Explain the steroid biosynthetic pathway:

Cholesterol → CYP11A1 (side-chain cleavage) → Pregnenolone → CYP 17 (HSD3B) → Progesterone... → CYP17 → Estrogen → CYP19A1 (aromatase) → Testosterone → HSD17B →Androstenedione

What's the difference between lipid and protein hormone metabolism?

Steroid Hormones are made water soluble in the liver where they re-enter blood to go to kidney/bile

Protein hormones are degraded in kidney/liver by breaking peptide bonds

Explain the difference between a slow and a fast response?

Slow Response (genomic/classical response) : steroid hormone binds to intercellular receptor → (binds to nuclear receptor) genome interaction, increase mRNA/protein synthesis → in vivo response

Takes HOURS to DAYS

Fast response (non-genomic) : steroid hormone binds to membrane/intracellular receptor → A.C. activation → increased secondary messenger (cAMP) and kinase activity → initiates a cellular response

Takes SECONDS to MINUTES

Match the following numbers to the different type of hormone signaling:

Protein Hormone Signaling Steroid Hormone Signaling

1. Forms a transcription factor when bound to receptor.
2. Uses cyclic AMP as a second messenger.
3. cAMP binds regulatory unit of protein kinase A.
4. Receptor is located within the cytoplasm of the cell.
5. Receptor has three domains: extracellular, transmembrane, and intracellular.
6. Requires a transport protein to travel to target tissue.
7. Utilizes Heat Shock Proteins.
8. ATP activates Adenylate cyclase.

For a positive feedback loop, effectors make adjustments in the same direction as the initial event

For a negative feedback loop, effectors make adjustments in the opposite direction as the initial event

Negative feedback will regulate the tonic release of LH to support the CL until PGF2a causes CL regression

List the types of hormones down below, examples of each, and where their receptors would be

Peptide: receptor in plasma membrane (GnRH, OT)

Protein: receptor in plasma membrane (PRL)

Glycoprotein: receptor in plasma membrane (8% FSH, 1-2% LH) (30%- hCG – pregnancy tests) (45%- eCG)

What's special about glycoproteins? As carbohydrate % increase, half-life increases

What portion of the glycoprotein makes it unique? Beta-subunit they all have the same alpha-subunit

Steroid: receptor in nucleus and plasma membrane

Lipids: receptor in plasma membrane

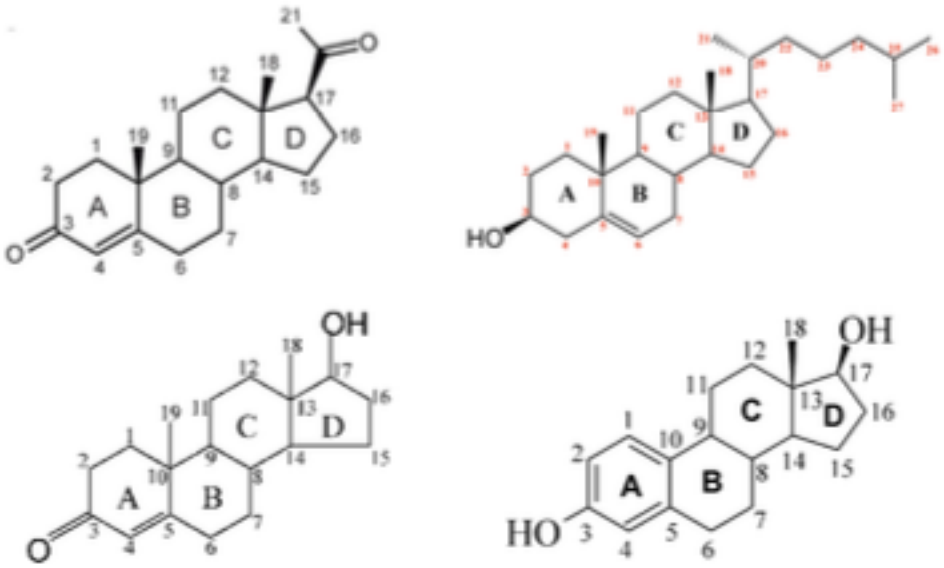
- Arachidonic acid is the precursor
  PGE2= vasodilation, maintains CL
  PGF2a= vasoconstriction, causes CL regression

Biogenic Amines: derived from tyraline and tryptophan.

- Dopamine, norepinephrine, epinephrine, histamine, serotonin, melatonin

What are the following hormones? From top left to right: Progesterone, cholesterol

From bottom left to right: testosterone, estrogen



Draw how protein/peptide hormones stimulate a cellular effect: