What is Autophagy?

Autophagy is a natural cellular mechanism by which the cells in our body degrade unnecessary or damaged components within the cell. The process of autophagy helps maintain normal functioning (homeostasis) in the cell. The term “autophagy” literally means “self-eating.”

Though autophagy sounds like self-destruction, the process actually helps clean up harmful material inside the cells and rejuvenates them. Autophagy may completely destroy damaged molecules, or recycle them into new components which can be used for cellular repair.

In times of stress, when cells are deprived of nutrients or oxygen, autophagy can provide an alternate source of energy from the recycled cellular material to help them survive. Autophagy can help the immune system by cleaning up toxins and infectious agents.

Under certain conditions, autophagy can also induce programmed cell death (apoptosis).

In short, autophagy is a part of a cellular process that maintains cell homeostasis by finding a balance between making and breaking cellular components.

What is the process of autophagy?

Autophagy forms a part of the metabolic process which helps cells convert food into a form of energy that cells can use to grow and divide. Metabolism balances between two opposing activities, anabolism, and catabolism.

Anabolism is a process that synthesizes molecules and builds cellular structures, while catabolism breaks them down. Autophagy is a catabolic process.

A human cell is composed of a nucleus, surrounded by a semifluid substance known as cytoplasm, enclosed within a cellular membrane. The cytoplasm is made up of a solution known as cytosol, protein molecules, and structures known as organelles, which are essential for the survival and functioning of the cell.

What is the process of Autophagy?

During Autophagy, a semicircular membrane known as phagophore forms and closes around some of the molecules and organelles in the cytoplasm and becomes what is known as an autophagosome.

The autophagosome fuses with an organelle known as the lysosome. The lysosome contains digestive enzymes that break down the contents of the autophagosome.

The resulting molecules are released back into the cytosol to be recycled and used in the metabolic process.

Autophagy is a natural process that occurs all the time in the cell, less when well-fed, and more when under stress.

Autophagy may engulf non-specific cell components, or selectively remove damaged components or invasive bacteria and other pathogens.

What is autophagy in fasting?

Intermittent fasting is a possible way to induce autophagy. Under normal conditions, when the cell has sufficient nutrients, autophagy degrades damaged components in the cell. When fasting starves the cells, autophagy helps digest some of the cell components, to provide the necessary energy for survival.

The liver stores excess glucose as glycogen. When glucose levels drop with fasting, the liver converts glycogen into glucose and releases it.

After the stored glucose is depleted, the liver breaks down fat to make a substance known as ketones to provide energy. This process is known as ketosis.

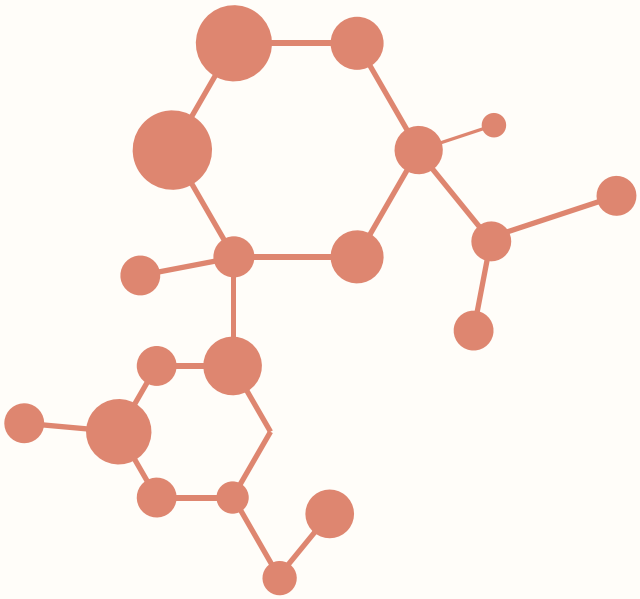
Many people follow intermittent fasting and calorie restriction diets for weight reduction. A currently popular diet known as the ketogenic diet, in which 75% of the daily calories come from fat, is believed to induce ketosis and autophagy.

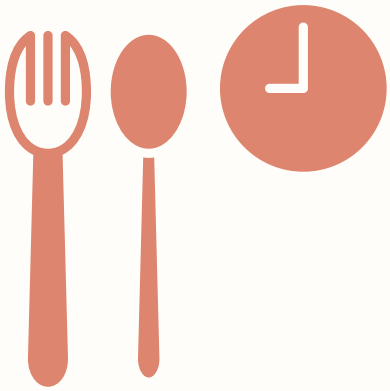
What is Autophagy in fasting?

Research indicates that intermittent fasting, calorie restriction, and ketosis can all trigger Autophagy.

However, a majority of studies have so far been conducted only on animals. It is also not clear what type of cells initiate Autophagy in response to fasting.

For instance, fasting may induce Autophagy in any type of cell and not necessarily in fat cells.





How long do you need to fast for autophagy?

Depending on the individual's metabolism, significant Autophagy may take two to four days of fasting in humans.

Autophagy is believed to begin when glucose and insulin levels drop considerably. Animal studies have shown evidence of Autophagy after 24 hours of fasting, which starts peaking at around 48 hours of fasting.

Some studies have detected Autophagy in human cultured neutrophils (the most abundant type of immune cell in the blood) after 24 hours.

There are, however, no conclusive studies on humans that indicate an optimal period of fasting to achieve Autophagy.

Do not attempt to fast to induce Autophagy without discussing this method with your doctor.