

Viktor T. Belay

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EDUCATION

Cornell University, Weill Cornell Graduate School of Medical Sciences

Doctor of Philosophy: Physiology, Biophysics, and Systems Biology

Advisors: Dr. Richard K. Hite and Dr. John D. Chodera

New York, NY

Aug. 2019 – Present

American University, College of Arts and Sciences

Bachelor of Science: Mathematics and Physics

Advisors: Dr. Julia Chifman and Dr. Wolfgang Losert

Washington, DC

Aug. 2015 – May 2019

SELECTED RESEARCH EXPERIENCE

Memorial Sloan Kettering Cancer Center

Departments of Structural Biology and Computational Biology

Doctoral Candidate, Laboratories of Richard K. Hite and John D. Chodera

Feb. 2020 - Present

New York, NY

- Using cryogenic electron microscopy, electrophysiology, fluorescence imaging, and other experimental biophysical and biochemical techniques to characterize intracellular ion channel and transporter structure and function
- Simulating membrane protein structures using all-atom molecular dynamics to probe conformational dynamics and generate experimentally testable hypotheses
- Determining the structural basis for potentiation of inositol trisphosphate (IP3) receptors by adenine nucleotides such as adenosine triphosphate (ATP) and cyclic monophosphate (cAMP)
- Exploring the structural basis of regulation by phosphatidylinositols and adenine nucleotides of the endolysosomal proton/chloride antiporter CLC6
- Investigating the basis for binding site recognition of oxidized glutathione in the endoplasmic reticulum major facilitator superfamily transporter SLC33A1

KTH Royal Institute of Technology/Karolinska Institutet

SciLifeLab

Visiting Researcher, Laboratory of Dr. Lucie Delemotte

- Used machine learning methodologies developed in the lab of Dr. Delemotte to analyze high-dimensional molecular dynamics simulation trajectories of the lysosomal potassium and proton channel TMEM175

Aug. - Sep. 2022

Stockholm, Sweden

University of Maryland

Department of Physics

Undergraduate Researcher, Laboratory of Dr. Wolfgang Losert

- Used coarse-grained physical simulations to make predictions about cellular motility under directed motion
- Validated simulation results experimentally using *Dictyostelium discoideum* as a model for motile human cells

May 2018 - May 2019

College Park, MD

American University

Department of Mathematics

Undergraduate Researcher, Laboratory of Dr. Julia Chifman

- Compiled emerging evidence linking dysregulation in iron metabolism pathways to oncogenic pathways in humans
- Developed a computational model of iron metabolism and oncogenic pathways
- Generated predictions that connected dysregulation of specific proteins in iron metabolism pathways to oncogenesis

May 2017 - May 2019

Washington, DC

PREPRINTS AND PEER-REVIEWED PUBLICATIONS

- Shanshan Liu*, Mark Gad*,..., **Viktor Belay**, et al. "SLC33A1 exports oxidized glutathione to maintain endoplasmic reticulum redox homeostasis". *bioRxiv*, accepted at *Nature Cell Biology*. (2026).
- **Viktor Belay**, Navid Paknejad, Vinay Sapuru, John D. Chodera, Richard K. Hite. "Structural dynamics of adenine nucleotide potentiation of the human type 2 IP3 receptor". *bioRxiv*, in review at *Proceedings of the National Academy of Sciences*. (2026).

* Indicates equal contribution

ADDITIONAL WRITING

- Alexander Payne*, **Viktor Belay***. “Understanding druggable states in a protein implicated in Parkinson’s Disease”. *Folding At Home*. (2022).
- Ivy Zhang*, **Viktor Belay***, William Glass*. “Could a new class of antibodies treat COVID-19 in a manner that avoids resistance?” *Folding At Home*. (2020).

* Indicates equal contribution

TECHNICAL SKILLS

Biochemistry and Molecular Biology: Construct design and cloning, site-directed mutagenesis, soluble and membrane protein expression optimization and purification, protein sample preparation for downstream assays

Cell and Tissue Culture: Mammalian cell culture for protein expression and live-cell assays, bacterial cell culture for cloning and plasmid propagation, and insect cell culture for protein expression and baculovirus generation

Structural Biology: Cryo-EM sample preparation and vitrification, Glacios and Krios microscope operation, data collection with SerialEM and EPU, data processing in RELION, cryoSPARC, ChimeraX, Coot, and Phenix

Biological assays: Whole-cell patch-clamp electrophysiology, live-cell imaging, and radiolabeled ligand binding assays

Computational Biophysics: Modeling and simulation of all-atom biomolecular systems (using OpenMM or Gromacs) and trajectory analysis (collective variable identification, conformational landscape characterization)

Programming languages and computational management: Python, MATLAB, R, Unix Shell/Bash, Linux cluster High Performance Computing, Git version control

Design and communication: Adobe Illustrator, Adobe Photoshop, Adobe Premiere Pro, Adobe After Effects, Microsoft Office, LaTeX

AWARDS AND HONORS

Second Place Research Talk Prize, PBSB Retreat	2024
Memorial Sloan Kettering Cancer Center MERIT Sawyer’s Fellowship,	2023-2029
Finalist, Howard Hughes Medical Institute (HHMI) Gilliam Fellowship	2022
First Place Prize, Weill Cornell Medicine Three-Minute Thesis competition (3MT)	2022
Molecular Biophysics Training Program Fellowship (NIH T32)	2022
Department of State Citizen Diplomacy Action Fund Award	2021
Initiative to Maximize Student Development (IMSD) Fellowship (NIH T32)	2019-2024
<i>Cum Laude</i> graduation honor, American University	2019
First place poster prize, University of Maryland Research fair	2018
Scholars Scholarship, American University	2015-2019
Blair Jones Mathematical Endowment, American University	2017-2018
Summer Scholars Fellowship, American University	2017-2018

RESEARCH TALKS AND LECTURES

”Structural Biology of native GABA receptors”	New York, NY
<i>Lecture</i>	June 2025
Weill Cornell Medicine ACCESS Summer Program	
“Adenine nucleotides in the function of the IP3 receptor”	New York, NY
<i>Research Talk</i>	August 2024
Weill Cornell Initiative To Maximize Student Development (IMSD) retreat	
“Mechanistic insights into adenine nucleotide potentiation of the IP3 receptor”	New York, NY
<i>Research Talk</i>	August 2024
Weill Cornell Molecular Biophysics Training Program (MBTP) Symposium	
“Structural mechanism of potentiation of IP3 receptors by adenine nucleotides”	New York, NY
<i>Research Talk</i>	November 2023
Weill Cornell Physiology, Biophysics, and Systems Biology Program Retreat	
“Structural mechanism of potentiation of IP3 receptors by adenine nucleotides”	Castelldefels, Spain
<i>Research Talk</i>	August 2023
Organellar Ion Channels and Transporters Gordon Research Conference	
“Structural Investigation of the endosomal Cl⁻/H⁺ antiporter CLC6”	New York, NY
<i>Research Talk</i>	May 2023
Weill Cornell Molecular Biophysics Training Program Research in Progress	

“What is biological physics?” <i>Lecture</i> University of Maryland Training and Research Experience in Nonlinear Dynamics REU	College Park, MD May 2022
“How can we use contemporary laboratory methods to study human disease?” <i>Lecture</i> The Rockefeller University Data for the People (D4P) program	New York, NY June 2022
“The immune system and HLA molecules” <i>Lecture</i> The Rockefeller University Summer Research Program (SSRP)	New York, NY June 2021
“Databases of genetic information” <i>Lecture</i> The Rockefeller University Summer Research Program (SSRP)	New York, NY May 2021
“COVID-19 and type 2 diabetes” <i>Lecture</i> The Rockefeller University Data for the People (D4P) program	New York, NY May 2020

POSTER PRESENTATIONS

“Structural investigation of IP3 receptor potentiation by adenine nucleotides” <i>Poster</i> Membrane Transporter Mechanisms Gordon Research Conference	Les Diablerets, Switzerland May 2025
“Investigation of IP3 receptor potentiation by adenine nucleotides” <i>Poster</i> Weill Cornell Physiology, Biophysics, and Systems Biology Program retreat	New York, NY November 2024
“Structural mechanism of potentiation of IP3 receptors by adenine nucleotides” <i>Poster</i> Organellar Ion Channels and Transporters Gordon Research Conference	Castelldefels, Spain August 2023
“Probing the mechanism of TMEM175 mutations using Folding@home” <i>Poster</i> 2nd Annual Center on Membrane Protein Production and Analysis (COMPAA) symposium	New York, NY July 2022
“Investigating the endosomal H⁺/Cl⁻ exchanger CLC6” <i>Virtual Poster</i> Weill Cornell Molecular Biophysics Training Program Symposium	New York, NY March 2021
“Modeling the collective behavior of Dictyostelium discoideum under directed migration” <i>Poster</i> American Physical Society (APS) March Meeting	Boston, MA March 2019
“Oncogenic Pathways and Iron Phenotypes in Breast Cancer” <i>Poster</i> American University Robyn Rafferty Mattias Student Research Conference	Washington, DC March 2019
“Oncogenic Pathways and Iron Phenotypes in Breast Cancer” <i>Poster</i> James Madison University Shenandoah Undergraduate Mathematics and Statistics Conference	Harrisburg, VA October 2018
“Modeling the collective behavior of Dictyostelium discoideum under directed migration” <i>Poster</i> University of Maryland Research Fair	College Park, MD August 2018
“Oncogenic Pathways and Phenotypes in Breast Cancer” <i>Poster</i> The Ohio State University Mathematical Biosciences Undergraduate Conference	Columbus, OH August 2017

TEACHING, MENTORSHIP, AND ADMINISTRATION

Northeast Regional Alliance MedPrep Program <i>Role: Module Instructor and panelist</i> Mount Sinai Icahn School of Medicine	May - July 2025
Weill Cornell Black Student Union <i>Role: Founder and organizer</i> Weill Cornell	Jan. 2022 - June 2025

Path to Wellness seminar	Jan. - June 2024
<i>Role: Organizer</i>	
Weill Cornell and Memorial Sloan Kettering Cancer Center	
Weill Cornell Medicine Three Minute Thesis competition	Oct. - Nov. 2023
<i>Role: Judge</i>	
Weill Cornell	
Inaugural Molecular Biophysics Training Program Trainee Retreat	July 2023
<i>Role: Organizer</i>	
Weill Cornell	
Public School District 4 Science Fair and Invention Convention 2023	April 2023
<i>Role: Judge</i>	
New York City Public Schools	
Data For The People (D4P)	2020, 2022
<i>Role: Fellow</i>	
The Rockefeller University	
Weill Cornell Medicine Three Minute Thesis competition	Nov. 2022
<i>Role: Competitor and presenter</i>	
Weill Cornell	
Tri-I Minority Society “Coffee for the Culture” prospective student panel	Mar. 2022
<i>Role: Panelist</i>	
Weill Cornell	
Schrodinger Introduction to Drug Discovery course	July - Aug. 2022
<i>Role: Teaching Assistant</i>	
Schrodinger	
Summer Science Research Experience (SSRP)	May - Aug. 2022
<i>Role: Mentor and lecturer</i>	
The Rockefeller University	
My Fave Queer Chemist Podcast	July 2022
<i>Role: Invited guest interviewee</i>	
My Fave Queer Chemist	
STEMCONNECT virtual workshop: careers in STEM	Jan. 2022
<i>Role: Panelist</i>	
ThinkSTEM	
Espirit de Corps graduate student mentorship program	2021, 2022
<i>Role: Peer mentor</i>	
Weill Cornell	
Pre-med Conference, Weill Cornell Medical and Graduate School programs	Dec. 2021
<i>Role: Panelist</i>	
Weill Cornell	
Memorial Sloan Kettering Cancer Center virtual undergraduate URM panel	Sep. 2021
<i>Role: Panelist</i>	
Memorial Sloan Kettering Cancer Center	
High School Catalyst Program	May - Aug. 2021
<i>Role: Mentor and lecturer</i>	
Memorial Sloan Kettering Cancer Center	
Community Leader Fellowship NYC	2020,2021
<i>Role: Founder and director</i>	
United States Department of State, Weill Cornell	
Weill Cornell Graduate School Recruitment and Admissions Committee	2020
<i>Role: Graduate student representative</i>	
Weill Cornell	