

Molecular Biology of the Mammalian Cell Cycle
BIOL 6024 Topics in MCBB
Tuesday and Thursday 12:30 – 1:45
Instructors: Jill Sible and John Tyson

Background and Objectives: The cell division cycle underlies the growth, development and reproduction of all eukaryotes. A wealth of information derived from molecular and cell biology experiments paired with computational tools to organize and interpret this information renders a comprehensive understanding of the mammalian cell cycle control network a reachable goal of the early 21st century. Once we understand how the cell cycle is regulated, then we will discover ways to manipulate the cell cycle to our advantage, inducing the regeneration of damaged neurons, interfering with the reproduction of pathogenic nematodes, and notably, turning off the proliferation of cancer cells.

In this course, we will explore the molecular mechanisms, based on signaling pathways regulating cyclin dependent kinases (CDK), that underlie cell cycle controls. We will examine the intracellular and extracellular signals that start and stop the cell cycle, and we will explore the molecular basis of cancer, from the perspective of mutations that disrupt normal cell cycle control pathways.

Evaluation: Regular class attendance is expected. Students will make oral presentations on topics from the original research literature. Everyone is expected to participate in the general discussion of these papers and should read the assigned papers before class. Students will complete two written assignments: 1) a critique of one of papers they present (due a week after the presentation) and 2) a focused review article on some aspect of cell cycle control and cancer (due the last week of class).

class participation: 50%

critique of article: 20%

review article: 30%

Reference Books:

Murray and Hunt, *The Cell Cycle*, Freeman, New York, 1993

Alberts et al., *Molecular Biology of the Cell*, 3rd ed. Chapter 17

Lodish et al., *Molecular Cell Biology*, Chapter 25

Class Schedule

Class	Date	Topic	Presenter
		INTRODUCTION	
1	Tues, Aug 28	General info./What is the cell cycle?/ Biochemical studies-frog eggs	Sible
2	Thur, Aug 30	Physiological studies	Tyson
3	Tues, Sep 4	Genetic studies I - yeast	Tyson
4	Thur, Sep 6	Molecular biology studies/identity of MPF	Sible
5	Tues, Sep 11	Genetic studies of cancer	Sible
6	Thur, Sep 13	Cell cycle engine/ Introduce the hallmarks of cancer	Tyson/Sible
		THE MAMMALIAN CELL CYCLE AND CANCER	
7	Tue, Sep 18	Self sufficiency in growth (GF signaling, Rb)	Tyson
8	Thu, Sep 20	Student presentations	
9	Tue, Sep 25	Student presentations	
10	Thu, Sep 27	Avoiding social constraints and other anti-growth signals	Tyson
11	Tue, Oct 2	Student presentations	
12	Thu, Oct 4	Student presentations	
13	Tue, Oct 9	Genomic instability (p53 and Chk1/Chk2)	Sible
14	Thu, Oct 11	Student presentations	
15	Tues, Oct 16	Student presentations	
16	Thu, Oct 18	Evading apoptosis	Sible
17	Tues, Oct 23	Student presentations	
18	Thu, Oct 25	Student presentations	
19	Tue, Oct 30	Achieving immortality (telomerase)	Tyson
20	Thu, Nov 1	Student presentations	
21	Tues, Nov 6	Sustaining angiogenesis	Tyson
22	Thu, Nov 8	Student presentations	
23	Tue, Nov 13	Student presentations	
24	Thur, Nov 15	Metastasis	Sible
25	Tue, Nov 27	Student presentations	
26	Thur, Nov 29	Student presentations	
27	Tue, Dec 4	Evading the immune system/student presentations	Elgert
27	Thu, Dec 6	Cancer in Clams!!!!!! attend Biol. Seminar in lieu of class	Chuck Walker
28	Tue, Dec 11	New Therapies for treating cancer	Sible