MTR/REG 621 Cell & Gene Therapy

Spring 2023

Time: Wednesdays 10:15 AM-12:15PM

*Note the 9 – 10 am hour should remain reserved for team meetings.

Dates: Jan 18 – Apr 19

Location: Smilow Researcch Center, PCAM, 8-146

Instructor Information

Course Director

Michael Milone, MD, PhD
Associate Professor of Pathology and Laboratory Medicine
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Assistant Course Director

Elizabeth Hexner, MD, MSTR
Associate Professor of Medicine
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Course Coordinator

Megan Maxwell
Associate Director, ITMAT Education
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General Information

Description

This course will provide students with a general overview of translational research in the area of gene and cell therapy. This includes technical considerations, translating preclinical investigation into therapeutics, the execution of gene and cell therapies clinical trials, and key regulatory issues. Entrepreneurial considerations will be discussed as well. By the end of this course, students will understand the basic technologies employed for gene and cell therapy along with approaches and pitfalls to translating these therapies into clinical applications including regulatory and commercial aspects of this emerging area.

Evaluation Methods:

Students will be graded based on class attendance, participation, a paper presentation and two group project presentations.
30% – Attendance and Class Participation
30% – Paper Presentation
20% – Project Presentation #1
20% - Project Presentation #2

Attendance & Participation (30%)

Attendance:
Students are expected to attend *and participate* in all classes. If for any reason a student will not be in class, they should contact Dr. Milone (milone@pennmedicine.upenn.edu) or Dr. Hexner (hexnere@pennmedicine.upenn.edu) prior to class to alert them of the absence and make arrangements to make up course content. Two excused absences are allowed

during the course which will not affect the attendance grade. Absences in excess of two will result in 1 point deducted from the attendance portion of the grade.

Participation:
Prior to each class, materials will be posted online to the Canvas course site. Students are expected to watch and read the materials and **come to class prepared with to discussion the material.** Each class will involve discussion in which you are expected to participate. Your engagement and participation are important not only for your own learning but also for the learning of others.

Paper discussion (30%):
Students will be responsible for reading the assigned papers prior to class. The format of the paper discussion will be a brief introduction of the key background and underlying question(s) followed by an in-depth analysis of the paper by all members of the class. Each student should be prepared to present the brief background if called upon. This background should include:

- What question did the study set out to address?
- What is the significance of the question to the field?
- What was the overall approach used to address the question?

In addition, the students should be able to explain each figure of the assigned paper if called upon during the discussion. Students will be graded based on their introductory presentation and active participation in the figure discussions.

Project (40% divided equally over two presentations)
The students will be assigned to a group of 3-4 students. As a group, the students will develop a plan to translate a product based upon a gene and/or cell therapy technology from the basic preclinical phase into a phase I clinical trial. The group will be required to prepare two (2) presentations. The first presentation will focus on assessing the basic science around the technology, the adequacy of the pre-clinical testing as it relates to safety and efficacy prior to entering a human clinical trial and critically evaluating approaches to manufacturing the product appropriate for use in humans. The second presentation will focus on the regulatory and ethical aspects to translating the technology into the clinic. This will include proposing a clinical trial strategy for a first-in-human study with a critical evaluation of the pitfalls and challenges associated with the proposed strategy.

Course Policies:

Academic Integrity:
As a student at The University of Pennsylvania, you are required to uphold the Code of Academic Integrity. Specifically, this means that materials that you submit either online or in person should be independent works created by you that uphold all tenets of academic integrity (i.e. do not cheat, fabricate, or plagiarize, amongst others). We encourage you to reach out to the course director or coordinator if you are not clear on what potential violations are.

Canvas:
All course materials (ppts, announcements, lecture recordings) and assignments will be posted on Canvas. We recommend that you choose the "Notify me right away" option for your most frequently checked email address in the "Announcements" area of the "Notification Preferences" page: https://canvas.upenn.edu/profile/communication.

Course Evaluations:
Course evaluations are completed via Blue at the end of the semester. These are a required part of course participation. Students can access evaluation forms with their PennKey and password and will also receive emails when forms are available.

Student Disabilities Services:
The University of Pennsylvania provides reasonable accommodations to students with disabilities who have self-identified and been approved by the office of Student Disabilities Services (SDS). Please make an appointment to meet with me as soon as possible in order to discuss your accommodations and your needs. If you have not yet contacted SDS, and would like to request accommodations or have questions, you can make an appointment by calling SDS at 215-573-9235. The office is located in the Weingarten Learning Resources Center at Stouffer Commons 3702 Spruce Street, Suite 300. All services are confidential.

Tentative Course Schedule

Week	Topic	Lecturer
Jan 18	Overview of Gene and Cell Therapy Field & Orientation to Course Paper discussions (Instructor Lead)Horowitz 1990 HSCT and T cells	Michael Milone Elizabeth Hexner
Jan 25	Gene Therapy Vectors Paper Discussions (Student Lead)	Michael Milone
Feb 01	Gene Editing Paper Discussions (Student Lead) NYCE T cell paper	Michael Milone
Feb 08	Stem Cells & Tissue Engineering Paper Discussions (Student Lead)	Elizabeth Hexner Roddy O'Connor
Feb 15	**MAGE-A3 TCR toxicity** Correlative Sciences and its Importance to Successful Clinical Trials – Tet2 story Paper Discussions (Student Lead)	Michael Milone
Feb 22	Pre-clinical Safety Testing of Vector-based Gene Therapies Paper Discussions (Student Lead)	TBD
Mar 01	Manufacturing of Complex Cell-based Therapeutics Apheresis/Tour of South Tower cGMP Facility	Bruce Levine Andrew Fesnak Han Van Der loo
Mar 08	**No class Spring Break**	
Mar 15	**Project Presentations – Part 1**	
Mar 22	Patenting Gene & Cell Therapies	Kathryn Doyle, PhD, JD Saul-Ewing
Mar 29	Overview of Regulatory Review for Gene and Cell Therapies FDA Guidance on Cell & Gene Therapies How-to Workshop: Writing an IND for Gene Therapy Products	Julie Jadlowsky
Apr 5	Ethical Considerations in Gene and Cell Therapy Clinical Trials	Megan Kasimatis Singleton (JHMS)
Apr 12	Translating Gene & Cell Therapies into Viable Commercial Products	Arun Das
Apr 19	**Final Project Presentations** **Final Class Wrap up**	