Proton Therapy Training

Clinical & Operations
October 8 – October 12, 2018
Welcome to MD Anderson Cancer Center and the Proton Therapy Center in Houston, TX. We are excited that you have chosen our world-class facilities to further your knowledge and understanding of proton therapy. With the most innovative technology and a multidisciplinary team approach, our cancer experts include radiation oncologist, physicists, medical dosimetrists, nurses, anesthesiologist, radiation therapist and others.

Depending on the training track(s) you have chosen, over the course of the next week(s), our goal is to educate you on Clinical Operations, Treatment Planning and/or Physics and Service Maintenance. Any one or all three of these tracks will better prepare you as you engage in new frontiers with proton therapy and extend its benefits to patients with a wide range of cancers.

Thank you and enjoy the program!

Steven J. Frank, MD
Medical Director, Proton Therapy Center

Brandon Gunn, MD
Associate Medical Director, Proton Therapy Center

Matthew Palmer, MBA
Chief Operating Officer, MD Anderson Cancer Proton Therapy Center - Houston

X. Ronald Zhu, PhD
Physics Director, Proton Therapy Center

Mayankkumar Amin, CMD
Medical Dosimetry, Clinical Supervisor

Charles Merrifield, BS, RT
Radiation Therapy, Clinical Supervisor

Jo McDonald, MSN, RN, CEN
Nurse Manager

Beth De Gracia, RN, BSN, OCN, CCRC
Research Nurse Supervisor

Lee Chamblee, MBA
Education Program Coordinator
Educational Objectives
After attending the conference, participants should be able to

- Incorporate the knowledge and skills learned through hands-on practice sessions to better prepare for proton therapy treatments, thus improving patient outcomes (knowledge, competence, performance, patient outcomes),
- Interpret the effectiveness of proton therapy to assess which intervention would be most appropriate for patients with different solid tumor cancer diagnoses (knowledge, competence),
- Assess how an interprofessional system will improve the quality of care for patients receiving proton therapy (knowledge, competence),
- Utilize proton therapy clinical trials and assess their outcomes for a better understanding of the importance and significance in the treatment of cancer (knowledge, competence, performance),
- Gain a greater appreciation and perspective of the steps and personnel needed to perform quality proton therapy (knowledge, competence).

Target Audience
This activity is intended for physicians and fellows in medical oncology, surgical oncology, radiation oncology, pediatrics and radiology, clinical research nurses in oncology and trainees.

Evaluation
A course evaluation form will provide participants with the opportunity to comment on the value of the program content to their practice decisions, performance improvement activities, or possible impact on patient health status. Participants will also have the opportunity to comment on any perceived commercial bias in the presentations as well as to identify future educational topics.

Accreditation/Credit Designation
The University of Texas MD Anderson Cancer Center is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The University of Texas MD Anderson Cancer Center designates this live activity for a maximum of 56.00 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

CME Certificates and Attendance Verification Certificates
Certificates awarding AMA PRA Category 1 Credit™ or certificates documenting attendance will be distributed to participants when an individual departs the conference. To obtain a CME certificate, physicians must submit a completed evaluation questionnaire and a CME Verification Form.

Upon request, a record of attendance (certificate) will be provided on-site to other health care professionals for requesting credits in accordance with state nursing boards, specialty societies, or other professional associations.

The University of Texas MD Anderson Cancer Center has implemented a process whereby everyone who is in a position to control the content of an educational activity must disclose all relevant financial relationships with any commercial interest that could potentially affect the information presented. MD Anderson also requires that all faculty disclose any unlabeled use or investigational use (not yet approved for any purpose) of pharmaceutical and medical device products. Specific disclosure will be made to the participants prior to the educational activity.

Agendas are subject to change because we are always striving to improve the quality of your educational experience. MD Anderson may substitute faculty with comparable expertise on rare occasions necessitated by illness, scheduling conflicts, and so forth.

Photographing, audio taping, and videotaping are prohibited.
Contributors – Course Materials

Steven Frank, MD                  Mayank Amin, CMD
Brandon Gunn, MD                  Tyler Williamson, CMD
Matt Palmer, MBA                  Jennifer Johnson, PhD
X. Ronald Zhu, PhD                Heng Li, PhD
Arnold Paulino, MD                Rola Georges, CMD
Susan McGovern, MD                Manny Oyervides, CMD
Anita Mahajan, MD                 Richard Wu
Jo Chang, MD                      Xiaodong Zhang, PhD
Quynh Nguyen, MD                  Cody Crawford, CMD
Steven Lin, MD                    Kit Ciura, CMD
David Grosshans, MD               Archana Gautam, MS, DABR
SeungTaek Choi, MD                Falk Poenisch, PhD
Jo McDonald, MSN, RN, CEN          Narayan Sahoo, PhD
Amanda McNiece, RD, CSO, LD        Tai Ly, RN, MSN, CCRN, ANP
Shannon Popovich, MD              Ritsuko Komaki, MD
Leni Mathews, MSN, RN, OCN, CCRC, CCRA
Beth De Gracia, RN, BSN, OCN, CCRC
Joanie Blais, RN, BSN
Martha Coleman
Kimberly Bennett, RN

Contact

Lee Chamblee, MBA
Education Program Coordinator
Proton Therapy Center
lchamble@mdanderson.org
713-563-8336
1840 Old Spanish Trail
Houston, TX  77054
Monday – October 8, 2018

Operations & Facilities + MDs (disease site specific)

9:00am – 9:30am  Registration + Breakfast
9:30am – 10:20am Welcome Video + Tour
10:20am – 11:00am Introduction to Proton Therapy – Clinical

11:00am – 11:15am Break

11:15am – 12:30pm Introduction to Proton Therapy - Physics

12:30pm – 1:30pm  Lunch

1:30pm – 3:30pm  (Operations/Facilities) Overview of Proton Therapy Center (patient flow, staffing, special consideration for proton patients)

3:30pm – 3:45pm  Break

3:45pm – 4:15pm  Service Maintenance
Tuesday – October 9, 2018

MDs (disease site specific) + Nursing and Clinical Nutrition

9:00am – 10:00am  H&N – Evidence/Literature
10:00am – 11:15am  Head & Neck (H&N) MDACC Way of Treatment

11:15am – 11:30am  Break
11:30am – 12:15pm  Head & Neck (H&N) Case Presentation

12:15pm – 1:00pm  Lunch

1:00pm – 1:30pm  Nursing Presentation
1:30pm – 2:00pm  Child Life Advocacy
2:00pm – 2:30pm  Clinical Nutrition

2:30pm – 2:45pm  Break
2:45pm – 3:15pm  Radiation Therapy Observation

3:15pm – 4:30pm  Q & A
**Wednesday – October 10, 2018**

**MDs (disease site specific) + MLPs + Pediatric Anesthesia**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00am – 9:15am</td>
<td>Lung Evidence/Literature</td>
</tr>
<tr>
<td>9:15am – 10:00am</td>
<td>Lung - Quality &amp; Safety</td>
</tr>
<tr>
<td><strong>10:00am – 10:15am</strong></td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>10:15am – 11:00am</td>
<td>Nurse Practitioner (role of the MLP)</td>
</tr>
<tr>
<td>11:00am – 12:00pm</td>
<td>Pediatric Anesthesia</td>
</tr>
<tr>
<td><strong>12:00pm – 1:00pm</strong></td>
<td><strong>Lunch</strong></td>
</tr>
<tr>
<td>1:00pm – 2:00pm</td>
<td>Central Nervous System (CNS) Evidence/Literature</td>
</tr>
<tr>
<td>2:00pm – 2:30pm</td>
<td>Central Nervous System - Quality &amp; Safety</td>
</tr>
<tr>
<td><strong>2:30pm – 2:45pm</strong></td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>2:45pm – 3:15pm</td>
<td>Central Nervous System (CNS) MDACC Way of Treatment</td>
</tr>
<tr>
<td>3:15pm – 3:45pm</td>
<td>Central Nervous System (CNS) Case Presentation</td>
</tr>
<tr>
<td><strong>3:45pm – 4:00pm</strong></td>
<td><strong>Q &amp; A</strong></td>
</tr>
</tbody>
</table>
Thursday – October 11, 2018

**MDs (disease site specific)**

8:00am – 9:00am  
Genitourinary - Prostate (GU) Evidence/Literature

9:00am – 9:45am  
Genitourinary – Prostate – Case Presentation

**9:45am – 10:00am**  
*Break*

10:00am – 11:00am  
Observation of Treatment (Gantry)

11:00am – 12:00pm  
(MD) Pediatric Evidence/Literature

**12:00pm – 1:00pm**  
*Lunch*

1:00pm – 1:30pm  
(MD) Pediatric – Quality & Safety

1:30pm – 2:30pm  
(MD) Pediatric MDACC Way of Treatment

**2:30pm – 2:45pm**  
*Break*

2:45pm – 3:15pm  
(MD) Pediatric Case Presentation

**3:15pm – 3:45pm**  
Q & A
Friday – October 12, 2018

**Research Nurses and Financial Clearance**

9:00am – 9:45am  
Fundamentals of Clinical Research

9:45am – 10:15am  
Overview of exciting clinical trials and prospective/QOL studies at the PTC

10:15am – 10:35am  
Overview of clinical research at the RCCs and collaborative studies where MDACC is the lead site/collaborating site

**10:35am – 10:45am**  
**Break**

10:45am – 11:00am  
Overview of interesting research studies for our pediatric patients.

11:00am – 11:10am  
Overview of future research projects

**11:10am – 12:10pm**  
**Lunch**

12:10pm – 12:40pm  
International Patient Center

12:40pm – 1:10pm  
Language Assistance

1:10pm – 1:20pm  
Insurance Welcome + Video

1:20pm – 1:50pm  
New Patient Referral

1:50pm – 2:20pm  
Insurance Authorization Process

**2:20pm – 2:35pm**  
**Break**

2:35pm – 2:50pm  
Denials & Appeals

2:50pm – 3:00pm  
Final Insurance Approval Process
MONDAY, October 8, 2018

**Introduction to Proton Therapy – Clinical**
Steven Frank, MD or Brandon Gunn, MD
This topic will include an introductory video on Proton Therapy, a tour of the Proton Therapy Center – Houston, and an introduction to the clinical component of the PTC along with a time for questions and answers about the PTC.

**Introduction to Proton Therapy – Physics**
Ronald Zhu, PhD
This topic will cover the physical basis of proton therapy, the uncertainties in proton therapy and the various methods in delivering proton therapy.

**Overview of Proton Therapy Center (Operations & Facilities)**
*Matthew Palmer, MBA*
This topic will discuss the patient flow from start to finish at the Proton Therapy Center - Houston, discuss the overall operations of a proton therapy center and how it differs from conventional operations and summarize key elements that make a proton therapy center successful.

**Service Maintenance (Operations & Facilities)**
*Enzo Pera/Luster McDaniel*
This topic will provide an understanding of the service organization structure and objectives of the Proton Therapy Center as well as understanding the management of spare parts, providing knowledge of our warehouse and an overview of the principles and purpose of service agreements.
**TUESDAY, October 9, 2018**

**Head & Neck Evidence/Literature**  
*Steven Frank, MD*  
This topic will give you an understanding of which patients can benefit from proton therapy in head and neck tumors. You will learn the outcomes and toxicity from proton beam treatment in various disease sites within the head and neck.

**Head & Neck MDACC Way of Treatment**  
*G. Brandon Gunn, MD*  
This topic will cover current standards of care for head and neck cancers and will review proton therapy treatment philosophies for head and neck cancers. Also covered will be a review of proton therapy specific treatment planning and plan evaluation for head and neck cancers; a physician’s perspective.

**Head & Neck Case Presentation**  
*Steven Frank, MD or G. Brandon Gunn, MD*  
This topic will review target delineation for head and neck cancers, discuss organs at risk for head and neck cancers and review common indications and benefits of proton therapy for head and neck cancers via based reviews.

**Nursing**  
*Jo McDonald, MSN, RN, CEN*  
This topic will provide an understanding of the role of the proton therapy nurse, nursing requirements for a nurse to work in a proton therapy center and an understanding of the patient population seen here at MD Anderson’s Proton Therapy Center.

**Child Life Advocacy**  
*Laura Wiedemann, MS, CCLS*  
This topic will orient participants to the professional standards and practice of child life specialist. Participants will acquire knowledge on basic child life skill sets including diagnostic education, developmentally appropriate preparation and procedure support.
Clinical Nutrition
Debra Ruzensky, RD, CSO, LD
This topic will identify nutrition goals during proton therapy and cover nutrition-related side effects during the proton therapy treatment. Participants will be able to identify signs/symptoms of malnutrition in radiation patients, identify nutrition impact symptoms related to radiation at various sites of treatment and be able to name nutritional goals for patients during treatment.

Radiation Therapy Observation
Shane Ikner, B.A., R.T. (R) (T) (MR)
Observation of the Gantries and the Radiation Therapist

WEDNESDAY, October 10, 2018

Lung Evidence/Literature
Zhongxing Liao, MD
This topic will discuss advantages and limitations of proton therapy in lung cancer and explore a future approach to optimizing proton therapy in lung cancer.

Lung Quality & Safety
Joe Chang, MD
This topic will review quality assurance of proton therapy in lung cancer.

Nurse Practitioner (NP)
Tai Ly, RN, MSN, CCRN, ANP
This topic will give you a better understanding of the roles of the Nurse Practitioner at the PTC, the process of becoming a patient at the PTC and the differences between photon and protons.

Pediatric Anesthesia
Shannon Popovich, MD
This topic will cover the overall process from start to finish regarding a pediatric anesthesia patient. By the end of the presentation you will be familiar with the pediatric anesthesia assessment, the central line access and maintenance, laryngospasm and with pediatric growth and development pertaining to child life involvement and anesthesia personnel interacting with pediatric patients.
Central Nervous System (CNS) Evidence/Literature
David Grosshans, MD
This topic will cover the indications for proton therapy for tumors of the brain and spine, provide an understanding of ongoing trials of proton therapy for brain tumors and understand the potential early and long term benefits of proton therapy for brain tumors.

Central Nervous System (CNS) Quality & Safety
David Grosshans, MD
This topic will cover the MDACC methods of delivering high quality brain and spine proton therapy and MDACC techniques for safely treating CNS patients with protons.

Central Nervous System (CNS) MDACC Way of Treatment
David Grosshans, MD
This topic will cover current standards of care for CNS cancers and will review proton therapy treatment philosophies for cancers of the brain and spine.

Central Nervous System (CNS) Case Presentation
David Grosshans, MD
This topic will provide various case presentations for typical proton therapy cases for the brain and spine.

THURSDAY, October 11, 2018

Prostate (GU) Evidence/Literature
Seungtaek Choi, MD
This topic will summarize the rationale for use of proton therapy in the treatment of GU cancers and cover the clinical experience and literature of proton therapy for GU cancers.

Prostate (GU) Case Presentation
Seungtaek Choi, MD
This topic will provide various case presentations for typical GU cases at the Proton Therapy Center.
Pediatric Evidence/Literature
Mary McAleer, MD
This topic will explain how to determine which factors contribute to late effects of treatment in pediatric cancer and will review the radiotherapy parameters which have been associated with late effects of therapy. You will also gain an appreciation on why proton therapy may be beneficial in the treatment of children.

Pediatric Quality & Safety
Mary McAleer, MD
This topic will cover the MDACC methods for delivering high quality pediatric proton therapy and MDACC techniques for safely treating pediatric patients with protons.

Pediatric MDACC Way of Treatment
Mary McAleer, MD
This topic will provide an insight on pediatric experiences here at the Proton Therapy Center and explain the benefits and needs of multidisciplinary cancer center care for children.

Pediatric Case Presentation
Mary McAleer, MD
This topic will provide various case presentations for typical proton therapy cases in children.

FRIDAY, October 12, 2018

Research – Fundamentals of Clinical Research
Leni Matthews, MSN, RN, OCN, CCRC, CCRA
This is to topic will define research, clinical trials, human subjects, protocols and the research team here at MD Anderson. It will identify types of clinical trials and clinical trial phases and discuss what guides the conduct of clinical research.

Research – Overview of Clinical Trials and Prospective Quality of Life Studies
Beth DeGracia, RN, BSN, OCN, CCRC
This topic will provide a better understanding of the clinical trials involving proton therapy and will convey the importance of clinical trials and why we need to pursue these in the future.

Research – Overview of Clinical Research at the Regional Care Centers  
*Joanie Blais, RN, BSN*  
This topic will explain the process of opening a research protocol in the Houston area locations and describe the research process at these locations. Also covered will be the involvement of the Clinical Research Support Center team and how they interact with the clinical researchers.

Research - Overview of Interesting Studies for our Pediatric Patients  
*Nancy Philip*  
This topic will give you the knowledge of existing and future clinical trials as well as prospective trials that are available to our adult and pediatric patients at the Proton Therapy Center. Also presented will be the resources available to our patients who are interested in participating in our clinical trials both at MD Anderson and the Regional Care Centers and Houston area locations.

International Patient Center  
*Martha Coleman*  
This topic will give an overview of MD Anderson’s international new patient process and our international patient volumes and major countries our patients are coming from across the globe.

Language Assistance  
*Cesar Palacio*  
This topic will provide attendees with a clear understanding of how Language Assistants operates and the tools needed to assist non-English speaking patients at the Proton Therapy Center.

Insurance Welcome + Video  
*Deanna Martin*  
This topic will provide an overview of the Proton Therapy Insurance workflow and introduce a video showing a patient’s perspective of getting insurance approval.

Insurance – New Patient Referral Process  
*Kimberly Bennett, RN*
This topic will cover the different types of new patient referrals to the Proton Therapy Center and discuss the new patient referral process.

**Insurance - Insurance Authorization Process**  
*Deanna Martin*  
This topic will cover the importance of improving communication with patients being seen at the Proton Therapy Center and how to respond to patient requests in a timely manner.

**Insurance – Denials & Appeals**  
*Deanna Martin*  
This topic will give you an understanding of the process of both denials and appeals for proton therapy and enable you to become familiar with the reasons why proton therapy is denied and the steps involved in the appeals process.

**Insurance – Final Insurance Approval Process**  
*Deanna Martin*  
This topic will cover the benefits and financial clearance process for getting patients approved for proton therapy treatments.
**Steven J. Frank, MD** is an Associate Professor, Deputy Department Chair of Strategic Programs and Proton Therapy Center Medical Director at the University of Texas MD Anderson Cancer Center (MDACC). He obtained his medical degree from the Emory University School of Medicine and completed his clinical residency at MDACC. He joined the MDACC Department of Radiation Oncology faculty in 2006 specializing in head and neck and genitourinary cancers. He is one of the first in the world to use intensity-modulated proton therapy to treat patients with oropharyngeal cancer and developed a novel positive contrast MRI implantable marker that is now FDA approved and the first to be used in prostate cancer patients to localize the delivery of radiation therapy with brachytherapy. He is the principle investigator of a NIH/NCI-sponsored Phase II/III randomized oropharyngeal trial evaluating the treatment approaches of concurrent chemoradation therapy using IMRT vs IMPT for advanced stage oropharyngeal tumors. He has published more than 130 peer-reviewed articles related to proton therapy, brachytherapy and defining the value of proton therapy in an evolving healthcare system.

**G. Brandon Gunn, MD** is an Associate Professor in the Department of Radiation Oncology at the University of Texas MD Anderson Cancer Center and Associate Medical Director of the Proton Therapy Center. His primary clinical focus is on Head and Neck and Non-Melanomatous Cutaneous Malignancies.
X. Ronald Zhu is a professor in the University of Texas MD Anderson Department of Radiation Physics and Proton Therapy Center Physics Director. He completed his PhD degree in Chemical Physics at the University of Utah. His primary focus is on proton therapy physics, including commissioning, quality assurance, treatment planning, uncertainties, tumor and normal tissue responses in proton therapy. Ron has been with MD Anderson since September 2003.

Matt Palmer, MBA has served as the Chief Operating Officer, MD Anderson Cancer Proton Therapy Center – Houston since January 2016. Previously, Mr. Palmer was the Administrative Director of the Center from May 2014 to January 2016. Prior to that, he was the Medical Dosimetry Supervisor for the proton medical dosimetry team at the Center from March 2010 to May 2014. He has worked at MDACC since 2000 and he has 14 years of clinical experience in all three major specialties within the Division of Radiation Oncology at MD Anderson. Mr. Palmer completed his undergraduate degree at Baylor University and his Master’s in Business Administration from the University of Houston.

Enzo Pera is the VP of Systems Maintenance and Operation for The MD Anderson Proton Therapy Center in Houston. He has a BS degree in electrical engineering from Italy and is a Certified Construction Manager. He worked as Project Manager for Hitachi America for seven years during the design, construction and commissioning of the Proton Therapy Center. After working in the Initial Outfitting and Transitioning of several military hospitals, in January 2015 he returned to the Proton Therapy Center joining the Partnership that runs the center’s operation. His primary role is to supervise the service group and to guarantee that the medical equipment is ready every day for the safe and reliable treatment of the patients.
Luster McDaniel is a Sr. Accelerator Technician at University of Texas MD Anderson Proton Therapy Center. He completed his Industrial Electrician Certification at NCCER. Luster is also a State of Texas license Journeyman Electrician. He is part of the Proton Therapy Support Team which services and maintains the Proton Therapy Systems. The Proton Therapy Support Team in association with Radiation Physics Team work to assure that the Proton Therapy System meets quality, safety and reliability goals. Luster has been with MD Anderson since July 2008 and worked for Hitachi America 2 years prior to coming to work for MD Anderson.

Jo McDonald, MSN, RN, CEN is a Clinical Nurse Manager in the University of Texas MD Anderson Department of Radiation Oncology Proton Therapy Center. She completed her Masters of Science in Nursing in 2015 with a focus in Executive Nursing Leadership at the University of Texas Medical Branch School of Nursing in Galveston Texas. Jo has been with MD Anderson for two years.

Laura Wiedemann is a Certified Child Life Specialist at the University of Texas at MD Anderson Proton Therapy Center. She completed her bachelors of science in child development at the University of Arkansas and a master’s of science in child life at Texas State University. She has been a child life specialist for 6 years, and has spent the last two and a half years at the Proton Therapy Center.
Debra Ruzensky is a Senior Clinical Dietitian at the University of Texas MD Anderson Cancer Center where she currently works in the outpatient radiation oncology department. Debra received her undergraduate degree at Southeastern Louisiana University followed by a career with the Cooperative Extension Service in Louisiana, South Carolina, and Wisconsin. Debra furthered her interest in nutrition by getting her RD certification at Mount Mary University in Milwaukee. She worked for 10 years at Oncology Alliance as a manager and Clinical Dietitian in the Milwaukee area with adult chemotherapy and hematology patients. Debra is a Certified Specialist in Oncology.

Zhongxing Liao, MD is a full professor with term tenure in the Department of Radiation Oncology at the University of Texas MD Anderson Cancer Center. She specializes in thoracic radiation oncology, and has been spearheading the technological advancement in treating lung cancer. This including the advancement from 2-D to 3-D, from 3-D to IMRT. During the last decades, she has been leading the prospective randomized trials of IMRT vs. Proton for thoracic cancers and was the PI on number of important clinical trial. Her clinical translational research has been cutting edge and practice changing. She has been working at MDACC as a faculty member for 19 years.

Shane Ikner, B.A., R.T.(R) (T) (MR) is an expert-level radiation therapist at the University of Texas MD Anderson Cancer Center where he is certified in radiography, radiation therapy and magnetic resonance. Shane has a bachelor of arts in Health Care Administration from Ottawa University, where he is now enrolled in a master’s degree program for business administration. Shane helped integrate an MR unit into the simulation setup and provided important input with regard to the MR LINAC. He has created new treatment devices for head & neck setups to use with MR and radiation therapy. Shane has worked at MD Anderson for over 10 years.
**Joe Y. Chang, MD** is currently a tenured Professor, Director of Stereotactic Radiotherapy Program, MDACC. He is chair for American College of Radiology (ACR) Appropriate criteria Lung cancer expert panel and Chair of Thoracic subcommittee of international Particle Therapy Co-Operative Group (PTCOG). He is an international known expert in radiotherapy and one of the pioneers in the field of proton therapy and stereotactic radiotherapy in lung cancer. He is PI or Co-PI for many institutional, national and international clinical trials in lung cancer. He published more than 190 peer-reviewed articles in the top oncology journals including 21 book chapters related to image-guided radiation therapy.

**Tai Ly RN, MSN, CCRN, ANP** is a Nurse Practitioner in the University of Texas MD Anderson Department of Radiation, Proton Therapy Center, Genitourinary Service since the beginning of the Proton Therapy Center in 2006. She received her MSN specialized in Oncology at the University of Texas at Houston. She also completed her Adult Nurse Practitioner program at the University of Texas at Houston. She has been with MD Anderson Cancer Center since 1998.

**Shannon Popovich, MD, CMQ**, is an Associate Professor of Anesthesiology at the University of Texas MD Anderson Cancer Center and Anesthesia Director at the Proton Therapy Center. She completed her MD and Anesthesiology Residency training at the University of Texas Medical Branch at Galveston before joining MD Anderson as a faculty member. Dr. Popovich is a member of the Pediatric and Surgical Oncology Anesthesia Teams. Dr. Popovich has been at MD Anderson for over 13 years.
David Grosshans, MD is a physician scientist in the Department of Radiation Oncology at the University of Texas MD Anderson Cancer Center. He completed his MD and PhD degrees at the University of Colorado prior to joining MD Anderson for his clinical training at MD Anderson. He is currently a faculty member focused on the treatment of patients with brain, skull base and spine tumors with proton therapy. Dr. Grosshans has been at MD Anderson for over 10 years.

Seungtaek Choi, MD is an Associate Director in the Department of Radiation Oncology at the University of Texas MD Anderson Cancer Center. He graduated from MIT with a bachelor’s degree in nuclear engineering and received his M.D. from Cornell University Medical College. His medical training consists of internships in Internal Medicine at UCLA, residency at University of Washington Medical Center and fellowship in IMRT at MD Anderson Cancer Center. Dr. Choi specializes in Genitourinary cancers and treats patients with both x-rays and protons. Dr. Choi has been at MD Anderson for over 12 years.

Mary McAleer, MD, PhD is an Associate Professor in the Department of Radiation Oncology at the University of Texas MD Anderson Cancer Center. She completed her MD/PhD degrees and residency training in Radiation Oncology at Thomas Jefferson University in Philadelphia, PA, prior to joining MD Anderson as a faculty member. Her clinical practice focuses on the treatment of pediatric patients and adult patients with central nervous system tumors using advanced radiation technologies including stereotactic radiotherapy and proton-beam radiation. Dr. McAleer has been at MD Anderson for 12 years.
**Leni Mathews, MSN, RN, OCN, CCRC, CCRA** is a Supervisor in the Clinical Research Support Center. She has worked at MD Anderson since 2002 in various roles including Research Nurse: Radiation Oncology, Clinical Research Monitor- Investigational New Drug Office, Educator- Clinical Research Support Center, and now Supervisor, Clinical Research Quality overseeing Research Education Programs.

**Beth DeGracia RN, BSN, OCN, CCRC** is a clinical research nurse supervisor in the University of Texas MD Anderson Department of Radiation Oncology. She completed her Bachelor of Science Degree in Nursing at Texas Woman’s University. Her primary focus is clinical research nursing at the Proton Therapy Center. Beth has been with MDACC for 25 years.

**Joanie Blais** is a Manager of Clinical Research Quality in the University of Texas MD Anderson Clinical Research Support Center. She completed her Bachelor of Science in Nursing at Valparaiso University. Joanie has been with MD Anderson for 12 years.
Nancy Philip is a clinical Studies Coordinator in the University of Texas MD Anderson Department of Radiation Oncology. She completed her M.D in the Angeles University Foundation of Philippines. Her primary focus is on clinical research in pediatric patients. Nancy has been with MD Anderson for 5 years.

Martha Coleman, MSN, RN, OCN is the Administrative Director for the International Center and the International Assessment Center. She completed her Bachelor of Science Degree in Nursing and Master of Science degree in Nursing at The University of Texas Medical Branch at Galveston. She has been in the International Center for 10 years and with MDACC for 18 years.

Cesar Palacio is the Director of Language Assistance. Cesar started his career in languages over 25 years ago as a freelance Spanish translator and interpreter while studying at Texas Tech University. A native of Peru, his interest in languages took him to obtain degrees in Technical Communications and Latin American Studies, which paired with his initial training in biology. This prepared Cesar to advance in the field of medical translation and interpretation. Cesar has been with MD Anderson for 9 years.
Kimberly Bennett, RN, MSN, MPH, OCN, CNL is a Patient Navigator at the MD Anderson Proton Therapy Center. She completed her Master of Science in Nursing at the University of Virginia and her Master of Public Health at the University of Texas Health Science Center. She has been an oncology nurse her entire career.

Deanna Martin is the Proton Therapy Business Services Manager at the University of Texas MD Anderson Cancer Center Proton Therapy Center. Prior to joining PTCH as the Business Manager, her concentration was focused on Health Plan Member Service for insurance plans Commercial, Medicaid and Medicare and self-funded employer plans. She has over 25 years customer service leadership experience and 12 of the years with Texas Children’s Health Plan, United Healthcare and Insperity. Deanna joined the Proton Therapy Center this year.
Below are many of the terms most commonly used in the field of proton therapy:

**A**

**Adjuvant therapy:** A treatment used in addition to the main course of therapy.

**Anesthesia:** The process where a drug is administered for medical or surgical purposes that will induce partial or total loss of sensation and may be topical, local, regional or general, depending on the method of administration and area of the body affected. At the MD Anderson Proton Therapy Center, anesthesia is administered intravenously (by IV through the vein) and patients do not require intubation which is common practice at other proton therapy centers.

**Anesthesiologist:** A medical doctor who specializes in administering anesthesia. At the MD Anderson Proton Therapy Center, many of the children we treat require anesthesia to help them remain still during treatment. We have a dedicated on-site anesthesia team that specializes in treating children.

**Aperture:** A metal block containing a hole through which the radiation (photon or proton) beam passes. Each field or area of treatment for each patient requires a custom-made aperture. The shape of the hole is the approximate shape of the target being treated by the beam. Every patient has her or his own set of apertures, and no other patients use them. At the MD Anderson Proton Therapy Center, apertures are made of brass and created in our on-site machine shop.

**B**

**Benign tumor:** A tumor that grows locally but may not spread to other parts of the body. Benign tumors can cause problems because as they grow, they can press and displace normal tissues. They can be dangerous in confined places such as the skull.

**Biopsy:** Removal of a tissue sample for examination by a pathologist.

**Bragg peak:** The point at which protons deposit most of their energy. This point occurs at the ends of the protons' paths. Through a process called modulation, radiation oncologists can spread this peak to match the contours of tumors or other targets. The flexibility of the Bragg Peak is one of the things that make protons an excellent and targeted option for the treatment of many types of cancer.
C

**Cancer:** Uncontrolled, abnormal cell growth that invades and destroys healthy tissues if not controlled by effective treatment. Cancer is a general term that includes hundreds of different diseases, including Hodgkin's disease and leukemia.

**Chemotherapy:** Treatment with anti-cancer drugs that may be administered orally (by mouth) or intravenously (by IV through the vein) of a person's body.

**Cobalt-60:** A naturally radioactive substance that is used in some therapy machines to treat cancer by external beams.

**Combined proton and photon therapy:** Using both protons and photons (X-rays or electron beams) to treat cancer or other diseases. Combined treatment is used when neither therapy can be used alone. For example, protons are often used with X-rays to boost the radiation dose to specific parts of a treatment volume in order to provide a higher dose of radiation while protecting nearby tissues.

Used alone, X-rays can deliver too much radiation to normal tissue. If protons alone were used, microscopic cancer in sites distant from the cancer (in lymph nodes, for example) might be missed. Combining the two treatments allows optimal use of both, while reducing the risk of complications.

**Compensator:** A custom-made, beam-shaping device through which a proton beam is delivered. It is used to absorb some energy from the proton beam so that it stops just on the edges of the target or tumor. This keeps the normal, healthy tissues beyond the tumor from receiving radiation. This is used with an aperture. At the MD Anderson Proton Therapy Center, the compensator for each patient is made from thick acrylic and created in our on-site machine shop.

**Couch:** The table -- often called the "couch" at MD Anderson Proton Therapy Center -- where the patient lies during treatment. In proton radiation treatment, final patient alignment is performed by adjusting the motorized couch with respect to the proton nozzle. This ensures that the treatment position matches the position the patient was in when the planning CT scans were taken.

**CT Scan:** Computed tomography scan (also known as a CAT scan) is a computerized X-ray procedure that produces cross-sectional images of the body. The images are far more detailed than X-ray films and can reveal disease or abnormalities in tissue and bone. The procedure is usually noninvasive and brief.
Digital Rectal Examination (DRE): A screening procedure for prostate and colorectal cancers. The physician feels the rectal wall to assess its smoothness. Abnormalities are evaluated by other tests, generally including biopsy and an exam by a pathologist.

Dosimetrist: A medical professional who plans and calculates the proper radiation dose for treatment. Dosimetrists work under the supervision of the physician – who prescribes the proper treatment dose – to make sure the prescribed dose is delivered by the therapy plan. At the MD Anderson Proton Therapy Center, our team of 9 medical dosimetrists must have graduated from an accredited program and be certified by the American Association of Medical Dosimetrists.

Electron beam: A negatively charged subatomic particle that is accelerated to different energies and used to treat cancer.

External-beam radiation: Radiation delivered from a source outside the body.

Gamma rays: High-energy rays that come from a radioactive source such as Cobalt-60.

Gantry: A device that rotates the radiation delivery apparatus around the patient during treatment delivery. The rotation allows treatment from different angles. At MD Anderson Proton Therapy, we have three treatment rooms that house gantries that administer proton beams from 360-degree angles.

Gray: A measure of absorbed radiation dose. One Gray equals 100 rads, which is an older term used to describe this.

Ionizing radiation: Radiation of sufficient energy to displace electrons from the atoms of cells and produce ions. Ionized cells are damaged and must repair themselves to stay alive. Normal cells are usually better able to repair themselves than cancer cells.
**Immobilization device:** A device – mask for the face or a cradle for the body, leg or arm, depending on the area that will receive treatment – used to help prevent the patient from moving during radiation treatment. Some patients who are receiving proton therapy will use these devices during their treatments.

**Implant:** The process of placing a small source of radioactive material in or near a cancer.

**Linear accelerator:** A machine that creates high-energy radiation to treat cancers. A linear accelerator uses electricity to form a stream of fast-moving subatomic particles. Also called a "linac" (pronounced LYN-ack).

**Magnetic Resonance Imaging (MRI):** A diagnostic imaging technique that uses a magnetic field and radio waves to produce highly detailed images of the body. Both MRI and CT scans may be used in planning proton therapy.

**Malignant:** Cancers that are capable of spreading and invading normal tissue and to distant tissues (metastasis).

**Medical oncologist:** A physician who uses chemotherapy to treat cancer. Medical oncologists, like radiation oncologists and surgical oncologists, receive intensive training and serve long residency periods to become experts in their specialty.

**Metastasis:** The spreading of a cancer from one part of the body to another. Cells in the second tumor are like those in the original tumor.

**Modulator wheel:** A spinning, polycarbide wheel with vanes of variable depth. In proton radiation therapy, protons passing through the thinner vanes travel farther into the body than those passing through the thicker sections. Different wheels, with different vanes, can be used to shift the peak energy (the Bragg peak) to different depths of the tumor.

**Nozzle:** The device through which protons are delivered to the patient. Proton beam delivery begins in the accelerator, where an ion source generates protons. At the MD Anderson Proton Therapy Center, the accelerator (synchrotron) energizes the protons to a prescribed energy and sends them to the beam transport system, which sends the beam to the treatment rooms.
Each treatment room has a nozzle, which looks much like the nozzle of a water hose and is the final element in the beam delivery system. The nozzle not only delivers the beam to the patient, but also monitors beam uniformity, alignment, and dose delivered.

O

Oncologist: A doctor who specializes in treating cancer.

P

Pencil beam scanning: A very precise form of proton therapy treatment that uses protons to deliver radiation treatment across the height and width of a tumor. It can be directed to move throughout the tumor’s depth to "paint" the treatment volume with radiation from the beam. MD Anderson Proton Therapy Center is one of the only centers in the world to use pencil beam scanning, also called spot scanning or active beam, to treat patients.

Photon: A quantum (energy packet) of electromagnetic radiation; the elementary particle of photon radiation therapy. X-rays and gamma rays are photon radiation (sometimes called “traditional” or “conventional” radiation).

Positron Emission Tomography (PET): A nuclear medicine imaging procedure that can identify areas of cancerous tissue based on their higher than normal metabolic activity. It can be used in radiation treatment planning to help identify tumor tissue by the behavior of its cells, sometimes in cases where the tumor tissue is not visible on CT scans or MRI.

Prostate-Specific Antigen (PSA): A protein that serves as a marker for prostate cancer or benign prostatic hyperplasia. PSA levels can be used to help detect prostate cancer, to monitor prostate cancer treatment and to warn of possible recurrence.

Proton: A positively charged particle found in the nucleus of an atom. Protons used in proton therapy come from stripping a hydrogen atom of its electron. They can be accelerated and controlled to release their energy within a well-defined range in tissues, such as a tumor.

R

Rad: "Radiation absorbed dose" or a measure of the amount of radiation absorbed by tissues. This term has been replaced by the Gray (100 rad = 1 Gray).
**Radiation**: Energy carried by waves or a stream of particles. Visible light, X-rays and proton beams all are examples of radiation.

**Radiation oncologist**: A physician who uses high-energy radiation, including protons, to treat cancer. Radiation oncologists also may use ionizing energy to treat diseases other than cancer. At the MD Anderson Proton Therapy Center, patients meet with their radiation oncologist before treatment begins, weekly during the course of treatment and for follow-up as needed.

**Radiation therapist**: A specially trained medical professional who deliver the ionizing radiation with specialized treatment machines. At the MD Anderson Proton Therapy Center, patients will work with a team of specialized radiation therapists each day during proton therapy treatment.

**Radiation therapy**: The use of high-energy penetrating rays or subatomic particles to treat disease. Types of radiation include X-rays, electrons, protons, alpha and beta particles, and gamma rays. Radioactive substances include cobalt, radium, iridium, and cesium.

**Radiologist**: A physician specially trained to interpret diagnostic X-ray images and perform specialized X-ray procedures.

**Radiotherapy**: Another word for radiation therapy.

**S**

**Simulation**: The use of X-ray pictures to plan radiation treatment. The area to be treated is located precisely and marked for treatment. At MD Anderson Proton Therapy Center, all patients who receive proton therapy will first go through a simulation.

**Snout**: The part of the nozzle closest to the patient. The snout supports the aperture and compensator.

**T**

**Target volume**: Often used to describe a tumor or area of concern that will receive proton treatment.

**Treatment volume**: Generally a bit larger than the target volume, the treatment volume surrounds the target with an additional margin to include the cancer and surrounding tissues, which may harbor microscopic extensions of cancer. With proton therapy, treatment of surrounding tissues is limited to what is absolutely necessary in order to achieve the result of destroying cancer cells.
**Treatment port or field:** The place in the body at which the radiation beam is aimed.

**Treatment table:** The table – often called the “couch” at MD Anderson Proton Therapy Center - - that the patient lies on during treatment. In proton radiation treatment, final patient alignment is performed by adjusting the motorized table with respect to the proton nozzle. This ensures that the treatment position matches the position the patient was in when the planning CT scans were taken.

**Tumor:** An abnormal mass of tissue. Tumors are either benign or malignant.

X

**X-rays:** High-energy, ionizing, electromagnetic radiation that can be used at low doses to diagnose disease or at high doses to treat cancer.
Contact Information

Steven Frank, MD – sjfrank@mdanderson.org
Brandon Gunn, MD – GBGunn@mdanderson.org
Matthew Palmer, MBA – mpalmer@mdanderson.org
X. Ronald Zhu, PhD – xrzhu@mdanderson.org
Susan McGovern, MD – slmcgove@mdanderson.org
Joe Chang, MD – jychang@mdanderson.org
Quynh Nguyen, MD – qnnnguyen@mdanderson.or
Anita Mahajan, MD- amahajan@mdanderson.org
David Grosshans, MD – dgrossha@mdanderson.org
Seungtaek Choi, MD – stchoi@mdanderson.org
Jo McDonald, MSN, RN, OCN – JRMcDonald@mdanderson.org
Haley Deas – HKDeas@mdanderson.org
Tai Ly – tly@mdanderson.org
Shannon Popovich, MD – smpopovich@mdanderson.org
Leni Mathews, MSN, RN, CEN – lamathew@mdanderson.org
Joanie Blais, RN, MSN – jcblais@mdanderson.org
Beth De Gracia, RN, BSN, OCN - bdegracia@mdanderson.org
Nancy Philip, RN – Nkumbalasseriyl@mdanderson.org
Kimberly Bennett, RN – KABennett@mdanderson.org
Deanna Martin – DVMartin1@mdanderson.org
THE UNIVERSITY OF TEXAS

Proton Therapy

Making Cancer History®