ENDOCRINE SYSTEM-PART 1

Dr. SHEETAL JAIN

Glands

Endocrine Glands Defined

- Exocrine glands
  - secrete products into ducts which empty into body cavities or body surface
  - sweat, oil, mucous, & digestive glands
- Endocrine glands
  - secrete products (hormones) into bloodstream
  - pituitary, thyroid, parathyroid, adrenal, pineal
  - other organs secrete hormones as a 2nd function
    - hypothalamus, thymus, pancreas,ovaries,testes, kidneys, stomach, liver, small intestine, skin, heart & placenta

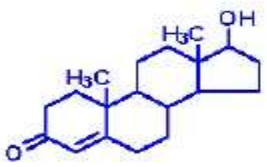
Hormones

Types of Hormones

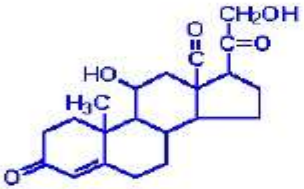
- water-soluble
- lipid -soluble

TYPES OF HORMONE

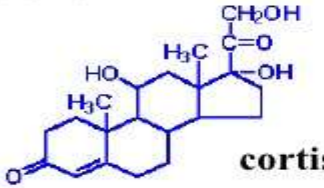
Lipid-soluble Hormones



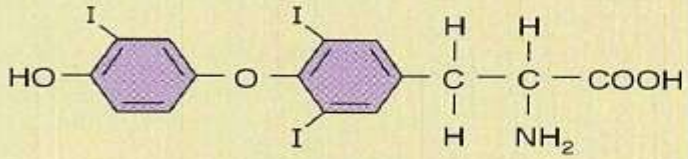
testosterone



aldosterone



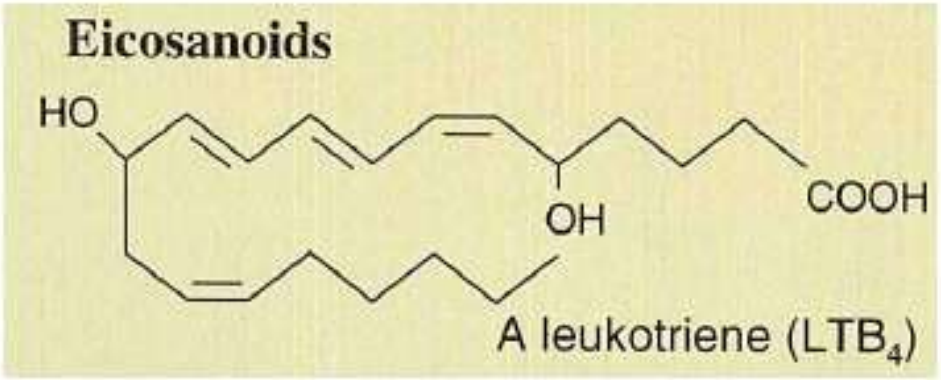
cortisol



Triiodothyronine (T_3)

- **Steroids**
  - lipids derived from cholesterol
  - made in SER
  - different functional groups attached to core of structure provide uniqueness
    - e.g. cortisol, progesterone, estrogen, testosterone, aldosterone
- **Thyroid hormones**
  - tyrosine ring plus attached iodines
  - are lipid-soluble
- **Retinoic acid**
  - lipids derived from **retinol** (vitamin A)
  - regulate proliferation, differentiation and death of many cell types
- some **vitamins** can acts a lipid-soluble hormones
  - e.g. vitamin D
- **Nitric oxide (NO)**
  - gas

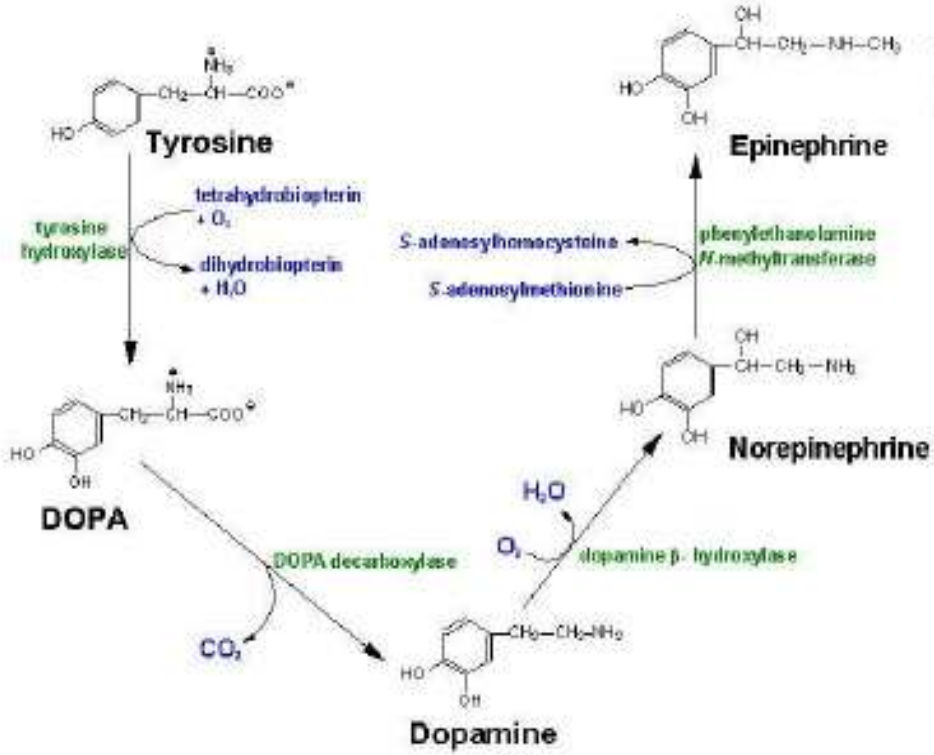
Lipid-soluble Hormones

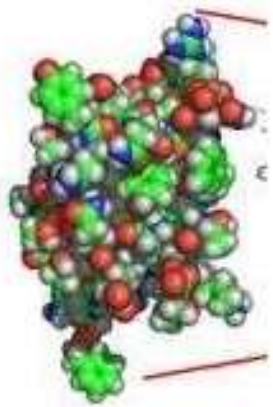


Eicosanoids

- **prostaglandins or leukotrienes**
- derived from **arachidonic acid** (fatty acid)
- AA is converted either into prostaglandin H or into the leukotrienes
- conversion of AA into prostaglandins is regulated by the COX enzymes
- both act in the inflammatory reaction
  - e.g. stimulate smooth muscle cells to contract
  - e.g. stimulate nerve cells – pain

Water-soluble Hormones





insulin

Amine, peptide and protein hormones

- modified amino acids to protein chains
- **serotonin, melatonin, histamine, epinephrine, insulin, dopamine**
- protein hormones – comprised of one or many polypeptide chains
  - insulin, glucagon
- peptide hormones – comprised of chains of amino acids
  - e.g. growth hormone, oxytocin
- amine hormones – derived from the amino acids tyrosine or tryptophan
  - epinephrine (tyrosine and phenylalanine), serotonin (tryptophan), dopamine (tyrosine)
- can also act as neurotransmitters

CONTROL

Control of Hormone Secretion

- Regulated by signals from nervous system, chemical changes in the blood or by other hormones
- Negative feedback control (most common)
  - decrease/increase in blood level is reversed
- Positive feedback control
  - the change produced by the hormone causes more hormone to be released
- Disorders involve either hyposecretion or hypersecretion of a hormone

THANKS