

## CURRICULUM VITAE

**NAME:** J. Crawford Downs, PhD

**TITLE:** Associate Scientist  
Research Director, Ocular Biomechanics Laboratory  
Devers Eye Institute  
Legacy Health System  
Portland, Oregon

### PERSONAL INFORMATION:

Date of birth: October 13, 1967  
Place of birth: Alexandria, Louisiana  
Citizenship: USA

Married: Georgia Houk

### EDUCATION:

**BS, Economics** August, 1991  
Tulane University  
New Orleans, Louisiana

**MA, Economics** December, 1992  
Tulane University  
New Orleans, Louisiana

**MS, Biomedical Engineering** May, 1998  
Tulane University  
New Orleans, Louisiana

**PhD, Biomedical Engineering** May, 2002  
Tulane University  
New Orleans, Louisiana  
Dissertation: "Experimental and Computational Modeling of the Posterior Scleral Shell of the Normal and Glaucomatous Monkey Eye."

**Postdoctoral Fellow** 4/02 - 8/02  
Department of Ophthalmology  
LSU Eye Center  
Louisiana State University Health Sciences Center  
New Orleans, Louisiana

**ACADEMIC  
APPOINTMENTS:**

**Adjunct Assistant Professor** 10/02-present  
 Department of Biomedical Engineering  
 Tulane University  
 New Orleans, Louisiana

**Adjunct Assistant Professor** 2/06-present  
 Department of Biomedical Engineering  
 OGI School of Science and Engineering  
 Oregon Health and Science University  
 Portland, Oregon

**OTHER  
APPOINTMENTS:**

**Assistant Professor - Research** 9/02-11/05  
 Department of Ophthalmology  
 LSU Eye Center  
 Louisiana State University Health Sciences Center  
 New Orleans, Louisiana

**Graduate Teaching Assistant** 8/91 - 5/92  
 Department of Economics  
 Tulane University  
 New Orleans, Louisiana

**Peer Tutor Supervisor** 8/92 - 12/92  
 Educational Resource Center  
 Tulane University  
 New Orleans, Louisiana

**Instructor/Graduate Teaching Assistant/  
Graduate Research Assistant** 8/94 - 4/01  
 Department of Biomedical Engineering  
 Tulane University  
 New Orleans, Louisiana

**Research Associate** 5/01 - 3/02  
 Department of Ophthalmology  
 LSU Eye Center  
 Louisiana State University Health Sciences Center  
 New Orleans, Louisiana

**MILITARY  
SERVICE:**

**Airman: Aircraft Carrier Flight Deck Crew** 3/87 - 2/89  
 United States Navy  
 USS Constellation, CV-64  
 Naval Air Station Coronado, California

**MEMBERSHIPS:**

American Society of Mechanical Engineers (ASME), 2002-present  
 ASME Bioengineering Division Solids Committee, 2007-present  
 Association for Research in Vision and Ophthalmology, 1998-present  
 Biomedical Engineering Society, 1999-present  
 European Society of Biomechanics, 2004-present  
 IEEE Engineers in Medicine and Biology, 2009-2010

**HONORS AND  
 ACHIEVEMENTS:**

1989-91 Louisiana Legislative Scholarship, Tulane University, New Orleans, Louisiana  
 1989-94 Dean's List, Tulane University, New Orleans, Louisiana  
 1993 Alpha Theta Epsilon Honor Society, University of New Orleans, New Orleans, Louisiana,  
 Inductee  
 1988 United States Navy Personal Letters of Commendation (2)  
 1988 United States Navy Meritorious Unit Commendation  
 1988 Armed Forces Expeditionary Medal  
 1995-98 Graduate Student Representative to Associated Student Body Senate, Tulane  
 University, New Orleans, Louisiana  
 1995-99 Vice-President, Graduate Association of Biomedical Engineers, Tulane University,  
 New Orleans, Louisiana  
 1995-99 Graduate Student Representative, Tulane University Faculty Senate, Tulane  
 University, New Orleans, Louisiana  
 1998 Instructor, Mechanics of Materials, School of Engineering, Tulane University,  
 New Orleans, Louisiana  
 1998 Who's Who Among Students at American Colleges and Universities, Inductee  
 1998 Provost Search Committee, Graduate Representative, Tulane University, New  
 Orleans, Louisiana  
 1998-99 President, Graduate School Student Association (GSSA), Tulane University,  
 New Orleans, Louisiana  
 1998-99 Chairman, Graduate and Professional Student Council, Tulane University,  
 New Orleans, Louisiana  
 1999-00 Secretary, Graduate School Student Association (GSSA), Tulane University,  
 New Orleans, Louisiana  
 1998-99 GSSA Representative, Graduate and Professional Student Association (GAPSA),  
 Tulane University, New Orleans, Louisiana  
 1999 Graduate Representative, University President's Strategic Planning Committee on  
 Research, Tulane University, New Orleans, Louisiana  
 1999 Fashion Group International, New Talent Award - Alpha Region (Gulf South)  
 1999 Fashion Group International, Alpha Award in Furniture Design - Single Piece  
 1999 Alpha Eta Mu Beta Biomedical Engineering Honor Society, Tulane University,  
 Representative to the National Meeting, Seattle, Washington  
 1999 Biomedical Engineering Society/Engineers in Medicine and Biology Joint  
 Conference, Student Paper Competition Finalist, Atlanta, Georgia  
 1999-2000 University Graduate Council, Graduate Representative, Tulane University,  
 New Orleans, Louisiana  
 2000 Fashion Group International, Alpha Award in Furniture Design - Single Piece  
 2001 National Eye Institute Travel Fellowship, Association for Research in  
 Vision and Ophthalmology, Ft. Lauderdale, Florida  
 2002 Commencement Speaker, Class of 2002, Tulane University, New Orleans, Louisiana

- 2004 2004 Global Glaucoma Award for best basic science paper worldwide, given by the Association of International Glaucoma Societies, Vienna, Austria for: Burgoyne CF, Downs JC, Bellezza AJ, Hart RT: Three-dimensional reconstruction of normal and early glaucoma monkey optic nerve head connective tissues. *Investigative Ophthalmology and Visual Science*, 45:4388-99, 2004.
- 2006 Chairman and Moderator, Ocular Biomechanics paper session, World Congress of Biomechanics, Munich, Germany
- 2007 Chairman and Moderator, Ocular Biomechanics paper session, ASME Summer Bioengineering Conference, Keystone, Colorado
- 2008 Chairman and Moderator, Ocular Biomechanics paper session, ASME Summer Bioengineering Conference, Marco Island, Florida
- 2009 Moderator, IOP, Biomechanics and Blood Flow paper session, ARVO Conference, Ft. Lauderdale, Florida
- 2009 Chairman and Moderator, Ocular Biomechanics paper session, ASME Summer Bioengineering Conference, Lake Tahoe, California
- 2009 Panel Member, Allergan Glaucoma Advisory Panel: IOP Modulation in Glaucoma. Seattle, Washington.
- 2009-2010 Panel Member, Lasker/International Retinal Research Foundation Initiative for Innovation in Vision Science: The Role of Astrocytes in Retinal Degeneration, including Glaucoma. Woods Hole, Massachusetts, and Howard Hughes Medical Institute, Janelia Farm Campus, Virginia.
- 2010 Chairman of the Ocular Biomechanics Track and Chairman of the Anterior Segment Biomechanics paper session, World Congress on Biomechanics, Singapore
- 2011 American Glaucoma Society abstract chosen for presentation in the “Best of the SGS Symposium” at the World Glaucoma Congress in Paris, France.
- 2011 Chairman and Moderator, Ocular and Other Mechanics paper session and Nano, Micro, and Multiscale Mechanics paper session, ASME Summer Bioengineering Conference, Farmington, Pennsylvania.

**INVITED LECTURES:**

- 2002 “Characterization of geometric and material property changes in the sclera of monkey eyes with early experimental glaucoma.” Alcon Laboratories, Fort Worth, Texas.
- 2003 “Finite element modeling of the optic nerve head and posterior scleral shell in experimental glaucoma.” Mardi Gras Conference: Frontiers of Grid Computing and Simulation at the Nano-Bio Interface, Louisiana State University, Baton Rouge, Louisiana.
- 2003 “Finite element modeling of the normal and early glaucomatous monkey optic nerve head and other biological tissues.” Biological Computation and Visualization Center, Louisiana State University, Baton Rouge, Louisiana.
- 2004 “3-D Reconstruction and Biomechanical Modeling of the Normal and Early Glaucomatous Monkey Optic Nerve Head.” Department of Ophthalmology, University of Alabama School of Medicine, Birmingham, Alabama.
- 2005 “Biomechanics of the Optic Nerve Head (ONH) in Glaucoma.” Faculty Lecture at the Glaucoma Subspecialty Day of the American Academy of Ophthalmology meeting. Chicago, Illinois.

- 2005 “High Resolution 3-D Reconstruction of the Optic Nerve Head in Glaucoma.” Department of Ophthalmology, University of California School of Medicine, Sacramento, California.
- 2007 “Optic Nerve Head Biomechanics: The Role of Intraocular Pressure in Glaucoma.” Combined Medical Grand Rounds, Devers Eye Institute and Oregon Health Sciences University, Portland, Oregon.
- 2007 “Biomechanics of the Optic Nerve Head in Glaucoma.” Department of Biomedical Engineering Seminar Series, Oregon Graduate Institute, Oregon Health Sciences University, Portland, Oregon.
- 2007 “Optic Nerve Head Biomechanics: The Role of Intraocular Pressure in Glaucoma.” Thorny Issues in Ophthalmology Conference, Devers Eye Institute, Portland, Oregon.
- 2008 “Glaucoma Is a Disease of Ocular Biomechanics, Which Can Be Modeled and Controlled (Possibly).” Wavefront Presbyopic Refractive Corrections Congress, San Francisco, California.
- 2008 “Potential Applications of Fluorescent 3D Reconstructions in Studies of the Role of Ocular Biomechanics in Glaucoma.” Invitrogen, Inc, Eugene, Oregon.
- 2008 “Biomechanics of the Optic Nerve Head and Sclera in Glaucoma.” Ocular Biomechanics Symposium, Association for Research in Vision and Ophthalmology Conference (ARVO), Ft Lauderdale, Florida.
- 2008 “The Role of Ocular Biomechanics in Glaucoma.” Department of Biomedical Engineering, The Ohio State University, Columbus, Ohio.
- 2009 “The Importance of Ocular Biomechanics to Clinical Ophthalmology.” Resident’s Lecture, Wilmer Eye Institute, Johns Hopkins University Medical Center, Baltimore, Maryland.
- 2009 “The Role of Ocular Biomechanics in Glaucoma - A Case Study of Moving Targets.” Wilmer Eye Institute, Johns Hopkins University Medical Center, Baltimore, Maryland.
- 2009 “Biomechanics? What Is It and What Does It Mean to Ophthalmologists?” Thorny Issues in Ophthalmology Conference, Devers Eye Institute, Portland, Oregon.
- 2009 Panel Member, Lasker/International Retinal Research Foundation Initiative for Innovation in Vision Science Symposium: The Role of Astrocytes in Retinal Degeneration, including Glaucoma. Woods Hole, Massachusetts.
- 2009 Panel Member, Allergan Glaucoma Advisory Panel: IOP Modulation in Glaucoma. Seattle, Washington.
- 2010 “The Role of Ocular Biomechanics in Glaucoma - A Case Study of Moving Targets.” College of Optometry, University of Houston, Houston, Texas.
- 2010 “The Role of Ocular Biomechanics in Glaucoma - A Case Study of Moving Targets.” Legacy Research Seminar Series, Legacy Research Institute, Portland, Oregon.
- 2010 “Ocular Biomechanics in Glaucoma.” Singapore Eye Research Institute, Singapore.

- 2010 “IOP Fluctuation: Is It a Meaningful Phenomenon?” American Academy of Ophthalmology Glaucoma Subspecialty Day Faculty Lecture, Chicago, Illinois
- 2011 “Biomechanical Stress in the Optic Nerve Head.” Asia Pacific Academy of Ophthalmology Congress, Sydney, Australia.
- 2011 “Biomechanics of the Optic Nerve Head in Eyes with Myopic Features.” World Glaucoma Congress, Paris, France
- 2011 “IOP Telemetry In Non-human Primates: Initial Characterization Of Continuous IOP At Multiple Time Scales.” Best of the AGS Symposium, World Glaucoma Congress, Paris, France.

#### **EXTRAMURAL FUNDING:**

1. Principal Investigator: Kaufman HE, **Co-Investigator: Downs JC**: Bioadhesives for corneal surgery. Eye Bank Association of America, Washington, DC. July 1, 2003 – June 30, 2004, \$3,755 direct costs.
2. Principal Investigator: Burgoyne CF, **Co-Investigator: Downs JC**: IOP-related force and failure in the optic nerve head. R01 EY11610, National Eye Institute, NIH. July 1, 2002 – June 30, 2012. \$2,231,210 in direct costs.
3. **Principal Investigator: Downs JC**, Co-Investigator: Burgoyne CF: Development of a telemetric monitor for IOP. R21 EY016149, National Eye Institute, NIH. August 1, 2005 - June 30, 2008. \$275,000 in direct costs.
4. **Principal Investigator: Downs JC**, Co-Investigator: Wang, L: Fluorescent 3D Reconstruction of Optic Nerve Heads. R21 EY018152, National Eye Institute, NIH. September 30, 2007 - August 31, 2009. \$275,000 in direct costs
5. **Principal Investigators: Downs JC (contact PI)** and Girkin CA, Co-Investigator: Burgoyne CF: Age-related Changes in Optic Nerve Head Structure and Biomechanics. R01 EY018926, National Eye Institute, NIH. April 1, 2008 - March 31, 2012. \$1,000,000 in direct costs
6. **Principal Investigators: Downs JC (contact PI)** and Girkin CA, Co-Investigator: Burgoyne CF: Racial Variations in Optic Nerve Head Structure and Biomechanics. R01 EY019333, National Eye Institute, NIH. December 1, 2008 - November 30, 2011. \$600,000 in direct costs
7. Principal Investigator: B Fortune, **Co-Investigators: Downs JC**, Burgoyne CF, Wang L: Axonal Cytoskeletal Changes in Experimental Glaucoma. R01 EY019327, National Eye Institute, NIH. September 30, 2009 - August 30, 2013. \$900,000 in direct costs

#### **RESEARCH REVIEW COMMITTEES:**

- 2003 Ad-hoc reviewer for NIH, National Eye Institute SBIR/STTR R41/R43 Special Emphasis Panel ZEY1 VSN (02)
- 2006 Ad-hoc reviewer for NIH, National Eye Institute Scientific Review Group BDPE (10)

- 2007-2009 Reviewer for American Health Assistance Foundation, National Glaucoma Research
- 2009 Reviewer for NIH, National Eye Institute Scientific Review Group ZRG1 ETTN-E(92)S
- 2009 Reviewer for the Chief Scientist Office, Biomedical and Therapeutic Research Committee, Government of Scotland, UK
- 2010 Ad-hoc Reviewer for NIH, February and June panels, National Eye Institute Scientific Review Group AED

**POSTDOCTORAL FELLOWS TRAINED:**

**CURRENT:**

1. Rafael Grytz, PhD: Computational Assessment of the Contribution of Collagen Fibrils to the Biomechanics of the Lamina Cribrosa and Sclera. April 2009-present.
2. Massimo Fazio, PhD: Age-related Changes and Racial Variations in the Anisotropic Nonlinear Properties of the Posterior Scleral Shell of the Eye: an Experimental and Computational Study. January 2011-present.
3. Vincent Libertiaux, PhD: Age-related Changes and Racial Variations in Optic Nerve Head Biomechanics. January 2011-present.

**PAST:**

1. Yi Liang, PhD: In Vivo Measures of ONH Blood Flow at Normal and Elevated IOP in Monkeys Using Laser Speckle Flowgraphy. 2006-2008.  
Current Affiliation: Principal Mechanical Engineer, Innovention Toys, LLC. Portland, Oregon
2. Sanjay Kodiyalam, PhD: Voxel-based Finite Element Modeling of Lamina Cribrosa Biomechanics in the Monkey Eye. 2004-2009.  
Current Affiliation: Postdoctoral Fellow, Department of Computer Science, Southern University, Baton Rouge, Louisiana
3. Michael D. Roberts, PhD: Continuum-level ONH Biomechanics in the Normal and Glaucomatous Monkey Eye. 2004-2010.  
Current Affiliation: N/A
4. Ian A. Sigal, PhD: Factors Determining ONH Biomechanics: a Parametric Study of Primary Factors and Their Interactions. 2006-2010.  
Current Affiliation: Assistant Professor of Ophthalmology and Bioengineering, University of Pittsburgh, Pittsburgh, Pennsylvania

**GRADUATE STUDENTS TRAINED:**

**CURRENT:**

1. Kevin Ivers: In Vivo Investigation of Changes in the Lamina Cribrosa and Optic Nerve Head During Glaucomatous Progression. PhD project in Optometry, College of Optometry, University of Houston, Houston, Texas. Committee Chairman: J Porter; Members: JC Downs, RS

Harwerth, M Twa. 2010-present.

**PAST:**

1. Michael JA Girard, PhD: Anisotropic Nonlinear Properties of the Posterior Scleral Shell of the Normal and Glaucomatous Monkey Eye: an Experimental and Computational Study. PhD project in Biomedical Engineering, Tulane University, New Orleans, Louisiana. PhD awarded December 2008. Committee Chairman: JC Downs; Co-Chairs: JK-F Suh and CF Burgoyne; Members: DP Gaver and RC Anderson.  
Current Affiliation: Imperial College Junior Research Fellow, Department of Bioengineering, Imperial College London, UK
2. Hongli Yang, PhD: Biomechanical behavior of the normal and early glaucomatous monkey optic nerve head. PhD project in Biomedical Engineering, Tulane University, New Orleans, Louisiana. PhD awarded May 2010. Committee Chairman: CF Burgoyne; Co-Chair: JC Downs; Members: DP Gaver and RC Anderson.  
Current Affiliation: Research Associate, Optic Nerve Head Research Laboratory, Devers Eye Institute, Portland, Oregon
3. Massimo Antonio Fazio, PhD: Age-related and Racial Variations in the Anisotropic Nonlinear Properties of the Posterior Scleral Shell of the Human Eye: an Experimental and Computational Study. Doctor of Research project in Mechanical Engineering, University of Calabria, Calabria, Italy. PhD awarded January 2011. Committee Members: A Poggialini, JC Downs, and L Bruno.  
Current Affiliation: Postdoctoral Fellow, Ocular Biomechanics Laboratory, Devers Eye Institute, Portland, Oregon

**UNDERGRADUATE STUDENTS TRAINED:**

**PAST:**

1. Ensor, ME: Posterior scleral thickness in perfusion-fixed normal and early-glaucoma monkey eyes. Undergraduate senior research project in Biomedical Engineering, Tulane University, New Orleans, Louisiana. 1998-99, Co-advised by RT Hart and CF Burgoyne.
2. Blidner, RA: Peripapillary scleral thickness in the perfusion-fixed normal monkey eye. Undergraduate senior research project in Biomedical Engineering, Tulane University, New Orleans, Louisiana. 1999-2000, Co-advised by RT Hart and CF Burgoyne.
3. Pottle, J: Size and shape of Bruch's membrane opening within 3-D reconstructions of normal and early-glaucoma monkey eyes. Undergraduate senior research project in Biomedical Engineering, Tulane University, New Orleans, Louisiana. 2002-2003, Co-advised by RT Hart and CF Burgoyne.
4. Combs, A: Central corneal thickness as a predictor for thickness of the lamina cribrosa and peripapillary sclera in monkey eyes. Undergraduate senior research project in Biomedical Engineering, Tulane University, New Orleans, Louisiana. 2003-2004, Co-advised by RT Hart and CF Burgoyne.
5. Yuzuriha, J: Development of a light blocking embedding media for episcopic imaging of soft tissues in the fluorescent domain.

6. Seigfried, WP: Analysis of continuous IOP telemetry data at multiple time scales.

#### **INVENTIONS AND PATENTS:**

1. **Inventor: Downs JC**, Co-Inventor: Bellezza AJ: Grips for mechanical testing of soft fibrillar materials. Assignee: Tulane University, New Orleans, Louisiana. Disclosed 1998, under further review for patent application and licensure.

#### **PUBLICATIONS**

##### **ABSTRACTS:**

1. **Downs JC**, Burgoyne CF, Thomas KA, Thompson HW, Hart RT: Effects of strain rate on the mechanical properties of posterior rabbit sclera. BMES/EMBS Abstract nr. 15.3.1. Proceedings of the First Joint Conference of the Biomedical Engineering Society and the Engineers in Medicine and Biology Society. 1999:Abstracts 213.
2. **Downs JC**, Thomas KA, Hart RT, Burgoyne CF: Quadrant-dependent elastic and viscoelastic material properties of peripapillary sclera. ARVO Abstract #1713, Investigative Ophthalmology and Visual Science. 1999;41[suppl]:S325.
3. Ensor ME, **Downs JC**, Hart RT, Burgoyne CF: Scleral thickness in the posterior pole of the normal and glaucomatous perfusion-fixed monkey eye. ARVO Abstract #4779, Investigative Ophthalmology and Visual Science. 1999;41[suppl]:S898.
4. **Downs JC**, Thomas KA, Burgoyne CF, Hart RT: Quadrant-dependent elastic and viscoelastic material properties of peripapillary sclera from normal monkey and rabbit eyes. BMES Abstract #T5.2. Annals of Biomedical Engineering. 2000;28[Suppl1]:S44.
5. Blidner RA, **Downs JC**, Hart RT, Burgoyne CF: Peripapillary scleral thickness in the perfusion-fixed normal monkey eye. ARVO Abstract #1774, Investigative Ophthalmology and Visual Science. 2000;42[suppl]:S329.
6. Brodner DC, **Downs JC**, Graham HD: Periosteal readhesion after browlift in New Zealand White rabbits. Combined Otolaryngic Spring Meeting. 2000.
7. **Downs JC**, Thomas KA, Hart RT, Burgoyne CF: Elastic and viscoelastic material properties of peripapillary sclera in normal and early glaucomatous monkey eyes. ARVO Abstract #4461, Investigative Ophthalmology and Visual Science. 2001;42[suppl]:S831.
8. **Downs JC**, Suh J-KF, Hart RT, Burgoyne CF: Finite element model validation of viscoelastic scleral material properties of normal and glaucomatous monkey eyes. ARVO Abstract #4042, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 5-10, 2002. [for text, see <http://www.arvo.org>].
9. **Downs JC**, Suh J-KF, Burgoyne CF, Hart RT: FEM validation of a spectral viscoelastic model of posterior sclera. Abstract # 32603. Proceedings of the 2002 ASME International Mechanical Engineering Conference and Exposition. 2002.
10. Burgoyne CF, **Downs JC**, Bellezza AJ, Hirons BA, Reynaud JF: Building and visualizing the first 3-dimensional (3D) of the normal and early glaucomatous monkey optic nerve head. Mardi Gras Conference: Frontiers of Grid Computing and Simulation at the Nano-Bio Interface, LSU, Baton Rouge, Louisiana. February 27, 2003.
11. Kim JC, **Downs JC**, Graham HD: Timescale for periosteal readhesion after brow-lift in New Zealand White rabbits. Combined Otolaryngic Spring Meeting. 2002.

12. **Downs JC**, Bellezza AJ, Reynaud JF, Hirons BA, Zhou P, Burgoyne CF: Plastic deformation of the lamina cribrosa within digital three-dimensional (3D) reconstructions of early glaucomatous monkey optic nerve heads. ARVO Abstract #4796, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 4-9, 2003. [for text, see <http://www.arvo.org>].
13. Hirons BA, Reynaud JF, Bellezza AJ, Zhou P, **Downs JC**, Burgoyne CF: Visualization of digital three-dimensional (3D) reconstructions of the connective tissues of the optic nerve head. ARVO Abstract #3872, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 4-9, 2003. [for text, see <http://www.arvo.org>].
14. Bellezza AJ, Hart RT, **Downs JC**, Reynaud JF, Hirons BA, Burgoyne CF: Continuum finite element modeling of the normal and early glaucomatous monkey optic nerve head. ARVO Abstract #1094, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 4-9, 2003. [for text, see <http://www.arvo.org>].
15. Burgoyne CF, **Downs JC**, Bellezza AJ, Hirons BA, Reynaud JF, Hart RT: Finite Element Modeling of the Optic Nerve Head (ONH) Connective Tissues: Building a Science for ONH Susceptibility. International Congress of Ophthalmology, Chantilly, France, May 28-31, 2003.
16. Burgoyne CF, **Downs JC**, Cioffi GA, Hart RT: Progress in Finite Element Modeling of the Monkey Optic Nerve Head (ONH) - Clinical Implications for Predicting Axonal and Connective Tissue Susceptibility. American Glaucoma Society Annual Meeting, Sarasota, Florida, March 4-7, 2004.
17. Grau, V, **Downs JC**, Burgoyne C: Segmentation of Connective Tissue in the Optic Nerve Head Using an Anisotropic Markov Random Field. 2004 IEEE International Symposium on Biomedical Imaging, Arlington, Virginia, April 15-18, 2004.
18. Grau V, **Downs JC**, Burgoyne CF: Three-dimensional (3-D) Segmentation of the Connective Tissue Architecture of the Lamina Cribrosa. ARVO Abstract #1117, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, April 25-29, 2004. [for text, see <http://www.arvo.org>].
19. Pottle J, **Downs JC**, Burgoyne CF: Bruch's Membrane Opening is vertically Elongated within Three-dimensional (3-D) Reconstructions of the Optic Nerve Heads (ONH) of Monkey Eyes with Early Experimental Glaucoma. ARVO Abstract #1118, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, April 25-29, 2004. [for text, see <http://www.arvo.org>].
20. Anderson RC, Burgoyne CF, Bellezza AJ, **Downs JC**, Hart RT: Finite Element Modeling of Lamellar Disinsertion in Early Experimental Glaucoma. ARVO Abstract #2155, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, April 25-29, 2004. [for text, see <http://www.arvo.org>].
21. **Downs JC**, Hart RT, Grau V, Bellezza AJ, Hirons BA, Burgoyne CF: Micro Finite Element Modeling of the Lamina Cribrosa in Monkey Eyes. ARVO Abstract #2157, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, April 25-29, 2004. [for text, see <http://www.arvo.org>].
22. Hirons BA, **Downs JC**, Reynaud JF, Burgoyne CF: Visualizing and Interacting with Large Volumetric Datasets Containing the Optic Nerve Head Connective Tissues. ARVO Abstract #2170, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, April 25-29, 2004. [for text, see <http://www.arvo.org>].
23. Girard M, Suh J-KF, Hart RT, Burgoyne CF, **Downs JC**: Effects of Storage Time on the Mechanical Properties of Rabbit Peripapillary Sclera After Enucleation. ARVO Abstract #2177, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, April 25-29, 2004. [for text, see <http://www.arvo.org>].

24. Sander EA, **Downs JC**, Burgoyne CF, Nauman EA: Effects of Limited O<sub>2</sub> and Nutrient Availability on Cell Number and Viability in Cultured Scleral Fibroblasts. ARVO Abstract #2183, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, April 25-29, 2004. [for text, see <http://www.arvo.org>].
25. Nauman EA, Woods F, Sander EA, **Downs JC**, Burgoyne CF: A Cellular Solid Model of the Lamina Cribrosa. ARVO Abstract #5530, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, April 25-29, 2004. [for text, see <http://www.arvo.org>].
26. **Downs JC**, Hart RT, Grau V, Bellezza AJ, Hirons BA, Burgoyne CF: Construction of Voxel-based Geometries of the Optic Nerve Head and Lamina Cribrosa for Continuum and Micro FE Modeling. 14<sup>th</sup> European Society of Biomechanics Congress, 's-Hertogenbosch, The Netherlands, July 4-7, 2004.
27. Yang H, **Downs JC**, Hart RT, Burgoyne CF: Neural Canal and Peripapillary Scleral Alterations within Three-Dimensional (3D) Reconstructions of Early Glaucoma (EG) Monkey Optic Nerve Heads (ONH). ARVO Abstract #3511, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 1-5, 2005. [for text, see <http://www.arvo.org>].
28. Burgoyne CF, **Downs JC**, Bellezza AJ, Wang L, Fortune B, Cull G, Cioffi GA: Axon Loss at the Onset of Confocal Scanning Laser Tomographic (CSLT) Detected Optic Nerve Head (ONH) Surface Change in Early Experimental Glaucoma (EEG) Is Modest (16–29%) and Diffuse (Central and Peripheral). ARVO Abstract #2372, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 1-5, 2005. [for text, see <http://www.arvo.org>].
29. Girard M, **Downs JC**, Burgoyne CF, Suh J-KF: Experimental Surface Strain Mapping of Porcine Peripapillary Sclera Under Intraocular Pressure. ARVO Abstract #1271, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 1-5, 2005. [for text, see <http://www.arvo.org>].
30. Nauman EA, Sander EA, **Downs JC**, Hart RT, Burgoyne CF: Comparison of Animal Eye Geometries and Their Impact on Ocular Biomechanics. ARVO Abstract #1270, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 1-5, 2005. [for text, see <http://www.arvo.org>].
31. Sander EA, **Downs JC**, Hart RT, Burgoyne CF, Nauman EA: A Cellular Solid Model for Analysis of the Microstructural Mechanics of the Lamina Cribrosa. ARVO Abstract #1269, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 1-5, 2005. [for text, see <http://www.arvo.org>].
32. Kodiyalam S, Hirons BA, Hart RT, Burgoyne CF, Kalia RK, Nakano A, Vashista P, **Downs JC**: Development of Large-Scale Parallel Finite Element Simulations of the Lamina Cribrosa Microstructure in the Optic Nerve Head (ONH). ARVO Abstract #1267, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 1-5, 2005. [for text, see <http://www.arvo.org>].
33. Hart RT, Roberts MD, Burgoyne CF, **Downs JC**: Finite element sub-structuring method for analysis of the optic nerve head. Abstract #6357, 5<sup>th</sup> World Congress of Biomechanics, Munich, Germany, July 29- August 4, 2006. Journal of Biomechanics. 2006;39[suppl 1]:S385.
34. Roberts MD, Hart RT, Burgoyne CF, **Downs JC**: Continuum-level finite element modeling of the optic nerve head. Abstract #7263, 5<sup>th</sup> World Congress of Biomechanics, Munich, Germany, July 29- August 4, 2006. Journal of Biomechanics. 2006;39[suppl 1]:S385.
35. Sander EA, **Downs JC**, Hart RT, Burgoyne CF, Nauman EA: In-plane mechanics of the optic nerve head with cellular solids models. Abstract #6025, Munich, Germany, July 29- August 4, 2006. Journal of Biomechanics. 2006;39[suppl 1]:S385.

36. Grimm J, Reynaud J, Yang H, **Downs JC**, Burgoyne CF: 3D quantification of lamina cribrosa microarchitecture in normal and early glaucomatous monkey eyes. ARVO Abstract #3295, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 1-5, 2005. [for text, see <http://www.arvo.org>].
37. Roberts MD, Burgoyne CF, Hart RT, **Downs JC**: Continuum-level finite element modeling of the optic nerve head: influence of microstructure on biomechanics in normal and early glaucoma eyes. ARVO Abstract #3300, Association for Research in Vision and Ophthalmology, Fort Lauderdale, Florida, May 6-10, 2007. [for text, see <http://www.arvo.org>].
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