

# CELL DEATH



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*Shaping Lives...*  
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## CELL DEATH

Cell death is the process by which a cell stops functioning and eventually dies. This can happen in a number of different ways, including programmed cell death (also known as apoptosis) or cell death that occurs as a result of injury or disease (also known as necrosis). In either case, the end result is the removal of damaged or unnecessary cells, which is important for maintaining the health of the organism.

**TYPES:** There are several types of cell death, including:

**Apoptosis:** This is a type of programmed cell death that occurs as a normal part of development and tissue maintenance. During apoptosis, cells are targeted for destruction and the process is carefully controlled, to avoid damaging surrounding tissues.

**Necrosis:** This is a type of cell death that occurs as a result of injury or disease. Unlike apoptosis, necrosis is not a controlled process, and often results in the release of harmful substances into the surrounding tissues.

### **APOPTOSIS:**

Apoptosis is a type of programmed cell death that occurs as a normal part of development and tissue maintenance. It is a regulated process that is essential for the proper functioning of an organism.

**PATHOGENESIS:** The development of apoptosis involves several key steps:

1. **Initiation:** The first step in the development of apoptosis is the initiation of the process, which can be triggered by a variety of internal or external signals. For example, cells may undergo apoptosis in response to DNA damage, oxidative stress, or changes in the levels of hormones or growth factors.

2. **Activation of caspases:** Once the apoptosis process has been initiated, a group of enzymes known as caspases become activated. These enzymes are responsible for breaking down key components of the cell.
3. **Chromatin condensation:** The next step in the development of apoptosis is the condensation of chromatin, which is the material that makes up the chromosomes. This condensation makes it easier for the cell to be fragmented or breaks down into smaller pieces.
4. **Nuclear fragmentation:** The next step is the fragmentation of the nucleus, which is by the action of caspases.
5. **Formation of apoptotic bodies:** The fragments of the cell then condense into small, membrane-bound structures called apoptotic bodies. These structures are recognized and phagocytosed (engulfed) by neighboring cells or by immune cells, which helps to prevent inflammation and the release of toxic cellular contents into the surrounding tissue.
6. **Elimination:** Finally, the apoptotic bodies are eliminated from the organism, bringing the process of apoptosis to a close.

## **NECROSIS:**

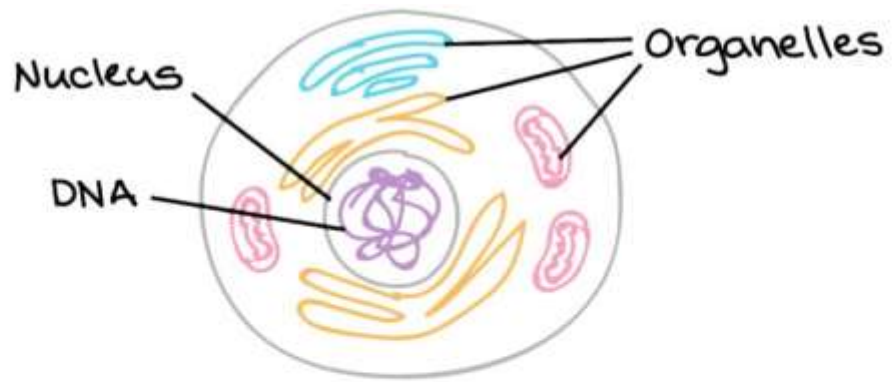
Necrosis is a type of cell death that occurs as a result of injury or disease, and is characterized by the sudden and uncontrolled death of cells. Unlike apoptosis, which is a regulated and controlled process, necrosis is not a normal part of cellular function, and often results in the release of harmful substances into the surrounding tissue.

**PATHOGENESIS:** The development of necrosis typically involves the following steps:

1. **Initial injury:** Necrosis is triggered by an injury to the cell, such as physical damage, exposure to toxins, or the lack of oxygen or nutrients.
2. **Loss of membrane integrity:** The injury leads to the loss of integrity of the cell membrane, allowing substances that are normally contained

within the cell to leak out into the surrounding tissue.

3. **Inflammatory response:** The release of cellular contents triggers an inflammatory response, as immune cells are attracted to the site of injury to remove the dead cells and cellular debris.
4. **Swelling and lysis:** The damaged cell swells and eventually bursts, releasing its contents into the surrounding tissue. This can lead to further damage to nearby cells and tissues, and can also cause the release of harmful substances such as enzymes and free radicals.
5. **Phagocytosis:** Immune cells, such as phagocytes, then move in to engulf and remove the dead cells and cellular debris, helping to prevent inflammation and further tissue damage.



Injury to cell

Cue to enter apoptosis



NECROSIS



APOPTOSIS