

BIOGRAPHICAL SKETCH

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NAME Jay D. Humphrey		POSITION TITLE Regents Professor and Carolyn S. & Tommie E. Lohman Professor	
eRA COMMONS USER NAME Humphrey			
EDUCATION / TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Virginia Tech, Blacksburg, VA	B.S.	1981	Engineering Science & Mechanics
Georgia Institute of Technology, Atlanta, GA	M.S.	1982	Engineering Science & Mechanics
Georgia Institute of Technology, Atlanta, GA	Ph.D.	1985	Applied Mechanics / Bioengineering
Johns Hopkins University, Baltimore, MD	Post-Doc	1987	Cardiovascular Biomechanics

A. Positions and Honors

Professional Positions

- 1985-1987 Johns Hopkins University, Department of Medicine – Cardiology
Post-doctoral Research Fellow (with F.C.P. Yin)
- 1987-1998 University of Maryland, Department of Mechanical Engineering
Assistant (1987-91), Associate (1991-97), Full (1997-98) Professor
- 1999-pres Texas A&M University, Department of Biomedical Engineering
Professor (1999-pres), Lohman Professor (2004-pres), Regents Professor (2006-pres)

Professional Service

Societies: AIMBE, ASME-Bioengineering Division, SES, North American Vascular Biology Organization;
Member: Executive Committee US National Committee on Biomechanics, World Council of Biomechanics
Grant Reviewer: NIH (many Special Emphasis and ad hoc, Chair 2x), NSF (panel, site visit, external), The Whitaker Foundation, American Heart Association, March of Dimes, Canadian NRC and CIHR, Austrian Science Foundation, FONDECYT-Chile, Dutch Technology Fund, French-HFSP, German-Israeli Science Foundation, International Science Foundation, Swiss Science Foundation
Editorial Boards: co-Editor in Chief, *Biomechanics and Modeling in Mechanobiology* 02-pres; Editorial Board 98-pres, *Journal of Biomechanics*; Associate Editor 98-04, *Journal of Biomechanical Engineering*
Journal Reviewer: 45 different journals ranging from engineering to life science and applied mathematics

Primary Honors or Awards

National Research Service Award (NRSA), National Institutes of Health, 1987
Young Scientist Award, American Society of Biomechanics, 1987
FIRST Award, National Institutes of Health, 1988-93
YC Fung Young Investigator Award, ASME Bioengineering Division, 1990
Presidential Young Investigator (PYI), National Science Foundation, 1991-96
Fellow, American Institute for Medical and Biological Engineering, 2001
Fellow, M.E. DeBakey Institute for Comparative Cardiovascular Sciences, Texas A&M, 2002
College Level Distinguished Achievement Award, Association of Former Students, Texas A&M, 2004
Hetenyi (Best Paper) Award, Society of Experimental Mechanics, 2005
The 2006 Distinguished Lecturer in Biomechanical Engineering, Stanford University, 2006
Elected Member, World Council of Biomechanics (2006-2018)

B. Selected Peer-Reviewed Publications (from 2 textbooks, 1 edited book, and 125 journal papers)

Gleason RL, LA Taber and JD Humphrey (2004) A 2-D model of flow-induced alterations in the geometry, structure and properties of carotid arteries. ASME J Biomech Engr 126: 371-381.

David G and JD Humphrey (2004) Redistribution of stress in a nonlinear, anisotropic membrane due to the introduction of a circular hole. J Biomech 37: 1197-1204.

Gleason RL and JD Humphrey (2004) A mixture model of arterial growth and remodeling in hypertension: Altered muscle tone and tissue turnover J Vas Res 41: 352-363.

Na S, Z Sun, GA Meininger and JD Humphrey (2004) On atomic force microscopy and the constitutive behavior of cells. Biomech Model Mechanobiol 3: 75-84.

Gleason RL, S Grey, E Wilson and JD Humphrey (2004) A multiaxial computer-controlled organ culture and biomechanical device for mouse carotid arteries. ASME J Biomech Engr 126: 787-795.

Gleason RL and JD Humphrey (2005) Effects of a sustained extension on arterial growth and remodeling: A theoretical study. J Biomech 38: 1255-1261.

Baek S, PB Wells, KR Rajagopal and JD Humphrey (2005) Heat-induced changes in the finite strain viscoelastic behavior of a collagenous tissue. ASME J Biomech Engr 127: 580-586.

Mori D, G David, JD Humphrey, JE Moore (2005) Stress distribution in a circular membrane with a central fixation. ASME J Biomech Engr 127: 549-553.

Everett WN, P Shih, JD Humphrey (2005) A bi-plane video-based system for studying the mechanics of arterial bifurcations. Exp Mech 45: 377-382.

Banatwala M, C Farley, D Feinberg, JD Humphrey (2005) Parameterization of the shape of intracranial aneurysms using Legendre polynomials. Comp Meth Biomech Biomed Engr 8: 93-101.

Gleason RL, JD Humphrey (2005) A 2-D constrained mixture model for arterial adaptations to large changes in mechanical loading. Math Model Medicine 22: 347-369.

Heistand MR, RM Pedrigi, SL Delange, J Dziezyc, JD Humphrey (2005) Multiaxial mechanical behavior of the porcine anterior lens capsule. Biomech Model Mechanobiol 4: 168-177

Wells PB, S Thomsen, MA Jones, S Baek, JD Humphrey (2005) Histological evidence for the role of mechanical stress in modulating thermal denaturation of collagen. Biomech Model Mechanobiol 4: 201-210.

Baek S, KR Rajagopal, JD Humphrey (2005) Competition between radial expansion and thickening in the enlargement of an intracranial saccular aneurysm. J Elast 80: 13-31.

Baek S, KR Rajagopal, JD Humphrey (2006) A theoretical model of enlarging intracranial fusiform aneurysms. ASME J Biomech Engr 128: 142-149.

Heistand MR, RM Pedrigi, J Dziezyc, JD Humphrey (2006) Redistribution of strain in the porcine lens capsule due to a continuous circular capsulorhexis. J Biomech 39: 1537-1542.

Wells PB, AT Yeh, JD Humphrey (2006) Effect of glycerol on the mechanical behavior and thermal damage susceptibility of collagenous tissue. IEEE Trans Biomed Eng 53: 747-753.

Saravanan U, S Baek, KR Rajagopal, JD Humphrey (2006) On the deformation of the circumflex coronary artery during inflation tests at constant length. Exp Mech 46: 647-656.

Hu JJ, TW Fossum, MW Miller, H Xu, S Liu, JD Humphrey (2007) Biomechanics of the basilar artery in hypertension. Annl Biomed Engr 35: 19-29.

David G, RM Pedrigi, MR Heistand and JD Humphrey (2007) Regional multiaxial mechanical properties of the porcine anterior lens capsule. ASME J Biomech Engr 129: 97-104.

Pedrigi RM, E Staff, S Glenn, G David, JD Humphrey (2007) Altered multiaxial mechanical properties of the porcine anterior lens capsule cultured in high glucose. ASME J Biomech Engr 129: 121-125.

Gleason RL, E Wilson, JD Humphrey (2007) Biaxial biomechanical adaptations of mouse carotid arteries cultured at altered axial extensions. J Biomech 40: 766-776.

Baek S, *RL Gleason*, KR Rajagopal, JD Humphrey (2007) Theory of small on large for computing fluid-solid interactions in arteries. Comp Meth Applied Mech Engrg 196: 3070-3078.

Na S, GA Meininger, JD Humphrey (2007) A theoretical framework of F-actin remodeling in vascular smooth muscle cells subjected to cyclic stretch. J Theor Biol 246: 87-99.

Guo H, JD Humphrey, MJ Davis (2007) Effects of biaxial stretch on arteriolar function in vitro. Am J Physiol 292: H2378-2386.

Pedrigi RM, G David, J Dziezyc, JD Humphrey (2007) Regional mechanical properties and stress analysis of the human anterior lens capsule. Vis Res 47: 1781-1789.

David G, JD Humphrey (2007) Finite element model of stresses in the anterior lens capsule. Comp Meth Biomech Biomed Engr 10: 237-243.

Hu JJ, S Baek, JD Humphrey (2007) Stress-strain behavior of the passive basilar artery in normotension and hypertension. J Biomech 40: 2559-2563.

Ravikumar KM, JD Humphrey, W Hwang (2007) Spontaneous unwinding of a labile domain in a collagen triple helix J Mech Matl Struct 2: 999-1010.

Humphrey JD, S Baek, LE Niklason (2007) Biomechanics of cerebral vasospasm and its resolution: I. A new hypothesis and theoretical framework. Annls Biomed Engr 35: 1485-1497.

Baek S, A Valentin, JD Humphrey (2007) Biomechanics of cerebral vasospasm and its resolution: II. Constitutive relations and model simulations. Annls of Biomed Engr 35: 1498-1509.

Dye WW, RL Gleason, E Wilson, JD Humphrey (2007) Biaxial biomechanical behavior of carotid arteries in two knockout models of muscular dystrophy. J Appl Physiol 103: 664-672

Humphrey JD, *PB Wells*, S Baek, JJ Hu, K McLeroy, A Yeh (2008) A theoretically motivated design of a biaxial tissue culture system for intravital microscopy. Biomech Model Mechanbiol (in press)

Humphrey JD (2008) Vascular adaptation and mechanical homeostasis at tissue, cellular, and sub-cellular levels. Cell Biochem Biophys (in press).

Alford PW, JD Humphrey, LA Taber (2008) Growth and remodeling in a thick-walled artery model: Effects of spatial variations in wall constituents. Biomech Model Mechanobiol (in press)

Humphrey JD, CA Taylor (2008) Intracranial and abdominal aortic aneurysms: Similarities, differences and need for a new class of computational models. Ann Rev Biomed Engr (accepted)

Textbooks

Humphrey JD (2002) *Cardiovascular Solid Mechanics: Cells, Tissues, and Organs*. Springer-Verlag, NY (757 pages).

Humphrey JD, SL Delange (2004) *An Introduction to Biomechanics: Solids and Fluids, Analysis and Design*. Springer Verlag, NY (631 pages) – Reprinted in 2005 and designated a Springer Classic Textbook.

Edited Book

Cowin SC and JD Humphrey (2002) *Cardiovascular Soft Tissue Mechanics*, Kluwer, Netherlands.

C. Ongoing Research Support

R01 EB-8366, Niklason and Humphrey (MPI) 7/07 – 6/11

Agency: National Institutes of Health, NIBIB

Title: Enabling Technologies for Growing Collagenous Tissues

Goal: To develop mathematical growth and remodeling models and intravital imaging capabilities to guide the design of tissue engineered collagenous tissues, with particular attention to arteries.

R01 HL-80415, Humphrey (PI) 4/05 – 3/09 (NO OVERLAP SINCE LARGE VESSEL GRANT)

Agency: National Institutes of Health, NHLBI

Title: Ex Vivo Delineation of Mechanisms of Cerebral Vasospasm

Goal: To test the hypothesis, using an ex vivo organ culture system, that cerebral vasospasm following the rupture of an intracranial aneurysm results from competing chemo-mechanobiological responses characterized by altered smooth muscle contractility and matrix turnover.

R01 HL 058856, Friedman (PI) at Duke 4/99 – 3/08

Agency: National Institutes of Health, NHLBI

Title: Role of Geometry in Atherogenesis

Goal: Our subcontract seeks to correlate the mechanics within human coronary arteries with histopathology as well as information on the local hemodynamics.

JDH Role: Sub-contractor

BRP-RO1 HL-64372, Humphrey (PI) 9/01 – 8/06 (no-cost extended)

Agency: National Institutes of Health, NHLBI

Title: Histo-mechanics & Biology of Remodeling in Hypertension

Goal: To develop mathematical models that describe spatial and temporal consequences of mechanotransduction induced growth and remodeling of arterioles and arteries in hypertension in multiple vascular beds in the same mini-pig model.

D. Selected Recently Completed Research Support

R21 HL-76319, Humphrey (PI) 4/04 – 3/07

Agency: National Institutes of Health, NHLBI

Title: Novel Organ Culture & Theory for Arteriolar Remodeling

Goal: To design a combined confocal – organ culture system to quantify arteriolar remodeling under the action of sustained increases in contractility.

No Number, Humphrey (PI) 1/03 – 5/06

Agency: The Whitaker Foundation

Title: A Special Opportunity in Vascular Biomechanics and Mechanobiology at Texas A&M University

Goal: To expand our graduate research and graduate training program across three colleges (Engineering, Medicine, and Veterinary Medicine)