GLYCOLYSIS

(EMP)

[DEPTH OF BIOLOGY]

GLYCOLYSIS [DEPTH OF BIOLOGY]

Aerobic condition → Pdt. → Pyruvate

Anaerobic condition → Pdt. → Lactic acid

[DEPTH OF BIOLOGY]

Some free energy is conserved
In form of ATP & NADH

❖ Glycolysis is found in cytoplasm/ cytosol of all cells.

❖Glycolysis is major pathway for utilisation of glucose. [DEPTH OF BIOLOGY]

❖ Glycolysis important for those cells which do not have mitochondria because this process forms ATP.

ex. Erythrocytes/ RBC

❖ Essential for brain (glucose) or for proper functioning of brain.

❖ Intermediate are used for synthesis of fats and amino acid. [DEPTH OF BIOLOGY]

GLUCOSE ← **GLYCOLYSIS** → BREAKAGE

[DEPTH OF BIOLOGY]

α- D- Glucose [6C]

ATP / ADP — Phosphorylation

Glucose-6-Phosphate [6C]

Isomerisation

Fructose-6-Phosphate [6C]

ATP / ADP — Phosphorylation

Fructose-1,6-Diphosphate [6C]

Cleavage

(3C) PGAL⇌DHAP [3C]

NAD^+ / $H^+ + NADH$ — [DEPTH OF BIOLOGY]

2 X 1,3- di PGA [3]

ADP + ip / 2 ATP — Dephosphorylation

2 X 3 PGA [3C]

Shifting of phosphate

2 X 2 PGA

[DEPTH OF BIOLOGY] — Hydration

2 X PEPA (PhosphoenolPyruvate)

ADP + ip / 2 ATP — Dephosphorylation

2 X Pyruvic Acid ($CH_3COCOOH$)

Enzymes Involved in Glycolysis

1. Hexokinase
2. Phosphogluco Isomerase
3. Phosphofructokinase
4. Aldolase
5. Phosphotrio Isomerase
6. Phosphogluco Dehydrogenase / Phosphoglucoaldehyde Hydrogenase
7. Phosphoglycero Kinase
8. Phosphoglycero Mutase
9. Emolase
10. Pyruvate Kinase

Anaerobic Pathway/ Fermentation

(Energy Loss)

1. Lactic Acid Anaerobic respiration

$$\text{Pyruvic acid } (CH_3COCOOH) + NADH_2 \xrightarrow[\text{Dehydrogenase}]{\text{Lactate}} \text{Lactic Acid } (CH_3CHOHCOOH) + NAD^+$$

[DEPTH OF BIOLOGY]

2. Alcoholic Anaerobic Fermentation

$$\text{Pyruvic acid} \xrightarrow[\text{dehydrogenase}]{\text{pyruvate}} \text{Acetaldehyde } (CH_3CHO) + CO_2\uparrow$$

$$\text{Acetaldehyde} + NADH_2 \xrightarrow[\text{dehydrogenase}]{\text{alcohol}} \text{Ethyl alcohol} + NAD^+$$

In Glycolysis aerobic pathway → Formation 10 – utilised 2 ATP

→ 8 ATP formed [DEPTH OF BIOLOGY]

[DEPTH OF BIOLOGY]

Phases of Glycolysis

1. Energy Investment Phase
[DEPTH OF BIOLOGY]

2. Energy Splitting Phase

3. Energy Generation Phase
[DEPTH OF BIOLOGY]

ENERGETICS

Glycerol 3- Phosphate dehydrogenase ⟶ 6
(2 NADH, ETC, Oxidation phosphorylation)

[DEPTH OF BIOLOGY]

Phosphoglycerate Kinase (SLP) ⟶ 2

Pyruvate Kinase (SLP) ⟶ 2

[DEPTH OF BIOLOGY]

Two ATP consumed reaction catalysed by Hexokinase & phosphofructo kinase ⟶ -2

Net ATP Synthesis in Glycolysis aerobic condition ⟶ 8

[DEPTH OF BIOLOGY]

Significance of Glycolysis

[DEPTH OF BIOLOGY]

- Energy obtain in form of ATP which is used further for various metabolic process.
- Acetyl Co – A is essential for biosynthesis of cholesterol.
- Glycolysis is the first step of the complete oxidation of glucose. [DEPTH OF BIOLOGY]
- RBC does not contain mitochondria . So, in RBC ATP Production takes place by glycolysis.
- Pyruvate (end product of glycolysis) is used in biosynthesis of amino acid. [DEPTH OF BIOLOGY]