

Chapter-9- Cellular Respiration

1. Respiration- Aerobic, Anaerobic, Fermentation. What is Oxidation and Reduction? What are Oxidizing and Reducing agents in any reaction?
 2. Coenzymes, NADH and FADH₂, what are oxidized states of these coenzyme?
 3. **Respiration in detail**, (you must know all that is on power point)
 - a. Glycolysis (start and end products),
 - b. Pyruvate to Acetyl CoA,
 - a. in the presence of O₂, pyruvate enters the mitochondrion Before the citric acid cycle can begin, pyruvate must be converted to acetyl CoA, which links the cycle to glycolysis
 - c. Citric acid cycle
 - d. Oxidative phosphorylation (ETC and Chemiosmosis)
- Cellular respiration has three stages:
 1. **Glycolysis** (breaks down glucose into two molecules of pyruvate, occurs in Cytoplasm, Glycolysis can take place both in presence and absence of Oxygen)
 2. **The citric acid cycle** (completes the breakdown of glucose, only in presence of oxygen, occurs in mitochondrial matrix)
 3. **Oxidative phosphorylation** (accounts for most of the ATP synthesis, occurs in inner mitochondrial membrane)
 - The process that generates most of the ATP is called oxidative phosphorylation because it is powered by redox reactions
 - Oxidative phosphorylation accounts for almost 90% of the ATP generated by cellular respiration.
 - A smaller amount of ATP is formed in glycolysis and the citric acid cycle by **substrate-level phosphorylation**
4. Fermentation, Alcohol, lactic acid as end product and what are obligate anaerobe, facultative anaerobe.

Chapter 12- The Cell Cycle and Mitosis

Mitosis:

Chromatin=uncondensed DNA which is found in nucleus and anaphase and when it goes to mitosis it condenses into chromosomes called chromatids

1. Cell Division 2 kinds

- **Mitosis**- produces Somatic cells, Diploid, Identical
- **Meiosis**- produces Gametes, (Sperm, egg) also know as reproductive cells, Haploid, non identical

2. Know all of the following terms –

- Chromatin, Chromosomes, Homologous Chromosomes, Sister Chromatids
- Centrosome, Centromere, Spindle fibers, Kinetochore

**Inside centromere where spindle fibers attach it is the kinetochore
Spindle fibers come from centrosomes**

3. Eukaryotic Cell cycle – M phase + Interphase

- M phase or Mitotic phase or cell division phase ---- Mitosis + Cytokienesis
- Interphase or cell growth and chromosome copying phase -- $G_1 + S + G_2$

*Mitosis- 1. Prophase 2. Prometaphase 3. Metaphase 4. Anaphase
5. Telophase (PPMAT)*

Cytokinesis- – Is the Division of cytoplasm (Cleavage in animal cell and Cell plate in Plant cell)

4. Binary fission, Origin of replication, Cell cycle control system (cell clock), what happens when cell in different stages are fused together (slide 18)
5. G_1 , and G_2 Checkpoint of cell cycle control systems, what's G_0 ?
6. MPF --- Cyclin + CDk, MPF triggers cell into past G_2 into M.
7. Internal and external signals at checkpoints ----- lead to either a go ahead or stop signal
- Internal signals- kinetochores not attached to spindle microtubules
 - External signals- 3 kinds
 1. Growth factor (PDGF)
 2. Anchorage dependence
 3. Density-dependent inhibition

8. How do cancer cells behave differently than normal Cell in case of Internal and external signals? What is Transformation, Benign tumor, Malignant tumor, Metastasis

- Cancer cells are different than normal cells because they do not exhibit density-dependent inhibition or anchorage dependence. They do not respond normally to the body's control mechanisms. They do not need growth factors to grow and divide because: they may make their own growth factor, they may convey a growth factors signal without the presence of the growth factor, and they may have an abnormal cell cycle control system.
- Normal cells are converted to a cancerous cell by a transformation. They form tumors, which are masses of abnormal cells within otherwise normal tissue, and if those abnormal cells remain at the original site, the lump is called a benign tumor. Malignant tumors invade surrounding tissues and can metastasize which means the cancerous cells export to other parts of the body where they may form secondary tumors.

Chapter 13- Meiosis and Sexual Life Cycles

1. Sexual and Asexual reproduction, Karyotype, Autosomes, Sex chromosomes.
2. Meiosis, Mitosis, fertilization(which two of these 3 alternate the chromosome number in sexual life cycle)
3. Homologous chromosomes(Maternal and paternal), Sister Chromatids, Nonsister chromatids
4. Meiosis—Meiosis I + Meiosis II, what is the outcome/ result of each one (slide 11)
 - a) Meiosis I – Prophase I → Metaphase I → Anaphase I → Telophase I and cytokinesis (PMAT)
 - b) Meiosis II – Prophase II → Metaphase II → Anaphase II → Telophase II and cytokinesis (PMAT)
5. Synapsis leading to Crossing over (happens in Prophase)
6. **Sexual reproduction** - occurs by three mechanisms
 - a) Independent assortment of chromosomes
 - b) Crossing over
 - c) Random fertilization