

Oct. 2011

CURRICULUM VITAE

W. MATTHEW PETROLL, PH.D.

Work Address: Department of Ophthalmology
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EDUCATION

B.S.E., Biomedical Engineering, Duke University, May 1984.

M.E., Biomedical Engineering, University of Virginia, January, 1987.
Area of Concentration: Computer Applications to Medicine and Biology.

Ph.D., Biomedical Engineering, University of Virginia, May, 1989.
Area of Concentration: Digital Image Processing.

PROFESSIONAL EXPERIENCE

Instructor, *Center for Sight*, Georgetown University Medical Center, September 1989 - September 1991.

Assistant Professor (Research Track), *Department of Ophthalmology*, University of Texas Southwestern Medical Center at Dallas, September 1991 – August 1997.

Associate Professor (Research Track), *Department of Ophthalmology*, University of Texas Southwestern Medical Center at Dallas, September 1997 – August 2005.

Member, *Joint Graduate Studies Committee in Biomedical Engineering*, University of Texas Southwestern Medical Center at Dallas and University of Texas at Arlington, September 1991 - present.

Professor (Research Track), *Department of Ophthalmology*, University of Texas Southwestern Medical Center at Dallas, September 2005 – August 2008.

Professor (Tenure Track), *Department of Ophthalmology*, University of Texas Southwestern Medical Center at Dallas, September 2008 - present.

AREAS OF INTEREST

Cell Motility and Mechanics
Digital Imaging Processing
In Vivo Confocal Microscopy
Biomechanics and Wound Healing
Corneal Cell Biology

HONORS

Research to Prevent Blindness Manpower Award
(\$20,000 in unrestricted research funds; awarded 7/1/96)

Research to Prevent Blindness Olga Keith Weiss Scholar Award
(\$50,000 in unrestricted research funds; awarded 6/15/99)

Research to Prevent Blindness Lew R. Wasserman Merit Award
(\$55,000 in unrestricted research funds; awarded 7/1/2004)

Research to Prevent Blindness Senior Scientific Investigator Award
(\$75,000 in unrestricted research funds; awarded 1/1/2008)

Fellow, Association for Research in Vision and Ophthalmology (2009), Silver Level

REVIEW PANELS

National Institutes of Health, *Small Business Innovative Research (SBIR) Grants*, Bioengineering and Physiology Study Section, February and June, 2000.

National Institutes of Health, *Bioengineering Research Grants*, July 2000.

National Institutes of Health, *R03 Small Grants for Pilot Research*, November 2002.

National Institutes of Health, *Small Business Innovative Research (SBIR) Grants*, Medical Imaging Study Section, June 2004.

National Institutes of Health, *Surgery, Anesthesiology and Trauma Member Conflict Study Section*, July 2008.

National Institutes of Health, *Stem Cell Challenge Grants*, Stage 1 Reviewer, September 2009.

Fight for Sight *Grants in Aid* and *Post-Doctoral Fellowship* Review Panel, January 2001 – present.

Reviewer for Tear Film & Ocular Surface Society, ARVO Travel Awards, 2009 – present.

Member, National Institutes of Health, National Eye Institute *Anterior Eye Disease* Study Section, July 2006 – June 2010.

National Institutes of Health, *CounterACT U-54* Study Section, March 2011.

INTELLECTUAL PROPERTY

Primary Creator, “Image Acquisition Software” (specialized software for acquisition and analysis of *in vivo* confocal microscopy images). Licensed to Tandem Scanning Corporation (Reston, VA) by the University of Texas Southwestern Medical Center at Dallas on 11/21/94.

Primary Creator, “Depth encoding Software” (specialized software for control and display of focal plane position during *in vivo* confocal microscopy). Licensed to Tandem Scanning Corporation (Reston, VA) by the University of Texas Southwestern Medical Center at Dallas on 11/21/94.

Primary Creator, “On-line 3-D confocal software” (specialized software for on-line acquisition and analysis of 3-dimensional *in vivo* confocal microscopy images). Currently licensed to University of Helsinki, University of Indiana, Case Western Reserve University, Alcon Laboratories, and Aarhus University, Denmark.

OTHER ACADEMIC ACTIVITIES

Editorial Board Member, *Cornea*, May 1993 - January 1996.

Editorial Board Member, *Scanning Journal*, May 1995 - present.

Web Page Oversight Committee, Department of Ophthalmology, 1997 – 2004.

Member, Intellectual Property Advisory Committee, University of Texas Southwestern Medical Center, September 1997 – present.

Editorial Board Member, *Eye and Contact Lens*, January 2002 – present.

Member, Program Planning Committee for Association for Research in Vision and Ophthalmology (ARVO) Annual Meeting (Cornea Section), May 2002 – May 2005 (Co-Chair for 2005 meeting)

Session Co-chair, *Forces at Cellular and Molecular Levels*, Biomedical Engineering Society Annual Meeting, October, 2009.

Editorial Board Member, *Experimental Eye Research*, September 2010 - present.

Session Co-chair, *Corneal Regeneration and Modeling*, 2012 Cornea Gordon Research Conference.

MEMBERSHIPS

IEEE Computer Society, 1990-1995.

Biomedical Engineering Society (BMES), 1985-present.

Association for Research in Vision and Ophthalmology (ARVO), 1989-present.

American Society for Cell Biology (ASCB), 1994-present.

TEACHING

Administrative:

Ph.D. Diagnostic Exam Coordinator (BME 6194), Joint Graduate Studies Program in Biomedical Engineering, September 1998 – present.

Curriculum Committee, Joint Graduate Studies Program in Biomedical Engineering, 9/2006 – present.

Member, Bioengineering Departmental Promotion and Tenure Committee, U.T. Arlington, 2009 – present.

Graduate Student Trainees:

Masters Project Supervisor, Keith Boettcher, 1/93-12/93. "Determination of Keratocyte Density versus Thickness in Rabbit Cornea using 3-D Imaging Techniques."

Masters Project Supervisor, Amy McKinney, 1/94-10/94. "An Analytical Model of the Effect of Changes in Hydration on Corneal Biomechanics."

Dissertation Research Supervisor, Partha Roy, 1/94 – 12/97. "An in vitro force measurement assay to study the early mechanical interaction between corneal fibroblasts and collagen matrix."

Masters Thesis Supervisor, Jie Li, 7/98 – 6/2000. "An integrated system for on-line 3-dimensional confocal imaging *in vivo*."

Masters Thesis Supervisor, Mridula Vishwanath, 6/2002 – 12/2003. "Role of Rho and Rac in the Response of Corneal Fibroblasts to Changes in Mechanical Stress."

Dissertation Research Supervisor, Areum Kim, 9/2004 – 5/2008. "Investigation of Cell Morphology and Cell-induced 3-D Matrix Reorganization using Laser Scanning Confocal Microscopy (LSCM)."

Masters Thesis Supervisor, Saurabh Vaidya, 8/2010 – 6/2011. "Development of Analysis and Display Software for the HRT-RCM In Vivo Confocal Microscope."

Dissertation Research Supervisor, Chengxin Zhou, 9/2008 – present. "Dynamic Assessment of Corneal Keratocyte Migration Mechanics in 3-D Culture."

Post-Doctoral Trainees:

Alex Yu, Ph.D. 7/1998 – 7/2000. "Development of a Corneal Pachymeter and Profilometer."

Dimitris Karamichos, Ph.D. 7/2006 – 6/2008. "Mechano-regulation of Corneal Fibroblasts in 3-D Collagen Matrices."

Areum Kim, Ph.D. 7/2008 – 2/2010. "Growth Factor Regulation of Corneal Keratocyte Mechanical Behavior."

Miguel Miron, Ph.D. 2/2010 – 1/2011. "Keratocyte Migration Mechanics: Fibrin vs. Collagen"

Medical Student Trainees (UT Southwestern Summer Student Research Program):

Joseph Hsu, Summer, 1998.

Timmy Kovoor, Summer, 2002.

Andrea Kim, Summer, 2003.

Linda Ly, Summer, 2004 and 2005.

Sara Lindsey, Summer 2005

Michael Hu, Summer 2006

Xihui Lin, Summer, 2009

Matthew Weaver, Summer 2010

Peter Ririe, Summer 2010

Undergraduate Student Trainees:

Mary Black, Summer, 2004 (SURF Program).

Brook Hyatt, Summer, 2005 (SURF Program).

Omar Hariri, Summer, 2009.

Devanish Trivedi, Spring, 2011 (Green Fellowship Program)

Cyonna Holmes, Summer 2011 (SURF Program)

Other Mentoring:

Mentor for Basit Khan (high school senior), Frisco Independent School District Independent Study & Mentorship Program, 2008-2009.

Lectures:

Lecturer, BME 5382, "Laboratory Principles"
University of Texas Southwestern Medical Center, Spring 1992 - 1995.

Lecturer, BME 4325, "Introduction to Biomedical Engineering"
University of Texas at Arlington, 1991 - 2004.

Lecturer, BME 5101, "Seminar in Biomedical Engineering"
University of Texas Southwestern Medical Center, 2005 - present.

Biostatistics 1 and 2, "Ophthalmology Resident Lecture Series"
University of Texas Southwestern Medical Center, 2005 - present.

Clinical Confocal Microscopy, "Ophthalmology Resident Lecture Series"
University of Texas Southwestern Medical Center, 2011 - present.

PUBLICATIONS

Refereed Journal Articles:

1. Petroll WM, Knight H, Rochester DF. A model approach to assessing diaphragmatic volume displacement. *J Appl Physiol* 69:2175-2182, 1990.
2. Knight H, Petroll WM, Adams JM, Shaffer HA, Rochester DF. Videofluoroscopic assessment of muscle fiber shortening in the in-situ canine diaphragm. *J Appl Physiol* 68:2200-2208, 1990.
3. Petroll WM, Knight H, Rochester DF. Effect of lower rib cage expansion and diaphragm shortening on the zone of apposition. *J Appl Physiol* 68:484-488, 1990.
4. Knight H, Petroll WM, Rochester DF. Relationships between abdominal and diaphragmatic volume displacements. *J Appl Physiol* 71:565-572, 1991.
5. Andrews PM, Petroll WM, Cavanagh HD, Jester JV. Tandem scanning confocal microscopy (TSCM) of normal and ischemic living kidneys. *Am J Anat* 191:95-102, 1991.
6. New KC, Petroll WM, Boyde A, Martin L, Corcuff P, Leveque JL, Lemp MA, Cavanagh HD, Jester JV. In vivo imaging of human teeth and skin using real-time confocal microscopy. *J Scanning* 13:369-372, 1991.
7. Mathers WD, Shields WJ, Sachdev MS, Petroll WM, Jester JV. Meibomian gland morphology and tear osmolarity changes with acutane therapy. *Cornea* 10:286-290, 1991.
8. Mathers WD, Sachdev MS, Shields WJ, Petroll WM, Jester JV. Meibomian gland dysfunction in chronic blepharitis. *Cornea* 10:277-285, 1991.
9. Petroll WM, Cavanagh HD, Lemp MA, Andrews PM, Jester JV. Digital image acquisition in *in vivo* confocal microscopy. *J Microsc* 165:61-69, 1992.
10. Jester JV, Petroll WM, Garana RMR, Lemp MA, Cavanagh HD. Comparison of in vivo and ex vivo cellular structure in rabbit eyes detected by tandem scanning microscopy. *J Microsc* 165:169-181, 1992.
11. Ichijima H, Petroll WM, Jester JV, Cavanagh HD. Confocal microscopic studies of living rabbit cornea treated with benzalkonium chloride. *Cornea* 11:221-225, 1992.
12. Ichijima H, Ohashi J, Petroll WM, Jester JV, Cavanagh HD. Effects of increasing DK with rigid contact lens extended wear on rabbit epithelium using confocal microscopy. *Cornea* 11:282-287, 1992.
13. Mathers WD, Sachdev MS, Petroll WM, Lemp MA. Morphologic effects of contact lens wear on the corneal surface. *CLAO J* 18:49-52, 1992.

14. Jester JV, Petroll WM, Feng W, Essepian J, Cavanagh HD. Radial keratotomy: I. The wound healing process and measurement of incisional gape in two animal models using in vivo confocal microscopy. *Invest Ophthalmol Vis Sci* 33:3255-3270, 1992.
15. Garana RMR, Petroll WM, Herman I, Barry P, Andrews P, Cavanagh HD, Jester JV. Radial keratotomy: II. Role of the myofibroblasts in corneal wound contraction. *Invest Ophthalmol Vis Sci* 33:3271-3282, 1992.
16. Petroll WM, New KC, Sachdev M, Cavanagh HD, Jester JV. Radial Keratotomy: III. Relationship between wound gape and corneal curvature in primate eyes. *Invest Ophthalmol Vis Sci* 33:3283-3291, 1992.
17. Mathers WD, Binarao GB, Petroll WM. Ocular evaporation and the dry eye: a new measuring device. *Cornea* 12:335-340, 1993.
18. Petroll WM, Cavanagh HD, Barry PA, Andrews PM, Jester JV. Quantitative analysis of stress fiber orientation during corneal wound contraction. *J Cell Sci* 104:353-363, 1993.
19. Watson TF, Petroll WM, Cavanagh HD, and Jester JV: In vivo confocal microscopy in clinical dental research: An initial appraisal. *J Dentistry* 20:352-358, 1992.
20. Pulver MC, Petroll WM, Andrews PM. Noninvasive microscopic evaluation of the intact living nephrotic kidney. *Lab Invest* 68:592-596, 1993.
21. Ichijima H, Ohashi J, Petroll WM, Cavanagh HD. Morphological and biochemical evaluation for rigid gas permeable contact lens extended wear on rabbit corneal epithelium. *CLAO J* 19:121-8, 1993.
22. Petroll WM, Jester JV, Cavanagh HD. 3-Dimensional imaging of corneal cells using in vivo confocal microscopy. *J Microsc* 170:213-219, 1993.
23. Ichijima H, Petroll WM, Andrews PM, Barry PA, Dai M, Jester JV, Cavanagh HD. In vivo confocal microscopic studies of endothelial wound healing in rabbit cornea. *Cornea* 12(5):369-378, 1993.
24. Ichijima H, Petroll WM, Barry PA, Andrews PM, Dai M, Cavanagh HD, and Jester JV. Actin filament organization during endothelial wound healing in the rabbit cornea. Comparison between transcorneal freeze and mechanical scrape injuries. *Invest Ophthalmol Vis Sci* 34:2803-2812, 1993.
25. Cavanagh HD, Petroll WM, Alizadeh H, He Y-G, McCulley JP, and Jester JV. Clinical and diagnostic use of in vivo confocal microscopy in patients with corneal disease. *Ophthalmology* 100(10):1444-1454, 1993.
26. Andrews PM, Jester JV, Petroll WM, Barry PA, Ichijima H, Cavanagh HD. In vivo osmotic perturbation of intercellular fluid channels in the rabbit corneal endothelium. *Cornea* 13:253-8, 1994.
27. Jester JV, Barry PA, Lind GJ, Petroll WM, Garana R, Cavanagh HD. Corneal keratocytes: in situ and in vitro organization of cytoskeletal contractile proteins. *Invest Ophthalmol Vis Sci* 35:730-743, 1994.
28. Imayasu M, Moriyama T, Ichijima H, Ohashi J, Petroll WM, Jester JV, Cavanagh HD. The effects of daily wear of rigid gas permeable contact lenses treated with contact lens care solutions containing preservatives on the rabbit cornea. *CLAO J* 20:183-8, 1994.

29. Imayasu M, Petroll WM, Jester JV, Patel SK, Cavanagh HD. The relationship between contact lens oxygen transmissibility and binding of *Pseudomonas Aeruginosa* to the cornea after overnight wear. *Ophthalmology* 101:371-388, 1994.
30. Petroll WM, Boettcher K, Barry PA, Jester JV, Cavanagh HD. Quantitative assessment of anteroposterior keratocyte density in the normal rabbit cornea. *Cornea* 14:3-9, 1995.
31. Barry PA, Petroll WM, Andrews PM, Cavanagh HD, Jester JV. The spatial organization of corneal endothelial cytoskeletal proteins and their relationship to the apical junctional complex. *Invest Ophthalmol Vis Sci* 36:1115-1124, 1995.
32. Jester JV, Petroll WM, Barry PA, and Cavanagh HD: Expression of α -smooth muscle actin during corneal stromal wound healing. *Invest Ophthalmol Vis Sci* 36:809-819, 1995.
33. Jester JV, Petroll WM, Barry PA, Cavanagh HD. Temporal, 3-dimensional, cellular anatomy of corneal wound tissue. *J Anat* 186:301-311, 1995.
34. Petroll WM, Jester JV, Barry P, Cavanagh HD. Assessment of f-actin organization and apical-basal polarity during in vivo cat endothelial wound healing. *Invest Ophthalmol Vis Sci* 36:2492-2502, 1995.
35. Petroll WM, Jester JV, Cavanagh HD. Quantitative 3-dimensional confocal imaging of the cornea in situ and in vivo: System design and calibration. *Scanning* 18:45-49, 1996.
36. Jester JV, Barry-Lane PA, Cavanagh HD, Petroll WM. Induction of α -smooth muscle actin expression and myofibroblast transformation in cultured corneal keratocytes. *Cornea* 15:505-516, 1996.
37. Petroll WM, Roy PR, Chuong C, Hall B, Cavanagh HD, Jester JV. Measurement of Surgically-induced corneal deformations using 3-dimensional confocal microscopy. *Cornea* 15:154-164, 1996.
38. Roy PR, Petroll WM, McKinney AE, Chuong CJ. Computational models of the effects of hydration on corneal biomechanics and the results of radial keratotomy. *J Biomech Engng* 118:255-258, 1996.
39. Jester JV, Maurer JK, Petroll WM, Wilkie DA, Parker RD, Cavanagh HD. Application of in vivo confocal microscopy to the understanding of surfactant-induced ocular irritation. *Toxicol Path* 24:412-428, 1996.
40. Petroll WM, Jester JV, Barry-Lane PA, Cavanagh HD. Effects of bFGF and TGF β 1 on f-actin and ZO-1 organization during cat endothelial wound healing. *Cornea* 15:525-532, 1996.
41. Ren H, Petroll WM, Jester JV, Cavanagh HD. Adherence of *Pseudomonas Aeruginosa* to shed rabbit epithelial cells after overnight wear of contact lenses. *CLAO J* 23:63-68, 1997.
42. Barry-Lane PA, Wilson SE, Cavanagh HD, Petroll WM, Jester JV. Characterization of SV40-transfected cell strains from rabbit keratocytes. *Cornea* 16:72-78, 1997.
43. Li H, Petroll WM, Moller-Pederson T, Maurer JK, Cavanagh HD, Jester JV. Epithelial and corneal thickness measurements by in vivo confocal microscopy through focusing (CMTF). *Curr Eye Res* 16:214-221, 1997.

44. Jester JV, Barry-Lane PA, Petroll WM, Olsen DR, Cavanagh HD. Inhibition of corneal fibrosis by topical application of blocking antibodies to TGF β in the rabbit. *Cornea* 16:177-187, 1997.
45. Moller-Pederson T, Vogel MD, Li H, Petroll WM, Cavanagh HD, Jester JV. Quantification of stromal thinning, epithelial thickness, and corneal haze following photorefractive keratectomy using in vivo confocal microscopy. *Ophthalmology* 104:360-368, 1997.
46. Roy P, Petroll WM, Cavanagh HD, Chuong CJ, Jester JV. An in vitro force measurement assay to study the early mechanical interaction between corneal fibroblasts and collagen matrix. *Exp Cell Res* 232:106-117, 1997.
47. Petroll WM, Barry-Lane PA, Cavanagh HD, Jester JV. ZO-1 reorganization and myofibroblast transformation of corneal endothelial cells after freeze injury in the cat. *Exp Eye Res* 64:257-267, 1997.
48. Maurer JK, Li HF, Petroll WM, Parker RD, Cavanagh HD, Jester JV. Confocal microscopic characterization of initial changes of surfactant-induced eye irritation in the rabbit. *Toxicol Appl Pharmacol* 143:291-300, 1997.
49. Petroll WM, Cavanagh HD, Jester JV. Assessment of stress fiber orientation during healing of radial keratotomy wounds using confocal microscopy. *Scanning* 20:74-82, 1998.
50. Sacks MS, Chuong CJ, Petroll WM, Kwan M, Halberstadt C. Collagen fiber architecture of a cultured dermal tissue. *J Biomech Engng* 119:124-127, 1997.
51. Nartey IN, Cavanagh HD, Jester JV, Andrews P, Petroll WM. Characterization of specular dark events in human donor corneal endothelium by scanning and transmission electron microscopy. *Cornea* 17:544-549, 1998.
52. Moller-Pedersen T, Petroll WM, Cavanagh HD, Jester JV. Neutralizing antibody to TGF β modulates stromal fibrosis but not regression of photoablative effect following PRK. *Curr Eye Res* 17:736-747, 1998.
53. Petroll WM, Jester JV, Bean JJ, Cavanagh HD. Myofibroblast transformation of cat corneal endothelium by transforming factor- β 1, - β 2, - β 3. *Invest Ophthalmol Vis Sci* 39:2018-2032, 1998.
54. Jester JV, Li HF, Petroll WM, Parker RD, Cavanagh HD, Carr GJ, Smith B, Maurer JK. Area and depth of surfactant-induced corneal injury correlates with cell death. *Invest Ophthalmol Vis Sci* 39:922-36, 1998.
55. Moller-Pederson T, Li HF, Petroll WM, Cavanagh HD, Jester JV. Confocal microscopic characterization of wound repair after photorefractive keratectomy using in vivo confocal microscopy. *Invest Ophthalmol Vis Sci* 39:487-501, 1998.
56. Moller-Pederson T, Cavanagh HD, Petroll WM, Jester JV. Corneal haze development after PRK is regulated by volume of stromal tissue removal. *Cornea* 17:627-639, 1998.
57. Petroll WM, Jester JV, Bean JJ, Cavanagh HD. Labeling of cycling corneal endothelial cells during healing using a monoclonal antibody to the Ki67 antigen (MIB-1). *Cornea* 18:98-108, 1999.

58. Ren DH, Petroll WM, Jester JV, Ho-Fan J, Cavanagh HD. Short-term hypoxia downregulates epithelial cell desquamation in vivo, but does not increase pseudomonas aeruginosa adherence to exfoliated human corneal epithelial cells. *CLAO J* 25:73-79, 1999.
59. Ren DH, Petroll WM, Jester JV, Ho-Fan J, Cavanagh HD. The relationship between contact lens oxygen permeability and binding of pseudomonas aeruginosa to human cornea epithelial cells after overnight and extended wear. *CLAO J* 25:80-100, 1999.
60. Ren DH, Petroll WM, Jester JV, Cavanagh HD. The effect of rigid gas permeable contact lens wear on proliferation of rabbit corneal and conjunctival epithelial cells. *CLAO J* 25:136-141, 1999.
61. Jester JV, Huang J, Barry-Lane PA, Kao WW, Petroll WM, Cavanagh HD. Transforming growth factor(beta)-mediated corneal myofibroblast differentiation requires actin and fibronectin assembly. *Invest Ophthalmol Vis Sci* 40:1959-67, 1999.
62. Petroll WM, Hsu JKW, Bean JJ, Cavanagh HD, Jester JV. The spatial organization of apical junctional complex-associated proteins in feline and human corneal endothelium *Curr Eye Res* 18:10-19, 1999.
63. Roy P, Petroll WM, Cavanagh HD, Jester JV. Exertion of tractional force requires the coordinated up-regulation of cell contractility and adhesion. *Cell Motil Cytoskeleton* 43:23-34, 1999.
64. Maurer JK, Parker RD, Petroll WM, Carr GJ, Cavanagh HD, Jester JV. Quantitative measurement of acute corneal injury in rabbits with surfactants of different type and irritancy. *Toxicol Appl Pharmacol* 158:61-70, 1999.
65. Jester JV, Moler-Pederson T, Huang J, Sax CM, Petroll WM, Cavanagh HD, Piatigorsky J. The cellular basis of corneal transparency: Evidence for 'corneal crystallins'. *J Cell Sci* 112:613-622, 1999.
66. Chang JH, Ren H, Petroll WM, Cavanagh HD, Jester JV. The application of in vivo confocal microscopy and tear LDH measurement in assessing corneal response to contact lens and contact lens solutions. *Curr Eye Res* 19:171-181, 1999.
67. Hsu JKW, Cavanagh HD, Jester JV, Ma L, Petroll WM. Changes in corneal endothelial apical junctional protein organization following corneal cold storage. *Cornea* 18:712-720, 1999.
68. Roy P, Petroll WM, Chuong CJ, Cavanagh HD, Jester JV. Effect of cell migration on the maintenance of tension on collagen matrix. *Ann Biomed Eng* 27:721-730, 1999.
69. Vesaluoma M, Perez-Santonja J, Petroll WM, Linna T, Alio J, Tervo T. Corneal stromal changes induced by myopic LASIK. *Invest Ophthalmol Vis Sci* 41:369-376, 2000.
70. Linna TU, Vesaluoma MH, Perez-Santonja JJ, Petroll WM, Alio JL, Tervo TMT. Effect of myopic LASIK on corneal sensitivity and morphology of subbasal nerves. *Invest Ophthalmol Vis Sci* 41:393-397, 2000.
71. Vesaluoma MH, Sankila EM, Gallar J, Muller LJ, Petroll WM, Miolanen JA, Forsius H, Tervo TM. Autosomal recessive cornea plana: in vivo morphology and corneal sensitivity. *Invest Ophthalmol Vis Sci* 41:2120-2126, 2000.
72. Li J, Jester JV, Cavanagh HD, Black TD, Petroll WM. On-line 3-dimensional confocal imaging in vivo. *Invest Ophthalmol Vis Sci* 41:2945-2953, 2000.

73. Chakravarti S, Petroll WM, Hassell JR, Jester JV, Lass JH, Paul J, Birk DE. Corneal opacity in lumican-null mice: defects in collagen fibril structure and packing in the posterior stroma. *Invest Ophthalmol Vis Sci* 41:3365-3373, 2000.
74. Moller-Pederson T, Cavanagh HD, Petroll WM, Jester JV. Stromal wound healing explains refractive instability and haze development after photorefractive keratectomy: A 1-year confocal microscopic study. *Ophthalmology* 107:1235-1245, 2000.
75. Vesaluoma MH, Petroll WM, Perez-Santonia JJ, Valle TU, Alio JL, Tervo TMT. Laser in situ keratomileusis flap margin: Wound healing and complications imaged by in vivo confocal microscopy. *Am J Ophthalmol* 130:564-573, 2000.
76. Linna TU, Vesaluoma M, Petroll WM, Tarkkanen A, Tervo T. Confocal microscopy of a patient with irregular astigmatism after LASIK reoperations and relaxation incisions. *Cornea* 19:163-169, 2000.
77. Jester JV, Molai A, Petroll WM, Parker RD, Carr GJ, Cavanagh HD, Maurer JK. Quantitative characterization of acid- and alkali-induced corneal injury in the low-volume eye test. *Toxicol Pathology* 28:668-678, 2000.
78. Rosenburg ME, Tervo TM, Petroll WM, Vesaluoma MH. In vivo confocal microscopy of patients with corneal recurrent erosion syndrome or epithelial basement membrane dystrophy. *Ophthalmology* 107:565-573, 2000.
79. Lee YG, Chen WYW, Petroll WM, Cavanagh HD, Jester JV. Corneal haze following photorefractive keratectomy (PRK) using different epithelial removal techniques: mechanical debridement versus laser-scrape. *Ophthalmol* 108:112-120, 2001.
80. Yi DH, Petroll WM, Bowman RW, McCulley JP, Cavanagh HD. Surgically induced astigmatism after hyperopic and myopic photorefractive keratectomy. *J Cataract Refract Surg* 27:396-403, 2001.
81. Ladage PM, Yamamoto K, Ren DH, Li L, Jester JV, Petroll WM, Bergmanson JP, Cavanagh HD. Proliferation rate of rabbit corneal epithelium during overnight rigid contact lens wear. *Invest Ophthalmol Vis Sci* 42(12):2804-12, 2001.
82. Petroll WM, Ma L, Jester JV, Cavanagh HD, Bean J. Organization of junctional proteins in proliferating cat corneal endothelium during wound healing. *Cornea* 20:73-80, 2001.
83. Kirveskari J, Vesaluoma MH, Moilanen JAO, Tervo TMT, Petroll WM, Linnolahti E, Renkonen R. A novel non-invasive, in vivo technique for the quantification of leukocyte rolling and extravasation at sites of inflammation in human patients. *Nature Med* 7:376-379, 2001.
84. Yamamoto K, Ladage PM, Ren DH, Li L, Petroll WM, Jester JV, Cavanagh HD. Bcl-2 expression in the human cornea. *Exp Eye Res* 73:247-55, 2001.
85. Ladage PM, Yamamoto K, Ren DH, Li L, Jester JV, Petroll WM, Cavanagh HD. Effects of rigid and soft contact lens daily wear on corneal epithelium, tear lactate dehydrogenase, and bacterial binding to exfoliated epithelial cells. *Ophthalmology* 108:1279-88, 2001.
86. Li L, Ren DH, Ladage PM, Yamamoto K, Petroll WM, Jester JV, Cavanagh HD. Annexin V binding to rabbit corneal epithelial cells following overnight contact lens wear or eyelid closure. *CLAO J* 28:48-54, 2002.

87. Yamamoto K, Ladage PM, Ren DH, Li L, Petroll WM, Jester JV, Cavanagh HD. Effect of eyelid closure and overnight contact lens wear on viability of surface epithelial cells in rabbit cornea. *Cornea* 21:85-90, 2002.
88. Ren DH, Yamamoto K, Ladage PM, Molai M, Li L, Petroll WM, Jester JV, Cavanagh HD. Adaptive effects of 30-night wear of hyper-O₂ transmissible contact lenses on bacterial binding and corneal epithelium: A 1 year clinical trial. *Ophthalmology* 109:27-39, 2002.
89. Cavanagh HD, Ladage PM, Li SL, Yamamoto K, Molai M, Ren DH, Petroll WM, Jester JV. Effects of daily and overnight wear of a novel hyper oxygen-transmissible soft contact lens on bacterial binding and corneal epithelium: a 13-month clinical trial. *Ophthalmology* 109(11):1957-69, 2002.
90. Jester JV, Huang J, Petroll WM, Cavanagh HD. TGFβ induced myofibroblast differentiation of rabbit keratocytes requires synergistic TGFβ, PDGF and integrin signaling. *Exp Eye Res* 75:645-657, 2002.
91. Wang X, Shen J, McCulley JP, Bowman RW, Petroll WM, Cavanagh HD. Intraocular pressure measurement after hyperopic LASIK. *CLAO J* 28:136-139,2002.
92. Petroll WM, Yu A, Li J, Jester JV, Cavanagh HD, Black T. A prototype two detector confocal microscope for in vivo corneal imaging. *Scanning* 24:163-170, 2002.
93. Khatri S, Lass JH, Heinzl FP, Petroll WM, Gomez J, Diaconu E, Kalsow CM, Pearlman E. Regulation of endotoxin-induced keratitis by PECAM-1, MIP-2, and Toll-like receptor 4. *Invest Ophthalmol Vis Sci* 43:2278-2284, 2002.
94. Gokmen F, Jester JV, Petroll WM, McCulley JP, Cavanagh HD. In vivo confocal microscopy through-focusing to measuring corneal flap thickness after laser in situ keratomileusis. *J Cataract Refract Surg* 28:962-970, 2002.
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Book Chapters and Review Articles:

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17. Petroll WM. Dynamic assessment of cell-matrix mechanical interactions in three-dimensional culture. *Methods in Molecular Biology* 370:67-81, 2007.
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GRANT SUPPORT

Completed

Grantor: National Institutes of Health (National Eye Institute) - R03
Title of Project: *In Vivo Analysis of Corneal Endothelial Wound Healing*
Role: Principal Investigator
Annual Amount and start date: \$17,211 direct costs; 9/30/91

Grantor: The Whitaker Foundation
Title of Project: *A Novel Technique for Measuring the Biomechanical Properties of the Cornea after Radial Keratotomy*
Role: Principal Investigator
Annual Amount and start date: \$50,000 direct costs, 12/01/92
Total amount of award and dates: \$150,000 direct costs; 12/01/92 - 11/30/95

Grantor: National Institutes of Health (National Eye Institute) R01 EY07348-06
Title of Project: *Role of the Myofibroblast in Corneal Wound Contraction*
Role: Co-Investigator (Jester, PI)
Annual amount and start date: \$150,000 direct costs, 7/01/93
Total amount of award and dates: \$452,188 direct costs; 7/01/93 to 6/30/96

Grantor: National Institutes of Health (National Eye Institute) R01 EY10738-01
Title of Project: *Role of O₂ in Contact Lens-Induced Bacterial Binding*
Role: Co-Investigator (Cavanagh, PI)
Annual amount and start date: \$114,000 direct costs, 9/30/94
Total amount of award and dates: \$342,667 direct costs; 9/30/94 to 9/29/97

Grantor: Bausch & Lomb
Title of Project: *Role of O₂ in Contact Lens-Induced Binding of Pseudomonas Aeruginosa in Corneal Epithelium*
Role: Co-Investigator (Cavanagh, PI)
Annual amount and start date: \$129,000 direct costs, 1/01/95
Total amount of award and dates: \$258,000 direct costs, 1/01/95 to 12/31/96

Grantor: Procter & Gamble
Title of Project: *Mechanistic Correlates of Ocular Irritancy*
Role: Co-Investigator (Jester, PI)
Annual amount and start date: \$163,000 direct costs, 8/01/95
Total amount of award and dates: \$326,000 direct costs, 8/01/95 to 7/31/97

Grantor: National Institutes of Health (National Eye Institute) R01 EY11235-01
Title of Project: *Growth Regulation During Healing of Corneal Endothelium*
Role: Principal Investigator
Annual amount and start date: \$130,000 direct costs, 8/01/96
Total amount of award and dates: \$390,000 direct costs, 8/01/96 to 7/31/99

Grantor: Research to Prevent Blindness
Title of Project: Manpower Award
Role: Principal Investigator
Annual amount and start date: \$20,000 direct costs, 7/01/96

Grantor: National Institutes of Health (National Eye Institute) R01 EY07348-09
Title of Project: *Role of the Myofibroblast in Corneal Wound Contraction*
Role: Co-Investigator (Jester, PI)
Annual amount and start date: \$185,000 direct costs, 12/01/96
Total amount of award and dates: 759,829 direct costs; 12/01/96 to 11/30/00

Grantor: Alcon Laboratories, Inc.
Title of Project: *Affects of Ocular Irrigating Solutions on the Corneal Endothelium*
Role: Principal Investigator
Annual amount and start date: \$64,000 direct costs; 8/01/98

Grantor: Texas Advanced Technology Program
Title of Project: *A Hand-held Fiber Optic Confocal Corneal Pachymeter and Profiliometer*
Role: Principal Investigator
Annual amount and start date: \$52,000 direct costs, 1/01/98
Total amount of award and dates: \$102,000 direct costs; 1/01/98 - 7/31/00

Grantor: National Institutes of Health (National Eye Institute) R01 EY10738-04
Title of Project: *Role of O₂ in Contact Lens-Induced Bacterial Binding*
Role: Co-Investigator (Cavanagh, PI)
Annual amount and start date: \$175,000 direct costs, 12/01/99
Total amount of award and dates: \$520,725 direct costs; 12/01/99 – 11/30/02

Grantor: Research to Prevent Blindness
Title of Project: Olga Keith Weiss Scholar Award
Role: Principal Investigator
Annual amount and start date: \$50,000 direct costs, 6/15/99

Grantor: Eye Bank Association of America
Title of Project: *Effect of Storage and Recovery on Endothelial junctions*
Role: Principal Investigator
Annual amount and start date: \$10,000 direct costs; 7/01/99

Grantor: Lions Eye Bank
Title of Project: *Apical Junctional Protein Regulation During Cold Storage*
Role: Principal Investigator
Annual amount and start date: \$10,000 direct costs; 7/01/99

Grantor: Alcon Laboratories, Inc.
Title of Project: *Response of lens Capsule Epithelial Cells to Osmotic Stress*
Role: Principal Investigator
Annual amount of and start date: \$23,950 direct costs; 3/01/00

Grantor: National Institutes of Health (National Eye Institute) R01 EY13322-01
Title of Project: *Assessment of Corneal Fibroblast Biomechanical Behavior*
Role: Principal Investigator
Annual amount and start date: \$200,000 direct costs, 2/01/01
Total amount of award and dates: \$700,000 direct costs, 2/01/01 to 11/30/04

Grantor: Alcon Laboratories, Inc.
Title of Project: *Assessment of Proprietary Solutions Using Confocal Microscopy*
Role: Principal Investigator
Total amount of award and dates: \$82,687 direct costs; 7/01/00 - 12/31/01

Grantor: National Institutes of Health (National Eye Institute) R01 EY07348-13
Title of Project: *Regulation of Corneal Myofibroblast Transformation*
Role: Co-Investigator (Jester, PI)
Annual amount and start date: \$225,000 direct costs, 12/01/00
Total amount of award and dates: \$1,189,282 direct costs; 12/01/00 to 11/30/05

Grantor: Alcon Laboratories, Inc.
Title of Project: *Long-term Response of Lens Capsule Epithelial Cells to Viscoelastic*
Role: Principal Investigator
Total amount of award and dates: \$23,980 direct costs; 4/30/02 - 12/31/04

Grantor: Alcon Laboratories, Inc.
Title of Project: *Assessment of the Corneal Response to Antibiotic Compounds using In Vivo Confocal Microscopy*
Role: Principal Investigator
Total amount of award and dates: \$32,480 direct costs; 7/15/02 - 12/31/03

Grantor: Alcon Laboratories, Inc.
Title of Project: *Assessment of Corneal Toxicity using In Vivo Confocal Microscopy and ZO-1 Staining*
Role: Principal Investigator
Annual amount and start date: \$15,000 direct costs, 4/01/04
Total amount of award and dates: \$31,000 direct costs; 4/01/04 - 11/17/06

Grantor: Alcon Laboratories, Inc.
Title of Project: *Measurement of SOVD Retention Using Confocal Microscopy*
Role: Principal Investigator
Annual amount and start date: \$59,000 direct costs, 5/01/03
Total amount of award and dates: \$177,000 direct costs; 5/01/03 - 11/31/06

Grantor: National Institutes of Health (National Eye Institute) R01 EY10738-07
Title of Project: *Role of O₂ in Contact Lens-Induced Bacterial Binding*
Role: Co-Investigator (Cavanagh, PI)
Annual amount and start date: \$200,000 direct costs, 4/01/04
Total amount of award and dates: \$625,000 direct costs, 4/01/04 to 3/31/07

Grantor: Research to Prevent Blindness
Title of Project: Lew R. Wasserman Merit Award
Role: Principal Investigator
Annual amount of and start date: \$55,000 direct costs, 7/01/04

Grantor: Microdiffusion, Inc.
Title of Project: *Effects of Hyperoxygenated Solutions on Human Cell Viability*
Role: Principal Investigator
Annual amount and start date: \$50,000 direct costs; 8/01/06

Grantor: National Institutes of Health (National Eye Institute) R01 EY13322-04
Title of Project: *Assessment of Corneal Fibroblast Biomechanical Behavior*
Role: Principal Investigator
Annual amount and start date: \$225,000 direct costs, 12/01/04
Total amount of award and dates: \$675,000 direct costs; 12/01/04 to 11/30/07

Grantor: National Institutes of Health (National Eye Institute) R24 EY016664-01
Title of Project: *Infrastructure Development Grant for Cornea Research*
Role: Imaging Module Director (Nieder Korn, PI)
Annual amount and start date: \$147,224 direct costs, 5/01/05
Total amount of award and dates: \$750,000 direct costs; 5/1/05 to 4/30/10

Grantor: National Institutes of Health R01 AR048840
Title of Project: *Hyaluronan-mediated regulation of Langerhans Cells*
Role: Co-Investigator (Mummert, PI)
Annual amount and start date: \$215,000 direct costs, 5/1/07
Total amount of award and dates: \$645,000 direct costs; 5/1/07 – 4/30/10

Grantor: Research to Prevent Blindness
Title of Project: *Senior Scientific Investigator Award*
Role: Principal Investigator
Annual amount and start date: \$75,000 direct costs; 1/01/08

Grantor: National Institutes of Health (National Eye Institute) 1P30 EY020799-01
Title of Project: *Core Grant for Vision Research*
Role: Imaging Module Director (Nieder Korn, PI)
Total amount of award and dates: \$495,115 direct costs; 6/1/2010 to 5/31/2011
(Funded for one year by ARRA)

Grantor: National Institutes of Health (National Eye Institute) R21 EY019817-01
Title of Project: *A Novel 3-dimensional Culture Model of the Anterior Cornea*
Role: Principal Investigator
Annual amount and start date: \$125,000 direct costs, 8/01/09
Total amount of award and dates: \$275,000 direct costs, 8/1/09 to 7/31/11

Active:

Grantor: National Institutes of Health (National Eye Institute) R01 EY13322-07

Title of Project: *Assessment of Corneal Fibroblast Biomechanical Behavior*

Role: Principal Investigator

Annual amount and start date: \$250,000 direct costs, 4/01/08

Total amount of award and dates: \$1,250,000 direct costs, 4/1/08 to 3/31/13

Grantor: Center for Alternatives to Animal Testing Project #2010-13

Role: Principal Investigator

Annual amount and start date: \$13,479 direct costs, 1/31/10

Total amount of award and dates: \$26,957 direct costs, 1/31/10 to 1/31/12

Grantor: Alcon Laboratories, Inc.

Title of Project: *Assessment of Epithelial Toxicity using Live/Dead Labeling*

Role: Principal Investigator

Annual amount and start date: \$11,538 direct costs; 11/01/10 – 5/31/11

Grantor: Allergan

Title of Project: *Corneal Rostock Module Instrument Upgrade*

Role: Principal Investigator

Total funding requested and dates: \$22,000 direct costs; 12/14/10 - 5/31/11

Grantor: National Institutes of Health (National Eye Institute) 1P30 EY020799-02

Title of Project: *Core Grant for Vision Research*

Role: Imaging Module Director (Nieder Korn, PI)

Total funding requested and dates: \$2,000,000 direct costs; 6/01/2011 to 5/31/16

Grantor: Alcon Laboratories, Inc.

Title of Project: *Assessment of Corneal Epithelial Cell Viability Following Exposure to Ophthalmic Solutions*

Role: Principal Investigator

Annual amount and start date: \$24,000 direct costs; 10/01/11 – 7/31/12

Pending:

Grantor: United States Air Force (DOD)

Title: *Immunomodulatory Therapy to Minimize Corneal Scar Formation after Injury*

Role: PI for UT Southwestern Sub-Contract

Total funding requested and dates: \$79,058 direct costs; 10/01/2011 to 9/30/13