

# Drake C. Jensen

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## EDUCATION

### Washington University School of Medicine

*PhD in Computational & Molecular Biophysics*

*Thesis Title:* Fluorescent-based approaches for quantifying bacterial transcription initiation kinetics

*Advisor:* Eric Galburt, PhD.

GPA: 3.45/4.00

**St. Louis, MO**

*April 2023*

### Southern Illinois University Edwardsville

*Master of Science in Chemistry (Biochemistry focus)*

*Thesis Title:* Functional Analysis of Calmodulin's Calcium Dependent Inactivation of Orai1

*Advisor:* Chin-Chuan Wei, PhD.

GPA: 3.89/4.00

**Edwardsville, IL**

*May 2015*

### Southern Illinois University Edwardsville

*Bachelor of Arts in Chemistry*

*Bachelor of Science in Biology (Genetics and Cellular Biology focus)*

GPA: 3.92/4.00

**Edwardsville, IL**

*May 2013*

*May 2013*

### Rock Valley College

*Associates of Science*

GPA: 3.84/4.00

**Rockford, IL**

*May 2010*

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## RESEARCH

### Washington University School of Medicine, Andrea Soranno, Ph.D.

*Postdoctoral Researcher*

- Monitored basal and transcription-factor-regulated transcription kinetics for different sigma-factor containing RNA polymerase holoenzymes.
- Advanced protocols for purification of RNA polymerase and sigma-factors.
- Evaluated conformational dynamics of various proteins required for transcription initiation.
- *Techniques employed:* single molecule FRET and FCS

**St. Louis, MO**

*May 2023–present*

### Washington University School of Medicine, Eric Galburt, Ph.D.

*Graduate Research Assistant*

- Elucidated mechanisms of promoter-specific gene regulation in *Mycobacterium tuberculosis*.
- Developed real-time fluorescent methods for detection of initial transcribing intermediate and steady-state rate analyses of full-length RNA synthesis.
- *Techniques employed:* stopped-flow kinetics, equilibrium anisotropy titrations, steady-state kinetics, Analytical Ultracentrifugation (AUC)

**St. Louis, MO**

*August 2015–April 2023*

### Southern Illinois University Edwardsville, Chin-Chuan Wei, Ph.D.

*Undergraduate/Graduate Research Assistant / Lab Manager*

- Involved in projects aiming to determine the molecular mechanism of important signaling molecules including Nitric Oxide Synthase (NOS), NADPH Oxidase (NOX), Dual Oxidase (DUOX)

**Edwardsville, IL**

*March 2012–August 2015*

and Calmodulin (CaM) and their roles in calcium signaling, programmed cell-death (apoptosis) and reactive oxygen species (ROS) production.

- Instructed and oversaw eight undergrads and four M.S. students' research.
- *Techniques employed:* Circular Dichroism (CD), Differential Scanning Calorimetry (DSC), Isothermal Titration Calorimetry (ITC), steady-state and lifetime fluorescence, and stopped-flow kinetics.

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## TEACHING

### Washington University School of Medicine

St. Louis, MO

Graduate Teaching Assistant

Fall 2016

- Taught Laboratory on DNA Manipulation where students cloned, expressed and purified proteins involved in the Cytochrome C biogenesis pathway.
- Instructed laboratory techniques on western blotting and heme staining.

Lecturer

Spring 2022 and 2023

- Gave lecture on single-molecule force spectroscopy applications to study molecular motors for Molecular Biology at the Cutting Edge course.

### Southern Illinois University Edwardsville

Edwardsville, IL

Graduate Teaching Assistant / Instructor

January 2013-May 2015

- Taught General Chemistry (Semester I), Physical Chemistry (Semester I), and Biochemistry labs.
- Instructed advanced laboratory techniques such as Isothermal Titration Calorimetry, Differential Scanning Calorimetry, enzyme kinetics, PCR/restriction enzyme digests, protein expression, and protein purification via FPLC.
- Assisted in conceiving and writing two novel Isothermal Titration Calorimetry experiments (see publications) to be used successively in the physical and biochemistry labs.

### Rock Valley College

Rockford, IL

Undergraduate Teaching Assistant / Student Tutor

August 2009-August 2010, Summer 2011

- Taught General Physics (Semester I). Led recitation sessions and sample problem discussions.
- College Reading & Learning Association (CRLA) Level II advanced certified tutor. Aided students in general chemistry, general biology, physics, and calculus courses.

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## PUBLICATIONS

### Research Articles

\*corresponding author(s), +co-first authors

1. **Jensen, D.**<sup>+</sup>; Ruiz Manzano, A.<sup>+</sup>; Rector, M.; Tomko, E. J.; Record, M. T.; Galburt, E. A.\* “High-throughput, fluorescent-aptamer-based measurements of steady-state transcription rates for the *Mycobacterium tuberculosis* RNA polymerase.” *Nucleic Acids Res.* 51(19), e99; **2023**. [Link to Article](#)
2. Chadda, A.; **Jensen, D.**; Tomko, E. J.; Ruiz Manzano, A.; Nguyen, B.; Lohman, Galburt, E. A.\* “*Mycobacterium tuberculosis* DNA repair helicase UvrD1 is activated by redox-dependent dimerization via a 2B domain cysteine.” *PNAS.* 119(8), e2114501119; **2022**. [Link to Article](#)
3. Prusa, J.; Zhu, D. X.; Flynn, A. J.; **Jensen, D.**; Ruiz Manzano, A.; Galburt, E. A.; Stallings, C. L.\* “Molecular dissection of RbpA-mediated regulation of fidaxomicin sensitivity in mycobacteria.” *J. Biol. Chem.* 298(4), **2022**. [Link to Article](#)

4. **Jensen, D.**; Ruiz Manzano, A.; Rammohan, J.; Stallings, C. L.; Galburt, E. A.\* “CarD and RbpA modify the kinetics of initial transcription and slow promoter escape of the *Mycobacterium tuberculosis* RNA polymerase.” *Nucleic Acids Res.* 47(13), 6685-6698; **2019**. [Link to Article](#)
5. Prusa, J.; **Jensen, D.**; Santiago-Collazo, G.; Pope, S. S.; Garner, A. L.; Miller, J. J.; Ruiz Manzano, A.; Galburt, E. A.; Stallings, C. L.\* “Domains within RbpA Serve Specific Functional Roles that Regulate the Expression of Distinct Mycobacterial Gene Subsets.” *J. Bacteriol.* 200(13), e00690-17; **2018**. [Link to Article](#)
6. Garner, A. L.; Rammohan, J.; Huynh, J. P.; Onder, L. M.; Chen, J.; Bae, B.; **Jensen, D.**; Weiss, L. A.; Ruiz Manzano, A.; Darst, S. A.; Campbell, E. A.; Nickels, B. E.; Galburt, E. A.; Stallings, C. L.\* “Effects of Increasing the Affinity of CarD for RNA Polymerase on *Mycobacterium tuberculosis* Growth, rRNA Transcription, and Virulence.” *J. Bacteriol.* 199(4), e00698-16; **2017**. [Link to Article](#)
7. O'Brien, L. C.\*; Hannah, R. B.; Wei, C.-C.; **Jensen, D.**; Shabestary, N.; DeMeo, C.; Eder, D. J. “EDTA:Mn<sup>2+</sup>-Binding Affinities: A Modern Experiment in Thermodynamics for the Physical Chemistry Laboratory.” *J. Chem. Educ.* 92(9), 1547-51; **2015**. [Link to Article](#)
8. Wei, C.-C.\*; **Jensen, D.**; Boyle, T.; O'Brien, L. C.; DeMeo, C.; Shabestary, N.; Eder, D. J. “Isothermal Titration Calorimetry and Macromolecular Visualization for the Interaction of Lysozyme and its Inhibitors.” *J. Chem. Educ.* 92(9), 1552-1556; **2015**. [Link to Article](#)
9. **Jensen, D.**; Reynolds, N.; Yang, Y.-P.; Shakya, S.; Wang, Z.-Q.; Stuehr, D. J.; Wei, C.-C.\* “The Exchanged EF-hands in Calmodulin and Troponin C Chimeras Alter the Induced Hydrophobicity and Impair the Interaction with Orai1: A Spectroscopic, Thermodynamic and Kinetic Study.” *BMC Biochemistry.* 16(6); **2015**. [Link to Article](#)

### Reviews & Book Chapters

\*corresponding author(s)

10. **Jensen, D.**; Galburt, E. A.\* “The Context-Dependent Influence of Promoter Sequence Motifs on Transcription Initiation Kinetics and Regulation.” *J. Bacteriol.*; 203(8), e00512-20; **2021**. Selected as “New and Notable.” [Link to Article](#)
11. Wang, Z.-Q.; Stuehr, D. J.\*; Wei, C.-C.\*; **Jensen, D.** “Calcium Signaling: NO Synthase.” *Encyclopedia Biol. Chem.* 3<sup>rd</sup> Ed. 6, 602-608; **2021**. [Link to Article](#)

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## **PRESENTATIONS**

### Talks

- “Mechanisms of sigma-factor-dependent transcriptional control in *Mycobacterium tuberculosis*.” WUSM Department of Biochemistry & Molecular Biophysics Seed Grant Award Symposium. St. Louis MO, 2023.
- “Mechanisms of sigma-factor-dependent regulation of ribosomal RNA transcription.” WUSM Department of Biochemistry & Molecular Biophysics Rising Star Symposium. St. Louis MO, 2022.
- “Fluorescent-based approaches for measuring transcription kinetics.” SIUE Department of Chemistry Seminar Series. Edwardsville IL, 2022.
- “Quasi-high-throughput *in vitro* measurements of steady-state transcript flux.” WUSM Department of Biochemistry & Molecular Biophysics Science Fridays. St. Louis MO, 2022.
- “Steady-state kinetic analysis of transcription.” WUSM Department of Biochemistry & Molecular Biophysics Science Fridays. St. Louis MO, 2021.

- “The A’s and B’s of mycobacterial transcription initiation.” **WUSM Department of Biochemistry & Molecular Biophysics Science Fridays. St. Louis MO, 2020.**
- “Mechanisms of transcription repression in *Mycobacterium tuberculosis*.” **WUSM Department of Biochemistry & Molecular Biophysics Elliot Elson Fellowship Seminar. St. Louis MO, 2019.**
- “*Mycobacterium tuberculosis* CarD and RbpA: transcriptional repressors.” **WUSM Biochemistry, Biophysics & Structural Biology Program Retreat. Potosi MO, 2018.**
- “Kinetic regulation of mycobacterial transcription.” **WUSM Department of Biochemistry & Molecular Biophysics Science Fridays. St. Louis MO, 2018.**

**Posters**      only external conferences and presenting author are included

- “A real-time fluorescence-based readout for quantitative *in vitro* measurements of steady-state transcript flux.” **Biophysical Society Meeting. San Francisco CA, 2022.**
- “CarD and RbpA slow the kinetics of *Mycobacterium tuberculosis* RNA polymerase promoter escape.” **Gibbs Conference on Biothermodynamics. Carbondale IL, 2019 and Gordon Research Conference: Mechanisms of Microbial Transcription. Lewiston ME, 2019.**
- “Regulation of mycobacterial RNA Polymerase promoter escape kinetics by transcription factors CarD and RbpA.” **Biophysical Society Meeting. Baltimore MD, 2019.**
- For additional poster abstracts published online, [see here](#)

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## **LEADERSHIP & OUTREACH**

- **Session Moderator** for the following meetings
  - WUSM Department of Biochemistry & Molecular Biophysics Retreat (2022)
  - Annual Gibbs Conference on Biothermodynamics (Virtual, 2020)
  - WUSM Biochemistry, Biophysics, & Structural Biology Program Retreat (2019)
- **WUSM Department of Biochemistry & Molecular Biophysics Survey Committee (2019-2021)**
  - Assisted in creating an annual survey to gather information on areas of satisfaction and need for improvement in department.
  - Aided in analyzing and presenting survey results for department.
- **WUSM Department of Biochemistry & Molecular Biophysics Liaison Committee (2016-2020)**
  - Served as committee chair for 1 year – oversaw semi-annual meetings with the committee and department chair.
  - Organized Biochemistry, Biophysics, & Structural Biology program welcome events for incoming students.
  - Assigned student mentors and individually mentored second year graduate students through qualification exam process. Additionally, scheduled qualifying exam practice talks and question and answer sessions.
  - Served on a mock qualifying exam panel (2021).
- **WUSM Department of Biochemistry & Molecular Biophysics Summer Outreach Program (2022-present)**
  - Mentored an undergraduate student in research and data analysis for the three-month program (2022).
  - Served on selection committee (2024).

- *WUSM Department of Biochemistry & Molecular Biophysics DEI Committee (2022-present)*
  - Gave talk at SIUE Chemistry grad student seminar series on reasons to explore further graduate studies and tips for the application process (2022).

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## **AFFILIATIONS**

- Biophysical Society (2019-present)
- American Society for Biochemistry and Molecular Biology (2014-2015)
- American Chemical Society (2013-2015)
- Phi Kappa Phi (2012-2015)
- Undergraduate Research and Creative Activities (URCA) Associate (2012-2013)
- Phi Theta Kappa (2009-2011)

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## **AWARDS**

- WUSM Department of Biochemistry & Molecular Biophysics professional development grant award recipient (2023)
- WUSM Department of Biochemistry & Molecular Biophysics Rising Star Award (2022)
- WUSM Department of Biochemistry & Molecular Biophysics seed grant award recipient (2022)
- WUSM Biochemistry, Biophysics, & Structural Biology Retreat Poster Presentation Award (2019)
- Washington University Center for Cellular Imaging and Institute of Clinical and Translational Sciences seed grant award recipient (2019-2020)
- Biophysical Society Annual Meeting Graduate Travel Award (2019)
- WUSM Department of Biochemistry & Molecular Biophysics Elliot L. Elson Education and Training Award (2017-2018)
- WUSM Department of Biochemistry & Molecular Biophysics Gary K. Ackers Fellow (2016-2017)
- SIUE Outstanding Graduate Thesis Award (2015)
- SIUE Thomas D. Bouman Memorial Graduate Research Scholar Award (April 2015)
- Outstanding Graduate Student in the Department of Chemistry Award (2014-2015)
- Department of Chemistry Graduate Research Award (2013-2014)
- SIUE Graduate School Student Research Symposium Presentation Award (April 2014)
- Research Grants for Graduate Students (RGGS) (Fall 2013)
- SIUE Thomas D. Bouman Memorial Undergraduate Research Scholar Award (April 2013)
- Outstanding Senior Assignment in the Department of Chemistry (2012-2013)
- Outstanding Senior Student in the Department of Chemistry Award (2012-2013)
- Physical Science Outstanding Performance Student Award (2009-2010)
- Department of Composition and Literature Writing Recognition Award (Fall 2008, Spring 2009)