Foundations of Biomedical Research 2021

Week 8: Cytoskeletal Dynamics and Cell Motility - Pierre McCrea & George Eisenhoffer

Time	Monday October 18	Tueday October 19	Wednesday October 20	Thursday October 21	Friday October 22
8:30	Lecture 1: Cytoskeletal Networks, the cell scaffold (GE)	Lecture 4: Hostpathogen interactions: adhesion and the cytoskeleton (YX)	Biostats/ bioinformatics Exercise	Lecture 6: Mechanical Forces in Cellular Adhesion (GE)	Lecture 7: Adhesion and Downstream Signaling (RJ)
9:15	Lecture 2: Cell:cell Contacts (PM)	Breakout: Functional Microscopy Use 1 (AP)	Break	Breakout : Group mock hypothesis development	Lecture 8: Small GTPases and motility
10:00 - 10:15	Break	Break		Break	Break
11:00	Lecture 3: ECM and Integrins (JM)	Breakout: Functional Microscopy Use 2 (AP)	Lecture 5: Cell Polarity (SC)	Breakout : Group mock hypothesis development (GE, PM)	Final Breakout: Jeopardy contest on the weeks topics. (PM, GE)

AP - Adriana Paulucci
GE - George Eisenhoffer
JF - Jeff Frost
JM - Joseph McCarty
RJ - Randy Johnson
SC – Shane Cunha
YX - Yi Xu

Week 8 Learning Objectives: Cytoskeletal Dynamics and Cell Motility

- Learn about the basic structure and functional roles of the cytoskeleton (actin filaments, microtubules, intermediate filaments), inclusive of the cytoskeleton's roles in development and disease (e.g., cell motility).

- Appreciate the choices in imaging modalities that are available to unravel key properties of cells (e.g. to better understand cell-cell or cell-substrate associations, cell shape changes or movements, intracellular cytoskeletal structures, protein associations).

- Develop and retain an overview of the central biological contributions of cell-cell interactions (e.g. as mediated *via* cadherin:cadherin contacts), and of cell-substrate interactions (e.g. as mediated *via* integrin:ECM contacts). For example, signals that these adhesive contacts generate, and their participation in forming or maintaining normal cell polarity in the apical-basal (“z”) or proximal-distal ("xy/ planar") dimensions, as well as their roles in disease/ host-pathogen interactions.

- Learn about the role of mechanical forces in the regulating cell shapes changes (e.g. via cytoskeleton reorganization of actin filaments and microtubules) and cell motility (e.g. via modulating cell-cell contacts and cell-substrate interactions) to impact the form and function of different tissues.

-Develop a working knowledge of how a large group of enzymes (e.g. small GTPases) are regulated by guanine nucleotide exchange factors (e.g, GEFs, which assist in GDP dissociation) and GTPase activating proteins (e.g. GAPs, that stimulate GTP hydrolysis) to act as molecular switches and control a wide range of essential biochemical pathways (e.g., cell growth, differentiation, proliferation, migration, establishment and maintenance of polarity, and cytoskeletal organization) in all eukaryotic cells