

Emma M. Lessieur Contreras, M.D., Ph.D.
CURRICULUM VITAE

EDUCATION

- M.D.; University of Tamaulipas, Tampico, México July 1997 – June 2004
- Research Assistant; National Heart Institute, México City, México July 2004 – December 2005
- Clinical Research Fellow; Retinal Vascular Center, University of Texas, Houston, TX August 2006 – June 2008
- Clinical Research Fellow; Cole Eye Institute, Cleveland Clinic, Cleveland, OH December 2008 – May 2011
- Ph.D.; Case Western Reserve University, Cleveland, OH July 2012 – May 2018
- Postdoctoral Fellow; Case Western Reserve University, Cleveland, OH September 2018 – January 2019
- Postdoctoral Scholar, Center for Translational Vision Research, University of California, Irvine, CA May 2019 –

PROFESSIONAL EXPERIENCE

Postdoctoral Scholar, University of California - Irvine, Irvine, CA May 2019 –
Center for Translational Vision Research
Mentor: Timothy S. Kern, Ph.D.

- My postdoctoral training research has provided a compelling link between neutrophil-derived neutrophil elastase (NE) and the development of micro-vasculopathy in early diabetic retinopathy. I have been investigating different pharmacological platforms to block NE activity in the eye with encouraging results.
- I have defined a potential mechanism behind the susceptibility of the retinal vasculature to leukocyte-mediated damage, and is due at least in part, to the endothelial cells' local phenotypic diversity by expression of ICAM-1.
- This work has generated two first author manuscripts and one first co-author manuscript and was funded through a National Eye Institute minority supplement postdoctoral fellowship.

Postdoctoral Fellow, Case Western Reserve University, Cleveland, OH September 2018 – January 2019
Department of Pharmacology
Mentor: Timothy S. Kern, Ph.D.

- I learned the diverse assays for the studies of diabetic retinopathy and associated conditions using mice as model system. I relocated with the laboratory to the University of California, Irvine

Graduate Student, Case Western Reserve University, Cleveland, OH July 2012 – May 2018
Cleveland Clinic Lerner College of Medicine | Molecular Medicine
Cole Eye Institute
Mentor: Brian D. Perkins, Ph.D.

- Performed a systematic study about ciliary transition zone proteins as genetic modifiers of *cep290* dependent retinal pathology using zebrafish as a model system.
- Generated an *ahil* (transition zone protein) zebrafish mutant and found that the protein is required for disc morphogenesis and outer segment maintenance in zebrafish.
- I defined that heterozygous mutant allele in ciliary genes including *ahil* and *arl13b* but not *cc2d2a* influence photoreceptor function in zebrafish with homozygous mutation in *cep290*. These findings furthered our understanding in the diverse retinal phenotypes observed in ciliopathies.
- This work generated two first author manuscripts and was funded through a National Eye Institute minority supplement graduate training.

Clinical Research Fellow, Lerner Research Institute, Cleveland, OH December 2008 – May 2011
Cleveland Clinic | Ophthalmic Research Department
Cole Eye Institute

Mentors: John W. Crabb, Ph.D. and Bela Anand-Apte, M.B.B.S.; Ph.D.

- Screening and identification of potential candidates for a variety of ocular IRB protocols.
- Blood sample collection, plasma, and tissue preservation.
- Creation of databases involved with projects pertaining to identification of biomarkers of susceptibility to ocular neovascularization, uveal melanoma and glaucoma using genomic and proteomic analysis.

Clinical Research Fellow, University of Texas, Houston, TX
Health Science Center at Houston
Retinal Vascular Center
Mentor: Charles A. Garcia, M.D.

August 2006 – June 2008

- Member in training of the Diabetic Retinopathy Clinical Research Network (DRCR.net). DRCR Protocols A – K, series of protocols related to Diabetic Retinopathy coordinated by the NEI.
- EYETECH. EOP1013. A phase 2/3 randomized, controlled, double-masked, multi-center, comparative trial, in parallel groups, to compare the safety and efficacy of intravitreal injections of 0.3 mg Pegaptanib sodium (MACUGEN), given as often as every 6 weeks for 3 years, to sham injection, in subjects with diabetic macular edema involving the center of the macula.
- SIRION. ST-601A-002a. A phase 3 multicenter, randomized, double-masked, placebo-controlled study of the safety and efficacy of difluprednate in the treatment of inflammation following ocular surgery.
- GENAERA. Phase I, II and III Clinical Trials of Squalamine lactate (EVIZON) for the treatment of minimally classic or active occult Choroidal neovascularization associated with age related macular degeneration.

Research Assistant, National Heart Institute, México City, México
Department of Pharmacology
Mentor: Aurora de la Peña, Ph.D.

July 2004 – December 2005

- Study of anticoagulant properties of steroids drugs in diabetic patients, coagulation test analysis.

Undergraduate Researcher, Instituto Mexicano del Seguro Social, Tamaulipas, México
Department of Epidemiology
Mentor: Hilario Medrano, M.D.

July 2003 – June 2004

- Screening, diagnosis, and treatment of patients with infectious diseases including patient education, data collection and data analysis.

PROFESSIONAL ACTIVITIES

Committee service

- Panelist, Women in STEM Summit April 2025
Keck's Women in STEM and Student Government, Keck Graduate Institute, Claremont, CA
- Panelist, "Different roads leading to meet goals – Successful women in STEM" Feb 2025
Association for Women in Science at University of California, Irvine
- Chair of the Chican@/Latin@ Staff Association July 2024
University of California, Irvine
- Moderator, "Graduate student and postdoc career program: Academic career, is it for me?" March 2024
American Society for Biochemistry and Molecular Biology Annual Meeting (Discover BMB), San Antonio, TX.
- Panelist, "A journey to becoming an NIH funded investigator" August 2023
NIH Diversity Supplement Professional Development Workshop, Virtual
- Co-chair of the Chican@/Latin@ Staff Association Mentorship Program July 2022 – June 2024
University of California, Irvine
- Member of the Committee of Women in Vision Research August 2021 –
Center for Translational Vision Research (CTVR)
University of California, Irvine
- Secretary of the Molecular Medicine Diversity Initiative Group (MolMed-DIG) July 2012 – May 2018
Molecular Medicine Ph.D. Program
Case Western Reserve University, Cleveland, OH

Professional Associations and Scholarly Societies

- Society for Advancement of Chicanos/Hispanics & Native Americans in Science (SACNAS) March 2024 –
- American Society for Biochemistry and Molecular Biology (ASBMB) June 2023 –
- The Association for Research in Vision and Ophthalmology (ARVO) May 2015 –

Editorial service

- Diabetologia ad hoc journal reviewer
- Frontiers in Neuroscience ad hoc journal reviewer
- Journal of Neuroimmunology ad hoc journal reviewer
- Scientific Reports ad hoc journal reviewer
- The FASEB Journal ad hoc journal reviewer

Teaching service

Guest lecturer, University of California, Irvine Fall 2020 – Fall 2024
Department of physiology and biophysics
Course: PHYSIO 272 Eye: Health and Disease
Topic: “*Retinal vasculature and diabetic retinopathy*”

Instructor, Lerner Research Institute, Cleveland, OH Spring 2018
Lerner Research Day - Middle School Students from Underrepresented Minorities
Topic: “*Embryonic Development of the Vertebrate Retina*”

Instructor, Case Western Reserve University, Cleveland, OH Summer 2017
Department of Molecular Medicine, PhD Students
Course: MMED 501 Principles of Clinical and Translational Research
Topic: Human clinical trials

Teaching Preceptor, Case Western Reserve University, Cleveland, OH Fall 2010 – Spring 2011
School of Medicine, MD Students
Course: HLTH 9011M Pre-Clerkship Electives
Topic: Intermediate Medical Spanish II

Mentoring service

- Mentor for Arianna Isabella Andrade, University of California, Irvine Spring 2024 – Spring 2025
School of Biological Sciences, BIO 199
Under my mentorship: Awardee of the 2024 Undergraduate Research Opportunities (UROP) Award at UCI
- Mentor for Jillian Jian Ling Fu, University of California, Irvine Spring 2024 – Fall 2024
School of Biological Sciences, BIO 199
- Mentor for Evan Nicholas Gelsinger, University of California, Irvine Winter 2023 – Spring 2025
School of Biological Sciences, BIO 199
Under my mentorship: Awardee of the 2024 Undergraduate Research Opportunities (UROP) Award at UCI
- Mentor for Betzaida Salvador, University of California, Irvine Fall 2023 – Spring 2024
School of Social Ecology, DREAM Program Fellow
- Mentor for Simona Pedro, University of California, Irvine Fall 2023 – Spring 2024
School of Social Sciences, DREAM Program Fellow
- Mentor for Jirote Jiyacharoen, University of California, Irvine Fall 2021 – Spring 2024
School of Biological Sciences, BIO 199
Under my mentorship: Awardee of the 2023 Undergraduate Research Opportunities (UROP) Award at UCI
Currently: Pursuing a career in medicine
- Mentor for Avanti Munje, University of California, Irvine Fall 2020 – Winter 2023
School of Biological Sciences, BIO 199
Currently: Pursuing a career in medicine
- Mentor for Genesis Marina Villalta, University of California, Irvine Fall 2022 – Spring 2023
School of Biological Sciences, DREAM Program Fellow
Currently: Volunteer at Outpatient Clinic in Anaheim, CA
- Mentor for Alice Oum, University of California, Irvine Fall 2019 – Spring 2023
School of Biological Sciences, BIO 199
Under my mentorship: Awardee of the 2022 Undergraduate Research Opportunities (UROP) Award at UCI
Currently: Pharm.D. student at Chapman University; Orange, CA

- Mentor for Fatima Elghazali, University of California, Irvine
School of Biological Sciences, BIO 199
Currently: NIH – IRTA Postbac Fellow Fall 2019 – Spring 2022
- Mentor for Ellen M. Piccillo, John Carroll University
School of Biology Fall 2017 - Spring 2018
Currently: Otolaryngology resident at Jacobs School of Medicine and Biomedical Sciences: Hamburg, NY
- Mentor for Gabrielle C. Nivar, Case Western Reserve University
School of Physics Fall 2016 - Spring 2017
Currently: Behavioral Optometrist at Kennedy Vision Therapy, Cambridge, MA

HONORS AND SPECIAL AWARDS

- Tom Angell Fellowship Award (Postdoctoral scholar) May 2024
To postdoctoral scholars contributing to student wellness and retention by mentorship
Graduate Division
University of California Irvine
- Outstanding Fellow/Resident Research Award (Basic science) June 2023
School of Medicine Annual Research Awards – Honorable mention
University of California Irvine
- Joseph M. and Eula C. Lawrence – Travel Award March 2023
To attend the Association for Research in Vision and Ophthalmology (ARVO) 2023
The Retina Research Foundation
- Vision Research Scholarship for ARVO 2023 – Travel Award January 2023
Center for Translational Vision Research & The Woman in Vision Research Committee
School of Medicine | Department of Ophthalmology
University of California Irvine
- Biennial International Symposium on Ocular Regeneration – Travel Award October 2016
Department of Ophthalmology
Harvard Medical School
- Best Intern of the Year, Hospital Español de México May 2003
School of Medicine
Universidad Autónoma de Tamaulipas, México

RESEARCH GRANTS AND FELLOWSHIPS

Grants

Retina-derived extracellular vesicles in diabetic retinopathy: their potential role in pathogenesis and therapy

NEI K99/R00 award – MOSAIC Postdoctoral Career Transition Award to Promote Diversity

Term of Award: June 2023 – May 2028

Amount: \$949,315

Role: Principal investigator

Purpose: In parallel to my postdoctoral training, I performed exploratory experiments that laid the foundation of this award, and this award describes molecular, biochemical, and pharmacological studies to expand our understanding of the pathogenesis of diabetic retinopathy, with a focus on retina-derived extracellular vesicles (including exosomes and microvesicles).

Fellowships

Role of Photoreceptors in the Pathogenesis of Diabetic Retinopathy

Timothy S. Kern, Ph.D., Principal Investigator

Granting Agency: *National Eye Institute-Minority supplement*

Term of Award: May 2020 – May 2022

Amount: \$225,000

Role: Postdoctoral scholar

Cilia assembly and transport in the vertebrate retina

Brian D. Perkins, Ph.D., Principal Investigator

Granting Agency: *National Eye Institute-Minority supplement*

Term of Award: May 2014 – August 2017

Amount: \$75,000

Role: Graduate student

Graduate student award - HHMI Med into Grad (MIG) Initiative

Granting Agency: *Howard Hughes Medical Institute*

Term of Award: July 2012 – June 2013

Amount: \$25,000

Role: Graduate student

LECTURES AND PRESENTATIONS

Invited Lectures

- **Lessieur EM** “*Extracellular vesicles in diabetic retinopathy: their potential role in pathogenesis and therapy*” University of Virginia Biomedical Engineering Department (The Emerging Leaders in BME Symposium). Charlottesville, VA. September 2024.
- **Lessieur EM** “*Neutrophil-derived extracellular vesicles from diabetic mice promote retinal endothelial cells cytotoxicity via NE-GSDMD axis*” American Society for Biochemistry and Molecular Biology Annual Meeting (Discover BMB). San Antonio, TX. March 2024.
- **Lessieur EM** “*The eye: the organ with the stickiest vasculature in diabetes*” Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS). Anaheim, CA. November 2022.
- **Lessieur EM, Kern TS** “*Neutrophil-derived extracellular vesicles in diabetic retinopathy*” Center for Translational Vision Research – Ophthalmology Research Seminar: Distinguished Speaker Visitor Dr. Michael F. Chiang (NEI Director), University of California-Irvine. Irvine, CA. September 2022.
- **Lessieur EM, Kern TS** “*The role of the visual cycle in retinal capillary degeneration in diabetes*” Gavin Herbert Eye Institute - Ophthalmology Grand Rounds, University of California-Irvine. Irvine, CA. September 2022.
- **Lessieur EM, Kern TS** “*Leukocytes, adhesion molecules, and vascular damage in early diabetic retinopathy*” International Center for Translational Eye Research & The Department of Physical Chemistry of Biological Systems. Warsaw, Poland. April 2022.
- **Lessieur EM, Kern TS** “*Neutrophils, neutrophil elastase, and vascular damage in prodromal diabetic retinopathy*” Center for Translational Vision Research - Ophthalmology Research Seminar: Distinguished Speaker Series, University of California-Irvine. Irvine, CA. July 2020.
- **Lessieur EM, Perkins, BD.** “*The Joubert Syndrome Proteins Arl13b and Ahi1 differentially modify the severity of retinal degeneration due to loss of Cep290*” Cleveland Clinic, Cole Eye Institute, Departmental Research Report, April 2017
- **Lessieur, EM, Perkins, BD.** “*Genetic mechanisms driving phenotypic variability in ciliopathies*” Cleveland Clinic, Cole Eye Institute, Departmental Research Report, February 2016.

Posters

- **Lessieur EM, Gao FY, Bollinger ZR, Gelsinger EN, Villalta GM, Salvador BY, Andrade AI, Kern, TS.** “*Retina extracellular vesicles and diabetic retinopathy*” The Association for Research in Vision and Ophthalmology (ARVO), May 2025
- **Lessieur EM, Du Y, Saadane A, Kiser J, Oum A, Lee CA, Tang J, Kern TS.** “*Theophylline inhibits capillary degeneration and neural dysfunction of early diabetic retinopathy*” UCI Gavin Herbert Eye Institute, Discovery Center for Eye Research, Bench to Bedside Symposium, June 2024
- **Lessieur EM, Gao FY, Du Y, Ratitong B, Jiyachoen J, Kiser J, Pearlman E, Kern TS.** “*Neutrophil-derived extracellular vesicles from diabetic mice promote retinal endothelial cell cytotoxicity via NE-GSDMD axis*” FASEB Summer Conference on the Biology and Chemistry of Vision, June 2023
- **Lessieur EM, Gao FY, Du Y, Jiyachoen J, Kiser J, Kern TS.** “*Neutrophil-derived extracellular vesicles from diabetic mice promote retinal endothelial cell cytotoxicity*” The Association for Research in Vision and Ophthalmology (ARVO), April 2023

- **Lessieur EM**, Saadane A, Du Y, Liu H, Tang J, Kiser J, Kern TS. “Partial deletion of *Lrat* inhibits the prodromal characteristics of diabetic retinopathy: Updates” UCI Gavin Herbert Eye Institute, Discovery Center for Eye Research, Bench to Bedside Symposium, June 2022
- **Lessieur EM**, Saadane A, Du Y, Liu H, Tang J, Kiser J, Kern TS. “Partial deletion of *Lrat* inhibits the prodromal characteristics of diabetic retinopathy” The Association for Research in Vision and Ophthalmology, May 2022
- **Lessieur EM**, Zhang W, Li L, Nivar GC, Piccillo EM, Song P, Perkins BD, Khanna H "Mutations in zebrafish *cep290* result in age-related cone degeneration" The Association for Research in Vision and Ophthalmology (ARVO), May 2017
- **Lessieur EM**, Fogerty J, Gaivin RJ, Song P, Perkins BD "The ciliopathy gene *ahi1* is required zebrafish cone photoreceptor outer segment morphogenesis" Cleveland Clinic Lerner College of Medicine, 7th Annual Molecular Medicine PhD Program Student Research Showcase, October 2016
- **Lessieur, EM**, Fogerty, J, Song, P, Perkins, BD "The Joubert Syndrome protein *Ahi1* is required for cone outer segment formation in zebrafish" CCF, The Association for Research in Vision and Ophthalmology (ARVO), May 2016
- **Lessieur, E.**, Perkins, B. "The zebrafish *cep290*^{fh297} mutant affects cones photoreceptor structure in adults (UPDATES)" Cleveland Clinic Lerner College of Medicine, Molecular Medicine PhD Program Student Research Showcase, October 2015
- **Lessieur, E.**, Perkins, B. "The zebrafish *cep290*^{fh297} mutant affects cones photoreceptor structure in adults" CCF, The Association for Research in Vision and Ophthalmology (ARVO), May 2015
- **Lessieur, E.**, Perkins, B. "TALEN-induced targeted mutations in the zebrafish *ahi1* gene " Cleveland Clinic Lerner College of Medicine, Molecular Medicine PhD Program Student Research Showcase, September 2014

PUBLICATION AND BIBLIOGRAPHY

RESEARCH PAPERS – Peer reviewed

A. PUBLISHED

1. Tan K, **Lessieur EM**, Cutler A, Nerone P, Vasanji A, Asosingh K, Erzurum S, Anand-Apte B. “Impaired function of circulating CD34(+) CD45(-) cells in patients with proliferative diabetic retinopathy.” *Exp Eye Res* 2010 DOI: 10.1016/j.exer.2010.05.012
2. Bell BA, Yuan A, Diccico RM, Fogerty J, **Lessieur EM**, Perkins BD. "The adult zebrafish retina: In vivo optical sectioning with Confocal Scanning Laser Ophthalmoscopy and Spectral-Domain Optical Coherence Tomography." *Experimental Eye Research* 2016 DOI: 10.1016/j.exer.2016.10.001
3. **Lessieur EM**, Fogerty J, Gaivin RJ, Song P, Perkins BD. “The Ciliopathy Gene *ahi1* Is Required for Zebrafish Cone Photoreceptor Outer Segment Morphogenesis and Survival.” *IOVS* 2017 DOI: 10.1167/iovs.16-20326
4. **Lessieur EM**, Song P, Nivar GC, Piccillo EM, Fogerty J, Rozic R, Perkins BD. “Ciliary genes *arl13b*, *ahi1* and *cc2d2a* differentially modify expression of visual acuity phenotypes but do not enhance retinal degeneration due to mutation of *cep290* in zebrafish”. *PLoS One* 2019 DOI: 10.1371/journal.pone.0213960
5. Liu H, **Lessieur EM**, Saadane A, Lindstrom SI, Taylor PR, Kern TS. “Neutrophil elastase contributes to the pathological vascular permeability characteristic of diabetic retinopathy”. *Diabetologia* 2019 DOI: 10.1007/s00125-019-04998-4
6. Saadane A, **Lessieur EM**, Du Y, Liu H, Kern TS. “Successful induction of diabetes in mice demonstrates no gender difference in development of early diabetic retinopathy”. *PLoS One* 2020 DOI: 10.1371/journal.pone.0238727
7. Saadane A, Du Y, Thoreson WB, Miyagi M, **Lessieur EM**, Kiser J, Wen X, Berkowitz BA, Kern TS. “Photoreceptor cell calcium dysregulation and calpain activation promote pathogenic photoreceptor oxidative stress and inflammation in prodromal diabetic retinopathy”. *Am J Pathol* 2021 DOI: 10.1016/j.ajpath.2021.06.006.
8. **Lessieur EM**, Liu H, Saadane A, Du Y, Tang J, Kiser J, Kern TS. “Neutrophil-derived proteases contribute to the pathogenesis of early diabetic retinopathy”. *IOVS* 2021 DOI: 10.1167/iovs.62.13.7.
9. Cruz MA, Bohinc D, Andraska EA, Alvikas J, Raghunathan S, Masters NA, van Kleef ND, Bane KL, Hart K, Medrow K, Sun M, Liu H, Haldeman S, Banerjee A, **Lessieur EM**, Hageman K, Gandhi A, de la Fuente M, Nieman MT, Kern TS, Maas C, de Maat S, Neeves KB, Neal MD, Gupta AS, Stavrou EX “Nanomedicine Targeting to Activated Neutrophils and Neutrophil-Platelet Complexes Using an α_1 -antitrypsin-derived Peptide Motif”. *Nature Nanotechnology* 2022 DOI:10.1038/s41565-022-01161

10. **Lessieur EM**, Liu H, Saadane A, Du Y, Kiser J, Kern TS. “ICAM-1 on the luminal surface of endothelial cells is induced to a greater extent in mouse retina than in other tissues in diabetes”. *Diabetologia* 2022 DOI: 10.1007/s00125-022-05719-0
11. Saadane, A, Veenstra A, Minns M, Tang J, Du Y, Elghazali FA, **Lessieur EM**, Pearlman E, Kern TS. “CCR2-positive monocytes contribute to the pathogenesis of early diabetic retinopathy in mice”. *Diabetologia* 2023 DOI: 10.1007/s00125-022-05860-w
12. Luu JC, Saadane A, Leinonen H, Choi EH, Gao FY, Lewandowski D, Halabi M, Sander CL, Wu A, Wang JM, Singh R, Gao S, **Lessieur EM**, Dong Z, Palczewska G, Mullins RF, Peachey NS, Kiser PD, Tabaka M, Kern TS, Palczewski K. “Stress resilience-enhancing drugs preserve tissue structure and function in degenerating retina via phosphodiesterase inhibition”. *PNAS* 2023 doi: 10.1073/pnas.2221045120
13. Chandrakumar S, Santiago Tierno I, Agarwal M, **Lessieur EM**, Du Y, Tang J, Kiser J, Yang X, Kern TS, Ghosh K. “Mechanical regulation of retinal vascular inflammation and degeneration in diabetic retinopathy”. *Diabetes* 2023 DOI: 10.2337/db23-0584.

B. IN-PRESS

1. **Lessieur EM**, Kern TS. “Quantification of diabetes-induced adherent leukocytes in retinal vasculature (Leukostasis)”
Invited Methods Article – JoVE

C. SUBMITTED

1. **Lessieur EM**, Saadane A, Du Y, Liu H, Tang J, Kiser J, Kern TS. “Partial deletion of *Lrat* inhibits the prodromal characteristics of diabetic retinopathy”. *JBC*

PAPERS IN PREPARATION – Research completed

1. **Lessieur EM**, Du Y, Saadane A, Kiser J, Lee CA, Tang J, Oum A, Kern TS. “Theophylline inhibits capillary degeneration and neural dysfunction of early diabetic retinopathy”.
2. **Lessieur EM**, Saadane A, Du Y, Liu H, Kiser J, Kern TS. “Gasdermin-D and the development of early diabetic retinopathy”.
3. **Lessieur EM**, Gao FY, Jiyacharoen J, Du Y, Saadane A, Kiser J, Kern TS. “Neutrophil-derived extracellular vesicles from diabetic mice promote retinal endothelial cell cytotoxicity”.