

LECTURE #10: REGULATION OF CELL PROLIFERATION AND SURVIVAL

1. Cell cycle progression
 - G1, S, G2, M
 - Cdk classes
 - Cyclin classes

2. Mechanisms of regulation (how to impose the proper order of events)
 - Entry into G1
 - G1 cyclins (D-type cyclins)
 - Cdk inhibitors
 - Entry into S phase
 - Role of Rb
 - Control of M phase
 - Inhibitory role of the Wee1 and Myt1 protein kinases
 - Stimulatory role of the Cdc25 phosphoprotein phosphatase
 - Multiple roles of regulated proteolysis

3. Checkpoint controls (how to try to avoid problems when things go wrong)
 - Assessing the completeness of DNA replication
 - Response to DNA damage
 - Sensing errors in spindle assembly, alignment, and function
 - Monitoring readiness for cytokinesis

4. Molecular basis of carcinogenesis (how bad things can get)
 - Many proto-oncogenes encode components of signal transduction pathways that normally promote cell proliferation or trigger exit from the quiescent state
 - Many tumor suppressor genes encode components of the machinery that normally retards growth-stimulatory pathways

5. Apoptosis (how to go quietly when your time is up)
 - Death domain receptors
 - Activation of a protease cascade (“Caspases”)
 - Regulation
 - Bcl-2 and related proteins, Bad, and Bax
 - c-Akt/PKB-mediated survival
 - NF- κ B-mediated survival