CAMB 650 – Maintenance of Genome Integrity

Tues, 2-5pm
Room 701 BRB II/III

Course Directors

Eric J. Brown, PhD
Asst Prof of Cancer Bio
U. Penn. School of Medicine
514 BRB II/III
(215) 746-2805, Fax (215) 573-2486
brownej@mail.med.upenn.edu

Craig H. Bassing, PhD
Asst Prof of Pathology and Lab Medicine
U. Penn. School of Medicine
4054 Colket Translational Research Bldg.
267-426-0311, Fax (267) 426-5165
bassing@mail.med.upenn.edu

Brad Johnson, MD, PhD
Assoc Prof of Pathology & Lab Medicine
U. Penn. School of Medicine
405A Stellar-Chance/6100
215-573-5037
johnsonb@mail.med.upenn.edu

Description:

DNA damage checkpoint and repair genes are important for maintaining genome integrity and suppressing cancer and aging. These processes function as part of a complex interconnected network of DNA recognition and processing, checkpoint signaling cascades and DNA repair. To study this emerging research area, students in CAMB 650 critically evaluate key research findings published in the last five years. In addition to providing an advanced understanding of DNA damage checkpoints, DNA repair, and the connections of these processes with cancer and aging, this course is designed to allow students to gain experience in critiquing scientific literature both independently and through group discussion.

Prerequisites and notes:

Previous completion of CAMB 530 or equivalent introduction to cell cycle and DNA damage response regulation is recommended, but not required. All BGS students are eligible to take this course. However, if the class is over-registered, priority will be given to Cell and Molecular Biology Graduate Group and Cancer Biology students. The length of this course and the scheduling of assignments are designed to accommodate the preliminary examination requirements for second year students.

Class Format:

Course work is primarily based on a round table discussion format. Each week, a topic in DNA damage responses will be covered. A 15 minute introduction to the topic will be given by the instructor and a review and two primary research papers will be assigned for reading and analysis. Papers will be accompanied by a questionnaire (6 multi-part questions) addressing the research area, data, methods and the author’s and student’s interpretations of the data. In the following week, students will return their answers and engage in a round table discussion of the papers. In discussion, students will be given the opportunity to argue their points of view on the papers and develop novel research hypotheses and approaches. This course will be taught one session per week (3 hours) to promote analysis of assigned research papers and synthesize ideas and conclusions.
Topics (one per week):

Tues 1/18  Introduction to DNA damage checkpoints and DNA repair. History and present state of the field (Brown, Bassing and Johnson)
Tues 1/25  Sources of DNA damage (Bassing)
Tues 2/1   DNA repair: homologous recombination and NHEJ (Johnson)
Tues 2/8   Cell cycle checkpoints and genome integrity (Brown)
Tues 2/15  Chromatin modification in DNA repair (Bassing)
Tues 2/22  DNA damage and cancer: when checkpoints fail (Brown)
Tues 3/1   DNA damage and cancer: when repair fails (Bassing)
Tues 3/8   Therapeutic strategies for cancer treatment (Brown)
Tues 3/15  Connections between checkpoints/repair and telomere maintenance (Johnson)
Tues 3/22  Genome integrity and aging (Johnson)
Tues 3/29  Chalk talks
Tues 4/5   Presentations

Grading:
Take home questionnaire assignments and participation in class discussions will each make up 40% of each student’s final grade. In the final two weeks of the course, each student will propose a future research topic in the field of DNA damage responses, cancer and aging. Initially, student proposal ideas will be explored in short “chalk talk” formats to seek advice and critiques from their fellow students. In the second week, students will give a 15-minute oral presentation of their research proposal, describing the biological question to be addressed and how to best approach it experimentally. This proposal and participation in chalk talk discussions will comprise 20% of the final grade.