

Summary of Lec 15

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structure dictates function

1 Fates of Pyruvate

The Pyruvate produced in the Glycolysis can be further processed either aerobically and anaerobically. The best part about anaerobic Glycolysis is that it requires no ATP and reproduces the NAD^+ required for Glycolysis. In complex animals, Fermentation happens during strenuous exercise. Following the Fermentation, we require quite a high recovery time where high amount of O_2 molecules are consumed to reproduce the excess glucose consumed during **Lactic** acid fermentation. It also supplements the restoration of glycogen reserves.

2 Gluconeogenesis

The pyruvate produced during Glycolysis can be fed to the **Citric** acid cycle to produce the precursor *Phosphoenol-Pyruvate* for synthesis of Glucose. Many other Glucogenic amino acids can also be fed to the citric acid cycle and hence leads to the production **PEP** for glucose synthesis. Thus, anything that can be converted to pyruvate or PEP can be used for the synthesis of Glucose. The synthesis of glucose is primarily important because brain, nervous system and RBCs use only glucose for energy synthesis. Other monosaccharides can be fed to the Glycolysis pathway in one or the other way.

The pathway for Gluconeogenesis is just the opposite of Glycolysis. This eliminates the extra overhead of a futile cycle. There is no production of ATP during gluconeogenesis.

3 Pentose Phosphate Pathway

This pathway is necessary for the synthesis of precursor for DNA and RNA synthesis. The main products are NADPH and ribose-5-phosphate. The oxidative phase generates NADPH and a pentose. The non-oxidative pathway is where pentose is again converted back to glucose. The latter happens more in tissues requiring more NADPH than R-5-P such as liver and adipose tissue.

4 Lactose Intolerance

The oligosaccharides need to be converted to monosaccharides outside the cells for their further processing. In certain cases, the cleavage of lactose in milk is hampered and hence it is left unused. Bacteria can act on them and produce the toxic products leading to the symptoms observed in lactose intolerance patients.

5 Warburg Effect

Warburg concluded that cancer cells have a special tendency to ferment glucose to lactic acid even in the presence of oxygen. This marks the presence of cancer cells in our body.