Quo Vadis?
Topics, Theories, Tools, Therapies

OCTOBER 8-13, 2005
Congress of Neurological Surgeons
55th Annual Meeting
Boston, Massachusetts
Preface

The 55th Annual Meeting of the Congress of Neurological Surgeons was held at the Hynes Convention Center in Boston, Massachusetts from October 8 to October 13, 2005. Volume 53 of *Clinical Neurosurgery* represents the official compilation of the invited scientific manuscripts from the plenary sessions, the biographic and bibliographic information of the honored guest, and the presidential address. The program theme of “Quo Vadis” was subdivided sequentially into “Topics,” “Theories,” “Tools,” and “Therapies.”

The Annual Meeting Chairman, Dr. Christopher Wolfla, and the Scientific Program Chairman, Dr. Christopher Getch, organized and led this outstanding, well-attended meeting. This year’s Honored Guest, Dr. Roberto Heros, presented aspects of his lifelong neurosurgical work in a series of lectures on cerebral aneurysms, AVMs, and hemodilution and fluid management. The Presidential Address, by Dr. Nelson Oyesiku, provided a fascinating talk on civilization, entitled “Homogeneity and Heterogeneity: Lessons from Nature and Society.” The list of special lecturers was stellar and included Nobel Laureate Professor Wole Soyinka, who gave the Walter E. Dandy Oration, entitled “Rapture and Rupture in the Liminal World;” Professor Ian Wilmut on “Cells from Cloned Embryos in Research and Therapy;” Professor Vilayanur Ramachandran, who talked on the “Neurology of Human Nature;” Professor Sidney Watkins on “The Physiology and Pathology of Motor Racing: Triumph and Tragedy in Formula One;” and Professor Robert Langer on “Polymers in the Delivery of Drug Treatments.”

Our congratulations go out to the Annual Meeting Committee for their outstanding efforts in putting together such a superb conference. We would like to thank all of the contributors to *Clinical Neurosurgery* for their timely dedication to this volume. We also express our sincerest gratitude to Jennifer Sollenberger at Lippincott Williams and Wilkins for diligently compiling all the manuscripts into their final form to make this volume a reality. We thank the CNS and its membership for the honor of serving as co-Editors of Volume 53. This has been a transition year for *Clinical Neurosurgery*, as Dr. Grant takes over the helm full time. Due to his commitment serving in the United States Air Force in Iraq, the two of us served as co-Editors for this volume. Dr. Grant will be taking over as Editor-in-Chief effective the 56th Annual Meeting in Chicago. We look forward to seeing you there for an innovative educational program.

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*Gerald A. Grant, M.D.*
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Contributors

Manish Aghi, M.D., Ph.D.
Department of Neurosurgery
Massachusetts General Hospital
Harvard Medical School
Charlestown, Massachusetts

Franklin Aigbirhio, Ph.D.
Wolfson Brain Imaging Centre
University of Cambridge
Cambridge, England

Joshua M. Ammerman, M.D.
Surgical Neurology Branch
National Institute of Neurological Disorders and Stroke
National Institutes of Health
Bethesda, Maryland
Department of Neurological Surgery
George Washington University Medical Center
Washington, D.C.

Department of Neurosurgery
Radcliffe Infirmary
Oxford, England
University Laboratory of Physiology
University of Oxford
Oxford, England

Peter G. Bain, F.R.C.P.
Division of Neurosciences and Mental Health
Imperial College of London
London, England

Danielle Baleriaux, M.D.
Department of Neurosurgery
Erasme Hospital-ULB
Brussels, Belgium

Nicholas M. Barbaro, M.D.
Department of Neurological Surgery
University of California, San Francisco
San Francisco, California

Gene H. Barnett, M.D.
Department of Neurosurgery
Brain Tumor Institute
The Cleveland Clinic Tausig Cancer Center
Cleveland, Ohio

Mustafa K. Baskaya, M.D.
Department of Neurological Surgery
University of Miami School of Medicine
Miami, Florida
Edward C. Benzel, M.D.
Spine Institute
Spine Research Laboratory
The Cleveland Clinic Foundation
Cleveland, Ohio

Erica F. Bisson, M.D.
Division of Neurological Surgery
University of Vermont
Burlington, Vermont

Keith L. Black, M.D.
Maxine Dunitz Neurosurgical Institute
Cedars-Sinai Medical Center
Los Angeles, California

Nicolas M. Boulis, M.D.
Department of Neurosurgery
Lerner College of Medicine
The Cleveland Clinic Foundation
Cleveland, Ohio

Charles Leon Branch, Jr., M.D.
Wake Forest University
Baptist Medical Center
Winston-Salem, North Carolina

Jacques Brotchi, M.D., Ph.D.
Department of Neurosurgery
Erasme Hospital-ULB
Brussels, Belgium

Michael Bruneau, M.D.
Department of Neurosurgery
Erasme Hospital-ULB
Brussels, Belgium

Ross Bullock, M.D., Ph.D.
Department of Neurosurgery
Harold F. Young Neurosurgery Center
Virginia Commonwealth University
Richmond, Virginia

John A. Butman, M.D., Ph.D.
Diagnostic Radiology Department
Warren G. Magnusson Clinical Center
National Institutes of Health
Bethesda, Maryland

Nicholas A. Butowski, M.D.
Department of Neurological Surgery
University of California, San Francisco
San Francisco, California
Joaquin Camara-Quintana, B.S.
Department of Neurological Surgery
University of California, San Francisco
San Francisco, California

Thomas Adrian Carpenter, Ph.D.
Wolfson Brain Imaging Centre
University of Cambridge
Cambridge, England

Susan M. Chang, M.D.
Department of Neurological Surgery
University of California, San Francisco
San Francisco, California

Jason S. Cheng, B.S.
Department of Neurological Surgery
University of California, San Francisco
San Francisco, California

Martin Coleman, Ph.D.
Division of Academic Neurosurgery
Wolfson Brain Imaging Centre
University of Cambridge
Cambridge, England

E. Sander Connolly, M.D.
Department of Neurological Surgery
Columbia University
New York, New York

James Dambrosia, Ph.D.
Biostatics Branch
National Institute of Neurological Disorders and Stroke
National Institutes of Health
Bethesda, Maryland

Judith Dinsmore, F.R.C.A.
Department of Neuroanesthesia
St. George's Hospital
London, England

Andrew F. Ducruet, M.D.
Department of Neurological Surgery
Columbia University
New York, New York

Robert D. Ecker, M.D.
Department of Neurosurgery and Toshiba Stroke Research Center
School of Medicine and Biomedical Sciences
University at Buffalo, State University of New York
Buffalo, New York
Michael R. Egnor, M.D.
Department of Neurosurgery
State University of New York, Stony Brook
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Aaron Fleischman, Ph.D.
Department of Biomedical Engineering
The Cleveland Clinic Foundation
Cleveland, Ohio

Fred H. Geisler, M.D., Ph.D.
Illinois Neuro-Spine Center
Rush-Copley Hospital
Aurora, Illinois

Philip L. Gildenberg, M.D., Ph.D.
Departments of Neurosurgery and Radiation Oncology
Baylor Medical College
Houston, Texas

Charlotte Gilman, R.N.
Department of Neurosurgery
Harold F. Young Neurosurgery Center
Virginia Commonwealth University
Richmond, Virginia

Rainer Glass, Ph.D.
Cellular Neuroscience Group
Max Delbruck Center for Molecular Medicine (MDC)
Berlin, Germany

Alexander L. Green, M.R.C.S.
Department of Neurosurgery
Radcliffe Infirmary
Oxford, England

University Laboratory of Physiology
University of Oxford
Oxford, England

Mark N. Hadley, M.D., F.A.C.S.
Division of Neurological Surgery
University of Alabama at Birmingham
Birmingham, Alabama

Roberto C. Heros, M.D., F.A.C.S.
Department of Neurological Surgery
University of Miami School of Medicine
Miami, Florida

Eric J. Heyer, M.D., Ph.D.
Department of Anesthesiology
Columbia University
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L. Nelson Hopkins, M.D.
Departments of Neurosurgery and Radiology and Toshiba Stroke Research Center
School of Medicine and Biomedical Sciences
University at Buffalo, State University of New York
Buffalo, New York

Ramin Javahary, M.D.
Department of Neurological Surgery
University of Miami School of Medicine
Miami, Florida

Andrew Jea, M.D.
Department of Neurological Surgery
University of Miami School of Medicine
Miami, Florida

Mark Kayanja, M.D., Ph.D.
Spine Research Laboratory
Department of Biomedical Engineering
The Cleveland Clinic Foundation
Cleveland, Ohio

Helmut Kettenmann, Ph.D.
Cellular Neuroscience Group
Max Delbruck Center for Molecular Medicine (MDC)
Berlin, Germany

Paul Keetae Kim, M.D.
Department of Neurosurgery
Wake Forest-Bowman Gray School of Medicine
Winston-Salem, North Carolina

Juergen Kiwit, M.D.
Department of Neurosurgery
Helios Hospital Berlin
Berlin, Germany

David G. Kline, M.D.
Department of Neurosurgery
Louisiana State University
New Orleans, Louisiana

Christopher J. Koebbe, M.D.
Department of Neurological Surgery
Jefferson Hospital for Neuroscience
Thomas Jefferson University
Philadelphia, Pennsylvania

Ricardo J. Komotar, M.D.
Department of Neurological Surgery
Columbia University
New York, New York
Nikki Kunene, M.Sc.
Department of Information Systems
Virginia Commonwealth University
Richmond, Virginia

Jeffrey J. Laurent, M.D.
Division of Neurological Surgery
University of Alabama at Birmingham
Birmingham, Alabama

Florence Lefranc, M.D., Ph.D.
Department of Neurosurgery
Erasme Hospital-ULB
Brussels, Belgium

Elad I. Levy, M.D.
Departments of Neurosurgery and Radiology and Toshiba Stroke Research Center
School of Medicine and Biomedical Sciences
University at Buffalo, State University of New York
Buffalo, New York

Muh Lii Liang, M.D.
Division of Neurosurgery
The Hospital for Sick Children
University of Toronto
Toronto, Ontario, Canada

Mary Limbo, B.A.
Department of Neurological Surgery
University of California, San Francisco
San Francisco, California

Kenneth W. Lindsay, Ph.D., F.R.C.S.
Department of Neurosurgery
Institute of Neurological Sciences
Southern General Hospital
Glasgow, Scotland

Gentao Liu, Ph.D.
Maxine Dunitz Neurosurgical Institute
Cedars-Sinai Medical Center
Los Angeles, California

Xuguang Liu, Ph.D.
Division of Neurosciences and Mental Health
Imperial College of London
London, England
Russell R. Lonser, M.D.
Surgical Neurology Branch
National Institute of Neurological Disorders and Stroke
National Institutes of Health
Bethesda, Maryland

Anne Luptrawan, M.S.N., N.P.
Maxine Dunitz Neurosurgical Institute
Cedars-Sinai Medical Center
Los Angeles, California

R. Loch MacDonald, M.D., Ph.D.
Department of Surgery
University of Chicago Hospitals
Chicago, Illinois

Robert J. Maciunas, M.D., M.P.H., F.A.C.S.
Departments of Neurosurgery, Radiation, and Radiation Oncology
University Hospitals of Cleveland
Case Medical School
Cleveland, Ohio

William J. Mack, M.D.
Department of Neurological Surgery
Columbia University
New York, New York

Joseph R. Madsen
Department of Neurosurgery
Children’s Hospital
Boston, Massachusetts

Henry T. Marsh, F.R.C.S.
St. George’s Hospital
London, United Kingdom

Robert L. Martuza, M.D.
Department of Neurosurgery
Massachusetts General Hospital
Harvard Medical School
Charlestown, Massachusetts

Anna Mazzeo, M.D.
Department of Neurosurgery
Harold F. Young Neurosurgery Center
Virginia Commonwealth University
Richmond, Virginia
Department of Neuroscience, Psychiatric, and Anesthesiological Sciences
University of Messina
Messina, Italy
Guy M. McKhann II, M.D.
Department of Neurological Surgery
Columbia University
New York Presbyterian Hospital
New York, New York

Rajiv Midha, M.D., M.Sc., F.R.C.S.C.
Department of Clinical Neurosciences
Division of Neurosurgery
University of Calgary and Foothills Medical Centre
Calgary, Alberta, Canada

J Mocco, M.D.
Department of Neurological Surgery
Columbia University
New York, New York

Jacques J. Morcos, M.D., F.R.C.S. (Eng.), F.R.C.S. (Ed.)
Department of Neurological Surgery
University of Miami School of Medicine
Miami, Florida

Mary Murphy, F.R.C.S.(SN)
Department of Neurosurgery
St. George’s Hospital
London, England

Richard B. North, M.D.
Departments of Neurosurgery, Anesthesiology, and Critical Care Medicine
The Johns Hopkins University School of Medicine
Baltimore, Maryland

Edward H. Oldfield, M.D.
Surgical Neurology Branch
National Institute of Neurological Disorders and Stroke
National Institutes of Health
Bethesda, Maryland

Adrian Owen, Ph.D.
MRC Cognition and Brain Sciences Unit
Cambridge, England

Sarah L.F. Owen, B.A.
University Laboratory of Physiology
University of Oxford
Oxford, England

Nelson M. Oyesiku, M.D, Ph.D., F.A.C.S.
Department of Neurosurgery
Emory University
Atlanta, Georgia
Aditya Pandey, M.D.
Department of Neurological Surgery
Jefferson Hospital for Neuroscience
Thomas Jefferson University
Philadelphia, Pennsylvania

David J. Paterson, D.Phil.
University Laboratory of Physiology
University of Oxford
Oxford, England

Division of Academic Neurosurgery
Wolfson Brain Imaging Centre
University of Cambridge
Cambridge, England

Samuel Rabkin, Ph.D.
Department of Neurosurgery
Massachusetts General Hospital
Harvard Medical School
Charlestown, Massachusetts

Daniel K. Resnick, M.D.
Department of Neurological Surgery
University of Wisconsin
Madison, Wisconsin

Jonathan Riley, B.S.E.
Department of Neurosurgery
Lerner College of Medicine
The Cleveland Clinic Foundation
Cleveland, Ohio

Robert H. Rosenwasser, M.D., F.A.C.S.
Department of Neurological Surgery
Jefferson Hospital for Neuroscience
Thomas Jefferson University
Philadelphia, Pennsylvania

Shuvo Roy, Ph.D.
Department of Biomedical Engineering
The Cleveland Clinic Foundation
Cleveland, Ohio

James T. Rutka, M.D., Ph.D., F.R.C.S.C.
Division of Neurosurgery
The Hospital for Sick Children
University of Toronto
Toronto, Ontario, Canada
Rod Samuelson, M.D.
Department of Neurosurgery
Harold F. Young Neurosurgery Center
Virginia Commonwealth University
Richmond, Virginia

Rene O. Sanchez-Mejia, M.D.
Department of Neurological Surgery
University of California, San Francisco
San Francisco, California

Department of Medicine
Columbia University
New York, New York

Rishi N. Sheth, M.D.
Department of Neurological Surgery
University of Miami School of Medicine
Miami, Florida

Wole Soyinka
Nobel Prize in Literature, 1986

Robert J. Spinner, M.D.
Departments of Neurologic Surgery, Orthopedics, and Anatomy
Mayo Clinic
Rochester, Minnesota

John F. Stein, F.R.C.P
University Laboratory of Physiology
University of Oxford
Oxford, England

Wale A.R. Sulaiman, M.D., Ph.D.
Section of Neurosurgery
University of Manitoba
Winnipeg, Canada

Ali Sultan, M.D.
Department of Neurological Surgery
University of Miami School of Medicine
Miami, Florida

Michael Synowitz, M.D.
Department of Neurosurgery
Helios Hospital Berlin
Berlin, Germany
Cellular Neuroscience Group
Max Delbruck Center for Molecular Medicine (MDC)
Berlin, Germany
Matthew I. Tomey, B.A.
Department of Neurological Surgery
Columbia University
New York, New York

Vincent C. Traynelis, M.D.
Department of Neurosurgery
University of Iowa Hospitals and Clinics
University of Iowa Carver College of Medicine
Iowa City, Iowa

Ramachandra P. Tummala, M.D.
Department of Neurological Surgery
University of Miami School of Medicine
Miami, Florida

Alex B. Valadka, M.D., F.A.C.S.
Department of Neurosurgery
University of Texas Medical School
Houston, Texas

Erol Veznedaroglu, M.D.
Department of Neurological Surgery
Jefferson Hospital for Neuroscience
Thomas Jefferson University
Philadelphia, Pennsylvania

Shouyan Wang, Ph.D.
University Laboratory of Physiology
University of Oxford
Oxford, England

Mariann M. Ward, R.N., M.S.
Department of Neurological Surgery
University of California, San Francisco
San Francisco, California

Eric S. Watkins, O.B.E., M.D., D.Sc., F.R.C.S.
Federations du Sport L’automobile
Paris, France
Department of Neurosurgery
University of London
London, England

Astrid Weyerbrock, M.D.
Division of Neurosurgery
The Hospital for Sick Children
University of Toronto
Toronto, Ontario, Canada
Peter R. Wilkins, F.R.C.P.  
Department of Neuropathology  
St. George’s Hospital  
Oxford, England

David A. Wilson, B.S.  
Department of Neurological Surgery  
Columbia University  
New York, New York

Stacey Quintero Wolfe, M.D.  
Department of Neurosurgery  
University of Miami  
Miami, Florida

Kangning Xie, M.Sc.  
University Laboratory of Physiology  
University of Oxford  
Oxford, England

Harold F. Young, M.D.  
Department of Neurosurgery  
Harold F. Young Neurosurgery Center  
Virginia Commonwealth University  
Richmond, Virginia

John S. Yu, M.D.  
Maxine Dunitz Neurosurgical Institute  
Cedars-Sinai Medical Center  
Los Angeles, California

Joseph Zurica, B.A.  
Department of Anesthesiology  
Columbia University  
New York, New York

Rui Zou  
Department of Neurosurgery  
Children’s Hospital  
Boston, Massachusetts
ROBERTO C. HEROS
Biography

Roberto C. Heros was born in 1942 in Havana, Cuba. After the Communist takeover in 1960, he left Cuba for exile. He participated as a paratrooper platoon commander in the Bay of Pigs invasion and was captured. After serving 2 years in prison, Dr. Heros was released as a result of an exchange with the United States Government. He attended medical school at the University of Tennessee where he graduated, first in his class, in 1968.

Dr. Heros completed his internship and his first year general surgery residency at the Massachusetts General Hospital in Boston and then served as Major for 2 years in the United States Air Force. He then completed his residency in neurosurgery at the Massachusetts General Hospital, Harvard Medical School, before moving to the University of Pittsburgh as an Assistant Professor. He moved back to Massachusetts General Hospital in 1980 to become Director of Cerebrovascular Surgery. Dr. Heros moved through the academic ranks at Harvard to reach full professorship in 1989, at which time he moved to the University of Minnesota as the Lyle A. French Professor and Chairman of the Department of Neurosurgery. He moved to the University of Miami in 1995 as Professor, Co-Chairman, and Program Director of the Department of Neurosurgery and the founding Director of the University of Miami International Health Center.

Dr. Heros has authored or co-authored four textbooks and has published nearly 150 refereed articles and approximately 70 textbook chapters dealing with cerebral aneurysms, arteriovenous malformations, experimental cerebral ischemia, and cranial base surgical approaches. His research has been in the area of cerebral protection from ischemia, particularly with hemodilution. He held National Institutes of Health funding as primary investigator in this area for 12 years and served both in Study Sections and, later, as a full member of the National Advisory Council of the National Institute of Neurologic Disorders and Stroke (1995–1998).

Dr. Heros has been Visiting Professor at more than 50 institutions in this country and abroad, and he has delivered more than 500 invited national and international presentations. He holds honorary memberships in several Latin American and European neurosurgical societies and is also Honorary Member of the Japan Neurosurgical Society. He has been Chairman of the Editorial Board of Neurosurgery and currently serves on the Editorial Boards of seven journals, including the Journal of Neurosurgery. He was the founding Chairman of the National “Brain Attack” Coalition and was the first Chairman of the Neurovascular Committee of the World Federation of Neurosurgical Societies. He is Past President of the American Academy of Neurological Surgeons and the American Association of Neurological Surgery. He has been the Honored Guest of the Federation of Latin American Neurosurgical Societies and the Italian Neurosurgical Society and, this year, he is the “Honored Guest” of the Congress of Neurological Surgeons. He has been elected as the President of the Congress of the World Federation of Neurosurgical Societies, which will take place in Boston in 2009.
Bibliography

118. Nussbaum ES, Heros RC, Madison MT, Awasthi D, Truwit CL: The pathogenesis of arteriovenous malformations: Insights provided by a case of multiple arteriovenous malfor-


