

# Megan Dacek

Graduate Student (she/her)

My passion for problem solving and creative thinking is the reason I am pursuing a career in scientific research. With my computational knowledge and 5+ years of research experience, I have honed my skills to be able to tackle any task set in front of me. This, along with my team-player attitude and excellent communication skills, has allowed me to succeed throughout my graduate school career. I am currently seeking a challenging opportunity to continue engineering immunotherapeutics.

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## SKILLS

CAR T cell engineering

Molecular cloning

Primary lymphocyte isolation and culture

T cell transduction

Viral transduction (retroviral and lentiviral)

Phagocytosis assays

Multicolor flow cytometry

Macrophage/dendritic cell differentiation

Immune cell phenotyping

CRISPR/Cas9

Mammalian cell culture

Mouse tumor models (xenograft and syngeneic)

Immune cell functional assays

Protein expression and purification

Python

MATLAB

FlowJo

Prism

Microsoft Office Suite

## EDUCATION

### Doctoral Candidate in Pharmacology

Weill Cornell Medicine

07/2016 - Present

*Thesis Project*

- Potentiating innate and adaptive immunity with engineered CAR T cells

### B.S. in Biomedical Engineering

Boston University

09/2012 - 05/2016

*Capstone Project*

- Engineered Lipid-Based Nanoparticles for Drug Delivery Across Blood-Brain Barrier Model

Cumulative GPA: 3.80

## SELECTED PUBLICATIONS AND TALKS

*Research Article*

### Potentiating antibody-dependent killing of cancers with CAR T cells secreting CD47- SIRP $\alpha$ pathway inhibitors

*Author(s)*

Megan M. Dacek, Christopher M. Bourne, Thomas J. Gardner, Katherine Panageas, Anas Younes, David A. Scheinberg

*In preparation*

*Research Article*

### Engineered 293T cells as a test platform to characterize radiohaptens for pretargeted imaging and radioimmunotherapy

*Author(s)*

Megan M. Dacek†, Simone Krebs†, Darren R. Veach, Sarah M. Cheal, Lukas M. Carter, Mike R. McDevitt, Blesida Punzalan, Daniela Burnes Vargas, Sebastien Monette, Adam L. Kesner, David A. Scheinberg, Steven M. Larson

*In preparation*

## SELECTED PUBLICATIONS AND TALKS

### Research Article

#### Targetable Micropharmacies: Cells that activate Small-molecule Drugs in situ at Tumors

##### Author(s)

Thomas J. Gardner, J. Peter Lee, Dinali Wijewarnasuriya, Nihar Kinarivala, Christopher M. Bourne, Keifer Kurtz, Broderick C. Corless, Megan M. Dacek, Aaron Y. Chang, George Mo, Kha Nguyen, Renier J. Brentjens, Derek S. Tan, David A. Scheinberg.

Under Review

### Research Talk

#### Potentiating innate and adaptive immunity with engineered CAR T cells

##### Author(s)

Megan M. Dacek

##### Date of Talk

Keystone Symposia, 12 March 2019

Cancer Immunotherapy: Mechanistic Insights to Improve Clinical Benefit

### Review

#### Targeted cellular micropharmacies: Cells engineered for localized drug delivery

##### Author(s)

Thomas Gardner, Megan M. Dacek†, Chris Bourne†, Manish Malviya†, Keifer Kurtz†, Leila Peraro†, Pedro Silberman†, Kristen Vogt†, Mildred Unti, Renier Brentjens and David Scheinberg

##### Published

Cancers, Aug 2020

### Research Article

#### A PET Imaging Strategy for Interrogating Target Engagement and Oncogene Status in Pancreatic Cancer

##### Author(s)

Kelly E. Henry, Megan M. Dacek, Thomas R. Dilling, Jonathan D. Caen, Michael J. Evans, Jason S. Lewis

##### Published

Clinical Cancer Research, Jan 2019

## PROJECTS

### Potentiating innate and adaptive immunity with engineered CAR T cells (Thesis) (2017 - Present)

- Designed bicistronic and tricistronic genetic vectors encoding CAR and CV1 (CD47-SIRPα antagonist).
- Expressed, purified and quantified recombinant protein (CV1) in bacteria and mammalian cells.
- Transduced primary T cells (human and mouse) and evaluated gene expression by flow cytometry, western blot, and ELISA.
- Assessed in vitro and in vivo anti-tumor activity of engineered CAR T cells.
- Phenotyped tumor infiltrating immune cells (T cells, macrophages, dendritic cells) using multi-color flow cytometry.

### Development of a novel humanized benzyl-DOTA antibody for in vivo tracking of CD19 CAR T cells (2017 - Present)

- Designed membrane tethered form of novel scFv against radiohaptens.
- Transduced primary human T cells with designed genetic constructs.
- Quantified radiohapten binding to cells using radio-uptake assays and flow cytometry.
- Assessed in vitro and in vivo cytotoxicity of T cells with added radiohapten.
- Analyzed PET/SPECT images to assess biodistribution of CAR T cells in vivo.

### Programmed an EOG-controlled eye cursor using MATLAB (11/2014 - 12/2014)

- Wrote MATLAB code to acquire real-time electrooculogram data and translate signal to mouse cursor movements.
- Developed MATLAB GUI to easily test and troubleshoot code.
- Tested code with various inputs and volunteers.

### Engineered lipid-based nanoparticle for drug delivery across blood-brain barrier model (09/2015 - 05/2016)

- Engineered lipidcoated calcium phosphate (CaP) nanoparticle to deliver small interfering RNA (siRNA) across blood brain barrier (BBB).
- Conjugated peptide angiopep2 to nanoparticles to increase transcytosis across an in vitro endothelial barrier.
- Used microfluidic BBB model to test nanoparticle delivery of siRNA.

### Development of dual rapid diagnostic test for Chikungunya and Dengue Fever (01/2015 - 05/2015)

- Designed RDT for use in low-resource settings to diagnose and distinguish between chikungunya and dengue fever.
- Generated and printed 3D prototype using SolidWorks.
- Analyzed potential failure modes of RDT.

### Optimization of micro-bubble formation for use as ultrasound contrast agent (04/2015 - 09/2015)

- Studied the effect of gas pressure used to generate microbubbles.
- Used coulter counter to determine size and uniformity of microbubbles.
- Assessed correlation between input gas pressure and size of microbubbles.

## **RESEARCH EXPERIENCE**

### **Graduate Student, David A. Scheinberg Laboratory** Memorial Sloan Kettering Cancer Center

05/2017 - Present

New York, NY

#### *Achievements*

- Established and optimized human and murine CAR T cell programs in the lab.
- Engineered CAR T cells with novel immune modulating proteins.
- Engineered CAR T cells to deliver diagnostic and therapeutic isotopes to tumors.
- Mentored 3 rotation students.

*Contact:* David A. Scheinberg - [scheinbd@mskcc.org](mailto:scheinbd@mskcc.org), 646-888-2190

### **Rotation Student, Jason Lewis Laboratory** Memorial Sloan Kettering Cancer Center

03/2017 - 07/2017

New York, NY

#### *Achievements*

- Conjugated radioactive imaging agent to tumor-targeting moiety.
- Assessed biodistribution of conjugated imaging agent in xenograft mouse models.
- Correlated tumor uptake of imaging agent with treatment outcome in vitro and in vivo.

*Contact:* Jason Lewis - [lewisj@mskcc.org](mailto:lewisj@mskcc.org)

### **Rotation Student, Daniel Heller Laboratory** Memorial Sloan Kettering Cancer Center

07/2016 - 10/2016

New York, NY

#### *Achievements*

- Generated cancer drug-loaded, indocyanine nanoparticles.
- Validated computational model to predict drug nanoparticle formation.
- Tested nanoparticle drug delivery in vitro against panel of cancer cell lines and patient-derived xenografts.

*Contact:* Daniel Heller - [hellerd@mskcc.org](mailto:hellerd@mskcc.org)

### **Undergraduate Researcher, Tyrone Porter Laboratory** Boston University

04/2015 - 05/2016

Boston, MA

#### *Achievements*

- Differentiated iPSCs into brain endothelial cells.
- Engineered a cell-lined blood brain barrier (BBB) model using differentiated iPSCs.
- Engineered siRNA-loaded calcium phosphate nanoparticles for gene knockdown in brain glioma cells.

*Contact:* Tyrone Porter - [tmp@bu.edu](mailto:tmp@bu.edu)

## **CERTIFICATES**

MITx: Introduction to Computer Science and Programming Using Python (06/2020 - 08/2020)

Completed and received a passing grade (98%) in course run by MIT offered online through EDx.

## TEACHING EXPERIENCE

### **Digital Media Academy**

Assistant Instructor

06/2014 - 08/2014

#### *Courses*

- Introduction to Java Programming (ages 14-18).
- Java Programming for Minecraft (ages 8-12).
- Animation and Cartoon Creation (ages 8-12).

*Contact:* Rachele Harding - rachele@digitalmediaacademy.org

### **Memorial Sloan Kettering Cancer Center**

Rotational Student Mentor

07/2018 - Present

#### *Tasks/Achievements*

- Mentor first year Ph.D. students through 2 month-long independent research projects in Dr. Scheinberg's lab.

*Contact:* David A. Scheinberg - scheinbd@mskcc.org

## AWARDS AND HONORS

NIH F31, Ruth L. Kirschstein Predoctoral Individual  
National Research Service Award (2019 - Present)

*Weill Cornell Medicine*

2nd Place, Third Year Talk (2019)

*Weill Cornell Medicine*

- Awarded 2nd place (among all third year students) for research talk given annual program retreat.

Best First Year Poster (2017)

*Weill Cornell Medicine*

- Awarded first prize for poster presented at annual program retreat.

DoD CDMRP PRCRP Horizon Award (2019)

*Name of the institution that issued/awarded it*

- Awarded, application withdrawn

Conference Scholarship (2019 - 2020)

*Keystone Symposia*

- Awarded scholarship and chosen for research talks at two separate Keystone conferences, based on submitted abstracts.