

William M. Rosencrans, PhD

Postdoctoral Fellow, National Institute of Neurological Disorders and Stroke, NIH · Bethesda, MD
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EDUCATION

- Doctor of Philosophy (PhD), Biochemistry and Molecular Biophysics** June 2025
California Institute of Technology (Caltech), Pasadena, CA
Thesis: Mechanisms of Pharmacological and Cellular Regulators of Mitophagy
Advisers: Tsui-Fen Chou, David C. Chan, and Richard J. Youle
- Bachelor of Arts, Physics with Honors, minor in Biology** May 2019
Colgate University, Hamilton, NY
- Exchange Student**, National University of Singapore, Singapore May–December 2017

POSITIONS

- 2025–present **NIH IRTA Postdoctoral Fellow**, NINDS, Bethesda, MD · Adviser: Richard Youle
- 2020–2025 **NIH IRTA Graduate Researcher**, Caltech, Pasadena, CA · Advisers: David Chan, Tsui-Fen Chou, Richard Youle
- 2019–2020 **NIH IRTA Post-Baccalaureate Fellow**, NICHD, Bethesda, MD · Advisers: Sergey Bezrukov, Tatiana Rostovtseva
- 2017 **Visiting Undergraduate Researcher**, National University of Singapore · Adviser: Johan van der Maarel
- 2015–2019 **Undergraduate Research Assistant**, Colgate University, Hamilton, NY · Adviser: Engda Hagos
- 2013–2015 **High School Research Assistant**, Long Island University, Brookville, NY · Adviser: Theodore Brummel

RESEARCH EXPERIENCE

- Center for Alzheimer's and Related Dementias (CARD), NINDS, NIH** June 2021–present
PI: Richard J. Youle, PhD

- Proposed and lead a small-molecule drug discovery program to develop autophagy-targeting chimeras (AutoTACs)
- Lead a team of technicians, PhD students, postdocs, and contract research organizations (CROs)
- Ran several drug discovery campaigns, including virtual, DNA-encoded library, and biophysical screens
- Carried out a hit-to-lead study identifying the first ligands to our protein target
- Solved the first crystal structures of our target bound to small-molecule ligands
- Developed sub-micromolar ligands to the autophagy initiation complex capable of rewiring autophagy
- Discovered that the autophagy machinery is co-opted to shut down innate immune signaling by delivering STING from the Golgi to the lysosome

- Division of Biology and Biological Engineering, Caltech** September 2020–June 2025
PIs: Tsui-Fen Chou, PhD, and David C. Chan, MD, PhD

- Characterized the mechanism of action of two clinical-stage mitophagy-activating small molecules, identifying a conserved pathway leading to mitophagy activation and off-target toxicity (*Science Advances*, 2025)
- Discovered and biophysically characterized the lipid-tethering properties of the autophagy scaffold protein FIP200
- Developed and characterized a fluorescent sensor for lysosome–mitochondria contact sites
- Developed a mass-spectrometry method to identify proteins trafficking between organelles within the same cell
- Used X-ray crystallography and protein NMR to determine compound binding sites

- Section on Molecular Transport, Eunice Kennedy Shriver NICHD, NIH** June 2019–August 2020
Post-Baccalaureate Researcher (IRTA) · PI: Sergey M. Bezrukov, PhD

- Characterized the channel properties of the voltage-dependent anion channel 2 (VDAC2) and its interaction with the pathogenic protein α -synuclein

- Assessed the calcium transport properties of VDAC isoforms, mutants, and complexes
- Determined the effect of the novel anti-arrhythmic compound efsevin on VDAC2 channel function

Section on Molecular Transport, Eunice Kennedy Shriver NICHD, NIH

May–December 2018

Special Volunteer · PI: Sergey M. Bezrukov, PhD

- Investigated the effects of potential therapeutic compounds and peptides on mitochondrial membrane and channel function
- Assessed how the neuroprotective drug olesoxime modifies VDAC function and its interaction with α -synuclein in the context of Parkinson's disease
- Performed single-molecule electrophysiology, synthetic bilayer preparation, membrane channel reconstitution, and bilayer overtone analysis
- Developed statistical-physics-based modeling and data analysis pipelines for single-channel experiments

Lab of Cancer Biology, Department of Biology, Colgate University

Fall 2015–Spring 2019

Lab Assistant · PI: Engda G. Hagos, PhD

- Investigated and published on the role of the transcription factor KLF4 in mitochondrial health and mitophagy
- Initiated and led a new project on the role of KLF4 in metabolic reprogramming
- Trained and mentored students in western blotting, tissue culture, transfection, RT-qPCR, ChIP, and immunofluorescence and confocal microscopy
- Led the lab during the PI's sabbatical, including setting research direction, grant writing, budgeting, ordering, and lab maintenance

Lab of Biopolymer Physics, National University of Singapore

May–December 2017

Undergraduate Researcher · PI: Johan R. C. van der Maarel, PhD

- Investigated the physics of recombinant megabase-sized chromatin confined to nanochannels
- Performed single-molecule fluorescence imaging, nanochannel fabrication, and atomic force microscopy of biological samples
- Developed polymer-physics models to interpret experimental data, using MATLAB for video processing and analysis

Lab of Experimental Optics, Department of Physics, Colgate University

October 2016–May 2017

Lab Assistant · PI: Enrique J. Galvez, PhD

- Tested for a proposed discriminatory force exerted by photons on chiral molecules
- Set up and aligned optical paths, interferometers, and lasers
- Worked on a method to visualize the fluorescence rotation of chiral carbon nanotubes

Lab of Molecular Genetics, Department of Biology, Long Island University

October 2013–January 2016

High School Research Assistant · PI: Theodore Brummel, PhD

- Used stable-isotope mass spectrometry to detect changes in mTOR signaling and autophagy
- Performed *Drosophila* culture, protein extraction, western blotting, and lifespan assays; maintained fly stocks and co-wrote grants for the lab

HONORS AND AWARDS

5050 Fellow, Fifty Years (Cohort 8)

March 2026

Selected for a program that trains scientists to translate their research into companies

Student Bioenergeticist Award, Biophysical Society

Winter 2023

Awarded for contributions to the field of mitochondrial biophysics

Jacobs Translational Medicine Fellowship, Caltech

Spring 2020

Awarded to a select group of matriculating graduate students broadly interested in translational biomedical research

NSF Graduate Research Fellowship Program, Honorable Mention

Spring 2020 and 2021

National award recognizing potential in scientific research

NIH Oxford-Cambridge Scholars Program, NIH (declined)

Spring 2020

Selected from a national cohort to pursue a collaborative PhD between Oxford/Cambridge (UK) and the NIH

Dean's List with Distinction, Colgate University Awarded to students with a GPA of 3.6 or higher	6 semesters
J. Amato and A. Aveni Award, Colgate University Awarded to a student who demonstrates undergraduate success and potential in physics research	Spring 2019
Poster Presentation Meritorious Honors, American Association for Cancer Research Awarded to the top 10 undergraduate poster presenters at the AACR Annual Meeting	Spring 2019
Biophysical Society Travel Award Travel funding to present first-author research at the Biophysical Society Annual Meeting	Winter 2019
Post-Baccalaureate Intramural Research Training Award, NIH Selected from a competitive pool of applicants to fund 1–2 years of pre-graduate research at the NIH	Fall 2018
Michael J. Wolk '60 Heart Foundation Summer Fellowship, Colgate University Competitive funding to support biomedical summer research	Summer 2018
Alice Griswold Award, Al Kalfus Long Island Math Fair Highest award, for the best paper presented at the fair	Spring 2014

PEER-REVIEWED PUBLICATIONS

1. Rajendran M*, **Rosencrans WM***, Bautista NA, Fitzgerald W, Huynh D, Beyene BG, Quan B, Petersen JD, Hwang J, Chou TF, Bezrukov SM, Rostovtseva TK. (2026). Three mammalian VDAC isoforms distinctly regulate mitochondrial function and proteome to maintain cell metabolism. *Journal of Biological Chemistry* 302(1), 111009. doi:10.1016/j.jbc.2025.111009 *Equal contribution.
2. **Rosencrans WM**, Lee RW, McGraw L, Horsburgh I, Wang TY, Quan B, Huynh D, Johnston JA, Chan DC, Chou TF. (2025). Putative PINK1/Parkin activators lower the threshold for mitophagy by sensitizing cells to mitochondrial stress. *Science Advances* 11(35), eady0240. doi:10.1126/sciadv.ady0240
3. **Rosencrans WM**, Khuntia H, Ghahari Larimi M, Mahalakshmi R, Yu TY, Bezrukov SM, Rostovtseva TK. (2025). Conformational plasticity of mitochondrial VDAC2 controls the kinetics of its interaction with cytosolic proteins. *Science Advances* 11(17), eadv4410. doi:10.1126/sciadv.adv4410
4. Rostovtseva TK, Weinrich M, Jacobs D, **Rosencrans WM**, Bezrukov SM. (2024). Dimeric Tubulin Modifies Mechanical Properties of Lipid Bilayer, as Probed Using Gramicidin A Channel. *International Journal of Molecular Sciences* 25(4), 2204. doi:10.3390/ijms25042204
5. **Rosencrans WM**, Chan DC. (2023). Fusion activators enhance mitochondrial function. *Mitochondrial Communications* 1, 33-34. doi:10.1016/j.mitoco.2023.03.001
6. Le Guerroué F, Bunker EN, **Rosencrans WM**, Nguyen JT, Basar MA, Werner A, Chou TF, Wang C, Youle RJ. (2023). TNIP1 inhibits selective autophagy via bipartite interaction with LC3/GABARAP and TAX1BP1. *Molecular Cell* 83(6), 927-941.e8. doi:10.1016/j.molcel.2023.02.023
7. Rajendran M, Queralt-Martín M, Gurnev PA, **Rosencrans WM**, Rovini A, Jacobs D, Abrantes K, Hoogerheide DP, Bezrukov SM, Rostovtseva TK. (2022). Restricting α -synuclein transport into mitochondria by inhibition of α -synuclein-VDAC complexation as a potential therapeutic target for Parkinson's disease treatment. *Cellular and Molecular Life Sciences* 79(7), 368. doi:10.1007/s00018-022-04389-w
8. Wang F, Li S, **Rosencrans WM**, Cheng KW, Stott GM, Mroczkowski B, Chou TF. (2022). Sulforaphane is Synergistic with CB-5083 and Inhibits Colony Formation of CB-5083-Resistant HCT116 Cells. *ChemMedChem* 17(11), e202200030. doi:10.1002/cmdc.202200030
9. Wang F, Li S, Cheng KW, **Rosencrans WM**, Chou TF. (2022). The p97 Inhibitor UPCDC-30245 Blocks Endo-Lysosomal Degradation. *Pharmaceuticals* 15(2), 204. doi:10.3390/ph15020204
10. **Rosencrans WM**, Aguilera VM, Rostovtseva TK, Bezrukov SM. (2021). α -Synuclein emerges as a potent regulator of VDAC-facilitated calcium transport. *Cell Calcium* 95, 102355. doi:10.1016/j.ceca.2021.102355
11. **Rosencrans WM**, Rajendran M, Bezrukov SM, Rostovtseva TK. (2021). VDAC regulation of mitochondrial calcium flux: From channel biophysics to disease. *Cell Calcium* 94, 102356. doi:10.1016/j.ceca.2021.102356

12. Basak R, **Rosencrans W**, Yadav I, Yan P, Berezhnoy NV, Chen Q, van Kan JA, Nordenskiöld L, Zinchenko A, van der Maarel JRC. (2020). Internal Motion of Chromatin Fibers Is Governed by Dynamics of Uncompressed Linker Strands. *Biophysical Journal* 119(11), 2326-2334. doi:10.1016/j.bpj.2020.10.018
13. Rostovtseva TK, Queralt-Martín M, **Rosencrans WM**, Bezrukov SM. (2020). Targeting the Multiple Physiologic Roles of VDAC With Steroids and Hydrophobic Drugs. *Frontiers in Physiology* 11, 446. doi:10.3389/fphys.2020.00446
14. **Rosencrans WM**, Walsh ZH, Huerb N, Blum A, Belew M, Liu C, Chernak B, Brauer PR, Trazo A, Olson A, Hagos E. (2020). Cells deficient for Krüppel-like factor 4 exhibit mitochondrial dysfunction and impaired mitophagy. *European Journal of Cell Biology* 99(1), 151061. doi:10.1016/j.ejcb.2019.151061
15. Rovini A, Gurnev PA, Beilina A, Queralt-Martín M, **Rosencrans W**, Cookson MR, Bezrukov SM, Rostovtseva TK. (2020). Molecular mechanism of oleoamine-mediated neuroprotection through targeting α -synuclein interaction with mitochondrial VDAC. *Cellular and Molecular Life Sciences* 77(18), 3611-3626. doi:10.1007/s00018-019-03386-w
16. Yadav I, **Rosencrans W**, Basak R, van Kan JA, van der Maarel JRC. (2020). Intramolecular dynamics of dsDNA confined to a quasi-one-dimensional nanochannel. *Physical Review Research* 2(1), 013294. doi:10.1103/PhysRevResearch.2.013294
17. Cheng WWL, Budelier MM, Sugawara Y, Bergdoll L, Queralt-Martín M, **Rosencrans W**, Rostovtseva TK, Chen ZW, Abramson J, Krishnan K, Covey DF, Whitelegge JP, Evers AS. (2019). Multiple neurosteroid and cholesterol binding sites in voltage-dependent anion channel-1 determined by photo-affinity labeling. *Biochimica et Biophysica Acta – Molecular and Cell Biology of Lipids* 1864(10), 1269-1279. doi:10.1016/j.bbalip.2019.06.004
18. Brauer PR, Kim JH, Ochoa HJ, Stratton ER, Black KM, **Rosencrans W**, Stacey E, Hagos EG. (2018). Krüppel-like factor 4 mediates cellular migration and invasion by altering RhoA activity. *Cell Communication & Adhesion* 24(1), 1-10. doi:10.1080/15419061.2018.1444034
19. Zinchenko A, Berezhnoy NV, Wang S, **Rosencrans WM**, Korolev N, van der Maarel JRC, Nordenskiöld L. (2018). Single-molecule compaction of megabase-long chromatin molecules by multivalent cations. *Nucleic Acids Research* 46(2), 635-649. doi:10.1093/nar/gkx1135

INVITED SEMINARS

Development of Autophagy Targeting Chimeras (AutoTAC)

Center for Alzheimer's and Related Dementias, NIH, Bethesda, MD · August 2026

Stopping the STING: Autophagy Machinery in Innate Immune Control

Scripps Research Seminar, La Jolla, CA · July 2026

STING is suppressed by an ATG9A-ATG13-ATG101-dependent Golgi to Lysosome degradation pathway to restrain chronic inflammation

Autophagy Gordon Research Conference, Ventura, CA · 2026

CONFERENCE PRESENTATIONS (PRESENTING AUTHOR)

The FIP200 CLAW domain functions as an anionic membrane tether

2025 Biophysical Society Annual Meeting · flash talk and poster

The mitochondrial VDAC isoforms: one molecule at a time

2023 Biophysical Society Annual Meeting · Bioenergetics award talk

A dynamic plasticity of VDAC2 revealed by single-molecule electrophysiology

2020 Biophysical Society Annual Meeting, San Diego, CA

VDAC isoforms in mitochondrial biology: why so similar, yet different?

2019 NHLBI Mitochondrial Biology Symposium, NIH, Bethesda, MD

KLF4 regulates metabolic homeostasis in response to energy stress

2019 AACR Annual Meeting, Atlanta, GA

Effect of steroids on mitochondrial metabolite channel function and lipid membrane properties

2019 Biophysical Society Annual Meeting, Baltimore, MD

A screen for the effect of nonpolar compounds on VDAC function identifies olesoxime as an allosteric modifier of VDAC gating

2019 Physics Honors Theses Symposium, Colgate University, Hamilton, NY

Effect of steroids on mitochondrial metabolite channel function and lipid membrane properties

2018 NIH Research Festival, Bethesda, MD

Stretch and dynamics of single chromatin molecules confined to nanofluidic channels

2018 Biophysical Society Annual Meeting, San Francisco, CA

Cells deficient for Krüppel-like factor 4 exhibit impaired mitophagy

2017 National Conference on Undergraduate Research, Memphis, TN

The effect of TOR signaling on nitrogen stable isotope fractionation

2016 Society for Integrative and Comparative Biology Annual Meeting, Portland, OR

An exploration of the regions created by cevians in triangles

2014 Al Kalfus Long Island Math Fair, Hempstead, NY

TEACHING

Teaching Assistant, Division of Biology and Biological Engineering, Caltech Spring 2021; Winter 2024–2025

- Teaching assistant for introductory biology and cellular microscopy
- Wrote all assignment and exam questions for the course
- Developed lab-based assignments to teach modern microscopy techniques

Tutor, Center for Learning, Teaching, and Research, Colgate University Spring 2019

- Tutored students in molecular biology courses, helping them build effective study and test-taking habits

Lab Teaching Assistant, Department of Biology, Colgate University Spring 2017

- Helped develop a new lab curriculum in cell and mitochondrial biology
- Gave lectures on cell biology and laboratory practice
- Supervised student operation of lab equipment, answered questions on cell biology concepts and techniques, and set up weekly experiments

GRANTS AND FUNDING

Pharmacological targeting of Tau aggregates for autophagic removal October 2022–October 2025
\$2,810,983

Development of MitoTAC compounds to treat Parkinson's disease March 2023–March 2025
The Merkin Institute for Translational Research, \$400,000

Uncovering the biochemical and structural basis of the VDAC–p97 interaction 2022
The J. Yang and Family Foundation, \$40,000

PROFESSIONAL SOCIETIES

Biophysical Society	2017–present
American Physical Society	2019–2020
Society of Physics Students	2019–2020
American Association for Cancer Research, student member	2018–2020
Sigma Pi Sigma Physics Honor Society	2018–2020
Society for Integrative and Comparative Biology	2015–2016