Hypothalamus
- GnRH → **Ptuitary**→ FSH,LH →**Corpus Leteum/Testes**
- CRF → **Ptuitary**→ ACTH → **Adrenal cortex** → Glucocorticoids
- Oxytocin + strength & frequency of **Uterine muscle** contraction
- ADH → + Aquaporins open in **distal convoluted tubules** & **collecting ducts**; + H_2O re-absorption; BP↑

Pineal gland Melatonin regulates Circadian Rhythm

Thyroid
- T4 ☆ T3
  - T3 is 5 times more potent than T4
  - 99.5% T4,T3 are bound to proteins----inactive form
  - 100% T4 , 20% T3 are produced in thyroid
  - 80% T3←T4 (via 5'-monodeiodase)
- Calcitonin ↓ Bone breakdown ↓ plasma Ca^{2+} level

Parathyroid Glands PTH ↑ Bone breakdown ↑ plasma Ca^{2+} level; ↑ Kidney phosphate excretion

Pituitary Gland
- Anterior
  - Tropic Hormones
    - FSH
      - Estrogen ← maturation of follicles+ ♀
      - Sperm← maturation of somniferous tubules ♂
    - LH
      - Ovulation and maintenance of **Corpus Lutuem** ♀
      - Regulate Progesterone secretion
      - Testerone ← Interstitial cells in **Testes** ♂
    - Glucocorticoids ← **Adrenal Cortex** + ACTH
    - T4, T3 ← **Thyroid gland** + TSH
  - Direct Hormones
    - Milk production + Prolactin
    - Pain-relieving neurotransmitter Endorphins
    - Bone & muscle growth GH/somatotropin
- Intermediate
  - In frogs darkening skin MSH
- Posterior (Store)
  - Oxytocin
  - ADH/vasopressin

Thymus T-cell maturation Thymosin

Pancreas
- Glucagon (α cells)
  - Protein & fat degeneration +
  - Glycogen→Glucose +
  - Gluconeogenesis +
- Insulin (β cells)
  - Glucose uptake in muscles & fat +
  - Glucose→Glycogen +
  - Fat→Glucose +
  - aa uptake
  - Anti-Glucagon
  - Anti-Glucocorticoids

Ovaries (♀)
- Estrogen
  - Female reproductive tract +
  - Secondary sexual characteristics +
  - Influence libido
  - Thickening endometrium
  - ← **Ovarian Follicles**
- Progesterone
  - Endometrium: Development, Maintain
  - ← **Corpus Luteum**

Testes (♂)
- Androgen
- Testosterone

Adrenal gland
- Cortex
  - Glucocorticoids: Cortisol, Cortisone
    - Protein breakdown ↑ synthesis↓
    - aa release from skeletal muscles ↑
    - Lipid release from fat tissues ↑
    - Gluconeogenisis ↑
    - Anti- Insulin
    - Anti- Inflammation
  - Meralocortioids: Aldosterone
    - ↑ Transport of Na^+, K^+
    - ↑ Na^+ re-absorption K^+ excretion
    - ↑ H_2O re-absorption
  - Sex hormones: Androgen small amount in both genders
- Medulla
  - Epinephrine
  - Norepinephrine
    - ↑Glycogen →glucose in liver & muscles
    - ↑ Basal metabolic rate
    - ↑ lipid release from adipose tissues
    - ↑ Strength & rate of heart beat
    - ↑ Blood to brain, heart, skeletal muscles
    - ↓ Blood to skin, kidneys, digestive tract

Kidneys
- Renin
  - Angiotensinogen
  - ↓
  - Angiotensin I → Angiotensin II
  - ↓
  - **Adrenal cortex** → Aldosterone
- EPO
  - + stem cells rubriblasts
  - + mitosis rate
  - + reticulocytes release from bone marrow
  - + HgB formation ++ RBC maturity rate

S. Ma original