CONCEPT: OVERVIEW OF EXTRACELLULAR SIGNALING MOLECULES

Types of extracellular signaling molecules

● There are many types of extracellular signaling molecules, with numerous different functions

□ Examples of signaling molecules include:

Signaling molecules types
Steroid hormones and nuclear receptors
Gasses like NO
Neurotransmitters
Peptide Hormones and Growth factors (Ex: insulin and endorphins)
Eicosanoids – lipids that bind cell surface receptors

□ Signaling molecules have a variety of functions

Signaling molecules functions
Relay signals in the cell
Act as scaffolds to bring signaling proteins together
Transduce signals into a different form
Amply signal through **signal cascades** which produce large amounts of a small intracellular signaling molecule
Spread, anchor, or modulate other signals

● Signaling molecules act over different _____

□ **Endocrine** molecules are transported through the circulatory system to distance cells

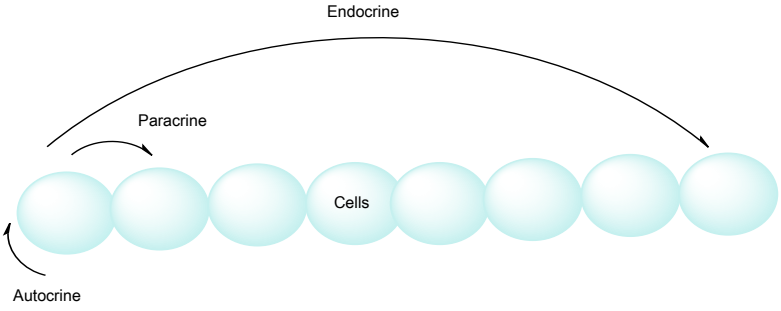
- Ex: Hormones

□ **Paracrine** molecules signal to cells in close proximity (*local mediators)*

- Ex: Neurotransmitters or growth factors

□ **Autocrine** molecules signal to themselves

EXAMPLE:



Cell Response to Signaling Molecules

● Receptor transmit signals in two main ways

1. Receptor transmits a signal from its cytoplasmic domain to a nearby enzyme

- Generates a second messenger that will continue to signal in the cell

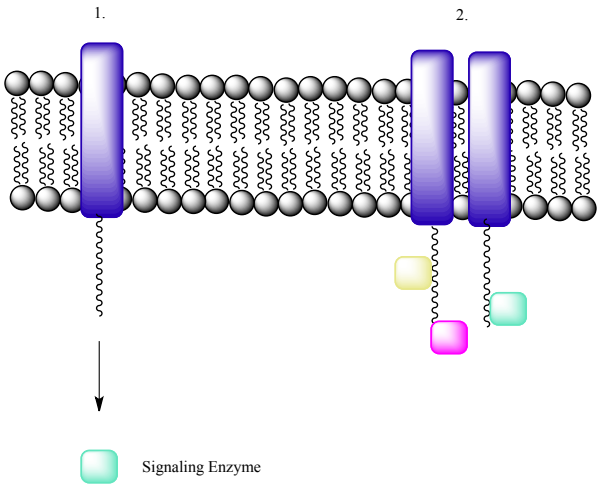
2. Receptor transforms its cytoplasmic domain into a recruiting station for signaling proteins

● Cells must be able to respond to a _____ of signaling molecules and pathways

□ Different cell types respond differently to signaling molecules

- Ex: Acetylcholine decreases heart muscle contraction and stimulates skeletal muscle contraction

EXAMPLE: Two methods of receptor signaling



PRACTICE:

1. Which of the following is not a classification of signaling molecules?
    a. Autocrine
    b. Paracrine
    c. Endocrine
    d. Lyoncrine

2. True or False: Signaling molecules work only through signaling cascades.
    a. True
    b. False