Master of Science in Translational Research

Emma A. Meagher, MD
Program Director, MTR
Vice Dean, Clinical Research
The Shifting Interface of Academia and Healthcare

Integrating the translation of discovery into medical education

The Learning Health Care System
- Large Data
- Academic Partnerships/Consortia
- Team Science
- Science of Healthcare Economics
- Science of healthcare operations on outcomes
The Evolution of the Research Landscape

**The Learning Health Care System**

Clinical Trials + Observational Studies + Pragmatic trials

“Translational Research” Innovation

Proof of Concept Animals ←→ Proof of Concept Humans

Basic Research

Clinical Research

Health Sciences Policy + Health Systems Research

Perelman School of Medicine University of Pennsylvania

Institute for Translational Medicine and Therapeutics
Overall Goals of MTR Program

• Provide mentored training experience in translational research by combining didactic and experiential experiences in a structured degree granting program

• Prepare trainees to think critically to pose and answer research questions
Providing the Educational Environment

Ingredients for successful outcomes:

- Course work
- Mentoring
- Advising
- Funding
- Resources
- Collaboration
- Professional Development Core
General Information

• The program enrolls ~20 students per year
  • Includes a mix of MD Students, Residents, Fellows, Pre/Postdoctoral Scientists, and early stage Faculty

• 10 funded (TL1) trainee slots for predoc students per year

• Students apply early in their 3rd year of Med School (Sept/Oct)

• Selection occurs in December

• Students start program at the end of their 3rd year (July)
MTR Concentrations

Discovery: For students who are elucidating the basic pathophysiological etiology and/or process of disease. Projects may be proof of concept in cell or animal models or human samples.

Biomedical Informatics: For students who are adopting informatics methodologies to develop and test their own hypotheses.

EntSci: For students who aim to navigate both business and academic environments as you conduct research and consider commercialization opportunities.

TTRS: For students who are testing discoveries for preclinical and/or clinical effect. Projects may be first in humans, phase 1, or assessing the safety, efficacy, quality, and performance of regulated products.

Core Courses

Biomedical Informatics

Translation Therapeutics and Regulatory Science
Overview of Curriculum

- 12 credits

- 6 Required Courses
  - Biostats, scientific writing, measurement, protocol development, ethics

- 2 Elective Courses
  - a mix of one credit and/or half credit courses

- 2 Lab Rotations
  - Students learn 2 specific methods and are awarded 2 credits

- 2 credits for Thesis
  - Students are awarded 2 credits for completing their thesis successfully
Research Project

Timeline

Application

Summer

Fall

Proposal Presentation

Build Proposal

Refine Proposal

Submit Revised Proposal

Project Execution

Written Thesis & Oral Defense

Spring Year 2
Professional Development Core (PDC)

- Things I Wish I Knew: Past & Current Trainees
- Mentee Training 4 sessions
- Professional Development Core
- Goal Setting with the Individual Development Plan (IDP)
- Negotiation Skills
- Research Toolbox: Penn Data Analytics Center
- Mindful Approaches to Conflict
### Integration of Curricula - Sample MTR Study Plan

<table>
<thead>
<tr>
<th>YEAR</th>
<th>FALL</th>
<th>SPRING</th>
<th>SUMMER</th>
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<tbody>
<tr>
<td>1</td>
<td>Module 1</td>
<td>Module 2</td>
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<td>2</td>
<td>Module 2</td>
<td>Module 4</td>
<td>Module 4</td>
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<td>3</td>
<td>Module 4</td>
<td>Module 5</td>
<td>MTR 601, 602 (Summer II)</td>
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<td></td>
<td>Apply to program</td>
<td>Step 1 USMLE</td>
<td>Research</td>
</tr>
<tr>
<td>4</td>
<td>MTR 600, 603</td>
<td>MTR 604, Elective 1</td>
<td>MTR 605, MTR 999 (Summer I)</td>
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<td></td>
<td>Research</td>
<td>Research</td>
<td>Research</td>
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<tr>
<td>5</td>
<td>MTR 999, Elective 2</td>
<td>Module 5 + 2 Thesis</td>
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<tr>
<td></td>
<td>Research</td>
<td>Credits</td>
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<td></td>
<td></td>
<td>Research</td>
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Clinical Rotations

- Permitted times: July and August after year one or spring of your final semester
- Summer I Term at the end of year one is required and the only term when MTR 605 Data Manuscript Writing is offered

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Summer Session II</th>
<th>Fall</th>
<th>Spring</th>
<th>Summer Session I</th>
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<tbody>
<tr>
<td>MTR 601</td>
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<td>MTR 604</td>
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<tr>
<td>MTR 602</td>
<td>MTR 603</td>
<td>Elective 1</td>
<td>MTR 999 Lab 1</td>
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<table>
<thead>
<tr>
<th>Year 2</th>
<th>Summer Session II</th>
<th>Fall</th>
<th>Spring</th>
<th></th>
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<tbody>
<tr>
<td>July/August</td>
<td>Elective 2</td>
<td>Rotations permitted</td>
<td>Thesis Defense (MTR 607/608)</td>
<td></td>
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<tr>
<td>Rotations</td>
<td>MTR 999 Lab 2</td>
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<td></td>
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<tr>
<td>Permitted</td>
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## Finances

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<tr>
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</thead>
</table>
| 1    | Module 1  
MD tuition | Module 2  
MD tuition |        |
| 2    | Module 2  
MD tuition | Module 4  
MD tuition | Module 4 |
| 3    | Module 4  
MD tuition | Module 5  
MD tuition | MTR tuition  
TL1 starts July 1<sup>st</sup> |
| 4    | MTR tuition  
TL1 grant | MTR tuition  
TL1 grant | MTR tuition  
TL1 ends June 30<sup>th</sup> |
| 5    | MTR tuition | Module 5 + MTR  
MD tuition |        |
Grant Funding & Tuition Costs

- **Tuition Costs to student**
  - $60,336 (Total degree cost in FY 19)
  - Subtract $20,500 (Tuition funds provided by appointment to the TL1 grant)
  - Subtract $10,012 (PSOM additional course policy for 2 courses)
  - This leaves $29,824 estimated out of pocket costs for MTR tuition

- The out of pocket tuition cost is roughly equivalent to the one semester of MD tuition that is not charged during Fall of year 5.
  - If you receive a PSOM scholarship it may not be used during the MTR program, thus you are taking on an additional financial burden.

- Of note all TL1 scholars receive a cost of living stipend of $24,324 for one year.
# Current MD-MTR Students

<table>
<thead>
<tr>
<th>Student</th>
<th>Research Area</th>
<th>Research Project</th>
<th>Mentor</th>
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</thead>
<tbody>
<tr>
<td>John Arena, BA</td>
<td>Neurosurgery</td>
<td>Mechanisms of Axonal Degeneration Following Traumatic Brain Injury</td>
<td>Douglas H Smith, MD</td>
</tr>
<tr>
<td>Christopher Corbett, BS</td>
<td>Thoracic Surgery</td>
<td>Intraoperative Molecular Imaging for Pulmonary Adenocarcinoma: Does the Use of Multiple Biomarkers Increase Specificity?</td>
<td>Sunil Singhal, MD</td>
</tr>
<tr>
<td>Julia D'Souza, BS</td>
<td>Radiology</td>
<td>Trapping of Chemotherapeutics in Tumors via Antivascular Ultrasound</td>
<td>Chandra Sehgal, PhD</td>
</tr>
<tr>
<td>Yohannes Ghenbot, BS</td>
<td>Neurosurgery</td>
<td>Augmenting Perception Through Direct Electrical Stimulation of the Adult Somatosensory Cortex</td>
<td>Timothy Lucas, MD, PhD</td>
</tr>
<tr>
<td>Anthony Martin, BS</td>
<td>Orthopaedic Surgery</td>
<td>Acellular Hyaluronic Acid Scaffold with Embedded Biofactors for Cartilage Regeneration in a Minipig Cartilage Defect Model</td>
<td>Robert L. Mauck, PhD</td>
</tr>
<tr>
<td>Alexander Morrison, BS</td>
<td>Immunology</td>
<td>Mechanisms of CD40-dependent T cell trafficking in pancreatic ductal carcinoma</td>
<td>Robert Vonderheide, MD, Dphil</td>
</tr>
<tr>
<td>Neil Patel, BS</td>
<td>ENT: Head and Neck Surgery</td>
<td>Do Solitary Chemosensory Cells drive an IL-25 mediated eosinophil inflammatory response in chronic rhinosinusitis with nasal polyps?</td>
<td>Noam A. Cohen, MD, PhD</td>
</tr>
<tr>
<td>Robert Schwab, BS</td>
<td>Immunology</td>
<td>Heart CAR-T</td>
<td>Avery Posey, PhD</td>
</tr>
<tr>
<td>Nicolas Seranio, BS</td>
<td>Radiation Oncology</td>
<td>Elucidation of the role of circulating tumor cells as biomarkers in the management of bladder cancer</td>
<td>Gary Kao, MD</td>
</tr>
<tr>
<td>Elliot Stein, BA</td>
<td>Interventional Radiology</td>
<td>Coaxial Electrochemical Ablation Device</td>
<td>Greg Nadolski, MD</td>
</tr>
<tr>
<td>Rosaline Zhang, BS</td>
<td>Pediatric Plastics Surgery</td>
<td>&quot;Black Bone&quot; MRI as alternative to CT for craniofacial imaging and evaluation of common bony pathologies</td>
<td>Scott Bartlett, MD</td>
</tr>
<tr>
<td>Steve Cho, BS</td>
<td>Neurosurgery</td>
<td>Enhancing and understanding intraoperative detection of tumors using near-infrared fluorescence</td>
<td>John Y.K. Lee, MD</td>
</tr>
<tr>
<td>Alexandra Dreyfuss, BS</td>
<td>Radiation Oncology</td>
<td>A Mouse Model to Study Image-Guided, Radiation-Induced Cardiac Injury and Potential Clinically Targetable Biologic Mediators</td>
<td>Constantinos Koumenis, PhD</td>
</tr>
<tr>
<td>Drew Goldberg, BA</td>
<td>Cardiovascular Surgery</td>
<td>Proteomic analysis and hemodynamic assessment of endothelial progenitor and mesenchymal stem cell exosome therapy in a heart failure model</td>
<td>Pavan Atluri, MD</td>
</tr>
<tr>
<td>Carissa Livingston, BS</td>
<td>Cardiology</td>
<td>Sunitinib-Induced Cardiotoxicity in an Engineered Cardiac Microtissue Model</td>
<td>Kenneth Margulies, MD</td>
</tr>
<tr>
<td>Abhinay Ramachandran, BS</td>
<td>Cardiology</td>
<td>Manipulation of Pro-Hypertrophic Molecular Targets to Alter the Hypertrophic Cardiac Myocyte Response to Increased Stiffness</td>
<td>Kenneth Margulies, MD</td>
</tr>
<tr>
<td>Leah Zuroff, BA</td>
<td>Neurology</td>
<td>Characterization of functional immune response phenotypes at various stages of ocrelizumab therapy: predicting treatment response and outcomes for relapsing MS</td>
<td>Amit Bar-Or, MD</td>
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</tbody>
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MTR Contact Information

Emma A. Meagher, MD
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emma@upenn.edu

Rachel Bastian, MSEd
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bastianr@upenn.edu

Megan Maxwell, MSW
Program Coordinator
mmaxwell@upenn.edu

Visit website:
http://www.itmat.upenn.edu/mtr/
### MTR Tuition & Fee Distribution

*based on 2 cu per term and FY19 Tuition rates*

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| 3    | Module 4 MD tuition | Module 5 MD tuition | TL1 begins July 1  
9,694 (MTR tuition 2 c.u.)  
- 9,694 (TL1 grant)  
= 0 balance to student on Summer II bill |
| 4    | 10,056 (MTR tuition 2 c.u.)  
-5403 (TL1 grant)  
= 4653 balance to student on Fall bill | 10,056 (MTR tuition 2 c.u.)  
-5403 (TL1 grant)  
= 4653 balance to student on Spring bill | TL1 ends June 30  
9,694 (MTR tuition 2 c.u.)  
= 9,694 balance to student on Summer 1 bill |
| 5    | 10,056 (MTR tuition 2 c.u.)  
=10,056 balance to student on Fall bill | 31,568 Module 5 (MD Tuition)  
+10,056 (MTR Tuition 2 c.u.)  
-10,056 (PSOM Add’tl course)  
= 31,568 balance to student on Spring bill |  |