

# Difference Between Cell Membrane and Nuclear Membrane

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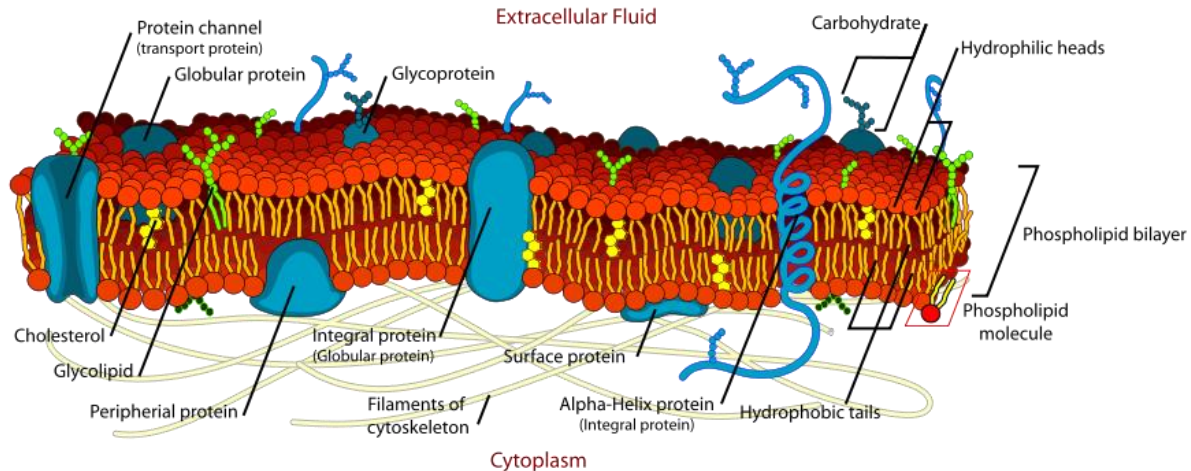
## Key Difference - Cell Membrane vs Nuclear Membrane

The [cell membrane](#), also known as plasma membrane is the barrier which separates the interior of the cell from the outside environment. It is made of the [lipid](#) bilayer and membrane proteins. The main function of the cell membrane is to protect the cell from disruption. It also protects the inner cell [organelles](#). The nucleus is one of the most important organelles found in [eukaryotic cells](#). An envelope known as nuclear membrane surrounds the [nucleus](#). Nuclear membrane protects the genetic material of the eukaryotic cell. The **key difference** between the cell membrane and nuclear membrane is that **cell membrane encloses the cytoplasm and the cell organelles and is a lipid bilayer while nuclear membrane encloses the nucleus and it is made up of the double lipid bilayer.**

## What is Cell Membrane?

The cell membrane is defined as the cytoplasmic lipid bilayer that surrounds the [protoplasm](#). It is also known as plasmalemma. The cell membrane is a biological membrane that separates the interior of the cell from the outside environment. It consists of the lipid bilayer and embedded proteins. The embedded proteins are three types; integral proteins, peripheral proteins and transmembrane proteins. It also consists of complex fats like [cholesterol](#) and [carbohydrates](#). The carbohydrates are either attached to proteins or lipids ([glycoproteins](#) and glycolipids respectively).

The basic function of the cell membrane is to protect the cell from its surrounding environment. Apart from that, it also protects cell organelles and also controls the movement of substances that go in and out of the cell. The cell membrane is selectively permeable to the ions and [organic molecules](#). Additionally, it involves cell adhesion, ion conductivity and cell signalling.



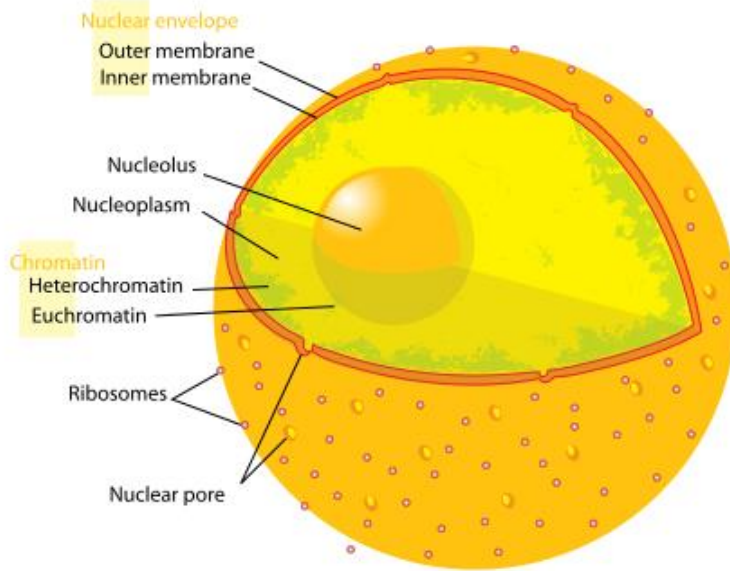
**Figure 01: The Cell Membrane**

According to the fluid mosaic model of the Singer and Nicolson (1972), the lipid bilayer cell membrane is dynamic, in which the lipid and protein molecules diffuse much easily. In plants, the cell membrane is surrounded by a rigid cell wall. In gram-negative [bacteria](#), they have a plasma membrane that is surrounded by an outer membrane. But, the other bacteria are having only the plasma membrane. A cell wall also surrounds the bacteria cell membrane consisted of peptidoglycan ([amino acids](#) and sugars).

## What is Nuclear Membrane?

The nuclear membrane is also known as the nuclear envelope. It is defined as the double lipid bilayer membrane which surrounds the genetic material and nucleolus of the eukaryotic cell. The two lipid bilayers are known as inner nuclear membrane and outer nuclear membrane. The space between these two membranes is known as perinuclear space. Space is approximately 20 -40 nm wide and it is contiguous with the inside of the [endoplasmic reticulum](#). The main function of the nuclear envelope is to protect genetic material, and it also involves in transportation of genetic material (e.g. mRNA) in and out of the nucleus during [protein synthesis](#).

The outer membrane of the nuclear envelope shares a common border with the endoplasmic reticulum. And the outer nuclear membrane has a higher concentration of proteins like “Nesprin”. The inner nuclear membrane usually encloses the [nucleoplasm](#). And it is covered by a nuclear lamina. The nuclear lamina is a mesh of intermediate filaments that stabilizes the nuclear envelope. It also involves the chromatin function as well as expression.



**Figure 02: The Nuclear Membrane**

In [eukaryotes](#), during the prometaphase of the [cell division](#), the nuclear membrane breaks down, and it reforms again in the telophase. The nuclear membrane consists of thousands of nuclear pore complexes. They are large hollow proteins which link inner and outer nuclear membranes. In mammalian cells, the nuclear membrane undergoes rupturing during interphase due to nuclear deformation, which is later rapidly repaired.

## What are the Similarities Between Cell Membrane and Nuclear Membrane?

- Both are made up of lipid bilayers.
- Main functions of both membranes are protection and transportation.
- Both are extremely important for the cell survival.
- Both have proteins in the structure.

## What is the Difference Between Cell Membrane and Nuclear Membrane?

Cell Membrane vs Nuclear Membrane	
The cell membrane is defined as the cytoplasmic lipid bilayer membrane that surrounds the protoplasm of the cell.	The nuclear membrane is defined as the two lipid bi layer membrane which surrounds the genetic material and nucleolus of the eukaryotic cell.

Nature of the Membrane and Pores	
Cell membrane is a continuous membrane without any pores.	Nuclear membrane is a discontinuous membrane with complex pores.
Number of Units	
Cell membrane is a single unit membrane (one lipid bilayer).	Nuclear membrane consists of two unit membranes (two lipid bilayers).
Persistence	
Cell membrane persists during the lifetime of the cell.	Nuclear membrane disappears during the cell division in prometaphase and reforms again in telophase.
Permeability and Transportation	
The cell membrane is a semi-permeable membrane and regulates the flow of substances like ions, organic molecules between protoplasm and external environment.	The nuclear membrane is permeable only to small non-polar molecules (mRNA and proteins) and regulates the flow of these molecules between nucleoplasm and cytoplasm.
Endoplasmic Reticulum (ER)	
The endoplasmic reticulum is not found attached to the cell membrane.	The endoplasmic reticulum is normally found attached to the nuclear membrane.
Prokaryotic and Eukaryotic	
The cell membrane is found in both prokaryotic and eukaryotic organisms.	The nuclear membrane is found only in eukaryotic organisms.

## Summary - Cell Membrane vs Nuclear Membrane

The membranes are an important compartment of a cell. They are classified as the cell membrane and organelles membranes. The cell membrane is also called as plasma membrane (cytoplasmic membrane) and is separating the interior of the cell from the outside environment. The cell membrane is made of the lipid bilayer and embedded proteins. The cell membrane has complex lipids like cholesterol and carbohydrates attached to it. The main function of the cell membrane is to protect the cell from its surroundings. It also protects the inner cell organelles. On the other hand, the nuclear

membrane is the double lipid bilayer which surrounds nucleolus and chromatin of the nucleus. It is also known as the nuclear envelope. The nuclear membrane is a discontinuous sheet made with a lot of pores, unlike cell membrane. This is the difference between the cell membrane and nuclear membrane.

#### **Reference:**

- 1.Cooper, Geoffrey M. “The Nuclear Envelope and Traffic between the Nucleus and Cytoplasm.”The Cell: A Molecular Approach. 2nd edition., U.S. National Library of Medicine, 1 Jan. 1970. [Available here](#)
- 2.“Cell membrane.” Wikipedia, Wikimedia Foundation, 5 Dec. 2017. [Available here](#)
- 3.“Nuclear membrane.” Wikipedia, Wikimedia Foundation, 13 Dec. 2017. [Available here](#)

#### **Image Courtesy:**

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- 2.'Diagram human cell nucleus'By Mariana Ruiz LadyofHats - Own Work (Public Domain) via [Commons Wikimedia](#)

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