

# April 8 & 9, 2004

## Design of Medical Devices Conference

*sponsored by the Biomedical Engineering  
Institute and the University of Minnesota*

*Radisson Hotel Metrodome  
615 Washington Ave S.E.  
Minneapolis, Minnesota*



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### *Special thank you to:*

Prof. Arthur G. Erdman, Conference Chair  
Prof. William K. Durfee, Program Chair  
Ms. Alyssa A. Burger, Conference Administrator  
Prof. Victor Barocas, Poster Session Coordinator

# Minnesota's Medical Device Community Forum: Design of Medical Devices

Thursday, April 8 & Friday, April 9, 2004

Radisson Hotel Metrodome  
615 Washington Ave SE, Minneapolis, Minnesota

## THURSDAY APRIL 8

8:15 - 9:30

### **Boston Scientific Welcome and Opening Session**

Moderators: Arthur G. Erdman & William K. Durfee, University of Minnesota

"The State of Medical Device Industry in Minnesota" - **Patricia Newman**, Minnesota Department of Employment and Economic Development

9:30 - 10:30

### **Refreshment Break: Opening of Corporate Exhibits**

10:30 - 12:00

Ballroom A

### **Session A1: Emerging Thermal Therapy Applications**

Chair: **John Bischof** – Department of Mechanical Engineering, University of Minnesota

"Applications of Superparamagnetic Nanoparticles for Drug Delivery and Hyperthermic Treatments" - **T. Andrew Taton**, University of Minnesota, Department of Chemistry

"The Use of High Field MR: Issues of Thermal Safety and Measurement in Vivo" - **Thomas Vaughan**, University of Minnesota, Department of Radiology, Center for Magnetic Resonance Imaging

"Manipulation and Control of Temperature and Injury Processes in Thermal Therapy Applications" - **John Bischof**, University of Minnesota, Department of Mechanical Engineering

"Pathology of the Thermal Lesion: Case Studies from Urologic, Hepatic, Cardiovascular and Uterine Tissues" - **Jim Coad**, West Virginia University, Department of Surgical Pathology

"Contrast Enhanced Ultrasonography to Measure Perfusion Defects in Thermally Injured Tissues" - **Emad Ebbini**, University of Minnesota, Department of Electrical Engineering

"Overview of Cryosurgical Research at SUNY Binghamton" - **John G. Baust**, Center for Cryobiological Research, State University of New York at Binghamton

10:30 - 12:00

Ballroom B

### **Session A2: Engineered Tissue Devices**

Chair: **Robert Tranquillo** – Department of Biomedical Engineering, University of Minnesota

"Biomimetic Nano-fibrous Scaffolds" - **Peter X. Ma**, University of Michigan, Department of Biologic and Materials Science, Department of Biomedical Engineering

"Corneal Tissue Engineering" - **Victor H. Barocas**, University of Minnesota, Department of Biomedical Engineering

"Biomimetic Nanocomposites for Hard Tissue Engineering" - **Wei-Shou Hu**, University of Minnesota, Department of Chemical Engineering and Materials Science

"A Tissue-Engineered Small Diameter Artery" - **Robert T. Tranquillo**, University of Minnesota, Department of Biomedical Engineering and Chemical Engineering and Materials Science

10:30 - 12:00

Ballroom C

### **Session A3: Urology**

Chair: **Manoj Monga** – Department of Urologic Surgery, University of Minnesota

"Impact of Instrumentation in Minimally Invasive Urology" - **Anup P. Ramani**, University of Minnesota

"Instrumentation for the Endoscopic Removal of Kidney Stones" - **Manoj Monga**, University of Minnesota, Department of Urologic Surgery

"Plasmakinetic Applications - Transurethral Resection of the Prostate and Laparoscopy" - **Scott Latterell**, Gyrus Medical

10:30 - 12:00  
HHH Room

**Session A4: Minnesota Bioscience Zones**

Chair: **Joan Bechtold** – Director, Orthopaedic Biomechanics Lab, Hennepin County Medical Center

“Goals of the Bioscience Zones Program” - **Representative Lynne Osterman**

“The University of Minnesota and the Source of Bioscience Start-Ups: Challenges and Opportunities” -

**Robert Elde**, Dean, College of Biological Sciences, University of Minnesota

“Public Perspective” - **R. T. Rybak**, Mayor, City of Minneapolis, Minnesota

“Rochester’s Perspective on Biosciences” - **Gary W. Smith**, Rochester Bioscience Zone

“City of Rochester Perspective” - **Mayor Brede**, City of Rochester

“Incubators - The Critical Role They Play in the Development of Early State High Tech Start Up Companies” - **Harlan T. Jacobs**, Genesis Business Centers, Ltd.

“A Brief History of an Emerging Company in Turbulant Times” - **Daniel G. Miller**, Excorp Medical, Inc.

12:00 - 1:00

**Box Lunch: Corporate Exhibits**

1:30 - 3:00  
Ballroom A

**Session B1: Cell and Tissue Preservation Workshop**

Chair: **Allison Hubel** – Department of Mechanical Engineering, University of Minnesota

“Manufacturing Cell Therapy Products” - **Diane Kadidlo**, Fairview-University Medical Center, Minneapolis, Minnesota

“Fundamentals of Cell Preservation” - **Allison Hubel**, University of Minnesota, Department of Mechanical Engineering

**John M. Baust**

1:30 - 3:00  
Ballroom B

**Session B2: Device Based Treatments in Neurology**

Chair: **Paul Tuite** – Department of Neurology, University of Minnesota

“Device Based Treatments in Neurology: An Overview” - **Paul Tuite**, University of Minnesota, Department of Neurology

“Deep Brain Stimulation and Vagal Nerve Stimulation for Epilepsy” - **Stephen Holloway**, University of Minnesota, Department of Neurology, VA Medical Center

“Management of Spasticity” - **Dennis Dykstra**, University of Minnesota, Department of Physical Medicine and Rehabilitation

“Device Based Treatments in Neurology: An Overview” - **Antonio Strafella**, McGill University, Department of Neurology, Monreal Neurological Institute, Montreal, Quebec, Canada

1:30 - 3:00  
Ballroom C

**Session B3: Laparoscopy and Robotics**

Chair: **Manoj Monga** – Department of Urologic Surgery, University of Minnesota

“Laparoscopic Bariatric Surgery for the Management of Obesity” - **Sayed Ikramuddin**, University of Minnesota, Department of Surgery

“Robotic Assisted Cardiothoracic Surgery” - **Kenneth K. Liao**, University of Minnesota, Division of Cardiovascular and Thoracic Surgery

“Thoracoscopic and Laparoscopic Surgery” - **Michael Maddaus**, University of Minnesota, Department of Surgery

1:30 - 3:00  
HHH Room

**Session B4: Medical Device Coatings**

Chair: **Dan Mooradian** – Synovis Life Technologies, Inc.

3:00 - 3:30

**Refreshment Break**

3:30 - 5:00  
Ballroom A

**Session C1: BioMEMS I**

Chair: **Susan Mantell** – Department of Mechanical Engineering, University of Minnesota

“BioMEMS-based Drug Delivery System” - **Li Cao**, Iowa State University, Department of Mechanical Engineering  
“Nanoparticle and Polymer-Based Micro Devices for Potential Biomedical Applications” - **Tianhong Cui**, University of Minnesota, Department of Mechanical Engineering  
“Molecular Nano-Gates for Attoliter Molecular Deliver Systems” - **Mark A. Shannon**, University of Illinois at Urbana-Champaign

3:30 - 5:00

Ballroom B

**Session C2: Technology and Devices for Diabetes Management**

Chair: **Bernhard J. Hering** – Department of Surgery, University of Minnesota

“Technical Requirements for a Glucose Sensor in an Artificial Pancreas” - **Clark K. Colton**, Massachusetts Institute of Technology, Department of Chemical Engineering  
“Cell-based Therapies for Type 1 Diabetes” - **Bernhard J. Hering**, University of Minnesota, Diabetes Institute for Immunology and Transplantation  
“Imaging Glucose Metabolism in the Human Brain” - **Rolf Gruetter**, University of Minnesota

3:30 - 5:00

Ballroom C

**Session C3: Innovative Technology in Ophthalmology**

Chair: **Timothy W. Olsen** – Department of Ophthalmology, University of Minnesota

“Use Microtechnology in Glaucoma Treatment” - **Tingrui Pan**, University of Minnesota, Department of Electrical and Computer Engineering  
“A Nanoparticle Generator for Ophthalmologic Applications” - **Amir Naqwi**, Powerscope Incorporated  
“Direct Visualization of Sutured Posterior Chamber Intraocular Lens (PCIOL) Implantation using an Endoscope through the Pars Plana” - **Jonathan T. Pribila**, University of Minnesota  
“High-speed Scanning Laser Ophthalmoscopy using Auto-fluorescence in the Minnesota Grading System of Age-Related Macular Degeneration” - **Ausra Pond**, University of Minnesota, Medical School  
“A Transscleral Drug Delivery System for Age-Related Macular Degeneration” - **Timothy W. Olsen**, University of Minnesota, Department of Ophthalmology  
“Computer Tools for Optimized Ophthalmic Drug Delivery” - **Victor H. Barocas**, University of Minnesota, Department of Biomedical Engineering

3:30 - 5:00

HHH Room

**Session C4: Collaborative Design of Healthcare Delivery**

Chair: **Ryan Armbruster** – Department of Medicine, Mayo Clinic

“A Program for Innovating Healthcare Delivery” - **Alan Duncan**, Mayo Clinic College of Medicine, Medical Director, SPARC Program  
“More than Space: The Innovation Journey and the Patient Journey” - **Dana Cho**, IDEO  
“Opportunities from a ‘Collaborators’ Perspective” - **Jack Tanis**, Steelcase

5:00 - 6:30

**Cocktail Reception: Guidant Foundation Student Poster Session and Corporate Exhibits**

## FRIDAY APRIL 9

8:30 - 10:00

Ballroom A

**Session D1: BioMEMS II**

Chair: **Tianhong Cui** – Department of Mechanical Engineering, University of Minnesota

“Micro and Nanotechnologies for Multiplexed Bioanalysis” - **Dennis L. Polla**, University of Minnesota, Department of Electrical Engineering and Computer Science  
“Microfluidice and Cell Processing” - **Allison Hubel**, University of Minnesota, Department of Mechanical Engineering  
“The Development of a MEMS Sensor for Absolute Angle Measurement” - **Damrongrit Piyabongkarn**, University of Minnesota, Department of Mechanical Engineering

8:30 - 10:00

Ballroom B

**Session D2: Telemedicine**

Chair: **Stanley M. Finkelstein** – University of Minnesota, Dept. of Laboratory Medicine and Pathology

“Delivering Health Care to the Home Using Telemachine” - **Stanley M. Finkelstein**, University of Minnesota, Department of Laboratory Medicine and Pathology

"Teleclinics: Technology, Operations, and Human Factors, Integrating a Telerehabilitation Program into a Clinical Setting" - **Tim Bowman**, Sister Kenny Institute / Abbot Northwestern Hospital  
"Engineering R&D Issues in Telerehabilitation" - **Michael Rosen**, The National Rehabilitation Hospital  
"Effective Telehealth Solutions - Architectures and Patients" - **Alan Haggerty**, American TeleCare Inc.

8:30 - 10:00  
Ballroom C

### **Session D3: Cardiovascular Physiology**

Chair: **Paul Iazzo** – Department of Surgery, University of Minnesota

"What is the BMEI Cardiovascular Physiology Interest Group?" - **Paul A. Iazzo**, University of Minnesota, Department of Surgery  
"The Use of Animal Models to Assess Pre-Clinical Safety and Efficacy of New or Modified Medical Devices" - **Richard W. Bianco**, University of Minnesota, Assistant Vice President and Director of Experimental Surgery  
"Choosing the Right CV Animal Model Anatomically" - **Alexander Hill**, Medtronic, Inc.  
"Development of a Large Animal Model for the Evaluation fo Cellular Cardiomyoplasty" - **Robert P. Gallegos**, University of Minnesota, Department of Surgery  
"MRI Assessment of CV Physiology" - **Jianyi Zhang**

8:30 - 10:00  
Ballroom D

### **Session D4: Entrepreneurship**

Chair: **Doug Johnson** – Carlson School of Management, University of Minnesota

"You Can Control How FDA Affects Your Startup Company" - **Morris Waxler**, LaFollette Godfrey & Kahn  
"Medical Device Start-ups: Considerations and Lessons" - **Tom Hektner**, StarFire Medical  
**R.B. Lahner**, Rider Bennett  
"The Good and Bad of Start-up Financing" - **Edson W. Spencer, Jr.**, Affinity Capital  
**Matt Putnam**  
"Moving from Ideas to Medial Product Development: Confessions from an Orthopaedic Maverick: - **Stephen D. Kuslich**, Spineology Inc., PneuMedics

10:00-10:30

### **Refreshment Break Corporate Exhibits**

10:30-12:00  
Ballroom A

### **Session E1: Nanoparticles and Biomedicine**

Chair: **Uwe Kortshagen** – Department of Mechanical Engineering, University of Minnesota

"Cell and Tissue Interactions with Nanoparticles" - **Allison Hubel**, University of Minnesota, Department of Mechanical Engineering  
"Biological Imaging with Quantum Dots" - **David J. Norris**, University of Minnesota, Department of Chemical Engineering and Materials Science  
"An Application of Nanoparticle Technology in Dental Fillings Materials" - **Sumita B. Mitra**, 3M, ESPE Dental Products Laboratory

10:30-12:00  
Ballroom B

### **Session E2: Multimodality Diagnostic Imaging Instrumentation**

Chair: **Bruce Hammer** – Department of Radiology, University of Minnesota

"Multimodality Imaging of Anatomy and Physiology with SPECT/CT" - **Bruce Hasegawa**, University of California, San Francisco, USCF Physics Research Laboratory  
"Streamlining Radiotherapy: Integrating Imaging, Treatment and Verification into a Cohesive Whole" - **Paul J. Reckwerdt**, TomoTherapy Incorporated, Madison, Wisconsin  
"Combining MRI and PET: Potential Benefits and Existing Challenges" - **Ray Raylman**, West Virginia University

10:30-12:00  
Ballroom C

### **Session E3: Mechanical Devices for Cardiovascular Therapy**

Chair: **Leslie W. Miller** – Department of Medicine, University of Minnesota

"Coronary Stents" - **Carmelo Panetta**, University of Minnesota, Cardiovascular Division  
"Cardiac Resynchronization: Biventricular Pacing Heart Failure" - **Leslie Miller**, University of Minnesota, Department of Medicine  
"ASD Closure Device" - **Gladwin Das**  
"Heart Valve Design" - **R. Morton Bolman III**, University of Minnesota, Chief of Division of Cardiovascular

and Thoracic Surgery  
"Current Status of Left Ventricular Assist Device Therapy for Heart Failure" - **Ranjit John**, University of Minnesota, Department of Surgery

10:30-12:00

Ballroom D

**Session E4: The Million Dollar Question: Why Does Medical Device Development Cost So Much?**

Chair: **Lynn Ihlenfeldt** – Minnetronix, Inc.

"Requirements for a Successfully Developed Medical Devices" - **Randall S. Nelson**, St. Jude Medical / DAIG Division

"Inputs...Outputs...Reviews...Verification...Validation: What's It All Mean?" - **Toni Grabinger**, Project Leadership Services

"Implementing Successful and Cost Effective Clinical and Regulatory Programs or How to Herd Cats" - **Tierney Norsted**, Regulatory & Clinical Research Institute Inc. (RCRI)

12:00 - 1:15

**Luncheon: Medtronic Presents Keynote: Doris A. Taylor**

**Doris A. Taylor**, Bakken Chair in Cardiovascular Repair

1:30 - 3:00

Ballroom A

**Session F1: Nanobiotechnology**

Chair: **T. Andrew Taton** – Department of Chemistry, University of Minnesota

"Nucleic Acid Sequence Identification using Gold Nanoparticle Probes and the Verigene ID Detection System" - **James Storhoff**, Nanosphere, Inc.

"Designing Peptide-Amphiphiles for Increased Cell Adhesion" - **Efrosini Kokkoli**, University of Minnesota, Department of Chemical Engineering and Materials Science

"Functional DNA and Protein Nanoarrays for High Sensitivity Bioanalysis and Detection" - **Linette Demers**, NanoInk, Inc.

1:30 - 3:00

Ballroom B

**Session F2: Magnetic Fields and Medicine**

Chair: **Bruce E. Hammer**, University of Minnesota, Department of Radiology

"Engineering and Medical Applications of Magnetic Fields" - **Bruce E. Hammer**, University of Minnesota, Department of Radiology

"Magnetocardiography: A New Way to Detect Ischemic Heart Disease" - **Peter A. Smars**, Mayo Clinic, Department of Emergency Medicine

"New Dimensions in Functional Magnetic Resonance Imagine (fMRI)" - **Kamil Ugurbil**, University of Minnesota, Center for Magnetic Resonance Research

1:30 - 3:00

Ballroom C

**Session F3: Trends in Congestive Heart Failure Treatment**

Chair: **Rich Nazarian** – Minnetronix, Inc.

"A Surgeon's View" - **William S. Pierce**, The Pennsylvania State University, Department of Surgery

"An Industry View" - **Ken Charhut**, Orqis Medical, Inc.

"A Cardiologist's View" - **Marc Pritzer**, Abbot Northwestern Hospital

1:30 - 3:00

Ballroom D

**Session F4: Human Factors in Medical Device Design**

Chair: **Richard Stein** – Guidant Corporation

**Richard E. Stein**, Guidant Corporation

**Paul Blowers**, Medtronic, Inc.

**W. Robert Worrell**, Worrell Design Inc.

**Bob North**, Human Centered Strategies



# Design of Medical Devices Speaker Biographies:

**Ryan Armbruster**, Department of Medicine, Mayo Clinic.

**Victor H. Barocas** joined the Department of Biomedical Engineering at the University of Minnesota in 2000. His interests include bioMEMS, and cardiovascular and ophthalmic engineering.

**John G. Baust, PhD**, is a Lead Professor in the Department of Biological Sciences and Professor in the Department of Bioengineering at SUNY Binghamton. Dr. Baust is also President and CEO of BioLife Solutions, Inc., and serves as Editor-in-Chief, Journal of Cell Preservation Technology.

**John M. Baust**

**Joan Bechtold**, Director, Orthopaedic Biomechanics Laboratory, Hennepin County Medical Center.

**Richard W. Bianco**, has 30+ years of experience in the management of Experimental Surgical projects. In addition, as Assistant Vice President for Regulatory Affairs at the University of Minnesota, he oversees all regulatory requirements relative to all research programs throughout the University.

**John Bischof, PhD**, Professor, University of Minnesota, Departments of Mechanical Engineering and Biomedical Engineering and Urologic Surgery. Earned B.S., M.S. and Ph.D. degrees in Biomedical and Mechanical Engineering from the University of California at Berkeley.

**Paul Blowers**, Principal Scientist, Medtronic, Inc. MA, human factors/applied experimental psychology.

**R. Morton Bolman III, MD**, Chief of Cardiovascular and Thoracic Surgery at the University of Minnesota since 1989, and Executive Director of Lillehei Heart Institute. Active adult cardiac surgery clinical practice at Fairview-University Medical Center and Regions Hospital with special interest in aortic disease. Research interests are organ preservation for transplantation as well as myocardial stem cell preservation.

**Tim Bowman, MBA**, is the project director of the Advanced Rehabilitative Technologies (ART) program at Sister Kenny Institute where he leads the activities within the RERC on Telerehabilitation. He has been involved in a number of projects within ART that integrates innovative rehabilitation devices and technology into the delivery of rehabilitation.

**Mayor Brede**

**Li Cao, PhD**, is an Assistant Professor at Department of Mechanical Engineering at Iowa State University since August 2000. Her research areas focus on design, fabrication, and characterization of Micro and Nano structures and systems.

**Ken Charhut** has served as CEO of Orqis Medical for the past 5 years. Orqis(TM) Medical Corporation is a clinical-stage medical device company that is applying its discovery of a new hemodynamic principle to change the way congestive heart failure is treated. Mr. Charhut received his BSME degree from Cornell University and a MBA from the University of Chicago.

**Dana Cho**, is a senior designer with IDEO's Smart Spaces. Smart Spaces at IDEO looks at the intersections between space, services, and technology to understand the strategic value of space for an organization's future trajectory. Recent experience involves managing programs for Gap Inc., Memorial Health, and Stanford University's Center for Innovations Learning.

**Jim Coad**, West Virginia University, Department of Surgical Pathology. He is nationally recognized pathologist in tissue ablation/destruction induced by thermal injury.

**Clark K. Colton**, received the B. Ch.E from Cornell University and Ph.D. from MIT (1969), after which he joined the faculty to become Professor (1976), Deputy Head of Chemical Engineering (1977-78), and Bayer Professor (1980-86). His research spans many areas of bioengineering and currently includes methods to improve islet transplantation and targeted drug delivery.

**Tianhong Cui, PhD**, is serving as an Associate Professor of Mechanical Engineering at University of Minnesota. He has twelve years of experience in the field of MEMS and nanotechnology. His current research interests include MEMS, nanotechnology, and polymer micro/nanoelectronics.

**Gladwin Das**

**Linette Demers, PhD**, is Senior Scientist at NanoInk, Inc., a Chicago-

based company commercializing Dip-Pen Nanolithography (DPN). She received her Ph.D. in Chemistry at Northwestern University, where she helped develop some of NanoInk's core technologies.

**Alan Duncan, MD**, is the Medical Director of SPARC, a program to deliver systemic innovation capabilities in healthcare delivery. He has extensive experience and interest in clinical systems and process improvement. In addition to SPARC operations, he is also responsible for identifying new and emerging technologies to support SPARC projects.

**William K. Durfee, PhD**, is a Professor and Director of Design Education in the Department of Mechanical Engineering at the University of Minnesota. His professional interests include rehabilitation engineering, muscle mechanics and product design.

**Dennis Dykstra, MD, PhD**, is chairman of the Dept of Physical Medicine and Rehabilitation at the University of Minnesota and specializes in the diagnosis and management of spasticity and dystonia.

**Emad Ebbini**, Professor, University of Minnesota, Department of Electrical Engineering. Is actively engaged in research on diagnostic and therapeutic aspect of medical ultrasound.

**Robert Elde**, is Dean of the University of Minnesota's College of Biological Sciences and the J. B. Johnston Land Grant Professor of Neuroscience in the Department of Neuroscience. In recent years he has partnered with government and industry to create a biotechnology research park near the University and has led creation of University Enterprise Laboratories, an incubator for start-up biotech companies.

**Arthur G. Erdman, PhD**, specializes in kinematics, biomechanics and medical device design. His research and development activities include dentistry, orthopedics, neurology, urology, MR-guided instruments, cardiology and sports biomechanics.

**Stanley M. Finkelstein, PhD**, is a professor of Laboratory Medicine and Pathology at the University of Minnesota. He is a Fellow of the American Institute of Medical and Biological Engineering. His research interests focus on patient home monitoring in chronic diseases, telemedicine, and medical informatics.

**Robert P. Gallegos, MD**, is a resident in the Department of Surgery currently completing his PhD under the direction of Richard Bianco and R. Morton Bolman III. His primary research interest is the development of pre-clinical animal models for the evaluation of stem cell cardiomyoplasty.

**Toni Grabinger**, has extensive experience in all aspects of project management. Examples: medical devices and instrumentation, communications, business process development; large corporations and small; international projects. Toni co-owns Project Leadership Services, a Minneapolis based project management consulting company.

**Rolf Gruetter**, Associate Professor, University of Minnesota, Departments of Radiology and Neuroscience.

**Alan Haggerty**, is Chief Technology Officer and Vice President of Engineering for American TeleCare. He is a technology veteran with over 20 years of experience in the research and development of embedded systems for mission critical and high reliability applications including measurement, control, and communication systems. He's held a number of leadership and engineering positions at Honeywell Laboratory, Optical Solutions and Agere Systems (formerly Lucent Technology/Bell Labs).

**Bruce E. Hammer, PhD**, is an Associate Professor of Radiology and Director of the Center for Interdisciplinary Applications in Magnetic Resonance (CIA-MR) at the University of Minnesota. His active areas of research include magnetic resonance imaging (MRI), MR device development, magnetic levitation and NMR quantum computing.

**Bruce Hasegawa, PhD**, currently is a Professor of Radiology at UCSF where he serves as the director of the UCSF Physics Research Laboratory. His current research interests include multimodality imaging of structure and function in humans and in small animals.

**Tom Hektner**, is a cofounder of StarFire Medical, a privately held medical device company in Maple Grove. Previously he co-founded ProtoStar which formed CVRx, Inc. (hypertension Rx), Anulex Technologies, Inc (disc repair) and VERTx (part of Spine Wave) vertebral body repair. Combined financings through 2nd round exceed \$80M. He held executive positions at SciMed (VP R&D), Cobe and Baxter.

**Bernhard J. Hering, MD**, is Associate Professor of Surgery, Director of

the Islet Transplant Program, Associate Director of the Diabetes Institute for Immunology and Transplantation, and holder of the Eunice L. Dwan Diabetes Research Chair at the University of Minnesota.

**Alexander Hill, PhD**, is a senior scientist at Medtronic, Inc. His research interests include comparative anatomy and physiology, cardiovascular anatomy and pathology, and biomedical imaging.

**Stephen Holloway, MD, PhD**, is the Director of the Neurophysiology Laboratory at the Minneapolis VA Medical Center and specializes in electroencephalography and epilepsy, with a special interest in EEG source analysis.

**Wei-Shou Hu** is a Distinguished McKnight University Professor. His research interests encompass tissue engineering of hepatic tissues, genomic cell culture engineering and the gene regulation network in microbial secondary metabolism.

**Allison Hubel, PhD**, is the Mayhugh Associate Professor in the Department of Mechanical Engineering. Her interests include cell and tissue engineering and preservation.

**Sayed Ikramuddin**, is an Associate Professor of Surgery and Co-Director of the Minimally Invasive Surgery program at the University of Minnesota. He is the Robert and Katherine Goodale Chair in MIS. As the Director of the Bariatric Surgery Program, his interests lie in the mechanism of development of type 2 diabetes in obese patients and surgical innovations in the management of obesity.

**Paul A. Iazzo, PhD**, Professor, Department of Surgery with joint appointments in Anesthesiology and Physiology, specializes in applied physiology and outcomes research. He is on the graduate faculties in Biomedical Engineering, Neuroscience and Physiology and is also the Director for Education for the Lillehei Heart Institute.

**Harlan T. Jacobs**, is the founder and president of Genesis Business Centers, Ltd., a for profit entity that provides consulting services in respect of the establishment and operation of high tech incubator programs as well as to the inventors and entrepreneurs that utilize the services of a business incubator program. Excorp Medical, a 1996 graduate of the Genesis incubator program, is now in the final stages of commercializing a bioartificial liver technology.

**Ranjit John, MD**, completed his medical school at the Christian Medical College in India. His general surgical residency was done at New York Medical College in New York. Currently, he is an Assistant Professor in the Division of Cardiothoracic Surgery, Department of Surgery at the University of Minnesota. His clinical and research interests lie in the field of surgical therapy for heart failure.

**Doug Johnson**, is currently the Director of the Carlson Ventures Enterprise at the Carlson School of Management, University of Minnesota. He has prior experience in the information technology, investment banking and venture capital industries.

**Diane Kadidlo**, Fairview-University Medical Center, Minneapolis, Minnesota.

**Erosini Kokkoli, PhD**, is Assistant Professor of Chemical Engineering and Materials Science at the University of Minnesota. She received her Ph.D. in Chemical Engineering from the University of Illinois, and then completed postdoctoral work at the University of California at Santa Barbara. Prof. Kokkoli's research focuses on biomaterials engineering, biomolecule adhesion, and targeted drug delivery.

**Stephen D. Kuslich, MD**, is currently the founder and president of two companies: Spineology and PneuMedics. He was also the founder and president of Spine-Tech (1984-1998). He holds more than thirty U.S. patents. Dr. Kuslich practiced and taught spinal surgery in Minneapolis and Stillwater from 1976 until his retirement from practice in 2001.

**R. B. Lahner**, Rider Bennett

**Scott Latterell**

**Kenneth K. Liao, MD**, is an Assistant Professor of Surgery and Surgical Director of Heart Transplant Program at the University of Minnesota. He is board certified by both American Board of Surgery and American Board of Thoracic Surgery. Dr. Liao is accredited for successfully performing the first series of Robotic cardiac surgery in the state of Minnesota.

**Peter X. Ma** received his BS in Polymer Chemistry from Tsinghua University, and Ph.D. in Polymer Science and Engineering from Rutgers University, and did postdoctoral research with Bob Langer at MIT. He is now an Associate Professor at University of Michigan. His research areas are polymers, biomaterials, nano-materials, and tissue engineering.

**Michael Maddaus, MD**, is a Professor of Surgery whose clinical and

research interests lie in pulmonary and esophageal diseases. He is an expert in minimally invasive surgery of these organs.

**Susan C. Mantell, PhD**, Professor in the Department of Mechanical Engineering at the University of Minnesota. Her research in MEMS focuses on design and modeling for liquid environments.

**Leslie Miller, MD**, is the Director of the Heart Failure program at the University of Minnesota. He is involved in the care of patients who undergo placement of biventricular pacing systems.

**Sumita B. Mitra, PhD**, Corporate Scientist, 3M ESPE Dental Products Division, 3M Company. Ph.D. in Organic/Polymer Chemistry, U. of Michigan. Currently she is in charge of new materials/products R&D at this division. Dr. Mitra is the creator of many new dental materials technologies and the developer of several new product segments for the dental and orthodontic market. She is the recipient of 47 patents and has numerous publications in the areas of polymer science and dental materials.

**Daniel G. Miller, PhD**, has been President and Chief Executive Officer of Excorp Medical since inception. Previously, he was Vice President for Research & Development at Dianon Systems, Inc., a public company providing laboratory services and information products to physicians in oncology and gynecology. Dr. Miller's responsibilities at Dianon included strategic planning, new product introduction, technology transfer, regulatory affairs and quality assurance. He holds a Ph.D. from the Department of Pharmaceutical Biochemistry at the University of Wisconsin-Madison.

**Manoj Monga** is the Joseph Sorkness Professor of Urologic Surgery at the University of Minnesota. He completed his training at Tulane University in New Orleans in 1997, then joined the faculty of the University of California San Diego. Following a sabbatical with Dr. Ralph Clayman at Washington University he joined the University of Minnesota in 2001. His primary focus is the systematic evaluation of medical device design in endourology.

**Dan Moordian**, Synovis Life Technologies, Inc.

**Amir Naqwi**, is the founder and president of Powerscope, which develops high-tech instrumentation for process industry and medical applications. He obtained a Ph.D. degree in Engineering from Stanford in 1987 and has worked in academia and industry in the area of optical instrumentation.

**Rich Nazarian** is CEO and one of three founders of Minnetronix, Inc., a Minnesota-based medical device product development company. Mr. Nazarian is the principal inventor on seven patents ranging from telemetry systems for implantable devices to networked cardiopulmonary bypass systems.

**Randall S. Nelson**, is currently Director of EP Product Development for St. Jude Medical/Daig division. He has led development teams and developed medical devices, primarily for the cardiovascular field, for over twenty years. Mr. Nelson has a Mechanical Engineering degree from the U. of Minnesota and an Economics degree from Willamette University.

**Patricia Neuman** has been involved with Minnesota's healthcare industry for over 20 years. For the past 17 years she has been the Healthcare Specialist for the Minnesota Department of Employment and Economic Development. Recently, she added the duties of business development representative for the East Metro area. Ms. Neuman was one of the original coordinators of the Medical Alley Association and the MN Bio Association. Ms. Neuman has been an advocate and major supporter for emerging Minnesota high tech companies. She has received the Medical Alley Award and Minnesota Biotechnology Award in recognition of her outstanding contributions to the local medical device industry.

**David J. Norris**, University of Chicago, B.S., Chemistry (1990); MIT, Ph.D., Physical Chemistry (1995); NSF Postdoctoral Fellow, UCSD (1995-97); NEC Research Institute (Princeton, NJ), Research Scientist (1997-2001); University of Minnesota, Department of Chemical Engineering and Materials Science, Associate Professor (2001-present).

**Tierney Norsted, PhD, MPH**, is a Co-Founder and Vice President of Regulatory and Clinical Research Institute, Inc. (RCRI), a CRO serving the medical device, IVD and bioscience community. She has extensive experience in worldwide medical device clinical and regulatory affairs. She holds a PhD and a MPH in Epidemiology along with a BA in Biostatistics. Dr. Norsted has held clinical and regulatory management positions for medical device companies since 1987 where she has been responsible for both domestic and international programs.

**Bob North**, Chief Scientist, Human Centered Strategies, an independent consulting group focusing on the application of human factors in medical device design.

**Timothy W. Olsen, MD**, was selected to direct the Lions Macular Degeneration Center and the Retina Service at the University of Minnesota in



1998. He is an Associate Professor and holds the William H. Knobloch Chair. He has an active clinical-surgical practice.
- Lynne Osterman**, Minnesota House of Representatives, Author of the Bioscience Zone Legislation
- Tingrui Pan**, Ph.D. Candidate in Electrical Engineering (Expected in 2005), M.S. Candidate in Biomedical Engineering (Expected in 2004), M.S.E.E. in Electrical Engineering, 2002, University of Minnesota, B.E. in Mechanical Engineering, 2000, Tsinghua University.
- Carmelo Panetta, MD**, is an Assistant Professor with the subspecialty of interventional cardiology. His areas of research include contrast induced nephropathy, cardiovascular disease in the presence of kidney disease and diabetes mellitus and device development.
- William Pierce** has been at the forefront of heart research, designing and developing mechanical assist devices and total, implantable artificial hearts throughout his entire career. Since joining the faculty of Penn State University in 1970, he has led a team of engineers and scientists focused on the development of artificial hearts. Dr. Pierce is the co-inventor of the Pierce-Donachy assist pump and was principal investigator throughout the development of the Penn State Total Artificial Heart. Dr. Pierce is currently the Evan Pugh Professor of Surgery and Professor Emeritus of the Department of Surgery at Penn State.
- Damrongrit Piyabongkarn**, is currently a Ph.D. candidate in Mechanical Engineering Department at the University of Minnesota. His dissertation is titled "Development of a MEMS gyroscope for absolute angle measurement." His research interests include advanced control systems, MEMS sensor/actuator design, signal processing and vehicle dynamics.
- Dennis L. Polla**, is currently a Professor in the University of Minnesota Department of Electrical and Computer Engineering. His research interests include MEMS and nanotechnology for biomedical applications.
- Ausra Pond**, is a third year medical student. She has a B.S degree in biology from the University of Minnesota.
- Jonathan T. Pribila, PhD**, is an MD/PhD candidate at the University of Minnesota. He received a PhD in Microbiology, Immunology, and Cancer Biology from the University of Minnesota in 2003. He is currently a third year medical student.
- Marc Pritzner, MD**, Cardiologist, Abbott Northwestern Hospital
- Matt Putnam**
- Anup P. Ramani, PhD**, is a minimally invasive urological surgeon with a special interest in laparoscopy. He completed a two year fellowship in Advanced Urological Laparoscopy at the Cleveland Clinic Foundation. His main interests are the application of minimally invasive techniques in the management of urological cancers and renal transplant.
- Ray Raylman, PhD**, is currently an Associate Professor of Radiology and Vice Chair of Research. He received his PhD in Physics from the University of Michigan. His current research is in nuclear medicine instrumentation.
- Paul J. Reckwerdt**, is the President and co-founder of TomoTherapy and is one of the lead designers of the concept. Working for decades in cancer therapy this is his second company started from ideas spawned at the University of Wisconsin.
- Michael Rosen, PhD**, (PhD, 1973, Northwestern U) is the outgoing director of National Rehabilitation Hospital's Rehabilitation Engineering Service where he has led the RERC on Telerehabilitation and the Assistive Technology Research Center. He was a research scientist in Mechanical Engineering at MIT from 1975 to 1993; and Associate Professor in BME and director of Rehabilitation Engineering at the University of Tennessee-Memphis, 1993-1998. His activities include development of telerehabilitation systems and design of assistive, therapeutic and assessment technologies.
- R. T. Rybak**, Mayor, City of Minneapolis, Minnesota, Chairman of the Board of Minneapolis Lifescience Corridor. R.T. Rybak was elected Mayor of Minneapolis in November of 2001 in his first run for public office with 65 percent of the vote. Since he took office in January of 2002, Mayor Rybak has streamlined the City's development functions, created a \$10 million housing trust fund, strengthened the City's Code of Ethics, and closed a \$50 million gap in City funding by delivering four budgets in less than two years. Minneapolis now leads the state in affordable housing production, job creation and the arts.
- Mark A. Shannon, PhD**, is the director of the Micro-Mechanical Systems (MMS) Laboratory at the University of Illinois at Urbana-Champaign, a laboratory devoted to research and education in the design and fabrication of micro- and nanoelectromechanical systems (MEMS & NEMS) and mesoscale mechanisms, such as the Integrated Mesoscopic Cooler Circuit (IMCC), microscale fuel cells, high-temperature microchemical reactors, and micro-nanofluidic sensors for biological fluids. He is an Associate Professor of Mechanical, Electrical, and Bioengineering at UIUC, and is an affiliate of the Beckman Institute of Advanced Science and Engineering. He received his B.S. (1989) M.S. (1991) and Ph.D. (1993) degrees in Mechanical Engineering from the University of California at Berkeley.
- Peter A. Smars, MD**, graduated from Loma Linda University, CA 1982. Residency training in Internal Medicine at Mayo Clinic 1986-88, and fellowship in Emergency Medicine and Echocardiography, Mayo Clinic 1988-89. Since on staff at Mayo Clinic in the Department of Emergency Medicine.
- Gary W. Smith**, has been working professionally as a certified economic developer for over 25 years. He has been with Rochester Area Economic Development, Inc since 1989. Smith has facilitated over 100 development projects in the Rochester area. These projects include business starts, expansions and new locations. During the past ten years RAEDI facilitated projects have generated over \$2 billion of economic activity and created over 8,000 jobs for Rochester residents.
- Edson W. Spencer, Jr.**, is Managing Partner of Affinity Ventures IV, Founder/Principal of Affinity Capital Management, Managing Partner of AVIII and AVII, and Managing General Partner of PSF. From 1981-1990, he held management positions in sales and marketing at Dycos Petroleum. He serves on numerous portfolio company boards of directors, has served as President of the Minnesota Venture Capital Association and on several non-profit boards of directors. He has an MBA from Columbia University and a BA from Williams College.
- Richard E. Stein**, Principal System Engineer, Guidant Corporation. Specializes in medical device design including human factors.
- James Storhoff, PhD**, is Senior Scientist at Nanosphere, Inc., a private nanobiotechnology company in Northbrook, IL. He received his Ph.D. in Chemistry from Northwestern University, and developed much of the technology behind Nanosphere's detection platforms during his graduate studies.
- Antonio Strafella, MD, PhD**, is a neurologist with expertise in movement disorders, neurophysiology and brain imaging. He is performing intra-operative single unit recordings, brain stimulation and brain imaging studies in Parkinson's disease and Dystonia.
- Jack Tanis**, Director of Applied Research, Steelcase.
- Doris A. Taylor**, Bakken Chair in Cardiovascular Repair, Department of Physiology, Medical School, University of Minnesota. B.S., Biology, Mississippi University for Women, Columbus, MS, 1977, Ph.D., Pharmacology, Southwestern Medical School, Dallas, TX, 1988.
- T. Andrew Taton, PhD**, is Assistant Professor of Chemistry at the University of Minnesota. He received his B.S. from Yale University and his Ph.D. from Harvard University, both in Chemistry. Prof. Taton's research focuses on the biotechnological applications of nanoparticles, and particularly their use in molecular diagnostics and drug delivery.
- Robert T. Tranquillo** became head of the Department of Biomedical Engineering when it was formed four years ago. He is a Distinguished McKnight University Professor. His interests include neural and cardiovascular tissue engineering.
- Paul Tuite, MD**, is the Director of the Parkinson's disease and movement disorders program at the University of Minnesota.
- Kamil Ugurbil, PhD**, University of Minnesota, Center for Magnetic Resonance Research
- Thomas Vaughan, PhD**, 1980 NASA, Kennedy Space Center, FL (Coop Engineer on Space Shuttle project) 1982 Texas Instruments, Dallas TX (Design engineer, Advanced Government Systems) 1984 University of Texas Southwestern (Radiology Research Engineer on early 2T MRI) 1989 University Alabama, Birmingham+Philips, Hamburg (Chief Engineer on early 4T MRI) 1995 Massachusetts General Hospital+Harvard Univ. (Director Engineering, MGH-NMR Ctr) 1999 University Minnesota, Ctr Magnetic Resonance Rsch. (PI Engineering 7T, 9.4T MRI).
- Morris Waxler, PhD**, provides consulting services to clients of LaFollette Godfrey & Kahn on FDA regulation of medical devices. He provided such services at Hogan & Hartson (Washington, DC) after leaving a long and distinguished career regulating medical devices at FDA.
- W. Robert Worrell**, President, Worrell Design Inc. Started Worrell Design, Inc. in 1976, an industrial design firm.