism
    - primary
      - adenoma
    - Thyrotoxicosis
      - iatrogenic

# HPT Axis



↑ metabolic rate and heat production  
enhancement of growth and CNS development  
enhancement of sympathetic activity

# ACTIONS of THYROID HORMONES

- regulates tissue basal metabolism
  - ↳ ↑ carbohydrate use, protein synthesis / degradation, and fat synthesis / degradation
- regulates heat production
- ↑ absorption of carbohydrates from the intestine
- upregulation of hair production / growth (anagen phase)
- ↑ the number of β-1 adrenergic receptors on cardiac muscle and adipocytes
- ↑ gluconeogenesis
- encourages lipolysis → enhances cellular uptake of cholesterol for catabolism
- ↑ CO<sub>2</sub> and heat production
- ↑ glucose uptake
- ↑ mitochondrial O<sub>2</sub> consumption and oxidative phosphorylation (↑ ATP production)

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