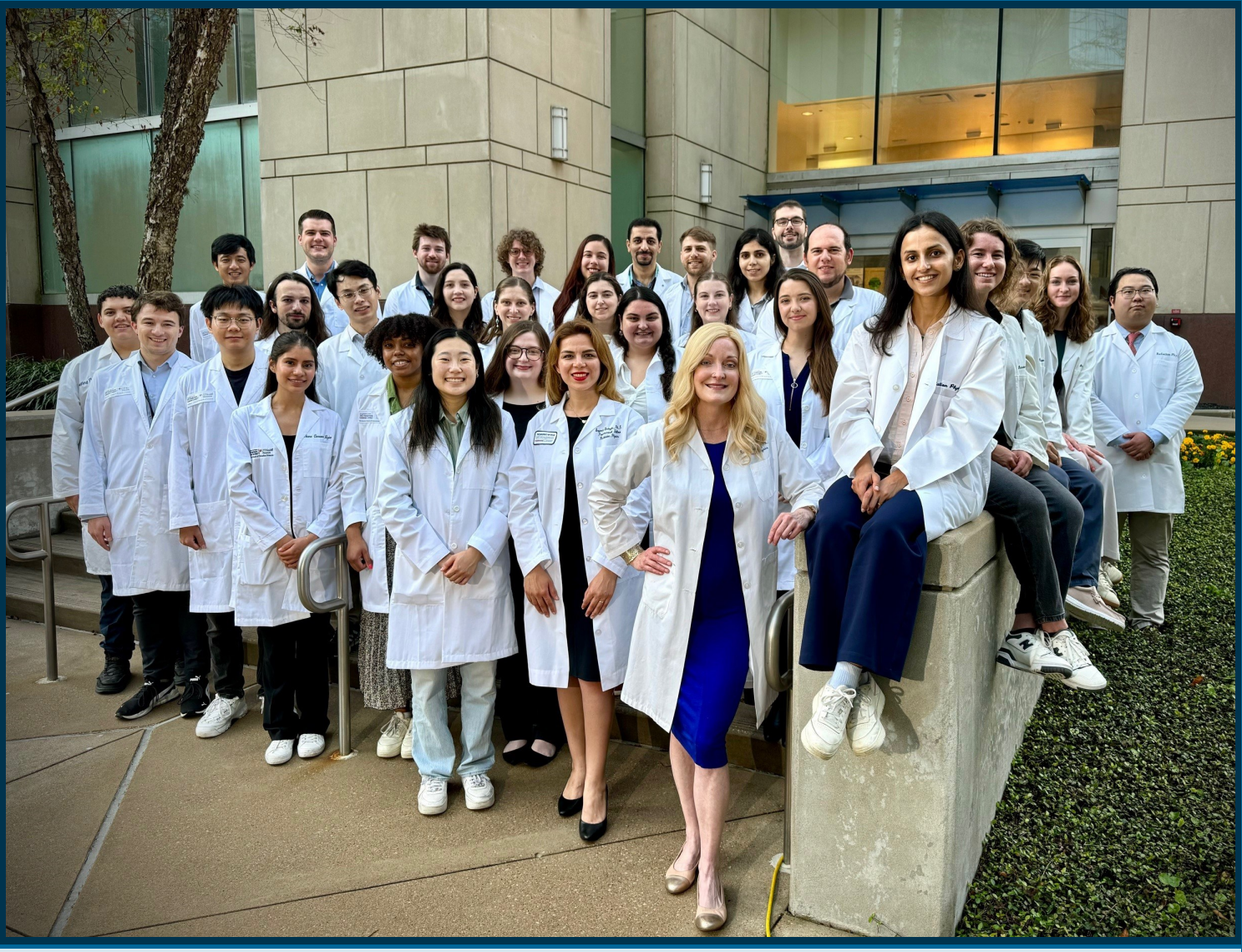
Medical Physics Alumni NEWSLETTER

SUMMER 2025| VOLUME 19

THE UNIVERSITY OF TEXAS MD Anderson Cancer Center | UTHealth Houston
Graduate School of Biomedical Sciences

Student Body Academic Year 2024-2025



Class photo was taken during filming for a video to highlight the vast research opportunities in both radiation therapy and imaging physics and clinical resources available to our students.
Check out our **recruitment video** on YouTube.
https://www.youtube.com/watch?v=DaF3zwlqyYg&t=5s

Medical Physics Program Leadership

Rebecca M. Howell, PhD
Director

Radiation Physics Department
RHowell@mdanderson.org

A. Kyle Jones, PhD
Deputy Director

Imaging Physics Department
kyle.jones@mdanderson.org

Paige Taylor, PhD
Director of Admissions

Radiation Physics Department
pataylor@mdanderson.org

Program Steering Committee

Faculty Member	Position/Until	Email
Rebecca Howell, PhD	Director/2025	rhowell@mdanderson.org
Kyle Jones, PhD	Deputy Director/2025	kyle.jones@mdanderson.org
Paige Taylor PhD	Admissions Director/2025	pataylor@mdanderson.org
Christopher R. Peeler, PhD	#1, Radiation Physics/2024	rpeeler@mdanderson.org
Rachel Barbee, PhD	#2, Nuclear Medicine/2026	rbarbee@mdanderson.org
Moiz Ahmad PhD	#3, Imaging Physics/2026	mahmad@mdanderson.org
Steven Millward, PhD	#4, External/2026	smillward@mdanderson.org
Eugene J. Koay, MD	#5, Non-Medical Physics/2024	ekoay@mdanderson.org
Kristy Brock, PhD	#6, Imaging Physics/2025	kkbrock@mdanderson.org
Tze Yee Lim, PhD	#7, Radiation Physics/2025	tlim@mdanderson.org
John Hazle, PhD	Ex officio	jhazle@mdanderson.org
Mary Martel, PhD	Ex officio	mmartel@mdanderson.org

Candidacy Examination Committee

Faculty Member	Position/Until	Email
Jingfei Ma, PhD	Imaging Physics/2026	jma@mdanderson.org
Kristy Brock, PhD	Radiation Physics/2027	kkbrock@mdanderson.org
Moiz Ahmad, PhD	Imaging Physics/2027	mahmad@mdanderson.org
Peter Balter, PhD	Radiation Physics/2026	pbalter@mdanderson.org

Inside This Edition

Program Director Report

Introduction

As my first term as Program Director comes to a close, I'm filled with deep gratitude for the joy this role has brought into my life. One of the greatest privileges has been witnessing the full arc of a student's journey—from their first outreach, sometimes years before applying, eager to learn about a career in medical physics, to watching them grow and excel in our program, and ultimately celebrating their achievements at graduation. Each year, as I sit down to write the alumni newsletter and reflect on the milestones of the past twelve months, I'm overwhelmed with pride—not only in our remarkable students, but also in the dedicated faculty who teach, support, and mentor them. It's truly an honor to share their accomplishments with you.

Commission on Accreditation of Medical Physics Education Programs (CAMPEP) Reaccreditation

I am delighted to announce that the CAMPEP accreditation for our Graduate Medical Physics Program—encompassing our MS, PhD, and certificate offerings—has been successfully renewed through 2029.

Our Program Students

Our students and alumni form the backbone of our academic community. Their achievements during their studies and their continued success post-graduation play a pivotal role in advancing the field of medical physics. Throughout this newsletter, we recognize their accomplishments, including prestigious fellowships, honors, and awards. Special congratulations to Constance Waddel-Owens, recipient of the 2024 Aaron M. Blanchard Research Award for the best dissertation and most impactful research. This year, we celebrated the graduation of five PhD students, one SMS student, and one certificate student. Their dissertation and thesis abstracts, along with commencement photos, are featured in this issue. The incoming class of 2025, consisting of five PhD candidates, two SMS students, and two certificate students, is detailed on pages 2021.

As you go through the newsletter, you will see the strong sense of community that flourishes among our students. During their time with us, they weave a network of future colleagues, collaborators, and lifelong friends. It is an immense pleasure and honor to interact with such intelligent, innovative, hard-working, and genuinely compassionate individuals.

Our Program Faculty

Our esteemed faculty primarily come from the Imaging and Radiation Physics Departments, with invaluable support from accomplished colleagues in Cancer Systems Imaging, Biostatistics, Radiation Oncology, and Radiology. Our program proudly includes 94 faculty members, comprising 61 full members and 33 associate members. I wish to express my heartfelt gratitude to each faculty member for their unwavering dedication to teaching and mentoring our students, both in the classroom and in clinical settings.

This year, we celebrate a transition in leadership as Dr. Laurence passes the role of Director of Admissions to Dr. Paige Taylor. We extend our sincerest thanks to Dr. Court for his many years of dedicated service in this position and warmly welcome Dr. Taylor to her new role. Finally, it is with great pleasure that I share the news of Dr. A. Kyle Jones being honored with the 2025 John P. McGovern Award for Outstanding Teaching (details on page 16).

Philanthropy Funding

My sincere thanks go to every one of you who contributed to the Shalek Fund this year. Your generosity has allowed us to cover tuition and fees for our two incoming SMS students, directly influencing their career trajectories. Additionally, I wish to acknowledge Dr. Richard "Bud" Wendt III for his generous financial donation to endow the Edward F. Jackson PhD Graduate Education Fund. As this fund continues to grow, its impact on future students will consistently increase. Bud has graciously shared a message on philanthropy in this newsletter (page 6), and his words are truly inspiring. I encourage you to consider supporting the Edward F. Jackson PhD Graduate Education Endowment Fund or the Robert J. Shalek Fund this year and, in the years, to come.

Remembering Marilyn

Marilyn A. Stovall, PhD passed away this year. We honor her and her 65 years service to MD Anderson and the field of medical physics at the end of this newsletter (pages 58-67).

Rebecca M. Howell

Program Courses & Course Directors

Core Courses	Course Director
Imaging Science	David Fuentes, PhD & Dragon Mirkovic, PhD
Introduction to Medical Physics I: Basic Interactions	Kent Gifford, PhD
Introduction to Medical Physics II: Medical Imaging	John Rong, PhD
Introduction to Medical Physics III: Therapy	Adam Melancon, PhD
Introduction to Medical Physics IV: Physics of Nuclear Medicine	Rachel Barbee, PhD
Therapy Medical Physics II	Christopher Peeler, PhD & Leonard Che Fru, PhD
Diagnostic Medical Physics II	Jason Stafford, PhD
Radiation Detection, Instrumentation and Data Analysis	Mallory Glenn, PhD
Introduction to Radiation Protection	Rajat Kudchadker, PhD
Fundamental Anatomy, Physiology and Biology for Medical Physics I	David Flint, PhD
Fundamental Anatomy, Physiology and Biology f or Medical Physics II	A. Kyle Jones, PhD
Statistics for Medical Physicists	Sanjay Shete, PhD
Electronics for Medical Physicists	Xinming Liu, PhD
Medical Physics Seminar	Laurence Court, PhD
Medical Physics Seminar	Julie Pollard Larkin, PhD
The Ethical Dimensions of the Biomedical Sciences	Shane Cunha, PhD (Integrative Bio & Pharm)
Electives	**Course Director**
Supervised Clinical Experience in Radiation Therapy	Tze Yee Lim, PhD
Radiation Induced Late Effects and Survivorship Journal Club	Dragan Mirkovic, PhD
Special Project Course - Proton Therapy	Narayan Sahoo, PhD

Our courses directors are experts in their respective areas and are truly the cornerstone of the MDAUTH Medical Physics Graduate Program. Huge shout-out to them for doing the heavy lifting to teach our students the fundamental aspects of medical physics!

Philanthropy Message from Bud

In my nine years as the director of the Graduate Program in Medical Physics I experienced quite vividly the crucial role that philanthropy plays in the success of our Program. Yes, the Graduate School of Biomedical Sciences, the Departments of Radiation Physics and Imaging Physics at UTMD Anderson, and the funding agencies that support the research teams of our faculty members are all essential to that success. But beyond that, contributions by our alumni, faculty members and friends to the Shalek Fellowship Fund have enabled quite a few of our students, past and present, to take the graduate educational step along the pathway to becoming medical physicists. I have been and remain grateful to all of the supporters of the Program.

While the Shalek Fellowship Fund is dedicated to scholarships for our students, and donations to it are typically used in the year in which they are made, the Program also has the need for an enduring source of funds that can be used for a wider range of purposes across the mission of the Program. When Ed Jackson moved to the University of Wisconsin, the then deans of the Graduate School established an endowment fund in his honor. It produces a very modest annual income. At Ed's request, the Program can use that income for the benefit, broadly defined, of our students.

Having survived beyond age 70-1/2 and thus being able to make Qualified Charitable Distributions from my tax-deferred retirement accounts, I wanted to take advantage of a matching program at UTHealth Houston, which administers the Jackson Fund, to grow its corpus and thus to increase the income that the Program could use each year. Since it turned out that the Jackson Fund could not accept donations, a parallel fund with the same name, the Edward F. Jackson PhD Graduate Education Endowment Fund has been created that can receive donations. I have pledged $150,000 over five years to it. This will be matched 1:1 by UTHealth Houston's Trailblazers program. This endowment is managed by The University of Texas Investment Management Company (aka UTIMCO). The typical return is 8% of which half is re-invested in the fund and the other half is made available to the beneficiary, in this case our Program, each year. The endowment is structured so that the fund will remain dedicated to the Program or its successors in perpetuity. Imagine what the Program could accomplish if the corpus of the Jackson Endowment Fund were to grow to one or two million dollars or more. We could support another student each year. We could send all of the first-year students to the AAPM meeting. We could sponsor student research seminars. We could sponsor our students' attendance at research retreats. We could support our students' outreach activities in the community. The possibilities are numerous and worthy.

Philanthropy is a very personal matter. We are all bombarded by requests from righteous and worthy causes that in total would exhaust anyone's finite resources. Our stage of life and competing responsibilities affect the resources that we can bring to bear on these causes. At the end of the day, to quote the cardboard sign of my favorite panhandler on my way to the Medical Center, "Anything helps."

Please consider donating to the Shalek Fellowship Fund in order to support student scholarships. Please consider donating to the Jackson Endowment Fund in order to make a gift in perpetuity to the Program and all of its activities that benefit our students. Your gifts honor the memories of two great medical physicists, Drs. Shalek and Jackson, and support the education of our future great medical physicists.

Bud Wendt

How You Can Contribute……

PLEASE CONSIDER A DONATION TO THE SHALEK FELLOWSHIP FUND

All gifts to the Robert J. Shalek Fellowship Fund are used to support of the Medical Physics Graduate Program and specifically to support incoming SMS students including tuition, fees, and when funding is sufficient, partial stipends. Please consider donating to this important source of student funding.

More details for making a donation are provided on page 56-57.

PLEASE CONSIDER A DONATION TO EDWARD F. JACKSON PHD GRADUATE EDUCATION ENDOWMENT FUND

Established in 2013 in honor of Edward F. Jackson, PhD, in support of the Medical Physics Program at the GSBS. **The Edward F. Jackson, PhD Graduate Education Endowment Fund**, supports the Medical Physics Program including but not limited to student support, through scholarships, fellowships, scientific merit awards, teaching assistantships, student health benefits and travel awards; program development including recruitment, admissions, outreach, new student orientation and new initiatives; and general program support designed to enhance the educational experience for students such as retreats, seminars and poster sessions.

Contact Susan Simon if you are interested in UTHealth Houston's Trailblazers Program that matches five-year pledges totaling more than $100,000.
Email: Susan.m.simon@uth.tmc.edu or Office: 713-500-3118

Use this link to make a gift directly to the endowment fund:
go.uth.edu/JacksonEducationEndowment
In the drop-down menu, select: Edward F. Jackson, PhD Graduate Education Endowment Fund.

Meet the Student Council

The 2024- 2025 Student Council

Hayden Scott
Student-Faculty Liaison

Rebecca Lim
Networking Liaison - Diagnostic

Angela Gearhardt
Networking Liaison - Therapy

Diana Carrasco
First Year Student Liaison

Hayden, Rebecca, Angela, Diana, and Madison were fully engaged in their roles on the council. A key accomplishment was the creation and passing of Student Council By-laws, which had not previously been established within our program. *The program thanks them for their service.*

Madison Grayson
Education Liaison

The Incoming 2025- 2026 Student Council

Collin Harlan
Student-Faculty Liaison

Lucus McCullum
Networking Liaison - Diagnostic

Taylor Meyers
Networking Liaison - Therapy

Anna Marks
First Year Student Liaison

The Student-faculty liaison also serves as a member of the steering committee.

Welcome to our new council members!

Natalie West
Education Liaison

Student-Faculty Liaison Report

The Student-Faculty Liaison is the primary administrative officer of the council and acting as a bridge between students and faculty members. This role encompasses various tasks, including facilitation of communications, representing students' interests to the program, and overseeing the student council.

Report from Hayden Scott

During the 2024–2025 academic year, I had the great fortune of serving as the Student-Faculty Liaison. The most rewarding aspect of this year in Student Council was collaborating with such a dedicated and inspiring group of peers. Our council embodied a philosophy of "potluck and workshop," blending student engagement with service.

Whether it was Angela Gearhardt and Rebecca Lim organizing talks on burnout and consistently publishing a newsletter that served both Imaging and Therapy students, Madison Grayson guiding peers through fellowship applications and candidacy, or Diana Carrasco providing invaluable support and resources to first-year students, the impact of Student Council's efforts on the medical physics program was undeniable.

Building on the foundation laid by last year's council, I have expanded the reach of the Multi-Institutional Council. Our program's bylaws have become a model for others, first adopted by the University of Nevada Las Vegas, where a fellow Multi-Institutional Council member successfully helped establish their program's inaugural Student Council. We anticipate our framework will continue to serve as a guide for new councils across CAMPEP programs.

Reflecting our commitment to service, Rebecca Lim and Angela Gearhardt also co-led the planning of this year's Student Retreat, featuring a keynote by Dr. Young Lee-Bartlett and concluding with a volunteer initiative at the Houston Food Bank.

We are deeply grateful to the faculty, our fellow students, and especially to Lisa and Dr. Howell for their unwavering support and guidance throughout this remarkable year.

Hayden Scott

First-year Student Liaison Report

The First Year Liaison (FYL) shall represent and support the first-year students to ensure a smooth transition to the program and Houston.

Report from Diana Carrasco

This year, I had the joy of welcoming our newest class with a pool party to help everyone start connecting before the semester began. Each new student was paired with two current students as part of our mentorship tradition, helping them feel supported both in and out of the classroom.

We hosted one lunch/activity each semester focused on team-building and just getting to know each other better. I also encouraged everyone to join intramural soccer and softball (because bonding over missed goals and strikeouts is still bonding, right?).

Throughout the year, I worked closely with Madison, our Education Liaison, to make sure students felt confident heading into exams. I also tried to be a steady source of support, whether that meant sharing opportunities to attend conferences and compete in events, or just being someone they could talk to when things felt overwhelming.

Huge thanks to everyone who helped with interviews and served as buddies—you made a big difference! Now that we have our accepted student list, I've been sharing tips for moving to Houston and staying in touch with incoming students. It's been a privilege to serve in this role, and I'm so thankful for the chance to be part of their journey.

Diana Carrasco

Networking Liaison Report

The Networking Liaisons are responsible for improving the professional development of students within and from outside the program. This year we expanded this role to include representatives from both disciplines.

Report from Angela Gearhardt and Rebecca Lim

As Networking Liaisons, we worked to provide professional development opportunities to the medical physics student body. One way we aimed to improve students' professional development was promoting awareness of opportunities available to them by means of their associations with the graduate school, UTMD Anderson, and the Texas Medical Center.

We accomplished this by instituting a biweekly newsletter that shared events hosted by the Radiation Physics and Diagnostic Imaging departments, funding opportunities, and relevant professional development events in the broader graduate school and medical center. We also hosted events to encourage students' professional development. Some highlights include a burnout workshop hosted by Dr. Debbie Schofield, a career talk presented by Dr. Tom Shoup on medical device design and consulting, a SWAAPM and elevator pitch workshop featuring Dr. Julianne Pollard-Larkin, and a CV workshop led by Dr. Kari Brewer-Savannah. Our final task is to plan the 2025 Medical Physics Student Retreat. We are preparing an exciting day focusing on leadership and service. Students will first learn about leadership from our keynote speaker Dr. Young Lee, followed by a volunteering event at the Houston Food Bank to give back to the community. We will finish off the retreat with a networking dinner that will allow everyone to reconnect. As we wrap up this year at MD Anderson, it has been our great pleasure to serve on student council as networking liaisons, and we look forward to welcoming the next liaisons!

Angela Gearhardt and Rebecca Lim

Education Liaison Report

The Education Liaison is responsible for improving the professional development of students within and outside the program.

Report from Madison Grayson

It was an honor to serve this year as the Education Liaison for the Student Council. We began this year with an information session to help prepare the incoming third year students for their candidacy exams. This session aimed to address common questions about the process, and we were fortunate to have several senior students volunteer to share their experiences and offer valuable advice. I also met individually with many of the students preparing for their exam about their presentations. We also hosted practice exams where students gave their full presentation and other students asked them questions.

Throughout the year, I organized exam review sessions for the medical physics courses. I also hosted weekly ABR exam review sessions throughout the summer. Every week, we met and did practice ABR questions on a different subject. This was an excellent opportunity to learn from each other and review topics on the exam.

Thank you so much to all of the students who volunteered their time to lead review sessions, provide feedback during practice candidacy exams, and answer questions during information sessions! One of my favorite things about our program is how much support there is for students, and I am grateful to have had the opportunity to help facilitate it this year.

Madison Grayson

Student Grants and Fellowships

American Association of Physicists in Medicine (AAPM), Radiological Society of North America (RSNA) Graduate Fellowship
Skylar Gay |2021-2023| Advisor: L. Court, PhD
Kevin Liu |2022-2024| Advisor: E. Schueler, PhD
Lucas McCullum |2022-2023| Advisor: C.D. Fuller, PhD
Lian Duan |2023-2024| Advisor: S. F. Kry, PhD

American Legion Auxiliary Fellowship
Kevin Liu |2022-2023| Advisor: E. Schueler, PhD
Barbara Marquez |2022-2023| Advisor: L. Court, PhD
Kevin Liu |2023-2025| Advisor: E. Schueler, PhD
Hana Baroudi |2024-2025| Advisor: L. Court, PhD
Zaphanlene Kaffey |2024-2026| Advisor: C.D. Fuller, MD, PhD
Angela Gearhardt |2025-2026| Advisor: S. F. Kry, PhD
Natalie West |2025-2026| Advisor: C.D. Fuller, MD, PhD

Cancer Prevention Research Institute of Texas (CPRIT) Predoctoral Fellowship
Yeseul Kim |2024-2025| Advisor: E. Koay, MD

CPRIT Innovation in Cancer Prevention Research Fellowship
Joseph DeCunha | 2022-2025| Advisor: R. Mohan, PhD
Kevin Liu |2022-2025| Advisor: E. Schueler, PhD
Barbara Marquez|2023-2025| Advisor: L. Court, PhD
Zaphanlene Kaffey |2024-2027| Advisor: C.D. Fuller MD, PhD

John J. Kopchick Fellowship
Skylar Gay |2024-2026 | Advisor: L. Court, PhD
Kevin Liu |2024-2026| Advisor: E. Schueler, PhD
Hana Baroudi |2023-2024| Advisor: L. Court, PhD

Fulbright Open Study/Research Scholarship (Germany)
Henry Meyer |2024-2025| Advisor: R. Mohan, PhD

Larry Deaven Fellowship in Biomedical Sciences
Skylar Gay |2023-2024| Advisor: L. Court, PhD

National Institutes of Health (NIH) The Academy Initiative for Maximizing Student Development T32 Training Grant
Angela Gearhardt |2024-2026| Advisor: S. F. Kry
Hayden Scott |2025-2026| Advisor: S. F. Kry
Note: this mechanism closed by the NIH, and funding was discontinued effective April 2025

NIH F31 Diversity Supplement
Lucas McCullum |2022-2023| Advisor: C.D. Fuller, MD, PhD

NIH R01 Diversity Supplement
Taylor Meyers |2023-2024| Advisor: R. Howell, PhD

NIH F31 Predoctoral Individual National Research Service Award
Madison Grayson | 2025-2027 | Advisor: R. Mohan, PhD
Collin Harlan |2025-2027| Advisor: J. Bankson, PhD

NIH/NCI Ruth L. Kirschstein NRSA Institutional Research Training Grant T32 Predoctoral Fellowship in Cancer Nanotechnology
Collin Harlan |2023-2025| Advisor: J. Bankson, PhD

National science foundation (NSF) Graduate Fellowship Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarship, Doctoral
Joseph DeCunha |2022-2025| Advisor: R. Mohan, PhD

Pauline Altman-Goldstein Foundation Discovery Fellowship
Aashish Gupta |2022-2023| Advisor: K. Brock, PhD
Kevin Liu |2024-2025| Advisor: E. Schueler, PhD

Rosalie B. Hite Graduate Fellowship in Cancer Research
Xinru Chen |2024-2025| Advisor: Jinzhong Yang

Student Grants and Fellowships

Robert J. Shalek Graduate Fellowship in Medical Physics
Allen Lopez Hernandez |2022-2023| Advisor: E. Schueler, PhD
Hayden Scott |2022-2023| Advisor: S. Kry, PhD
Diana Carrasco |Summer 2023| Advisor: P. Taylor
Derek Garcia |2023-2024| Advisor: K. Brock
Michael Yang |2023-2024| Advisor M. Glenn
Mary Hadley | 2024-2025 | Advisor: TBD, 1st year
Tyler O'Loughlin | 2024-2025 | Advisor: TBD, 1st year

University of Texas Health Science Center at Houston Center for Clinical and Translational Sciences TL1 Training Fellowship
Sam Mulder |2024-2025| Advisor C.D. Fuller, MD, PhD

UT Texas Health Center for Clinical and Translational Sciences T32 Training Fellowship
Natalie West |2025-2026| Advisor: C.D. Fuller, MD, PhD

UTHealth Houston Leads Fellowship
Zaphanlene Kaffey |2024-2025| Advisor: C.D. Fuller MD, PhD

UTHealth Innovation for Cancer Prevention Research Training Program Postdoctoral CPRIT Postdoctoral Fellowship
Kevin Liu |2025-2026| Advisors: S. Lin MD, PhD and G. Calin, MD, PhD

Student Awards and Honors

AAPM Best Medical International Travel Award (2024)
Rebecca Lim |2024| Advisor: K. Brock

AAPM Expanding Horizons Travel Award
Kevin Liu |2022| Advisor: E. Schueler, PhD
Androniki Mitrou |2024-2025| Advisor: K. Brock
Rebecca Lim |2025| Advisor: K. Brock

AAPM International Council Associates Mentorship Program
Hana Baroudi |2025| Advisor: L. Court, PhD

AAPM John R. Cameron Early Career Investigator Symposium Competition
Rebecca Lim |2024, 3rd place| Advisor: K. Brock
Kevin Liu |2024| Advisor: E. Schueler, PhD

AAPM Peter Almond Award of Excellence for an Outstanding Radiation Measurements Article
Kevin Liu |2024| Advisor: E. Schueler, PhD

AAPM Sexual and Gender Minority Subcommittee Travel Award
Henry Meyer |2024-2025| Advisor: R. Mohan, PhD

American Society for Radiation Oncology (ASTRO) Annual Meeting Abstract Award (1 or 12 awards)
Henry Meyer |2024-2025| Advisor: R. Mohan, PhD

Andrew Sowell-Wade Huggins Scholarship in Cancer Research
Lucas McCullum |2022-2023| Advisor: C.D. Fuller, MD, PhD
Aashish Gupta|2024-2025| Advisor: K. Brock, PhD

Annette Marie Loguidice Scholarship
Michael Yang |2023-2024| Advisor: M. Glenn
Hayden Scott |2024-2025| Advisor: S. Kry, PhD

Cancer Answers Foundation Scholarship
Rebecca Lim |2024| Advisor: K. Brock
Skyler Gay |2022-2023| Advisor: L. Court, PhD

Childhood Cancer Survivor Study (CCSS) Trainee Career Development Award
Taylor Meyers |2023-2024| Advisor: R. Howell PhD

CCSS Invited Plenary Presentation, 2025 CCSS Investigator Meeting
Taylor Meyers |2025| Advisor: R. Howell PhD

Student Awards and Honors

Edward Jackson Scholarship
Aashish Gupta |2018| Advisor: R. Howell, PhD
Diana Carrasco|2023| Advisor: Paige Taylor
Michael Yang |2023, 2024| Advisor: M.C. Glenn, PhD
Derek Garcia |2024| Advisor: |K. Brock, PhD
Mary Hadley |2025| Advisor: TBD, 1st year
Tyler O'Loughlin |2025| Advisor: TBD, 1st year

European Society of Radiation Oncology (ESTRO) Annual Congress, Top 5% of Abstracts,
Taylor Meyers |2025| Advisor: R. Howell PhD
Hayden Scott |2025| Advisor: S. Kry, PhD

ESTRO Annual Congress Young Researcher Finalist
Hayden Scott |2025| Advisor: S. Kry, PhD

FLASH Radiotherapy and Particle Therapy Conference Best Poster Presentation Award
Kevin Liu |2025| Advisor: E. Schueler, PhD

HPS Texas Chapter, Best Student Presentation Award
Taylor Meyers |2023| Advisor: R. Howell, PhD

International Congress of Radiation Research Travel Award
Kevin Liu |2023| Advisor: E. Schueler, PhD

International Conference on the use of Computers in Radiation therapy (ICCR) Rising Stars Competition
Rebecca Lim |2024, 3rd place| Advisor: K. Brock

ICCR Travel award
Kevin Liu |2024-2025| Advisor: E. Schueler, PhD

International Society for Magnetic Resonance in Medicine (ISMRM) 2023 Educational Stipend Award
Collin Harlan |2023, 2024| Advisor: J. Bankson, PhD
Jian Ming Teo |2023, 2024, 2025| Advisor: H.L. Liu, PhD
Natalie West, |2025| Advisor: C.D. Fuller, MD, PhD

ISMRM 2025 Educational Stipend Award MR-in-RT Oral Presentation Competition, 2nd place
Natalie West, |2025-2026| Advisor: C.D. Fuller, MD, PhD

James E. Tempesta, M.D., Endowed Scholarship
Xinru Chen |2023| Advisor: Jinzhong Yang

Janet Elaine Pierce Frye Scholarship for Cancer Research
Henry Meyer |2023-2024| Advisor: R. Mohan, PhD

Journal of Applied Medical Physics, Linda M. Wells GSBS Outreach Award
Hana Baroudi |2024| Advisor: L. Court, PhD

Sigma Xi Grant in Aid of Research
Madison Grayson |2025| Advisor: R. Mohan, PhD

Radiation Research Society Travel Award
Kevin Liu |2023-2025| Advisor: E. Schueler, PhD

Ray Meyn Scholarship for Cancer Research
Kevin Liu |2022| Advisor: E. Schueler, PhD
Zongsheng Hu |2025| Advisor: U. Titt, PhD

Winter Institute of Medical Physics Early Career Scholarship Award
Rebecca Lim |2024| Advisor: K. Brock
Natalie West, |2025| Advisor: C.D. Fuller, MD, PhD

MD Anderson Cancer Center, Division of Imaging Physics Trainee Research Day Oral Presentation Award
Collin Harlan |2023 (1st place)| Advisor: J. Bankson, PhD
Rebecca Lim |2024 (1st place)| Advisor: K. Brock

MD Anderson, Department of Imaging Physics Performance Award
Collin Harlan |2021| Advisor: J. Bankson, PhD

Southwest AAPM Travel Award
Skyler Gay |2025| Advisor: L. Court, PhD

Student GSBS Awards and Honors

MD ANDERSON UT HEALTH GSBS AWARDS

Research Day Elevator Speech Award
Barbara Marquez |2022, 1st place| Advisor: L. Court, PhD
Hayden Scott |2023, 2nd place| Advisor: S. Kry, PhD
Zaphanlene Kaffey |2024 2nd place| Advisor: C.D. Fuller MD
Diana Carrasco |2025, 2nd place pre-candidacy| Advisor: P. Taylor, PhD
Skyler Gay |2025, 2nd place post-candidacy| Advisor: L. Court, PhD

Research Day People's Choice Award
Aashish Gupta |2023| Advisor: K. Brock, PhD
Barbara Marquez |2021, 2nd place| Advisor: L. Court, PhD

Endowment Scholarship
Jian Ming Teo |2025| Advisor: H.L. Liu, PhD

Presidents' Research Scholarship
Kevin Liu |2025| Advisor: E. Schueler, PhD

Student Travel Awards
Aashish Gupta |2021| Advisor: K. Brock PhD
Barbara Marquez |2021| Advisor: L. Court, PhD
Hana Baroudi |2022, 2023, 2024| Advisor: L. Court, PhD
Collin Harlan |2022, 2023, 2024| Advisor: J. Bankson, PhD
Xinru Chen |2023| Advisor: J. Yang, PhD
Kevin Liu |2023| Advisor: E. Schueler, PhD
Allen Lopez Hernandez |2023| Advisor: E. Schueler, PhD
Lucas McCullum |2023| Advisor: C.D. Fuller, PhD
Henry Meyer |2023| Advisor: R. Mohan, PhD
Hayden Scott |2023| Advisor: S. Kry, PhD
Skyler Gay |2023, 2024| Advisor: L. Court, PhD
Jian Ming Teo |2023, 2024| Advisor: H.L. Liu, PhD
Zaphanlene Kaffey |2023, 2025| Advisor: C.D. Fuller MD, PhD
Natalie West |2023, 2024, 2025| Advisor: C.D. Fuller, MD, PhD
Rebecca Lim |2023, 2024, 2025| Advisor: K. Brock
Androniki Mitrou |2024, 2025| Advisor: K. Brock

Dr. A. Kyle Jones Selected for the 2025 John P. McGovern Award for Outstanding Teaching

Dr. A. Kyle Jones has been long recognized by the Medical Physics Program as an outstanding educator. This year his dedication to education and mentorship was acknowledged by the student body of the University of Texas MD Anderson Cancer Center-UT Health Houston Graduate School of Biomedical Sciences.

The award recognizes excellence in teaching based on the following criteria:

- Knowledge of the subject
- Interest in/enthusiasm for teaching
- Interest in and understanding of students
- Responsiveness to student questions
- Encouragement of independent thinking
- Accessibility to students

Below is the transcript of the inspiring speech that Dr. Jones gave at the 2025 GSBS commencement:

I was running on the treadmill at the Fitness Center back in April when I learned that I had been selected as the 2025 John P. McGovern Award for Outstanding Teaching from The University of Texas MD Anderson Cancer Center-UT Health Houston Graduate School of Biomedical Sciences. I was stunned by the news, which was particularly special to me because all nominations and the selection of the awardee are done by the students at the graduate school.

While reading up on Dr. McGovern (he was an allergist who earned most of his wealth through investing in real estate), I learned that he founded the Academy of Oslerian Medicine, named after Dr. William Osler. Dr. Osler had three personal ideals, which really resonated with me:

- To do the day's work well and not to bother about tomorrow.
- To act the golden rule, as far as in me lay, toward my professional brethren and towards the patients committed to my care.
- To cultivate such a measure of equanimity as would enable me to bear success with humility, the affection of my friends without pride, and to be ready when the day of sorrow and grief came to meet it with the courage befitting of a man.

Dr. Osler's number one philosophy about teaching? You are always a student. How accurately this describes my experience teaching in our program, where I learn as much from the students and contributors to my classes as I've ever taught to our students.

To this, I will add one more thing that I tell all my student: Challenge dogma and tradition.

As Scott Galloway says, greatness is in the agency of others. I owe a debt of gratitude to Dr. John Hazle for his unwavering support for education; Ashley Way, MD, Aashish Gupta, MS, and Madison Grayson for serving as TAs for my classes; and the students in the Medical Physics Graduate Program and GSBS for this incredible honor.

A. Kyle Jones

Dr. Jones, In the Students' Words

Anatomy & Physiology tends to be one of the more intimidating classes for students, since it requires a very different kind of learning than we typically have experienced within physics. Dr. Jones has an incredible ability to make this course approachable and engaging. His ability to break down complex topics, connect the material to clinical practice, and enthusiasm sets him apart as an exceptional educator.

As his teaching assistant this year, I have seen first hand how his clinically-focused approach to teaching anatomy has benefitted students and helped them build a strong foundation for their future work as medical physicists.

During my time shadowing in the clinic, I have often recognized concepts from his lectures and assignments, demonstrating how relevant his course is for our clinical training. I am grateful to have had the opportunity to learn from Dr. Jones both as a student and teaching assistant.

Madison Emily Grayson

Dr. Jones strives to create a peer-to-peer environment in the classroom where every student contribution becomes a part of the learning process.

He never shies away from adjusting lecture plans to fit student interests and makes anyone taking his courses feel valued, building their confidence to engage in scientific reasoning and challenge dogma.

Androniki Mitrou

Dr Jones has always been very enthusiastic with his anatomy classes and forthcoming with words of encouragement.

Jian Ming

Dr. Aaron Kyle Jones: A mentor and a teacher who leads by transforming his mentees

Looking back on my graduate school experience, Dr. Aaron Kyle Jones has been one of the most influential figures who has profoundly transformed and shaped my academic and professional development. As the Deputy Director of our program and the course director of Anatomy and Physiology (AP) I and II, Dr. Jones is not only an exceptional educator but also deeply committed to the overall growth of graduate students in our program. It is my great privilege to share a few reflections on his outstanding impact.

I first encountered Dr. Jones in the AP I course during my master's program. I was greatly moved by his teaching style which stood out for its clarity, depth and application. He brought his teaching materials to life by grounding concepts in real clinical examples, connecting them directly to how we would use the concepts in diagnostic imaging and therapy. His weekly quizzes, structured lectures, and case-studies pushed us to stay engaged while truly understanding the "why" behind each topic. We also had guest lectures from physicians and other professors for each organ sites, all of which greatly enhanced the learning experience and training of students in the class. Last but not least, the anatomy class prepares students well for the clinical part of American Board of Radiology part I exam which is a goal for all medical physics graduate students working towards a clinical career.

I was so inspired by his leadership as an educator and mentor that I decided to work with him as a TA for his AP II class. Under his guidance, I helped develop assignments that integrated imaging, dosimetry, and clinical testing across different anatomical sites. This experience not only reinforced my understanding of the material but also taught me how to design meaningful and applied educational tools focusing on clinical applications. I am incredibly grateful for his guidance, and I know I will carry the lessons he taught me throughout my career in medical physics.

Aashish Gupta

As an educator, I'm continually inspired by the dedication Kyle brings to every interaction with students. In the classroom, he is fully engaged, consistently encouraging students to think beyond the day's lesson and grapple with broader frameworks and more complex ideas. I'm especially impressed by the thoughtful, probing questions he poses during PhD defenses—questions that challenge and support each student in equal measure. It's a privilege to work alongside Dr. Kyle Jones, and I'm grateful to share in the leadership of the program with him.

Rebecca Howell

Aaron M. Blanchard Research Award

The Aaron Blanchard Research Award was established as a memorial to Aaron Blanchard, a graduate student in the Medical Physics Program, who succumbed to cancer before earning his degree.

The award was created by Blanchard's family and is sustained by their generosity and by other donations to the GSBS. It recognizes a medical physics graduate (SMS or PhD) for completion of an outstanding thesis or dissertation that is judged to make a significant contribution to cancer therapy or diagnosis. The recipient of the award is selected by a subcommittee reporting to the Medical Physics Graduate Program's Steering Committee.

The award consists of a certificate and monetary award. Additionally, the graduate's name is engraved on the Aaron Blanchard Research Award in Medical Physics plaque that is displayed in the classroom.

1999-2024 Award Recipients

2024 Constance Owens, PhD
2023 Tianzhe Li, PhD
2022 David B. Flint, PhD
2021 Travis Salzillo, PhD
2020 Drew Mitchell, PhD
2019 Megan Jacobsen, PhD
2018 Xenia Fave, PhD
2017 Justin Mikell, PhD
2016 Daniel Robertson, PhD
2015 John Eley, PhD
2015 Luke Hunter, SMS
2014 Christopher Peeler, PhD
2013 Kevin Casey, SMS
2012 Richard Castillo, PhD
2011 Brian Taylor, PhD
2010 Malcolm Heard, PhD
2009 Jonas Fontenot, PhD
2008 Stephen Kry, PhD
2007 Jennifer O'Daniel, PhD
2006 Jason Shoales, SMS
2005 Kent Gifford, PhD
2004 Stephen Kry, SMS
2003 Jennifer O'Daniel, SMS
2001 Brent Parker, SMS
2000 Steven McCullough, PhD
1999 Teresa Fischer, MS

The 2024 Aaron Blanchard Award Committee:

Kyle Jones, PhD. FAAPM, FSIR, Program Deputy Director

Peter Balter, PhD, FAAPM, Professor, Department of Radiation Physics

Pratip Bhattacharya, PhD, Professor, Department of Cancer Systems Imaging

2024 Blanchard Award Recipient

Constance A. Waddel-Owens, PhD

Dr. Owens received this award in recognition of her PhD Dissertation research

Risk and Risk Factors for Colorectal Subsequent Malignancies in Survivors of Childhood Cancer: A Report From The Childhood Cancer Survivor Study

Advisory Committee Members:

Rebecca Howell, PhD
Kristy K. Brock, PhD
Stephen F. Kry, PhD
Arnold de le Cruz Paulino, MD
Christine Peterson, PhD

Dr. Owens developed a novel population-based anatomical colorectal model with substructures for radiotherapy dosimetry in late effects studies of childhood cancer survivors and used the model to analyze the risk of secondary malignant neoplasms (SMN) based on the radiation dose to the entire colon and to specific substructures. Dr. Owens also incorporated chemotherapy doses into her risk models for multivariable analyses of the risk of SMN.

Dr. Owens has already published one peer-reviewed article on her dissertation work, and she is on the verge of final acceptance of her second article in the *Journal of Clinical Oncology*, Impact Factor 42.1(!!!). Based on her expertise and the quality of her work, Dr. Owens was invited to join Pediatric Normal Tissue Effects in the Clinic (PENTEC), an international multidisciplinary effort that aims to summarize normal-tissue toxicity risks for children and adolescents treated with radiation therapy for cancer.

The Award Committee thought that Dr. Owens demonstrated real skill in taking a challenging dataset and turning it into a focused work on a single impactful theme. Her figures were professional quality, and her dissertation was a fantastic read, with one reviewer commenting "like reading a good book, I could not wait to pick it back up after putting it down". Other reviewers praised the outstanding clarity of her writing and conclusions and the cross-disciplinary nature of her work. It is easy to see why her work will likely be published in JCO, as the quality of the figures and their content are what you expect to find in a clinical oncology journal.

Congratulations to Dr. Owens on her excellent body of work and her extremely high-quality dissertation that have earned her the 2024 Aaron Blanchard Research Award for the best dissertation in the MD Anderson-UT Health Houston Graduate School of Biomedical Sciences Medical Physics Program.

Dr. Owens is currently a postdoctoral fellow at MD Anderson and will join the MD Anderson medical physics (therapy) residency this fall.

Meet the Incoming Class of 2025

Admissions By the Numbers

88 Applications Received	**79** PhD	**9** SMS
17 Interviews Conducted	**13** PhD	**4** SMS
11 Offers Extended	**8** PhD	**3** SMS
7 Matriculating Fall 2025	**5** PhD	**2** SMS

PhD Students Matriculating in 2025

Ashwath Kapilavai, BS
Physics
University of North Carolina

Alan Lopez Hernandez, MS
MS in Medical Physics from UTMDACC/UT Health Houston
BS in Physics from University of Texas El Paso

Grace Nehring, BS
Physics
Rhodes College

Rowan Paplanus, BA
Physics
University of California Berkley

Eman Shokatian, MS
MS in Medical Physics from Iran Univ. of Medical Sciences
BS in Physics from Shahid Beheshti University

Meet the New SMS Students

SMS Matriculating in 2025

Mary Hadley, PhD
PhD in Physics from Brown University
BS in Physics from Yale University

Tyler O'Loughlin, BS
Physics
Utah Valley University

Meet the New Certificate Students

Certificate Students Matriculating in 2025

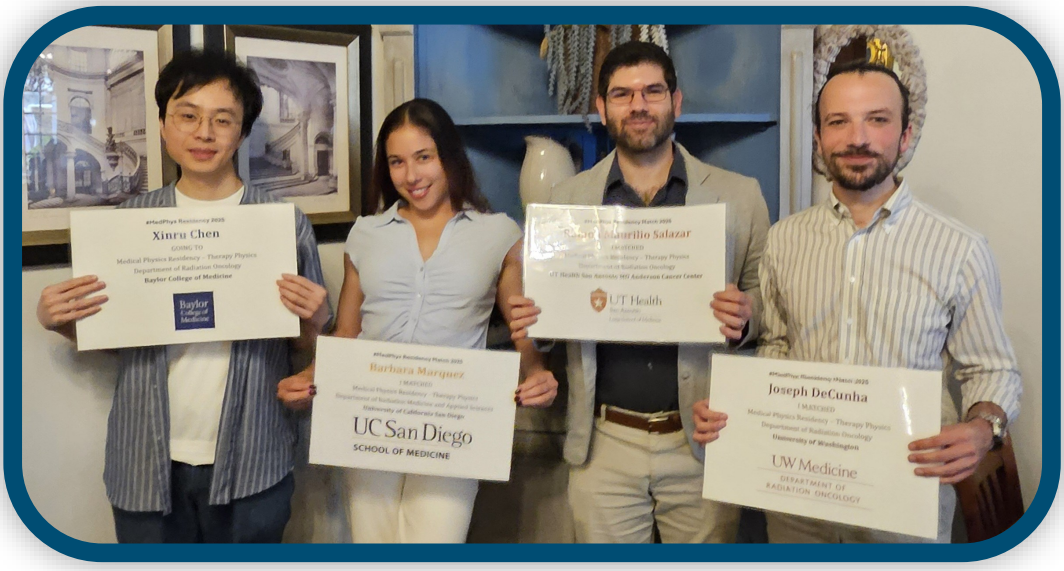
Chryzel Angelica B. Gonzales, PhD
PhD in Biomedical Science from
Hiroshima University
MS in Physics from
University of Santo Tomas

Nafiseh Ghazanfari, PhD
PhD in Biomedical Science from
State University of Groningen,
Netherlands

Academic Year 2024-2025 Graduates

Graduate	Dissertation Title	Advisor	Post-Grad. Position
Spring 2025 Graduates			
Barbara Marquez, PhD	The Development of Tools for Contour Review in Radiotherapy	Laurence Court, PhD	Medical Physics Residency UC San Diego
Hana Baroudi, PhD	Automated Radiotherapy Treatment Planning for Breast Cancer: A Robust Tool for Global Development	Laurence Court, PhD	Medical Physics Residency UTMD Anderson Cancer Center
Joseph DeCunha, PhD	Development of Lineal Energy Spectrum-Based Biological Effects Models for Protons	Radhe Mohan, PhD	Medical Physics Residency University of Washington
Xinru Chen, PhD	Artificial Intelligence (AI)-Assisted Cardiotoxicity Management in Lung Cancer Radiotherapy	Jinzhong Yang, PhD	Medical Physics Residency Baylor College of Medicine
Ramon Salazar, PhD (Certificate Recipient)	Completed 10 Courses and Postdoctoral Fellowship at MD Anderson	Laurence Court, PhD	Medical Physics Residency UT Health San Antonio
Summer 2025 Graduates			
Alan Lopez-Hernandez, MS	Insights Into the Radiation Chemistry of FLASH Radiation Therapy	Emil Schueler, PhD	PhD student Medical Physics Program MDA UT Health GSBS
Kevin Liu, PhD	Facilitating the Clinical Translation of FLASH Radiotherapy Through Dosimetry Development and Beam Parameter Optimization	Emil Schueler, PhD	Postdoctoral Fellowship UTMD Anderson Cancer Center

Residency Match Celebration



Full dissertations and thesis are available online (unless under embargo):
https://digitalcommons.library.tmc.edu/utgsbs_dissertations/

2025 Commencement

Let's Celebrate

2025 COMMENCEMENT

Let's Celebrate

2025 COMMENCEMENT

Barbara Marquez, PhD

2025 COMMENCEMENT

Hana Baroudi, PhD

2025 COMMENCEMENT

Fre'Etta Brooks, PhD

2025 COMMENCEMENT

Hunter Mehrens, PhD

2025 COMMENCEMENT

Joseph DeCuna, PhD

2025 COMMENCEMENT

Emily Caggiano Rieff, PhD

Emily was mentored by Cullin Taniguchi, MD, PhD. After his recent passing, Emil Schueler, PhD mentored her through to graduation.

Dr. Caggiano Rief received a PhD in Cancer Biology Therapeutics and Pharmacology.

2025 COMMENCEMENT

Dissertation Abstract

Barbara Marquez, PhD

The Development of Automated Tools for Contour Review in Radiotherapy

Peer review of organ-at-risk and target volume delineation is essential for patient safety and optimization of treatment outcomes. Peer review makes a substantial impact on patient outcomes, reporting notable rates of plan changes when reviewed and worse survival when patient cases are not reviewed. In around half of revised cases, target volume change is the required cause for modification (related to tumor control); in every one in ten cases, it is normal tissue sparing (related to treatment toxicity). Essentially all North American institutions with accredited residency training programs hold peer review to some capacity. However, accessibility to practicing routine peer review (especially of contours) is highly dependent on the presence of sub-specialized radiation oncology staff and their expensive time, making the workflow and qualitative decision-making inconsistent across all clinical practices, particularly those in low-resource settings. In pursuing the automation of the contour review process, especially with the wide adoption of auto-contouring to clinical practice, we aim to mitigate time and specialty resource shortages to this critical clinical practice.

The purpose of this study was to develop automated tools that can accurately identify sub-optimal contours (inadequate target coverage, sub-optimal delineation of organs at risk to reduce toxicity), agnostic of their manual or automated generation. To accomplish this, we first examined the relationship between geometric and dosimetric agreement metrics amongst normal tissue auto-contours and clinical contours in discerning whether the current state of automated contour QA (which mainly relies on geometric comparisons) was appropriately defining contour errors and deploying effective metrics for error detection. We tested this relationship over a substantial dataset of head and neck patients. Using this knowledge, we further examined the necessity of incorporating dose-based comparisons into normal tissue contour QA to improve the detection of clinically significant errors. A two-contour QA system was developed, leveraging an independent auto-contouring system to cross-validate a primary auto-contouring system in its performance against clinical manual delineations. We employed a logistic regression model as a means by which geometric and dosimetric comparisons in a two-contour QA system can flag potential errors in a primary auto-contouring system compared to the clinical ground truth. Finally, we explored automated contour QA of target contours by employing statistical process control to explore an interpretable and scalable approach for continuous contour quality monitoring of internal target volumes in cervical cancer. Control charts were generated to establish data-driven control limits for geometric and dosimetric comparisons between auto- and clinical target contours, allowing for automated flagging of deviations from expected contouring norms. This dissertation advances automated contour QA by integrating geometric, dosimetric, machine learning, and statistical process control techniques with auto-contouring, providing a framework for artificial intelligence-assisted contour verification that is interpretable, scalable, and clinically relevant. The tools developed in this work are expected to improve real-time contour QA through implementation to a web-based automated, expert peer review system, enabling clinics to practice contour peer review despite disparities in expertise and resources.

Advisory Committee:

Laurence Court, PhD
David T. Fuentes, PhD
Anuja Jhingran, MD
Tomas J. Whitaker, PhD
Christine B. Peterson, PhD
Julianne Pollard-Larkin, PhD
Surendra Prajapati, PhD

Dr. Marquez is currently a Medical Physics Resident (Therapy) at the University of California San Diego.

Dissertation Abstract

Hana Baroudi, PhD

Automated Radiotherapy Treatment Planning for Breast Cancer: A Robust Tool for Global Deployment

Breast cancer incidence continues to rise worldwide, particularly in low- and middle-income countries (LMICs), where limitations in resources already constrain access to timely and high quality care. Radiotherapy is a cornerstone of breast cancer management, proven to significantly lower both recurrence and mortality. However, a growing shortage of oncology experts worldwide threatens the prompt delivery of these treatments. In the United States, a substantial gap in the oncology workforce is projected, while LMICs are already grappling with disproportionately high patient-to-oncologist ratios. Treatment planning for radiotherapy involves considerable time and specialized expertise, and ongoing staffing challenges are expected to further delay treatment initiation, potentially jeopardizing patient outcomes.

This thesis proposes an automated solution to address the limited accessibility of radiotherapy planning in breast cancer management. Although automation has been explored in certain aspects of breast cancer treatment planning, existing efforts often focus on narrow tasks, specific treatment techniques, or single-institution datasets—raising concerns about the generalizability of automated tools. Our work advances an end-to-end approach to automate complex breast radiotherapy planning and systematically evaluates its performance across diverse patient populations.

An nnU-Net-based automated contouring model was trained using data from 104 whole-breast patients (80% for training and 20% for validation). The model's outputs were quantitatively assessed using the Dice similarity coefficient (DSC) and mean surface distance (MSD), and qualitatively reviewed by physicians to determine clinical acceptability. Five automated conventional planning approaches were developed, complemented by an established RapidPlan model for volumetric arc therapy. These included conventional tangents for whole-breast treatment, variations for supraclavicular node (SCLV) irradiation with or without axillary nodes, and two approaches for comprehensive regional lymph node irradiation—either photon wide tangents with an SCLV field or photon tangents with a matched electron field targeting the internal mammary nodes (IMN).

All algorithms begin by generating contours automatically for the breast clinical target volume, regional lymph nodes, and relevant organs at risk. Subsequently, gantry angles and field shapes are created and optimized to ensure adequate target coverage while constraining doses to nearby critical structures. Optimization relies on field weighting for the lymph node fields and a field-in-field technique for the tangents. These algorithms were integrated into the RayStation treatment planning system and tested for clinical validity on 15 internal whole-breast patients (150 plans) and 40 external patients from four institutions across Switzerland, Argentina, Iran, and the United States (360 plans). Plan evaluations focused on target coverage and adherence to normal tissue dose limits, and were reviewed by radiation oncologists (5-point scale for the internal dataset) and medical physicists (accept or edit for the external dataset). Further large-scale testing was performed on 272 internal and 285 external patients from six different countries (Argentina, Iran, Jordan, United States, South Africa and Switzerland).), enabling a comprehensive assessment of plan quality via dosimetric analysis and physicist review. The rate of automated plans requiring edits was compared across treatment sites, and fault tree analysis was employed to elucidate underlying reasons for any modifications.

Dissertation Abstract (Cont'd)

Hana Baroudi, PhD

Automated Radiotherapy Treatment Planning for Breast Cancer: A Robust Tool for Global Deployment

(Cont'd)

Automated contouring achieved DSC values above 0.70 for target volumes and an MSD under 3 mm. Two physicians deemed 63% of automatically generated contours acceptable without further edits.

Across 510 evaluated plans, target coverage requirements were met in 100% of breast cases, 99% for SCLV, 98% for axillary nodes, and 91% for IMN. Hot spots were more frequent in plans combining multiple fields, while dose constraints for the heart, ipsilateral lung, and contralateral breast were met in 95%, 92%, and 95% of plans, respectively. For the 15 internal patients, physician review indicated that 74% automated plans were clinically acceptable as is. Notably, when using automated contours in conjunction with the RapidPlan model, 73% of plans required no further modifications. Similarly, physicist review of 40 multi-institutional cases confirmed that 79% of automated plans were ready to use, with the rest needing minor edits. A broader evaluation encompassing 540 patients (4,860 plans) revealed that 78% of automated plans required no revisions, whereas 22% needed adjustments. The rate of edits was statistically comparable across institutions, except for data from Jordan and Switzerland, which exhibited better performance, and Yale, which included intentionally challenging cases. Automated planning treating IMNs with tangent fields was more robust than using electron fields. Fault tree analysis identified decisions about clinical compromises (target coverage vs. normal tissue doses) as the primary cause of plan modifications, followed by patient anatomical and positioning variations.

In conclusion, this thesis demonstrates the feasibility of a fully automated radiotherapy planning system for complex whole-breast cases. The approach successfully accommodates a wide range of clinical protocols and achieves robust performance across diverse patient populations. This automated solution has the potential to alleviate oncology workforce shortages and improve global access to timely, high-quality breast cancer radiotherapy.

Advisory Committee:
Laurence E. Court, PhD
Simona F. Shaitelman, MD, Ed.M
Sanjay Shete, PhD
Tucker Netherton, PhD
Joshua S. Niedzielski, PhD
Adam D. Melancon, PhD

Dr. Baroudi is currently a Medical Physics Resident (therapy) at the University ofTexas MD Anderson Cancer Center.

Dissertation Abstract

Joseph DeCunha, PhD

Development of Lineal Energy Spectrum-Based Biological Effects Models for Protons

In this dissertation, methods are developed and described to allow for the rapid calculation of microdosimetric spectra (specifically, lineal energy) for protons. SuperTrack, a GPU-accelerated tool for calculation of microdosimetric spectra was developed and is capable of computing lineal energy spectra up to 5000x faster than using Geant4 directly. Proton lineal energy spectra generated by SuperTrack are indistinguishable from those generated by Geant4. With SuperTrack, large libraries of lineal energy spectra for monoenergetic protons spanning 0 -300 MeV have been developed. The proton lineal energy spectra calculated by SuperTrack have been compared to experimental measurements made by a tissue equivalent proportional counter and demonstrate reasonable agreement. A method to sum monoenergetic lineal energy spectra to yield the lineal energy spectrum of a polyenergetic beam is described and validated. The summation approach for calculation of lineal energy spectra, along with the libraries generated by SuperTrack have been incorporated into a treatment planning system, RayStation IonPG-2023B.

Having made the rapid calculation of proton lineal energy spectra possible, investigations to establish and determine the optimal mathematical formulation of a mathematical radiobiological model for the prediction of the biological effects of protons began. Using previously gathered clonogenic cell survival response data of H460, H1437, U87, and AGO cell lines following proton irradiation, mathematical models describing the relative biological effectiveness of proton therapy as a function of lineal energy and linear energy transfer were developed. It was determined that the potential benefits of lineal energy spectrum-based radiobiological models for protons may only be meaningful in conditions where cells are subject to multiple irradiation conditions with differing underlying proton energy spectra at the same linear energy transfer.

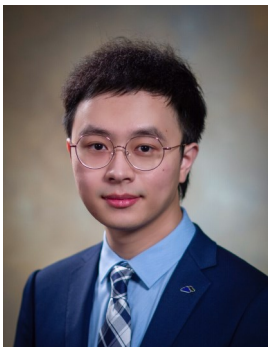
Following this, mathematical models to predict *in-vivo* treatment outcomes following proton therapy were developed. Four distinct analysis approaches were applied to a cohort of pediatric ependyoma patients treated with proton therapy, first identified in a prior study by Peeler *et al.* 2016. The analysis approaches attempted to determine whether a correlation with increasing linear energy transfer and the appearance of hyperintense regions on T2-weighted magnetic resonance imaging post-treatment were correlated. I found that analysis approaches which grouped voxel-level response data from all patients together indicated that higher linear energy transfer was correlated with increasing risk of post-treatment image change. However, analysis methods which considered the risk of each individual patient's risk of developing image changes found that most patients did not demonstrate increasing image change risk with increasing linear energy transfer. Additional work remains to be done to extend the lineal energy spectrum-based models developed to predict clonogenic cell survival to the prediction of *in-vivo* treatment response.

Advisory Committee:

Radhe Mohan, PhD
David Grosshans, PhD
Zhongxing Liao, MD
Dragan Mirkovic, PhD
Fada Guan, PhD
Oleg Vassiliev, PhD

Dr. DeCunha is currently a Medical Physics Resident (therapy) at the University of Washington.

Dissertation Abstract



Xinru Chen, PhD

Artificial Intelligence (AI)-Assisted Cardiotoxicity Management in Lung Cancer Radiotherapy

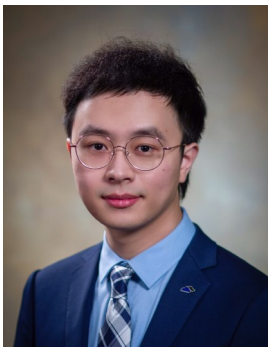
Lung cancer remains one of the leading causes of cancer-related mortality worldwide, with radiation therapy being a cornerstone of treatment. However, radiation-induced cardiotoxicity has emerged as a significant long-term complication, impacting patient survival and quality of life. There is increasing evidence that post-radiotherapy cardiotoxicity is better indicated by cardiac substructure dose, compared with whole heart dose. Despite this, cardiac substructures are not routinely incorporated into clinical workflows due to the significant time and resource demands associated with manual segmentation. Moreover, the relationship between dose distribution in radiotherapy plans and radiation-induced cardiotoxicity remains incompletely understood. Therefore, the development of an automated and precise segmentation approach for cardiac substructures, alongside a substructure-based cardiotoxicity prediction model, is essential for enabling the clinical application of cardiac substructure-specific dose constraints to mitigate cardiotoxicity risk. This study aims to establish automated tools to facilitate personalized cardiotoxicity management strategies in lung cancer radiotherapy.

First, a deep learning-based auto-segmentation model was developed to delineate 19 cardiac substructures on non-contrast planning computed tomography (CT) scans. The performance of the nnU-Net model was compared with the widely utilized 3D U-Net architecture. Subjective evaluation by four physicians determined that 94% of the automatically generated contours were clinically acceptable. Additionally, the same deep learning framework was employed to develop an auto-segmentation model for cardiac chambers on daily magnetic resonance (MR) images acquired with optimized flip angles. This model was specifically designed for adaptive radiotherapy workflows on MR-Linac systems, achieving a clinical acceptability rate of 95%. These models provide accurate and efficient cardiac substructure segmentation, facilitating both retrospective dosimetric analyses and prospective clinical applications.

Next, the relationship between cardiac substructure dose exposure and a cardiotoxicity biomarker, high-sensitivity cardiac troponin T (hs-cTnT) was investigated to investigate the role of individual cardiac substructures in radiation-induced toxicity. A rigorous analytical framework was implemented to assess the predictive value of clinical factors, dosimetric parameters, and radiomic features derived from both whole-heart and substructure-based metrics using two independent datasets. The findings demonstrated that cardiac substructure dosimetric parameters exhibited superior predictive performance, with left anterior descending coronary artery (LAD) V20Gy identified as the most significant predictor of hs-cTnT elevation.

Finally, a cardiotoxicity risk estimation and radiotherapy plan re-optimization framework was developed by integrating the auto-segmentation and toxicity prediction models. Objective functions were formulated based on recommended substructure dose thresholds and dynamically adjusted during the optimization process. The re-optimized treatment plans achieved significant reductions in LAD V20Gy and right ventricle maximum dose while maintaining adequate target coverage and adherence to organ-at-risk constraints.

Dissertation Abstract (Cont'd)



Xinru Chen, PhD

Artificial Intelligence (AI)-Assisted Cardiotoxicity Management in Lung Cancer Radiotherapy

(Cont'd)

In conclusion, this study establishes an artificial intelligence (AI)-assisted framework for cardiotoxicity management in lung cancer radiotherapy, incorporating automated segmentation models for both CT and MR imaging, a cardiotoxicity prediction model, and an optimization strategy for treatment planning. These tools substantially enhance the feasibility of cardiotoxicity risk assessment and mitigation, improve the understanding of radiation-induced cardiotoxicity, and enable patient-specific treatment plan modifications for improved clinical outcomes.

Advisory Committee:
Jinzhong Yang, PhD
Zhongxing Liao, MD
Laurence E. Court, PhD
Xiaodong Zhang, PhD
Joshua S. Niedzielski, PhD
Sanjay S. Shete, PhD

Dr. Chen is currently a Medical Physics Resident (therapy) at Baylor College of Medicine.

Thesis Abstract

Alan Lopez-Hernandez, MS

Insights Into the Radiation Chemistry of FLASH Radiation Therapy

Purpose: FLASH radiation therapy (FLASH-RT) is an emerging modality that delivers radiation at ultra-high dose rates (UHDR) and has shown consistent normal tissue sparing while preserving tumor control compared to conventional RT—a phenomenon termed the FLASH effect. Despite promising results, the mechanisms behind the FLASH effect remain unclear. Many hypotheses point to radiolytic interactions, but experimental validation is limited. This work aims to develop a robust experimental platform to evaluate the relationship between radiolytic species production and physical beam parameters relevant to FLASH-RT, alongside dosimetry tools for reliable UHDR beam characterization.

Methods: A beam collector (BC) Faraday cup detector was characterized on a FLASH Mobetron and benchmarked against a reference alternating-current current transformer (ACCT). Performance metrics included linearity with charge per pulse and total charge, pulse width (0.5– 4 μs), mean and instantaneous dose rate, and pulse repetition frequency (5–180 Hz). Alanine dosimetry was also evaluated across a wide range of doses under FLASH conditions.

For radiation chemistry studies, the spin trap DMPO was used to detect hydroxyl radicals (•OH) and hydrogen radicals (•H) in normoxic triple-distilled water. Irradiations were performed using a modified Varian Clinac 21X. Spin adducts (•DMPO-OH, •DMPO-H) were quantified via electron paramagnetic resonance (EPR) spectroscopy 120 s post -irradiation. Analytical correction for decay kinetics was applied to estimate initial •OH and •H yields.

Results: The BC showed excellent linearity and stable performance across beam parameters, supporting its use as a time-resolved UHDR monitor. Alanine dosimetry exhibited a linear dose response from 6–300 Gy, was PRF-independent, and reproducible under varying delivery schemes, validating it for FLASH-RT applications.

In the radiation chemistry experiments, •DMPO-OH yield decreased with increasing dose per pulse and cumulative dose, suggesting dose-rate and inter-pulse effects on radical formation. Simulations supported the role of oxygen-dependent radicals in competing with DMPO for •OH in multi-pulse scenarios.

Conclusion: A platform for quantifying radiolytic species under FLASH-RT-relevant conditions was established. Both the BC and alanine proved to be effective tools for UHDR beam monitoring and dosimetry. These findings highlight the importance of radiolytic interactions—particularly involving •OH and oxygen—in FLASH-RT and lay the groundwork for future mechanistic studies in biologically relevant models, advancing our understanding and clinical translation of FLASH-RT.

Advisory Committee:
Emil Schüler, PhD
Stefan Bartzsch, PhD
Rebecca M. Howell, PhD
Laurence Court, PhD
Uwe Titt, PhD

Alan is currently a PhD student in the Medical Physics Program, UTMDA/UT Health Graduate School of Biomedical Sciences

Dissertation Abstract

Kevin Liu, PhD

Facilitating the Clinical Translation of FLASH Radiotherapy Through Dosimetry Development and Beam Parameter

Radiation therapy (RT) is a crucial component of curative cancer therapy, with a majority of cancer patients in the United States receiving RT as part of treatment. The goal of RT is to maximize the therapeutic index in curing disease while minimizing any associated normal-tissue complications[1]. Recently, ultra-high dose-rate (UHDR) RT (mean dose rates ≥40 Gy/s for a total duration of ≤200 ms) has been reported to selectively spare normal tissues and organs while maintaining an isoeffective tumoricidal effect compared to conventional (CONV) dose rate RT in a variety of *in vivo* preclinical models[2]. This phenomenon has been termed the "FLASH effect." FLASH RT represents a fundamentally new paradigm for increasing the therapeutic index of RT relative to the same doses given at CONV dose rates (0.01–0.1 Gy/s), spurring accelerated efforts to bring it to clinical application[3-6].

Although the FLASH effect has been documented in multiple preclinical studies between different institutions, the original definition involving only mean dose rate and total irradiation time to invoke or magnify the FLASH effect may be insufficient—with variable results in the induction and magnitude of normal tissue sparing in a variety of published studies from different institutions[3,7]. A likely cause of this discrepancy is due to marked differences in the beam parameter settings that are used but are not often reported which complicates retrospective studies evaluating the FLASH effect. Additionally, limitations in existing dosimetry systems in accurately capturing these beam parameters may also be one of the key factors limiting their robust documentation in preclinical studies.

In light of these shortcomings, we will demonstrate the limitations and modifications required in existing radiation dosimeters and their respective protocols to accurately measure the beam parameters used to document UHDR beamlines. With these established detectors and protocols in place, we propose a series of systematic and rigorous preclinical *in vivo* experiments to compare quantitively the magnitude of FLASH effects based on radiation beam type and beam delivery parameters to optimize the FLASH therapeutic index. The information produced by this work will have high translational relevance as it would inform the design of emerging FLASH human clinical trials and accelerate the development of a new RT treatment paradigm while simultaneously providing direction to future mechanistic studies. The three specific aims of this project are as follows:

Aim 1: Establish real-time beam monitoring in electron UHDR beamlines using beam current transformers (BCTs) calibrated to dose-rate independent dosimeters. We will characterize BCTs in their response to monitor different relevant beam parameters in real-time such as beam energy, dose, dose per pulse, mean and instantaneous dose-rate by modifying machine parameters such as pulse width, pulse amplitude, pulse number, and pulse repetition frequency. BCTs will be used in conjunction with dose-rate independent passive dosimeters, such as Gafchromic film and OSLDs/TLDs, capable of accurate dose measurements in UHDR beamlines. We hypothesize that concurrent use of BCTs with passive dose-rate independent detectors will be suitable for accurate real-time dose and beam monitoring, within a dose uncertainty of <5%.

Aim 2: Develop the next generation of ionization (ion) chambers for UHDR reference dosimetry towards clinical translation. We will evaluate existing ion chambers to pinpoint specific features in their design that can be altered to provide more accurate readings in UHDR beamlines through the development of these

Dissertation Abstract (Cont'd)

Kevin Liu, PhD

Facilitating the Clinical Translation of FLASH Radiotherapy Through Dosimetry Development and Beam Parameter Optimization

next generation ion chambers. Confirmation and evaluation of ion chamber characteristics in FLASH will be obtained from beam measurements and design modifications of current ion chamber technology in collaboration with Standard Imaging Inc. to minimize ion recombination and polarity effects. We hypothesize that parallel-plate ion chambers with sub-mm electrode spacings at sufficiently high electric field gradients (≥ 1000 V/mm) will be able to in accurately measuring dose delivered from electron FLASH beamlines, and bring dosimetric calibration and reporting up to the standards necessary for clinical translation and subsequent clinical implementation of FLASH RT.

Aim 3: Optimize the physical beam parameters to maximally reduce normal tissue toxicity while maintaining therapeutic efficacy against tumors. We will perform an unprecedented, systematic, and comprehensive comparison of the physical beam parameters (e.g., total dose, mean dose rate, dose per pulse, radiation type) required to maximize the FLASH effect on normal tissue sparing of irradiated mice while investigating their therapeutic efficacy against tumors. We hypothesize that modifying beam parameters such as dose, dose per pulse, pulse width, radiation type, and mean dose-rate will yield differential tissue sparing effects and that the efficacy of FLASH RT is isoeffective with CONV RT in treating tumors. We expect to have determined the optimal set of beam parameters for maximally reduced GI toxicity using regenerating crypt and survival assays to validate our findings.

Impact: Completion of the proposed project will lay the foundation for our understanding of the physical beam parameters that are needed to achieve the FLASH effect with the infrastructure necessary for accurate real-time dose monitoring and measurement. These answers are critical for the successful implementation of FLASH RT in the clinical setting.

Advisory Committee:
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Devarati Mitra, MD, PhD
Ethan Ludmir, MD, PhD

Dr. Liu is currently a Postdoctoral Fellow in Radiation Oncology at UTMD Anderson Cancer Center.

We look forward seeing our list of future alumni continue to grow!

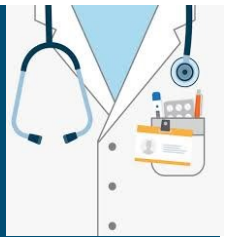
2024 White Coat Ceremony

All Second Year GSBS Students

Second Year Medical Physics Students

Left to right: Diana Carrasco, Angela Gearhardt, Androniki Mitrou, Yeseul Kim, Hayden Scott, Lian Duan, Luck Connell

2024 White Coat Ceremony



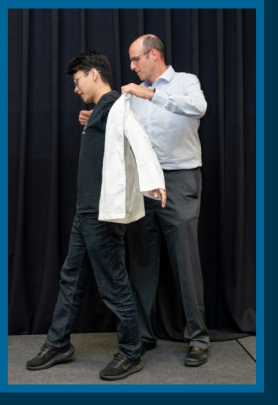










This right of passage signifies the official beginning of the mentor-mentee relationship and publicly reveals the students' mentors and labs.

Building Community

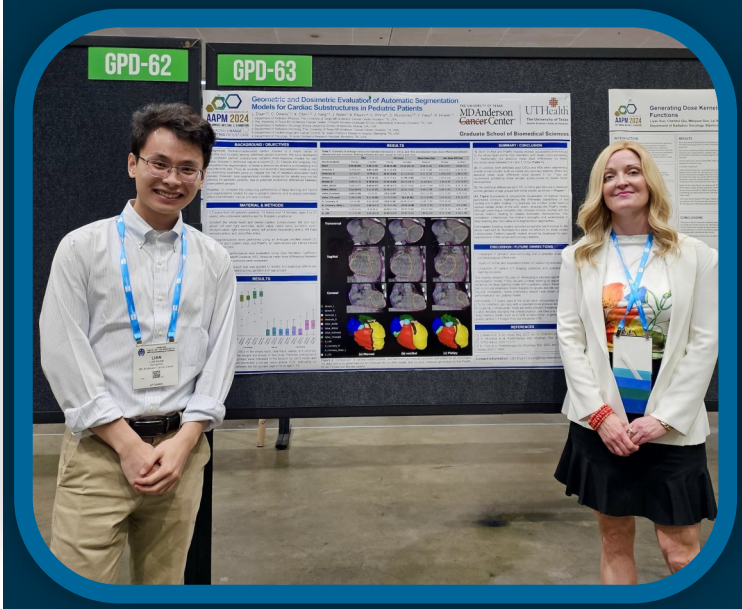
Building Community

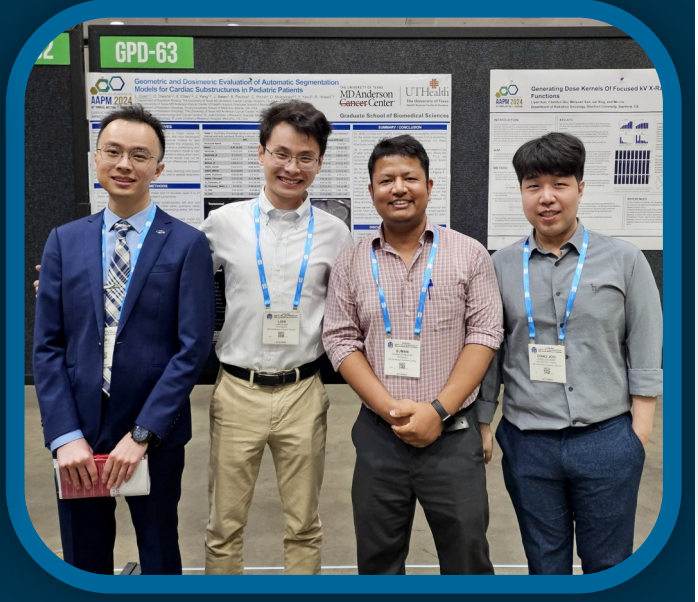
Students Lab Photos

Students Lab Photos

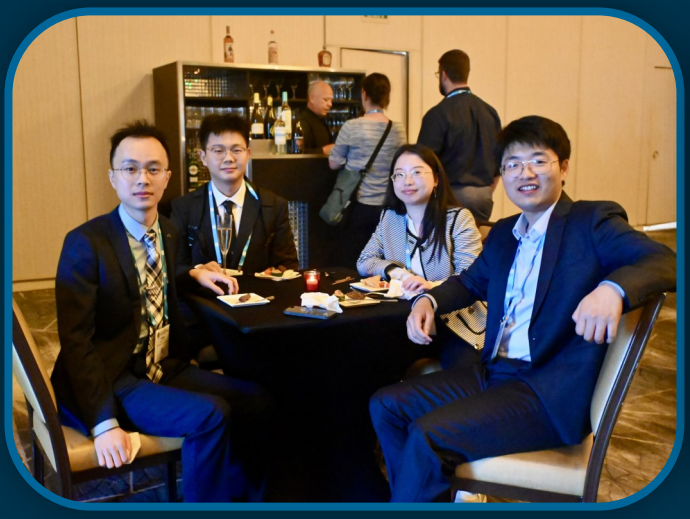
AAPM 2024 Photos

2024 AAPM Annual Meeting





2024 Annual Alumni Event



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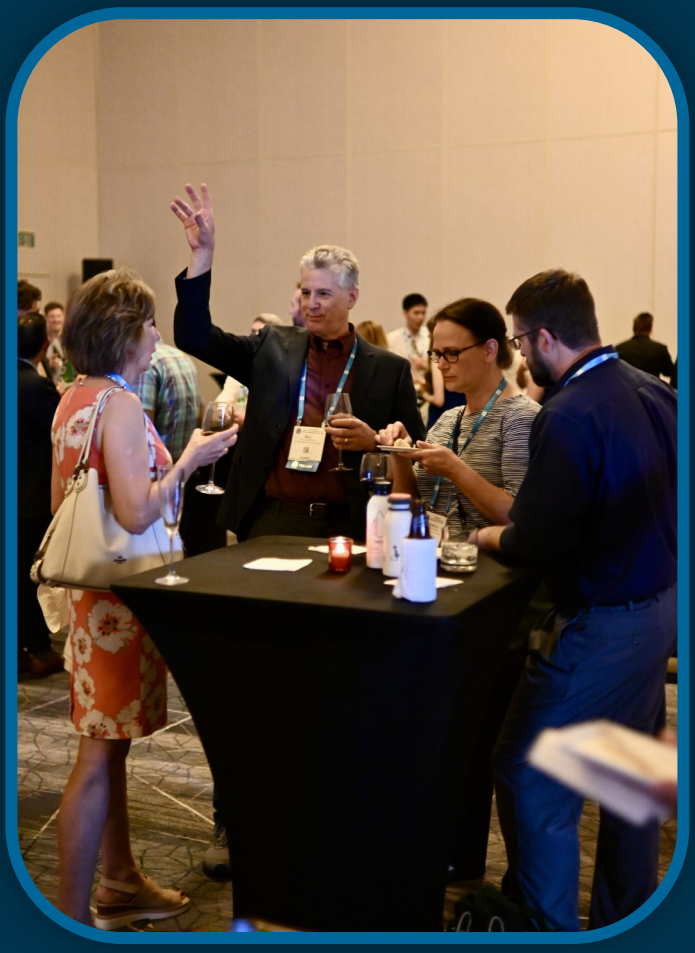
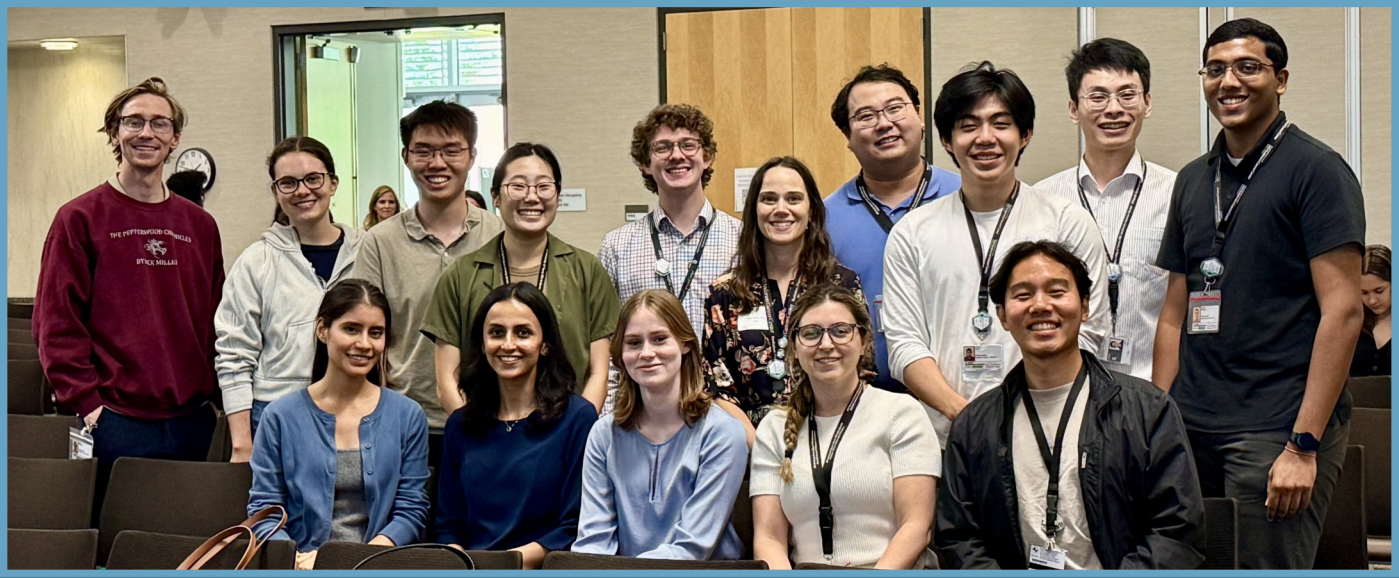
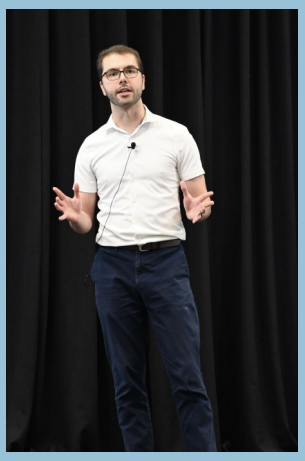
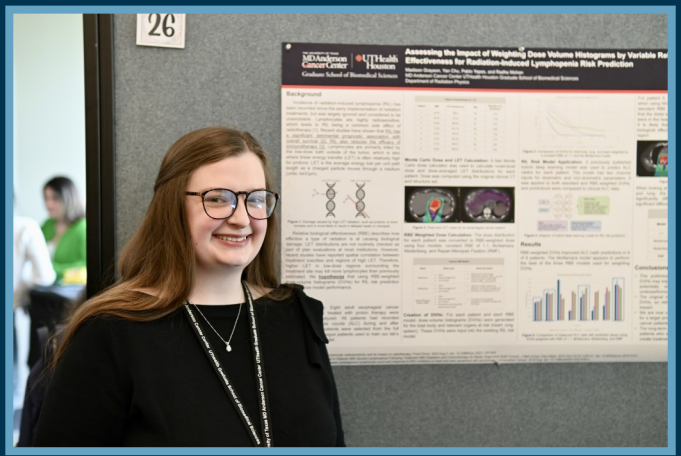


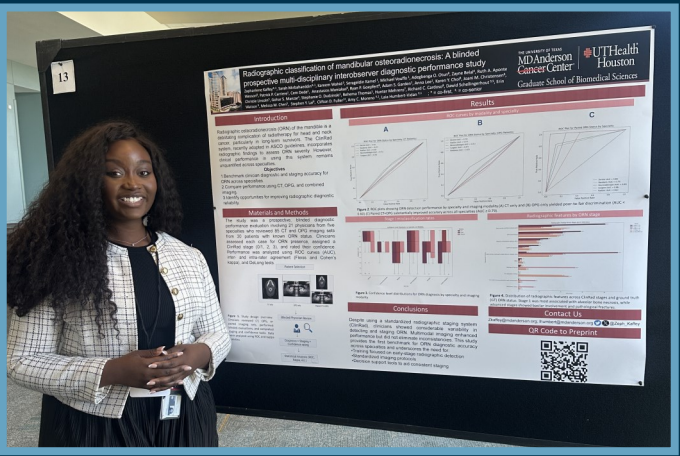
2025 Graduate Research Day



Elevator Speeches

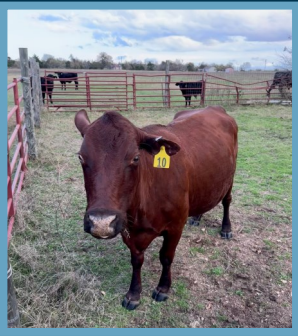






Grilling at the Bankson Ranch

Dr. Jim Bankson really went above and beyond inviting his lab to his ranch and cooking them delicious ribs!



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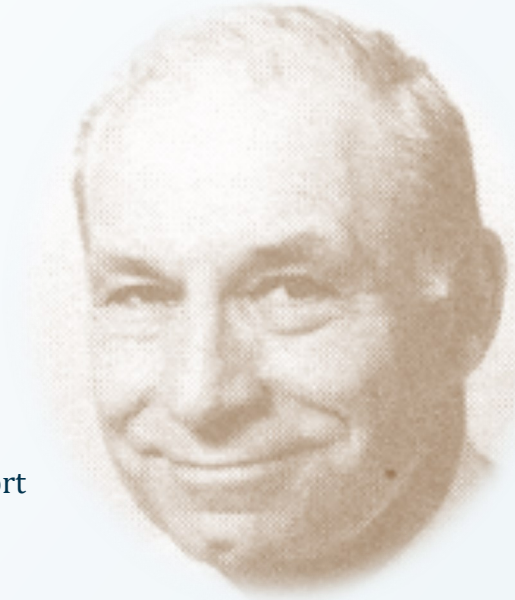

The Robert J. Shalek Fellowship is used specifically for the support of the Medical Physics Educational Programs. Donations to the fund also support the long-term goal of providing continuous funding for fellowships.

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CELEBRATING THE LIFE AND CAREER OF

MARILYN STOVALL

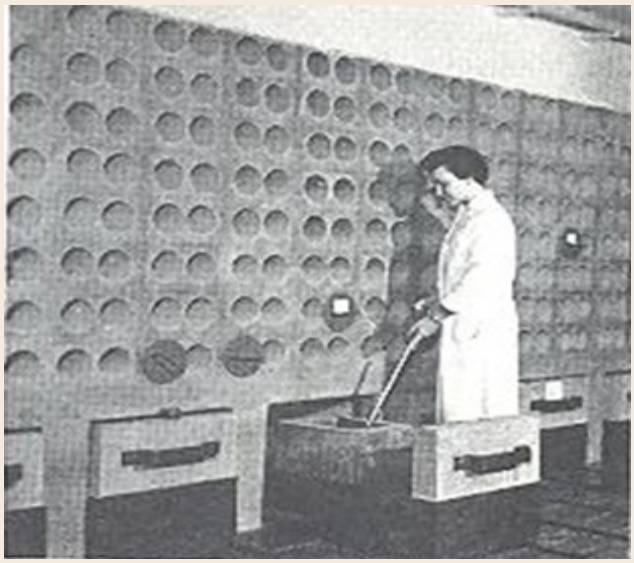
A PIONEER IN RADIATION PHYSICS PATIENT CARE AND CANCER SURVIVOR LATE EFFECTS RESEARCH

1960 photo of the Radiation Department. Front row (left to right): Gilbert Fletcher, **Marilyn Stovall**, Warren Sinclair, Joan Mathis (departmental secretary), and Robert Shalek.

Marilyn Stovall, a Pioneer in Radiation Physics Patient Care and Cancer Survivor Late Effects Research

Marilyn Stovall began college at the young age of 16 and graduated from Baylor University with a dual Bachelor of Science in Zoology and Mathematics. After graduation at age 20 with virtually no financial resources, Marilyn scoured the ads in the Houston Chronicle for jobs related to her interests in science and math and then promptly purchased a one-way bus ticket to Houston, TX with plans to show up for interviews. She had several job offers, one from Merryl Lynch, another from an oil company, and one from MD Anderson. In 1951, Marilyn accepted a position as a radiation technologist at MD Anderson Hospital, working under Robert "Bob" Shalek, promising him to stay in the position for at least two-years. She kept that promise and went on to make her career at MD Anderson where she worked for 65 years until her retirement in 2015. During that time, she made tremendous and lasting contributions to the field of medical physics and on our understanding of treatment related late effects in cancer survivors. For perspective, when Marilyn Stovall started her career at MD Anderson, Harry S. Truman was president of the United States. The Houston population, which today exceeds seven million, was a mere 600,000 in 1951. Dr. R. Lee Clark was the President of MD Anderson, which had just 98 hospital beds compared to today's nearly 800 beds.

One of Marilyn Stovall's early responsibilities in 1953 as a physics technician was to supervise the installation of the first teletherapy cobalt source to be delivered in the United States, see photo on page 54. After the instillation, Marilyn was instrumental in the unit's quality assurance, developing novel cobalt radiotherapy techniques, and performing calculations for many patients' treatments.



Marilyn Stovall, lifting a package of Cobalt-60 from a storage box with remote tongs.

She and her physics colleagues defined treatment parameters such as dose normalization and field size standardization. Throughout the 1960s and much of the 1970s Marilyn served in the roles of Applied Mathematician and Senior Dosimetrist. She, along with mentor and colleague Dr. Shalek, was one of the primary developers of the first computerized brachytherapy calculation system, RADCOMP, revolutionizing the field of brachytherapy and impacting patients worldwide. Not only did she define essential mathematics in the calculation algorithm, but she was also directly involved with patients' treatment planning, which included driving to Texas A & M University to manually load patient-specific punch cards into their mainframe computer for dose calculations using the algorithm she helped develop. After the hours-long calculations, Marilyn would return to MD Anderson, treatment plan in hand, to assist with patients' brachytherapy deliveries. In one instance, and an example of her dedication to patient care, Marilyn took a bus to A&M carrying a patient's data, source data, and programs on punch cards to run the brachytherapy program and slept on a cot waiting for the run so she could bring the result back the next morning. By the 1970s, MD Anderson had a mainframe and physicists, including Marilyn, were able to run the RADCOMP program onsite (but still with punch cards) by just walking down the hall to the Department of Biomathematics. In 1977, Marilyn was promoted to Assistant in Physics, a position she remained in for twenty years, until she was promoted to Associate Professor following the completion of her doctorate degree.

Dr. Stovall directed the MD Anderson Radiation Dosimetry Services (RDS) for thirty years from its inception in 1985 to 2015, providing independent peer review of photon and electron beams to hospitals throughout the world. During those 30 years, the number of customers serviced by RDS grew dramatically both domestically and internationally. Under Marilyn's leadership the RDS provided nearly 200,000 output checks between January 1995 and December 2015 (including 1992 orthovoltage, 67,354 MV photon, 118,788 electron, and 3270 blood irradiator checks); statistics are not available for 1985-1995. Marilyn cared deeply about the community of medical physicists served by the RDS and felt a deep obligation to peer review as part of ensuring that every patient treated with radiotherapy received the intended prescribed doses. She was also deeply committed to providing high-quality customer service and insisted on the highest standards from her team. Her legacy of providing quality assurance goes on through the RDS, as they continue to serve our community of physicists both in the United States and throughout the world.

At the time of her retirement, she served as the Director of the MD Anderson Late Effects Group, which tracked and studied the long-term effects of cancer treatments, combining Dr. Stovall's long career in radiation physics with her graduate education and ongoing interest in epidemiology.

When she began her career, overall cancer survival was very low, just 35%, but as she observed survivorship increase each year, she became increasingly interested in treatment-related late effects among cancer survivors. She was among the first to hypothesize that there were long-term late effects from cancer treatment, establishing the MD Anderson Late Effects Group in 1977. Working, alongside Dr. John Boice, the Director of the National Cancer Institute Radiation Epidemiology Branch (NCI-REB), she collaborated on one of the first studies of radiation-related subsequent cancers, "Second cancers following radiation treatment for cervical cancer, An international collaboration among cancer registries. J Natl Cancer Inst 74:955-75, 1985". This seminal work brought the field of radiation epidemiology to the attention of the radiation oncology community. Dr. Stovall was the first to report radiation dose outside the treatment field and to develop methodology to estimate organ doses for survivors treated in the pre-computed tomography era of radiotherapy by reconstructing their radiation treatment fields on computational phantoms. During her tenure as the Director of the Late Effects Group, she reconstructed organ and body region doses for more than 100,000 survivors, including participants from national and international cohorts including the Childhood Cancer Survivor Study (CCSS), St. Jude Lifetime (SJLIFE), and Dutch Childhood Oncology Group (DCOG), The Adult Life After Childhood Cancer in Scandinavia (ALiCCS) Study, and Women's Environmental Cancer and Radiation Epidemiology Study (WECARE) – to name a few. Doses reconstructed by Dr. Stovall's team have been used to establish radiation dose response models for numerous subsequent cancers and chronic conditions.

Dr. Stovall also led efforts to quantify in-utero exposure to radiation for the thousands of pregnant women requiring radiotherapy each year. Many clinicians and physicists contacted her directly for estimates of radiation dose to fetus for specific cases, which she calculated by hand. Her team, including Susan Smith, the RDS Associate Lab Director, along with other task group members performed a large number of measurements to quantify fetal dose for different radiotherapy beams and field configurations. These data were reported in a American Association of Physicists in Medicine Task Group 36 Report (senior authored by Dr. Stovall), "Fetal Dose from Radiotherapy with Photon Beams".

In 2013, she was awarded the prestigious Failla Memorial Lecture Award from the Radiation Research Society, which honors outstanding contributions to the field of radiation research with significant and lasting impacts in understanding the effects of radiation on biological systems that have advanced the field. In 2015 the NCI-REB presented Dr. Stovall with an award in appreciation of more than 30 years of research on the late effects of radiation exposure.

Over her professional career, Dr. Stovall authored or contributed to nearly 300 peer-reviewed scientific papers, which have been cited over 35,000 times. Throughout her career, Dr. Stovall was an active member of the American Association of Physicists in Medicine for over 55 years (1960-2017), being awarded Fellow in 1997 and the Marvin M. D. Williams Professional Achievement Award for an eminent career in medical physics with an emphasis on clinical medical physics in 2007. Additionally, in 2013 she was awarded one of the AAPM's highest honors, the Edith H. Quimby Lifetime Achievement Award, for her contributions to the field and the association. In her own words, Marilyn reflected on her career and research in an AAPM History Interview(https://www.aapm.org/org/history/InterviewVideo.asp?i=146).

During the mid-1960's, Dr. Stovall spent two years on sabbatical as a Medical Section Officer at the International Atomic Energy Agency in Vienna, Austria. This experience was not only professionally formative and rewarding to her but was also the beginning of her passion for world travel. She was a lifelong traveler who loved exploring and hiking the world and was especially fond of visiting Switzerland and Ethiopia. One of Marilyn's favorite non-work pastimes was reading both non-fiction and fiction novels and she was especially fond of zombie vampire storylines. She also enjoyed puzzle building, especially the hard thousands of pieces puzzles.

Shared Memories from Colleagues, Collaborators, and Friends

Radhe Mohan, MD Anderson, Radiation Physics Department Chair during Marilyn Stovall's Tenure

I really admired Marilyn for refreshing outspokenness, honesty, and decency. She also had a great sense of humor. I came to know of her early in my medical physics career when I was at Memorial Sloan Kettering Cancer Center for her seminal work on brachytherapy dose calculation algorithm. During my tenure as Chair of Radiation Physics here at MDACC, she very ably led the nationwide Radiation Dosimetry Service and played important roles through her work in radiation-induced late effects, including secondary cancers.

Geoffrey Ibbott, MD Anderson, Radiation Physics Department Chair during Marilyn Stovall's Tenure

The profession, and indeed, the world, has lost one of the great pioneers in radiation physics and biology, and epidemiology. Marilyn's work, over the 65 years she spent at MDA, constitutes a formidable body of work and support of radiation oncology. She leaves behind a legacy that will be felt for many years to come.

During the very early part of my career, at the University of Colorado, commercial treatment planning systems weren't available, and I developed an interest in programming. I had written programs for external beam calculations and was next tasked with developing a brachytherapy program. A phenomenal source of guidance and data was a series of articles written by Marilyn, with Bob Shalek, and to my surprise she answered promptly and in great detail when I wrote to her with questions. Without the articles and her help, my project would have been far more difficult. It was therefore a huge honor when I got to meet her a couple of years later.

When I moved to MD Anderson, I took Will Hanson's position as Chief of Outreach Physics and became Marilyn's boss. We worked well together; Marilyn needed little from me other than occasional support. She and her Radiation Dosimetry Service team provided dosimetry assurance to many institutions, and on occasion found and resolved calibration errors that might have injured patients. The Late Effects Group made much research into long-term studies of radiation damage possible and contributed to the publications for many cancer cohorts.

Gregory T. Armstrong, St. Jude Children's Research Hospital, CCSS Principal Investigator

Legend, Leader, and Laughter are three of the things I have thought about while reflecting on Marilyn and her life's work today. Thankful for all she did that put CCSS on a strong foundation for success.

Leslie (Les) Robison, St. Jude Children's Research Hospital, former CCSS Principal Investigator

I am incredibly grateful to have known and worked with her over the past 30 years. Indeed, she leaves a remarkable imprint on the field of cancer survivorship research.

Kiri Ness, St. Jude Children's Research Hospital, St. Jude Lifetime and CCSS Collaborator

Marilyn was a true force and a great leader. She always made me stop and really think. She leaves a great Legacy!

Joseph Neglia, University of Minnesota, CCSS Collaborator

Marilyn's contributions to CCSS would be hard to overstate. And she was a bit of a character. We will miss her.

Tara Henderson, University of Chicago, CCSS Collaborator

I have learned so much about survivorship research from Marilyn since I was a fellow looking at phantoms with her. I was always in awe listening to her critiques of survivorship proposals on publication committee calls. She will be missed. She passed us an amazing legacy.

Jean M. Tersak, Children's Hospital of Pittsburgh, CCSS Collaborator

It is truly an honor and privilege. Her contributions will impact the field far beyond her lifetime. May she rest in peace for her goodness in her lifetime in the field.

Charles Sklar, Memorial Sloan Kettering Cancer Center, CCSS Collaborator

She was a true pioneer, a remarkable and unique individual and a valued colleague and collaborator. Fearless, and at times prickly, but always in pursuit of the best path forward. And yes, she had a wonderful, dry sense of humor. She will be greatly missed.

Yutaka Yasui, St. Jude Children's Research Hospital, St. Jude Lifetime and CCSS Collaborator

I have very fond memories of Marilyn through CCSS, especially her astute remarks in meetings.

Flora Van Leeuwen Netherlands Cancer Institute (NKI), Dutch Childhood Oncology Group

Marilyn enjoyed meeting new people and was very much interested in my problems with starting up late effects research in the Netherlands Cancer Institute. I remember how encouraging she was! In the 1990s she started doing our dosimetry for the lung cancer and breast cancer after HL studies and we never stopped collaborating on something after that. She was a true pioneer, a historian regarding radiation treatment, a great scientist and a remarkable woman. I feel privileged to have known her.

Cecile Ronkers, PhD, DCOG Collaborator, Past-NCI/REB Collaborator

Remembering very fondly this remarkable strong-willed and at time brilliant lady with the wonderful accent and dry humor who was part of my research journey in the radiation sciences from the first year of my PhD project. I can hear her laugh in my imagination as I write this Email - we probably last met at a CCSS meeting. Also, I think she was one of the first radiation physicists actively involved in multi-disciplinary late effects research in the medical setting (radiologic, RT) alongside epidemiologists, clinicians and other disciplines.

My favorite is a teleconference between her team at MD Anderson and NCI-REB in the early 2000s, when we were working together intensely on the CCSS subsequent thyroid cancer nested case control study, (successfully lead by Alice Sigurdsson, that resulted in two important papers in Lancet and Radiation Research) and I had the idea to tag on another CCSS Application of Intent, to expand those analyses. And we kind of discovered together, during that meeting really, that the dose reconstruction efforts at MDA across several case control studies were by then sufficiently advanced to plan the first CCSS cohort-wide analysis of radiation exposure and a late effect, the ideas which were later implemented by Parveen Bhatti and Lene Veiga, in their respective cohort papers on subsequent thyroid cancer. That was such an awesome moment!

Hans Storm, Denmark Cancer Registry, Late Effects Study Group

I have so many good memories from the collaboration and friendship with Marylin professional and private. She even had me share her private address in the 1980's as this was the only option to get and collect bonus miles on US airlines. I still remember with joy the days I had with her and her team at MD Anderson learning about the phantoms and dose estimation - in fact the photos I took then is on the opening page for my work-related photographs.

John Boice, Vanderbilt University, President of the National Council on Radiation Protection and Measurements, and former NCI/REB Director

It seems I've always known Marilyn; we're both from Texas and we published together for over five decades! She was calm and confident as we tackled the arising problems of incorporating radiation treatment plans into radiation epidemiologic investigations. She was brilliant and benevolent always giving others credit and always innovative in accomplishing seemingly impossible tasks. For example, in the 1980s we needed precise organ doses for over ten thousand cervical cancer patients treated within 19 population-based cancer registries or in 20 oncology clinics in 14 countries! "John, are you crazy?" And then she and the MD Anderson team came through, as she did for studies of childhood cancer (LESG and CCSS), breast cancer (WECARE), malignant and benign diseases (Radiation Epidemiology Branch), the genetic consequences of cancer therapy (Vanderbilt) and so many more. She was fun to be around with her infectious smile and impish charm!

Marilyn was a single-name phenomenon --- just "Marilyn" – similar to "Michael" of basketball or "Madonna" of music – we all knew who she was. Marilyn quietly but forcefully applied her skills in medical physics and patient dosimetry into the expanding discipline of radiation epidemiology, making unparalleled contributions, often behind the scenes, to our quantitative understanding of how radiation causes cancer in women and men. In her Failla lecture (Radiation Research Society) she mentioned processing over 100,000 patient records in 350 individual clinics, the first being in 1916 at the Radiumhemmet (now Karolinska, Sweden)! Marilyn was humble (perhaps to the extreme), gracious (giving more credit to others than they might deserve), trustworthy (she always got the job done), and firmly yet unobtrusively at one with the Lord (her faith was complete with serving and helping others). My family and I miss the marvelous Marilyn, recalling years together and recognizing that her legacy

Lindsay Morton, NCI/REB Director

I began researching radiotherapy-related second cancers in 2008 when I became an Investigator in the Radiation Epidemiology Branch (REB), Division of Cancer Epidemiology and Genetics, which is part of the Intramural Research Program of the National Cancer Institute (NCI). Marilyn was one of the first external collaborators I worked with – and I quickly realized that I was inheriting a generation's worth of scientific advances, collaboration, and friendship. Marilyn first began collaborating with REB around 1980 with the expansion of our Division's research on the adverse effects of cancer treatments and her establishment of the MD Anderson Late Effects Group. Working with John Boice, Peggy Tucker, Bob Hoover, Joe Fraumeni, Rochelle Curtis, Elaine Ron, and others, the resulting collaborations produced countless seminal papers that helped lay the foundation of this important research field. Marilyn consistently led outstanding teams in the reconstruction of doses to affected organs, developing deep expertise in radiotherapy treatments and records from around the world. These studies, with quantification of radiation dose-related adverse effects, directly impacted efforts to reduce treatment toxicity for cancer patients and provided a model for late effects research and collaboration that continues between our research groups and around the world today. Marilyn shaped these collaborations with her unique style: she was quick witted, determined, thoughtful, and full of laughter. Her scientific contributions are immeasurable, and her dedication to collaboration, teaching, and improving the lives of cancer patients has created an enduring legacy. On behalf of our team at the NCI, I send our condolences to her family and all of her colleagues as well as our gratitude for the opportunities to work with a true pioneer.

Diane Fuchs, WESTAT (data coordinator) and NCI/REB Studies Collaborator

Reading her obituary brought back so many wonderful memories. We had many good years together; we did good work!

Jonine Bernstein, Memorial Sloan Kettering Cancer Center, WECARE Study Principal Investigator

There are no words to express the sadness of Marilyns passing. She was a dedicated and brilliant scientist, a terrific and generous colleague, and a loving and witty friend. Querky and spirited- she always feared getting to the airport late- so she'd arrive 3 hours early. She loved the scent of lavender, and relished anything with it. Her work gave her such pride and joy, and she made sure that she was understood and that her work was as perfect as can be. She made us all better scientists and collaborators. I loved working with her and her work on our WECARE Study remains a testament to her devotion to her work. She will be sorely missed by all of us lucky to have known her. May her memory be a blessing.

Meghan Woods, Memorial Sloan Kettering Cancer Center, WECARE Study Collaborator

Dr. Stovall left an incredible mark on the radiation research world. Marilyn and Susan Smith contributed as a dynamic duo to the WECARE Study. I always appreciated Dr. Stovall's humor and candor- it was a good thing she was a 'straight-shooter', as I remember her telling me years ago that she drove a pick-up truck with a gun rack mounted on the back - I really wish I could remember how that came up in conversation over dinner at a WECARE meeting in New York City.

Chuck Lynch, Iowa Cancer Registry Principal Investigator and WECARE Study Collaborator

As Principal Investigator of the Iowa Cancer Registry, my research team collaborated with other population-based cancer registries in the United States, Canada, and Scandinavian countries on research projects involving cohorts of people who received radiation treatment for a first cancer to evaluate the impact of that treatment on development of a second cancer. For over three decades these projects occurred and involved first cancers of the ovary, bladder, testis, or breast, as well as Hodgkin disease and non-Hodgkin lymphoma. Initially, these projects were led by researchers as the Radiation Epidemiology Branch of the National Cancer Institute and, more recently, in the WECARE Study. Marilyn led her team requesting detailed radiation treatment data from the registries that involved review and abstraction of medical record data that they worked with to provide dose measurements of the radiation to other tissues and organs that extended beyond the first cancer site. These measurements added greatly to the data quality and quantity to evaluate the role of radiation in occurrence of the second cancer. In her role, Marilyn provided expert knowledge and diligence. It was an honor for me to collaborate with Marilyn. May she, most deservedly, rest in peace.

Diane Fuchs, WESTAT (data coordinator) and NCI/ REB Studies Collaborator

I'm sad to learn of Marilyn Stovall's passing. Reading her obituary brought back so many wonderful memories. I was very fond of her. We had many good years together; we did good work!

Remembrances from the MD Anderson RDS Team

Rita Weathers, RDS Data Integration Developer

As a supervisor and mentor Marilyn provided opportunity for many people to continue their pursuits in the radiation physics field and other fields of their choosing. People who worked for her or who were her students over the years moved on to become department leaders, dosimetrists, nurses, medical physicists, study managers and teachers. She thrived in the male dominated medical physics and radiation epidemiology worlds – making her own path. I was recruited by a classmate who was leaving Marilyn to start a career as a teacher, I was fresh off an interview with an petroleum-engineering firm where I was told part of the duties of the programmer position included backing up the receptionist and making coffee – a reality check – always glad I didn't take that job since the energy industry had a downturn shortly after. Marilyn did not list those tasks in the job interview - I was all in. There were times Marilyn made promises that seemed a stretch but with her guidance, support and can-do attitude, we made things happen. We never knew what new adventure she would bring back from international meetings such as identifying and collecting information on all radiation therapy facilities in the western hemisphere or abstracting data from records in languages we did not know. Marilyn worked her entire career at MD Anderson with early years in direct patient care, planning and assisting with patient treatments. Her reach was international and crossed many paths including radiation safety in medicine, occupational safety and assisting in estimating exposures from radiation accidents. Decades later I'm still hooked due to Marilyn's vision, infectious enthusiasm and in her trust in the team.

Marilyn frequently said her knowledge was broad but shallow. It was deep in many areas. She was a student of history, religion, art, nature photography and literature. She could converse on any topic. I did not share all of her interests, and I found her full of surprises. I could not see her watching "The Simpsons", reading romance novels or gory murder mysteries. To this day I can't get the images out of my head from a murder mystery she loaned me during a long flight delay – I had to finish it to be certain the perpetrator was caught.

When we visited the hospital for meetings, Marilyn would make a point to greet patients in the elevator to let them know they were seen. She enjoyed playing the role of elevator operator and made sure everyone had a pleasant trip. No job was too small, and she understood that it took the entire team to get the job done. In the workplace, she made a point to greet and thank the housekeeping crew or food service team or her newest employees. I'm certain she did the same in her personal life. I am a better person for having had Marilyn in my life.

Susan Smith, RDS Associate Lab Director

While my college training taught me science, working with Marilyn taught me how to apply science to make a difference in patients' lives. She was my first "professional" boss and I called her "Boss" for most of our 34 years working together; to which she would humorously retort back," Yes, and don't forget it!" We started our first studies together without personal computers, email, zoom or electronic data transfer, but we did real life science experiments measuring radiation doses. Marilyn's drive, ability to think logically outside the box, quick wit, and admirable grit were instrumental in getting the field of radiation late effects off the ground. She was never afraid of asking the hard questions, admitting she did not know the answer, to motivate her colleagues to search deeper. or warehouse under various weather conditions). To say the least, we often had a hard time keeping up with her as she brought back lots of work with her!

Marilyn's interests were varied and wide – she read books on so many topics (photography, art, science, diseases, romance, non-fiction, cooking) and even gave several books to my son, when she found out he had a love of history like she did and her bookshelf at home was full. She was a word-smith and a grammar queen (to say the least my grammar improved under her tenure!). Marilyn had a special interest in the epidemiology of viruses and bacteria; she always said it would not be another world war that would destroy people on Earth, but it would be an unknown virus or bacteria (recent pandemic is an excellent example of her forward thinking). Marilyn had a fascination for bugs and even owned a tarantula as a pet for many years. Since tarantulas do not need to eat often, this kind of pet suited her traveling lifestyle. Marilyn will be missed for so many attributes, but what I will miss the most is the humor and laughter she would bring to any situation, even dull, dry, physics lectures. I consider myself so lucky to have learned from the best!

Rebecca Howell (RDS Director, 2015-present)

I'm writing my remembrance last, and after reading all of the wonderfully heartfelt memories, I have been brought to tears (in the best way)…..

"Marilyn" an inspiring woman who needs no last name when spoken within our community. She was among, if not the first, female physicists in our field. Early in her career she changed the course of clinical physics and led the way in developing methods for dose calculation, computerized dose calculation, treatment planning, quality assurance, and peer review. Later in her career, she was a key contributor to paradigm shifting studies of late effects among long-term cancer survivors. I am struck by how much cancer survival improved over her career and thereby making possible the questions that drove Marilyn's research.

I came to know Marilyn by an old-fashioned communication method. Via -telephone, I "cold called" her, explaining that I was a new junior faculty member at MD Anderson, interested in working and learning from her. Fortunately, she invited me to visit her at the RDS. She was full of energy and research ideas. I was immediately hooked, but it was some time before I was doing research with her. She believed in bottom-up training, which is a method I came to respect and appreciate. I coded hundreds of CCSS records, which immersed me in historic radiotherapy data and gave me a clear understanding of the challenges and puzzle assembly inherent in retrospective organ dose reconstruction for late effects studies. In the decade since she retired, I have worked alongside Susan Smith and Rita Weathers to translate and expand this knowledge into understanding, quantifying, and mitigating late effects among more contemporary survivors. Marilyn was the sponsor who changed the trajectory of my career. Marilyn was calm under fire, always had a good story to tell, fiercely protected her team, and had an unparalleled wit. I loved sitting in the recliner in her office, hearing about the various vampire zombie novels she was reading and TV shows that she liked, which I'd never imagined her watching, like Two and a Half Men and the Simpsons. I smile when I think about Marilyn and I'm incredibly grateful that she allowed me into her world.

Marilyn Stovall, photo taken near the time of her Retirement in 2015

See you next year!