

DL
8/12/2021

[120BM0014] (1)

MEDICAL SCIENCE - II

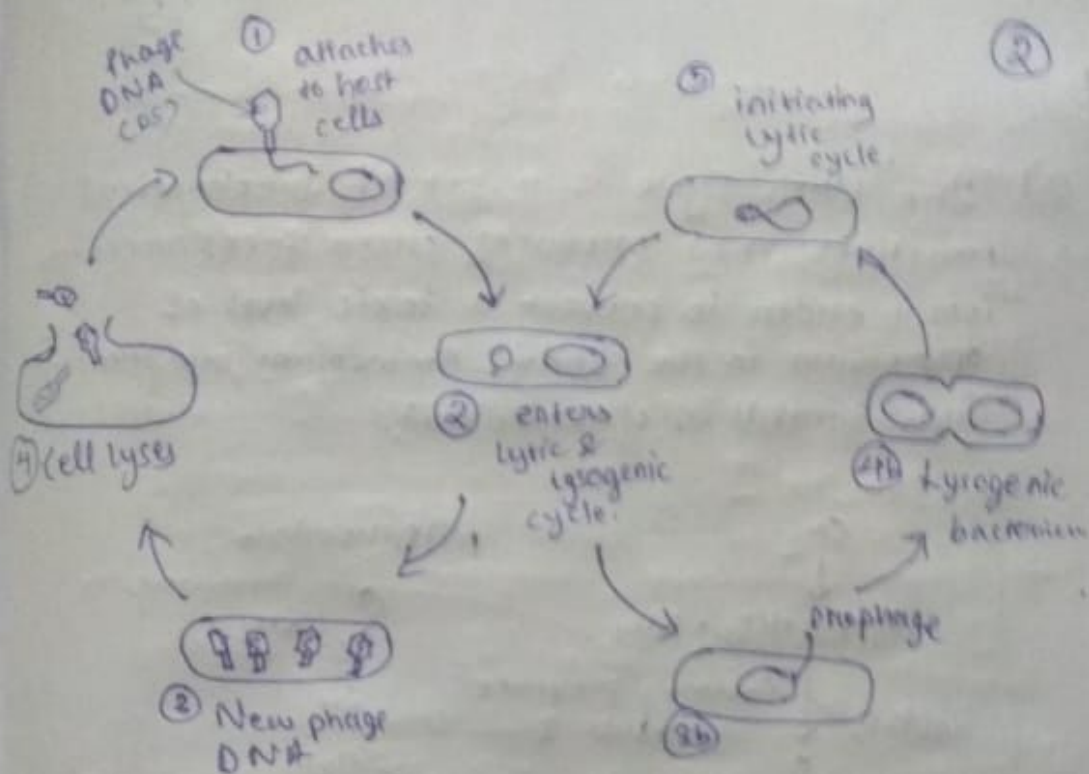
Q1)
a) Fungi are called natural decomposers, because they breakdown the dead and decaying organic matter into simpler substances such as carbon dioxide, water, simple sugars and mineral salts and provide nutrients back to soil. They release enzymes to break down the decaying material after which they absorb its nutrients.

b) To extract lignin from wood we would need fungi, especially brown rot fungi which degrade cellulose and hemicellulose in wood and recalcitrant lignin is left behind.

c) The four types are :-

- i) Electron microscopy
- ii) Immunologic Assays
- iii) Biological Assays
- iv) Hemagglutination Assay.

Q2) Virus tail binds to specific receptors on the cell surface and injects genetic material. Phage DNA circularizes and enters either lytic or lysogenic cycle. Phage DNA integrates with bacterial chromosome and converts to prophage. This prophage is removed due to stimulus such as UV radiation.

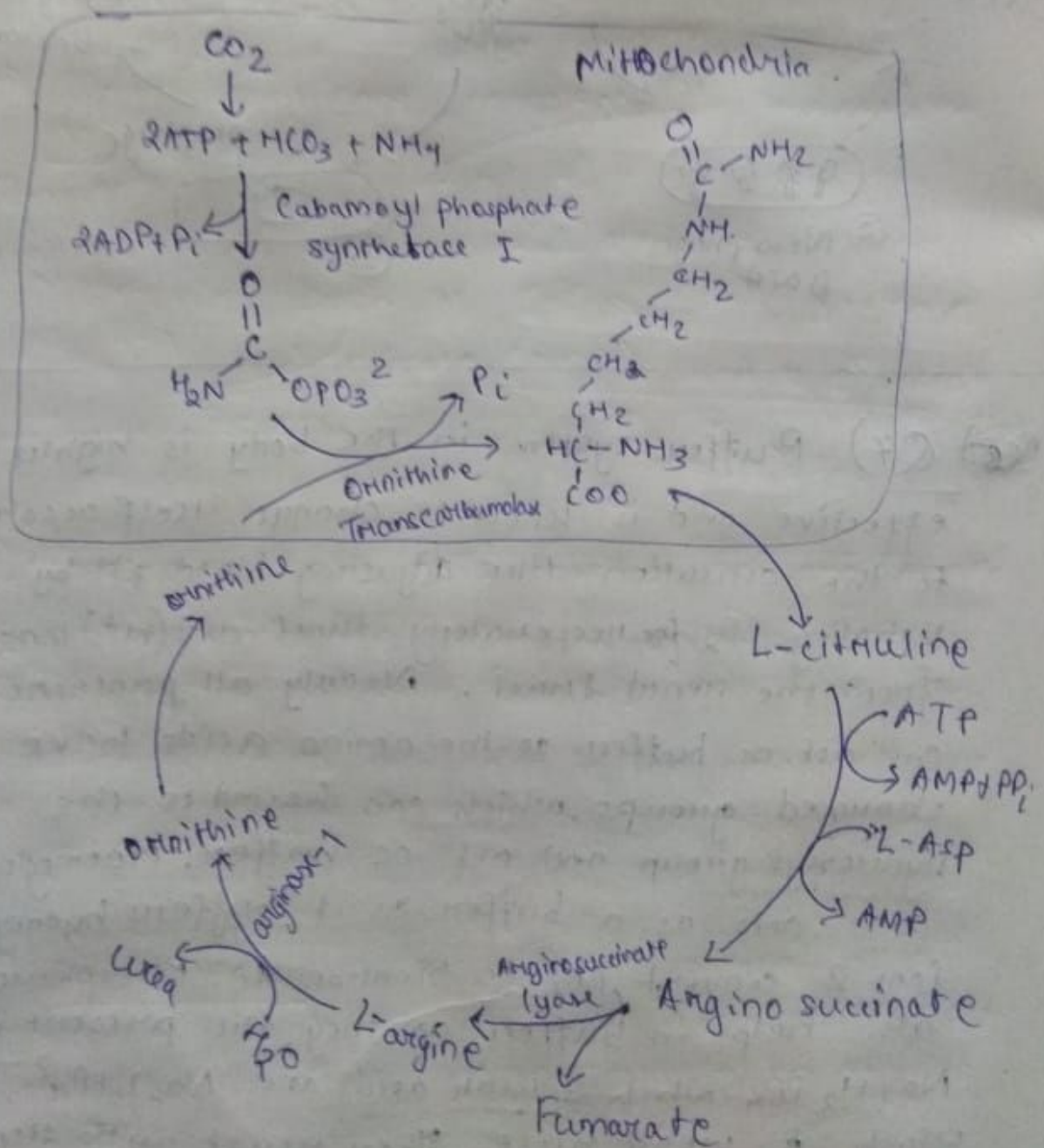


Q7) Buffer system in the body is highly effective and is known to change itself according to the situation like adjusting blood pH by exhaling CO_2 from respiratory tract and H^+ ions from the renal tract. Nearly all proteins can act as buffers as the amino acids have charged groups, which can bound to the hydroxyl group and act as buffers. Haemoglobin also acts as a buffer as it buffers hydrogen ions & convert CO_2 to bicarbonate. Phosphates also help in buffer as they are present in $\text{Na}_2\text{H}_2\text{PO}_4$ which is weak acid and $\text{Na}_2\text{HPO}_4^{2-}$ which is weak base. They react with strong acids and bases to change the pH. ~~Acid~~ Bicarbonate- Carbonic Acid Buffer also acts similar to phosphate and reacts with strong acids and bases to give water and change pH.

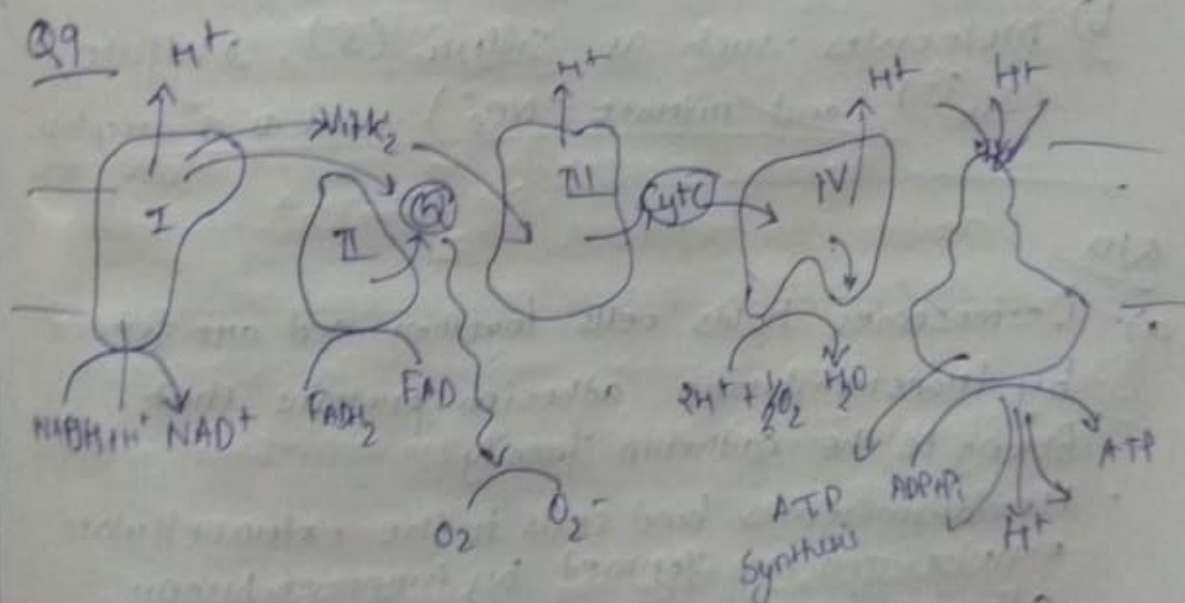
Q8

8

- a) The Urea Cycle is a set of biochemical reactions that produces urea from ammonium ions in order to prevent a toxic level of ammonium in the body. Ammonium are produced from breakdown of amino acid.



- b) When glucose levels are plentiful, the excess acetyl CoA generated by glycolysis can be converted into fatty acids, cholesterol, steroids. This process is lipogenesis which creates lipids. Lipogenesis takes place in cytoplasm of adipocytes (fat cells) and hepatocytes (liver cells). Some people's breathe may smell like acetone which is a sign of high levels of Ketones in the blood which are produced by liver.



- In aerobic respiration 10 NADH, 2 FADH molecules are formed.
- Electron transfer happens in inner membrane.
- 5 multi-enzyme present, 4 involved in transport and 1 for ATP synthesis.
- In complex II, FADH reductase present.
- Complex III, 2 types of Cyt-b 5560
5565

⑤
→ In complex IV, cyt-C oxidase enzyme present.

→ In complex V, F_0 , F_1 particles are present.

→ During NADH oxidation, e^- is released to complex I.

→ Next Ubiquinone, complex II, then complex IV to finally O_2 .

b) Molecules such as Sulfur (S), Sulfate (SO_4^{3-}) and nitrate (NO_3^-) used as e^- acceptors.

Q10

a) - Desmosomes holds cells together and are formed by transmembrane adhesion proteins that belong to the cadherin family.

- Hemidesmosomes bind cells to the extracellular matrix and are formed by transmembrane adhesion proteins of the integrin family.

b) i) Phagocytosis - is the process where large particles such as cells or relatively larger particles eat other foreign particles or engulf them.

ii) Endocytosis - they take up large cells by the process of invaginating the cell membrane and releases the material inside the cell. It uses active transport.

iii) Pinoocytosis - It is also called "cell drinking" which, literally takes extracellular substances as per need including water molecules. (6)

c) Active Transport is used by villi of small intestine to absorb glucose molecules.

Q6

a) i) Saprophytic Bacteria

- Feed on dead and decaying objects.
 - Helps in digestion by secreting enzymes.
 - Helps in respiration i.e. breakdown of food.
- Eg - B. Flammus.

ii) Parasitic Bacteria

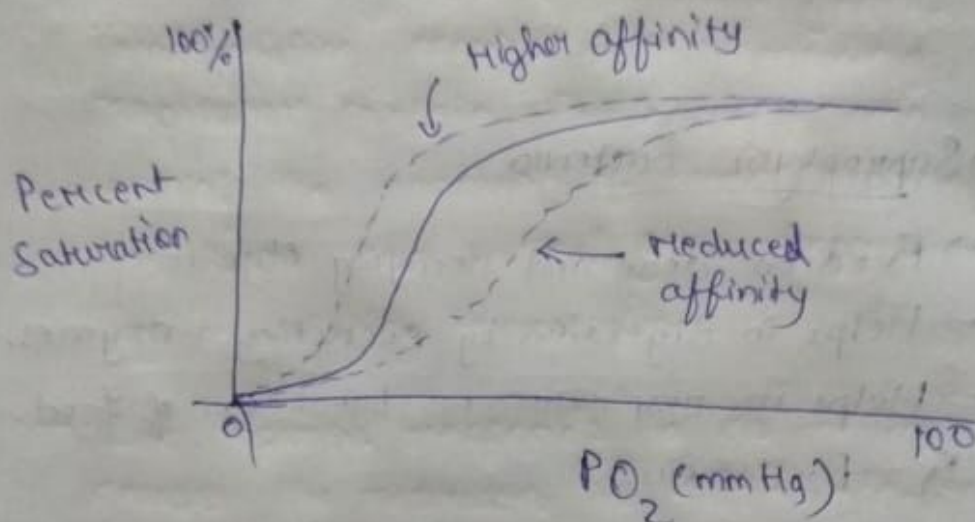
- They need a host cell to grow.
- They are pathogens and hence can cause diseases.

Eg - Pseudomonas Citri.

iii) Symbiotic Bacteria

- Has a symbiotic life structure.
- Eg - Bacillus Radicicola.

(4)
b) If the haemoglobin loses hydrogen ions from specific amino acids sites then subtle change in structure ~~changes~~ happens and ability to bind O_2 also. When pH falls, the reverse happens, haemoglobin absorbs H^+ ions and affinity for oxygen decreases.



Q5

a) Different Temperatures ~~are~~ for moist heat can be there.

→ Autoclaving - Here the objects are kept in a chamber for sterilized and a pressurized steam to preheat the autoclave. It helps to kill spores and bacteria.

→ Pasterization - In this process, the temperature is increased to a specific point for a specific time period and suddenly cooled to kill the bacteria.

b) Faculative

→ organisms obtain energy from aerobic respiration, anaerobic respiration and fermentation.

→ There is only one type of faculative

→ Parasite can survive without the host.

Obligate

8

→ Organisms obtain energy either from respiration or fermentation.

→ There are two types of obligate organisms.

→ Parasites only survive in the presence of host.

Q3

a) Loss in diversity of ~~and~~ bacteria and the loss of beneficial bacteria changing the microbiome scenario can lead to IBD in human gut.

b) Penicillin - inhibits transpeptidase.

Polymyxins - disrupt LPS of gram-negative outer membrane.

Rifampin - inhibits bacterial DNA

Chloramphenicol - inhibits bacterial protein.

c) Recombinant DNA identify, map and sequence the gene functions.

Q4

(9)

a) Operon Model of gene Regulation

→ group of genes coding for related proteins are arranged in units known as operons which consists of operator, promoter, regulator & structural genes.

Transcription occurs after removing repressor protein. Prokaryotes can control the amount of transcription, therefore can control gene expression by regulating transcription.

- Lac operon responds to an inducer that causes the repressor to dissociate from the operator, depressing the operon.
- The trp operon responds to a repressor protein that binds to two molecules of, tryptophan.

