

Week 10 – DNA Mutation & Repair

Part I – DNA Mutation & Repair

Learning Goal: Understand how cells detect and repair different kinds of DNA damage and what can happen if DNA is not properly repaired.

After the pre-class assignments you should be able to:

- Identify different sources of DNA mutation and damage
- Describe how mutations arise and how environmental factors can increase mutation rate
- Explain how DNA damage and/or mismatches are detected and repaired during base-excision repair, nucleotide-excision repair, mismatch repair, and double-strand DNA break repair (non-homologous end joining and homologous recombination)
- Discuss the possible consequences that could arise if DNA is not properly repaired

By the time you take the final exam you should also be able to:

- Evaluate data to compare and contrast mutation rates across organisms
- Determine the appropriate DNA repair pathway that a cell would use in response to a particular type of DNA mutation or damage

Part II – Control of the Cell Cycle

Learning Goal: Understand how cells regulate their growth and division through the cell cycle.

After the pre-class assignments you should be able to:

- Describe the stages of mitosis
- Explain why the appearance of DNA changes from interphase to mitosis
- Explain how CDK and cyclin regulate the progression of the cell cycle
- Define the terms oncogene, proto-oncogene, and tumor suppressor

By the time you take the final exam you should also be able to:

- Relate DNA repair processes (i.e., BRCA1) to the regulation of the cell cycle
- Relate changes in cell cycle regulation and the process of cell division to the development of cancer
- Relate the terms “homologous chromosome” and “sister chromatid” to the process of mitosis and the segregation of genetic information
- Predict how drugs or mutations that alter the process of mitosis will affect cell growth
- Predict how the presence of drugs or mutations that alter cell cycle regulation will affect cell growth and division