

Personal Information

Full Name: Carlos R. Escalante , Ph.D.

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Languages Spoken: English, Spanish

Professional Summary

Primary Departmental Specialization Area/Field

Physiology and Biophysics

Macromolecular Structure determination using multiple biophysical techniques X-ray, SAXS, Cryo-EM

Virology, Gene Regulation, Protein-DNA interactions, Transcription Factors.

Areas of Expertise and Interest

Virology

Gene Regulation

Protein-DNA interactions

Transcription Factors

Gene Therapy

Chromatin Remodelers

Interferon Regulatory Factors

Ribosomal RNA Transcription Regulation

Education

Post Graduate

Department of Biochemistry and Molecular Biophysics, Columbia University, New York, NY.

X-ray Crystallography

Research Advisor: Aneel Aggarwal

CONACYT PostDoctoral Award (1993-1994)

01/1993 - 01/1997

Graduate

Georgetown University

Chemistry 1992

Thesis Title: "Expression, Purification and Enzymatic characterization of human Aspartyl-tRNA Synthetase"

Research Advisor: David Yang

08/1986 - 12/1992

Undergraduate

Instituto Tecnológico y de Estudios Superiores de Monterrey, Mexico.

B.S Chemistry 1985

Honors (Highest score of class)

08/1981 - 12/1985

Academic Appointment History

Assistant Professor , Department of Physiology and Biophysics, Virginia Commonwealth University, School of Medicine, Richmond, Virginia, (Tenure Eligible).

08/2008 - Present

Research Program Member, Massey Cancer Center, Virginia Commonwealth University, School of Medicine, Richmond, Virginia.

01/2010 - Present

Research Assistant Professor, Department of Biophysics and Structural Biology, Mount Sinai School of Medicine, New York, New York.

01/2003 - 08/2008

Instructor, Department of Biophysics and Structural Biology, Mount Sinai School of Medicine, New York, New York

01/1997 - 01/2003

Lecturer in Chemistry, Department of Chemistry, Instituto Tecnológico y de Estudios Superiores de Monterrey, Monterrey, Nuevo Leon, Mexico.

01/1986 - 06/1986

Special Awards & Honors

Selected to the Linton-Poodry SACNAS Leadership Institute (2017)

06/2017

Blick Scholar Award

06/2014

CONACYT Postdoctoral Award

01/1993

Society Memberships

Member, Biophysical Society

01/2015 - Present

Member, American Microbiology Association
06/2014 - 04/2016

Member AAAS

Member SACNAS (Society for Advancement of Chicano and Native Americans in Science)
09/2009 - Present

Member, Virginia Academy of Sciences
04/2014 - 06/2017

Member American Crystallography Association
05/2014 - 05/2015

Scholarly Activities

Expert Services

NSF GRFP Study Section member
01/2017 - 01/2018

NSF Division of Biological Infrastructure, Study Section
06/2017 - 06/2017

VCU MASSEY Pilot Grants Reviewer
02/2017 - 02/2017

SACNAS Student Travel Awards Reviewer
07/2017 - 08/2017

VCU MASSEY Grant Reviewer
2017

NSF Division of Biological Infrastructure, Study Section Reviewer
2017

NIH NIGMS, Virology Section A (VirA) Study Section ad hoc
2013

VCU-CCTR Award Reviewer
2014

VCU-PRQF AWARD Reviewer
2013

PloS One, Refereeing (in progress)

Journal of Virology Refereeing
01/2013 - Present

Nucleic Acid Research Refereeing

2010 - Present

Journal of Biological Chemistry, Refereeing
2014 - Present

Proceedings of National Academy of Sciences, Refereeing
2016 - 2017

2018 International Parvovirus Workshop. Miami, Florida.
Moderator session 4
2018

Grants and Contracts: Active

1R01-GM124204
Structural insights into AAV mediated site-specific integration. \$197,000/year
09/2017 - 07/2021

Grants and Contracts: Past

VCU-PRQF AWARD (P.I: Escalante) 06/01/2014 – 05/31/2015
06/2014 - 05/2015

Structural Studies of IRF4 as target of Multiple Myeloma. \$50,000.

ACS-IRG GRANT (PI: Landry,J; Co-PI: Escalante, CR) 02/01/2014-01/31/2015
Structural Studies on the Chromatin Remodeling Complex NURF. \$30,000.
02/2014 - 01/2015

R21CA179008-01 (PI: Escalante) 07/01/2013 – 06/30/2015
Structural Studies of epigenetic regulation of rRNA gene by TTF-I. \$364,857
07/2013 - 06/2015

R56A1046458 (PI: Pintel, Co-PI: Escalante) 09/15/2013 – 08/31/2014
Parvovirus RNA processing and gene expression strategies. \$373,866
09/2013 - 08/2014

1R01GM092854 (PI: Escalante) 9/30/2010 – 08/31/2014
AAV Rep-DNA Complexes Underlying Site-Specific Integration. \$1,525,587
08/2014

ACS-IRG 11997-IRG-73-001-34-IRG (PI: Escalante) 1/1/10-12/31/10
Structural Studies of Reb1-DNA complexes. \$30,000.
01/2010 - 12/2010

NIH R01 GM073901 (PI: Linden, Co-PI: Escalante) 12/01/05 – 11/30/2009
Mechanisms of the AAV-2 Rep motor protein
12/2001 - 11/2009

Advising and Mentoring

Rahul Jaiswal Ph.D. Dr. Jaiswal came back from after a second postdoctoral position in Singapore where he learned Cryo-Electron Microscopy.

2018 - Present

Kamyar Sharifi. Undergraduate Student doing research in my Lab. Started in Summer 2017 and will continue until graduation.

06/2017 - Present

Josly Pierre-Louis. Undergraduate Research Student that worked during the 2017 - 2018 and is now starting the VCU PREP program in my Lab.

2017 - Present

Vishaka Santosh (2013- current) Expected to graduate at the end of summer August 2018. Vishaka's work has focused on the cryo-EM structures of the Adeno-Associated Virus in complex with DNA.

2013 - Present

Francisco Zarate-Perez Ph.D. (2013 – 2015) Instructor

2013 - 2015

Dr. Zarate-Perez has made significant accomplishments in the structural and functional characterization of the Adeno-Associated Virus Rep proteins that have advance the field and gave new insights into the mechanism of Site-specific Integration. He is currently in Dr. John Hackett laboratory at VCU Massey Cancer Center.

2013 - 2015

Clayton M. Bishop (2013-2014) Finished his Master's Degree. Currently in UT Southwestern School of Medicine in San Antonio. His thesis work entitled "Biochemical and Structural studies of AAV-2 Rep68-AAVs1 complex assembly", revealed that the initial complex assembly is highly cooperative requiring the concerted binding of the OBD, linker and helicase domains as well as oligomerization.

2013 - 2014

Yinong Zong (Ph.D.) (2012 – 2013) Research Assistant Professor. Zong worked on the epigenetic regulation of rRNA gene by TTF-I. He moved back to San Diego to work on Industry.

2012 - 2013

Soumya G. Remesh (2010-2014) Completed her Ph.D degree at the end of summer 2014. During her studies, Soumya determined the structure of the C-terminal domain of the Interferon Regulatory Factor 4 (IRF4) and her SAXS studies have provided the first low-resolution structure of the full length IRF4. The structural work has provided new insights into the mechanism of how these proteins are activated and how they partner with multiple transcription factors. He is doing a postdoctoral work at University of California Berkeley.

2010 - 2014

Demet Kekilli. Visiting undergraduate student from University of West England. Worked as a Research Assistant and was part of two publications. She finished her Ph.D and is currently doing a postdoct in Sweden.

08/2009 - 08/2010

Faik Musayev (Ph.D.) (2009 – 2015) Research Assistant Professor

Dr. Musayev has solved the structures of AAV-2 OBD domain and in complex with the integration site AAVS1. Both structures provided insights into the initial steps that occur during the assemble of a Rep68/DNA complex.

2009 - 2015

Francisco Zarate-Perez Ph.D. (2009 – 2013)

Dr. Zarate-Perez worked on biochemical and structural studies of AAV Rep proteins and preliminary electron microscopy work on the Rep-DNA complexes.

2009 - 2013

Rahul Jaiwal Ph.D. (2009 – 2012)

Dr. Jaiswal did a second postoc at the School of Biological Sciences Nanyang Technological University in Singapore. During his first tenure in my laboratory, he determined the structure of the first Eukaryotic Replication and Transcription Terminator Reb1 in complex with DNA.

2009 - 2012

Maria Villamil (M.D.) (2009 – 2012) Research Assistant. Maria served as a technical support in the laboratory.

2009 - 2011

Pablo Deioanness (2007 – 2010) Completed Ph.D. in Mount Sinai School of Medicine. I was co-advisor for his work on IRF-3 and IRF-7 apo-structures. Currently a PostDoct at NYU.

2007 - 2010

J.Anson James (2000 – 2004) Completed Ph.D in Mount Sinai School of Medicine in NYC. I was the co-advisor for his work in the crystal structure of AAV2- Rep40. He did a posdoct at the National Institutes of Health. Currently working at University of Virginia.

2000 - 2004

Juan Pablo Rodriguez. VCU undergraduate research worked for one year as part of the Cancer Biology course.

2016 - 2017

Joshua David. VCU undergraduate Student graduated in 2017 and is now a research assistant at Harvard Medical School.

2016 - 2017

Deeksha Aleti. VCU undergraduate Student.

2017 - 2017

Aamir Akbaralli. Summer Undergraduate Student from William and Mary. Currently at the PostBac program at NIH.

06/2015 - 08/2015

Hala Samir Hasanein. Summer research student from Alfaisal University in Saudi Arabia. Finished her MD degree this year.
06/2015 - 08/2015

Dagmawit Maelaf. VCU summer research student.
2014 - 2014

Andre G. Enowtaku. Summer Research Student.
06/2013 - 08/2013

Brittany Aeschlimann. Summer Research Student from James Madison University. Finished Medical School at WVU.
06/2012 - 08/2012

Kevin Tchokouani. Summer Research Student.
06/2012 - 08/2012

Celia Cifuentes. VCU Summer Undergraduate Research Student.
06/2012 - 08/2012

Marquis Flood. Summer VCU research student from MARC program.
06/2011 - 08/2011

Riswan Jivani. VCU summer research student.
06/2010 - 08/2010

Zachary Zemore. VCU undergraduate student part of Physiology and Biophysics summer research program. Graduate from VCU Medical School.
06/2010 - 08/2010

Debolina Biswas, VCU Biochemistry (Committee member)
2018

Iwona Ruchala, VCU Physiology and Biophysics (Committee member)
2017

Benjamin R. Belvin, Biochemistry (Committee member)
2017

Christopher Waite, VCU Physiology and Biophysics (Committee member)
2016

Sung Park, VCU Physiology and Biophysics (Committee member)
2016

Parag Surana (external committee member) National Center for Biological Sciences, Tata Institute of Fundamental Research, Bangalore, India.
2014

Jason Cramer, VCU Biochemistry Department (Committee member)
2014

Yoori Kim, VCU Physiology and Biophysics (Committee member)
2013

Logan C. Mayer, VCU Biochemistry (Exam Chair)
2017

Annamarie C. Dalton, VCU Biochemistry (Exam Chair)
2012

James D. Marion, VCU Biochemistry (Exam Chair)
2012

Muna Y. Suliman, VCU Biochemistry (Exam Chair)
2011

Tyler, J. Hendon, VCU Physiology and Biophysics (Committee member)
2018

Jacob Mirpanah, VCU Physiology and Biophysics (Committee member)
2018

Nicholas J. Clayton, VCU Physiology and Biophysics (Committee member)
2018

Megan Reed, Chemistry (Committee member)
2017

Eman I. Bani, Anatomy (Committee member)
2014

Benjamin R. Belvin, VCU Biochemistry (Committee member)
2014

Yoori Kim, VCU Biochemistry (Committee)
2012

Yasmin S. Alkhlaif, VCU Pharm/Tox (Exam Chair)
2017

Steve H. Kokorelis, Biochemistry (Exam Chair)
2017

Logan C. Meyer, Microbiology (Exam Chair)
2016

Adam L. Johnson, Microbiology (Exam Chair)
2015

Jonathan L. Forbes (Exam Chair)
2010

Zohal, Hamid (Exam chair)

2009

Presentations

Invited

Internal/VCU

2017 Massey Developmental Therapeutics Group Talk, February 24, invited talk 'Structural and Mechanistic insights into the mechanism of AAV mediated site-specific integration".

02/2018

2011 VCU Department of Biochemistry. April 4th, 2011

(Host: Jessica Bell)

2011

2010 VCU Institute for Structural Biology and Drug Discovery. (Host : H. Tonie Wright)

2010

2010 VCU MD/PhD Seminar Series

2010

Local/Regional (Virginia but Non-VCU)

Virginia Academy of Sciences (Student presenter)

Studies on the helicase activity of AAV Rep proteins driving capsid packaging

05/2017

National

2013 University of Kansas Medical Center. Department of Microbiology November 14th

Invited Lecture (Host: Jianming Qiu)

11/2018

2013 Center for Structural Biology. University of Florida, Gainesville, FL. September 16th. Invited Lecture. (Host: Mavis Agbandje-McKenna)

09/2018

2012 International Parvovirus Workshop. Cornell University. Ithaca, NY. June 17th-21st. Selected Talk. "The Oligomeric Properties of Rep68 reflect its multifunctionality".

06/2018

2012 International Parvovirus Workshop. Cornell University. Ithaca, NY. June 17th-21st. Selected Talk. "The interdomain linker of AAV-2 Rep68 plays an active role in oligomerization".

06/2018

2018 International Parvovirus Workshop. Miami, Florida. June 10 -14th, Selected Talk

and Chair, "Cryo-EM Structure of Rep68-ssDNA complex"
06/2014

2013 Brookhaven National Laboratory. National Synchrotron Light Source. February
1st. Invited Lecture (Host: Vivian Stojanoff)
2013

2009 Medical University of South Carolina. Department of Biochemistry
and Molecular Biology. August 8th. Invited Lecture. (Host: Deepak Bastia)
2009

International

2016 International Parvovirus Workshop. Ajaccio, France. June 19-23th, Selected Talk,
"Interaction of AAV Rep proteins with ssDNA".
06/2023

2014 International Parvovirus Workshop. Bourdeaux, France. June 22-26th, Selected
Talk, "Structural Insights into the assembly of AAV2 Rep68 in the AAVS1 integration
site".
06/2026

Posters or Other Unsolicited Presentations

Internal/VCU

2012 VCU Massey Center Cancer Retreat. October 18th. Poster Presentation. Structure
of Reb1-Ter3 DNA complex: A novel DNA binding domain provides insights into the
mechanism of eukaryotic termination replication.
10/2018

2011 VCU Massey Center Cancer Retreat. November 7th. Poster Presentation.
"Structural Studies of REB1-TER3 Complex using SAXS and X-ray Crystallography."
2011

2011 VCU Watts Day Symposium. October 18th. Poster Presentation. "Biochemical and
Biophysical Studies of AIM2-dsDNA complex".
10/2018

2011 VCU Watts Day Symposium. October 18th. Poster Presentation. "IFI16 Requires
cooperative action of two HIN domains in sensing the intracellular microbial DNA".
10/2018

2011 VCU Watts Day Symposium. October 18th. Poster Presentation. "The AAV-2
Rep68 protein presents a dynamic and oligomeric behavior".
10/2018

2011 VCU Watts Day Symposium. October 18th. Poster Presentation. "Role of
Interdomain linker on AAV-2 Rep68 oligomerization".
10/2018

Local/Regional (Virginia but Non-VCU)

2014 Virginia Academy of Sciences Meeting. May 15th. Poster Presentation. "Structural Insights into the assembly of AAV2 Rep68 in the AAVS1 integration site"
05/2018

2014 Virginia Academy of Sciences Meeting. May 15th. Poster Presentation. "X-ray Crystallography and Small Angle X-ray Scattering studies of Interferon Regulatory Factor 4"
05/2018

2014 Virginia Academy of Sciences Meeting. May 15th. Poster Presentation. "Assembly of AAV2 Rep68 on AAVS1 Requires Cooperativity of Individual Domains and Oligomerization".
05/2018

National

2018 Biophysical Society Meeting, February 17 – 21. Poster presentation, "Understanding AAV Packaging"
02/2018

2018 Keystone Symposium. Cryo-EM: From Cells to Molecules, February 4 -8th. Poster presentation. "Understanding AAV Packaging."
2018

2014 Protein Society Meeting. San Diego. July 27 – 30th, Poster Presentation, "X-ray Crystallography and Small Angle X-ray Scattering studies of Interferon Regulatory Factor 4".
07/2018

2014 Experimental Biology Meeting. San Diego, April 26th – 30th. ASBMB session. Poster Presentation. "X-ray Crystallography and Small Angle X-ray Scattering studies of Interferon Regulatory Factor 4".
04/2018

2012 Gordon Research Conference: Diffraction methods in Structural Biology, Bates College, Lewiston ME, July15 to July 20th. Poster Presentation: Structure of Reb1-Ter3 DNA complex: A novel DNA binding domain provides insights into the mechanism of eukaryotic termination replication.
07/2018

2011 FASEB Summer Research Conferences "Helicases and Nucleic Acid Translocases", SteamBoat Springs, CO. July 31 – August 1st. Poster Presentation: Dynamic oligomeric behavior of AAV-2 Rep68.
07/2018

Teaching Experience

Didactic and Clinical

Lecturer, Physiology 501: Graduate Physiology (Lecturer, 4 Lectures, Fall)
2017 - Present

Lecturer, Medicinal Chemistry 591: Topics in Medicinal Chemistry (Lecturer,
Spring, 1 lecture,
2016 - Present

Microbiology 607: Techniques in Molecular Biology and Genetics
(Lecturer, Fall, 2 lectures).
2016 - Present

Physiology 309: Introductory quantitative Physiology (Lecturer, 7
lectures)
08/2017 - 12/2017

Physiology 301: Engaging in undergraduate research (Lecturer, 1 lecture)
2014 - 2017

Physiology 606: Cell Physiology, from cells to Organisms (Course Director, 6 lectures,
Spring)
2012

Physiology 620: Ion Channels in membranes (Lecturer, 1 lecture, Spring)
2011 - Present

Physiology 692: Methods in Molecular Biophysics (Course Director, Lecturer, 10
lectures, Spring)
01/2011 - 05/2011

Medicine 117: Physiology Lab (Lecturer, 2 lectures, Spring)
2011 - 2013

Physiology 604: Cellular Physiology (Lecturer, 2 lectures, Fall)
2009 - 2010

Service Activities

Service to the University

VCU Faculty Senate alternate starting in Fall 2018
08/2018 - 08/2019

Participation on YMUN (Youjiang Medical University for Nationalities in Guangxi, China)
program from the Global Education Office.
08/2016 - Present

Committee member School of medicine Strategic planning task force
2011 - 2012

VCU Science Journalism and Scientific Literacy panel with students.
10/2016

Service to the School of Medicine

Assistant Graduate Program Director Department of Physiology and Biophysics
2014 - Present

Member of Physiology and Biophysics Scientific Equipment Organization
2014 - Present

Member of the Physiology and Biophysics Graduate program steering committee
2013 - Present

Member of Physiology and Biophysics Phase 1 Examining Committee
2013 - Present

Interviewer of student candidates for the MD/PhD program
2010 - Present

Interviewer for Biomedical Sciences Doctoral Program
2010 - Present

VCU SOM Graduate School representative to the SACNAS National Meeting
2009 - Present

BSDP Cohort Faculty Interviewers
2017

BSDP Committee meeting
2017

Search Committee Department of Physiology and Biophysics
2017

Search Committee Department of Physiology and Biophysics
2015

Search Committee Department of Anatomy and Neurobiology
2014

Search Committee Physiology and Biophysics Associate Professor
2014

Search Committee Radiation Biology Scientific program leader
2013

Interviewer Search Committee Department of Anatomy.
2013

Search committee for Director of Institute for Structural Biology and Drug design
2010 - 2013

Publications

Papers Published in Peer Reviewed Journals

1. Agúndez L, Zárate-Pérez F, Meier AF, Bardelli M, Llosa M, **Escalante CR**, Linden RM, Henckaerts E. Exchange of functional domains between a bacterial conjugative relaxase and the integrase of the human adeno-associated virus. PLoS One. 2018; 13(7):e0200841. PMID: [30016371](#)
2. Ibi D, de la Fuente Revenga M, Kezunovic N, Muguruza C, Saunders JM, Gaitonde SA, Moreno JL, Ijaz MK, Santosh V, Kozlenkov A, Holloway T, Seto J, García-Bea A, Kurita M, Mosley GE, Jiang Y, Christoffel DJ, Callado LF, Russo SJ, Dracheva S, López-Giménez JF, Ge Y, **Escalante CR**, Meana JJ, Akbarian S, Huntley GW, González-Maeso J. Antipsychotic-induced Hdac2 transcription via NF- κ B leads to synaptic and cognitive side effects. Nat Neurosci. 2017 Sep; 20(9):1247-1259. PMID: [28783139](#)
3. Bardelli M, Zarate-Perez F, Agundez L, Jolinon N, Michael Linden R, **Escalante CR**, Henckaerts E. Analysis of Replicative Intermediates of Adeno-associated Virus through Hirt Extraction and Southern Blotting. Bio Protoc. 2017 May 5; 7(9). PMID: [28660237](#)
4. Zarate-Perez F, Santosh V, Bardelli M, Agundez L, Linden RM, Henckaerts E, **Escalante CR**. Determination of Adeno-associated Virus Rep DNA Binding Using Fluorescence Anisotropy. Bio Protoc. 2017 Mar 20; 7(6). PMID: [28612042](#)
5. Bardelli M, Zárate-Pérez F, Agúndez L, Linden RM, **Escalante CR**, Henckaerts E. Identification of a Functionally Relevant Adeno-Associated Virus Rep68 Oligomeric Interface. J Virol. 2016 Aug 1; 90(15):6612-6624. PMID: [27170758](#)
6. Jaiswal R, Choudhury M, Zaman S, Singh S, Santosh V, Bastia D, **Escalante CR**. Functional architecture of the Reb1-Ter complex of Schizosaccharomyces pombe. Proc Natl Acad Sci U S A. 2016 Apr 19; 113(16):E2267-76. PMID: [27035982](#)
7. Musayev FN, Zarate-Perez F, Bishop C, Burgner JW 2nd, **Escalante CR**. Structural Insights into the Assembly of the Adeno-associated Virus Type 2 Rep68 Protein on the Integration Site AAVS1. J Biol Chem. 2015 Nov 13; 290(46):27487-99. PMID: [26370092](#)
8. Remesh SG, Santosh V, **Escalante CR**. Structural Studies of IRF4 Reveal a Flexible Autoinhibitory Region and a Compact Linker Domain. J Biol Chem. 2015 Nov 13; 290(46):27779-90. PMID: [26405037](#)
9. Musayev FN, Zarate-Perez F, Bardelli M, Bishop C, Saniev EF, Linden RM, Henckaerts E, **Escalante CR**. Structural Studies of AAV2 Rep68 Reveal a Partially Structured Linker and Compact Domain Conformation. Biochemistry. 2015 Sep 29; 54(38):5907-19. PMID: [26314310](#)
10. Jaiswal R, Singh SK, Bastia D, **Escalante CR**. Crystallization and preliminary X-ray characterization of the eukaryotic replication terminator Reb1-Ter DNA complex. Acta Crystallogr F Struct Biol Commun. 2015 Apr; 71(Pt 4):414-8. PMID: [25849502](#)
11. Zhao H, Ghirlando R, Alfonso C, Arisaka F, Attali I, Bain DL, Bakhtina MM, Becker DF, Bedwell GJ, Bekdemir A, Besong TM, Birck C, Brautigam CA, Brennerman W, Byron

O, Bzowska A, Chaires JB, Chaton CT, Cölfen H, Connaghan KD, Crowley KA, Curth U, Daviter T, Dean WL, Díez AI, Ebel C, Eckert DM, Eisele LE, Eisenstein E, England P, **Escalante C**, Fagan JA, Fairman R, Finn RM, Fischle W, de la Torre JG, Gor J, Gustafsson H, Hall D, Harding SE, Cifre JG, Herr AB, Howell EE, Isaac RS, Jao SC, Jose D, Kim SJ, Kokona B, Kornblatt JA, Kosek D, Krayukhina E, Krzizike D, Kuszniir EA, Kwon H, Larson A, Laue TM, Le Roy A, Leech AP, Lilie H, Luger K, Luque-Ortega JR, Ma J, May CA, Maynard EL, Modrak-Wojcik A, Mok YF, Mücke N, Nagel-Steger L, Narlikar GJ, Noda M, Nourse A, Obsil T, Park CK, Park JK, Pawelek PD, Perdue EE, Perkins SJ, Perugini MA, Peterson CL, Peverelli MG, Piszczek G, Prag G, Prevelige PE, Raynal BD, Rezaczkova L, Richter K, Ringel AE, Rosenberg R, Rowe AJ, Rufer AC, Scott DJ, Seravalli JG, Solovyova AS, Song R, Staunton D, Stoddard C, Stott K, Strauss HM, Streicher WW, Sumida JP, Swygert SG, Szczepanowski RH, Tessmer I, Toth RT 4th, Tripathy A, Uchiyama S, Uebel SF, Unzai S, Gruber AV, von Hippel PH, Wandrey C, Wang SH, Weitzel SE, Wielgus-Kutrowska B, Wolberger C, Wolff M, Wright E, Wu YS, Wubben JM, Schuck P. A multilaboratory comparison of calibration accuracy and the performance of external references in analytical ultracentrifugation. PLoS One. 2015; 10(5):e0126420. PMID: [25997164](#)

12. Dutheil N, Smith SC, Agúndez L, Vincent-Mistiaen ZI, **Escalante CR**, Linden RM, Henckaerts E. Adeno-associated virus Rep represses the human integration site promoter by two pathways that are similar to those required for the regulation of the viral p5 promoter. J Virol. 2014 Aug; 88(15):8227-41. PMID: [24829354](#)

13. Zarate-Perez F, Mansilla-Soto J, Bardelli M, Burgner JW 2nd, Villamil-Jarauta M, Kekilli D, Samsó M, Linden RM, **Escalante CR**. Oligomeric properties of adeno-associated virus Rep68 reflect its multifunctionality. J Virol. 2013 Jan; 87(2):1232-41. PMID: [23152528](#)

14. Glasmacher E, Agrawal S, Chang AB, Murphy TL, Zeng W, Vander Lugt B, Khan AA, Ciofani M, Spooner CJ, Rutz S, Hackney J, Nurieva R, **Escalante CR**, Ouyang W, Littman DR, Murphy KM, Singh H. A genomic regulatory element that directs assembly and function of immune-specific AP-1-IRF complexes. Science. 2012 Nov 16; 338(6109):975-80. PMID: [22983707](#)

15. Malu S, De Ioannes P, Kozlov M, Greene M, Francis D, Hanna M, Pena J, **Escalante CR**, Kurosawa A, Erdjument-Bromage H, Tempst P, Adachi N, Vezzoni P, Villa A, Aggarwal AK, Cortes P. Artemis C-terminal region facilitates V(D)J recombination through its interactions with DNA Ligase IV and DNA-PKcs. J Exp Med. 2012 May 7; 209(5):955-63. PMID: [22529269](#)

16. Zarate-Perez F, Bardelli M, Burgner JW 2nd, Villamil-Jarauta M, Das K, Kekilli D, Mansilla-Soto J, Linden RM, **Escalante CR**. The interdomain linker of AAV-2 Rep68 is an integral part of its oligomerization domain: role of a conserved SF3 helicase residue in oligomerization. PLoS Pathog. 2012; 8(6):e1002764. PMID: [22719256](#)

17. De Ioannes P, **Escalante CR**, Aggarwal AK. Structures of apo IRF-3 and IRF-7 DNA binding domains: effect of loop L1 on DNA binding. Nucleic Acids Res. 2011 Sep 1; 39(16):7300-7. PMID: [21596780](#)

18. Mansilla-Soto J, Yoon-Robarts M, Rice WJ, Arya S, **Escalante CR**, Linden RM. DNA structure modulates the oligomerization properties of the AAV initiator protein Rep68. *PLoS Pathog.* 2009 Jul; 5(7):e1000513. PMID: [19593381](#)
19. Gupta YK, Lee TH, Edwards TA, **Escalante CR**, Kadyrova LY, Wharton RP, Aggarwal AK. Co-occupancy of two Pumilio molecules on a single hunchback NRE. *RNA.* 2009 Jun; 15(6):1029-35. PMID: [19372537](#)
20. Roth-Walter F, Berin MC, Arnaboldi P, **Escalante CR**, Dahan S, Rauch J, Jensen-Jarolim E, Mayer L. Pasteurization of milk proteins promotes allergic sensitization by enhancing uptake through Peyer's patches. *Allergy.* 2008 Jul; 63(7):882-90. PMID: [18588554](#)
21. **Escalante CR**, Nistal-Villán E, Shen L, García-Sastre A, Aggarwal AK. Structure of IRF-3 bound to the PRDIII-I regulatory element of the human interferon-beta enhancer. *Mol Cell.* 2007 Jun 8; 26(5):703-16. PMID: [17560375](#)
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1. <https://www.sciencedaily.com/releases/2016/03/160328191851.htm>
2. <http://www.visembryo.com/story4438.html>
3. <https://phys.org/news/2016-03-crystal-transcription-terminator-protein.html>

Personal Statement

Since joining the Department of Physiology and Biophysics, I have given the opportunity to establish a productive and flourishing research program contributing to the scientific VCU research community. My initial goal was to develop a research laboratory that could integrate diverse structural biology techniques to tackle important and difficult biological problems. As my research track record shows, I have been successful in applying this approach to three major areas: (1) Studies on the mechanism of Adeno-Associated Virus mediated Site-Specific Integration with the goal of developing new gene therapy vectors; (2) Structural and Functional Studies on the mechanisms of Eukaryotic Transcription and Replication Termination and; (3) Mechanisms of transcription activation by IRF4. These studies have been awarded with three NIH grants so far. At the same time, I have helped in the development of the Physiology and Biophysics graduate program which includes my participation in several courses at the graduate and undergraduate level in multiple departments. I have designed advance courses in Molecular Physiology and Molecular Biophysical techniques and served on qualifying and thesis dissertation committees for more than 25 students. I have served as a mentor of 3 junior faculty, two postdocs, 2 PhD and 1 master's students. I have been involved in important roles in the administration of the Physiology and Biophysics department such as Assistant Graduate Program Director, member of the graduate steering and Phase 1 committees. I have a personal interest in promoting and mentoring students and since 2009 I have been participating in the SACNAS National Conference and other venues as a representative of the Biomedical Graduate Program. Outside activities include my participation in NIH and NSF grant review study sections and serving as a reviewer of several journals.

In 2015, I withdrew my tenure application due to concerns of my productivity although I had obtained R01 and R21 grants.. As I expressed in the letter for a tenure extension, I had some difficult personal problems that may have affected my productivity. However, since that time I have published 10 additional papers and received a new R01 grant in 2017.

I believe new exciting times are in the future. We are now implementing Cryo-EM techniques that will allow us to tackle many of the problems that were intractable using other structural techniques. For instance, a new project is aimed to understand the mechanism of how the packaging machinery of the Adeno-Associated Virus is able to pump DNA into the capsid. Understanding this process has enormous implication to improve the production of recombinant AAV particles to use in gene therapy trials, now a multi-million-dollar industry. A graduate student in my laboratory (Vishaka Santosh) has solved a Cryo-EM structure of Rep68 in complex with single-stranded DNA providing new insights into how these proteins function. At least three more structures are in the pipeline and I expect several high impact publications from this work. We are

also starting a new project on the transcriptional regulation of lysosomal processes by transcription factor TFEB. A VCU PREP student (Josly Pierre-Louis) has crystals that diffract to 3-4 Å. This protein is a target for potential therapeutic applications in a number of degenerative storage diseases .

I will continue my role as Assistant Program Director of the Physiology and Biophysics department. It is through this experience that I have discovered my passion to help students navigate their Ph.D. stage. I have recently participated in the NIH program 'train the trainers' to become a better mentor and implement new ideas for the VCU Doctoral program. I am also looking to establish links with local community colleges, to provide information to students who would like to start a career in the biomedical sciences and lack information and opportunities. This is particularly important because these institutions serve students from underrepresented minorities. My relationship with SACNAS will give the tools and guidance to implement these ideas. At the same time, I am currently looking to create a new undergraduate course that will focus on structural biology and protein function, something that is not in the curriculum.

I am looking forward to continuing to build my research program at VCU. I have provided a broad range of services to the Department, the community and the university,

I am looking forward in continuing developing a successful career at VCU and to increase my ties to the community.

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