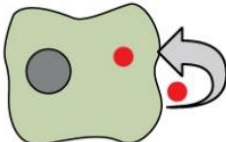
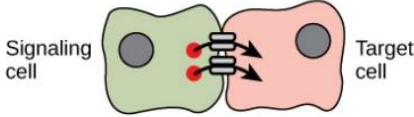
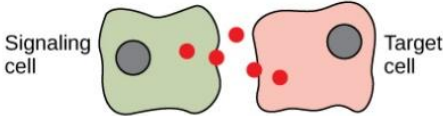



11.3.1

Cell Signaling Pathways

To help simply and organize the different types of cell signaling pathways we will divide the process into four categories: autocrine, gap junction, paracrine, and endocrine signaling.

Endocrine, Autocrine, Paracrine Signaling.

Forms of Chemical Signaling	
Autocrine	A cell targets itself.
	
Signaling across gap junctions	A cell targets a cell connected by gap junctions.
	
Paracrine	A cell targets a nearby cell.
	
Endocrine	A cell targets a distant cell through the bloodstream.
	

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Autocrine Signaling

As the name implies, auto “self” refers to the action of a ligand on the same cell that secreted it or on another cell of the same type that produced the hormone. For example, a lymphocyte releases signals that affect itself as well as other lymphocytes. In the case of viral infections, cells can release ligands that signal itself to start to undergo a programmed death to kill the virus.

Gap Junction Signaling

Gap junctions are physical connections of proteins that span between plasma membranes of neighboring cells. These proteins act as channels that allow small ligands to diffuse rapidly between two cells. An example of this type of ligand would be ions like Ca^{++} , or Na^{+} . This allows for a rapid communication between the two cells. In some cases, gap junctions form as a network between all the cells of a given tissue system, making the whole system function as one giant network. Examples would be some plants and animal heart muscle.

Paracrine Signaling

Like autocrine signaling, paracrine signaling is a local but short distance signaling. In paracrine signaling, the ligand is released into the extracellular space and regulates nearby cells of a different type. This type of signaling does not last long, eliciting short but quick response. For example, endothelial cells send signals that regulate smooth muscle activity in the walls of a blood vessel.

Endocrine Signaling

Endocrine signaling can reach the farthest and is the longest lasting form of cellular signaling. Ligands that are part of the endocrine signaling pathways employ the use of circulatory systems to travel long distances to interact with receptors of target cells. Ligands release in this fashion are called hormones.



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