Michael I. Dorrell Ph.D.

Professor of Biology: Point Loma Nazarene University
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Professional Preparation

Institution	Major	Degree	Year
Simpson College (IA)	Chemistry / Math (3.98gpa)	B.A.	1998
The Scripps Research Institute	Biomedical Research	Ph.D.	2003
The Scripps Research Institute	Cell and Developmental Bio	Post-doc	2004-2009

Appointments

11/15 – present **Full professor of Biology: Point Loma Nazarene University**
- Teaching various biology courses at all levels including GE, freshman majors, upper division requirements and electives, and graduate courses.
- Continued research studying targeted methods of treating glioblastoma brain cancers. Focuses on anti-angiogenic treatments and ADEP therapy.

08/12 – 11/15 **Associate professor: Point Loma Nazarene University**

08/09 – 08/12 **Assistant professor: Point Loma Nazarene University**

06/13 – 08/14 **Senior staff scientist: Lowy Medical Research Institute**
- 15 month leave from PLNU (two summers and intervening academic year)
- Established a new institute dedicated to the study of degenerative eye disease.
- Devised and tested hypotheses of the causes of MacTel based on clinical and basic research findings.
- Coordinated MacTel-based clinical and basic research around the globe.
- Continue to consult as a staff scientist 20% of my time.

08/09 – present **Adjunct assistant professor: The Scripps Research Institute**

2010 – 2012 **Research consultant: EyeCyte Inc.**

2007- 2009 **Adjunct professor: University of San Diego.**
- Taught 1 course per semester in conjunction with my post-doctoral work.
- Bio 104 (topics in human biology); Bio225 (Introduction to Cell Processes); Bio300 (Genetics); Bio495 (Senior Seminar)

04/05-08/09 **Postdoctoral fellow (Research Associate), The Scripps Research Institute**
- Explored cell-based therapies for the treatment of vascular diseases
- Explored combination angiostatic therapies for treating glioblastoma cancers.

05/04-04/05 **Research Scientist, Angiosyn Inc.** San Diego, CA
- Investigating the use of an angiostatic molecule (T2-TrpRS), characterized during my graduate work, for use in the clinic (purchased in ’05 by Pfizer)

09/03-05/04 **Research Consultant, Angiosyn Inc**. San Diego, CA
- Testing angiostatic compounds using models of retinal neovascularization.

05/03-05/04 **Research Associate, The Scripps Research Institute,** La Jolla, CA
- Role of tissue factor during developmental retinal angiogenesis
- Receptor identification, biochemical purification and characterization

1998-05/03 **Graduate student, The Scripps Research Institute,** La Jolla, CA
Thesis: “Endothelial Cell Guidance and Vascular Patterning during Retina Development”

2000-2001 **Research Consultant, Nanogen Inc.** San Diego, CA
- NanoChip Division, Analysis of Gene Expression Project

Teaching Experience

Point Loma Nazarene University

- University Now; Outreach program to under-priveleged high school students where we teach the students Bio101 (General elective human biology) and writing.
- Human Biology and Bioethics (Bio101), General education elective
- Cell Biology and Biochemistry (Bio210), Introductory level course for Biology majors
- Research Methodology (Bio301), Biology major's quad course. I specifically designed this course to teach students how to think like a scientist. The core project of the course is for the students to research the literature and create a novel grant proposal in biology.
- Advanced Cell Biology (Bio350), Biology major's course. I completely re-designed this course to reflect active learning in the manner of a "flipped course" whereby the students learn and teach each other content prior to coming to class to grapple with higher level concepts and projects.
- Developmental Biology (Bio400), Biology major's upper division elective. I added a half-semester laboratory project whereby students design and implement their own experiments studying teratogens and their effects on zebrafish development.
- Graduate-level Cell Biology (Bio663), 3-week intensive summer course for biology master's students to teach in-depth topics in cell function.
- Graduate-level Developmental biology (Bio664), 3-week intensive summer course for biology master's students: principles of development, cell differentiation, and evolution.
- Perspectives on Science (Bio695), Graduate level journal club style course.

University of San Diego

- Topics in human biology (Bio104), General biology course for non-majors
- Introduction to Cell Processes (Bio225), Cell and molecular biology course for biology and chemistry majors
- Genetics (Bio300), Genetics course for biology majors
- Genetics lab (Bio300L), Separate lab course designed to teach genetics laboratory methods
- Senior seminar (Bio495), Analysis and presentation of primary literature for senior biology majors

The Scripps Research Institute

- Undergraduate research supervisor
- Director of the Scripps Outreach Programs; organized curriculum for a 10 week course preparing high school students for summer internships in biomedical research, and an 8 week program presenting high school teachers with current theories and experimental methods in biomedical research
- Teacher in the Scripps Outreach Program; various courses including immunology, virology, cell and molecular biology, structural biology, and bioinformatics.

Bowdoin College (1 semester); Assisted professors through direct lecture and lab presentations

- Virology (Bio303), Human Genetics (Bio255), Topics in Neuroscience (Bio325), Introduction to Biology (Bio104), Cell Biology (Bio224), Biochemistry lab (Bio263)

Synergistic Activities

1999 - *present* **Undergraduate research mentor (TSRI and PLNU)**:

- Mentored multiple undergraduate students in the design and implementation of independent research projects. Several undergraduates became co-authors on publications.

2000 - present **Member: Association for Research in Vision and Ophthalmology**

- Yearly attendance and invited oral research presentations (‘02, ‘03, ’04, ‘05, ‘07, ‘08, ’09, ‘14) at the annual meeting for vision research (ARVO).

Spring 1999 - 2003 **Director / Teacher: Scripps Outreach Programs:**

- Annually organized curriculum and taught a 10 week course preparing high school students for summer internships in biomedical research at The Scripps Research Institute.
- Annually organized and taught an 8 week course at TSRI presenting high school teachers with current theories and experimental methods in biomedical research.

2004 – present ***Ad hoc*** **reviewer (*Nature Medicine, IOVS, Retina, Exp. Eye Research, PLoS One, Journal of Clinical Investigation*)**

Honors and Awards

2010, 2012	RASP grant; Point Loma Nazarene University
2006 – 2009	California Institute of Regenerative Medicine (CIRM) fellowship
2000-20003	Achievement Recognition for Collegiate Scientists (ARCS) fellowship
2003	Travel Grant – Association for Research in Vision and Ophthalmology
2002	Travel Grant - International Society of Differentiation
1998	Awards for Top Student in Chemistry and Mathematics, Simpson

Selected Volunteer Work

Tierresanta Lutheran Church: Youth Sunday school teacher; 2011 – present.
Tierresanta Lutheran Church: Vacation bible school coordinator and volunteer; 2010 – present.
St. Marks United Methodist Church: Youth fellowship leader 1998 - 2007.
St. Marks United Methodist Church: Pastoral and church relations committee 2000 - 2004
Youth soccer coach: Coached youth soccer at the YMCA and in AYSO 2007 - 2012
‘Kickin-it’ annual charity soccer event: Co-organizer and volunteer 2005-2009; (local charity event envisioned, organized, and implemented by my co-ed soccer team to help local families in need).

Publications: (* indicates undergraduate interns under my mentorship included as co-authors)

*1) Usui Y, Westenskow PD, Kurihara T, Aguilar E, Sakimoto S, Paris LP, Wittgrove C, Feitelberg D, Friedlander MS, Moreno SK, **Dorrell MI (co-corresponding author)**, Friedlander M. (2015) Neurovascular crosstalk between interneurons and capillaries is required for vision. *J Clin Invest*. Jun;125(6):2335-46

*2) **Michael I. Dorrell**, Michael Marcacci, Stephen Bravo, Troy Kurz, Jacob Tremblay, Jack C. Rusing. (2012) Ex Ovo Model for Directly Visualizing Chick Embryo Development. *American Biology Teacher (ABT)*. Nov/Dec 2012;74(9): 628 – 634.

*3) Weidemann A, Krohne TU, Aguilar E, Kurihara T, Takeda N, **Dorrell MI**, Simon MC, Haase VH, Friedlander M, Johnson RS. (2010) Astrocyte hypoxic response is essential for pathological but not developmental angiogenesis of the retina. *Glia* Aug;58(10):1177-85

*4) **Michael I. Dorrell,** Edith Aguilar, Ruth Jacobson, Sunia A. Trauger**,** Jeffrey Friedlander, Gary Siuzdak, Martin Friedlander. (2010) Rescuing astrocytes normalizes revascularization and prevents vascular pathology associated with oxygen induced retinopathy. *Glia* Jan 1;58(1):43-54.

5) **Michael I. Dorrell,** Edith Aguilar, Ruth Jacobson, Ray Gariano, John Heckenlively, Eyal Banin, G. Anthony Ramirez, Mehdi Gasmi, Alan Bird, Martin Friedlander. (2009) Antioxidant or neurotrophic factor treatment preserves function in a mouse model of neovascularization-associated oxidative stress. *J Clin Invest*. March;119(3):611-623.

6) **Michael I. Dorrell,** Edith Aguilar, Lea Scheppke, Faith Barnett, Martin Friedlander. (2007) Combination angiostatic therapy completely inhibits ocular and tumor angiogenesis. *Proc. Natl. Acad. Sci.* Jan 16;104(3): 967-972.

7) Matthew R. Ritter, Eyal Banin, Stacey K. Moreno, Edith Aguilar, **Michael I. Dorrell**, and Martin Friedlander. (2006) Myeloid progenitors differentiate into microglia and promote vascular repair in a model of ischemic retinopathy. *J Clin Invest.* Dec;116(12):3266-76.

*8) **Michael I. Dorrell**[1], Eyal Banin[1], Edith Aguilar, Chris M. Aderman, Alex C. Smith, Jeffrey Friedlander, Martin Friedlander (2006) T2-TrpRS inhibits preretinal neovascularization and enhances physiological vascular regrowth in OIR as assessed by a new method of quantification. *Invest Ophthalmol Vis Sci*. May;47(5): 2125-2134.

9) Atsushi Otani, **Michael I. Dorrell**, Karen Kinder, Stacey K. Moreno, Steven Nusinowitz, Eyal Banin, John Heckenlively, and Martin Friedlander. (2004) Rescue of retinal degeneration by intravitreally injected adult bone marrow-derived lin- hematopoietic stem cells. *J Clin Invest* Sept;114(6):765-774.

10) **Michael I. Dorrell[1],** Mattias Belting[1], Staffan Sandgren, Edith Aguilar, Jasimuddin Ahamed, Andrea Dorfleutner, Peter Carmeliet, Barbara M. Mueller, Martin Friedlander, and Wolfram Ruf. (2004) Regulation of angiogenesis by tissue factor cytoplasmic domain signaling. *Nat Med*. May;10(5):502-509.

11) **Michael I. Dorrell,** Atsushi Otani, Edith Aguilar, Stacey K. Moreno, and Martin Friedlander. (2004) Targeting of bone-marrow derived hematopoietic stem cells to the developing retinal vasculature is mediated by R-cadherin. *Blood*. May 1;103(9): 3420-3427.

*12) **Michael I. Dorrell,** Edith Aguilar, Christoph Weber, and Martin Friedlander. (2004) Global analysis of gene expression during mouse retina development. *Invest Opthalmol Vis Sci*. Mar;45(3):1009-19.

*13) Matthew R. Ritter, Stacey K. Moreno, **Michael I. Dorrell**, *et al*. (2003) Identifying potential regulators of infantile hemangioma progression through large-scale expression analysis – A possible role for the immune system during involution. *Lymphatic Res. Biol*. April;1(4):291-300.

14) **Michael I. Dorrell**, Edith Aguilar, and Martin Friedlander (2002) Retinal vascular development is mediated by endothelial filopodia, a pre-existing astrocytic template, and Specific R-cadherin adhesion. *Invest Opthalmol Vis Sci.* Nov:43(11):3500-3510.

15) Matthew R. Ritter, **Michael I. Dorrell**, Joseph Edmonds, Sheila Friedlander and Martin Friedlander (2002) Insulin-like growth factor 2 and potential regulators of hemangioma growth and involution identified by large-scale expression analysis. *Proc. Natl. Acad. Sci.* May 28;99(11):7455-60.

16) Atsushi Otani, Bonnie M. Slike, **Michael I. Dorrell**, John Hood, Karen Kinder, Karla L. Ewalt, David Cheresh, Paul Schimmel, and Martin Friedlander (2002) A fragment of human TrpRS as a potent antagonist of ocular angiogenesis. *Proc. Natl. Acad. Sci.* Jan 8;99(1):178-83.

17) Hans E. Purkey, **Michael I. Dorrell**, and Jeffrey Kelly (2001) Evaluating the binding selectivity of transthyretin amyloid inhibitors in blood plasma. *Proc. Natl. Acad. Sci.* May 8;98(10):5566-71.

Invited Reviews

Edith Aguilar, **Michael I. Dorrell**, David Friedlander, et al. (2008) Ocular Models of Angiogenesis. *Methods Enzymol*. 444:115-58.

Martin Friedlander, **Michael I. Dorrell**, Matthew R. Ritter, et al. (2007) Progenitor cells and retinal angiogenesis. *Angiogenesis.* March;10(2):89-101.

Michael I. Dorrell, Hannele Uusitalo, Edith Aguilar, Martin Friedlander. (2007) Ocular angiogenesis; basic mechanisms and therapeutic advances. *Survey of Ophthalmology*. Jan; 52(sup. 1): S3-S19.

Michael I. Dorrell, Martin Friedlander. (2006) Mechanisms of endothelial cell guidance during retinal vascular development. *Progress in Retinal and Eye Research*. May;25(3):277-95.

Book Chapters

Yoshihiko Usui, Peter D. Westenskow, Salome Murinello, **Michael I. Dorrell**, Leah Scheppke, Felicitas Bucher, Susumu Sakimoto, Liliana P. Paris, Edith Aguilar, and Martin Friedlander. Angiogenesis and Eye Disease. *Annual Review of Vision Science*. Volume 1, 2015. J.A. Movshon and B.A. Wandall (co-editors). Annual Reviews, Palo Alto, CA. USA. 2015. Pages 155 – 184.

Michael I. Dorrell and Martin Friedlander. Retinal vascular and retinal pigment epithelium gene expression. *Eye, Retina, and Visual System of the Mouse.* L.M. Chalupa and R.W. Williams (Eds). MIT Press. USA. 2008. Pages 685-696.

Michael I. Dorrell, Martin Friedlander, Lois E. H. Smith. Retinal vascular development. *Retinal Vascular Disease.* A.M. Joussen, T.W. Gardner, B. Kirchhof, and S.J. Ryan (Eds). Springer. Germany, 2007. Pages 24-35.

Patents:

U.S. Provisional Patent, Serial No. 60/562,821, "Methods of Modulating Vascularization"
U.S. Provisional Patent, Serial No. 60/577,156, "Compositions and Methods for Treatment of Neovascular Diseases"
U.S. Provisional Patent, Serial No. 10/836,289. "Selective R-Cadherin Antagonists and Methods"