7.341 Of Mice and Men: Humanized Mice in Cancer Research

Spring 2015 Wednesdays, 11 am – 1 pm (Class time and day flexible) Room 68-150



What are humanized mice? How can humanized mice help develop new immunotherapy-based cures for cancer? Are "mouse avatars" the future of personalized cancer therapy?

Join us to find the answers!

For more information, contact: <u>mkaur@mit.edu</u>

\*Cookies and coffee will be provided\*



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Instructor: Mandeep Kaur (<u>mkaur@mit.edu</u>, 4-5100, laboratory of Jianzhu Chen) Spring 2015. Wednesdays 11 am – 1 pm (Class day and time are flexible.) Room 68-150.

Almost everyone knows someone whose life has been affected by cancer. This devastating disease, which still carries a social stigma in certain parts of the world, generally remains unbeatable despite numerous efforts to curb and curtail it since the inception of the War On Cancer in the 1970s. Why is cancer such a difficult disease to treat? Despite all the effort and money poured into developing new cancer treatments, why are there so few cancer therapies that specifically target tumor cells? What is the best system to model the development of a human tumor? How can novel therapies be tested in a system that mimics the human body by modeling the interaction between human tumor cells and a human immune system, which plays a role in the detection and elimination of tumor cells? Cancer is thought to develop and spread by escaping surveillance from human immune cells, which would otherwise eliminate it. How can new treatment modalities, especially immune-based therapies that harness the natural ability of immune cells to kill target cells, be developed to treat cancer? These and other questions will be addressed in this course. We will explore the concepts of mouse models for human cancer, humanized cancer mice and cancer immunotherapy by reading recent and classic research articles. Humanized mice, like Mouse Man from the comic world, are essentially mice on the outside and human in the inside because of the presence of an intact and functional human immune system after engraftment with human stem cells. In humanized cancer mice the development of a human tumor occurs alongside a normal human immune system. We will focus on analyzing and critiquing research papers describing the development of human cancer models using humanized mice, thus hopefully mirroring the situation in patients. A review of the literature and a dissection of experimental designs will serve as a framework to guide discussions about the strengths and weaknesses of humanized mice (also referred to as humice) in cancer research and their unique position as a platform for the testing of new therapies prior to use in the clinic. The course will end with the exploration of a tantalizing new concept: the development of "personalized mice" or mouse "avatars" for individual cancer patients to test drug toxicities prior to dosing the patient as an effort to improve therapeutic efficacy and minimize undesired side effects. Many believe that immunotherapy represents the future of cancer therapy and humanized mice are a recent addition to the cancer biologist's tool-kit for modeling human cancer. This course will act as an introduction to the latest developments in the fields of cancer biology and immunotherapy. We will use the humice cancer field as a vehicle to fulfill the primary objective of this course -- the art and science of reading, analyzing and critiquing research articles. We will also have the opportunity to attend one or more seminars by experts in the field and visit a research laboratory actively involved in the generation of cancer humice.