Programme: F.Y.B.Sc

Subject: Microbiology

Paper Code: MIC 102

Paper Title: Microbiology and Biochemistry II

Unit:03

Module Name: Group Translocation

Module No:13

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Notes:

Group Translocation

Many bacteria such as *E.coli* take up glucose and other sugars by a process called as **Group Translocation**.

It is an energy dependent transport mechanism utilized by bacteria for transport of sugar into the cell. It is one of the active transport mechanism

Characteristic features of Group Translocation:

The distinguishing characteristic of **group translocation** is that a **molecule is chemically modified** as it is brought into the cell

Group translocation mechanisms differ fundamentally from true active transport because they do not establish **a concentration gradient** of a molecular species across the cell membrane

As a consequence, high concentration of the modified form can be generated and maintained within the cell at the expense of low concentrations of the unmodified form in the external environment. One compound is found in the external environment; a chemically modified form of it is found inside the cell.

Group translocation mechanisms are particularly conserving of metabolic energy;

Phosphotransferase system(PTS)- PEP Group translocation in E.coli

The most thoroughly studied of the group translocation systems is the *phosphotransferase* system (PTS) by which certain sugars are phosphorylated at the expense of phosphoenolpyruvate (PEP) as they enter the cell. It is a method used by bacteria for sugar uptake

When bacteria uses the process of group translocation to transport glucose across the membrane, a high energy phosphate group from PEP is transferred to glucose to form Glucose-6-PO4

The chemical composition of the transported compound is altered and No actual concentration gradient is produced

Each PTS is reasonably complex, involving the sequential action of four distinct phosphate-carrying proteins, termed HPr, Enzyme I, Enzyme III, and Enzyme II

Involves both cytoplasmic and membrane proteins

The last member of the chain, Enzyme II (E II), is located within the membrane and serves as a carrier protein for the sugar

PTS are widely distributed in bacteria, being found primarily among facultatively anaerobic bacteria (bacteria that grow in either the presence or absence of O2); some obligately anaerobic bacteria (e.g., *Clostridium* spp.) also have PTSs. However, most Aerobic bacteria lack PTSs.

Many Carbohydrates are transported by PTSs. *E. coli* takes up glucose, fructose, mannitol, sucrose, *N*acetylglucosamine, cellobiose, and other carbohydrates by group translocation.