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Paper :- Biochemistry II

Mam :- Kalsoom

Bs Radiology 2nd semester

X

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Answer No: 01

Starvation :-

→ A severe lack of food for a prolonged period not enough calories of any sort to keep up with the body's needs is starvation.

⇒ The result is substantial weight loss, wasting away of the body's tissues and eventually death.

Metabolic Changes during starvation :-

→ Metabolic relating to metabolism, the whole range of biochemical processes that occur within us. The term metabolic is often used to refer specifically to the breakdown of food and its transformation into energy.

⇒ Circulating glucose concentrations do not drop below 3.5 mmol L^{-1} even in prolonged starvation

⇒ During starvation the brain must be supplied with fuel in the form of glucose or ketone bodies, carbohydrate ~~res~~ reserves are depleted after 24h of starvation

⇒ In prolonged starvation, gluconeogenesis (GNG) is a metabolic pathway

that results in the generation of glucose from certain non-carbohydrate carbon substrates) provides the glucose oxidised by the brain.

⇒ The major substrates for gluconeogenesis are amino acids derived from skeletal muscle protein breakdown.

⇒ During starvation, most tissue utilize fatty acids to spare glucose for the brain.

⇒ Glucose utilization by the brain is decreased during prolonged starvation as the brain utilize ketone bodies (ketone bodies are the water-soluble molecules containing the ketone group that are produced by the liver from fatty acids during periods of low food intake) as the major fuel.

Cause of starvation:-

⇒ poverty

⇒ unequal income distribution in the world

⇒ conflict and hunger itself.

Answer No: 02

Clinical Significance of some enzymes:

- ⇒ Levels of some of the enzymes that are higher or lower than normal can indicate liver problems.
- ⇒ Some common liver function tests include enzymes are

Gamma-glutamyl transferase (GGT):

- ⇒ The gamma-glutamyl transferase (GGT) test may be used to determine the cause of elevated alkaline phosphatase (ALP).
- ⇒ Both ALP and GGT are elevated in disease of the bile ducts and in some liver diseases, but only ALP will be elevated in bone disease.

b Glucose-6-Phosphate

Dehydrogenase (G-6-PD) :-

- ⇒ G6PD deficiency is a genetic abnormality that results in an inadequate amount of glucose-6-phosphate dehydrogenase (G6PD) in the blood.
- ⇒ This is very important enzyme that regulates various biochemical reaction in the body.
- ⇒ G6PD is also responsible for keeping red blood cells healthy so they can function properly and live a normal life span.
- ⇒ Without enough of it, red blood cells break down prematurely.
- ⇒ This early destruction of red blood cells is known as hemolysis and it can eventually lead to hemolytic anemia.

CAUSES :-

- ⇒ This can cause fatigue, yellowing of the skin and eyes, and shortness of the breath.

Answer No: 03

ELECTRON TRANSPORT CHAIN

ETC is carried out for the formation of energy by FADH and NADH (Reduced co-enzymes) through biological mechanism.

\Rightarrow ETCs take place inside the mitochondrial membrane.

\Rightarrow Cluster of proteins present in mitochondrial inner membrane transfer electrons to form ATP's

\Rightarrow Energy store in the form of hydrogen or electrons, NADH and FADH .

\Rightarrow In NADH and FADH two electron are present.

\Rightarrow Eg NAD^+ takes two electrons and change into NAD^- , then NAD^- take one H^+ from 2H^+ and change into NADH

\Rightarrow In ETC various protein are involved

\Rightarrow FMN (flavoprotein)

Fe-S (Iron, Sulphur protein)

=> Ubiquinone Q

=> Cytochrome (cytochrome C, b, a, a₃)

=> These 4 proteins are called complex proteins

=> And divided in 4 complexes -

Function:

=> Electron move in Complex 1 --- here FMN transfer 2e electrons to Fe-S to then these move to Q.

=> And FADH₂ gives e⁻ to complex 2 (move in mitochondrial matrix) these 2e⁻ transfer to Q.

=> Then Q transfer the e⁻ to complex 3. these then move to different proteins and pass to complex 4, last e⁻ acceptor protein in Cyto a₃

=> In this process when e⁻ moves. ATP synthesis take place.

=> From last protein e⁻ moves to O₂, O₂ accept e⁻ and change to O₂

$\Rightarrow O_2 + 2H^+ \dots \dots H_2O$

$\Rightarrow H^+$ present in matrix

\Rightarrow water synthesis take place in ETC and in krebs cycle CO_2 synthesis take place.

\Rightarrow Every protein is more electronegative than previous protein.

\Rightarrow Every time e^- move its energy is utilize to make ATP.

\Rightarrow So at every step redox reaction is happening.

Oxidative phosphorylation

\Rightarrow synthesis of ATP in the presence of oxygen.

\Rightarrow it take place in inner membrane of mitochondria

\Rightarrow ATP form by break down of food.

\Rightarrow ATP is the form of energy

\Rightarrow ATP is form by glycolysis

⇒ 6 mole is break in 3mole called pyruvic acid.

⇒ 3 mole of pyruvic acid in oxidation is converted in 2mole of carbon goes in krebs cycle.

⇒ These step when completed and gives as energy.

⇒ Beside ATP, NADH also form

⇒ Beside ATP NADH also form.

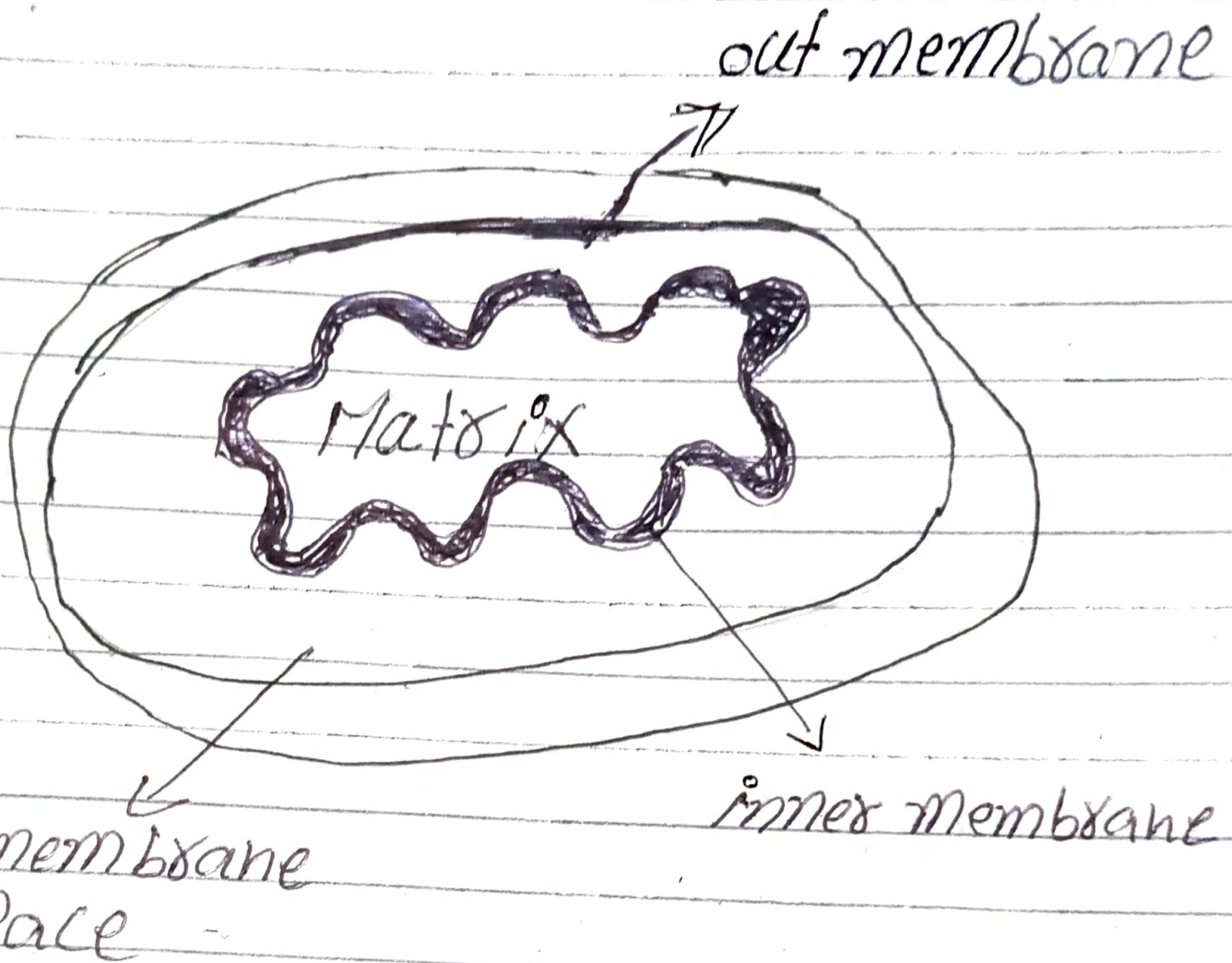
⇒ NADH, $2H^+$ seperated and in inner mitochondrial, electron also releases and pass through protein in ETC and at same time H^+ comes out in outer mitochondrial membrane.

⇒ When H^+ come out ADP is change into ATP.

⇒ Water molecules form in ETC

⇒ When ATP forms in oxidative phosphorylation at the same time ETC occur and water form.

Diagram



Answer no: 04

Metabolism of Carbohydrates :-

⇒ Metabolism converting food into energy.

⇒ Metabolism is the process by which your body converts what you eat and drink into energy.

⇒ During this complex biochemical process, calories in food and beverages are combined with oxygen to release the energy your body needs to function.

Carbohydrate metabolism :-

⇒ IS a fundamental biochemical process that ensures a constant supply of energy to living cells.

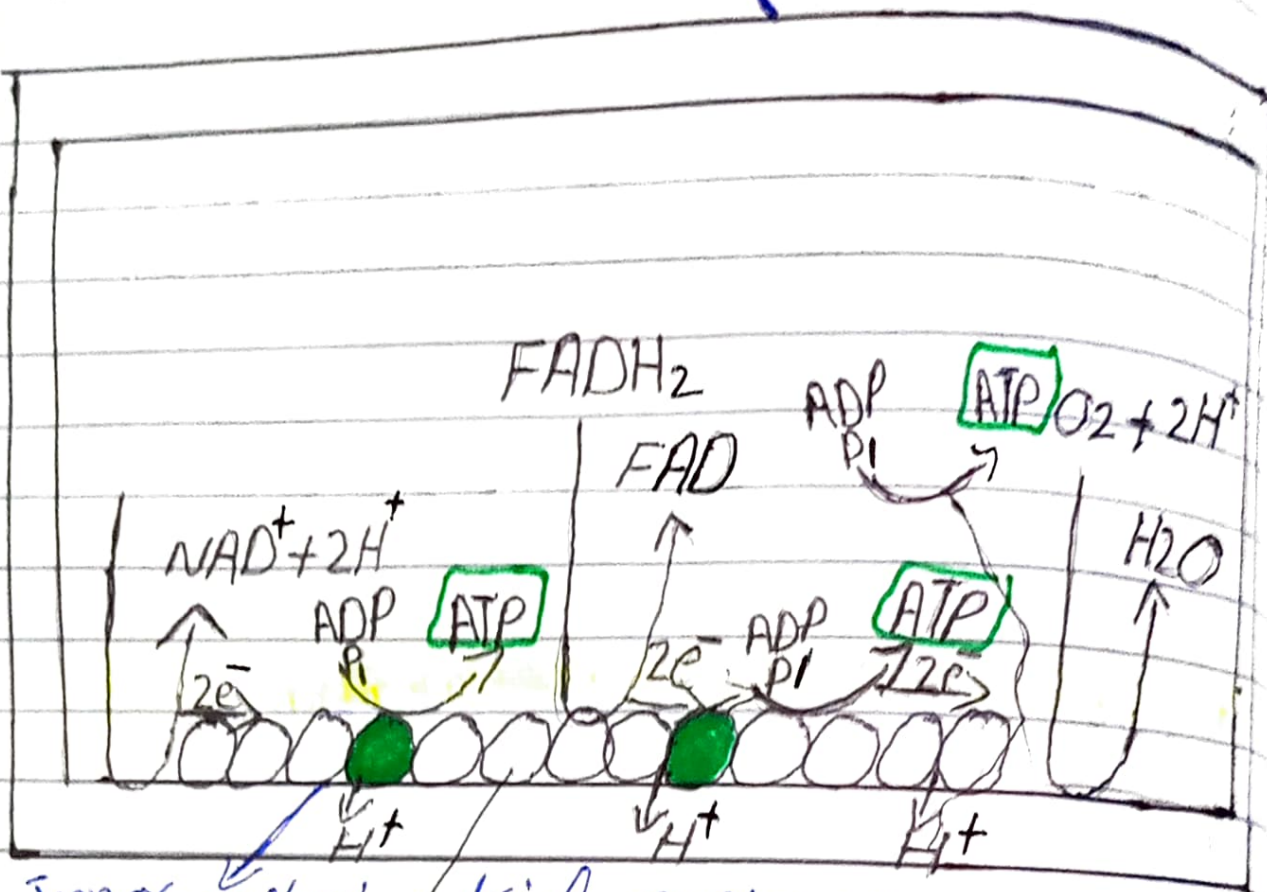
⇒ The most important carbohydrate is glucose, which can be broken down via glycolysis, enter into the Kreb's cycle and oxidative phosphorylation to generate ATP.

Answer No: 05

Diagram

oxidative Phosphorylation

cut mitochondrial membrane



inner mitochondrial membrane

Cytochromes in electron transport chain

X X X X