

INTERNATIONAL PROSTATE MRI WORKING GROUP

INTRODUCTION, BACKGROUND, GOALS, STRUCTURE, MEMBERSHIP, RESEARCH

Introduction

AdMeTech, a nonprofit organization, provides leadership, support and management of the international, multi-institutional, multi-disciplinary International Prostate MRI Working Group (Group). This Group offers a comprehensive, multi-disciplinary, multi-institutional approach to the advancement of MRI and Magnetic Resonance Spectroscopy (MRS) technologies and their integration with treatment of prostate cancer. In this Group, AdMeTech creates a unique interdisciplinary, multi-institutional environment where top international basic scientists, engineers, medical oncologists, radiologists, urologists, radiation oncologists, pathologists and other specialists work in cooperation with leaders of industry to expedite the development and implementation of MRI/MRS for clinical use.

Background

Prior to the establishment of the Group, AdMeTech Foundation convened a series of meetings of international thought leaders which had identified MRI/MRS as the most promising and mature clinical imaging tool for diagnosis of prostate cancer and developed a plan for the structure and function of the Group.

Goals

The Group is modeled after the International Breast MRI Working Group, which was established in 1993 and played a pivotal role in the facilitated development, standardization, testing and implementation of breast MRI and ultimately, its acceptance as a routine clinical tool today.

The Group is a strategic partnership of leaders of academia, industry, philanthropy and advocacy groups formed with the goal to support ground-breaking research and to develop the near-and long-term research strategy for facilitated advancement of MRI/MRS. This will include development of technical specifications, standards and quality control for multi-institutional clinical testing. The Group will develop vision for the future and clear pathways for its successful realization.

Structure, Membership, Research

Major Structural Components

- I. The Core Leadership Team (see I)
- II. "Blue Ribbon" Steering Committee (see II)
- III. Technical Working Groups will expand the development and expansion of research strategy for advancement of the key specific technical areas of prostate MRI/MRS (see III):
 - MR Spectroscopy (MRS) (see IIIA)
 - Diffusion-Weighted Imaging (DWI)/ Dynamic Contrast Enhancement (DCE) (see IIIB)
 - High Resolution Imaging/RF Coil Design (see IIIC)
 - T2-Weighted MRI (see IIID)
 - MR-Guided Biopsy (see IIIE)
 - Multi-Parametric Image Analysis (see IIIF)
- IV. Individual institutional Sites for Research and Development, including pilot studies (see IV)
- V. Industrial Liaison Board (see V)

Overview

I. **The Core Leadership Team** is led by Faina Shtern, MD, President of AdMeTech Foundation with the following Co-Leaders:

Clinical Radiology

- Jelle Barentsz, MD, PhD, Professor of Radiology, Radboud University of Nijmegen Medical Centre, Netherlands
- Fergus Coakley, MD, Professor of Radiology, Biomedical Imaging, and Urology; Chief Abdominal Imaging Section, and Vice Chair of Clinical Service, Department of Radiology and Biomedical Imaging, University of California, San Francisco
- Melvyn Clouse, MD, Deaconess Professor of Radiology, Harvard Medical School and Emeritus Chairman of Radiology, Beth Israel Deaconess Medical Center
- Clare Tempany, MD, Professor of Radiology and Chair of Radiology Research, Brigham and Women's Hospital and Harvard Medical School

Radiologic Imaging Quality Assurance & Technical Support

- John Kurhanewicz, PhD, Professor of Radiology, Pharmaceutical Chemistry and Urology and Director of Biomedical NMR Lab, University of California, San Francisco
- Martin Leach, PhD, Professor, Institute of Cancer Research and Section Chair, Royal Marsden Hospital, UK

Medical Oncology

- Philip Kantoff, MD, Professor of Medicine, Chief Clinical Research Officer and Chief of the Division of Solid Tumor Oncology, Dana-Farber Cancer Institute, Leader of the DanaFarber/Harvard Cancer Center Prostate Cancer Program and Director of the Prostate Cancer Specialized Program of Research Excellence (SPORE), Harvard Medical School

Urology

- Peter Pinto, MD, Director, Fellowship Program, Urologic Oncology Branch, National Cancer Institute

Radiation Oncology

- Alan Pollack, MD, PhD, Sylvester Professor and Chair, Department of Radiation Oncology, Sylvester Comprehensive Cancer Center, University of Miami Miller School of Medicine.

Pathology

- Thomas Wheeler, MD, Professor and Chairman, Department of Pathology and Professor of Urology, Baylor College of Medicine

II. **"Blue Ribbon" Steering Committee** includes the following members:

- Al Barqawi, MD, Assistant Professor of Urology, Section of Urologic Oncology, University of Colorado Health Science Center
- E. David Crawford, MD, Professor of Surgery and Urology; Head, Section of Urologic Oncology, Anschutz Cancer Center and Senior Associate Director of the Comprehensive Cancer Center, University of Colorado Health Sciences Center
- John Griffiths, MB, BS, DPhil, Professor, Molecular Imaging (MRI and MRS), Cancer Research UK Cambridge Research Institute, Cambridge University -Keya Hosseinzadeh, MD, Chief, Body MRI and Assistant Professor of Radiology, University of Pittsburgh Medical Center
- Eric Klein, Professor and Institute Chair and Director of the Center for Clinical and Translational Research, Glickman Urological and Kidney Institute, Section Head, Urologic Oncology, Cleveland Clinic

- Chris Logothetis, MD, Chair, Department of Genitourinary Medical Oncology, MD Anderson Cancer Center
- Peter Luijten, PhD, Professor of Functional Medical Imaging, Division of Radiology, Radiotherapy and Nuclear Medicine, Image Sciences Institute, University Medical Centre, Utrecht, Netherlands
- Robert Mulkern, PhD, Associate Professor of Radiology, Harvard Medical School, Associate Physicist, Department of Radiology, Children's Hospital Boston, Department of Radiology, Medicine, Brigham and Women's Hospital
- William Nelson, MD, PhD, Marion I. Knott Director and Professor of Oncology; Director, Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins; Associate Director, Translational Research, The Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins; Professor of Oncology, Urology, Pharmacology, Medicine, and Pathology, Johns Hopkins Medical School with joint Appointment in Environmental Health Sciences, The Johns Hopkins Bloomberg School of Public Health
- Mack Roach III, MD, Professor and Chair of Radiation Oncology and Professor, Urology, University of California, San Francisco
- Bruce Rosen, MD, PhD, Professor of Radiology and Health Sciences & Technology, Harvard Medical School, Massachusetts General Hospital (MGH), Director of the Nuclear Magnetic Resonance Center at MGH and Health Sciences Technologies/Massachusetts Institute of Technology's Athinoula A. Martinos Center for Biomedical Imaging
- Peter Scardino, MD, Chairman, Department of Surgery, David H. Koch Chair, Memorial Sloan-Kettering Cancer Center
- Howard Scher, MD, Chief, Genitourinary Oncology Service; D. Wayne Calloway Chair in Urologic Oncology, Memorial Sloan-Kettering Cancer Center
- Shahin Tabatabaei, MD, Department of Urology, Massachusetts General Hospital
- John Tomaszewski, MD, Professor of Pathology and Laboratory Medicine and Vice Chair of Anatomic Pathology - Hospital Services; Interim Chair, Pathology and Laboratory Medicine, University of Pennsylvania
- Michael Vannier, MD, Professor of Radiology, University of Chicago
- Jeffrey Weinreb, MD, Professor of Diagnostic Radiology; Director of Medical Imaging; Chief of Body Imaging; Chief of Magnetic Resonance Imaging, Yale School of Medicine
- Michael Zelefsky, MD, Chief, Brachytherapy Service and Professor of Radiation Oncology, Memorial Sloan-Kettering Cancer Center

III. Technical Working Groups include:

A. MAGNETIC RESONANCE SPECTROSCOPY

- John Kurhanewicz, PhD, (Leader) Full Professor of Radiology, Pharmaceutical Chemistry & Urology, Director of Biomedical NMR Lab, University of California, San Francisco
- John Griffiths, MB, BS, DPhil, Professor, Molecular Imaging (MRI and MRS), Cancer Research UK Cambridge Research Institute, UK
- Arend Heerschap, MD, PhD, Professor of MR Sciences, Department of Radiology, Radboud University Nijmegen Medical Center, Netherlands
- Amita Dave, Assistant Attending Physicist, Memorial Sloan-Kettering Cancer Center

B. DWI/DCE

- Martin Leach, PhD (Leader), Professor, Institute of Cancer Research and Section Chair, Royal Marsden Hospital, UK
- Stephan Maier, Associate Professor of Radiology, Brigham and Women's Hospital and Harvard Medical School

- Jurgen Futterer, PhD, Chief of Oncologic Interventional Radiology, Department of Radiology Radboud University Nijmegen Medical Center, Netherlands
- Bruce Rosen, MD, PhD, Professor of Radiology and Health Sciences & Technology, Harvard Medical School, Massachusetts General Hospital (MGH), Director of the Nuclear Magnetic Resonance Center at MGH and Health Sciences Technologies/Massachusetts Institute of Technology's Athinoula A. Martinos Center for Biomedical Imaging
- Peter Luijten, PhD, Professor Functional Medical Imaging, Division Radiology, Radiotherapy and Nuclear Medicine, Image Sciences Institute, University Medical Centre Utrecht, Netherlands
- Anwar Padhani, MD, Consultant Radiologist, Paul Strickland Scanner Centre, Head of MRI and Imaging Research, Mount Vernon Cancer Center, UK
- Neil Rofsky, MD, Associate Professor of Radiology, Harvard Medical School and Chief of MRI, Beth Israel Deaconess Medical Center
- Thomas Hambrock, MD, Researcher in Prostate MRI, Department of Radiology, Radboud University Nijmegen Medical Center, Netherlands

C. HIGH RESOLUTION IMAGING/RF COIL DESIGN

- Mark Rosen, MD, PhD (Leader), Assistant Professor of Radiology, The Hospital at the University of Pennsylvania
- Thomas Wheeler, MD, Professor and Chairman, Department of Pathology and Professor of Urology, Baylor College of Medicine
- John Tomaszewski, MD, Professor of Pathology and Laboratory Medicine, Vice Chair, Anatomic Pathology Hospital Services; Interim Chair, Pathology and Laboratory Medicine, University of Pennsylvania
- Georg Klump, PhD, Professor, Oldenburg University, Germany

D. T2 WEIGHTED IMAGING

- Robert Mulkern, PhD (Leader), Associate Professor of Radiology, Harvard Medical School, Associate Physicist, Radiology, Children's Hospital, Boston, Associate Physician, Medicine, Brigham and Women's Hospital
- Mukesh G Harisinghani, MD, Associate Professor of Radiology, Harvard Medical School, Associate Radiologist, Massachusetts General Hospital

E. MR-GUIDED BIOPSY

- Clare Tempany, MD (Leader), Professor of Radiology and Chair of Radiology Research; Brigham and Women's Hospital and Harvard Medical School
- Cynthia Menard, MD (Co-Leader), Associate Professor, Department of Radiation Oncology, University of Toronto, Clinician Scientist, Radiation Medicine Program, Princess Margaret Hospital, Canada
- Gabor Fichtinger, Director, Engineering, Center for Computer-Integrated Surgical Systems and Technology, Associate Research Professor, Computer Science, Mechanical Engineering, Radiology GWC Whiting School of Engineering, Johns Hopkins University

F. MULTI-PARAMETRIC IMAGE ANALYSIS

- Clare Tempany, MD (Leader), Professor of Radiology and Chair of Radiology Research; Brigham and Women's Hospital and Harvard Medical School
- Radka Stoyanova, PhD, Senior Scientific Associate, Department of Radiation Oncology, Fox Chase Cancer Center
- Masoom Haider, Associate Professor of Radiology, University of Toronto, Canada

IV. Individual Institutional Sites for Research and Development, including pilot studies. These research sites were selected based on their leadership position in the field, and the projects were selected based on their immediate high-impact on the field of prostate MRI/MRS:

- *Multiparametric MR Imaging of Prostate Cancer at 3 Tesla Clinical MR Scanner*. Principal Investigators: Amita Dave, PhD and Hedvig Hricak, MD, PhD, Memorial Sloan-Kettering Cancer Center. This group will provide leadership in the development and assessment of a comprehensive MRI as a clinical tool in patients with prostate cancer;
- *Improved detection and Assessment of Prostate Cancer Using Multi-Functional MRI*. Principal Investigator: Martin Leach, PhD, Royal Marsden Hospital, United Kingdom. This group will provide leadership in the development of improved image analysis techniques;
- *Performance of MRI vs. TRUS Needle Guidance to Sub-Regions of Gross Tumor Volume in Patients with High-Risk Localized Prostate Cancer*. Principal Investigator: Cynthia Menard, MD, PhD, Princess Margaret Hospital, University Health Network, Ontario, Canada. This research will address the need for improved, cost-effective biopsy techniques;
- *Quantitative T2 Relaxation Imaging and High Spatial Resolution 3D Imaging for Improved Tissue Characterization and Localization of Prostate Cancer for Image-Guided Therapy*. Principal Investigator: Robert Mulkern, PhD, Brigham and Women's Hospital, Harvard Medical School;
- *Detection of local Recurrence with Multiparametric MRI in Prostate Cancer Patients: a Pilot Study*. Principal Investigator: Drs. Jurgen Futterer and Jelle Barentz, University of Nijmegen, Netherlands. The goal of this study is to evaluate the diagnostic accuracy of 3 Tesla (3T) multiparametric endorectal MR imaging for detection of persistent or recurrent prostate cancer after treatment;
- *Molecular Imaging of Prostate Cancer*. Principal Investigator: Dr. John Kurhanewich, UCSF: The goal of this retrospective study is to determine whether imaging MRI/MRS biomarkers can predict disease progression in patients diagnosed with prostate cancer and managed with active surveillance. This retrospective work addresses a critical need in the area of prostate cancer care: to enhance active surveillance with imaging and to avoid unnecessary treatment while improving the identification of patients who require treatment;
- *Multi-parametric Prostate MR Image Analysis*. Principal Investigator: Dr. Clare Tempany, Brigham and Women's Hospital, Harvard Medical School. The goal of this study is to develop a multiparametric, quantitative, robust, reproducible, and time-resolved MRI examination and its correlation with both histopathology and long-term cancer outcomes. This group will provide leadership in the optimization of MR image analysis, one of the critical areas of research and development for larger-scale trials and clinical implementation;
- *Ex-Vivo MRI Microscopy of Prostate Cancer at 9.4T*. Dr. Aytekin Oto, Associate Professor of Radiology and Chief of Body MRI University of Chicago Medical Center. The goal of this innovative study is to optimize and to determine the feasibility of 9.4T MRI microscopy of fresh and fixed prostatectomy specimens. It is anticipated that high-field MR tissue analysis will be an important tool which will provide complimentary biologic information which cannot be obtained from standard histology.

V. Industrial Liaison Board includes the following members:

- Shawn Etheridge, Director of MR Marketing, Hitachi Medical Systems
- Bernadette Greenwood, Clinical Product Manager, Oncology, IN VIVO Corporation
- Berthold Kiefer, PhD, MR Application Development, Siemens
- Adrian Knowles, MR Clinical Development Leader, GE Health Systems
- Axel Krieger, PhD, Product Leader, Prostate Care Solutions, Hologic
- Rajeev Sehgal, Director, Patient Care Products, MEDRAD, Inc.
- Stacey Stevens, Senior Vice President of Marketing and Strategy, iCAD
- Pat Venters, Vice President, Women's Healthcare and Oncology, Philips Healthcare