Medical Physics Alumni NEWSLETTER

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

SUMMER 2023| VOLUME 17

Medical Physics Program Leadership

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Program Director Report

Introduction

I began my role as Program Director on September 1, 2022, a role held by Richard “Bud” Wendt III, from 2012 to 2022. Kyle Jones also began his term as Deputy Director this fall. This leadership transition occurred as part of our normal program leadership elections, which occur every three years. It is common for a program director to serve multiple terms, allowing program stability, but also giving our faculty a regular voice in selecting the program leadership, which includes the Program Director, Deputy-director, Director of Admissions, and Steering Committee.

As I reflect on the past 10 months, there has been considerable change, including the Director, Deputy-Director, Program Coordinator, and our administrative offices moving from Imaging Physics to Radiation Physics. However, the fundamental elements that make our program among the very best have remained constant. This includes our faculty, students, and of course the strong support from the chairs of both Imaging Physics and Radiation Physics, Drs. John Hazle and Mary Martel.

I also note that among the changes, I am the first woman at the helm since the inception of our program in the early 1960s. It is not lost on me that my leadership role comes at a time that coincides with unique challenges that may make it increasingly difficult to recruit a diverse student body. It is among my top priorities to maintain an inclusive environment for our students and future students.

Student Success

Our students and alumni are the cornerstone of our program. Their successes both in graduate school and in the years and decades after graduation have shaped and will continue to define the field of medical physics. The current cohort is no exception to our legacy, and they are featured throughout the newsletter, including a listing of fellowships, honors, and awards bestowed on them.

This academic year (Fall 2022 and Spring 2023 semesters), nine PhD students and one SMS student graduated. Their dissertation and thesis abstracts as well as commencement photos (for those that attended) are included in this newsletter. An additional five students defended their doctorate research this summer. Their dissertation abstracts and commencement photos will be included in the 2024 newsletter.

Curriculum and Faculty

There have been no changes to the curriculum in the past year. I’m happy to report that we’ve returned to an in-person classroom format. However, as an educational resource, we support virtual attendance in most classes.

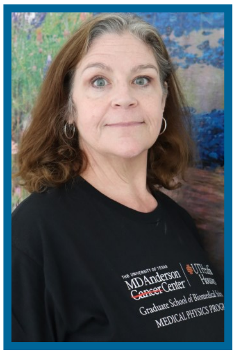
Our courses continue to be primarily taught by outstanding faculty from our Imaging and Radiation Physics Departments. We also have strong faculty representation from the Departments of Cancer Systems Imaging, Biostatistics, Radiation Oncology, and Radiology. Our faculty now totals 91 with 54 full members and 37 associate members. I would like to express my extreme gratitude to each and every faculty member for sharing their expertise and their time both teaching and mentoring our students. Many of our faculty also serve in the role of laboratory principal investigators (PI) and directly mentor our students. Many of them shared photos of their teams with me, which I’ve included in the newsletter.

Student Council

I’d like to give a huge shout-out to Barbara Marquez and Skyler Gay, our Student-Faculty Liaisons, for their extraordinary level of commitment to our program and their student colleagues. They were particularly helpful as I organized the orientation week activities for our incoming students. Their assistance in those early weeks cannot be underscored, for which I am very grateful. I would also like to acknowledge Hanna Baroudi for organizing several team-building and social events throughout the year. Her efforts helped our community of students to bond during this first year back on campus (post-pandemic). I also acknowledge Aashish Gupta for leading a successful student-to-student mentor program, which pairs incoming students with more senior students to help them acclimate to graduate school and Houston life. Each of them has contributed a report for this newsletter.

Program Director Report (Cont.)

Welcome Lisa Echeverry



Join me in welcoming our new Program Coordinator, Lisa Echeverry. She joined our team September 1, 2022. She holds a Bachelors of Arts in Healthcare Administration, with a minor in Organizational Management. She came to us with 27 years of experience at MD Anderson bringing a wealth of knowledge.

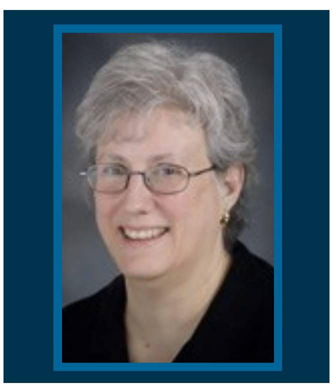
Lisa has quickly become my right-hand woman, handling essential and complicated administrative matters. I would like to express my deep appreciation to Lisa for diving-in to her new role and bringing enthusiasm to each day. I am also incredibly grateful for how she cares for our students and their wellbeing.

Acknowledgements

Imaging and Radiation Physics Department Chairs

I would like to thank our Imaging Physics and Radiation Physics Department Chairs, Drs. John Hazle and Mary Martel for their high levels of support and engagement. I would also like to thank them for generously supporting the 2023 Alumni Event, which will be held on July 23 during the AAPM Annual Meeting.

John Hazle, PhD
Chair, Imaging Physics



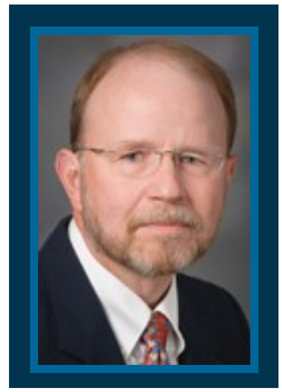
Mary Martel
Chair, Radiation Physics

Imaging and Radiation Physics Administrators

I would like to express my gratitude to our former Program Manager, Jeannette McGee, and Program Coordinator, Trenae Kyles (from the Imaging Physics Department), for their assistance throughout this year as Lisa and I "learned the ropes".

I am also deeply grateful to the Radiation Physics Department Administrator, Jason Thomas, Associate Administrator, Jose Alanez, Operations Manager, Dana Garrison, and Program Manager Melvina Kimble-Hackett for assisting us in many times in so many ways throughout this year.

Thank You to Richard "Bud" E. Wendt, III, PhD



Bud served three terms as Program Director before passing the baton. He remains an active member of our faculty and has continued his role as Course Director for Medical Physics IV: The Physics of Nuclear Medicine.

I am grateful to Bud for his nine years of service to our program in the role of Program Director and his mentorship of our students. He has been a role model and a mentor to me in my role as deputy-director and continues to advise me in my new role as Director. Bud has been a wonderfully generous with his time and passing on his knowledge as I navigated through my first year as Program Director.

Sincerely, Rebecca M. Howell

PLEASE DONATE 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.

Donations can be made either online or by check, details on page 57.

Deputy Director Report

Bereft of any original ideas of my own, I find myself drawn to comment on an aspect of our program that makes me very proud. I believe this aspect to be the product of the deep devotion of our program directors and program coordinators and the nature of the students we attract to and admit to our program.

I'm talking about the sense of community I always feel when I am around our students. In the classroom, in seminars, and everywhere in between, I am filled with the sense that our students, faculty, and program administration ***really care*** about one another. Those who read this newsletter will undoubtedly feel this too. Sure, caring takes on formal manifestations such as the student mentoring program. Beyond these formal manifestations, though, it permeates our program. I hear it in the halls, across from my office, while waiting for our program photographs to be taken. Within labs, across labs, in carefully curated study guides passed down from year to year, in student social programs and sports, in the hallways, and everywhere else.

This sense of community extends out into the world beyond the Texas Medical Center, carried by our alumni and the amazing work they do for patients everywhere. We all have the pleasure to revel in it for a brief time during our annual Alumni Reception at AAPM, to experience that sense of community very intensely for a few hours each year, energizing us for the year ahead. A blurring of professional and personal fulfillment, the sense that you will from now on be part of something much bigger than yourself.

So thank you Bud, Rebecca, Lisa, our students, and our alumni for fostering and nurturing this sense of community we enjoy. We have something really special here. So what ever it is y'all are doing, keep on doing it.

A. Kyle Jones

Meet the Student Council

Incoming 2023- 2024 Student Council

Skyler Gay
Student Faculty Liaison

Brandon Reber
Education Chair

Collin Harlan
Networking Liaison

Taylor Meyers
First Year Student Liaison

2022- 2023 Student Council

Barbara Marquez
Co-Student Faculty Liaison

Skyler Gay
Co-Student Faculty Liaison

Kai Huang
Education Chair

Aashish Gupta
First Year Student Liaison

These students have dedicated their time, effort, and enthusiasm to enhancing the student experience and making our program better.

Hana Baroudi
Social Liaison

Student Council Report

Barbara Marquez and Skyler Gay
Student Faculty Liaisons

A warm greeting to all readers of the 2022-2023 medical physics alumni newsletter! We are thrilled to report on another fantastic year at the Texas Medical Center.

This year's student council was co-led by Barbara Marquez and Skylar Gay (student-faculty liaisons) and an amazing team of liaisons: Kai Huang (education), Aashish Gupta (first-year experience), and Hana Baroudi (networking, formally known as social). Our year was filled with fun and educational events that our medical physics students took full advantage of.

Last summer we had the pleasure of being visited by Dr. Titania Juang, Assistant Professor and Assistant Vice chair of the University of California San Diego Department of Radiation Medicine and Applied Sciences. Barbara Marquez organized a day-long session at the Shell Energy Stadium -- home of the Houston Dynamo and Dash FC -- in which Dr. Juang led sessions on interview preparation for residency and beyond. Students enjoyed meals and snacks at the stadium while participating in interactive workshops, followed by watching the Dash take on Racing Louisville! During break, Barbara and Kai took Dr. Juang to their favorite dessert spot, Tiny's Milk & Cookies, for a Houston special treat.

We kicked off the 2022-2023 year with a "welcome back" social lead by Dr. Howell at King's Bierhaus for new students to meet current faculty and students before the start of classes. The fun continued with a Picnic & Theater at the Park lead by Hana Baroudi in which students enjoyed dinner boxes and the performance "Asia to the World" at Miller Outdoor Theater, Hermann Park. Aashish Gupta connected first-years to their senior student buddies via the Mentorship Program, fostering conversations and check-ins through several luncheons. The program benefitted from mentorship as well with visiting alumni seminars from Dr. Mark Newpower (fall) and Dr. Adam Riegel (spring). Thank you to Dr. Howell, Barbara Marquez, and Joseph DeCunha for organizing these sessions.

During the academic year, Kai Huang hosted a candidacy information session and led several practice sessions in which students preparing for their candidacy exam could give a mock presentation to a focus group of pre- and post-candidacy students who provided substantial feedback. Kai also worked with Aashish to host several mid-terms and finals prep sessions for first-year classes. Thank you to Skylar Gay, Daniel el Basha, Xinru Chen, Jian Ming Teo, and Madison Grayson for your mentorship and support in leading exam review sessions! Barbara and Aashish made sure there were breaks to the academic grind by organizing volleyball tournaments with the other GSBS programs in friendly competitive spirit. The competition ensued at the Fall Halloween-themed Student-Directors meeting where Fre'Etta Brooks, Daniel el Basha, and Henry Meyer + Hayden Scott took home gold, silver, and bronze in their costumes.

New this year: Dr. Howell hosted a virtual open-house for students applying to the medical physics program, supported by student council. We were very pleased to see many of these virtual faces at in-person interviews with GSBS in the spring.

We ended the Fall 2022 semester with a holiday cheer party at Dr. Howell's house, mingling between students and faculty. Thank you to Dr. Howell for hosting us in your beautiful home and Lisa Echeverry for preparing such wonderful student gifts!

We began January 2023 strong with an abstract how-to session from Kai to the first-year students who were preparing their first abstracts. Meanwhile, Barbara brought the GSBS offices of Student Financial Services, UTHealth Houston Benefits, and Tax office to give a 2-part informational session on student financial resources, internal fellowships and scholarships, loans, tax forms, and more to get ahead of student finances and goal-setting in 2023. Students got a break from abstract season with a wonderful Valentine's Day luncheon organized by Hana, which provided goodies and allowed students to write notes of appreciation to their advisors and classmates.

They also didn't have to wait for Halloween to dress up again, as Science Night called for the junior medical physicists to dress up to teach concepts of radiation detection and radioactivity to young children.

Student Faculty Liaison Report (cont.)

Thank you to Hana for organizing the medical physics table this year and Natalie West, Zeph Kaffey, and Rebecca Lim for pulling up in their artistically designed Mystery Van!

The spring semester culminated in March Madness brackets and residency interview panel experiences organized by Hana Baroudi and the handful of wonderful 2023 graduates from our program. Being one of the largest graduating classes, our students were able to benefit from a diverse storytelling of residency interviews and outcomes. A big congratulations and thank you to Sharbacha Edward, Yulun He, Soleil Hernandez, Kai Huang, Mary Gronberg, Kelly Nealon, Suman Shrestha, Cenji Yu, and Yao Zhao for providing your perspectives on your experience and making it to the next stage of your career! We also want to congratulate Hayden Scott on his completion of the SMS program and continuation to the PhD!

This academic year, the council along with the new program director, Dr. Howell, and our new program coordinator, Lisa Echeverry, were able to accomplish a successful suite of activities that fostered a flourishing academic and social environment for the medical physics graduate program. We want to thank Dr. Howell and Lisa for trailblazing the program's new directions and initiatives, and for their unrelenting support in the busiest and toughest of times. We continue to be grateful for Dr. Wendt's mentorship in transitioning leadership and continued support of medical physics program activities and endeavors.

This was undeniably a very eventful 2022-2023 We also want to shout out the 2022 first-year class for being present and involved in all program activities, from the mentorship program to the sports tournaments and supporting new students at the interview weekends and virtual open house. As the first class to enter GSBS fully in-person since 2019, we are very grateful to see them take full advantage of the program's resources and activities.

On behalf of the student council, it has been an honor to serve the 2022-2023 academic year and work alongside such wonderful program leadership. As Dr. Wendt would say, "bye for now!"

Barbara Marquez and Skyler Gay

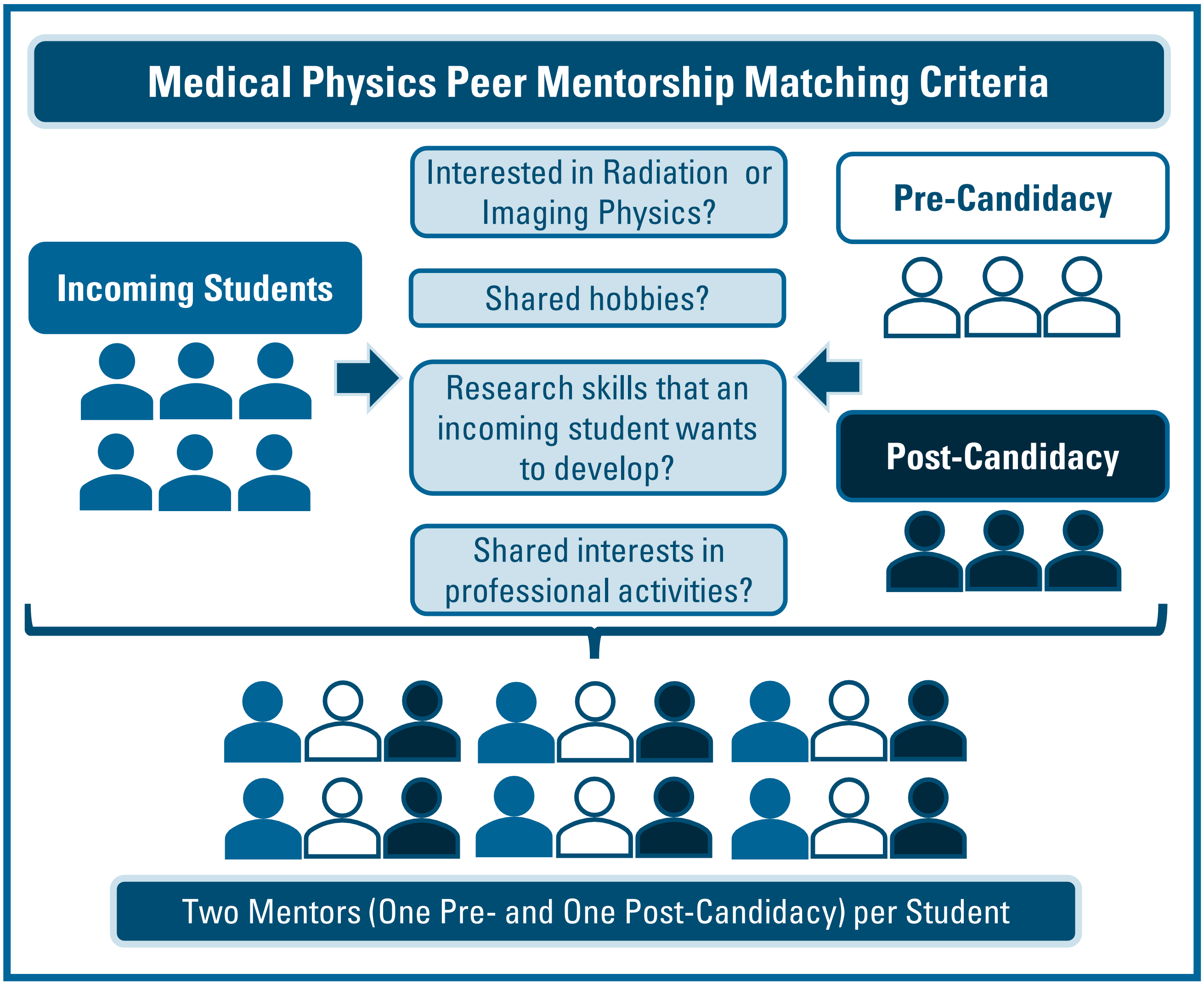
2022 Research Retreat with Invited Faculty, Dr. Titania Juang, University of California San Diego

First-year Student Liaison Report

Report from Aashish Gupta

The First Year Liaison (FYL) is dedicated to serving the needs of incoming first-year students in our program and play a crucial role in ensuring a smooth transition for these students, both academically and non-academically, as they join our program in Houston. To provide comprehensive support, the FYL implements a Peer-Mentorship program. This initiative pairs each incoming student with a current student mentor who can offer guidance in both academic and non-academic aspects of student life. Whether it's exam preparation or navigating life in H-town, the mentors act as buddies and a valuable source of information for their assigned mentees. *Aashish Gupta*

The criteria depicted in the figure below are used to carefully match incoming students with suitable mentors.



Throughout the academic year, the FYL organizes two luncheons, one in the fall and one in the spring semester. These luncheons serve as an opportunity for mentors and mentees to connect and discuss the mentees' experiences in the program. Additionally, the FYL organizes various educational activities and encourages participation in team building through participation in extra-curricular activities.

First-year Student Liaison Report (cont.)

Other Educational Activities: Constance Owens (presenter), Hana Baroudi (presenter) and Aashish Gupta (moderator) conducted an AAPM abstract writing session where they explained tips and tricks for submitting a strong abstract. At the end, first-year students were offered the opportunity to be assigned to a senior student who would review their abstract, upon request.

Team Building Experiences through Extra-Curricular Activities: To foster teamwork skills among first-year students and promote friendship within and outside the medical physics program, we organized various sports-related activities. These activities involved students working together to develop strategies and achieve a common goal: victory! *Our team, The Beam Hardeners,* actively participated in the TMC Softball league, Student Inter-council Volleyball league, and the 2023 Spartan Race, as depicted in the highlighted pictures below. Notably, The Beam Hardeners made it to the playoffs in the TMC Softball league, marking the first time a team with a majority of new students has qualified for the playoffs in our program's history.

Two first-year students share their experiences in the Peer Mentorship Program:

Taylor Meyers: My first year at MD Anderson as a Medical Physics PhD student has been a very exciting and rewarding process. Coming in with a master's degree from another CAMPEP accredited program allowed me to waive several courses, giving me the opportunity to get a jump start in finding the perfect lab and focus on my research project. Both the students and faculty have been extremely welcoming, making the transition into this next step of my career an easy one. Working for Dr. Howell and the Late Effects research group this year has provided me with many opportunities to learn and grow as a researcher, collaborate with amazing professionals around the world, and get involved with a research project that will have a lasting impact on the field of medical physics and radiation therapy.

Henry Meyer: The transition from undergraduate to graduate school, for me, was a very significant point in my life. Before officially beginning my time in the medical physics program, I had to move across the country, away from my friends and family to a place where I had not been for more than 48 hours before. Shortly after moving, I had to orient myself and begin navigating graduate school. The peer mentorship program provided a great way to form connections with those who had already gone through this process, providing much needed support in the process of beginning graduate school. My peer mentor has served as an excellent role model, wonderful collaborator, and great friend throughout my time in the medical physics program.

Networking Liaison Report

Report from Hana Baroudi, Networking Liaison

As a networking liaison for this year's student council, I aimed to not only find ways for us to have fun and detach from our busy work lives but I also wanted to create experiences that bring us together and create lasting memories and friendships. It is true that "Friends that you make in graduate school are friends you make for life". I've included highlights from some of our events from the past year. *Hana Baroudi*

Picnic in the Park Event

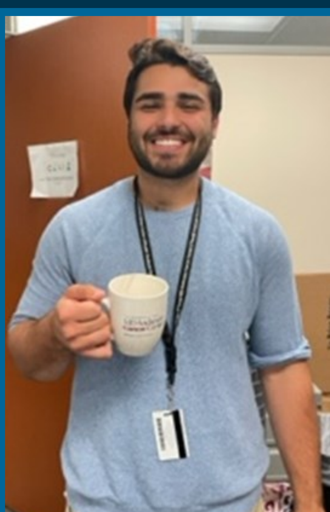
Valentine's Day Lunch: On Valentine's Day, the students got together for a lunch where they participated in a trivia competition, gave out encouraging cards to each other, and enjoyed a delicious build-your-own pasta station!

Networking Liaison Report (cont.)

Community Outreach Science Night:

The Medical Physics students came together under the leadership of Dr. Julianne Pollard-Larkin and Hana Baroudi to participate in the GSBS community outreach group where kids from the ages of 4-12 come to learn about science in a fun way. The Med Phys table was a huge success with conductive play-doh, dry ice experiments, and even a radioactive (but safe) Fiestaware cup!

Residency Interview Experience Panel Discussion:: A group of students that had recently gone through residency interviewing within and outside of the match as well as a recent alumna who sits on residency interview panels have shared their tips and tricks for excelling in the application and interview process with the student body. This event was hybrid.



March Madness Bracket Competition: A virtual game where competitors set their guesses for the March Madness Basketball competition at the beginning of the season and the person with the closest results wins. Although nobody really expected the result of this season, one of our students , Benjamin Insley, had the best brackets among the competitors and won an awesome mug.

ONE-RO Olympics participation:
A group of the student body participated in this year's ONE-RO Olympics games, great fun at work!

Student Fellowships

AMERICAN ASSOCIATION OF PHYSICISTS IN MEDICINE (AAPM), RADIOLOGICAL SOCIETY OF NORTH AMERICA (RSNA) GRADUATE FELLOWSHIP
Skyler Gay | 2021-2023 | Advisor: L. Court, PhD
Kevin Liu | 2022-2023 | Advisor: E. Schueler, PhD
Lucas McCullum | 2022-2023 | Advisor: C.D. Fuller, PhD
Lian Duan | 2023-2024| Entering Student (Fall 2023)

AMERICAN LEGION AUXILIARY FELLOWSHIP
Mary Peters Gronberg | 2019-2021 | Advisor: L. Court, PhD
Shannon Hartzell | 2021-2022 | Advisor: S. Kry, PhD
Hunter Mehrens | 2022-2023| Advisor: S. Kry, PhD
Kevin Liu | 2022-2023 | Advisor: E. Schueler, PhD
Kelly Nealon| 2022-2023| Advisor: L. Court, PhD

CANCER PREVENTION RESEARCH INSTITUTE OF TEXAS (CPRIT) GRADUATE SCHOLAR TRAINING AWARD
Soleil Hernandez | 2021-2023| Advisor: L. Court PhD

CPRIT INNOVATION IN CANCER PREVENTION RESEARCH FELLOWSHIP
Joseph DeCunha | 2022-Present| Advisor: R. Mohan, PhD
Kevin Liu | 2022-Present| Advisor: E. Schueler, PhD
Barbara Marquez | 2023-Present | Advisor: L. Court, PhD

CENTER FOR CLINICAL AND TRANSLATIONAL SCIENCES TL1 PREDOCTORAL FELLOWSHIP
Mary Peters Gronberg | 2021-2022 | Advisor: L. Court, PhD

CHARLENE KOPCHICK FELLOWSHIP
Soleil Hernandez | 2021-2022 | Advisor: L. Court PhD

EDWARD F. JACKSON SCHOLARSHIP RECIPIENT
Aashish Gupta | 2018 | Advisor: R. Howell, PhD

JOHN J. KOPCHICK FELLOWSHIP
Soleil Hernandez | 2022-2023 | Advisor: L. Court PhD
Shannon Hartzell | 2021-2022 | Advisor: S. Kry, PhD

MARILYN AND FREDERICK R. LUMMIS, JR. MD, FELLOWSHIP IN BIOMEDICAL SCIENCES
Suman Shrestha | 2018-2019| Advisor: R. Howell Ph.D.

NATIONAL SCIENCE FOUNDATION (NSF) GRADUATE RESEARCH FELLOWSHIP
Daniel El Basha| 2020-Present | Advisor: L. Court, PhD

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC) POSTGRADUATE SCHOLARSHIP, DOCTORAL
Joseph DeCunha | 2022-Present | Advisor: R. Mohan, PhD

NIH F31 DIVERSITY SUPPLEMENT
Lucas McCullum | 2022-2023 | Advisor: C.D. Fuller, PhD

NIH NATIONAL CENTER FOR ADVANCING TRANSLATIONAL SCIENCES (NCATS) UT CENTER FOR CLINICAL AND TRANSLATIONAL SCIENCES (CCTS) PREDOCTORAL FELLOWSHIP
Mary Peters Gronberg | 2021-2022 | Advisor: L. Court, 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

PAULINE ALTMAN-GOLDSTEIN FOUNDATION DISCOVERY FELLOWSHIP
Aashish Gupta |2022-2023 | Advisor: K. Brock, PhD

HEALTH PHYSICS SOCIETY (HPS) DADE W. MOELLER SCHOLARSHIP
Suman Shrestha | 2022-2023 | Advisor: R. Howell Ph.D.

HPS ROBERT S. LANDAUER FELLOWSHIP
Suman Shrestha | 2020-2021 | Advisor: R. Howell PhD

ROBERT J. SHALEK GRADUATE FELLOWSHIP IN MEDICAL PHYSICS
Mary Peters Gronberg | 2016-2017| Advisor: L. Court, PhD
Allen Lopez Hernandez | 2022-2023 | Advisor: E. Schueler, PhD
Hayden Scott | 2022-2023 | Advisor: S. Kry, PhD
Diana Carrrasco | Summer 2023 | Entering Student
Derek Garcia | 2023-2024 | Advisor: K. Brock
Michael Yang | 2023-2024| Entering Student (Fall 2023)

UNIVERSITY OF TEXAS MD ANDERSON UT HEALTH GRADUATE SCHOOL OF BIOMEDICAL SCIENCES (GSBS) ENDOWMENT FELLOWSHIP
Brandon Reber | 2022-2023| Advisor: K. Brock PhD

Student Awards and Honors

AAPM EXPANDING HORIZONS TRAVEL GRANT
Suman Shrestha | 2019 | Advisor: R. Howell PhD
Kevin Liu | 2023 | Advisor: E. Schueler, PhD

AAPM IMAGING PHYSICS BLUE RIBBON POSTER AWARD IN MRI AND NUCLEAR MEDICINE
Collin Harlan | 2023 | Advisor: J. Bankson, PhD

AAPM DOSE-STREAM GRAND CHALLENGE, 2ND PLACE TEAM AWARD
Mary Peters Gronberg | 2020 | Advisor: L. Court, PhD

AAPM ELEVATOR SPEECH AWARD
Mary Peters Gronberg | 2019 | Advisor: L. Court, PhD

AAPM JOHN R. CAMERON EARLY CAREER INVESTIGATOR SYMPOSIUM AWARD
Constance Owens | 2022 (3rd place) | Advisor: R. Howell, PhD

AAPM MEDPHYS SLAM PEOPLE'S CHOICE AWARD
Mary Peters Gronberg | 2019 | Advisor: L. Court, PhD

AAPM SCIENCE COUNCIL ASSOCIATE MENTORSHIP PROGRAM (SCAMP)
Suman Shrestha | 2023-2024 | Advisor: R. Howell PhD

AMERICAN COLLEGE OF RADIOLOGY MEDICAL PHYSICS GRADUATE STUDENT SCHOLARSHIP
Suman Shrestha | 2021 | Advisor: R. Howell PhD

CHILDHOOD CANCER SURVIVOR STUDY TRAINEE CAREER DEVELOPMENT AWARD
Suman Shrestha | 2018 | Advisor: R. Howell PhD

COUNCIL ON IONIZING RADIATION MEASUREMENTS (CIRMS), STUDENT TRAVEL GRANT
Mary Peters Gronberg | 2018 | Advisor: R. Howell, PhD

EDWARD JACKSON SCHOLARSHIP
Derek Garcia | 2023 | Advisor: K. Brock, PhD

EUROPEAN SOCIETY OF THERAPEUTIC RADIATION ONCOLOGY, JACK FOWLER AWARD
Sharbacha Edward | 2022 | Advisor: S. Kry, PhD

HEALTH PHYSICS SOCIETY (HPS) TRAVEL GRANT
Suman Shrestha | 2020, 2023 | Advisor: R. Howell 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 SOCIETY FOR MAGNETIC RESONANCE IN MEDICINE (ISMRM) 2023 EDUCATIONAL STIPEND AWARD
Collin Harlan | 2023 | Advisor: J. Bankson, PhD
Jian Ming Teo | 2023 | Advisor: H. Liu, PhD

JOURNAL OF APPLIED MEDICAL PHYSICS, TOP CITED ARTICLE
Hunter Mehrens | 2022 | Advisor: S. Kry, PhD

MD ANDERSON CANCER CENTER, DIVISION OF IMAGING PHYSICS TRAINEE RESEARCH DAY ORAL PRESENTATION AWARD
Collin Harlan | 2023 (1st Place) | Advisor: J. Bankson, PhD

MD ANDERSON CANCER CENTER, DEPARTMENT OF IMAGING PHYSICS PERFORMANCE AWARD
Collin Harlan | 2021 | Advisor: J. Bankson, PhD

MD ANDERSON CANCER CENTER, DEPARTMENT OF RADIATION PHYSICS BEST PAPER AWARD
Suman Shrestha | 2021 | Advisor: R. Howell PhD

MD ANDERSON UT HEALTH GSBS ELLEN TAYLOR AWARD
Sharbacha Edward | 2020 | Advisor: S. Kry, PhD
Mary Peters Gronberg | 2022 | Advisor: L. Court, PhD

MD ANDERSON UT HEALTH GSBS JESSE B. HEATH, JR. FAMILY LEGACY AWARD
Suman Shrestha | 2021-2022 | Advisor: R. Howell PhD

MD ANDERSON UT HEALTH GSBS GRADUATE RESEARCH DAY ELEVATOR SPEECH AWARD
Sharbacha Edward | 2020 | Advisor: S. Kry, PhD
Barbara Marquez | 2022 (1st place) | Advisor: L. Court, PhD
Hunter Mehrens | 2022 (finalist) | Advisor: S. Kry, PhD
Hayden Scott | 2023 (2nd place) | Advisor: S. Kry, PhD

MD ANDERSON UT HEALTH GSBS GRADUATE RESEARCH DAY ORAL PRESENTATION SKILLS AWARD
Hunter Mehrens | 2022 (1st place)| Advisor: S. Kry, PhD

MD ANDERSON UT HEALTH GSBS GRADUATE RESEARCH DAY PEOPLE'S CHOICE AWARD
Aashish Gupta | 2023 | Advisor: K. Brock, PhD
Barbara Marquez | 2021 (2nd place) | Advisor: L. Court, PhD

Student Awards and Honors

MD ANDERSON UT HEALTH ANNUAL SCIENTIFIC WRITING COMPETITION AWARD
Sharbacha Edward | 2019 | Advisor: S. Kry, PhD

MD ANDERSON UT HEALTH GSBS STUDENT TRAVEL AWARD
Aashish Gupta | 2019 | Advisor: R. Howell, PhD
Sharbacha Edward | 2019 | Advisor: S. Kry, PhD
Suman Shrestha |2018, 2020, 2022| Advisor: R. Howell PhD
Barbara Marquez | 2021 | Advisor: L. Court, PhD
Benjamin Insley |2021, 2022, 2023|Advisor: M. Salepour, PhD
Hana Baroudi | 2022, 2023 | Advisor: L. Court, PhD
Collin Harlan | 2022, 2023 | 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
Jiang Ming Teo | 2023 | Advisor: H. Liu, PhD
Natalie West | 2023 | Advisor: First Year Student
Rebecca Lim | 2023 | Advisor: First Year Student

MD ANDERSON UT HEALTH GSBS TRAINEE ENHANCEMENT AWARD
Lucas McCullum | 2023 | Advisor: C.D. Fuller, PhD
Kevin Liu | 2023 | Advisor: E. Schueler, PhD

MD ANDERSON UT HEALTH GSBS VIRTUAL CONFERENCE AWARD
Aashish Gupta | 2021| Advisor: K. Brock, PhD
Benjamin Insley | 2021| Advisor: M. Salepour, PhD
Suman Shrestha | 2021| Advisor: R. Howell PhD

NCI TRAVEL FELLOWSHIP FOR INTERNATIONAL SOCIETY OF RADIATIONEPIDEMIOLOGY AND DOSIMETRY
Suman Shrestha | 2019 | Advisor: R. Howell PhD

NATIONAL SCIENCE FOUNDATION (NSF) LIFE SCIENCE I-CORPS REGIONAL PROGRAM AWARD
Collin Harlan | 2019 | Advisor: J. Bankson, PhD

PHYSICS IN MEDICINE AND BIOLOGY, OUTSTANDING REVIEWER
Joseph DeCunha | 2022 | Advisor: R. Mohan, PhD

RADIATION RESEARCH SOCIETY SCHOLAR-IN-TRAINING TRAVEL AWARD
Kevin Liu | 2022 | Advisor: E. Schueler, PhD

RAY MEYN SCHOLARSHIP
Kevin Liu | 2021 | Advisor: E. Schueler, PhD

SYLVAN RODRIGUEZ FOUNDATION SCHOLARSHIP HONORING GEORGE M. STANCEL
Suman Shrestha | 2019 | Advisor: R. Howell PhD

SOUTHWEST AAPM EARLY CAREER INVESTIGATOR BEST ORAL PRESENTATION AWARD
Mary Peters Gronberg | 2022 (2nd place) | Advisor: L. Court, PhD

SOUTHWEST AAPM EARLY CAREER INVESTIGATOR BEST POSTER AWARD
Mary Peters Gronberg 2018 (3rd place)| Advisor: R. Howell, PhD
Aashish Gupta | 2020 (1st place) | Advisor: R. Howell PhD
Suman Shrestha | 2020 (3rd place) | Advisor: R. Howell PhD
Xinru Chen | 2023 | Advisor: J. Yang, PhD
Skyler Gay | 2023| Advisor: L. Court, PhD

SOUTHWEST AAPM MEDPHYS SLAM AWARD
Mary Peters Gronberg | 2019 | Advisor: L. Court, PhD
Suman Shrestha | 2021 (1st place) | Advisor: R. Howell PhD

Congratulations to all of our students and their advisors on their outstanding performance in securing funding and receiving awards in recognition of their research!

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.

2022 Recipient David B. Flint, PhD

Dr. Flint received this award in recognition of his PhD Dissertation research

"The Importance of DNA Repair Capacity to (and Model and Predict) Cell Radiosensitivity to Ions

Advisory committee Members:

Gabriel Sawakuchi, PhD
Asaithamby Aroumougame, PhD
Sang Hyun Cho PhD
David Grosshans MD, PhD
Radhe Mohan PhD
Simona Shaitelman MD, EdM
Jason Stafford, PhD

2001 - 2021 Award Recipients

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
2002 R. Jason Stafford, PhD
2001 Brent Parker, SMS
2000 Steven McCullough, PhD
1999 Teresa Fischer, MS

Dr. Flint's work challenged existing dogma in the field of radiation oncology that intrinsic radiosensitivity, which is closely related to DNA repair capacity, is less important for ion radiotherapy than it is for photon radiotherapy. His work demonstrates that, in fact, intrinsic radiosensitivity is no less important for ion therapy than it is for photon therapy. He also showed that while non-homologous end joining is the more important DNA repair pathway overall, its relative importance decreases with increasing ion linear energy transfer (LET). Finally, he created a model that can be used to predict, based on existing data for cells' radiosensitivity to photons, the response of cells to ion therapy.

Dr. Flint's dissertation is a fantastic and engaging read from start to finish. His bench work and data analysis represent an original and significant contribution to our knowledge of the impact of intrinsic radiosensitivity and DNA repair capacity on the response of cells to ion therapy. It is clear from his work that Dr. Flint understands these problems deeply, and he was able to critically evaluate and justify the methods he used to develop a cohesive conceptual and theoretical framework throughout his dissertation. His work has been highly cited in key journals in the field, evidence of the contribution of his work to the fields of radiation biology, medical physics, and radiation oncology.

2022 - 2023 Award Photos

2022 AAPM
Early Career Investigator
Awardee (3rd place),
Constance Owens

Xinru Chen, Devid Mar-
tinus, Ramon Salazar,
Skyler Gay, Zaphanlene
Kaffey, and Bud Wendt

2022 SWAAPM Early
Career Investigator Oral
Presentation and Poster
Finalists

2023 Texas Health Physics Society Student Presentation Awardee, Taylor Meyers

2023 Diagnostic Imaging Division Trainee Research Symposium Scholarship Awardees (left to right): Ernest Fonocho MD, Jun Hong, Seong-Woo Bae, Erin, Snoddy, Ryan Call PhD , Emily ThompsonPhD (alumni), and Collin Harlan (student)

2022 - 2023 Award Photos (cont.)

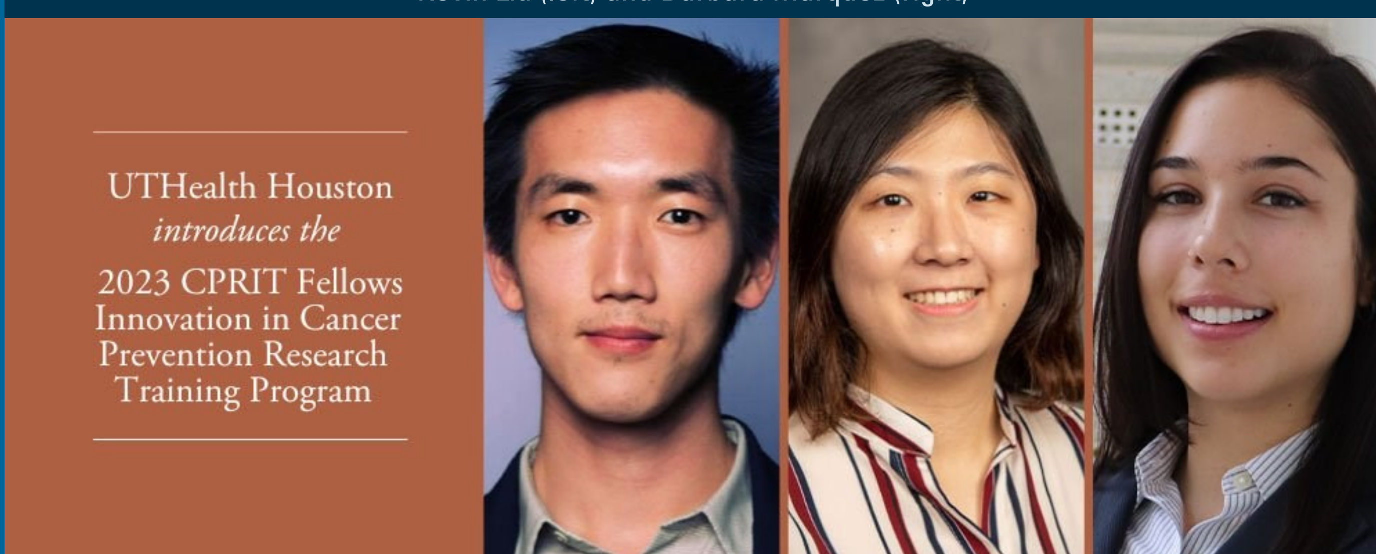
American Legion Auxiliary 2021-2022 Awardee:

Shannon Hartzell

2023 MD Anderson UT Health Graduate Student Research Day Awardees:

Hunter Mehrens, Barbara Marquez, Hayden Scott, Aashish Gupta, Erin Snoddy

2023 Cancer Prevention Institute of Texas Innovation in Cancer Prevention Fellowships, Kevin Liu (left) and Barbara Marquez (right)



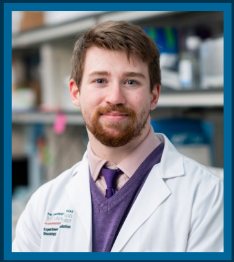
Meet the Incoming Class of 2023

Admissions
By the Numbers

104 Applications Received	**90** PhD	**14** SMS
20 Interviews Conducted	**16** PhD	**4** SMS
13 Offers Extended	**10** PhD	**3** SMS
10 Matriculating Fall 2023	**7** PhD	**2** SMS

PhD Students Matriculating in 2023

Dianna Carrasco, BS
Univ. Texas El Paso



Luke Connell, MS
Columbia University

Lian Duan, MS
Univ. of Pennsylvania

Angela Gearhardt, MS
Oklahoma University

Yeseul Kim, MS
Catholic Univ. of Korea

Androniki Mitrou, MS
Univ. Massachusetts Lowell

Hayden Scott, MS
MD Anderson UT Health

SMS Students Matriculating in 2023

Derek Garcia, BS
Sam Houston State University

Michael Yang, BS
Texas A&M Univ.

Meet the New Certificate Students

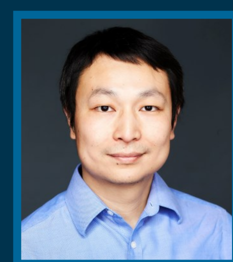
The certificate program is an important component of our graduate program and serves as an alternative pathway into the field of medical physics.

Requirements for admission to this program are a PhD either in physics or in a related discipline plus at least a minor in physics. Additionally, we require medical physics research experience at MD Anderson or UTHealth. Most of our certificate students are current or former post-doctoral fellows working with Medical Physics Program faculty.

Certificate students make-up on average 10 to 20% of our student body.

Certificate Students in 2022 & 2023

Amrit Kaphle, PhD
Physics
University of Tulsa



Liao Li, PhD
Industrial Engineering
University of Houston

Ramon Salazar, PhD
Experimental Particle Physics
University of Texas at Austin

M.S. Zoebaer, PhD
Physics
The University of Sydney

Academic Year 2023 Graduates

Graduate	Dissertation Title	Advisor	Post-Grad. Position
Fall 2022 Graduates			
Sharbacha Edward, PhD	Quantifying the Magnitude of Total Dose Deviation Caused by Various Sources of Error Among IROC Phantom Irradiation Results	Stephen F. Kry, PhD	Therapy Residency Washington University
Suman Shrestha, PhD	Infrastructure Development for Personalized Risk Prediction to Reduce Cardiovascular Disease in Childhood Cancer Survivors	Rebecca M. Howell, PhD	Post-doctoral Fellow Therapy Residency MD Anderson Cancer Ctr.
Spring 2023 Graduates			
Mary Gronberg, PhD	The Development of Artificial Intelligence-Based Tools for Expert Peer Review of Radiotherapy Treatment Plans	Laurence E. Court, PhD	Therapy Residency University of Texas Southwestern
Yulin He, PhD	Improving Dose-Response Correlations for Locally Advanced Non-Small Lung Cancer Patients Treated with Intensity Modulated Photon Therapy or Passive Scattering Proton Therapy	Kristy K. Brock, PhD Radhe Mohan, PhD	Therapy Residency University of Washington
Soleil Hernandez, PhD	Automating the Radiation Therapy Treatment Planning Process for Pediatric Patients with Medulloblastoma	Laurence E. Court, PhD	Therapy Residency University of Colorado
Kai Huang, PhD	Treatment Planning Automation for Rectal Cancer Radiotherapy	Laurence E. Court, PhD	Therapy Residency University of Maryland
Tianzhe Li, PhD	Interrogations of the Tumor Microenvironment Using Magnetic Resonance Imaging	Mark D. Pagel, PhD	Post-doctoral Fellow University of Nebraska
Kelly Nealon, PhD	The Safe and Effective Clinical Deployment of Artificial Intelligence Tools	Laurence E. Court, PhD	Instructor (ABR certified) Mass General Hospital
Hayden Scott, SMS	Extending the Lifetime of Optically Stimulated Luminescent Dosimeters for Use in Output Checks at IROC-Houston	Stephen F. Kry, PhD	PhD Program MD Anderson UT Health GSBS
Cenji Yu, PhD	Auto-segmentation in Pancreas and Liver Radiation Therapy	Laurence E. Court, PhD	Therapy Residency The Mayo Clinic

Full dissertations and thesis are available online (unless under embargo):

https://digitalcommons.library.tmc.edu/utgsbs_dissertations/

Sharbacha Edward, PhD with Dr. Julianne Pollard-Larkin, PhD

Mary Peters Gronberg PhD with Laurence E. Court, PhD

Photo credits (this page): Michael Craft

Soleil Hernandez, PhD with Laurence Court, PhD



Tianzhe Li, PhD with Mark D. Pagel, PhD



Photo credits (this page): Michael Craft

Hayden Scott, SMS with Dr. Julianne Pollard-Larkin, PhD

Photo credits Michael Craft and Dwight Andrews

Pre-ceremony Student and Faculty Huddle

Laurence Court, Mary Peters Gronberg, Hayden Scott, Sharbacha Edward, Cullen Taniguchi, Rebecca Howell, Soleil Hernandez, Wendy Woodward, and Julianne Pollard-Larkin

Dissertation Abstract

Sharbacha Edward, PhD

Quantifying The Magnitude of Total Dose Deviation Caused by Various Sources of Error Among IROC Phantom Irradiation Results

The Imaging and Radiation Oncology Core (IROC) phantoms are used as an end-to-end test of an institution's radiotherapy processes, and for clinical trial credentialing. Phantoms are treated like patients, and evaluation of the doses received by the thermoluminescent dosimeters (TLDs) inside the phantom, reflects the accuracy with which an institution can image, plan and irradiate a phantom or patient. Recent phantom results show that among the hundreds of various IROC phantoms irradiated annually, 8-17% of institutions fail this test. The purpose of this work was to investigate the various types of errors that may occur during the treatment process and quantify the magnitude of their contribution to planned treatment planning system (TPS) to measured TLD phantom dose deviation (TPS vs TLD dose deviation).

First, a preliminary study was conducted to identify the causes of failures among IROC phantoms. Categories of failure were established, and phantoms grouped accordingly. The results of this study lead to the investigation of three major error contributors: dose calculation error, delivery error and machine output error. Dose calculation error was assessed through independent recalculation of the phantom plans using a dose recalculation system (DRS). An acrylic output block containing TLDs was irradiated by each institution prior to phantom irradiation, to measure machine output on that day. Machine output error was determined through an assessment of both the output block's measured TLD doses and the machine output dose reported by the institution using their in-house QA device or ion chamber. Delivery error was assessed by evaluating the machine log files associated with a plan delivery. Prior to collecting log files from institutions, a study was conducted to test the ability of the IROC phantoms to accurately capture log file (specifically MLC) errors. This study used the deliberate introduction of MLC errors into the plans, to assess how well they would translate to measured and log file dose deviations. Delivery log files from institutions irradiating the phantoms were collected and evaluated for MLC rms error and delivered dose error. All error types were assessed on an individual TLD basis. Results were categorized into two groups: TLDs with dose deviations greater than the threshold for TLD measurement uncertainty (3.2%) represented the poorer performing group of phantom TLDs, and those with dose deviations less than 3.2%, the better performing group of phantom TLDs.

The majority (60%) of spine and head and neck (H&N) phantom failures, which are static (no motion) and generally have more highly modulated plans, were caused by systematic dose errors. This was when the dose in the entire plan was either too high or too low throughout the entire plan, indicating errors in the institution's TPS dose calculations. The lung phantom, which moves to simulate patient breathing, failed primarily due to localization errors. Localization errors, which manifested as the correct amount of dose, but delivered to a location off-set from the PTV, represented 62% of lung phantom failures. Dose calculation errors were found in 47% of all spine phantom results and 42% of all lung results. However, among failing phantoms, this error was present in 93% of spine cases and only 35% of lung cases, indicating a greater impact of dose calculation error on the highly modulated spine treatment versus the lung. Machine output error showed positive correlations with increasing dose deviation for spine ($r = 0.55$, $p < .001$), H&N ($r = 0.63$, $p < .001$) and lung phantoms ($r = 0.45$, $p < .001$), indicating that machine output accuracy has an impact on phantom performance.

management related dose deviations which are more difficult to quantify and assess via a remote phantom audit program such as IROC's. Therefore, among the errors evaluated, which were dosimetric in nature, we were able to quantify 56% of error among H&N phantoms, 68% among spine and only 19% of lung dose deviations.

Dissertation Abstract S. Edward (cont.)

The IROC phantom was found to detect MLC errors that were comparable to clinical results. Random MLC errors produced average dose deviations in the PTV of up to -2.8% for H&N and 0.7% for spine plans. Whole bank MLC shifts resulted in average PTV dose deviations of up to 8% for H&N and 7.1% for spine plans. Analysis of delivery error among IROC phantom log file results showed that compared to the average phantom TPS vs TLD dose deviation of 2.1% (max = 6.1%) for the H&N phantoms, and 2.3% (max = 8.5%) for the lung phantoms, delivered dose error was relatively small. The amount of dose deviation due to delivery errors ranged between -0.3% to 0.5% for the H&N phantom and -0.8% to 0.2% for the lung phantom.

Overall, dose calculation error was found to be the greatest contributor of dose deviations among highly modulated static phantom irradiations (spine and H&N), output error contributed almost equally to all three phantoms and delivery error was minimal with no correlation to phantom performance. Lung phantoms are primarily plagued by motion

Advisory Committee:
Stephen F. Kry, PhD
Peter A. Balter, PhD
Rebecca M. Howell, PhD
Christine B. Peterson, PhD
Julianne M. Pollard-Larkin, PhD

Note: Full dissertation is embargoed until November 16, 2023.

Dr. Edward is currently a medical physics resident in the Radiation Oncology Department at Washington University St. Louis

Dissertation Abstract

Mary Peters Gronberg, PhD

The Development of Artificial Intelligence-Based Tools for Expert Peer Review of Radiotherapy Treatment Plans

Creating a patient-specific radiation treatment plan is a time-consuming and operator-dependent manual process. The treatment planner adjusts the planning parameters in a trial-and-error fashion in an effort to balance the competing clinical objectives of tumor coverage and normal tissue sparing. Often, a plan is selected because it meets basic organ at risk dose thresholds for severe toxicity; however, it is evident that a plan with a decreased risk of normal tissue complication probability could be achieved. This discrepancy between “acceptable” and “best possible” plan is magnified if either the physician or treatment planner lacks focal expertise in the disease site.

Many clinics implement expert-peer review programs, where each treatment plan is reviewed by other radiation oncologists with the same disease specialization. These expert peer review programs are not able to be implemented at small clinics, which represent the majority of clinics around the world, due to limited staff and resources. Consequently, a scalable peer review approach to ensure that patients receive high-quality radiation plans is an unmet clinical need for many centers.

The purpose of this study was to develop automated treatment plan quality assurance tools that can provide expert peer review, without the need for actual access to teams of specialized radiation oncologists. To accomplish this, we trained deep learning models to predict patient-specific optimum-achievable 3D dose distributions for radiotherapy plans of head and neck cancer patients. We conducted experiments by varying the deep learning architectures, loss functions, data augmentation techniques, and CT normalization methods to determine the top-performing model. We then tested the application of dose prediction to automatically identify suboptimal head and neck plans and benchmarked its performance against manual physician review. Finally, we tested the translatability of our approach for plan quality assessment to another disease site—gynecologic cancers. We trained a deep learning model to predict high-quality dose distributions for VMAT plans for patients with gynecologic cancers and tested the usability of predicted dose distributions to help improve plan quality by guiding plan re-optimization. The tools developed in this work are expected to be integrated into a web-based automated, expert, peer review system, enabling clinics around the world to receive treatment plan recommendations of the same quality as those offered by expert, specialized radiation oncologists. The implementation of an automated, expert peer review system will address current disparities in expertise and resources of clinics around the world.

Advisory Committee:
Laurence E. Court, PhD
Carlos E. Cardenas, PhD
Clifton David Fuller, MD, PhD
Rebecca M. Howell, PhD
Anuja Jhingran, MD

Note: Full dissertation is embargoed until April 25, 2024.

Dr. Peters Gronberg is currently a Medical Physics Resident in the Department of Radiation Oncology at University of Texas Southwestern Medical Center

Dissertation Abstract

Soleil Hernandez, PhD

Automating the Radiation Therapy Treatment Planning Process for Pediatric Patients with Medulloblastoma

Over the past 50 years, pediatric cancer 5-year survival rates increased from 20% to 80% in high-income countries, however, these trends have not been mirrored in low-and-middle-income countries (LMICs). This is due in part to delayed diagnosis, higher rates of advanced disease at presentation and a growing lack of access to high quality medical personnel and technology necessary to deliver complex treatments.

The long-term goal of this study was to alleviate demanding workflows and increase global access to high-quality pediatric radiation therapy by harnessing the power of artificial intelligence to automate the radiation therapy treatment planning process for pediatric patients with medulloblastoma. Radiation therapy for medulloblastoma consists of radiation to the craniospinal axis (CSI) and a boost of radiation to the post-operative tumor resection cavity. In this study we automated the treatment planning process for the primary course and boost treatment using deep learning and other automation approaches for autocontouring and autoplanning.

First, we developed and tested a 3D conformal CSI autoplanning tool for varying patient sizes based on the recommendations from the International Society of Pediatric Oncology (SIOP). The autocontoured structures' average Dice similarity coefficient (DSC) ranged from 0.65-0.98. Of the 18 plans tested, all were scored as clinically acceptable as-is or clinically acceptable with minor, time-efficient edits preferred or required. No plans were scored as clinically unacceptable.

Next, we tested the autocontouring and autoplanning tools on 51 CSI CT scans provided from St. Jude Children's Research Hospital to generate 15 autocontours and a composite CSI treatment plan. Three pediatric radiation oncologists from 3 institutions reviewed and scored each autocontour and plan. Of the 795 autocontours reviewed by 3 physicians, 97% of the autocontours were scored as clinically acceptable, with 92% of them requiring no edits. The clinically acceptability of the autoplans was divided by treatment field (brain and spine). For the brain field dose distributions, 100% were clinically acceptable. For the spine dose distributions, 92% of single field, 100% of extended field, and 68% of multiple field cases were scored as clinically acceptable. Most unacceptable cases were from the multiple field configuration, which is the most complex spine field configuration to plan. In all cases (major or minor edits), the physicians noted that they would rather edit the autoplan rather than create a new plan.

In the second aim of the experiment, we set to automate the treatment planning process for the resection cavity boost which included automatically contouring the post-operative gross tumor volume (GTV) resection cavity and generating a 3D conformal treatment plan. To automatically contour the GTV, we trained a CT-based, MRI-based, and multi-modality based autocontouring model. DSC (Mean$\pm 1\sigma$) scores were 0.75 ± 0.16 for CT-only, 0.77 ± 0.15 for MRI-only, and 0.80 ± 0.12 for multi-modality models. Hausdorff distances for the MRI-only and multi-modality models were significantly lower than for the CT-only model ($p<0.001$ and $p=0.013$, respectively). In clinical review, the MRI-only model achieved the best boundary detection.

Over the past 50 years, pediatric cancer 5-year survival rates increased from 20% to 80% in high-income countries, however, these trends have not been mirrored in low-and-middle-income countries (LMICs). This is due in part to delayed diagnosis, higher rates of advanced disease at presentation and a growing lack of access to high quality medical personnel and technology necessary to deliver complex treatments.

Dissertation Abstract S. Hernandez (cont.)

The long-term goal of this study was to alleviate demanding workflows and increase global access to high-quality pediatric radiation therapy by harnessing the power of artificial intelligence to automate the radiation therapy treatment planning process for pediatric patients with medulloblastoma. Radiation therapy for medulloblastoma consists of radiation to the craniospinal axis (CSI) and a boost of radiation to the post-operative tumor resection cavity. In this study we automated the treatment planning process for the primary course and boost treatment using deep learning and other automation approaches for autocontouring and autoplanning.

Advisory Committee:
Laurence Court PhD
Rebecca Howell, PhD
Carlos Cardenas, PhD
David Fuentes, PhD
Julianne Pollard-Larkin, PhD
Arnold Paulino, MD

Dr. Hernandez is currently a Medical Physics Resident in the Department of Radiation Oncology at the University Colorado

Note: Full dissertation is embargoed until April 26, 2024.

Dissertation Abstract

Yulun He, PhD

Improving Dose-Response Correlations for Locally Advanced Non-Small Lung Cancer Patients Treated with Intensity Modulated Photon Therapy or Passive Scattering Proton Therapy

The standard of care for locally advanced non-small cell lung cancer (NSCLC) is concurrent chemo-radiotherapy. Despite recent advancements in radiation delivery methods, the median survival time of NSCLC patients remains below 28 months. Higher tumor dose has been found to increase survival but also a higher rate of radiation pneumonitis (RP) that affects breathing capability. In fear of such toxicity, less-aggressive treatment plans are often clinically preferred, leading to metastasis and recurrence. Therefore, accurate RP prediction is crucial to ensure tumor coverage to improve treatment outcome. Current models have associated RP with increased dose but with limited accuracy as they lack spatial correlation between accurate dose representation and quantitative RP representation. These models represent lung tissue damage with radiation dose distribution planned pre-treatment, which assumes a fixed patient geometry and inevitably renders imprecise dose delivery due to intra-fractional breathing motion and inter-fractional anatomy response. Additionally, current models employ whole-lung dose metrics as the contributing factor to RP as a qualitative, binary outcome but these global dose metrics discard microscopic, voxel-(3D pixel)-level information and prevent spatial correlations with quantitative RP representation.

To tackle these limitations, we developed advanced deformable image registration (DIR) techniques that registered corresponding anatomical voxels between images for tracking and accumulating dose throughout treatment. DIR also enabled voxel-level dose- response correlation when CT image density change (IDC) was used to quantify RP. We hypothesized that more accurate estimates of biologically effective dose distributions actually delivered, achieved through (a) dose accumulation using deformable registration of weekly 4DCT images acquired over the course or radiotherapy and (b) the incorporation of variable relative biological effectiveness (RBE), would lead to statistically and clinically significant improvement in the correlation of RP with biologically effective dose distributions. Our work resulted in a robust intra-4DCT and inter-4DCT DIR workflow, with the accuracy meeting AAPM TG-132 recommendations for clinical implementation of DIR. The automated DIR workflow allowed us to develop a fully automated 4DCT-based dose accumulation pipeline in RayStation (RaySearch Laboratories, Stockholm, Sweden). With a sample of 67 IMRT patients, our results showed that the accumulated dose was statistically different than the planned dose across the entire cohort with an average MLD increase of ~1 Gy and clinically different for individual patients where 16% resulted in difference in the score of the normal tissue complication probability (NTCP) using an established, clinically used model, which could qualify the patients for treatment planning re-evaluation.

Lastly, we associated dose difference with accuracy difference by establishing and comparing voxellevel dose-IDC correlations and concluded that the accumulated dose better described the localized damage, thereby a closer representation of the delivered dose. Using the same dose-response correlation strategy, we plotted the dose-IDC relationships for both photon patients (N = 51) and proton patients (N = 67), we measured the variable proton RBE values to be 3.07–1.27 from 9–52 Gy proton voxels. With the measured RBE values, we fitted an established variable proton RBE model with pseudo-R2 of 0.98. Therefore, our results led to statistically and clinically significant improvement in the correlation of RP with accumulated and biologically effective dose distributions and demonstrated the potential of incorporating the effect of anatomical change and biological damage in RP prediction models.

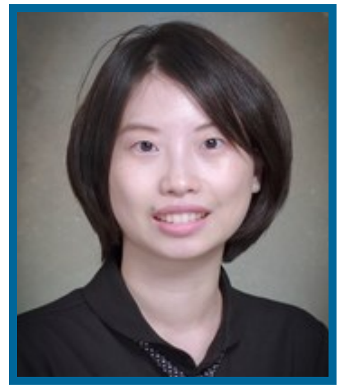
Advisory Committee:

Kristy Brock, PhD	**Radhe Mohan, PhD**
Laurence Court, PhD	Carlos Cardenas, PhD
Carol Wu, MD	Zhongxing Liao, PhD

Dr. He is currently a Medical Physics Resident in the Department of Radiation Oncology at the University of Washington

Dissertation Abstract

Kai Huang, PhD



Treatment Planning Automation for Rectal Cancer Radiotherapy

Background: Rectal cancer is a common type of cancer. There is an acute health disparity across the globe where a significant population of the world lack adequate access to radiotherapy treatments which is a part of the standard of care for rectal cancers. Safe radiotherapy treatments require specialized planning expertise and are time-consuming and labor-intensive to produce.

Purpose: To alleviate the health disparity and promote the safe and quality use of radiotherapy in treating rectal cancers, the entire treatment planning process needs to be automated. The purpose of this project is to develop automated solutions for the treatment planning process of rectal cancers that would produce clinically acceptable and high-quality plans. To achieve this goal, we first automated two common existing treatment techniques, 3DCRT and VMAT, for rectal cancers, and then explored an alternative method for creating a treatment plan using deep learning.

Methods: To automate the 3DCRT treatment technique, we used deep learning to predict the shapes of field apertures for primary and boost fields based on CT and location and the shapes of GTV and involved lymph nodes. The results of the predicted apertures were evaluated by a GI radiation oncologist. We then designed an algorithm to automate the forward-planning process with the capacity of adding fields to homogenize the dose at the target volumes using the field-in-field technique. The algorithm was validated on the clinical apertures and the plans produced were scored by a radiation oncologist. The field aperture prediction and the algorithm were combined into an end-to-end process and were tested on a separate set of patients. The resulting final plans were scored by a GI radiation oncologist for their clinical acceptability.

To automate of VMAT treatment technique, we used deep learning models to segment CTV and OARs and automated the inverse planning process, based on a RapidPlan model. The end-to-end process requires only the GTV contour and a CT scan as inputs. Specifically, the segmentation models could auto-segment CTV, bowel bag, large bowel, small bowel, total bowel, femurs, bladder, bone marrow, and female and male genitalia. All the OARs were contoured under the guidance of and reviewed by a GI radiation oncologist. For auto-planning, the RapidPlan model was designed for VMAT delivery with 3 arcs and validated separately by two GI radiation oncologists. Finally, the end-to-end pipeline was evaluated on a separate set of testing patients, and the resulting plans were scored by two GI radiation oncologists.

Existing inverse planning methods rely on 1D information from DVH values,2D information from DVH lines, or 3D dose distributions using machine learning[1] for plan optimizations. The project explored the possibility of using deep learning to create 3D dose distributions directly for VMAT treatment plans. The training data consisted of patients treated by the VMAT treatment technique in the short-course fractionation scheme that uses 5 Gy per fraction for 5 fractions. Two deep learning architectures were investigated for their ability to emulate clinical dose distributions: 3D DDUNet and 2D cGAN. The top-performing model for each architecture was identified based on the difference in DVH values, DVH lines, and dose distribution between the predicted dose and the corresponding clinical plans.

Results: For 3DCRT automation, the predicted apertures were 100%, 95%, and 87.5% clinically acceptable for the posterior-anterior, laterals, and boost apertures, respectively. The forward planning algorithm created wedged plans that were 85% clinically acceptable with clinical apertures. The end-to-end workflow generated 97% clinically acceptable plans for the separate test patients.

For the VMAT automation, CTV contours were 89% clinically acceptable without necessary modifications and all the OAR contours were clinically acceptable without edits except for large and small bowels. The RaidPlan model was evaluated to produce 100% and 91% of clinically acceptable plans per two GI radiation oncologists. For the testing of end-to-end workflow, 88% and 62% of the final plans were accepted by two GI radiation oncologists.

Dissertation Abstract K. Huang (cont.)

For the evaluation of deep learning architectures, the top-performing model of the DDUNet architecture used the medium patch size and inputs of CT, PTV times prescription dose mask, CTV, PTV 10 mm expansion, and the external body structure. The model with inputs CT, PTV, and CTV masks performed the best for the cGAN architecture. Both the DDUNet and cGAN architectures could predict 3D dose distributions that had DVH values that were statistically the same as the clinical plans.

Conclusions: We have successfully automated the clinical workflow for generating either 3DCRT or VMAT radiotherapy plans for rectal cancer for our institution. This project showed that the existing treatment planning techniques for rectal cancer can be automated to generate clinically acceptable and safe plans with minimal inputs and no human intervention for most patients. The project also showed that deep learning architectures can be used for predicting dose distributions.

Advisory Committee:

Laurence Court, PhD

Sam Beddar, PhD

Tina Marie Briere, PhD

Carlos Cardenas, PhD

Prajnan Das, MD, MPH

David Fuentes, PhD

Dr. Huang is currently a Medical Physics Resident in the Department of Radiation Oncology at the University of Maryland

Dissertation Abstract

Tianzhe Li, PhD

Interrogations of the Tumor Microenvironment Using Magnetic Resonance Imaging

Both tumor acidosis and tumor hypoxia are characteristics commonly found in the microenvironment of solid malignant tumors. Accurate characterization of the two phenomena could provide important information to clinicians for devising suitable treatment plans. Tumor acidosis and hypoxia are closely linked to each other. Tumor acidosis is caused by the inclination of cancer cells towards anaerobic respiration, and one of the main contributing factors for the avoidance of aerobic respiration is tumor hypoxia. Both phenomena can indicate the high metastatic potential of cancers and can also cause resistance of the cancer systems against anti-cancer therapies. Therefore, developing novel molecular imaging techniques is much needed for increasing the accuracy and the precision of the measurement of tumor acidosis and tumor hypoxia. These new molecular imaging methodologies will assist in achieving a better understanding of the cancer microenvironment and improving the quality of clinical care that cancer patients receive.

In this dissertation, I present new methodologies for analyzing data from acidoCEST MRI, which expand the capability of acidoCEST MRI in producing accurate and precise pH measurements. I also present results from a small animal study where electron paramagnetic resonance imaging (EPRI) oximetry was employed to study the oxygenation states of tumor systems. Specifically, in chapter 2 of this dissertation, I present results from, to the best of our knowledge, the first study in which machine learning models were trained with acidoCEST MRI data to accurately and precisely predict the pH levels of iopamidol chemical solutions. The results from this study show that machine learning is a powerful method for analyzing acidoCEST MRI data in both pH classification and pH regression, although the random forest model achieves superior performance in pH regression than the LASSO model. In chapter 3, I optimized the Bloch fitting method and showed that the Bloch fitting algorithm fits for pH levels effectively both from phantom solutions and from in vivo tumor systems. The results demonstrate that no supplementary MR information is needed for the Bloch fitting process and adding potentially inaccurate supplementary MR information can be detrimental and reduce the accuracy of the fitting results. In chapter 4, I use EPRI oximetry to study the hypoxia conditions of three types of tumor models and demonstrate that a new biomarker that measures changes in $\Delta pO2$ can be used to predict the early responses of cancers to radiation therapy as soon as 24 hours after the irradiation process is completed. The results from this study also demonstrate the importance of evaluating the oxygenation state of the cancer in each individual patient, as hypoxia conditions for the same tumor phenotype can vary significantly across subjects. The variation in intratumoral oxygenation can directly affect the efficacy of anticancer therapies.

Advisory Committee:
Marty Pagel, PhD
Jingfei Ma, PhD
Jason Stafford, PhD
Ken-Pin Hwang, PhD
Steven Millward, PhD

Note: Full dissertation is embargoed until May 15, 2024

Dr. Li is currently a Post-doctoral Fellow in the Radiation Oncology Department at the University of Nebraska

Dissertation Abstract

Kelly Nealon, PhD, DABR

The Safe and Effective Clinical Deployment of Artificial Intelligence Tools

18 million new cancer cases are diagnosed each year. Roughly half of these patients will be treated with radiation therapy, a complex technique that requires an interdisciplinary team of clinical staff and expensive equipment to be delivered safely. Cancer centers in Low- and Middle-Income Countries (LMIC) have an especially difficult time meeting the demands of radiation therapy as the complexity of treatment techniques increase, with only 37% of patients in these regions having access to the care they need. Artificial Intelligence (AI) based tools are being developed to simplify the treatment planning and quality assurance processes to increase the number of patients who can be treated, as well as improving the quality of their treatment plans. While AI techniques have shown great promise, with any new technology it is important to not only assess the potential benefits, but also the associated risk. To this end, we have performed a risk assessment of our in-house automated treatment planning system, the Radiation Planning Assistant, to identify points of risk and subsequently develop appropriate quality assurance and training resources to minimize patient risk.

To identify points of risk, a failure mode and effects analysis was performed by a multidisciplinary team of clinicians and software developers. Changes were then made to limit the risk of 76% of high-risk failures. These risk points were then incorporated into hazard testing, and we found that 62% of errors could be detected before a plan was created in the RPA. The user interface was then modified to limit the number of errors that will be propagated into the automatic planning process. Following the changes made to optimize the safety of the user interface, the efficacy of error detection during the plan review process was assessed. A custom checklist was developed to guide the review of automatically generated treatment plans, based on the results of our FMEA and AAPM TG-275. During final physics plan checks, when utilizing the customized checklist, we found an increase in the rate of error detection by 20% for physicists and 17% for medical physics residents.

An end-to-end test was then performed to evaluate the entirety of the RPA training and deployment procedure for new users. Users were asked to review training materials and generate 10 treatment plans, including all treatment sites available in the RPA. Following training, 100% of the errors present in these plans were detected and users reported that the developed training materials provided them with all information needed to generate safe, high-quality, treatment plans.

In conclusion, we have optimized the safety and efficacy of the RPA training, quality assurance, and deployment processes. This evaluation has allowed us to not only maximize the impact of our automated treatment planning tool, the RPA, but has also generated results that should be used to inform the development of safe AI software and clinical deployment procedures, in future clinical environments.

Advisory Committee:
Laurence Court, PhD
Eun Young Han, PhD
Stephen Kry, PhD
Valerie Reed, MD
Samantha Simiele, PhD

Dr. Nealon is an Instructor in the Department of Radiation Oncology at Massachusetts General Hospital

Dissertation Abstract

Suman Shrestha, PhD

Infrastructure Development for Personalized Risk Prediction to Reduce Cardiovascular Disease in Childhood Cancer Survivors

Although childhood cancer survivors have lengthy life expectancies, they run the risk of experiencing long-term health issues as a result of their treatment. The most frequent non-cancerous cause of morbidity and mortality for these survivors is cardiac disease. Radiation therapy (RT) has been linked in numerous cohort studies to a higher chance of developing a late cardiac disease in these survivors, and this risk rises with higher mean heart doses and increased RT exposure to larger cardiac volumes. Since, the heart is a heterogeneous organ made up of several distinct substructures, RT dose received by the entire heart does not accurately represent the dosage to the various cardiac substructures with likely different risk profiles. Given the ability of modern RT techniques to limit organ exposure and dose, contemporary RT plans should include dosimetric constraints specific to individual substructures.

A limiting factor in developing cardiac substructure level dose-response models is that cardiac substructure doses are not available for long-term survivors for whom late cardiac outcomes are well characterized. Moreover, existing whole-heart dose-response models were established based on dosimetry from reconstructing survivors' RT on computational phantoms with a simple heart model.

Thus, the main objective of this research was to expand the dose reconstruction infrastructure for late effects studies and enhance the heart model to improve the accuracy of whole heart dosimetry and enable cardiac substructure dose reconstructions for large multi-institutional childhood cancer survivor cohorts and establish sub-structure level dose-response relationships.

Note: Full dissertation is embargoed until November 17 2023.

<u>**Advisory Committee:**</u>
Rebecca M. Howell, PhD
Laurence C. Court, PhD
Stephen F. Kry, PhD
Chelsea C. Pinnix, MD, PhD
James E. Bates, MD

Dr. Shrestha currently a Post-doctoral Fellow (and will begin a Medical Physics Residency this fall) in the Radiation Physics Department at the University of Texas MD Anderson Cancer Center

Dissertation Abstract

Cenji Yu, PhD

Auto-segmentation in Pancreatic and Liver Cancer Radiation Treatment

Gastrointestinal cancers exhibit a high mortality rate compared to other cancer types. Among these, pancreatic cancer ranks as the fourth leading cause of cancer-related deaths worldwide. The five-year survival rate remains alarmingly low at a mere 9%. Hepatocellular carcinoma (HCC), another aggressive form of cancer, is rapidly becoming the primary cause of cancer-related deaths in the United States. The treatment of both liver cancer and pancreatic cancer heavily relies on a multidisciplinary approach. Innovative treatment strategies involving dose-escalated regimens, such as stereotactic body radiation therapy (SBRT), are emerging as an important pillar of the management of liver and pancreatic cancer. The success of these treatment modalities hinges upon the precise and standardized segmentation of organs-at-risk and target volumes to ensure the optimal quality of treatment plans.

We first developed an automated organs-at-risk segmentation tool for upper abdominal radiation therapy treatment. A dataset of 70 patients was collected and utilized as the training set and benchmark for our auto-segmentation tool. We employed the adaptive nnU-Net architecture to develop a model ensemble capable of contouring various organs, including the duodenum, small bowel (ileum and jejunum), large bowel, liver, spleen, kidneys, and spinal cord. The performance of the segmentation tool was evaluated on 75 patients using both contrast-enhanced and non-contrast-enhanced CT images, employing a five-point Likert scale assessment by five experts from three different institutions. To capture contours requiring major edits, we developed a distance-based quality assurance (QA) system. This system identified CT scans that were likely to yield suboptimal contours requiring time-consuming major edits. Evaluation of the QA system was conducted on clinical CT scans, with the clinical review score serving as the ground truth. For target volume segmentation, we employed transformer-based architectures, leveraging self-supervised learning and uncertainty estimation techniques to enhance performance and allow for stylistic customization. A total of 3094 unlabeled CT scans from liver cancer patients, along with 5050 publicly available CT scans, were collected for self-supervised pretraining in liver tumor segmentation. The pretrained encoders were then utilized to optimize downstream liver tumor segmentation models, evaluating the impact of self-supervised learning on tumor segmentation performance. For pancreatic tumor segmentation, we developed an ensemble-based approach incorporating multiple segmentation styles. Probability thresholding was employed to generate the final segmentation, enabling customization according to clinicians' preferences.

Our organs-at-risk segmentation tool achieved a clinical acceptance rate of over 90% for all organs except the duodenum, demonstrating its accuracy in delineation. Quantitative results were comparable to state-of-the-art methods, using a small but high-quality dataset. The QA system achieved an AUC of 0.89 for capturing contours requiring major edits on randomly sampled clinical CT scans. In liver tumor segmentation, our study revealed that self-supervised learning demonstrated 4-5% performance improvement when diverse unlabeled data were used for pretraining. This finding highlights the importance of incorporating a wide range of data during the pretraining stage. For pancreatic tumor segmentation, our ensemble-based segmentation method proved highly effective. It provided pixel-by-pixel uncertainty estimates and allowed customization through probability thresholding. Our customized contours surpassed the performance of the state-of-the-art segmentation model, even when utilizing identical training data, pretraining techniques, and hyperparameters.

Dissertation Abstract K. Huang (cont.)

Our auto-segmentation system for organs-at-risk achieved high clinical acceptance rates in upper-abdominal radiation treatment. The accompanying QA tool effectively captured contours requiring major edits. Leveraging a wide range of unlabeled data in self-supervised learning improved the performance of our transformer-based segmentation system. Additionally, our uncertainty-guided segmentation network allowed customization and identification of low-confidence regions. Our suite of auto-segmentation tools for pancreatic and liver cancer radiation treatment has the potential to streamline clinical workflows while prioritizing patient safety.

Advisory Committee:
Laurence Court, PhD
Rachael Martin Paulpeter, PhD
Ethan Ludmir, MD
Carlos Cardenas, PhD
Tinsu Pan, PhD
Albert Koong, MD, PhD

Note: Full dissertation is embargoed until, April 26, 2024.

Dr. Yu is currently a Medical Physics Resident in the Department of Radiation Oncology at the Mayo Clinic

Thesis Abstract

Hayden Scott, SMS

Extending the Lifetime of Optically Stimulated Luminescent Dosimeters for Use in Output Checks at IROC-Houston

Optically Stimulated Luminescent Dosimeters (OSLDs) are a prominent form of in-vivo dosimeter used both in clinics as well as for the audits of radiological equipment at the Imaging and Radiation Oncology Core (IROC)-Houston. These dosimeters have a recommended dose limit of 10 Gy due to a change in signal response with dose. To assist with the OSLD operation at IROC-Houston, evaluating the signal response of these dosimeters with IROC's methodologies offers the potential to extend the dose limit past 10 Gy, improve the efficiency of handling OSLDs, and reduce the cost and time spent on commissioning OSLDs.

The signal response of OSLDs were evaluated using the American Association of Physicists in Medicine (AAPM) Task Group (TG)- 191 recommendations. Evaluations of sensitivity and linearity characteristics were performed as accumulated dose increased. To re-use the OSLDs, the dosimeters were bleached. Four different monochromatic and one polychromatic light source was compared to the IROC light source to determine the impact that bleaching wavelength had on signal response. In addition, the OSLDs were evaluated for how the choice of bleaching light and accumulated dose affected signal regeneration. Finally, the response of OSLDs as a function of accumulated dose were evaluated as a function of different fractions of dose. Every irradiation was performed on a Co-60 beam at the same SSD of 80cm and field size of 24.5 x 24.5.

For the IROC system, we found that the signal response of OSLDs are stable within 1% up to 23 Gy. After this point, the sensitivity beings to decrease. The sensitivity of each OSLD relative to each other, ks,i did not change up to 50 Gy showing that the sensitivity change amongst all the OSLDs was applied universally amongst the group. There is a well characterized change in the slope of the linearity correction factor as accumulated history increases. For chromatic effects, we find that lower wavelengths remove signal the fastest, but polychromatic sources preserve the signal response to a greater accumulated dose history. For charge repopulation, we find that the degree of charge repopulation is related to dose, time, and bleaching light though this effect is nonsignificant with the IROC the newly analyzed dose limit of ~15-20 Gy. We find that fractionations at 5 Gy and higher yield a greater signal response compared to reference dosimeters, with larger fractions leading to a greater signal response. The greatest effect measured was with 30 Gy fractions at a value of 6.4% greater signal compared to reference. The greater fractions also exhibited a steeper increase in slope of the linearity correction factor.

IROC can extend the dose limit of 15-20 Gy of accumulated dose. The amount of charge repopulation at this dose level is insignificant, so the OSLDs in storage do not need to be rebleached prior to reintroducing them back into operation. For the application of correction factors, ks,i can re-use it's commissioned value whereas a value of kL needs to be evaluated based on the dose history and fractions used.

Advisory Committee:
Stephen F. Kry, PhD
Paola Alvarez, MS
Rebecca Howell, PhD
Adam Riegel, PhD
Ryan Sun, PhD

Mr. Scott is a Medical Physics Doctorate Student at MD Anderson UT Health Graduate School of Biomedical Sciences

Summer 2023 Graduates

The 2023 - 2024 academic year is off to an excellent and fast-paced start with five doctoral students defending their dissertation research this summer. They are listed below. We will feature their dissertation abstracts and commencement photos in the summer 2024 newsletter.

Graduate	DissertationTitle	Advisor	Post-Grad. Position
Yasaman Barekatain, PhD	The therapeutic potential of PRMT5 and MAT2A as synthetic lethal targets in MTAP-deficient GBM tumors	Raghu Kalluri, MD, PhD	Post-doctoral Fellowship MD Anderson Cancer Ctr.
Shannon Hartzell, PhD	Uncertainty in the Physical Basis of Estimates of Relative Biological Effectiveness in Carbon Radiotherapy	Stephen F. Kry, PhD	Post-doctoral Fellowship Mayo Clinic - Arizona
Constance Owens, PhD	Risk and Risk Factors for Colorectal Malignancies in Survivors of Childhood Cancer: A Report from the Childhood Cancer Survivor Study	Rebecca M. Howell, PhD	Post-doctoral Fellowship MD Anderson Cancer Ctr.
Saleh Ramezani, PhD	Antibody-Protein L Functional-ized Microparticles for Early Detection of Heterogeneous Colorectal Lesions	Mary Farach-Carson, PhD	Post-doctoral Fellowship MD Anderson Cancer Ctr
Yao Zhao, PhD	AI-enabled online plan adapta-tion for MR-guided stereotactic ablative radiotherapy (SABR) of head and neck cancer	Jinzhong Yang, PhD	Therapy Residency MD Anderson Cancer Ctr.

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

2022 Whitecoat Ceremony

Second year doctoral students (left to right):
Collin Harlan, Aashish Gupta, Skyler Gay, Jian Ming Teo, and Erin Snoddy

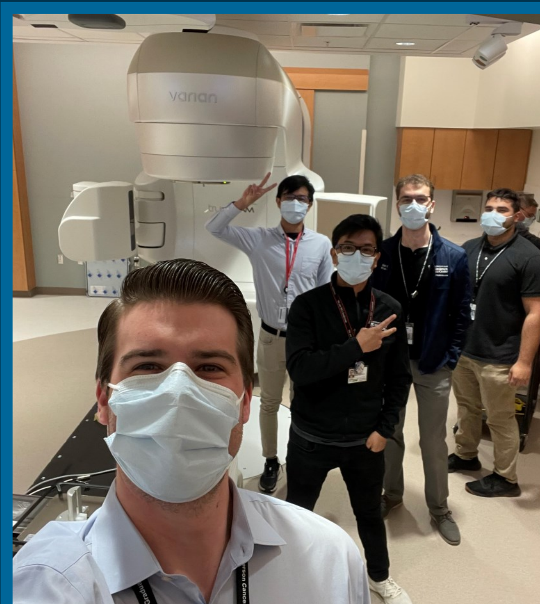
Colin Harlan with mentor, Jim Bankson, PhD

Aashish Gupta (left) and Erin Snoddy (right)
with mentor, Kristy Brock, PhD

Student Academic Life

First year students (left to right): Rebecca Lim, Zaphanlene Kaffey, Taylor Meyers, Natalie West, Lucas McCullum, Henry Meyer, and Alan Lopez Hernandez

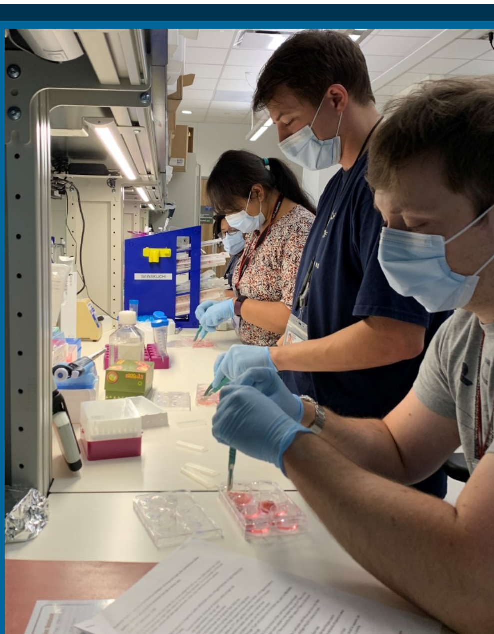
Therapy Lab: Zongsheng Hu, Henry Meyer, Natalie West, Lucas McCullum, Rebecca Lim, Alan Lopez Hernandez, and Zeph Kaffey



TG-51 lab (left to right): Collin Harlan, Jian Ming Teo, Skylar Gay, and Benjamin Lopez

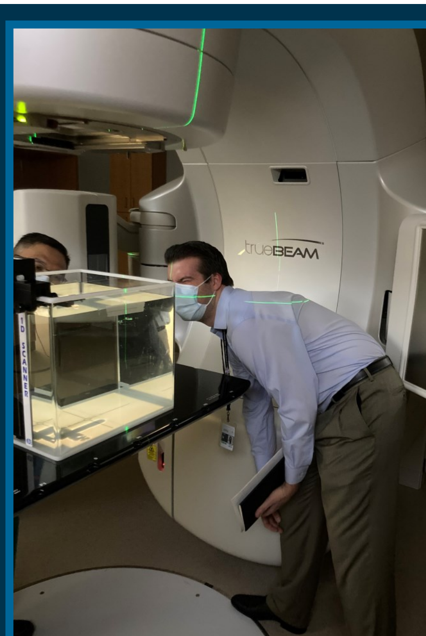
Measurement Life

Measurements at the National Center for Oncological Hadron Therapy (CNAO), Pavia Italy, Shannon Hartzell and Stephen Kry (left) and Paige Taylor (right)



Wet Lab Research Measurements
David Flint

Measurements at NPL
Fre'Etta Brooks



TG-51 Measurements
Collin Harlan

Student Sports and Fitness Life

Softball team: top row (left to right) Sam Mulder, Alan Lopez Hernandez, David Martinus, Aashish Gupta; bottom row (left to right) Hayden Scott, Henry Meyer, Lucas McCullum, Rebecca Lim, Natalie West, Barbara Marquez, and Taylor Meyers

Weightlifting crew (left to right): Lucas McCullum, Taylor Meyers, Barbara Marquez, Hayden Scott, and Henry Meyer

2022 - 2023 Conferences

Zaphanlene "Zeph" Kaffey and Sharbacha Edward at 2022 National Society of Black Physicists Conference

Natalie West, Zeph Kaffey, Barbara Marquez, and Alex Leone at the 20223 SWAAPM

Aashish Gupta, Hayden Scott, Hunter Mehrens, Barbara Marquez, Rebecca Howell, Kelly Kisling (alumna), and Constance Owens at the 2022 AAPM Annual Meeting

Kevin Liu, Alexander Baikalov, Luke Connell, Emil Schueler, Allison Palmiero, and Brett Velasquez FLASH Radiotherapy and Particle Therapy

Student World Experiences

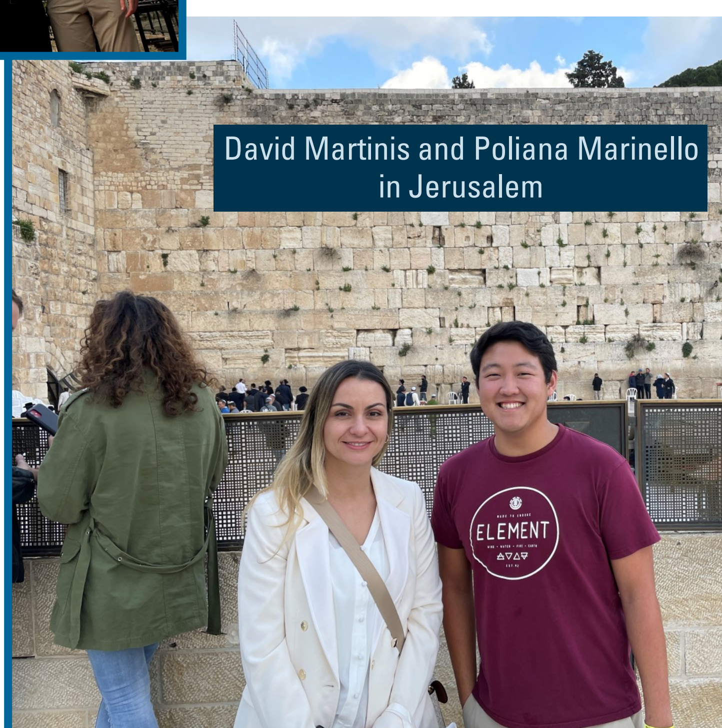
Aloha from the 2023 Radiation Research Society Social Event, Shannon Hartzell (center) and Kevin Liu (upper right)

Constance Owens at ESTRO in Vienna

Collin Harlan ISMRM in Toronto

Collin Harlan at ISMRM in London

Barbara Marquez, Kai Huang, Aashish Gupta, and Constance Owens, AAPM in Washington DC



David Martinis and Poliana Marinello in Jerusalem

Winter Festivities

Program Festivities

Brock Lab Festivities

Court Lab Festivities

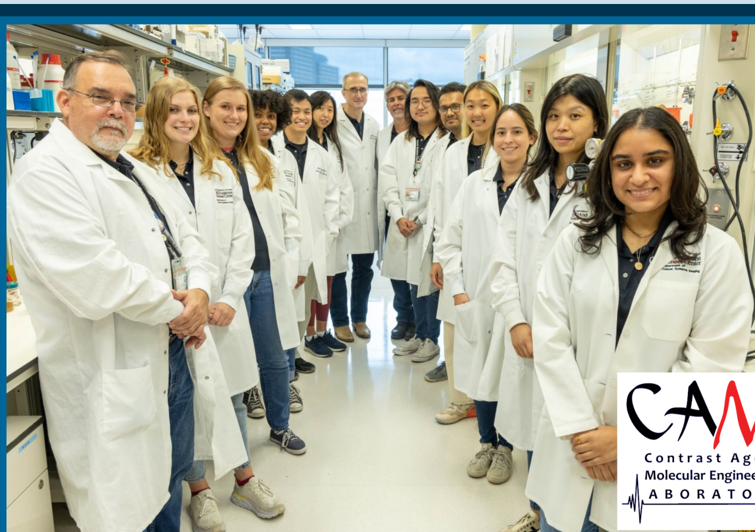
Our Research Laboratories

The Courtyard (Court) Laboratory

The Morfeus (Brock) Laboratory

Our Research Laboratories (cont.)

The Contrast Agent Molecular Engineering (Pagel) Laboratory (CAMEL)



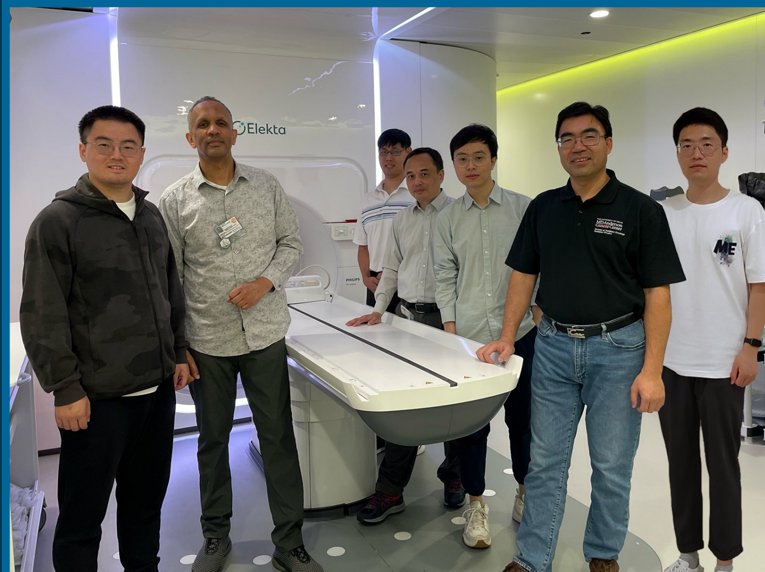
CAMEL
Contrast Agent
Molecular Engineering
LABORATORY

The Howell Laboratory - Late Effects Research Group

Our Research Laboratories (Cont.)

The Liu Laboratory

The Yang AART Laboratory



The Sawakuchi — Shaitelman Laboratory

Our Research Laboratories (Cont.)

The Kry Laboratory - Imaging and Radiation Oncology Core - Houston

The Schueler Laboratory

Our Research Laboratories (Cont.)

The Salehpour Laboratory

The Fuller Laboratory

Our Research Laboratories (Cont.)

The Bankson Laboratory

The Fuentes Laboratory

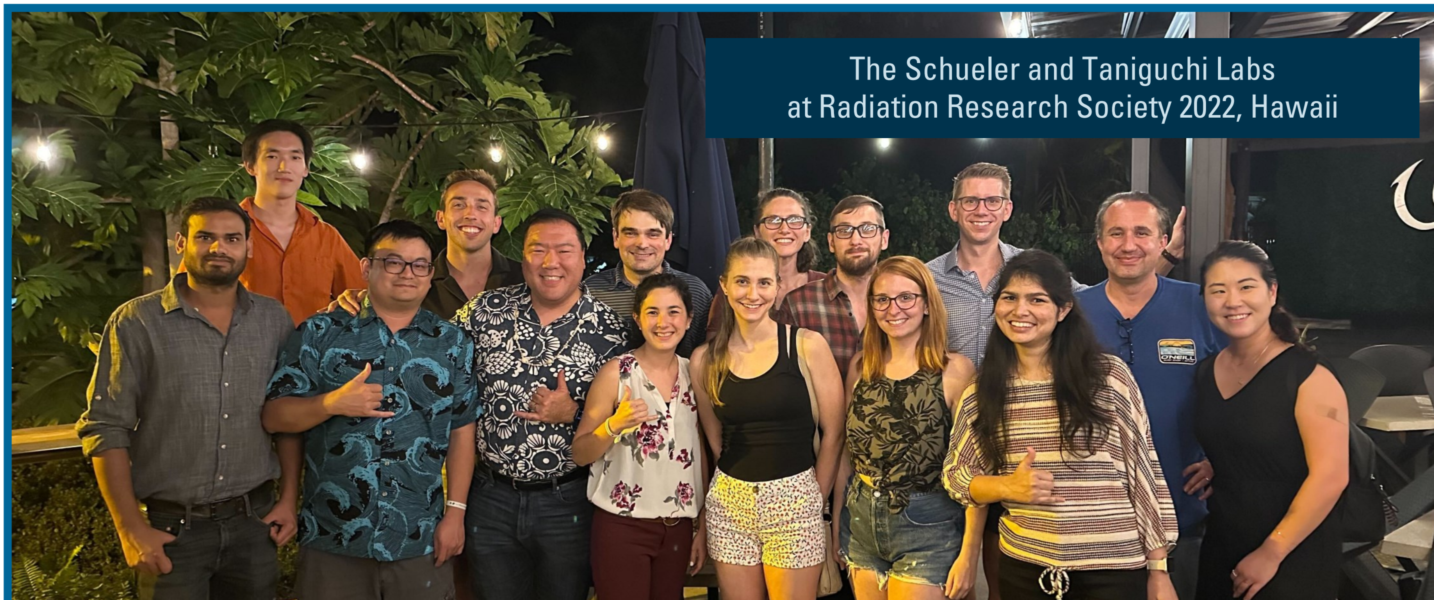
Lab Outings

The CAMEL Lab at the 2022 Texas Renaissance Fair

The Kry Lab at CNAO, Italy

The Farach-Carson Lab at the 2023 Houston Rodeo

The Bankson Lab at Houston ASTROS



The Schueler and Taniguchi Labs at Radiation Research Society 2022, Hawaii

Robert J. Shalek Fellowships in Medical Physics Overview

Shalek Fellowship Fund 2022 - 2023

The alumni, faculty and friends of the Medical Physics Program donated a total of $12,170 to the Shalek Fellowship Fund during the 2022-2023 year, with individual gifts ranging from $100 to $3000.

Our donors' generosity has enabled us to offer our two incoming SMS students this year, Derek Garcia and Michael Yang, tuition and fees for their first year in the program. Derek Garcia completed a BS in Physics at Sam Houston State University. Michael Yang completed a BS in Biomedical Engineering at Texas A&M University. Additionally, the fellowship provided Dianna Carrasco-Rojas (incoming PhD student) with tuition for the Summer 2023 term. Dianna Carrasco completed a BS in Physics at the University of Texas El Paso in May 2023.

Of the last five years' Shalek Fellowship recipients, have gone on to earn their PhDs in Medical Physics, are currently enrolled in PhD programs, or went from the SMS to a medical physics residency. *The donations to the Shalek Fellowship Fund thus have a direct and positive impact upon the students who receive them and thence upon the field of medical physics.*

The Medical Physics Program thanks the donors to the Shalek Fellowship Fund. All gifts, both large and small, both single and recurring, help the program in its work. Please consider giving generously.

Additionally, this year, we had a special donation and tribute (next column) from Dr. Kenneth R. Hogstrom, in honor of two faculty alumni.

Shalek Fellowship Donation Tribute

The Robert J. Shalek Fund was established in 1986 in honor of Dr. Shalek and his efforts as Department of Physics Chair and Medical Physics Program Director to fund University of Texas Health Science Center Graduate School of Biomedical Sciences and MD Anderson Cancer Center (MDACC) students. Generous donations from faculty, alumni, friends, and Short Course Program revenues fully funded 1-6 students annually for many years with nearly 100 students having received funding to date.

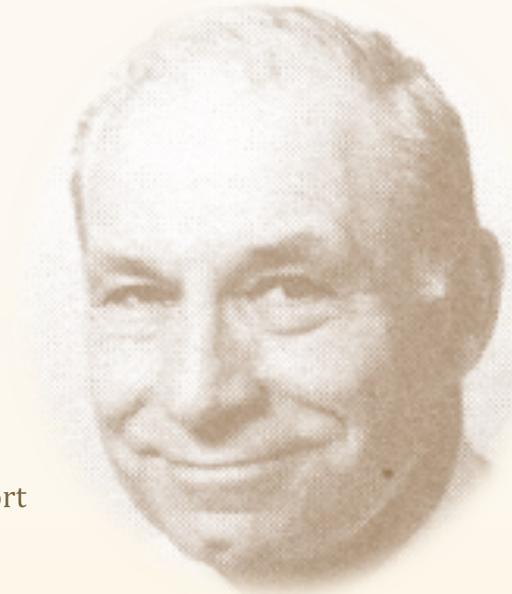
Equally important as this funding was the dedication of Program faculty members at MDACC and UTHSC to teach and mentor its graduate students. For many years Program graduates have made significant clinical, scientific, and leadership contributions to the fields of radiology and radiation oncology at multiple institutions over the United States, including MDACC.

No faculty members were more dedicated to graduate students at MDACC than Isaac Rosen (1993-2005) and Daniel Macey (1990 - 1996). Both treasured working with students. Therefore, it was with great satisfaction that I made my 2022-23 memorial gift to the Shalek Fund in memory of these two former MDACC faculty colleagues. Also, my gift was an opportunity to assist current graduate students and say thank you to the Program for its rewards, memories, and contributions to our profession.

Kenneth R. Hogstrom, PhD

MD Anderson Medical Physics Faculty
Drs. Dan Macey (L) and Isaac Rosen (R)

Robert J. Shalek
Fellowship Fund



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.

2023
Dianna Carrasco-Rojas
Derek Garcia
Michael Yang

2022
Alen E. Lopez Hernandez

2021
Rachel Glenn

2020
Hayden Scott

2019
Rebecca DiTusa

2017
Shannon Hartzell
Brandon Luckett

2016
Mary Peters Gronberg

2015
Brian Anderson
Laura Bennett
Benjamin Musall

2014
Daniela Branco
Harlee Harrison
Joseph Weygand

2013
Matte McInnis
Olivia Popnoe

2012
Ming Jung Hsieh
Jennifer Sierra Irwin
Dana Lewis
Justin Mikell

2011
Shuaping Ge
Annelise Giebeler
Olivia Huang
Elizabeth McKenzie
James Neihart
Matthew Wait

2010
Jennelle Bergene
Kevin Casey
Jared Ohrt
Kevin Vredevoogd

2009
Sarah Joy
Emily Neubauer
Paige Summers
Jackie Tonigan Faught

2008
Joseph Dick
James Kerns
Kelly Kisling
David Zamora

2007
Triston Dougall
Georgi Georgiev
Ryan G. Lafratta
Malcom Heard
Katie West

2006
Maria Bellon
Jimmy Jones
Nathan Pung
Yevgeney Vinogradskiy

2005
Renee Dickinson
Susannah Lazar
Alanna McDermott
Paige Nitsch

2004
Michael Bligh
Ryan Hecox
Hilary Voss

2003
Blake Cannon
Scott Davidson

2002
Earl Gates
Kenneth Homann
Hilary Voss
Claire Nerbun

2001
Melinda Chi
Gary Fisher
Jackeline Santiago

2000
Michael Beach

1999
Laura Butler
Amanda Davis
Nicholas Koch
Jennifer O' Daniel
Nicholas Zacharopoulos
Matthew Vossler

1998
Shannon Bragg-Sitton
Christopher Cherry
Dee-Ann Radford

1997
Christopher Baird
Aaron Blanchard
Michael Lemacks
Luke McLemore

1996
Michael Bieda
Tamara Duckworth
Gwendolyn Myron

1995
Jonathan Dugan
Teresa Fischer
Russell Tarver

1994
Victor Howard
Usman Qazi
Donna Reeve
Steve Thompson
Matthew Vossler

1993
Kyle Antes
Sarah Danielson
Dena McCowan
Donna Reeve
Matthew Vossler

1992
Peter Balter
Katy Jones

1991
John Bayouth
Robert Praeder
Twyla Willoughby

1990
Maria Graves
John Wallace

1989

Donation Pledge Form

Robert J. Shalek Fellowships in Medical Physics

Name ______________________________ Title ______________________

Address ____

Email ____

Total Donation/Pledge: (all contributions are fully tax deductible)

☐ $100	☐ $200	☐ $500	☐ $1,000	☐ Other: $_______

☐ Payment Enclosed: $_______ or ☐ Amount Pledged: $_______ by _______________

Does your (or your spouse's) institution have a matching gift program?

☐ Yes ☐ No

Would you consider making a legacy donation as part of your estate planning?

☐ Yes ☐ No

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