

# Steroid and Non-Steroid Hormones

by Sophia



## WHAT'S COVERED

In this lesson, you will learn to determine the differences between steroid and non-steroid hormones. Specifically, this lesson will cover:

## 1. Hormone Overview

Hormones are chemical messengers (derived from either amino acids or lipids) of the endocrine system. They are made and secreted by glands. Once secreted, hormones interact with specific types of cells, signaling the cell's activity to change in some way. Cell receptors are specific to the hormones they interact with, and certain types of hormones can only affect certain types of cells. This means that not every hormone affects every type of cell because not all cells will possess their receptors.

## 2. Steroid Hormones

**Steroid hormones** are lipids that are made from cholesterol. They're produced in the adrenal glands and reproductive glands. Because steroid hormones are lipids made from cholesterol, they are non-polar, hydrophobic (water-repelling) molecules. This means they can't move through blood (which is very watery) without help, but they can move through the plasma membrane easily. They get to make a direct path through the cell to receptors on the nucleus.

Steroid hormones will bind to receptors on the nucleus, and this will allow them to affect the behavior of the DNA. They can turn genes and DNA on or off; this controls protein-making mechanisms and can directly affect the target cell's function.

➞ **EXAMPLE** Examples of steroid hormones are estrogen (which is involved in female reproduction) and testosterone (which is involved in male reproduction).



### TERM TO KNOW

#### **Steroid Hormones**

Hormones that have a cholesterol backbone and are not soluble in water due to their lipid structure; steroid hormones are transported through the blood attached to carrier proteins; steroid hormones penetrate the cell membrane and interact with nuclear receptors that affect DNA transcription.

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## 3. Non-Steroid Hormones

**Non-steroid hormones** are derived from amino acids; as a result, they tend to be more polar/hydrophilic (water-attracting). This means that they can pass easily through the blood (which is very watery), but cannot pass through the target cells' plasma membranes. Instead, non-steroid hormones bind to receptors on the target cell's plasma membrane.



### TERM TO KNOW

#### Non-Steroid Hormones

A class of hormones that are primarily derived from amino acids and are water soluble due to their polar nature; non-steroid hormones are transported freely through the blood; non-steroid hormones interact with receptors on the cell membrane and activate secondary messenger systems that carry out their effects within the cell.

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## 4. Secondary Messenger

Remember, steroid hormones bind to receptors on the nucleus, and non-steroid hormones are going to bind to receptors on the target cell's plasma membrane. Because non-steroid hormones aren't able to pass through the plasma membrane, they will activate what are called **secondary messengers**.

Secondary messengers relay information to the interior of the cell. When non-steroid hormones bind with their receptors on the plasma membrane, the secondary messenger will be activated. The secondary messenger will then relay the signal ultimately to the DNA, where changes in the target cell's behavior are controlled.



### TERM TO KNOW

#### Secondary Messenger

A group of signaling molecules located near a hormone receptor on the inside of the cell; when a non-steroid hormone binds to its receptor, it activates secondary messenger systems that carry out specific effects inside of the cell. Non-steroid hormones rely on secondary messenger signaling molecules because they are unable to penetrate the cell membrane and get into the cell.



### SUMMARY

This lesson has been an **overview of hormones**, including **steroid** and **non-steroid hormones** and **secondary messengers**.

Keep up the learning and have a great day!

Source: THIS WORK IS ADAPTED FROM SOPHIA AUTHOR AMANDA SODERLIND



### TERMS TO KNOW

**Non-Steroid Hormones**

A class of hormones that are primarily derived from proteins and are water soluble due to their polar nature; non-steroid hormones are transported freely through the blood. Non-steroid hormones interact with receptors on the cell membrane and activate secondary messenger systems that carry out their effects within the cell.

**Secondary Messenger**

A group of signaling molecules located near a hormone receptor on the inside of the cell; when a non-steroid hormone binds to its receptor on the extracellular side of the plasma membrane, it activates secondary messenger systems that carry out specific effects inside of the cell. Non-steroid hormones rely on secondary messenger signaling molecules because they are unable to penetrate the cell membrane and get into the cell.

**Steroid Hormones**

Hormones that have a cholesterol backbone and are not soluble in water due to their lipid structure; steroid hormones are transported through the blood attached to carrier proteins. Steroid hormones penetrate the cell membrane and interact with nuclear receptors that affect the DNA.