Exponent®
Engineering & Scientific Consulting

Kate Rodowicz, Ph.D., P.E.

Principal Engineer | Biomechanics
Philadelphia
+1-215-594-8826 | krodowicz@exponent.com

Professional Profile

Dr. Rodowicz addresses issues involving the biomechanics of injuries, with expertise in the areas of human injury tolerance, injury mechanics, and human kinematics. At Exponent, she performs biomechanical accident reconstructions and evaluates injury mechanisms and injury potential in motor vehicle, sporting, industrial, and slip-and-fall accidents.

Additionally, Dr. Rodowicz analyzes biomechanical issues associated with the design and performance of consumer and industrial products. She specializes in traumatic brain injury, including concussion, and she has evaluated the effectiveness of helmets and other headgear in mitigating head injuries. Her other research interests include occupant kinematics and injury potential during motor vehicle and industrial truck accidents and balance retention and postural control strategies during postural disturbances. Dr. Rodowicz has published her research findings in peer reviewed journals and has presented these findings at professional conferences and meetings.

Dr. Rodowicz completed both her bachelor and doctorate degrees in mechanical engineering, where her studies were focused in solid mechanics, dynamics, human physiology, and medical sciences. She has held an academic appointment at Drexel University and has also served as a visiting lecturer at Widener University.

Prior to joining Exponent, Dr. Rodowicz was a National Science Foundation Graduate Research Fellow in the Cell and Protein Mechanics Laboratory at Drexel University in Philadelphia, Pennsylvania. Additionally, she has worked as a Research Assistant in the Department of Medicine at Baylor College of Medicine in Houston, Texas, and at the National Nanotechnology Laboratories in Lecce, Italy. By applying the fundamental theories of mechanics to biological systems, Dr. Rodowicz's interdisciplinary research has focused on problems that lie along the interface of engineering and medical technologies.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Drexel University, 2008

B.S., Mechanical Engineering, Drexel University, 2004

National Science Foundation Graduate Research Fellowship Program

Joseph Carleone Fellowship

Dean's Fellowship

Selected for the Drexel/UPenn IGERT Nanoscale Science and Engineering Fellowship Program

Pi Tau Sigma, Mechanical Engineering Honors Society

Licenses and Certifications

Certified Forklift Operator (CFO)

Professional Affiliations

American Society of Mechanical Engineers

Society of Automotive Engineers

ASTM International - Committee F08 on Sports Equipment, Playing Surfaces, and Facilities

Publications

Rapp van Roden E, Crosby C, Mortensen J, Rodowicz K. Factors Influencing the Effectiveness of a Center-Mounted Airbag in Reducing Occupant Excursion and Injury Potential in High-Speed Lateral Impacts. SAE Technical Paper 2022-01-0843.

Rodowicz K, Campolettano ET, Bruno AG, Schimpf N, Rogers MW. Evaluation of the effect of a rear operator guard on the overall safety for operators of stand-up lift trucks. ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering. 2021

Richards D, Ivarsson BJ, Scher I, Hoover R, Rodowicz K, Cripton P. Ice hockey shoulder pad design and the effect on head response during shoulder-to-head impacts. Sports Biomechanics 2016; 15(4):385-396.

Rodowicz KA, Olberding J, Rau A. Head injury potential and the effectiveness of headgear in women's lacrosse. Annals of Biomedical Engineering 2014; 43(4):949-957.

Yang N, Rodowicz KA, Dainty D. Baseball head impacts to the non helmeted and helmeted Hybrid III ATD. Proceedings of the ASME 2014 International Mechanical Engineering Congress and Exposition, IMECE2014-38648, Montreal, Quebec, November 14 20, 2014.

Rodowicz KA, Watson H. Incidence rate of sport-related traumatic brain injury diagnoses in the general population: An analysis of emergency department visits in 2001 and 2010. ASTM Selected Technical Papers 2014; 1552:187-195.

Fittanto D, Rodowicz KA. A comparison of 3D model dynamic simulation results with low speed crash test data. Society of Automotive Engineers International, 2012 01 0601, April 16, 2012.

Rodowicz KA, Dupont K, Smedley J, Raasch C, Mkandawire C, Fittanto D, Bare C, Smith J. Passenger vehicle occupant response to low-speed impacts with a tractor-semitrailer. Society of Automotive Engineers International, 2011-01-1125, April 14, 2011.

Rodowicz KA Layton B. Determination of the mechanical properties of DOPC:DOPS liposomes using an image procession algorithm and micropipette-aspiration techniques. Chemistry and Physics of Lipids, Chemistry and Physics of Lipids 2010; 163(8):787 793.

Rodowicz KA, Muhammad R, Heller M, Sala J, Mkandawire C. Biomechanical, perceptual, and cognitive factors involved in maintaining postural control while standing or walking on non-moving and moving surfaces: A literature review. ASME International Mechanical Engineering Congress and Exposition, IMECE2010-39276, November 12 18, 2010.

Muhammad R, Rodowicz K, Heller M, Sala J, Mkandawire C. Biomechanical, perceptual, and cognitive factors involved in balance recovery following unexpected perturbations: A literature review. ASME International Mechanical Engineering Congress and Exposition, IMECE2010-39285, November 12 18, 2010.

Chu I, Fernandez C, Rodowicz K, Lopez M, Lu R, Hubmayr R, Boriek A. Diaphragm muscle shortening modulates kinematics of lower rib cage in dogs. Regulatory, Integrative and Comparative Physiology; 299(6):R1456-1462.

Rodowicz KA, Francisco H, Layton B. Determination of the mechanical properties of DOPC:DOPS liposomes using an image procession algorithm and micropipette-aspiration techniques. Chemistry and Physics of Lipids 2010; 163(8):787-293.

Allen K, Layton B. Determination of the forces imposed by micro and nanopipettes during DOPC:DOPS liposome manipulation. Chemistry and Physics of Lipids 2009; 162:34-52.

Allen K, Sasoglu F, Layton B. Cytoskeleton-membrane interactions in neuronal growth cones: A finite element analysis study. ASME Journal of Biomechanical Engineering 2009; 131(2):021006.

Sasoglu F, Bohl A, Allen K, Layton B Parallel force measurement with a polymeric microbeam array using an optical microscope and micromanipulator. Computer Methods and Programs in Biomedicine 2009 Jan; 93(1):1-8.

Published Abstracts

Allen KB, Layton BE. A mechanical model for cytoskeleton membrane interactions. American Society of Mechanical Engineers ASME International Mechanical Engineering Congress and Exposition, Seattle, WA, November 11-15, 2007.

Sasoglu F, Kilinc D, Allen K, Layton B Parallel force measurement in cell arrays. American Society of Mechanical Engineers ASME International Mechanical Engineering Congress and Exposition, Seattle, WA, November 11-15, 2007.

Sasoglu F, Kilinc D, Allen K, Layton B Towards a method for printing a network of chick forebrain neurons for biosensor applications. IEEE-Engineering in Medicine and Biology Society, Lyon, France, August 23-26, 2007.

Allen K, Sasoglu F, Layton B Mechanical neural growth models. ASME International Mechanical Engineering Congress and Exposition, Orlando, FL, November 5-11, 2005.

Layton B, Allen K, Stokes M, Myers K, Baas P Towards a method for peripheral nervous system axonal stiffness measurements with MEMS-based microgrippers. 2nd Annual IEEE-Engineering in Medicine and Biology Society, Arlington, VA, March 16-19, 2005.

Presentations

Rodowicz KA, Prange M. Football. Limitations and considerations for head impact and concussion sensing technologies. SFIA Rules Committee Meeting - Football Committee Meeting, Indianapolis, IN, April 13, 2015.

Rodowicz KA. Head injury potential and the effectiveness of headgear in women’s lacrosse. SFIA Lacrosse Council Annual Meeting, Philadelphia, PA, January 2014.

Rodowicz KA, Watson H. Incidence rate of sport-related traumatic brain injury diagnoses in the general population: An analysis of emergency department visits in 2001 and 2010. ASTM Symposium on the Mechanism of Concussion in Sports Symposium, Atlanta, GA, November 13, 2013.

Rodowicz KA, Dupont K, Smedley J, Raasch C, Mkandawire C, Fittanto D, Bare C, Smith J. Passenger vehicle occupant response to low-speed impacts with a tractor-semitrailer. Society of Automotive Engineers World Congress, Detroit, MI, April 14, 2011.

Rodowicz KA, Muhammad R, Heller M, Sala J, Mkandawire C. Biomechanical, perceptual, and cognitive factors involved in maintaining postural control while standing or walking on non-moving and moving surfaces: A literature review. ASME International Mechanical Engineering Congress and Exposition, Vancouver, B.C., November 15, 2010.

Allen K, Layton B. A mechanical model for cytoskeleton and membrane interactions in neuronal growth cones. ASME International Mechanical Engineering Congress and Exposition, Seattle, WA, November 11 15, 2007.

Allen K, Layton B. A mechanical model for cytoskeleton membrane interactions. The Drexel Engineering Research Symposium, Philadelphia, PA, April 13, 2007.

Allen, K., Layton B. Mechanical axonal growth models: Towards directed neural growth and highly parallel piconewton force transduction. Invited talk at National Nanotechnology Laboratories, Lecce, Italy, July 2006.

Allen K, Layton B. Mechanical neural growth models. BMES Fall Meeting, Baltimore MD, September 29, 2005.

Allen K, Hubmayr R, Boriek A. Effects of lung volume, muscle activation, and posture on the kinematics of the lower canine rib cage. American Thoracic Society 2005 International Conference, San Diego, CA, May 20-25, 2005.

Allen K, Layton B. Microtubule polymerization, and single cell micromanipulation. A.J. Drexel Institute of Basic and Applied Protein Science 3rd Annual Protein Institute Retreat, Drexel University, Philadelphia, PA, June 16, 2005.