INTRO TO ENDOCRINE SYSTEM

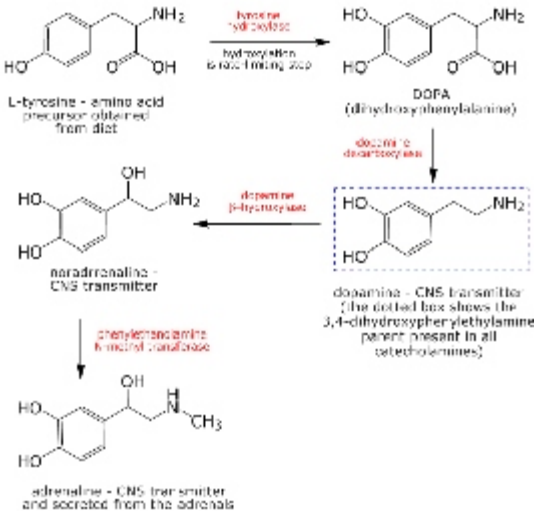
2/16/93, rvsd 2/22/94, 2/20/96, 10 Feb 00, 23 Feb 04, 25 Feb 08, 23Feb09, 22Feb10
Marieb P 540, Martini, P. 602, 6th: 605-, 7th: 591-600, 8th: 604-614

Endocrine: ductless glands, maintain **homeostasis**, secrete hormones, interconnected with the nervous system by hypothalamus (a neuroendocrine organ) (system: 607)

Three kinds of hormones: (p 608)

hormone class	nature, example	site of action	administered
amino acid deriv	catecholamines: epinephrine, norepinephrine, dopamine thyroxine melatonin	either membrane or nucleus	orally
peptide	chain of amino acids	membrane receptors	parenterally
steroid, lipids	cholesterol backbone or prostaglandins, etc	penetrate to nucleus	orally

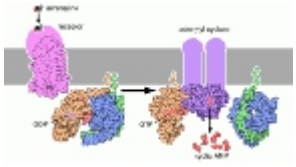
hormones directed to **target cells** with specific receptors



Interaction affects cell activity by:

change membrane permeability	antidiuretic hormone
gene activation, trigger protein synthesis	growth hormone
regulate enzyme activity	thyroxine on mitochondria
induce secretion	gastrin
stimulate mitosis	thyroid stimulating hormone

Second messenger system (p. 610) binds to receptor, activates G protein



adjusts cAMP conc, intracellular messenger:
- increase: G protein activates **adenylate cyclase** : ATP to **cyclic AMP** (ADH, FSH, LH, TSH)
- decrease: G protein enhances breakdown of cAMP (α_2 nor- and adrenaline receptors)

increase Ca^{++} levels, acts as second messenger (oxytocin, α_1 nor- and adrenaline receptors)

80% prescription drugs target G protein-coupled receptors

Steroids & thyroxine bind to nuclear receptors, regulate gene activity (or mitochondrion) (p 612)

Homeostasis by negative feedback system

positive stimulus may be
- hormonal (from anterior pituitary)
- humoral (from blood as in parathormone)
- neural (from CNS as in adrenal medulla)