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## ULTRA STRUCTURE & FUNCTION OF

### Mitochondria

The energy requirements of the living organism is fulfilled by a definite cell organelle known as Mitochondria. These cellular entities were first reported by Kolliker (1850) and were named as 'Redplast' by Altman in 1882. It was Benda who stained these particles by crystal violet and named them as 'Mitochondria'.

The mitochondria are very important cell organelle and are concerned with cellular respiration and energy production. They are capsule of trapping the chemical energy of the nutrients and which is subsequently utilized in the synthesis of ATP molecules. Thus, they account for the total energy production of the living system & hence, called as 'Powerhouse'.

"The mitochondrion is a bio-chemical machine which converts the potential energy of food stuff into chemical energy." ~~Mitochondria~~

#### Structure:

#### ① Light-Microscopy:-

Shape:- Mitochondria vary in shape but are generally filamentous or granules.

Size:- It is also variable with an average length of 3-4 microns and average diameter of 0.5 to 1.0 microns.

Number:- The number vary in different types of cell. The average number per cell is about 200-500. The number depends upon the metabolic state of the cells. Active cells have more number than the inactive cell.

Distribution:- Generally they are evenly distributed in the cytoplasm. However, in some cases, they show definite arrangement i.e.

In kidney tissues - they are basal.

In skeletal muscles - they are between myofibrils.

In sperm they are in middle piece etc.

## Ultra-structure

Under electron microscope, each mitochondrion exhibits the following structures:-

1. Each mitochondrion is a boat shaped structure having two membranes and two compartments.
2. The two membranes, known as outer and inner membrane, measure about 60-70 Å.
3. The two membranes are separated by a distance of 40-70 Å.
4. The space between the outer and inner membrane constitute the outer compartment while the space enclosed by the inner membrane constitute the inner compartment.
5. The space is filled with a dense fluid known as matrix.
6. The matrix is not homogeneous but contains dense granules (200-500 Å) which are the binding site for divalent cations viz,  $Mg^{++}$ ,  $Mn^{++}$  &  $Ca^{++}$  etc.

### Mitochondrial Membranes :-

1. Both the membranes resemble the unit membrane. They are bilamellar structure with another outer and inner protein layer and a middle lipid layer.
2. The outer membrane simply serves as a boundary membrane while the inner membrane is much more complicated in structure.
3. The inner membrane is highly folded structure giving rise to an irregular series of incomplete septa called as cristae, which project into the matrix.
4. The shape of cristae vary and depends upon the actual physiological state of the cell.