Endoplasmic Reticulum

by Sophia

WHAT'S COVERED

In this lesson, you will learn about the endoplasmic reticulum and its role in the cell. Specifically, this lesson will cover:

1. Endoplasmic Reticulum Overview

The **endoplasmic reticulum** is an organelle that is found in eukaryotic cells. If you remember from previous lessons, eukaryotic cells are cells that have a nucleus.

↱ EXAMPLE Our cells are eukaryotic cells, so an endoplasmic reticulum is an organelle that would be found in our cells.

HINT

If you were to think of the cell as a factory and of the organelles as different parts of the factory, the endoplasmic reticulum would be like a packager. Imagine a highway where materials are moving through this endoplasmic reticulum and getting ready to be packaged and sent off to other parts of the cells.

The endoplasmic reticulum also works closely with another organelle called the Golgi body or the Golgi apparatus. They help prep materials and get them packaged to be sent out to different parts of the cell.

TERM TO KNOW

Endoplasmic Reticulum

A cell organelle that assembles and packages proteins and lipids.

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2. Endoplasmic Reticulum's Role

The endoplasmic reticulum's role is to synthesize and package proteins and **lipids** in the cell. There are two parts of the endoplasmic reticulum: smooth and rough.

HINT

You'll often see endoplasmic reticulum abbreviated as ER. So when you see ER, just know that we're talking about the endoplasmic reticulum.

The endoplasmic reticulum is part of the **endomembrane system**, a system that makes lipids, modifies

proteins, and helps to package those molecules that will be sent out to different parts of the cell wherever they're needed. The endomembrane system includes the nucleus, the endoplasmic reticulum, the Golgi apparatus, and the plasma membrane. These organelles are grouped into a system because **vesicles** connect them. For example, a bit of the ER's membrane will pinch off into a membrane-bound bubble (a vesicle), which will merge with the membrane of the Golgi apparatus and deliver part of the ER's contents into the Golgi apparatus. Likewise, the Golgi apparatus will send vesicles to the ER.

TERMS TO KNOW

Lipid

A hydrophobic (water-repelling) biomolecule made up of glycerol and fatty acids; lipids include phospholipids, cholesterol and steroid hormones.

Endomembrane System

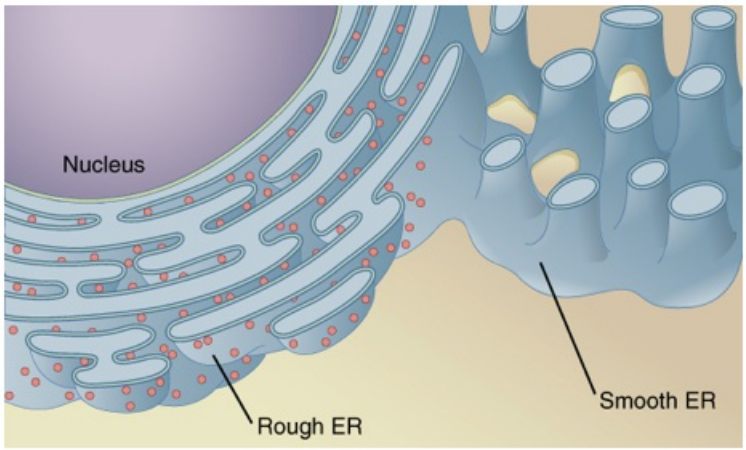
A system of cellular structures, including the endoplasmic reticulum, nuclear envelope, Golgi body and vesicles, that is used to synthesize and package proteins and lipids.

Vesicle

A small sac surrounded by a membrane which transports cellular products within the endomembrane system.

3. Endoplasmic Reticulum Parts

Surrounding the nucleus we have the nuclear envelope, which is where the endoplasmic reticulum begins. As you learn about the function of the endoplasmic reticulum, please refer to the image below.



3a. Rough ER

The **rough endoplasmic reticulum** is attached to the nuclear envelope. The reason that you call it rough ER is because it has **ribosomes** attached to it.

The little dots all over the place are the ribosomes. In this part of the endoplasmic reticulum, newly formed polypeptide chains will enter, then side chains will be added onto them to help complete that protein.

The function of ribosomes uses RNA messages sent from the nucleus to build proteins. It makes sense that the part of the endoplasmic reticulum with a lot of ribosomes on it (the "rough ER") is near the nucleus: The RNA messages leave the nucleus and immediately get converted into protein by the ribosomes on the rough

ER.

Proteins can act as enzymes, take part in the production and regulation of hormones, or regulate different cell functions. In the image above, the ribosomes are on the rough ER (and elsewhere in the cytoplasm). Finally, ribosomes are made up of two subunits. The parts of those ribosomes are made in the nucleus.

TERMS TO KNOW

Rough Endoplasmic Reticulum

A part of the endoplasmic reticulum with ribosomes embedded in it—mainly responsible for assembling and packaging proteins.

Ribosome

A cell organelle responsible for synthesizing proteins.

3b. Smooth ER

Further away from the nucleus, the ER has fewer ribosomes attached to it. With fewer ribosomes, this part of the ER does less protein production and more lipid production. It is called the **smooth endoplasmic reticulum**.

The smooth ER is called such because it does not have as many ribosomes attached to it. The smooth endoplasmic reticulum's job is to assemble lipids (fats).

HINT

The names of the different parts of the ER are fairly easy to remember: rough and smooth, depending on if they have a lot of ribosomes attached or not.

TERM TO KNOW

Smooth Endoplasmic Reticulum

A part of the endoplasmic reticulum responsible for mostly packaging lipids.

SUMMARY

This lesson has been an **overview of the endoplasmic reticulum**. Specifically, you learned about the **role of the endoplasmic reticulum** and the **major parts of the endoplasmic reticulum**.

Keep up the learning and have a great day!

Source: THIS WORK IS ADAPTED FROM SOPHIA AUTHOR AMANDA SODERLIND

ATTRIBUTIONS

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TERMS TO KNOW

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Endoplasmic Reticulum

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Ribosomes

A cell organelle responsible for synthesizing proteins.

Rough Endoplasmic Reticulum

A part of the endoplasmic reticulum with ribosomes embedded in it - mainly responsible for assembling and packaging proteins.

Smooth Endoplasmic Reticulum

A part of the endoplasmic reticulum responsible for mostly packaging lipids.

Vesicle

A small sac surrounded by a membrane which transports cellular products within the endomembrane system.