DAVID A. ANDERSON III

Post-Doctoral Research Fellow

Department of Pathology and Immunology
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Native English / Fluent Spanish

MISSION

Make original contributions to science and provide opportunities for rigorous training in immunology that are founded on basic principles of genome evolution, molecular biology, and genetic drivers of immunopathology. I strive to inspire students and trainees to develop critical thinking and technical skills developed through rigorous practice of the scientific method at the technological state-of-the-art.

RESEARCH INTERESTS

My research explores gene regulation in models of hematopoiesis and immune cell function at multiple scales. We use genomic and transcriptomic techniques to determine the contribution of master transcription factors to the control of development, cellular identity, and function. We use in vivo and in vitro primary cell assays to identify novel gene regulatory loci. To establish an independent, collaborative research program, I will develop precise genetic models investigate the mechanisms by which master transcription factor and target gene expression regulate hematopoiesis, myeloid cell development and function, and leukemogenesis.

- **Genetic determinants of DNA-binding specificity.** How does DNA sequence specificity mediate master transcription factors regulation of hematopoiesis and immune cell function?
- **Selection of non-coding cis-regulatory elements.** What are the cis-regulatory elements that control cell type, tissue, and inflammatory-specific gene expression? How are they co-opted in models of myelodysplasia? What are their roles in immunopathology?
- **Evolutionary basis of master transcription factor structure and function.** How have master regulators of transcription conserved function across species while also undergoing significant structural sequence divergence?

EDUCATION

Washington University in St. Louis 2014 – 2021
Ph.D., Immunology

University of Puerto Rico at Mayaguez 2008 – 2011
Ph.D. Candidate, Biological Oceanography

Athlone Institute of Technology, Ireland 2006
Laboratory training in molecular biology and biotechnology

New College of Florida 2004 – 2008
B.A. Biology w/ Honors

APPOINTMENTS

Postdoctoral Research Fellow (NIH NCI T32) 2021 – Present
Washington University School of Medicine
Pathology & Immunology

Graduate Research Fellow (NIH F31, NSF GFRP) 2014 – 2021
Washington University in St. Louis
DBBS - Immunology

Bioinformatics Visiting Instructor & Project Manager 2013 – 2014
University of Wisconsin – Milwaukee
Public Health Informatics and Genomics

Bioengineering Consultant 2012 – 2013
Universidad Técnica Federico Santa María, Santiago, Chile

Director of Science Education & External Partnerships 2011 – 2014
The International Preparatory School, Santiago, Chile

Graduate Research Assistant 2008 – 2011
University of Puerto Rico at Mayaguez
Department of Marine Sciences

Marine Science Outreach Coordinator 2008 – 2011
University of Puerto Rico at Mayaguez
Department of Marine Sciences

FELLOWSHIPS AND AWARDS

Postdoctoral Research Fellow (T32) National Cancer Institute, NIH 2021– Present
Training in cancer immunobiology and molecular cell biology

Program for Excellence in Science, AAAS/Science 2019 – 2020
Nominated by Dean Perlmutter
Washington University School of Medicine

Graduate Research Fellow (F31), National Cancer Institute, NIH 2017 – 2021
Regulation of dendritic cell function by LMYC

Graduate Research Fellow, National Science Foundation GRFP 2014 – 2017
Genetic basis of innate immune system evolution in Cnidarians

Biotechnology Exchange Student 2006
Athlone Institute of Technology, U.S. Department of Education

Florida Bright Futures Full Merit Scholarship 2004 – 2008

Admissions Scholarship, New College of Florida 2004 – 2008

EXTRAMURAL RESEARCH SUPPORT

Exploratory/Developmental Research Grant Award (R21) - $393,750 2021 – 2023
Mechanism of c-MYC repression by IRF8 in myeloid lineages
Conceived and written by me, submitted by Kenneth Murphy (PI)
National Institute of Allergy and Infectious Disease, NIH

Lerner-Gray Fund for Marine Research - $5000 2009
Transcriptional immune responses of reef-building corals to disease
American Museum of National History

Rising Explorer Grant - $2000 2008
Coral disease field research in Honduras
The Explorers Club Youth Activity Fund

Rising Explorer Grant - $2000 2007
Coral disease field research in Honduras
The Explorers Club Youth Activity Fund

Thesis Improvement Grant - $5000 2007
Coral disease and immunity
Nellie Mae Foundation

PEER-REVIEWED PUBLICATIONS

(https://scholar.google.com/citations?user=miqJDeUAAAAJ&hl=en)

1. Kim S, Chen J, Ou F, Ferris S, Liu T, Ohara R, **Anderson DA**, Wu R, Jo S, Gillanders W, Chen M, Gillanders W, Murphy T, Murphy K (2023) IL-6 suppresses cDC1 specification via C/EBPβ. **Journal of Experimental Medicine** 220(10)
2. Ou F, Ferris S, Kim S, Wu R, **Anderson DA**, Liu T, Jo S, Chen M, Gillanders W, Murphy T, Murphy K (2023) Enhanced in vitro type 1 conventional dendritic cell generation via recruitment of hematopoietic stem cells and early progenitors by Kit ligand. **European Journal of Immunology**: doi.org/10.1002/eji.2022502011
3. Liu T, Ou F, Belk J, Bagadia P, **Anderson DA**, Durai V, Yao W, Satpathy A, Murphy T, Murphy K (2023) Cis interactions in the Irf8 locus regulate stage-dependent enhancer activation. **Genes & Development**: doi: 10.1101/gad.350339.122.
4. Wu R, Ohara RA, Jo S, Liu T, **Anderson DA**, Ferris ST, Ou F, Kim S, Theisen D, Wong B, Gershon T, Schreiber RD, Murphy TL, Murphy KM (2022) Mechanisms of CD40-dependent cDC1 licensing beyond costimulation. **Nature Immunology**
5. **Anderson DA**, Ou F, Kim S, Murphy TL, Murphy KM (2021) Transition from cMyc to L-Myc during dendritic cell development coordinated by rising levels of IRF8. **J Exp Med** 219(2): e20211483
6. Kim SK, Bagadia P, **Anderson DA**, Liu T, Huang X, Theisen DJ, O'Connor KW, Ohara RA, Iwata A, Murphy TL, Murphy KM (2020) High Amount of Transcription Factor IRF8 Engages AP1-IRF Composite Elements in Enhancers to Direct Type 1 Conventional Dendritic Cell Identity. **Immunity** 53(4): 759-774
7. **Anderson DA**, Murphy TL, Eisenman RN, Murphy KM (2020) The MYCL and MXD1 transcription factors regulate the fitness of murine dendritic cells. **PNAS** 117(9): 4885-4893
8. DeBofsky AR, Klingler RH, Mora-Zamorano FX, Walz M, Shepherd B, Larson JK, **Anderson**

DA, Yang L, Goetz F, Basu N, Head J, Tonellato P, Armstrong BM, Murphy C, Carvan MJ (2018) Female reproductive impacts of dietary methylmercury in yellow perch (*Perca flavescens*) and zebrafish (*Danio rerio*). **Chemosphere** 195: 301-311

9. Briseño CG, Gargaro M, Durai V, Davidson JT, Theisen DJ, **Anderson DA**, Novack DV, Murphy TL, Murphy KM (2017) Deficiency of transcription factor RelB perturbs myeloid and DC development by hematopoietic-extrinsic mechanisms. **PNAS** 114(15), 3957-3962
10. **Anderson DA**, Grajales-Reyes GE, Satpathy AT, Vasquez Hueichucura CE, Murphy TL, Murphy KM (2017) Revisiting the specificity of the MHC class II transactivator CIITA in classical murine dendritic cells in vivo. **European J Immunol** 47(8): 1317-1323
11. **Anderson DA**, Walz ME, Weil E, Tonellato P, Smith MC (2016) RNA-Seq of the Caribbean reef-building coral Orbicella faveolata (Scleractinia-Merulinidae) under bleaching and disease stress expands models of coral innate immunity. **PeerJ** 4: e1616
12. Tussiwand R, Everts B, Grajales-Reyes G, Kretzer NE, Iwata AM, Bagaitkar J, Wu X, Wong R, **Anderson DA**, Murphy TL, Pearce EJ, Murphy KM (2015) Klf4 Expression in Conventional Dendritic Cells Is Required for T Helper 2 Cell Responses. **Immunity** 42(5): 916-928
13. Vasquez CE, **Anderson DA**, Oyarzun M, Carvajal A, Palma C (2014) Method for the stabilization and immobilization of enzymatic extracts and its application to the decolorization of textile dyes. **Biotechnology Letters** 36(10): 1999-2010
14. **Anderson DA**, Weil E, Armstrong R (2013) Hyperspectral sensing of disease stress in the Caribbean reef-building coral, *Orbicella faveolata*. **PLoS ONE** 8(12): e81478.
15. **Anderson DA**, Gilchrist S (2008) Development of a novel method for coral RNA isolation and the expression of a programmed cell death gene in white plague-diseased *Diploria strigosa* (Dana, 1846). **Proceedings of the 11th International Coral Reef Symposium** 1: 211-215

INVITED REVIEWS

1. **Anderson DA**, Dutertre CA, Ginhoux F, Murphy KM (2021) Genetic models of human and mouse dendritic cell development and function. **Nature Reviews Immunology** (21)2: 101-115
2. **Anderson DA**, Murphy KM (2019). Models of dendritic cell development correlate ontogeny with function. **Advances in Immunology** 143: 99-119
3. **Anderson DA**, Briseno CG, Murphy KM (2018) Development, diversity, and function of dendritic cells in mouse and human. **Cold Spring Harbor Perspectives in Biology** 10(11): a028613

PRESENTATIONS

1. **Anderson DA**, Murphy TL, Murphy KM (2020) A transition from MYC to MYCL dominance identifies early specification events during the development of IRF8-dependent dendritic cell subsets. **IMMUNOLOGY2020**
    - Abstract Published, conference cancelled due to COVID
2. **Anderson DA** (2020) A transition from MYC to MYCL dominance identifies early specification events during dendritic cell development. **WUSM Immunology Seminar Series**

3. **Anderson DA** (2018) Dendritic Cell Fitness is Regulated by LMyc/Mad1 Axis. **WUSM Immunology Seminar Series**
4. **Anderson DA** (2017) The Myc/Max/Mad Axis in DC development and function. **WUSM Immunology Seminar Series** (Oral)
5. **Anderson DA**, Bagadia P, Briseno C, Grajales G, Huang X, Liu T, Wu X, Murphy TL, Murphy KM (2017) LabChip: A collection of expression microarray data of dendritic cell subsets and progenitors. **WUSM Immunology Retreat** (Poster)
6. **Anderson DA**, Murphy TL, Murphy KM (2016) Restricted transcriptional footprint of the MHC class II transactivator, Ciita, in murine classical dendritic cells. **WUSM Immunology Retreat** (Poster)
7. **Anderson DA** (2014) De novo transcriptome assembly and annotation of an endangered coral. **School of Freshwater Sciences, University of Wisconsin Milwaukee** (Invited - Oral)
8. **Anderson DA**, Smith M, Weil E (2011). Holobiont transcriptome regulation in Montastraea faveolata affected by yellow band disease: from microbial community shifts to coral innate immunity. **Aquatic Sciences Meeting** (ASLO), San Juan, PR (Poster)
9. Weil E, Ruiz H, **Anderson DA** (2011). Perspectives on coral diseases in deep coral communities off the southwest coast of Puerto Rico. **Aquatic Sciences Meeting** (ASLO), San Juan, PR (Poster)
10. **Anderson DA**, Gilchrist S, Pedersen M (2008). Coral molecular responses to disease. **11th International Coral Reef Symposium** (ICRS) Ft. Lauderdale, FL (Poster)
11. **Anderson DA**, Pedersen M (2008) Differential gene expression of diseased and healthy corals. **Society for Integrative and Comparative Biology Annual Meeting**. San Antonio, TX (Poster)
12. **Anderson DA** (2006) The incidence of coral disease on the islands of Cayos Cochinos, Honduras. **Society for Integrative and Comparative Biology Annual Meeting**. Orlando, FL (Poster)

MEMBERSHIPS

American Association for the Advancement of Science (AAAS)
American Association of Immunologists (AAI)
Society of Integrative and Comparative Biology (SICB)
Association for the Sciences of Limnology and Oceanography (ASLO)
International Coral Reef Society (ICRS)

SERVICE & OUTREACH

Immunology Post-Doc Association, Washington University School of Medicine 2022

500 Queer Scientists: https://500queerscientists.com/david-anderson/ 2020

President, OUTgrads, WUSTL Arts & Sciences 2016 – 2019
LGBTQ+ graduate student organization, Danforth and Medical Campus

Careers column, "A detour for love." Science 346 (6205):134 2014

Letter to editor, "Academia has a place for LGBT scholars." 2014
Chronicle of Higher Education

Founding Director, Engineering Outreach Experience for High School Students 2011 – 2013
Universidad Técnica Federico Santa María, Santiago, Chile

Coordinator and Judge, K-12 Science Fair 2011 – 2013
The International Preparatory School, Santiago, Chile

Member, Coral Disease Working Group, 2008 – 2010
World Bank Global Environment Facility

Boat Captain & Instructor, Marine science field trips 2008 – 2010
University of Puerto Rico – Department of Marine Sciences

Mentor, High school and undergraduate students, 2005 – 2009
Marine Science Field Research and Grant Writing
New College of Florida

FIELD RESEARCH

PADI Open Water Diver (SCUBA) 2002 -
300+ scientific dives

International Coral Disease Field Transects 2008 – 2011
Bermuda, Curacao, Cayman Islands, Grenada, Hawaii, Puerto Rico
World Bank Global Environment Facility (GEF)

Research Cruise 2009
Puerto Rico, Mona Island, Vieques, St. Croix, St. Thomas
National Oceanic and Atmospheric Administration (NOAA)

International Coral Disease Field Transects 2005 – 2009
Cayos Cochinos, Honduras
Pritzker Marine Biology Research Center
New College of Florida

COURSES TAUGHT

Teaching Assistant, Introduction to Environmental Biology, WUSTL 2015
Supervisor: Dr. Eleanor Pardini

Visiting Instructor, Applied Bioinformatics, U. Wisconsin – Milwaukee 2013 – 2014
Supervisor: Dr. Peter Tonellato

Instructor, Cambridge International Accredited Sciences 2011 – 2014
AS/A-level Physics, Chemistry, Biology (AP Equivalent)
IGCSE Physics, Chemistry, Biology (10^{th} Grade Equivalent)
The International Preparatory School, Santiago, Chile

Instructor, English as a Second Language 2011
The Chilean Economic Development Agency (CORFO)

Santiago Chamber of Conference

Teaching Assistant, Genetics, New College of Florida 2007
Supervisor: Dr. Sandra Gilchrist

Teaching Assistant, Introduction to Biology, New College of Florida 2007
Supervisor: Dr. Amy Clore

GRADUATE COURSES/EXAMINATIONS

Washington University in St. Louis

Immunology Qualifying Exam – Passed		2016
Ethics and Research Science	(BIOL5011, WUSTL)	
Advanced Topics in Immunology	(BIOL5272, WUSTL)	
Immunobiology II	(BIOL5054, WUSTL)	
Immunobiology I	(BIOL5053, WUSTL)	
Molecular Microbiology & Pathogenesis	(BIOL5392, WUSTL)	
Fundamentals of Molecular Cell Biology	(BIOL5068, WUSTL)	

University of Puerto Rico Mayaguez

Biological Oceanography Qualifying Exam – Passed		2009
Biological Oceanography	(CMOB6618, UPR)	
Physical Oceanography	(CMOF6617, UPR)	
Chemical Oceanography	(CMOQ6615, UPR)	
Geological Oceanography	(CMOG6616, UPR)	
Systematics of Marine Invertebrates	(CMOB8676, UPR)	
Special Topics in Marine Invertebrates	(CMOB8994, UPR)	
Marine Physiology	(CMOB8645, UPR)	
Ecology and Zoogeography of Coral Reefs	(CMOB8709, UPR)	
Biology of Coral Reefs	(CMOB8708, UPR)	
Pigment Physiology	(CMOB8689, UPR)	
Advanced Biometrics	(AGRO6600, UPR)	
Remote Sensing in Oceanography	(CMOF6445, UPR)	
Marine Ecology	(CMOB8656, UPR)	

REFERENCES

Kenneth Murphy, M.D., Ph.D.
Eugene Opie First Centennial Professor
Pathology & Immunology
Washington University School of Medicine
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Robert Eisenman, Ph.D.
Professor, Basic Sciences Division
Fred Hutchinson Cancer Center
Seattle, WA
eisenman@fredhutch.org
(206) 667-444

Peter Tonellato, Ph.D.
Professor
Health Management and Informatics
University of Missouri School of Medicine
tonellatop@health.missouri.edu

Robert Schreiber, Ph.D.
Andrew M. and Jane M. Bursky - Distinguished Professor, Pathology & Immunology, Washington University School of Medicine,
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