CATHERINE E. NEWMAN
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EDUCATION

Harvard Medical School, Health, Sciences, and Technology Program, Boston, MA — July 2017 – Present

MD/PhD candidate, NIH Medical Science Training Program Grant Recipient

University of Cambridge, Churchill College, Cambridge, UK — September 2016- June 2017

Masters of Philosophy in Biological Science (Biochemistry), in the lab of Dr. Ben Luisi

- **Thesis:** Structural Studies of the Multidrug Efflux Pump AcrB in Lipid Nanodiscs.
- **Honors:** Gates-Cambridge Scholarship

Duke University, Durham NC — August 2012-May 2016

B.S. in Chemistry with Distinction, Concentration in Biochemistry, Minor in Biology, **GPA 3.9**

- **Thesis:** Understanding the Mechanism of Multidrug Binding by MepR, the Repressor of the *Staphylococcus aureus* Multidrug Efflux Pump, MepA
- **Honors:** Phi Beta Kappa, Magna Cum Laude, B.S. Degree Marshall at Graduation, Hypercube Scholar Award, Howard Hughes Research Fellowship, Duke Biochemistry Summer Fellowship, Duke Chemistry Gordon Fellowship, Dean's List with Distinction, Dean's List

RESEARCH

University of Cambridge Biochemistry Department, Laboratory of Dr. Ben Luisi — September 2016- Present

- Used cryo-Electron Microscopy to investigated the protein- lipid interactions of the tripartite multidrug efflux pump AcrB in lipid nanodiscs. The cryo-EM structure of AcrBZ in nanodiscs revealed novel conformations of AcrB and AcrZ, as well as specific protein interactions between AcrB and AcrZ that could modulate AcrB drug binding and efflux.

Duke University Medical Center, Laboratory of Dr. Richard Brennan — June 2012- May 2016

- Summer 2012: Gained exposure to lab techniques and x-ray crystallography while assisting with a project on the bacterial persistence of HipA aiming to mutate the protein to study its activity.
- 2012 – 2013: Investigated four novel M. tuberculosis toxin-antitoxin, attempting to isolate these toxins and antitoxins as well as deduce their structure through x-ray crystallography. Was awarded the Howard Hughes Research Fellowship in conjunction with this project.
- 2014 – Present: Studied MepR, a transcriptional regulator of the multidrug efflux pump MepA in S. aureus. Created mutations in MepR and tested their drug binding ability to determine where drugs bind this transcriptional regulator. Determined structures of two MepR with mutations that reduced drug binding through x-ray crystallography to 1.48 and 1.75 Å resolution. The results gave insight into the induction mechanism by which drug binding leads to a conformation change that prevents MepR activity. Was awarded the Biochemistry Summer Fellowship and Chemistry Gordon Fellowship in conjunction with this project.

Duke University Medical Center, CARE Research Group — 2010 – May 2016

- Study determining the role of gender on the severity of congestive heart failure at time of CABG surgery.

PUBLICATIONS

- Neuberger, A, Newman, CE, Orr, MW, Hsu, P, Samsudin, F, Ramos, L, Debela, M, Khalid, S, Storz, G, Luisi, BF, Du, D. Allosteric modulation of an RND transporter by a transmembrane small protein and cardiolipin. In preparation for publication.
- Newman, CE*, Birukou, I*, Brennan, RG. The Mechanism of Ligand-Induced DNA Binding Attenuation in *S. aureus* MepR. In preparation for publication.

PRESENTATIONS

- Newman, CE, Du, D, Luisi, BF. Structural Studies of the Multidrug Efflux Pump AcrB in Lipid Nanodiscs. Dissertation defense. September 2017.
- Newman, CE, Du, D, Luisi, BF. Structural Studies of the Multidrug Efflux Pump AcrB in Lipid Nanodiscs. Cambridge Microbiology Department. May 2017.
- Newman, CE, Birukou, I, Brennan, RG. Understanding the Mechanism of Multidrug Binding by MepR, the Repressor of the *Staphylococcus aureus* Multidrug Efflux Pump, MepA. Duke Chemistry Poster Presentation, Duke University, April 2016.
- Newman, CE, Birukou, I, Brennan, RG. The drug binding characteristics of MepR, a repressor of the *Staphylococcus aureus* multidrug efflux pump MepA. Duke Department of Biochemistry Retreat, Wrightsville Beach, January 2016.
- Newman, CE, Birukou, I, Brennan, RG. The drug binding characteristics of MepR, a repressor of the *Staphylococcus aureus* multidrug efflux pump MepA. Chemistry Summer Fellows Poster Presentation, Duke University, July 2015.
- Newman, CE, Birukou, I, Brennan, RG. Investigating the Structure of Four Toxin-Antitoxin Systems Upregulated in *M. tuberculosis* Persisters. Howard Hughes Poster Presentation, Duke University, July 2013.
- Newman CE, White WD, Newman MF, Mathew JP. Gender and Severity of New York Heart Association Classification at Presentation for Coronary Artery Bypass Surgery. *American Association of Anesthesiology National Meeting*. Abstract A1233, 2011

EXTRACURRICULAR ACTIVITIES AND SERVICE

Cambridge Care Collaborative — Spring 2018- Present

- Assisted in a free clinic at Beth Israel Deaconess Hospital that focused on weight management and urgent care appointments.

Leverett House Non-Resident Tutor, Harvard College — Spring 2017- Present

- Advise undergraduate premedical students on applying to medical school, and write committee recommendation letters for students.

Gates Cambridge Scholars Service Committee — 2016- Present

- Worked with the committee to organize service initiatives and events for scholars.

Duke Global Brigades — August 2012- May 2016

Duke Global Brigades is the campus chapter of the world's largest student led holistic development movement. The purpose is to empower communities to achieve their development goals by sending teams of volunteers to collaborate with the community and foster growth.

- 2012-2013- As a general body member I was part of the fundraising committee that raised over $1,000 for the group. I also traveled to Panama with a Medical Brigade in winter of 2012.
- 2013-2014 – As Medication Procurement Chair I collected more than $12,000 worth of medications and supplies for two brigade missions to Honduras.
- 2014-2015 – As President of Global Medical Brigade I planned a spring brigade to Panama, including collecting medications, fundraising, physician recruitment, and planning seminars to prepare students for the mission.
- 2015-2016 - As Campus Chairperson for Duke Global Brigades, I oversee the Medical, Dental, Business, Public Health, and Engineering divisions. I assist with planning each brigade, and work on recruitment, fundraising, and campus awareness and education.

Durham Veterans Affairs Hospital Volunteer April 2014- May 2016

- Volunteer in the 4B area as a patient greeter for short stay surgery. Greet each patient, show them to their beds, and assist them however possible. Aid the nursing staff in distributing snacks, providing information to patients and families, and assist doctors in locating patients.

FEMMES (Females Excelling More in Math, Engineering and Science) Volunteer January 2014- May 2016

- Prepare and run educational after school activities in Durham Public Schools to encourage elementary school girls to explore STEM fields. Lead a range of activities from computer science to chemistry that are fun and interactive.

Collegiate Athlete Premedical Experience (CAPE) January 2016-Present

- The CAPE program provides young women the opportunity for a unique premedical exposure. Shadow in the neuro-oncology clinic in the Duke Cancer Center and take patients histories before they see physicians. The program also involves biweekly meetings that include a monthly journal club. In the summer of 2016, I participated in a six week shadowing internship, shadowing different physicians at Duke.

Chemistry Teaching Assistant Fall 2015

- Lead a discussion section for the General Chemistry 101 class. Teach students how to approach chemistry problems in order to prepare them to utilize what they are learning in lectures in creative ways. The purpose of the discussion section is to give students the opportunity to engage with the material, present the answers to questions, and learn to apply chemical information.