CarboHydrates

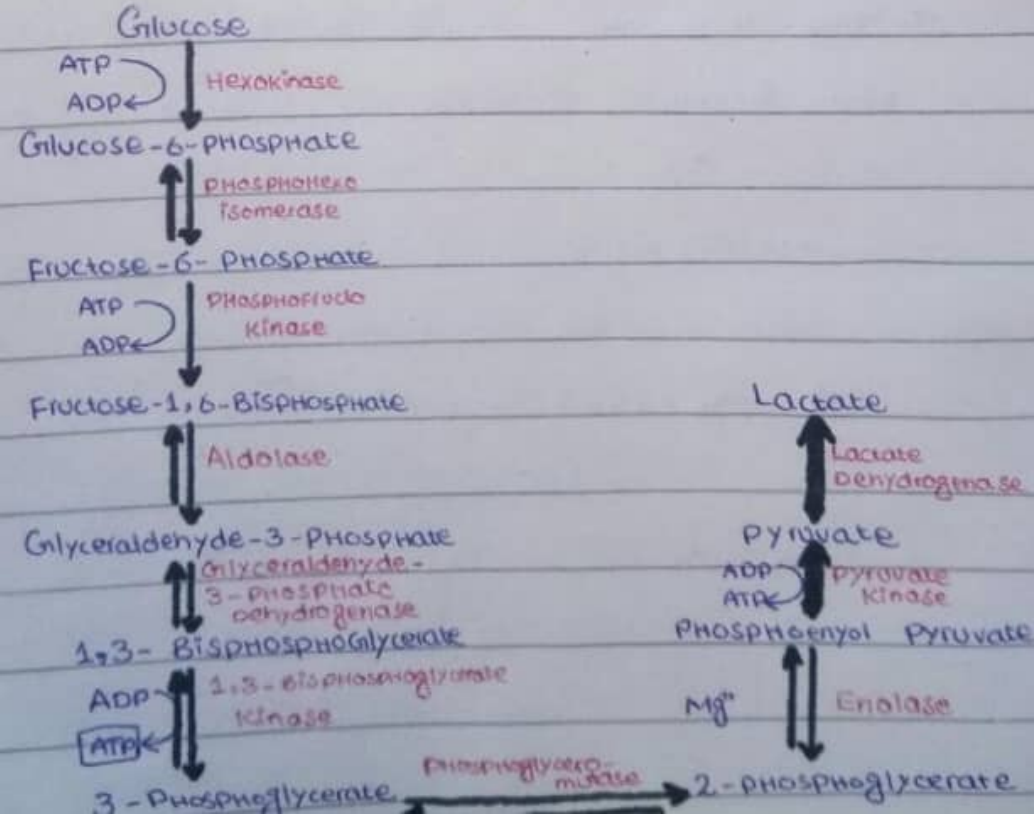
Glycolysis : Glycolysis is a series or sequence of reaction which converting Glucose or Glycogen into Pyruvate or into lactate with the energy production.

➡ It takes place in all cells of body and Enzyme for glycolysis is present in cytosol

➡ It is the major pathway for production of Energy in those cells having lack of Mitochondria.
i.e: Lens, Retina, RBC etc.

➡ It occur in both in presence or absence of the oxygen. In the presence of oxygen it is converted into pyruvate and in to Absence of oxygen converted into lactate.

Steps of Glycolysis :



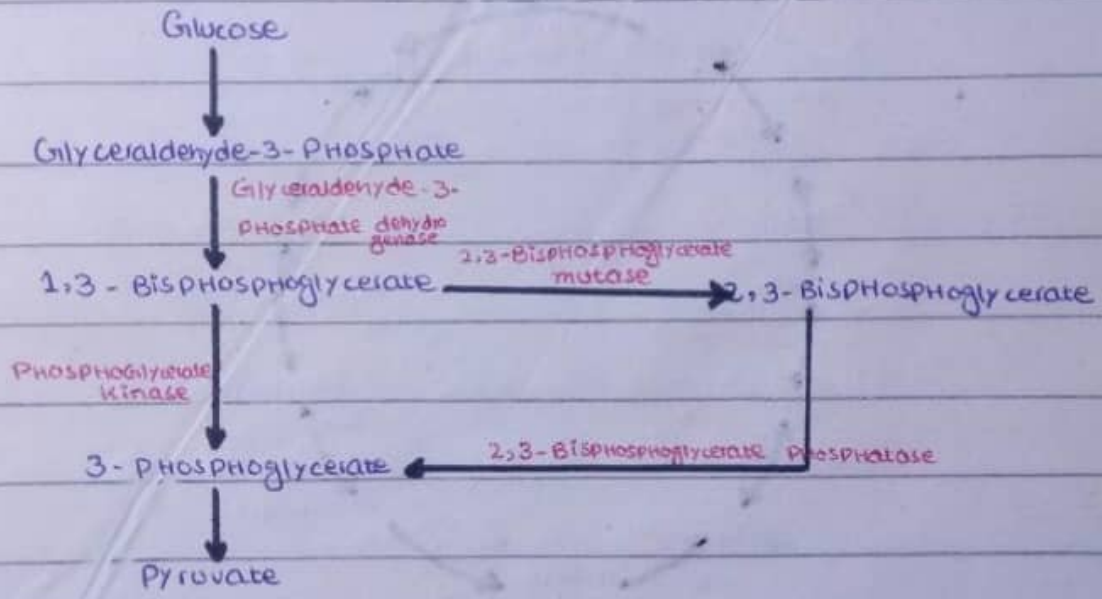
Net ATP Synthesis in Glycolysis Pathway in

Aerobic Condition 7

Anaerobic Condition 2

What is Rapoport-Leubring cycle and its significance

It is supplemantary Pathway in Glycolysis which is operative in mature erythrocytes.



Significance: ① It Allow the Glycolysis without generate ATP, thus it is Shunt Pathway to glycolysis.

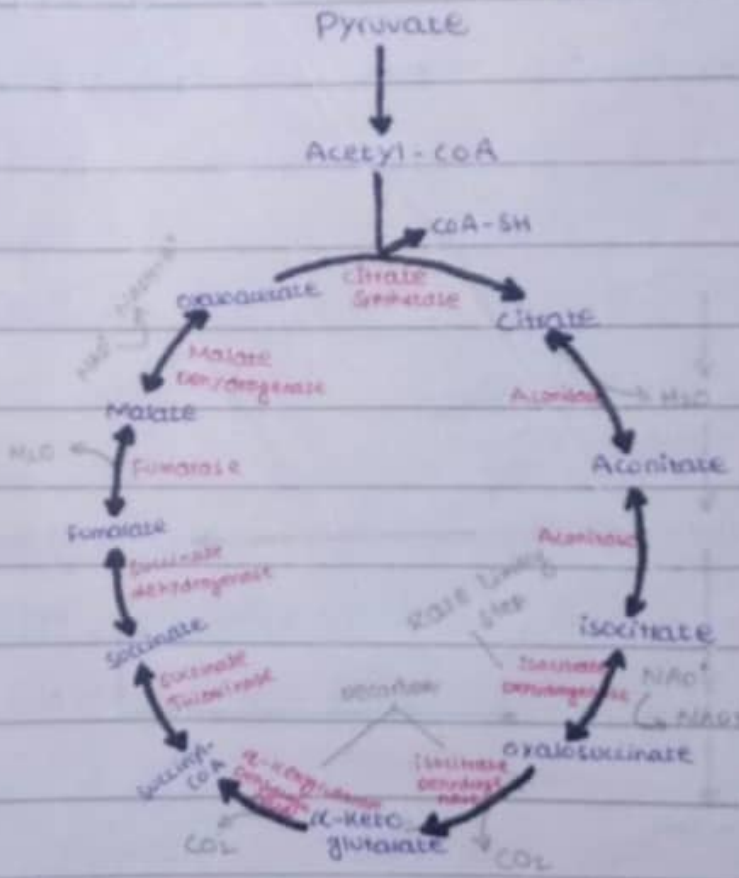
② 2,3-BPG bind to the Hemoglobin & reduce the Affainity of Hb with oxygen thus unload more oxygen to tiss

③ In Hypoxic Condition → ↑ 2,3 BPG Conc. in RBC

④ ↑ 2,3 BPG in Fetal Circulation.

Citric Acid cycle : Citric Acid cycle involves in the Oxidation of Acetyl-coA into Co_2 and H_2O.

The Enzyme of TCA cycle present in mitochondrial Matrix.



Inhibitors :

Enzyme	Inhibitors
Aconitase	Fluroacetate
α-ketoglutarate Dehydrogenase	Arsenite
Succinate dehydrogenase	Malonate.

ATP production:

3 NADH → 3 × 2.5 ATP = 7.5

1 $FADH_2$ → 1.5 ATP = 1.5

1 Substrate level phosphorylation → 1 ATP = 1

10 ATP

Amphibolic Nature of Citric Acid cycle:

Krebs cycle is both Catabolic and Anabolic in nature Hence reffered as Amphibolic.

The Citric Acid cycle provides many intermediates for synthesis of many Compound needed by body.

TCA cycle Actively involved in

1) Gluconeogenesis
2) Transamination
3) Deamination

Catabolic role: Acetyl-CoA is formed from CHO. Protein and Lipid and oxidized into CO_2 and H_2O & Energy

Anabolic role: There is importanta Anabolic reaction.

1) oxaloacetate is a precursor of Aspartate
2) Alpha ketoglutarate can made into Glutamate
3) Succinyl-CoA used for synthesis of Heme.
4) Mitochondrial ~~matrix~~ citrate transported to cytosol and cleave → require for synthesis of Sterol, FFAs.

juandice and generation of Free radicls which enter RBCs and Causes Hemolysis of RBC

(Due to ↓ NADPH and reduces GSH)

Gluconeogenesis : The synthesis of Glucose from non-carbonydrate Sources is caued Gluconeogens

Gluconeogenesis occur in **Liver** and mainly occur in cytosol, as well as partly mitochondrial

Compound used:

1) Pyruvate
2) lactate
3) Glucogenic Amino Acid
4) Glycerol part of Fat
5) Proprionate

irrevesible step of Glycolysis and bypased in Gluco

Step I Glucose —Hexokinase→ Glucose-6-phosphate

G-6-phosphatase (Glucokinase) → Glucose

Step III Fructose-6-phosphate —Phosphofruc kinase→ Fructose-1,6-Bisphosphate

F-1,6-Bisphosphatase → Fructose-6-phosphate

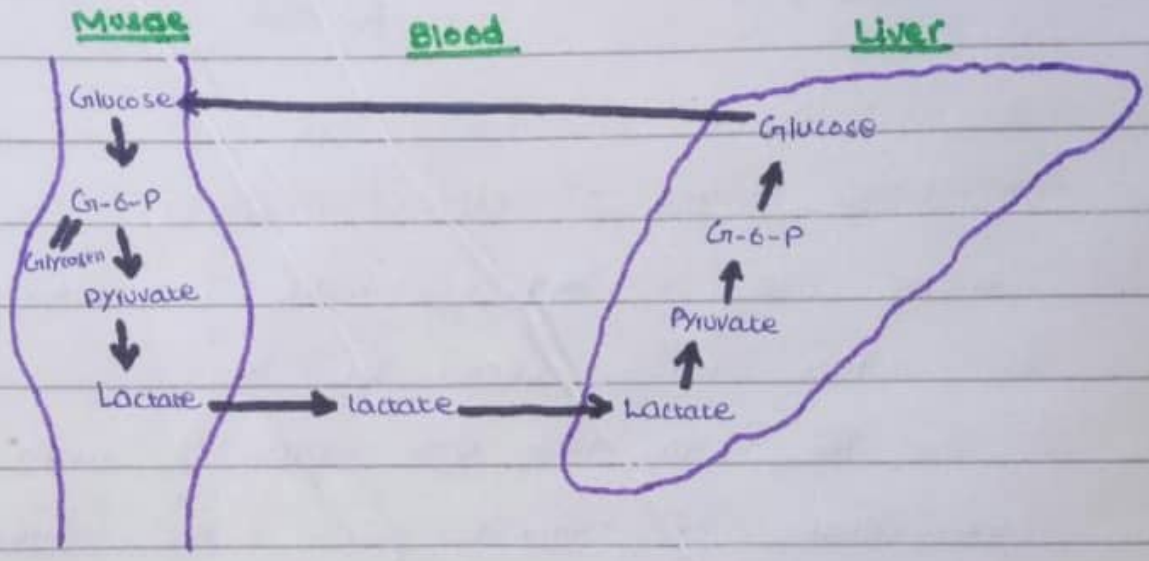
Step IX Phosphoenol Pyruvate —Pyruvate Kinase→ Pyruvate

Pyruvate carboxylase (Biotin + Mg^{++}) → oxaloacetate

PEPCK → Phosphoenyol pyruvate

Cori's lactic Acid cycle :

It is a process in which Glucose is Converted into lactate in muscle and in Liver it is reconverted into Glucose.



Significance :

(i) Prevent lactic Acidosis under Anaerobic Conditions

(ii) Produce ATP For muscle Activity through Glycolysis in muscle

(iii) lactate produced in muscle Actively re-utilized by the body.

How G6P dehydrogenase deficiency lead to Anemia:

Most OF the patient with G6P dehydrogenase deficiency does not exhibit Clinical symptoms. However most OF them develop Hemolytic Anemia when administred with oxydent drugs such as Sulphamethazole, Acetenalid, & ingestion of Flava beams. Develop Hemolytic Anemia

Give reason. Complication and Treatment of Galacto semia:

➡ Accumulation of free Galactose Leading to Galactosemia. It is a rare congenital disease in infants inherited as autosomal recessive disorder.

➡ Galactose metabolism is impaired Leading to High level of Glucose in Blood Galactosemia and in urine Galactosuria

Cause:

Galactose-1-phosphate uridyl Transferase

Symptoms

1) Mental Retardation
2) Vomiting
3) Diarrhea
4) Juandice
5) Renal Failure
6) Hepatomegaly

Treatment:

Removal of Galaltose (lactose free diet)

Essential Fructosuria : This is due to deficiency of Enzyme Fructokinase. Fructose not converted into Fructose-1-Phosphate.

This is a symptomatic condition with excretion of Fructose in urine.

Treatment:

Diet deprived of Fructose.

Heredietary Fructose intolarence :

It is due to deficiency of Enzyme Aldolase B

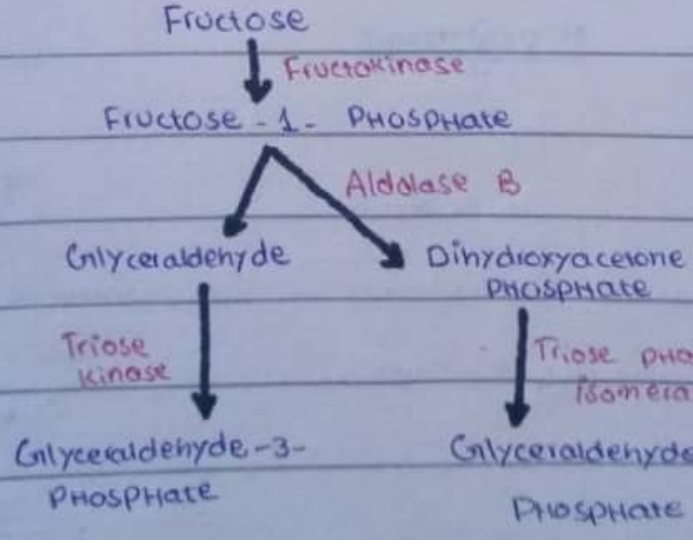
There is intracellular accumulation of Fructose-1-Phosphate.

Symptoms: Juandice
vomiting
Hypoglycemia
Hepatic Failure

Treatment:

Diet deprived of fructose.

Fructose Enter in Glycolysis :



How many ATP is Synthesized in HMP Shunt and Give Significance of it's :

NO ATP is used or generate in HMP-Shunt

HMP- Shunt is important in generating Two important Products.

1) Pentoses 2) NADPH

Pentoses: The most important pentose is ribose 5. Phosphate. The pentose and its derivatives are use for synthesis of Nucleic Acid e.g RNA, DNA. Nucleotide e.g ATP, ADP

NADPH:

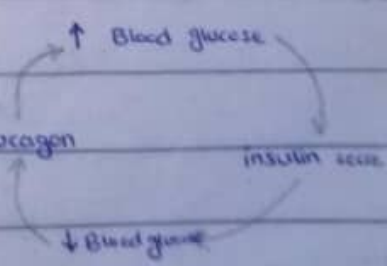
(i) It is involve in reductive biosynthesis of Sterols and Fatty acid.

(ii) It is required to preserve transperancy of Lens

(iii) Synthesis of Certain Aminoacids increasing Enzyme Glutamate dehydrogenase

Hormonal Regulation of Blood Glucose :

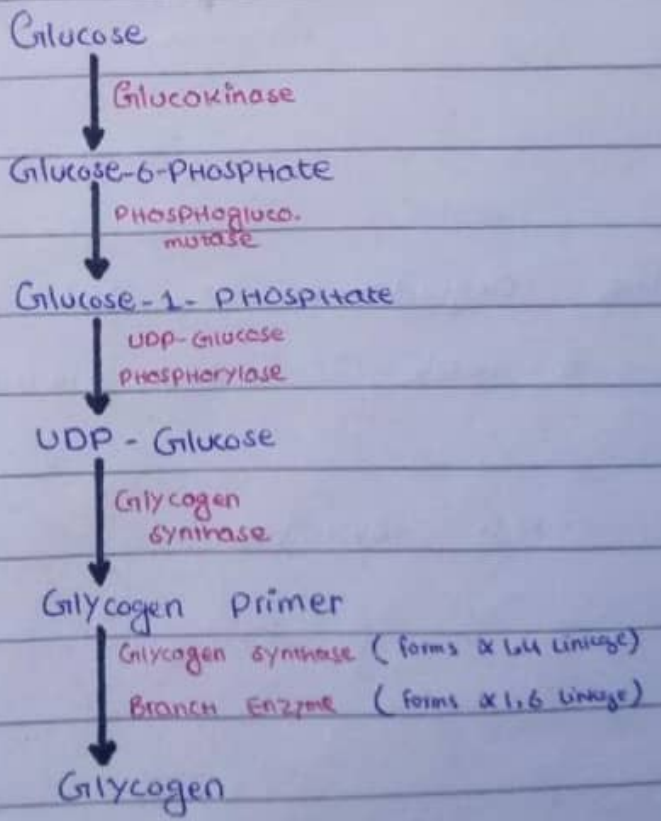
Hyperglycemic	Hypoglycemic
Glucagon	insulin
ACTH	Somatomedins
GH	Somatostatins
Epinephrine	drug : Sulfonylurease
Estrogen	
ADH	
Cortisol	



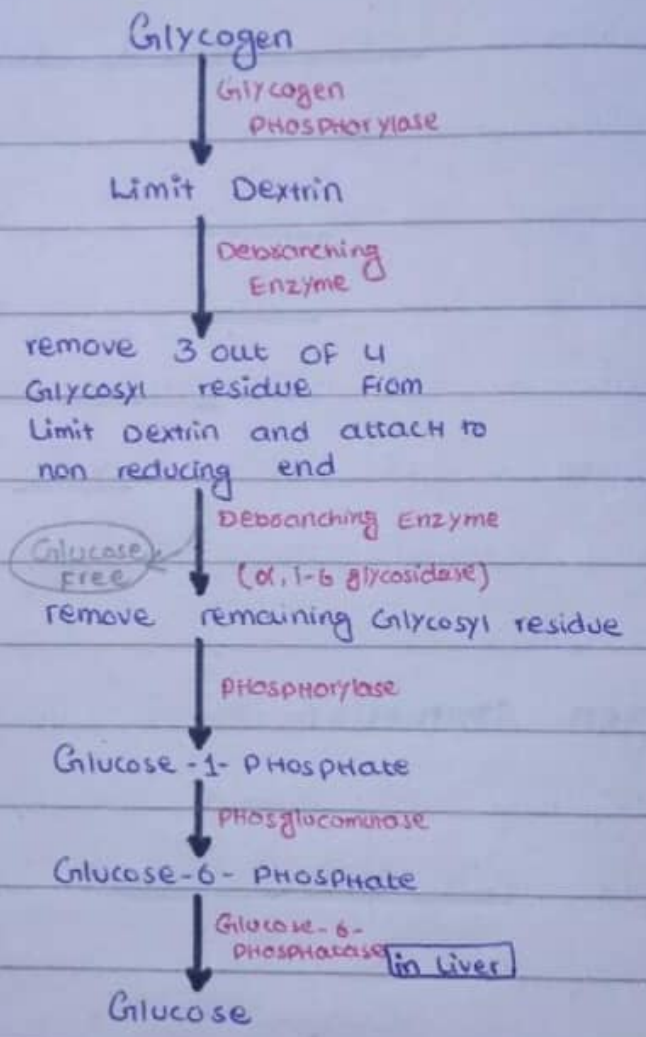
Significance of Uronic Acid Pathway :

1) It Provide UDP Glucoronic acid which is active form of Glucoronic acid.
2) Coagulation of Billirubin
3) Coagulation of steroid
4) Synthesis of the Glycosaminoglycans
5) Coagulation of various drugs which will make more water soluble & easily excretable.

Glycogen Synthesis : The synthesis of Glycogen from Glucose is caued Glycogenolysis. It require Two ATP molecules. (cytosol)



Glycogenolysis :



The Degradation of Stored glycogen in liver & muscle is Glycogenolysis.

Not reversible