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Department: Radiology 2nd

Section: A

Subject: Biochemistry

Q1 Explain the process of uric acid formation?

Ans:-

- ❖ *Uric acid production and metabolism are complex processes involving various factors that regulate hepatic production, as well as renal and gut excretion of this compound.*
- ❖ *Uric acid is the end product of an exogenous pool of purines and endogenous purine metabolism.*
- ❖ *The exogenous pool varies significantly with diet, and animal proteins contribute significantly to this purine pool.*
- ❖ *The endogenous production of uric acid is mainly from the liver, intestines and other tissues like muscles, kidneys and the vascular endothelium.*

Formation of Uric Acid:

- ❖ *Xanthine oxidase is an enzyme which catalyzes the formation of uric acid from xanthine and hypoxanthine, which in turn are produced from other purines.*
- ❖ *Xanthine oxidase is a large enzyme whose active site consists of the metal molybdenum bound to sulfur and oxygen.*
- ❖ *Within cells, xanthine oxidase can exist as xanthine dehydrogenase and xanthine oxidoreductase, which has also been purified from bovine milk and spleen extracts.*
- ❖ *Uric acid is released in hypoxic conditions (low oxygen saturation).*

Excretion of Uric Acid:

- *It has been known for many years that the kidney plays a major role in uric acid homeostasis, as more than 70% of urate excretion is renal.*
- *Hyperuricemia in gout is most commonly the result of relative urate under excretion, as the kidney has enormous capacity for urate reabsorption.*

Q2: Discuss all the protein complexes used in electron transport chain?

ANS:-Electron transport chain:-

The electron transport chain (ETC) is a cluster of proteins that transfer electrons through a membrane within mitochondria to form a gradient of protons that drives the creation of adenosine triphosphate (ATP). ATP is used by the cell as the energy for metabolic processes for cellular functions.

OCCURRENCE:- The electron transport chain is where most of the energy cells need to operate is generated. This "chain" is actually a series of protein complexes and electron carrier molecules within the inner membrane of cell mitochondria.

Electron Transport Chain:

- The by-products of most catabolic processes re NADH and FADH₂.
- Metabolic processes use NADH and FADH₂ to transport electron.
- These electrons are passed from NADH and FADH₂ to membrane bound electrons carriers which are then passed on to other electron carriers until they are finally given to oxygen resulting in the production of water.
- As electrons are passed from one electron carriers to another hydrogen ions are transported in to the inter membrane space at three specific points in the chain.
- The transportation of hydrogen ions creates a greater concentration of hydrogen ions in the intermembrane space than in the matrix which can then be used to drive ATP Synthase and produce ATP (a high energy molecule).

Protein complexes Of ETC:

Complex 1:

- NADH transfers two electrons to complex 1 resulting in four H⁺ ions being pumped across the inner membrane.

- NADH is oxidized to NAD^+ , which is recycled back into the Krebs cycle. Electrons are transferred from complex 1 to a carrier molecule ubiquinone Q or CoQ, which is reduced to ubiquinol.

Complex 2:

- FADH_2 transfers electrons to complex 2 and the electrons are passed along to ubiquinone Q. Q is reduced to ubiquinol, which carries the electrons to complex 3.

Complex 3:

- The passage of electrons to complex 3 drives the transport of four more H^+ ions across the inner membrane.
- While electrons are passed to another electron carrier protein Cytochromes C.

Complex 4:

- Cytochrome c passed electrons to the final protein complex 4. Two H^+ ions are pumped across the inner membrane. The electrons are then passed from complex 4 to an oxygen O_2 molecule, causing the molecule to split.
- The resulting oxygen atoms quickly grab H^+ ions to form two molecules of water.