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Compartmentalization

AP Bio with ❤️
Prahalad R

What is it?

In a house, each room is compartmentalized. For example, this kitchen is a good environment to cook. The bedroom is a good environment to rest and study. The living room is a good environment to relax and socialize.

Each room has a unique purpose and is one compartment of the whole house.

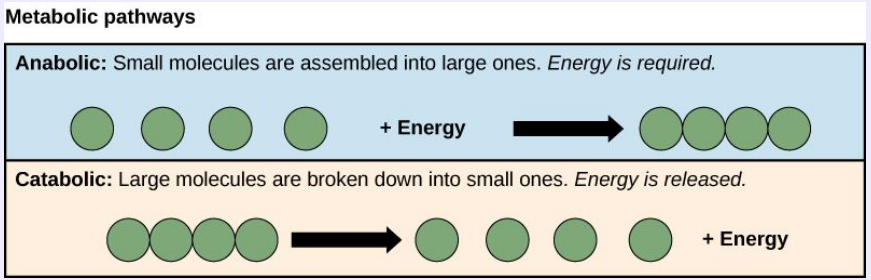
- The same thing can be said of compartmentalization in cells.

Why Compartmentalization Exists in Cells

source

Catabolism (breaking down substances) should be separated from **anabolism** (building new substances), etc.

- These two reactions cannot occur in the same space.
- For example:
  - Synthesis of Fatty Acids - Fatty acids are created by a protein called Fatty Acid Synthase. Another protein called Mitochondrial Trifunctional Protein breaks down fatty acids.
  - If you were to place these two in the same place, nothing would get done, because as the Fatty Acid Synthase created fatty acids, the trifunctional protein would keep cutting them down.



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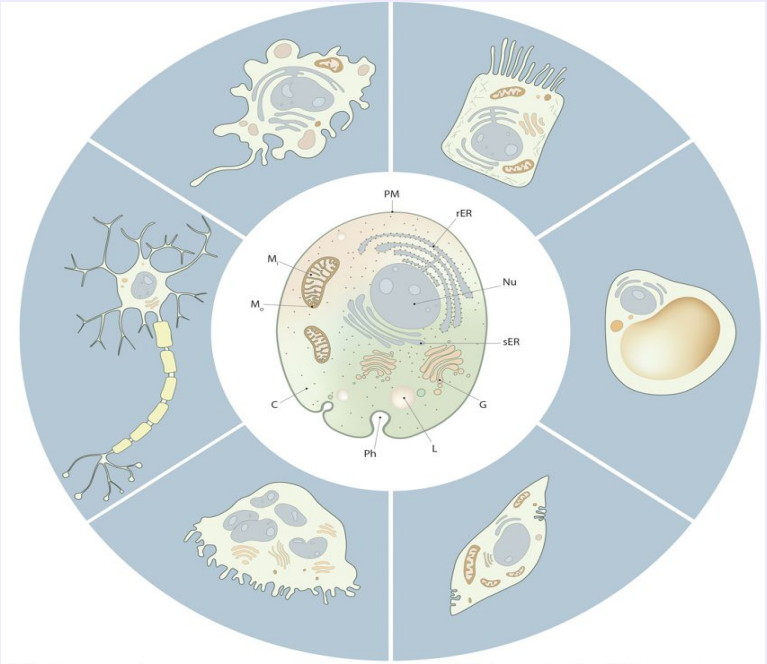
How is it created?

In eukaryotic cells, it is created by using **internal membranes.**

- These membranes surround the nucleus, create the folds of the endoplasmic reticulum and Golgi apparatus.
- Ex: Mitochondrion is surrounded by 2 membranes. This allows for **the separation of important of catabolic and anabolic reactions**, and creates a large surface area for reactions to occur.
- **Cell division** - right before cell division starts to take place, all of the organelles within the cell are duplicated.
- Thus when the cell divides, each new cell has a full set of compartmentalized organelles.

Compartmentalization in Cells

source



PM - plasma membrane
C - cytoplasm
Nu - nuclear compartment
rER - compartment of rough endoplasmic reticulum
sER - compartment of smooth endoplasmic reticulum
Mi - inner mitochondrial compartment
Mo - outer mitochondrial compartment
G - Golgi compartment
L - lysosomal compartmnent
Ph - phagosomal compartment