

MIGUEL A. ALCANTAR

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EDUCATION

- Massachusetts Institute of Technology, Cambridge, MA **2018 – present**
- Ph.D. student in Biological Engineering
- University of California San Diego, La Jolla, CA **2014 – 2018**
- B.S. Bioengineering – Biotechnology, *Summa Cum Laude*

EXPERIENCE

Graduate Research Assistant **Jan. 2019 – present**
Collins lab Massachusetts Institute of Technology

Principal Investigator: Prof. James J. Collins

- Designing computational and experimental tools for engineering synthetic probiotics that aid in the treatment of gut dysbiosis-induced diseases and prevention of gut infection
- Adapted CRISPR-based point-of-care diagnostic for detecting opportunistic pathogens post-organ transplantation and for monitoring organ transplant rejection
- Experimentally validated a computational pipeline for elucidating antibiotic mechanisms of action and adjuvant discovery

Undergraduate Research Assistant **June 2017 – July 2018**
Systems Biology Research Group University of California San Diego

Principal Investigator: Prof. Bernhard O. Palsson

- Developed a kinetic modeling-based computational framework for studying red blood cell metabolic enzyme regulation and associated control parameters, such as adenylate energy charge
- Applied supervised and unsupervised machine learning methods on metabolomics data from red blood cells in storage in order to elucidate underlying drivers of storage lesion

Undergraduate Research Assistant **Jan. 2017 – June 2017**
School of Medicine University of California San Diego

Principal Investigator: Prof. Alon Goren

- Established a UNIX pipeline for chromatin immunoprecipitation sequencing (ChIP-seq) data analysis in order to elucidate the mechanism behind epigenetic memory in eukaryotic cells
- Assisted with general wet-lab work – creating buffers, performing gel electrophoresis, and DNA-extraction – in preparation for ChIP-seq experiments

Research Intern **June 2016 – Aug. 2016**
National Heart, Lung, and Blood Institute National Institutes of Health

Principal Investigator: Dr. Robert J. Lederman

- Characterized the magnetic resonance properties of ferumoxytol for use as a contrast agent in MRI
- Developed and optimized protocols for employing contrast agents during interventional cardiovascular MRI catheterization procedures and patient circulating blood volume determination
- Created various MATLAB scripts for analyzing data obtained from both *in vivo* and *in vitro* MRI scans

General Chemistry Tutor **Oct. 2015 – June 2016**
Office of Academic Support and Instructional Services University of California, San Diego

Supervisor: Danika Garcia

- Worked effectively with small groups of students initially struggling (bottom 10%) with chemistry courses
- Assisted students with solving complex problems and understanding course concepts, ultimately resulting in the vast majority of students passing their course

SKILLS

- Proficient in: MATLAB, Python, R; experience in: Mathematica, Unix

- Experience analyzing various biological data types: 16S sequencing, ChIP-seq, metagenomics, metabolomics, multiplex-ELISA, RNA-seq
- GitHub username: maalcantar
- Experience with various wet-lab techniques: antibiotic assays (e.g., MIC testing), bacterial cell-culture, bacterial cloning, cell-free protein synthesis, DNA- and RNA-extraction, FACS, gel-electrophoresis, PCR

PUBLICATIONS

* Equal contribution

Jacqueline Valeri*, Katherine M. Collins*, Pradeep Ramesh*, **Miguel A. Alcantar**, Bianca A. Lepe, Timothy K. Lu, Diogo M. Camacho. "Sequence-to-function deep learning frameworks for engineered riboregulators". *In review*

Michael M. Kaminski, **Miguel A. Alcantar**, Isadora Lape, Robert Greensmith, Allison C. Huske, Jacqueline A. Valeri, Francisco M. Marty, Verena Klämbt, Jamil Azzi, Enver Akalin, Leonardo V. Riella, and James J. Collins. "A CRISPR-based assay for the detection of opportunistic infections post-transplantation and for the monitoring of transplant rejection". *Nature Biomedical Engineering* (2020).

Jason H. Yang, Sarah N. Wright, Meagan Hamblin, Douglas McCloskey, **Miguel A. Alcantar**, Lars Schrubbers, Allison J. Lopatkin, Sangeeta Satish, Amir Nili, Bernhard O. Palsson, Graham C. Walker, and James J. Collins. "A white-box machine learning approach for revealing antibiotic mechanisms of action". *Cell* (2019).

Rajiv Ramasawmy, Toby Rodgers, **Miguel A. Alcantar**, Delaney R. McGuirt, Jaffar M. Khan, Peter Kellman, Anthony Z. Faranesh, Adrienne E. Campbell-Washburn, Robert J. Lederman, Daniel A. Herzka. "Blood volume measurement using MRI and ferumoxytol: preclinical validation". *Journal of Cardiovascular Magnetic Resonance* (2018).

James T. Yurkovich*, **Miguel A. Alcantar***, Zachary B. Haiman, and Bernhard O. Palsson. "Network-level allosteric effects are elucidated by detailing how ligand-binding events modulate utilization of catalytic potentials." *PLOS Computational Biology* (2018).

CONFERENCES & PRESENTATIONS

Poster presentation: Miguel A. Alcantar, Longlong Si, Haiqing Bai, Melissa Rodas, Diogo M. Camacho, Rachelle Prantil-Baun, James J. Collins, Donald E. Ingber, "Identifying Influenza Biomarkers using Lung-on-Chip Disease Models" MIT Biological Engineering Retreat, Cambridge, MA, USA (October 2019)

Poster presentation: Miguel A. Alcantar, Longlong Si, Haiqing Bai, Melissa Rodas, Diogo M. Camacho, Rachelle Prantil-Baun, James J. Collins, Donald E. Ingber, "Lung-on-Chip Disease Models for Efficacy Testing." 15th Tissue Chip Consortium Meeting, Washington D.C, USA (October 2019)

Oral presentation: Miguel A. Alcantar, James T. Yurkovich, Zachary B. Haiman, and Bernhard O. Palsson, "Network-level allosteric effects are elucidated by detailing how ligand-binding events modulate utilization of catalytic potentials." SACNAS 2018, San Antonio, TX, USA (October 2018)

Oral presentation: Miguel A. Alcantar, James T. Yurkovich, Zachary B. Haiman, and Bernhard O. Palsson, "Allosteric Regulation of Phosphofructokinase in a Kinetic Model of Red Blood Cell Metabolism." Summer Research Conference at UC San Diego, La Jolla, CA, USA (August 2017)

Oral presentation: Miguel A. Alcantar, Elisheva Javasky, Inbal Shamir, Shashi Gandhi, Itamar Simon, and Alon Goren, "Study of the Mitotic Epigenomic Landscape Reveals Regulation of Nucleosome Deposition." 30th Annual UC San Diego Undergraduate Research Conference, La Jolla, CA, USA (April 2017)

Contributed Abstract for presentation: Rajiv Ramasawmy, Miguel A. Alcantar, Jaffar M. Khan, Adrienne E. Campbell-Washburn, Anthony Z. Faranesh, and Robert J. Lederman "Estimation of Circulating Blood Volume using

Ferumoxytol.” Proceedings to the International Society of Magnetic Resonance in Medicine 25th Annual Meeting, Honolulu, HI, USA (April 2017)

Contributed Abstract for presentation: Rajiv Ramasawmy, **Miguel A. Alcantar**, Jaffar M. Khan, Robert J. Lederman, and Anthony Z. Faranesh, “Estimation of Circulating Blood Volume using Ferumoxytol.” 20th Annual SCMR Scientific Sessions, Washington D.C, USA (February 2017)

AWARDS / ACHIEVEMENTS

- National Science Foundation Graduate Research Fellowship **2018**
- Lemelson Presidential Engineering Fellowship **2018**
- University Center for Exemplary Mentoring Fellowship **2018**
- GEM Associate Fellowship **2018**
- Undergraduate Provost’s Honor Roll, every quarter at UC San Diego **2014-2018**
- Genentech Scholar **2017**
- Tau Beta Pi member **2017**
- Gates Millennium Scholarship **2014**
- CEDAR Southern California Scholarship **2014**
- Society of Hispanic Professional Engineers Foundation Scholarship **2014**
- Beach Cities Masonic Lodge Scholarship **2014**

LEADERSHIP

Diversity co-Chair – Biological Engineering Graduate Student Board **Oct. 2018 - present**

- Increase awareness and education about the different groups represented within the department
- Organize diversity panel for biological engineering Ph.D. student interview weekend

Campus Engagement Chair – Tau Beta Pi **June 2017 – Present**

- Collaborate with on-campus organizations in order to create/co-host events that help promote the professional development of Tau Beta Pi members

Co-Campus-Based Leader – Gates Millennium Scholars Association at UCSD **June 2017 – June 2018**

- Encourage the development of caring and supportive relationships among over 50 UC San Diego Gates Scholars by managing events aimed at increasing academic excellence and service to others

Freshmen Liaison – UCSD Gates Millennium Scholars **June 2016 – June 2017**

- Organized events that helped develop academic and professional skillsets of first-year Gates Millennium Scholars at UC San Diego

Student Ambassador - Gates Millennium Scholars **Aug. 2014 – June 2016**

- Created outreach events and maintained communication with Lawndale High School seniors to assist them with writing successful scholarship applications

OUTREACH & COMMITTEES

Graduate student representative for MLK Celebration Planning Committee **July 2020 – present**

- Provide voice in organizing and selecting keynote speaker for the annual MLK celebration at MIT

Judge for 2020 Citywide Boston Science and Engineering Fair **Feb. 2020**

- Served as a judge for scientific presentation from students in the Boston public school system

Judge for Annual Biomedical Research Conference for Minority Students (ABRCMS) **Nov. 2019**

- Served as a judge for various undergraduate student poster presentations at ABRCMS 2019, in the computational and systems biology category

Exhibitor for Annual Biomedical Research Conference for Minority Students (ABRCMS) **Nov. 2019**

- Engaged with and helped recruit students interested in pursuing graduate studies at MIT

STEM career panelist at John D. O’Bryant School of Science and Mathematics **Oct. 2019**

- Discussed STEM career paths and opportunities, with an emphasis on diversity and inclusion

Exhibitor for Cambridge Science Festival **Apr. 2019**

- Designed an facilitated an interactive game called “Bowling over bacteria” in order to educate elementary-school aged children about antibiotic resistance