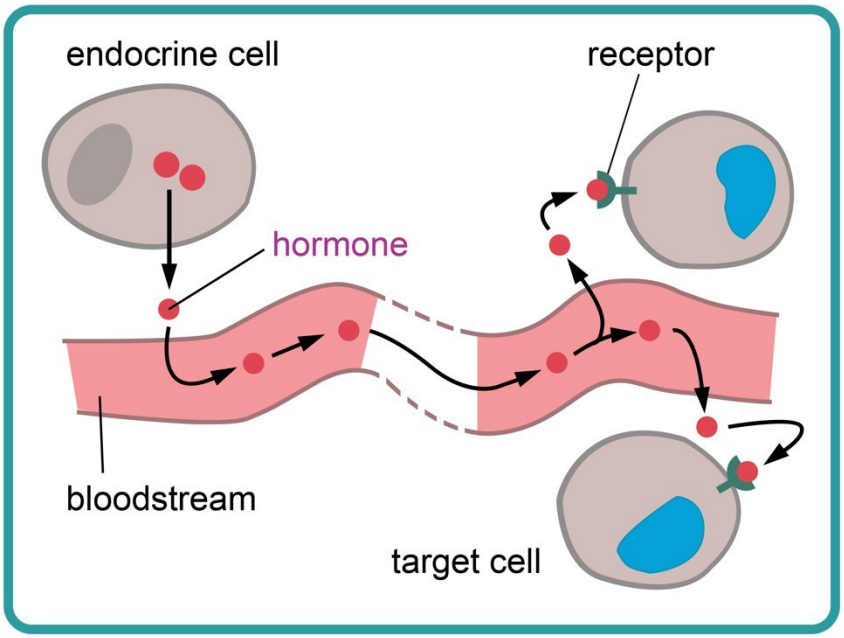
ENDOCRINE

The purpose of the endocrine system is to maintain the body's homeostasis using hormones. Hormones are signaling molecules. Although a wide variety of hormones function within the body, they share certain general characteristics:

1. Hormones have specific rates and rhythms of secretion. Three basic secretion patterns are: (1) circadian or diurnal patterns, (2) pulsatile and cyclic patterns, and (3) patterns that depend on levels of circulating substrates (e.g., calcium, sodium, potassium, or the hormones themselves).
2. Hormones operate within feedback systems, either positive or negative, to maintain an optimal internal environment.
3. Hormones affect only cells with specific receptors and then act on those cells to initiate specific cell functions or activities.

When an endocrine cell receives a stimulus or command, this stimulates the endocrine cell to secrete hormones into the blood stream. The hormones will then target and bind onto a specific receptor on a target cell. This will cause the target cell to initiate a response as shown in the diagram here.



Signaling Hormones

It is important to understand the signaling aspect of hormones. First, there are three types of signaling hormones, steroid, peptide and amine. The table below provides a description of the signaling hormones and their properties.

Class	Description		
Steroid	Lipids derive from choles	Undergoes constitutive secretion	
Peptide	Short polypeptide chains	Hydrophilic- cannot cross membrane Undergoes regulatory secretion	Insulin Glucagon
Amine	Derived from aromatic amino acid	Hydrophilic- cannot cross membrane	Thyroxine

Note that peptide and amine hormones are hydrophilic (water-soluble). This means that they are easily dissolved in fluid and do not have to bind to a protein in order to circulate. Characteristically, they also have a short half-life of just seconds to minutes as they are catabolized by circulating enzymes. Insulin, for example is a peptide hormone. Shortly after its release, it is catabolized by insulinase enzymes within 3-5 minutes.

Lipid-soluble hormones, in contrast, are transported bound to a protein. Because they are bound, they can remain in the blood for hours to days. It is very important to note here that when a hormone is bound to a protein, it cannot exert its effects. Only free circulating hormones can initiate responses inside of a target cell. This will be revisited as we delve into the diseases of the endocrine system. Upon arrival to the cell membrane, the protein-bound hormone must disengage from the protein in order to diffuse into the cell where its effects can be exerted.