

جامعة الانبار

قسم التقنيات الاحيائية

كلية العلوم

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### **A Summary of Energy Production Mechanisms**

1. Sunlight is converted to chemical energy in oxidation-reduction reactions carried on by phototrophs. Chemotrophs can use this chemical energy.
2. In oxidation-reduction reactions, energy is derived from the transfer of electrons.
3. To produce energy, a cell needs an electron donor (organic or inorganic), a system of electron carriers, and a final electron acceptor (organic or inorganic).

### **Metabolic Diversity among Organisms**

1. Photoautotrophs obtain energy by photophosphorylation and fix carbon from  $CO_2$  via the Calvin-Benson cycle to synthesize organic compounds.
2. Cyanobacteria are oxygenic phototrophs. Green bacteria and purple bacteria are anoxygenic phototrophs.
3. Photoheterotrophs use light as an energy source and an organic compound for their carbon source and electron donor.
4. Chemoautotrophs use inorganic compounds as their energy source and carbon dioxide as their carbon source.
5. Chemoheterotrophs use complex organic molecules as their carbon and energy sources.

### **Metabolic Pathways of Energy Use**

#### **Polysaccharide Biosynthesis**

1. Glycogen is formed from ADPG.

2. UDPNAc is the starting material for the biosynthesis of peptidoglycan.

### **lipid Biosynthesis**

3. Lipids are synthesized from fatty acids and glycerol.

4. Glycerol is derived from dihydroxyacetone phosphate, and fatty acids are built from acetyl CoA.

### **Amino Acid and Protein Biosynthesis**

5. Amino acids are required for protein biosynthesis.

6. All amino acids can be synthesized either directly or indirectly from intermediates of carbohydrate metabolism, particularly from the Krebs cycle.

### **Purine and Pyrimidine Biosynthesis**

7. The sugars composing nucleotides are derived from either the pentose phosphate pathway or the Entner-Doudoroff pathway.

8. Carbon and nitrogen atoms from certain amino acids form the backbones of the purines and pyrimidines.

### **The Integration of Metabolism**

1. Anabolic and catabolic reactions are integrated through a group of common intermediates.

2. Such integrated metabolic pathways are referred to as amphibolic pathways.

References': 1- Microbiology an introduction TWELFTH EDITION. Gerard. Tortora.2016.

2- Microbiology an introduction TENTH EDITION. Gerard. Tortora.2010.