Design of Medical Devices Conference

April 19 - 21, 2006
Radisson University Hotel • Minneapolis, Minnesota

The President's 21st Century Interdisciplinary Conference on Medical Devices

"Medical Devices for Delivering the New Biology"

President's 21st Century Interdisciplinary Conferences
April 21, 2006
Radisson University Hotel
Minneapolis, Minnesota

www.me.umn.edu/dmd
Minnesota’s Medical Device Community Forum:
Design of Medical Devices

Wednesday, April 19 & Thursday, April 20, 2006
Radisson University Hotel
615 Washington Ave SE, Minneapolis, Minnesota

WEDNESDAY APRIL 19

8:00 a.m. - 9:30 a.m.
Ballrooms A-D

Plenary Session
Moderators: Arthur G. Erdman, Ph.D., Department of Mechanical Engineering, University of Minnesota
William K. Durfee, Ph.D., Department of Mechanical Engineering, University of Minnesota

“Brain-Machine Interfaces” Andrew Schwartz, University of Pittsburgh School of Medicine
“The Future of Simulation for Medical Education,” Terri Seppala, Vice President, Cardiac Rhythm Management Education Services, Medtronic, Inc.

9:30 a.m.-10:30 a.m.

Corporate Exhibit Showcase/Break

10:30 a.m.-12:00 p.m.
Ballroom A

Session We1A: Surgical Simulators
Chair: Robert Sweet, M.D., Department of Urologic Surgery, University of Minnesota

“Simulator Design and Validation at the University of Minnesota Academic Health Center,”
Robert M. Sweet, M.D., Department of Urologic Surgery, University of Minnesota,
Clinical Director of Simulation Programs, AHC

“Medical Education Simulation Technology,” John J. Anton, Medical Education Technologies, Inc.
“The Use of Simulation for Training, Assessment and Certification: Pearls for Developers and Industry,”
Carla M. Pugh, M.D., Ph.D., Northwestern University

10:30 a.m.-12:00 p.m.
Ballroom B

Session We1B: Neurologic Devices
Chair: Paul Tuite, M.D., Department of Neurology, University of Minnesota

“Novel Applications of Deep Brain Stimulation,” Aviva Abosch, M.D., Ph.D., Department of Neurosurgery, University of Minnesota

“Telerehabilitation in Stroke: Cost, Convenience, and Science,” James R. Carey, Ph.D., P.T. Program in Physical Therapy, University of Minnesota


10:30 a.m.-12:00 p.m.
Ballroom C

Session We1C: Drug Delivery Technology
Chair: Ron Siegel, Sc.D., College of Pharmacy, University of Minnesota

“Therapeutic Micro and Nanotechnology,” Tejal A. Desai, Ph.D., University of California, San Francisco
“Microfabricated Reservoir Arrays for Drug Delivery,” John Santini, Ph.D., MicroCHIPS, Inc.
“Development of a Novel Biodegradable Drug-Eluting Stent,” Robert K. Schultz, Ph.D.,
REVA Medical, Inc., President

10:30 a.m.-12:00 p.m.
Ballroom D

Session We1D: Human Factors in Device Design
Chair: Richard Stein, BSEE, Advanced Patent Management, Guidant Corporation

“Applied Lessons in Human Factors,” Jason Fouts, SonoSite
“Examples of Good and Poor Human Factors Design,” Michael Tendick, P.E., Plexus
“Applied Lessons Learned in Implementing Good Human Factors Design in Medical Devices,”
Christian Trifillo, Creative Problem Solver, Worrell, Inc.
“Usability Testing Successes for a Medical Device,” Benjamin L. Somberg, Ph.D., Guidant, Cardiac Rhythm Management
Break for Lunch

**Medtronic Inc. Luncheon**
Moderator: Arthur G. Erdman, Ph.D., Department of Mechanical Engineering, University of Minnesota

Thomas J. Vasichek, Ph.D., Senior Director, Biosciences Technology Development, Medtronic, Inc.

**Session We2A: Minimally Invasive Surgery**
Chair: Anup Ramani, M.D., M.Ch., Department of Urologic Surgery, University of Minnesota

"Live Laparoscopic Surgery"
Moderator: J. Kyle Anderson, M.D., Department of Urologic Surgery, University of Minnesota
Surgeon: Anup Ramani, M.D., M.Ch., Department of Urologic Surgery, University of Minnesota
In this session, Dr. Ramani will be performing a kidney cancer surgery transmitted via videoconference from the University of Minnesota Medical Center, Fairview. The audience can engage in discussion of current and next generation minimally invasive surgical tools.

**Session We2B: Home Telemedicine**
Chair: Stanley Finklestein, Ph.D., Department of Laboratory Medicine and Pathology, University of Minnesota

"Home Telehealth Programs to Support the Elderly," Stanley M. Finklestein, Ph.D., Department of Laboratory Medicine and Pathology, University of Minnesota
"Smart Homes: Unobtrusive Environmental Monitoring for Health and Independence," Binh Q. Tran, Ph.D., Catholic University
"Home Monitoring that Adds Value," Tim Moore, M.D., Alere Medical Inc.

**Session We2C: BioMEMS**
Chairs: Tianhong Cui, Ph.D., Department of Mechanical Engineering, University of Minnesota
Rajesh Rajamani, Ph.D., Department of Mechanical Engineering, University of Minnesota

"Algometer Design Utilizing a Fingertip Load Sensor," Troy Pongratz, MS, Department of Mechanical Engineering, University of Minnesota
"Passive Wireless Acoustic Sensors for Biomedical Monitoring Applications," A. Serdar Sezen, Ph.D., Candidate, Department of Mechanical Engineering, University of Minnesota
"Microfabricated Platform for Single Cell Assay," Euisik Yoon, Ph.D., Department of Electrical and Computer Engineering, University of Minnesota
"Nano Self-Assembled Ion-Sensitive Field-Effect Transistors for Acetylcholine Biosensing," Yi Liu, Ph.D. Candidate, Department of Mechanical Engineering, University of Minnesota

**Session We2D: Open Papers I**
"Efficacy and Biodistribution of a Novel Drug Delivery System," Rachana Visaria, Ph.D., Department of Mechanical Engineering, University of Minnesota
"Fibrin Stem Patch Transplantation for Skeletal Muscle," Atsushi Asakura, Ph.D., Department of Neurology, University of Minnesota
"Drug Diffusion and Structural Design Criteria for Conventional and Auxetic Drug-Eluting Stents," William Jacob S. Della, Ph.D. Candidate, Department of Mechanical Engineering, University of Missouri - Kansas City
"Design of a Sound-Guided 3D Navigation System for Tibial Intramedullary Interlocking Nailing Fixation in Orthopedic Surgeries," Ming-Yih Lee, Ph.D., Chang Gung University, Taiwan

**Student Poster Session**

**LifeScience Alley Student Job / Internship Fair**

**Biomedical Engineering Society Regional Meeting**
THURSDAY APRIL 20

8:00 a.m. - 9:30 a.m.
Ballrooms A-D

Boston Scientific Plenary Session
Moderators: Arthur G. Erdman, Ph.D., Department of Mechanical Engineering, University of Minnesota
William K. Durfee, Ph.D., Department of Mechanical Engineering, University of Minnesota

"Regulating Combination Devices," Donna-Bea Tillman, Ph.D., Food and Drug Administration, Office of Device Evaluation
"Simulation Training: Where it is and Where is it Going?" Amy Charette, M.S., R.N., Director for Customer Market Development, Boston Scientific

9:30 a.m. - 10:30 a.m.

Corporate Exhibit Showcase/Break

Session Th1A: Entrepreneurship
Chairs: Douglas Johnson and Dick Sommerstad, Office of Business Development, University of Minnesota

"A Venture Capital Look at Medical Device Investing," Josh Baltzell, Split Rock Partners
"So You Want to Start a Medical Device Company," Thomas Hektner, BAE, ME, MBA, StarFire Medical, Inc.
"Business Relations," Dick Sommerstad, Academic and Corporate Relations, Office of Business Development, University of Minnesota

10:30 a.m. - 12:00 p.m.
Ballroom A

Session Th1B: Wireless Medical Devices
Chair: Scott Nelson, Logic Product Development

"ZigBee Wireless for the Medical Sensor Space," Jon Adams, Freescale Semiconductor
"Wireless Telemetry in Medical Devices," Javaid Masoud, Medtronic, Inc., CRDM

10:30 a.m. - 12:00 p.m.
Ballroom B

Session Th1C: Image-Guided Interventions
Chair: Emad Ebbini, Ph.D., Department of Electrical and Computer Engineering, University of Minnesota

"Imaging Guided Ablation of Renal Tumors," J. Kyle Anderson, M.D., Department of Urologic Surgery, University of Minnesota
"MRI Guide Focused Ultrasound Interventions," Kullervo Hynynen, Ph.D., Department of Radiology, Brigham and Women's Hospital
"Image-Guided Interventions," Chip Truwi, M.D., Department of Radiology, University of Minnesota
"High Frequency Ultrasound for Image Guided Intervention in Small Animal Models," Emad S. Ebbini, Ph.D., Department of Electrical and Computer Engineering, University of Minnesota

10:30 a.m. - 12:00 p.m.
Ballroom C

Session Th1D: Open Papers II

"Development of Sensory Compensation Artificial Leg (SCALE) to Enhance Balance Control for Amputees," Kok-Soon Soon, M.S., Chang Gung University, Taiwan
"Coordinated Planar Mechanisms to Approximate the Three Dimensional Motion of the Knee," Daniel Nielsen, Department of Mechanical Engineering, University of Minnesota
"An Inexpensive Weight Bearing Indicator for Rehabilitation of Patients with Lower Extremity Injuries," Daniel Walczyk, Ph.D., P.E., Department of Mechanical, Aerospace, & Nuclear Engineering, Rensselaer Polytechnic Institute

12:00 p.m.

12:15 p.m. - 1:45 p.m.
HiTH Room

St. Jude Medical Luncheon, Award Ceremony
Moderator: Arthur G. Erdman, Ph.D., Department of Mechanical Engineering, University of Minnesota

"Integrating Devices and Drugs to Improve Health Care: The Perspective of a Pharmaceutical Scientist," James Clodd, Pharm.D., Associate Dean for Research, College of Pharmacy, University of Minnesota
Session TH2A: Cardiovascular Therapies I
Chair: Paul Iaizzo, Ph.D., Department of Surgery, University of Minnesota

"Beating Heart Cardiac Valve Replacement," Steven Chu, Ph.D., Sunnyside Technologies, Inc.
"Heart Rhythm Lab: A Training Tool," Toby Markowitz, BSEE, Medtronic Inc., Cardiac Rhythm Management
"Quantitative Tissue Characterization Using Ultrasound," Yi Zheng, Ph.D., Department of Electrical and Computer Engineering, St. Cloud State University

Session TH2B: Biomedical Functional Imaging
Chair: Bin He, Ph.D., Department of Biomedical Engineering, University of Minnesota

"Neuroimaging Studies of Human Visual Function," Sheng He, Ph.D., Department of Psychology, University of Minnesota
"Non-Invasive Optical Tomography of Tissue Structure and Function," Taner Akkin, Ph.D., Department of Biomedical Engineering, University of Minnesota
"Electrophysical Functional Neuroimaging," Bin He, Ph.D., Department of Biomedical Engineering, University of Minnesota

Session TH2C: Nano and Microparticle Enhancement of Thermal Therapies
Chairs: John Bischof, Ph.D., Department of Mechanical Engineering, University of Minnesota
Robert Griffin, Ph.D., Department of Therapeutic Radiology, University of Minnesota

"TNF Coated Gold Nanoparticle Enhancement of Cryosurgery and Hyperthermic Therapy," John Bischof, Ph.D., Department of Mechanical Engineering, University of Minnesota
"Magnetic Devices and Nanoparticles for Thermal Therapies," Jian-Ping Wang, Ph.D., Department of Electrical and Computer Engineering, University of Minnesota
"Photothermal Diagnostics and Therapy with Gold Nanoclusters," Vladimir Zharov, Ph.D., Sc.D., University of Arkansas for Medical Sciences
"Monitoring and Assessment of Thermal Therapy Using Ultrasound," Emad S. Ebbini, Ph.D., Department of Electrical and Computer Engineering, University of Minnesota

Session TH2D: Open Papers III
"CFD-based Design Optimization of an Axial Flow Blood Pump," Alexandrina Untaroiu, M.S., Department of Mechanical and Aerospace Engineering, University of Virginia
"Application of the Finite Element Technique in the Design and Evaluation of the Artificial Facets," Vijay K. Goel, Ph.D., Department of Bioengineering, University of Toledo
"A Novel Integrated System for Wireless Power Transfer to Left Ventricular Assist Devices," Adel Nasiri, Ph.D., Department of Electrical Engineering and Computer Science, University of Wisconsin-Milwaukee

Corporate Exhibit Showcase/Break

Session TH3A: Cardiovascular Therapies II
Chair: Jonathan D. Pierce, Chief Financial Officer and Chief Operating Officer, Minnetronix, Inc

"VAD Design: Challenges Galore," William S. Pierce, M.D., Department of Surgery, Penn State University
"Cardiovascular Therapies," Jim Bullock, Atritech, Inc.
"The Use of Stem Cells Following Acute Myocardial Infarction," Jay H. Traverse, M.D., Minneapolis Heart Institute and the University of Minnesota
Session TH3B: Spine Devices
Chair: Vijay K. Goel, Ph.D., Department of Bioengineering, University of Toledo

"Evaluation of Artificial Facets," Vijay K. Goel, Ph.D., University of Toledo, Department of Bioengineering
"Annular Repair after Lumbar Discectomy," Steven L. Griffith, Ph.D., Anulex Technologies, Inc.
"Non-Intrusive Property Measurements in DNA Crosslinked Gels," Nosher A. Langrana, Rutgers University
"Application of Granular Mechanics to a Novel Biological Vertebral Augmentation Device," Joseph E. Hale, Ph.D., Spineology, Inc.

Session TH3C: Intellectual Property and Regulatory Affairs
Chair: Ralph F. Hall, J.D., Visiting Associate Professor, University of Minnesota Law School

"Recent Developments in IP Strategy," David W. Black, J.D., Schwesberg, Lundberg, Woessner & Kluth, P.A.
"FDA Disclosures and their Interplay with Patent Applications," Wendy J. Cusick, J.D., Patterson, Thuente, Skaar & Christensen, PA
"Medical Technology & Litigation," Craig J. Lervick, J.D., Oppenheimer Wolff & Donnelly LLP

Session TH3D: Open Papers IV
"Novel Implantable Prosthetic Vein Valve," Rahul D. Sathe, Georgia Institute of Technology
"Axial Compression Device for a Rat Tail Intervertebral Disc In vivo," Justin M. Stinnett-Donnelly, Department of Biomedical Engineering, University of Vermont
"In vivo Mobile Surgical Robotic Task Assistance," Mark Rentschler, M.S., Department of Mechanical Engineering, University of Nebraska
"A Novel Effective Minimally Invasive Surgery Suturing Device (MISSD) for Laparoscopic Operations," Shiamk Hajizadeh Farkouch, Tehran University of Medical Science
"Surface Mountable, Wafer-Level Packaged Accelerometer," Tom Kwa, Ph.D., Endevco / Meggitt Electronics

Networking Cocktail Reception

A Special Thanks to:

Planning Committee:
Arthur G. Erdman, Conference Chair
Department of Mechanical Engineering, University of Minnesota

William K. Durfee, Program Chair
Department of Mechanical Engineering, University of Minnesota

Paul A. Iaizzo, President’s Conference Program Chair
Department of Surgery, University of Minnesota

Jennifer A. Andre, Lindsey M. Reif, Barbara Pucel, Nancy Johnson, Conference Administration
Department of Mechanical Engineering, University of Minnesota

Jeffrey Mccullough, Tonya Fennel, Kristyama Schultz, Conference Administration
The Biomedical Engineering Institute, University of Minnesota

Gary Williams, AV Coordinator
Department of Surgery, University of Minnesota

Mary Koppel, Assistant Vice President for Public Affairs
Academic Health Center, University of Minnesota

Radisson University Hotel
Jada Fleming
Jillien Roundtree

University of Minnesota:
Biomedical Engineering Institute
Department of Mechanical Engineering
Academic Health Center
Printing Services
Welcome and Opening Remarks

Arthur G. Erdman, Ph.D., Conference Chair, Department of Mechanical Engineering, University of Minnesota
Robert Bruininks, President, University of Minnesota

Creating an Infrastructure to Support the Medical Device Industry
Chair: Richard Bianco, Associate Vice President for Regulatory Affairs, University of Minnesota
Frank Cerra, M.D., Senior Vice President for Health Sciences, Academic Health Center, University of Minnesota
Dale Wahlstrom, BioBusiness Alliance of Minnesota

Corporate Exhibit Showcase/ Break

“Medical Devices at 50 - The Public Policy Road Ahead”

Peter L. Gove, Retired St. Jude Medical Executive

Partnerships to Maintain Leadership in the Medical Device Industry
Chair: Kenneth H. Keller, Hubert H. Humphrey Institute, University of Minnesota

Product Design Programs: William K. Durfee, Ph.D., Department of Mechanical Engineering,
University of Minnesota
Medical Industry Leadership Institute: K.K. Sinha, Ph.D., Academic Director, Carlson School of Management,
University of Minnesota
MD/MS Medical Device Design Program: John Bischof, Ph.D., Department of Mechanical Engineering,
University of Minnesota
Interfacing with the University of Minnesota Biomedical Engineering Institute: Jeff McCullough, M.D., Director,
Biomedical Engineering Institute, University of Minnesota
Medical Device Center: Steven L. Crouch, Dean, Institute of Technology, University of Minnesota
Mayo/University Collaboration: Eric Wieben, Ph.D., Project Director, Minnesota Partnership and Director,
Mayo Clinic's Genomics Research Center

Lunch/ Discussion/ Open Microphone
Chair: Kenneth H. Keller, Hubert H. Humphrey Institute, University of Minnesota

Networking & Refreshments
We would like to thank all of our corporate sponsors: