Chapter 9 Endocrine System
Medical Terminology

I. Overview ➔ Fig. 9-1 ➔ ID organs
   A. Functions as control system
      1. Secretes chemical messengers:
         Hormones (= “excite”) – chemically, most are proteins or steroids (=solid)
      2. Specificity due to receptors in target tissue.
      3. Slower response, but longer acting than nervous system
      4. Major role in homeostasis
         Ex. Regulate blood sugar (insulin) – blood pressure
   B. Anatomically unusual ➔ main organs physically separate
   C. Essentially, every organ is an endocrine organ because all are in chemical
      communication with each other.
      Ex. Skin ➔ “Vitamin” D
         Fat ➔ estrogens
   D. Endocrine vs Exocrine
      ↓
      “secrete” ➔ onto body surfaces
      ↓
      via duct
      into bloodstream ➔ Ex. Sweat, sebaceous
      “ductless”

Fig. 9-2 Good review: NRF detail on pituitary

II. Pituitary gland + (Fig. 8-3)
   A. Located in bony depression in skull
   B. Mistakenly called “master gland”; regulated by hormones from hypothalamus

   C. Two lobes: different tissues/different hormones
      1. Anterior lobe (adenohypophysis) secretes 7 major hormones regulating growth and
         other endocrine organs
         - NRF all except Growth Hormone (GH)
         • excessive amount during childhood = pituitary gigantism
         • excessive amount after puberty = acromegaly ➔ Fig. 9-4
         • inadequate amounts = pituitary dwarfism ➔ Fig. 9-5
      2. Posterior lobe (neurohypophysis) releases 2 hormones made in hypothalamus
         Antidiuretic hormone (ADH) – normally decreases urine (kidneys retain H2O)
         NRF oxytocin

   D. Pineal gland
      ↓
      “pine cone”
      - secretes melatonin, which influences body cycles
      reproductive?
      jet lag
III. Thyroid & Parathyroids (4)

“shield-shaped
A. Thyroid gland located inferior to thyroid cartilage of larynx
   1. Secretes thyroid hormones which contain iodine
      \( T_3 \) (triiodothyronine)
      \&
      \( T_4 \) (thyroxine)

      Essential for proper growth, brain development, metabolism
   2. Goiter (Fig 9-6) enlarged thyroid gland, produced by hypo- or hyperthyroid condition
   3. Hyperthyroidism often produces exophthalmos (Note spelling!)
   4. Thyroid gland also secretes calcitonin – regulates \( \text{Ca}^{++} \) levels (↓ blood levels of \( \text{Ca}^{++} \)): insignificant in adults

B. Parathyroids
   1. Small, embedded in posterior thyroid
   2. Secrete parathyroid hormone (PTH)
      ↓
      Regulates \( \text{Ca}^{++} \) (↑ blood levels of calcium)
   3. So, removal → hypocalcemia
      ↓
      Tetany – muscle tremors

IV. Thymus
   A. Located superior mediastinum
   B. Secretes thymosin – group of hormones that “educates” T cells

V. Pancreas
   A. Located posterior to stomach in curve of small intestine
   B. Exocrine and endocrine gland
      - 1% endocrine from small, scattered clumps pancreatic islets (islet of Langerhans)
      -- different cell types produce different hormones
C. **Insulin**
1. Lowers blood glucose, moving it into cells → **hypoglycemia**
   ↓
   "sugar"
2. **Lack** of insulin → **hyperglycemia**
   ↓
   Glycosuria & polyuria, polydipsia
   ↓
   Thirst

DM = **diabetes mellitus** (= sweet)

3. **Type I (Juvenile) diabetes** or Insulin Dependent DM – begins early when pancreas stops producing insulin
4. **Type II (Adult) diabetes** or Non-insulin Dependent DM – body doesn’t respond well to insulin = insulin resistance
   --take oral hypoglycemic agents

D. **Glucagon**
1. raises blood glucose (insulin antagonist)

VI. **Adrenal glands** (2)
A. Located superior, medial to kidneys
B. Secretes “stress hormones”
C. Two histologically, physiologically distinct glands
   1. **Adrenal cortex** – outer rim that produces corticosteroid hormones
      ① **glucocorticoids** (cortisol most abundant) --regulate metabolism
      ② **mineralcorticoids** -regulate sodium & potassium (kali-)
         hyperkalemia or hypokalemia
      ③ **androgens** – sex hormones → excessive amounts = adrenal virilism
         “male” ↓

   2. **Adrenal medulla** – central portion that secretes epinephrine (Adrenalin) and norepinephrine
      --part of sympathetic nervous system (“fight-or-flight” responses)

VII. **Gonads** – review Reproduction notes
A. **Ovary**
   **Estrogen** – menstrual cycle
   ↓
   female
   ↓
   **month**
   → responsible for female sex characteristics
   **Progestosterone**
   ↓ ← steroid
   **Gestation** = pregnancy
   → major hormone during pregnancy

B. **Testes**
   Produce **testosterone**, an androgen
   → responsible for male sex characteristics