

**Course Title: Medical Biochemistry II**

**DT 2<sup>nd</sup>, Sec A**

**Lab Assignment**

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**Note: Avoid copy paste material, as it may deduct your marks.**

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Q1. Explain the process of Uric Acid Formation.

Q2. Discuss all the protein complexes used in Electron transport chain.

Ans..1. Uric Acid is a waste product created during the normal breakdown of purines, naturally occurring substances found in foods such as liver, mushrooms, anchovies, mackerel and dried beans according to the NIAMS. Uric Acid is normally cleaned out of

the blood by the kidneys, and passes out of the body along with urine.

Xanthine oxidation 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).

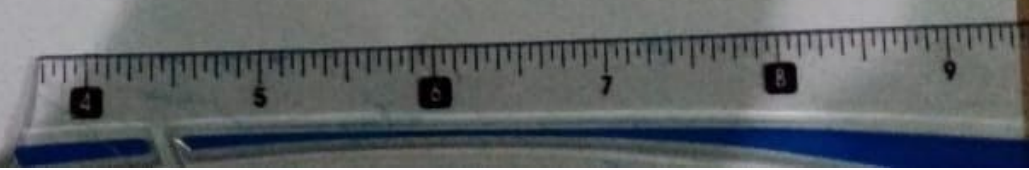
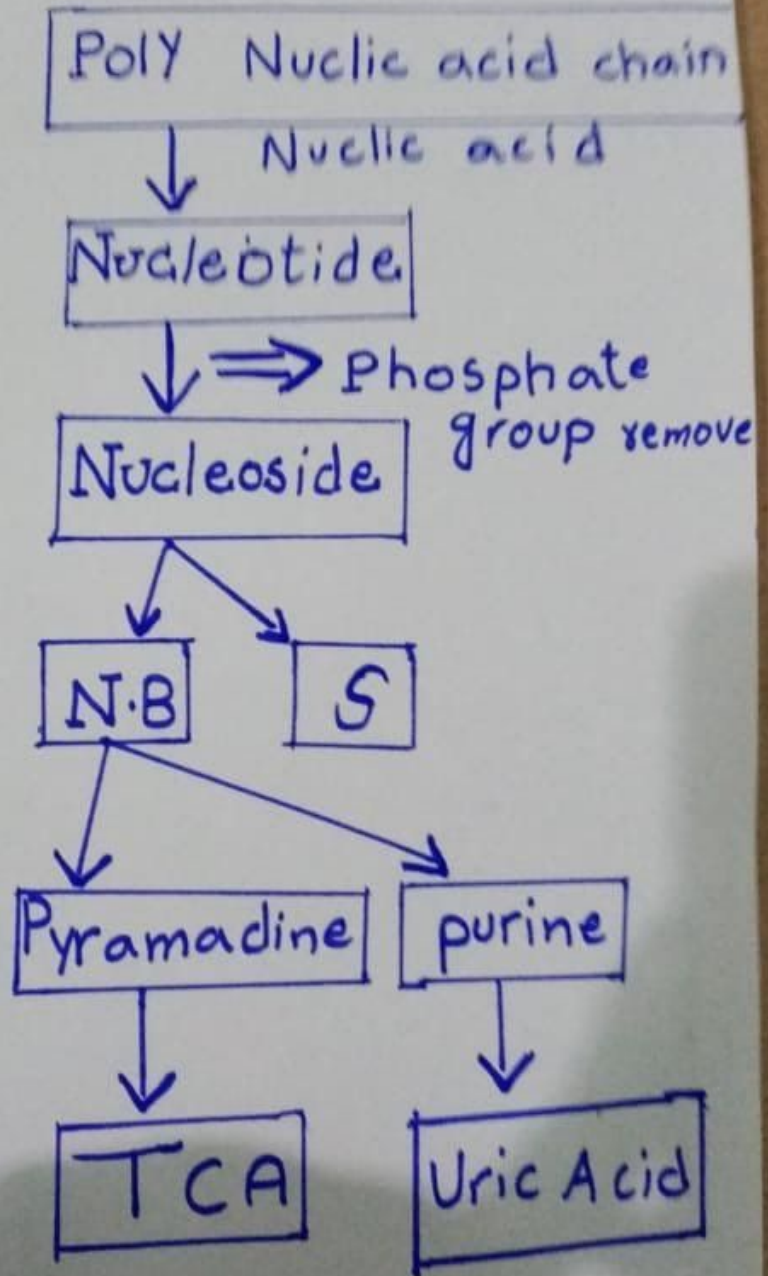
Uric acid is a heterocyclic compound of carbon, nitrogen, oxygen, and hydrogen with the formula  $C_5H_4N_4O_3$ . It forms ions and salts known as urates and acid urates, such as ammonium acid urate. Uric acid is a product of the metabolic breakdown of

purine nucleotides, and it is normal component of urine. high blood concentration of Uric Acid can lead to gout and are associated with other medical conditions, including diabetes and the formation of ammonium acid urate kidney stones.

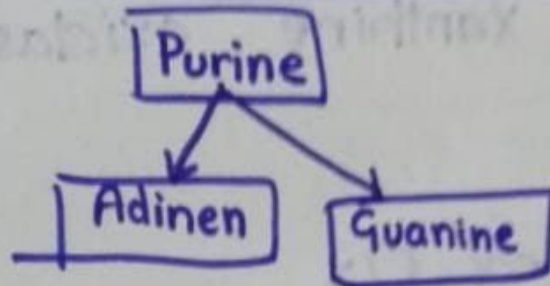
systematic IUPAC name

7,9-Dihydro-1H-purine-2,6,8(3H)-trione.

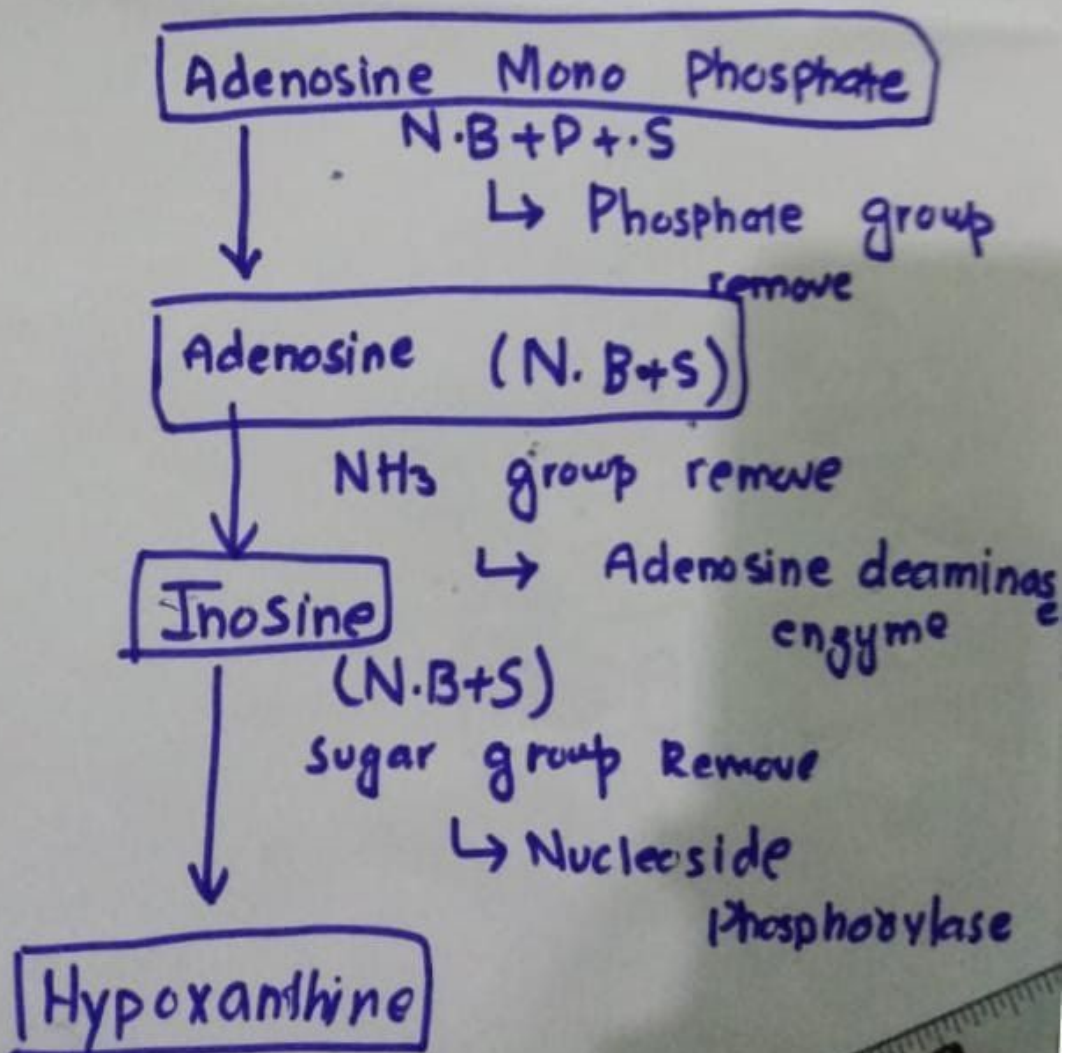
# Catabolism:

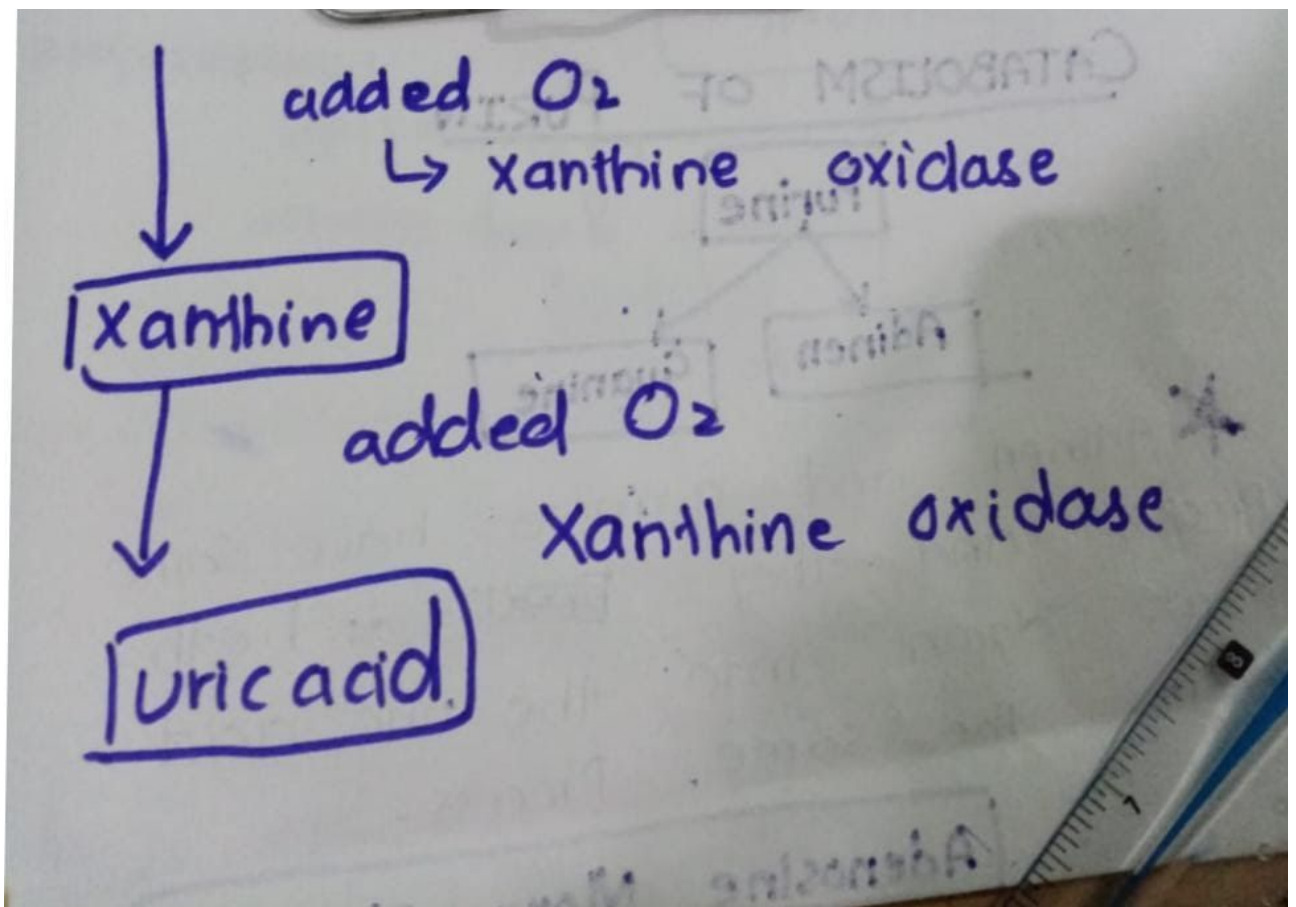


# CATABOLISM OF PURINE



★ Adenine and guanine have same process and they ~~break down~~ both break down into the uric acid with the same process.





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Ans 2. There are four protein complexes (labelled complex I-IV) in the Electron transport chain, which are involved in moving electrons from NADH and FADH<sub>2</sub> to molecular oxygen....

Complex III pumps protons through the membrane and passes its electrons to cytochrome C for transport to the fourth complex of proteins and enzymes.



The Electron transport chain uses a electrons from Electron Carriers to create a chemical gradient that can be used to power oxidative phosphorylation.

### complex I..

To start two Electrons are carried to first complex aboard NADH. complex I is composed of flavin mononucleotide (FMN) and an enzyme containing iron\_sulfur (feS). FMN which is derived from vitamin B2(also

called riboflavin), is one of several prosthetic group or Co factors in the Electron transport chain. A prosthetic group is a non - protein molecule required for the activity of a protein. prosthetic groups can be organic or inorganic and are non\_prptide molecules bound to a protein that facilitate its function.

Q and Complex II...

complex II directly receives FADH<sub>2</sub>, which does not pass through complex I. The

compound connecting the first and second complexes to the third is ubiquinone (Q) The Q molecule is lipid soluble and freely moves through the hydrophobic core of the membrane. Once it is reduced to QH<sub>2</sub> ubiquinone delivers its electrons to the next complex in the Electron transport chain.

receives the electrons transport chain

receives the Electrons derived from NADH

from complex I and the Electrons derived

from FADH<sub>2</sub> from complex II, including succinate dehydrogenase..

### complex III

The third complex is composed of cytochrome b, another Fe-S protein, Rieske center (2Fe-2S center) and cytochrome C proteins,. this complex is also called cytochrome oxidoreductase. cytochrome protein have a prosthetic heme group. the heme molecule is similar to the heme

hemoglobin, but it carries electrons, not oxygen. As a result, the iron ion at its core is reduced and oxidized as it passes the

Electrons, fluctuating between different oxidation state.  $\text{Fe}^{2+}$ (reduced) and  $\text{Fe}^{3+}$ (oxidized) the heme molecules in the cytochromes. have slightly different characteristics due to the effects of different proteins. binding them, which make each complex. complex III Pumps protons through

the membrane and passes as electrons to cytochromes C for transport to the fourth complex of proteins and enzyme cytochrome c is the acceptor of electrons from Q.

however whereas Q carries pairs of electrons, syndrome C can accept only one at a time..

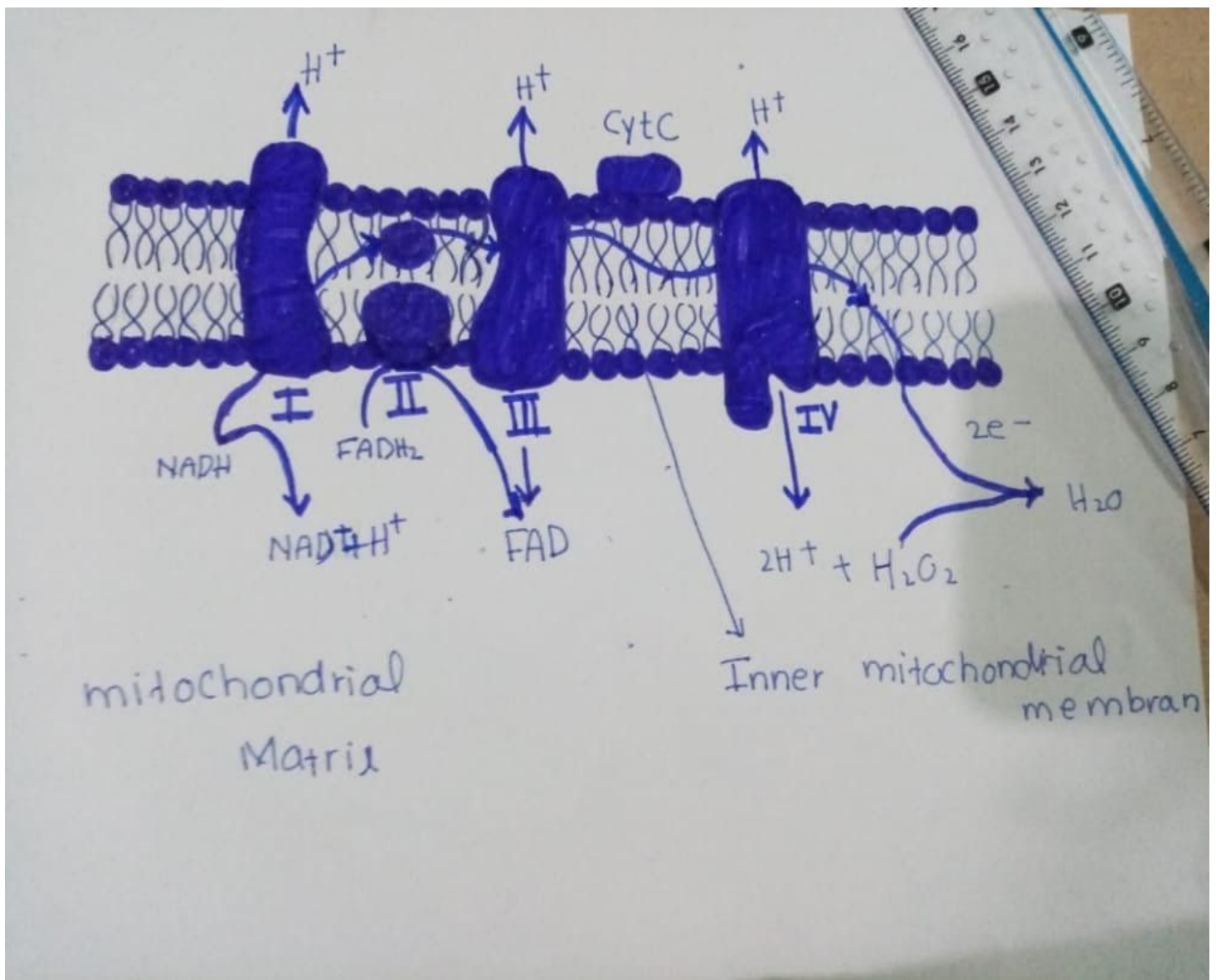
complex IV.. the fourth complex is

composed of cytochrome proteins c, a, and a<sub>3</sub>) and three copper ions (a pair of CUa and

one in cytochrome a<sub>3</sub>). The cytochromes hold an oxygen molecule very tightly between in the Iron and copper ions until the oxygen is completely reduced. the reduced oxygen then picks up two hydrogen ions from the surrounding medium to produce water (H<sub>2</sub>O) the removal of the hydrogen ions from the system also contributes to cyndrome proteins c, a and a<sub>3</sub>. complex contains two heme groups (one

each of the cytochromes a and a<sub>3</sub>) and three copper ions.

## Electron Transport chain:





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