DAVID W. KASTNER

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Education

Bioengineering	Massachusetts Institute of Technology	Current
B.S. Biophysics	Brigham Young University, Provo, Utah	2019
	GPA **4.0** | Honors | *Summa Cum Laude*, *Valedictorian*	

Honors

Prestigious Awards

National Science Foundation Graduate Research Fellowship (NSF GRFP)	2019
Alfred P. Sloan Award for Exemplary Mentorship (UCEM)	2019
National President's Volunteer Service Award	2018
Lieutenant Governor's Community Service Award	2018
National Barry Goldwater Scholarship	2017
National American Chemical Society Scholars Award (ACS)	2017
National Merck Pharmaceuticals Scholarship	2017
Simmons Center for Cancer Research Fellowship (SCCR)	2017

Noteworthy Awards

Vice Chancellor's Inclusive Excellence Fellowship	2020
Tolero Pharmaceuticals Fellowship	2018
National Hispanic Fund Scholarship (HSF)	2018
Inspired Learning University Fellowship	2018
Phi Kappa Phi National Honors Society 2018 Outstanding Student Award	2018
Karl G. Maeser Scholarship	2018
Elva Pederson Jorgenson Award	2018
University Undergraduate Research Award (URA)	2018
Full-Ride Merit-Based Scholarship	2017
Eagle Scout Award (Boy Scouts of America)	2008

Research/Professional Experience

Huntsman Cancer Institute (HCI) – *Salt Lake City, UT* Dec 2018 – Aug 2020

Mentor: Dr. Trudy Oliver

Project Title: *The Role of the Tumor Microenvironment in Small Cell Lung Cancer*

Description: Used genetically engineered mouse models to study development and treatment options for small cell, adenocarcinoma, and squamous lung cancer. The scope of my research was to better understand the molecular underpinnings of lung cancer and develop novel treatment options and resulted in two publications.

National Institutes of Health (NIH) – *Bethesda, MD* Jul 2018– Sept 2018

Mentor: Dr. Nico Tjandra

Project Title: *Identification and Characterization of Humanin-Bax Fibril Formation*

Description: Investigated peptide fibril formation implicated in apoptosis. The project made extensive use of electron microscopy, fluorescence, and light scattering techniques to characterize the dynamic properties of Bax and its ability to catalyze the fibrillation of an endogenous peptide.

Dana-Farber/Harvard Cancer Center (DFCI/HCC) – *Boston, MA* Apr 2018– Jul 2018

Mentor: Dr. Haribabu Arthanari

Project Title: *The Complete Profile of Isotopically Labeled Proteins from Pyruvate Precursors*

Description: Investigated novel methods of isotopically labeling proteins using techniques that leverage pyruvate metabolism. The internship used techniques such as cell culture, protein extraction and preparation, NMR procedures and theory, and data processing.

Adaptive Braces, LLC. – *Provo, UT* Aug 2016 – Dec 2020

Position: Founder
Website: www.adaptivebraces.com
Description: I started Adaptive Braces to pursue my interest in engineering and structural design using 3D printing. My main product is a 3D printed CMC joint that leverages the Voronoi pattern seen in nature, The 2020 Annual Report showcases the newest medical device as well as its applications and market.

Simmons Center for Cancer Research (SCCR) – *Salt Lake City, UT* May 2016 – Apr 2018

Mentor: Dr. Steven Castle

Project Title: *Bulky Dehydroamino Acids Enhance Proteolytic Stability and Folding in β-Hairpins*

Description: Over the course of a two-year prestigious fellowship with the SCCR, I researched complex bioactive products and peptides through synthesis and computational modeling. I engineered several anticancer peptides that will be tested in a long-term collaboration with Bristol-Myer Squibb.

Cellular Biology Teaching Assistant – *Provo, UT* Jan 2017 – May 2017

Position: Teaching Assistant
Website: http://lifesciences.byu.edu/
Description: While working as a teaching assistant in an advanced Cell Biology course, I gained a strong understanding of cellular structures and processes. In addition to serving as a valuable opportunity to master the material, it also served as a valuable teaching experience.

Computational and Synthetic Chemistry Researcher – *Provo, UT* Aug 2014 – Aug 2017

Mentor: Dr. Steven Castle

Project Title: *Progress Toward Synthetically Simplified Natural Anticancer Peptides*

Description: Synthesized non-standard amino acids and small peptides and predicted their structures using NMR and quantum mechanics DFT calculations. My research focused on using reaction coordinates and energies of formation to predict chemical properties and reaction pathways.

Humanitarian Missionary – *Osorno, Southern Chile* Apr 2012 – Apr 2014

Position: Full-time Humanitarian Volunteer
Supervisor: John Rappleye
Description: As a fluent bilingual American of Latino heritage, the Spanish language and history have been defining factors in the development of my identity. Consequently, I chose to serve as a full-time non-paid volunteer in Southern Chile. I volunteered in more than 20 cities in the Osorno region over a two-year period (over 40 hours a week). It was a pivotal event in teaching me about diversity.

Publications

Peer-reviewed Publications

1. Ireland, A.S.; Micinski, A.M.; Kastner, D.W.; Guo, B.; Wait, S.J.; Spainhower, K.B.; Conley, C.C.; Chen, O.S.; Guthrie, M.R.; Soltero, D.; Qiao, Y.; Huang, X.; Tarapcsak, S.; Devarakonda, S.; Chalishazar, M.D.; Gertz, J.; Moser, J.C.; Marth, G.; Puri, S.; Witt, B.L.; Spike, B.T.; Oliver, T.G. MYC Drives Temporal Evolution of Small Cell Lung Cancer Suntypes by Reprogramming Neuroendocrine Fate. *Cancer Cell* **2020**, *1* (38), 60-78. DOI: 10.1016/j.ccell.2020.05.001.

2. Joaquin, D.; Lee, M. A.; Kastner, D. W.; Singh, J.; Morrill, S. T.; Damstedt, G.; Castle, S. L. Impact of Dehydroamino Acids on the Structure and Stability of Incipient 3_{10}-Helical Peptides. *The Journal of Organic Chemistry* **2020**, *3* (85), 1601-1613. DOI: 10.1021/acs.joc.9b02747

3. Morris, D.L.; Kastner, D.W.; Johnson, S.; Strub, M.; He, Y.; Bleck, C.K.; Lee, D.; Tjandra, N.; Humanin induces conformational changes in the apoptosis regulator BAX and sequesters it into fibers, preventing mitochondrial outer-membrane permeabilization. *Journal of Biological Chemistry* **2019**, *50* (294), 19055-19065. DOI: 10.1074/jbc.ra119.0112977

4. Kastner, D.W. Computational Modelling of Peptides Containing Non-Standard Amino Acids *Undergraduate Honors Thesis* **2019**. *Theses*. 61. ISSN: 2572-4479

5. Kastner, D.W. The Ultimate Triumph of Truth. *Brigham Young University Commencement*, **2019**. URL: speeches.byu.edu

6. Ashraf, N.M., Krishnagopal, A., Hussain, A,. Kastner, D.W., Sayed, A.M., Mol Y.K., Swaminathan. K., Zeeshan, N. Engineering of serine protease for improved thermostability and catalytic activity using rational design. *International Journal of Biological Macromolecules* **2018,** 126, 229-236. DOI: 10.1016/j.ijbiomac.2018.12.218

7. Kastner, D.W.; Castle, S.L. *ONIOM(DFT:MM) study of yaku'amide A and analogues;* ORCA Report. *Journal of Undergraduate Research (JUR)*: Provo, **2018**. URL: jur.byu.edu

8. Jalan, A.; Kastner, D.W.; Webber, K.G. I.; Smith, M.S.; Price, J.L.; Castle, S.L. Bulky dehydroamino acids enhance proteolytic stability and folding in β-hairpin peptides. *Organic Letters* **2017**, *19* (19), 5190-5193. DOI: 10.1021/acs.orglett.7b02455

9. Ashraf, N.M.; Imran, K.; Kastner, D.W.; Ikram, K.; Mushtaq, A.; Hussain, A.; Zeeshan, N. Potential involvement of mi-RNA 574-3p in progression of prostate cancer: A bioinformatic study. *Molecular and Cellular Probes* **2017**, *36,* 21-28. DOI: 10.1016/j.mcp.2017.07.002

Manuscripts in Progress

1. Olsen, R.; Kastner, D.; Ireland, A.; Oliver, T. Loss of ASCL1 induces latent osteogenic program (manuscript in preparation at the Huntsman Cancer Institute).

2. Lo, C.; Joaquin, D.; Moyá, D.; Ramos, A.; Kastner, D.; White, S.; Christensen, B.; Castle, S. Synthesis and evaluation of potent yaku'amide A analogs (manuscript in preparation at Brigham Young University).

3. Dubey, A.; Kastner, D.; Arthanari, H. The complete profiling of isotopically labeled proteins from pyruvate precursors. (manuscript in preparation at Dana-Farber).

Grants

1. ONIOM(DFT:MM) Study of Yaku'amide A and Analogues. *Office of Research and Creative Activities (ORCA)*. Provo, **2018**.

Conference and Poster Presentations

1. Kastner, D. W.; Jalan, A.; Castle, S. L. Conformational ensemble calculations of proteolytically stable β-hairpins containing bulky α,β-dehydroamino acids. *American Chemical Society 254th National Meeting*, Washington D.C., **2017**.

2. Kastner, David W.; and Castle, Steven L., Progress toward synthetically simplified natural anticancer peptide (2018). *Library Undergraduate Poster Competition* **2018**, *5*. ISSN: 2572-4479

3. Kastner, D. W.; Castle, S. L. Computational predictions β-hairpins containing bulky dehydroamino acids. *Scholars Archive* **2017**, *4*. ISSN: 2572-4479

4. Kastner, D. W.; Lo, C. C. L.; Castle, S. L. Progress towards a synthetically simplified anticancer peptide. *Student Research Conference (SRC)*, Provo, **2018**.

5. Jalan, A.; Kastner, D. W.; Castle, S. L. QM/MM analysis of proteolytically stable β-hairpins. *Student Research Conference (SRC)*, Provo, **2017**.

6. Kastner, D.; Castle, S. L. ONIOM geometry optimization of bulky dehydroamino acids in β-hairpins. *IEEE Poster Session*, Provo, **2017**.

Skills and Specializations

Dry Lab

- Scientific Artwork
- pyRosetta
- QM/MM
- CHARMM
- Gaussian
- Molecular Visualization
- Supercomputing

Wet Lab

- NMR imaging and processing
- Cell culture and protein sample prep
- Immunohistochemistry (IHC)
- Electron microscopy (TEM)
- Light microscopy
- Organic synthesis
- PCR

Languages

Spanish, Python, Unix, and R

Societal and Honors Affiliations

National Scientific Research Honor Society Sigma Xi	2019
Association of Clinical Research Professionals (ACRP)	2018
Biophysical Society (BPS)	2017
American Chemical Society (ACS)	2017
National Spanish Speaker Honor Society (SDP)	2017
Biomedical Engineering Society (BMES)	2016
National Honor Society Phi Kappa Phi (PKP - Council Member)	2016
International Honor Society Golden Key (GKHS)	2016

Relevant Coursework

Physiology • Biophysics (PDBIO 568)	Grade: A (4.0)
Physiology • Advanced Physiology (PDBIO 362)	Grade: A (4.0)
Biology • Cell Biology (BIO 360)	Grade: A (4.0)
Biology • Computational Biology (BIO 362)	Grade: A (4.0)

Chemistry • Biophysical Chemistry (CHEM 468)	Grade: A (4.0)
Chemistry • Organic Chemistry (CHEM 351 & 352)	Grade: A (4.0)
Chemistry • Biochemistry (CHEM 481)	Grade: A (4.0)
Physics • Molecular Dynamics (PDBIO 550R)	Grade: A (4.0)
Physics • Electricity and Magnetism (PHSCS 220)	Grade: A (4.0)
Physics • Newtonian and Modern Physics (PHSCS 121 & 123)	Grade: A (4.0)
Mathematics • Differential and Integral Calculus (MATH 112 & 113)	Grade: A (4.0)