

DIVISION OF RADIATION ONCOLOGY **ANNUAL RESEARCH & EDUCATION** **NEWSLETTER**

Fiscal Year 2020



**Into the Cloud: Enhancing
Radiation Treatment Planning**

**Launching Nanomedicine in
Radiation Therapy**

**Empathy and Impact: Partnering
with Dedicated Community Leaders
in the Fight Against Cancer**

THE UNIVERSITY OF TEXAS
MD Anderson
Cancer Center
Making Cancer History™

Division Research & Education



Dear reader,

Welcome to the inaugural issue of the Division of Radiation Oncology Research & Education annual newsletter. We invite you to explore some of the highlighted initiatives and achievements led by our faculty, staff and trainees, as well as major events throughout the fiscal year 2020 (FY20).

This past year, we welcomed Dr. Albert Koong to his new role as Division Head, and Dr. Mary Martel as Chair of Radiation Physics. Each shares perspectives and visions on leadership, as well as their dedication to research and mentorship of next-generation leaders of radiation oncologists and medical physicists.

We feature representative high-impact scientific publications and strategic priorities in partnership with our community leaders and industry collaborators. These works constitute only a cross-section of the division's broad-ranging research and education portfolios, aimed at potentially practice-changing discoveries and paying-it-forward educational opportunities.

FY20 has also brought on a global pandemic, and with it, many additional challenges to our research and education enterprises. However, even as we all grapple with new ways of working and personal hardships, the human spirit is resilient and our commitment – to patients, our communities, and each other – is enduring. It is that spirit and dedication that are reflected in the stories unfolding within these next pages. We hope you enjoy reading them as much as we treasure the opportunity to share them.

Hanh H. Hoang, Ph.D.
Director, Radiation Oncology Research

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ABOUT THE NEWSLETTER

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ABOUT THE DIVISION OF RADIATION ONCOLOGY

The Division of Radiation Oncology at MD Anderson provides compassionate, state-of-the-art, quality radiation treatment to cancer patients while integrating education, laboratory and clinical research, and radiation physics to achieve improved outcomes.

<https://www.mdanderson.org/research/departments-labs-institutes/departments-divisions/division-of-radiation-oncology.html>

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Images without masks taken pre COVID-19 pandemic

Welcoming Dr. Albert Koong as Division Head

DIVISION HEAD PERSPECTIVES

Almost three and a half years ago, in August 2017, Albert Koong, M.D., Ph.D. joined MD Anderson as Chair of Radiation Oncology Department. Not only was he greeted by the blistering summer heat of Houston, Texas, but less than a month later, hurricane Harvey devastated the city and surrounding communities. Undeterred, Koong has since navigated the department and division through these and other challenges of patient care and academic medicine. In October 2019, he assumed the position of Division Head of Radiation Oncology. Prior to joining MD Anderson, Koong served as Associate Chair and Clinical Director of Radiation Oncology at the Stanford University School of Medicine.

A patient-centered, research-driven, and an internationally recognized physician-scientist with a clear vision and ambition to bring new treatment options to cancer patients, Koong embodies the transformative, compassionate, and inspiring leadership that is reflective of MD Anderson's core values of caring, integrity, and discovery.

Koong shares with us his aspirations for radiation oncology and what motivates him in our common quest to end cancer.

What prepared you for your role as Division Head?

Developing a robust relationship with the section chiefs was critical for me to learn how the department functions and fits into the overall structure of the institution. I trust the section chiefs to provide me with the necessary input so that I can make data-driven, sound decisions.

What inspires you?

My patients. As physicians, we have the privilege of taking care of patients with life-threatening illnesses. We have a fundamental obligation to do whatever we can to improve their health and the quality of care that our patients receive. I also have the privilege of working at a world-class cancer center where I work with outstanding faculty and staff in their respective fields.

Why is research important to you?

Research is essential to advancing cancer therapy so that we can improve outcomes for our patients. Discoveries in cancer broaden our understanding of fundamental biological processes, which can lead to breakthroughs in other diseases.

What is your vision for research in the division?

My aspiration is that the research priorities we identify will lead to a transformational change in cancer therapy for the benefit of our patients. This vision is outlined in the Radiation Oncology Strategic Initiatives (ROSI).

What is your laboratory research focused on?

My lab is focused on understanding cell signaling within the tumor microenvironment. Specifically, we study a pathway called the Unfolded Protein Response (UPR), which our lab and others have shown to be essential for tumor growth and progression using different genetic models of cancer. We have developed various classes of drugs that can block specific elements of this pathway. The overall goal is to advance these drugs into clinical testing with the ultimate goal of developing new classes of chemotherapy for cancer patients.

Not only is research important to you, but education is as well. Would you tell us why?

One of the greatest impacts we have as academic radiation oncologists is to train the next generation of physicians. We have a responsibility to our trainees and to our field to pass on the knowledge that we have gained. This knowledge will be amplified by our residents and fellows who will in turn, train others.

How does the division work to promote education?

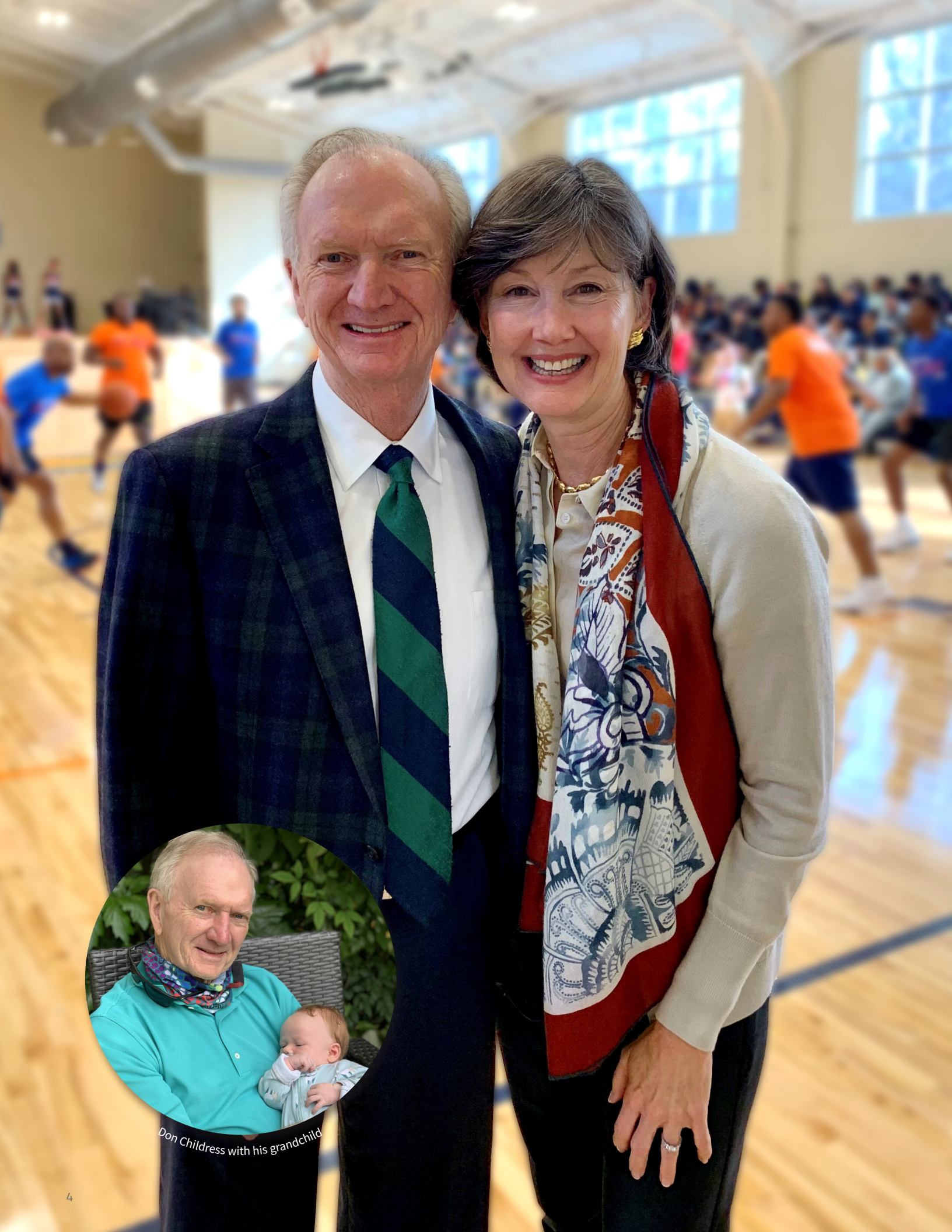
Dr. Prajnan Das is our Deputy Division Head for Education. He sets the overall priorities for our education program. The centerpiece of these efforts is our residency program.

Dr. Chelsea Pinnix has recently taken over as the Program Director of the No. 1 ranked residency program in the country. We also have robust programs to train fellows, postdocs, and students.

Dr. Jillian Gunther is leading an initiative to attract more underrepresented minorities into our field through a medical student fellowship program. These are just a few examples of the various education initiatives that are going on now.

What is something you have learned from patients?

From my patients, I have learned almost everything that is worthwhile to learn in medicine.



Don Childress with his grandchild

Empathy and Impact: Partnering with Dedicated Community Leaders in the Fight Against Cancer

PHILANTHROPY

Don Childress is a family man, entrepreneur, pilot and cancer survivor. He received radiation therapy as part of his care at MD Anderson. Although his cancer was cured, he endured significant side effects from treatment. The extraordinary level of care, positive treatment outcome, and overall experience with physicians and staff left a lasting impression on him and his wife, Sidney Childress — so much so that they were motivated to support the Radiation Oncology Strategic Initiatives (ROSI), a road map for the division's research and educational priorities.

The Childresses, who have been supporting MD Anderson since 2017, made a gift of \$1 million from The J. Donald Childress Foundation Inc., to support these promising projects.

"If patients after me can receive radiation therapy and get the same results with less side effects — well, I think this is a worthwhile cause," says Childress. Reflecting two of the Childresses' core priorities, empathy and impact, the gift will enable our faculty and researchers to catalyze additional new projects and initiatives that may not yet be positioned for conventional federal or state funding, but that potentially and ultimately could redefine radiation treatment planning and standards of care.

A spotlight on drug candidates with radioprotective effects

Physician-scientist Cullen Taniguchi, M.D., Ph.D., associate professor, was recruited to MD Anderson from Stanford University in 2014 as a prestigious Cancer Prevention and Research Institute of Texas (CPRIT) Scholar. He specializes in treating pancreatic cancer, a largely intractable disease that is difficult to detect in a timely manner and has a five-year survival rate of only 5% to 10%.

Taniguchi's team of researchers focuses on, among various research areas, discovering and understanding new and creative ways to minimize the side effects of radiation therapy. "Traditional approaches often ask how much treatment a patient can 'tolerate' without significant harm," Taniguchi explains. "Our lab, on the other hand, takes a different approach and asks instead: How can we make our current treatments more effective by reducing the bad side effects?"

Head and neck cancers are generally hard to treat with radiation therapy as it can be harmful to these sensitive areas. This disease site serves as a good model for the Taniguchi lab to answer the above question. With support from the Childress gift, the research team conducted studies to test a class of drugs called CDK4/6 inhibitors that could potentially protect normal tissue from radiation damage. They tested this drug in an animal model and discovered that these inhibitors appear to protect different types of normal tissue from radiation-induced injury. Understanding, and ultimately leveraging, the radioprotective activities of these Food and Drug Administration-approved drugs would be transformative.



Gabriel Sawakuchi, Ph.D. (left) and Cullen Taniguchi, M.D., Ph.D. (right) Image taken pre COVID-19 pandemic (5/9/2018)

"This generous gift has enabled us to continue our fight against cancer," says Taniguchi. The next steps in this challenging fight are aimed at validating and translating these significant laboratory results to clinical fruition as quickly and safely as possible.

Accelerating radiation oncology translational research through the biomarker initiative

A biomarker, a blend of the words "biological marker," is any substance found in the body that can be measured and studied to make a number of predictions or conclusions related to disease onset, treatment efficacy and outcomes. Thus, biomarkers are an incredibly powerful part of our toolkit. Radiation oncologist and physician-scientist Simona Shaitelman,

M.D., associate professor, and radiation physicist Gabriel Sawakuchi, Ph.D., associate professor, co-lead the predictive biomarkers pillar, a ROSI pillar aimed at expanding the division's biomarker infrastructure and collection for robust translational research toward patient care. Recognized for its critical role in our overall research mission, the Biomarker Initiative is also a beneficiary of the foundational support from the Childresses. "This gift has made possible several biomarker studies that otherwise would not have launched without this resource," Shaitelman says.

With a laboratory up and running, and the scientific partnership across radiation oncology and radiation physics, the biomarker team has established best practices to safely and efficiently collect, process and store high-quality biospecimens. "These are really precious resources that patients are donating to us," says Shaitelman. Our investigators across the division collaborate to design and include certain biomarkers and correlative studies in their clinical trials in an effort to optimally utilize the invaluable, but limited, patient samples and the gift toward answering fundamental scientific questions.

In collecting and, in phase two of this strategic initiative, analyzing these specimens, our radiation oncologists will be able to predict radiation responsiveness in patients specific to their type of cancer. "Ideally, as we identify biomarkers, we can build a system that can guide physician treatment planning," Shaitelman

says. "We're not there yet, but that's the vision — to incorporate biomarker data and information into treatment planning." With this ambitious goal realized, our radiation oncologists will have additional tools at their disposal in developing advanced levels of care for patients.

"Gifts such as the one from the Childresses can be transformative in improving cancer care," says Division Head and Chair of the Department of Radiation Oncology, Albert Koong, M.D., Ph.D. "When we are able to fast-track a project such as those within ROSI, the real benefit is to patients, whose treatment will reflect the application of newly acquired knowledge," he says. "We are grateful that Don and Sidney placed their confidence in us."

Where Physics Meets Radiation Oncology: Detecting DNA Damage Induced by Carbon Ions

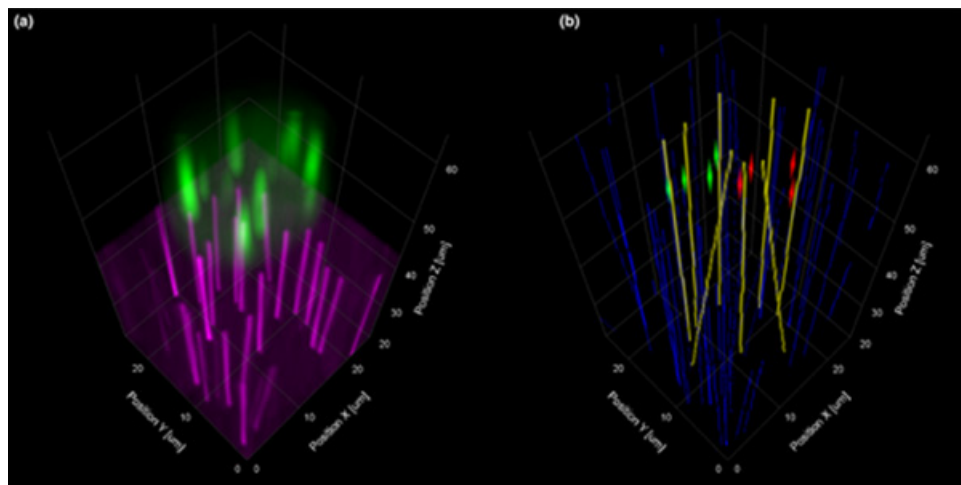
The fundamental principles of physics undergird the research and clinical applications of radiation therapy. In the Department of Radiation Physics, faculty and professional staff are involved in conducting innovative research; education and mentorship of students and residents; and clinical imaging, planning, and dosimetry.

RESEARCH

Gabriel Sawakuchi, Ph.D. is an associate professor in the Department of Radiation Physics and co-leader of the Predictive Biomarkers Pillar for the Radiation Oncology Strategic Initiatives (ROSI). He has a special research interest in studying DNA damage response caused by radiation. Collaborating with an international group of physicists, engineers, biologists and oncologists, Sawakuchi developed and published a new technique for studying DNA damage from carbon ion therapy, "Isolation of time-dependent DNA damage induced by energetic carbon ions and their fragments using fluorescent nuclear track detectors." This was featured in the journal, *Medical Physics*, as an Editor's Choice article, and it also made the cover of the January 2020 issue.

extent of DNA damage that can be caused by radiation, in order to better adjust the radiation dose and time points of radiation administration needed to overcome DNA repair and ultimately kill cancer cells.

Sawakuchi and his team custom built an instrument that can measure biological responses by imaging live cells and, at the same time, physically follow the individual tracks of radiation-induced DNA damage in each cell with nanoscale spatial resolution. Using this instrument, they discovered that the types of DNA damage produced by high-energy radiation particles associate with cell death.



3D and Real-Time Imaging of DNA damage (green) and Radiation Particle Tracks (magenta) into Cells (from McFadden et al. "Isolation of time-dependent DNA damage induced by energetic carbon ions and their fragments using fluorescent nuclear track detectors". *Med Phys*. 2020 Jan;47(1):272-281.

Carbon ion therapy is an emerging type of radiation therapy. It may have the potential to reduce healthy tissue destruction while treating cancer patients, especially those whose tumors are resistant to other types of radiation therapy. DNA damage from carbon ion therapy, as well as from other types of radiation therapy, such as proton therapy, can be used as biomarkers to monitor the effectiveness of radiation therapy and to provide information on radiation dose and scheduling.

Because cells have a remarkable way of repairing DNA damage and surviving, investigators sought to measure the types and

To our knowledge, no other instrument of its kind has been reported. This enables Sawakuchi and team to deftly navigate and bridge the domains of biology, physics, and clinical application. To extend their featured studies, these researchers are developing the next-generation 3D and real-time imaging equipment to study the effects of radiation on neurons. The goal is to develop clinical strategies to mitigate cognitive deficits after radiation therapy. If proven successful, this work will help broaden the application of radiation therapies and provide patients with more treatment options.

A New Approach to a Common Question in Cancer Research

What kills cancer cells? Boyi Gan, Ph.D. might just have a new answer.

FACULTY PROFILE

Dr. Gan, associate professor in the Department of Experimental Radiation Oncology, brings his passion to end cancer through research and discovery. “Our lab has been studying ferroptosis, a type of cell death that is triggered by toxic buildup of lipid damages called lipid peroxidation in the cellular membrane, and its relevance to cancer,” Gan explains.

Gan and his team discovered that radiation therapy can induce this kind of cell death. As the phenomenon was still in early proof-of-concept stage, and not likely well positioned for external funding, they submitted their proposal to the Radiation Oncology Strategic Initiatives (ROSI) Boot Walk Seed Grant and were awarded funding for his study entitled, “Targeting a Novel Ferroptosis Defense Pathway in Radioresistance.”

“We were very fortunate to receive ROSI seed funding because it provided the critical jump-start for us to work on this exciting project and to publish the resulting manuscript (in Cell Research),” says Gan. The findings from the ROSI-funded study aided Gan and his group to successfully compete for a Research Project Grant (R01) from the National Institutes of Health (NIH), to further investigate the mechanism(s) through which radiation-induced ferroptosis of cancer cells occurs. When combining ferroptosis inducers, called FINs, with radiation therapy, Gan and his team observed a significant reduction in tumor size.



Chao Mao, Guang Lei, Hyemin Lee, Yilei Zhang, Boyi Gan, Ph.D., Yuelong Yan, Pranavi Koppula, Xiaoguang Liu, and Weijie Cheng. Image taken pre COVID-19 pandemic (12/16/2019)

This project’s journey from idea to seed award, high-impact publication, and external peer-reviewed funding, is emblematic of the success stories that the ROSI seed funding program seeks to catalyze across the division. It also demonstrates the potential impact of ROSI in support of our prolific faculty, like Gan, who in this fiscal year alone, has attained three R01 or similar grants to support his robust cancer research program.

“Biology is extremely complex. My inspiration to do research is derived from my curiosity in the beauty and complexity of life science and my personal experience with family and friends who have suffered from devastating diseases such as cancer,” Gan describes. “By studying fundamental biological questions, we can identify novel effective therapies to help our patients in the near future.” With that ultimate goal, Gan and his team of scientists continue their singular focus on the life and death of cancer cells – how cancer cells persist or perish under this type of stress – to turn this vital question into potentially practice-changing solutions.

Radiation Oncology Strategic Initiatives



Through division-wide collaboration, Radiation Oncology faculty and leadership identified research and educational priorities to transform the next generation of radiation therapy. As such, the Radiation Oncology Strategic Initiatives was developed as a road map comprising six pillars: Advanced Imaging, Global Radiation Treatment Access, Immuno-Radiation Therapy, Particle Therapy, Predictive Biomarkers, and FLASH Radiation Therapy (added in FY20). These pillars are supported by five cross-cutting platforms, including: Data Science, Clinical Trials & RO Network Research, Education, Health Services Research, and Quality & Safety.

Each pillar and platform is led by Radiation Oncology faculty leaders who foster an environment of collaboration (within and external to the division) and mentorship for trainees and early-career faculty. Specific seed funding opportunities for faculty and non-faculty researchers are available throughout the year, and are administered through the various pillars and platforms. Applications undergo a peer-review process, and awards are managed by the ROSI program administration team. For additional and current information, contact ROSI@mdanderson.org.



Welcoming Dr. Mary Martel as Radiation Physics Chair

Mary Martel, Ph.D. is a rare and powerful combination of servant leadership, mentorship, and physicist. In 2019, shattering a steep glass ceiling, she became the first woman to be appointed as Chair in the Radiation Oncology division and of the Radiation Physics department at MD Anderson Cancer Center.

RADIATION PHYSICS CHAIR PERSPECTIVES

Martel exemplifies a unique leadership model, with her outstanding career accomplishments that have spanned the local and national levels, and beyond the boundaries of medical physics and innovative research. She honors the exceptional mentors that have helped shape her career by extending the ladder and a supportive hand to the next generation of faculty leaders. She is paving the foundational groundwork for other women to continue breaking barriers in the field of physics.

Serving as the Director of Faculty Support in the Department of Radiation Physics, Martel empowers and guides junior faculty and others on their career development journeys.

As we reflect on an incredible year and milestone for the Department of Radiation Physics, Martel shares with us her vision, advice, inspiration, and views on research, academic medicine and the male-majority world of medical physics.

What prepared you for your role as Chair of Radiation Physics?

Our department has over 250 employees, not just faculty and professional staff medical physicists, but also dosimetrists, engineers, machinists, administrative staff, educational trainees, and many more. There is no substitute for prior supervisory and leadership experience in order to be successful as the Chair of the Department of Radiation Physics.

I became the clinical physics lead at a New York City hospital right out of the gate from a postdoctoral fellowship/residency. With each successive move, I have always taken on more responsibility,

What is your vision for research in Radiation Physics?

Our division took an important step several years ago in conducting a research retreat to establish the Radiation Oncology Strategic Initiatives (ROSI). The “pillars” of ROSI reflect the research vision for the department and the division. Physics contribution is recognized through leadership of ROSI work. In addition, our department has a number of strong research groups and are considered world leaders in research. I think of our groups in terms of generations. We have strong research leaders who are professors and associate professors, but we must continue to recruit assistant professors who are research-focused to grow our next generation of scientists. The vision for our department’s research continues to focus on disruptive technology and treatment via physics, biology and clinical development.



Mary Martel, Ph.D.

“It is important to remember that we stand on the shoulders of women leaders who have come before us and paved the way for the advances that women today have gained.”

as Clinical Physics Chief until I came to MD Anderson 13 years ago, and as Deputy Director of Clinical Physics. I was also elected President of the American Association of Physicists in Medicine (AAPM), our professional society, and as Chair of Science Council for the American Society for Radiation Oncology (ASTRO), giving me national leadership experience. Along the way, you hone your leadership skills and establish your core values (“caring, integrity, transparency”, as a servant leader).

It is important to communicate your core values to your team and department through words, and most importantly, through actions. These guiding principles helped elevate me throughout my career to reach what I consider the pinnacle of medical physics, becoming the Chair of Radiation Physics at MD Anderson.

What inspires you?

Our patients have always inspired me toward purpose in life and career. My Ph.D. is in physics and when I learned that physics could be applied to the medical field, I was quickly drawn in! Inspiration comes from working with outstanding health care professionals that are focused on our patients.

Why is research important to you?

I chose to enter academic medicine because research is important to me. Research is what “moves the field forward” toward better treatment and outcome for our patients. Of course, patient-centered care is our priority, but discovery through innovation is an essential part of working at MD Anderson, and we provide leadership toward high-quality care.

As a leader in a male-dominated profession, what insight and advice would you share with young women entering your field or another male-dominated profession?

It is important to remember that we stand on the shoulders of women leaders who have come before us and paved the way for the advances that women today have gained. We have so much farther to go before there is equality. My best advice is to find people who will provide mentorship and sponsorship for their careers. Their experience helps to “pay it forward” so that each generation may continue to gain ground in male-dominated professions.

What advice would you give to junior faculty who are trying to shape their careers?

I advise junior faculty to first connect with purpose in their career. Careers are not a series of boxes waiting to be checked off. It is important to be proactive in finding opportunities that are meaningful in advancing their career but also having an impact on their field. When a faculty is struggling, I ask them to find a role model in their field and see how this person attained their position and status. This helps the faculty member gain perspective on their own career.

What sparked your passion for mentorship of faculty members?

Mentorship and sponsorship have long been a focus of my career. I have had great mentors in my career, and it is important to continue to pass along knowledge learned and wisdom attained to the next generation.

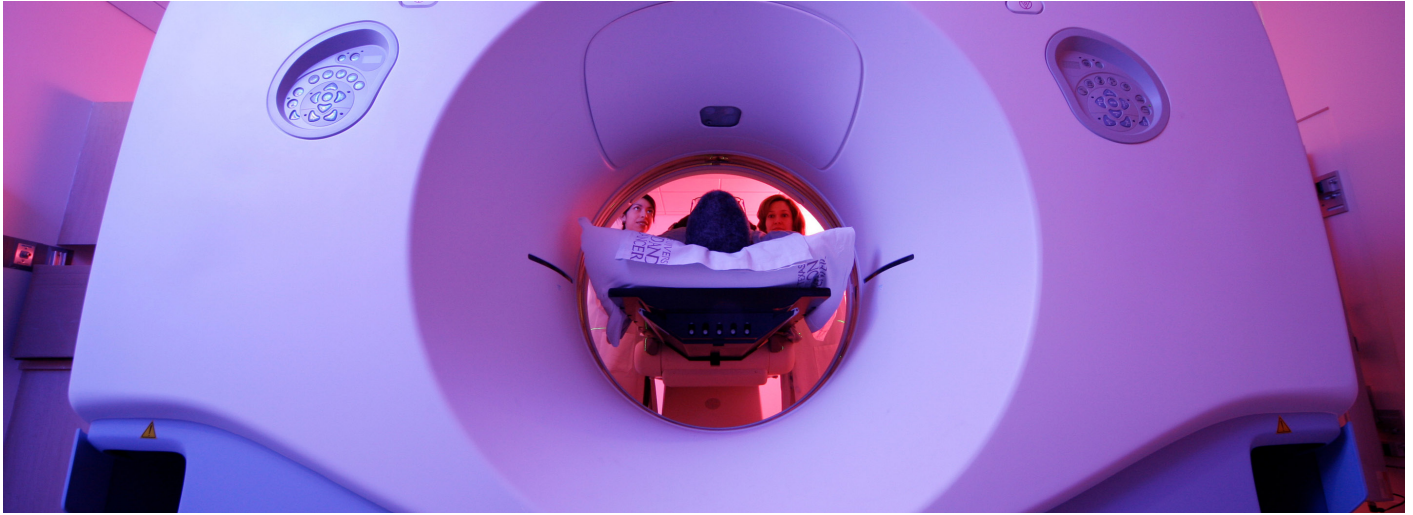


Image taken pre COVID-19 pandemic (07/11/2006)

Laying the Foundation for the Next Generation of Radiation Oncologists

EDUCATION

Our core value of discovery is marked in the richness and successes of the educational programs we offer. From institutional leaders to our Division Head of Radiation Oncology, Dr. Albert Koong, a focus on education is vital to continuing our mission to end cancer.

Director of Medical Student Education in Radiation Oncology, Jillian Gunther, M.D., Ph.D., has her own reasons for educating the next generation. Like all physicians, she was once a medical student and discovered her passion for radiation oncology through educational opportunities. “I love working with medical students because they are sincerely excited to learn about our field,” says Dr. Gunther. “It’s a good reminder of why I love what I do and why I decided to pursue radiation oncology in the first place.”

The Radiation Oncology Medical Student Elective Rotation is one of the educational programs that Gunther leads. Students interested in the field of radiation oncology are encouraged to apply for an opportunity to have firsthand exposure to the remarkable work of our physicians and better understand the role radiation therapy plays in the treatment of cancer. “I value the opportunity to help

reframe the design and execution of these programs. “We’ve tried to recreate many of the components of our typical elective in the virtual environment,” Gunther explains. “We’ve established several didactic sessions that are held virtually for students to view and now have a weekly virtual lecture series that still provide faculty the ability to teach the important aspects of radiation oncology,” she says. Numerous virtual events have enabled students to interact with our residents, faculty, and residency program staff.

Another exciting new offering that Gunther champions is the Radiation Oncology Medical Student Summer Research Program. This research fellowship is for those who have completed their first year of medical school and are considering a path in the field of radiation oncology, with a focus on students from underrepresented minority groups. The curriculum will include introductory lectures on science and medicine, a faculty mentor, participation in a research project, and observation of clinical activities. “We are very excited about this program and look forward to mentoring our first students in 2021,” Gunther says.

“I love working with medical students because they are sincerely excited to learn about our field.”

guide students along their path to residency and aid them in achieving their goals,” says Gunther. Participating in this elective rotation will give students the chance to learn the basic principles of radiation physics, radiobiology, and radiation safety; to interact with patients from consultation to treatment; and to improve interpersonal communication skills and professionalism. This is an important offering as some of these students are likely to be future residents learning alongside our faculty and staff.

Despite the challenges of the novel coronavirus, this academic opportunity and others still remain as the results of efforts to

Gunther has a wealth of wisdom and knowledge to share when it comes to a career in medicine. “For those interested in radiation oncology, I advise that students first focus on gaining skills to become an excellent physician and oncologist, then a radiation oncologist,” Gunther says. “There are important lessons to learn in every experience a student encounters, whether it be in the classroom or in the clinic. These opportunities help shape future oncologists at the number one cancer hospital in the nation,” she says. “These young students have so much potential to change our field for the better. This is the overarching goal – continuance of new discoveries in cancer care to ultimately serve our patients.”



Into the Cloud: Enhancing Radiation Treatment Planning

STRATEGIC ALLIANCE

Within the Division of Radiation Oncology, our clinicians perform physician-to-physician peer review of approximately 12,000 radiation treatment plans annually at the main campus, Houston area locations, and across the nation-wide MD Anderson Cancer Network.

Before a patient begins radiation therapy, a treatment plan is created to fit the specific needs of the patient to achieve the best possible outcome. Many factors are considered when creating a

optimal treatment with the most limited toxicity,” says Karen Hoffman, M.D., who is one of two alliance Principal Investigators (PIs), together with Laurence Court, Ph.D.

This partnership has the potential to not only benefit patients at MD Anderson, but it may also have significant impact for our collaborators at the cancer network hospitals. “We already partner with the cancer network to do real-time peer review of radiation therapy treatment plans, but we expect that this



Laurence Court, Ph.D. (top left), Thomas Whitaker, Ph.D. (top right), Karen Hoffman, M.D., M.H.Sc., M.P.H. (bottom left), and Roman Wicha, Ph.D. (bottom right)

plan: the patient’s clinical history, the appropriateness of the area being treated, and how it compares to internal standards and international standards of care.

To improve this complex process, a strategic alliance with Varian Medical Systems was established to develop a cloud-based platform through which radiation oncologists, dosimetrists, and medical physicists may collaborate in the planning, review, and delivery of radiation therapy.

“I believe in the importance of providing the highest quality possible plans for our patients in order to deliver the most optimal treatment with the most limited toxicity.”

“I feel very fortunate to be involved and a part of this process because I believe in the importance of providing the highest quality possible plans for our patients in order to deliver the most

platform is going to improve the efficiency and quality of that process,” says Court, the other alliance PI.

Through centralized communications, data integration, standardized documentation, and integrated standards, the quality and value of radiation therapy peer-review will be augmented while reducing the amount of time it takes to review radiation treatment cases.

“By improving consistency of treatments and collecting data from many patients (within and external to the MD Anderson main campus), it gives us the ability to really thoroughly understand how different types of treatment give different outcomes and to optimize the patient-specific plan,” says Court.

With this goal in mind, Hoffman and Court will be working closely with other division faculty, our colleagues in Information Services, and the team at Varian Medical Systems to improve the overall quality of radiation treatment plans and optimize the therapeutic benefit of radiation therapy delivered to cancer patients at MD Anderson and beyond.



Patients ring the bell to mark a milestone in their cancer treatment.

Resiliency, Hope, and Valuable Learning from our Patients: Sources of Inspiration for One Radiation Oncologist

FACULTY PROFILE

Caroline Chung, M.D., is an associate professor in radiation oncology and diagnostic imaging who has a multitude of goals and achievements in research. “Research is essential to helping us better understand disease processes so that we can continue improving treatments for our patients,” says Chung. She enjoys teaching and mentoring and sharing this message with trainees and members of her computational lab focused on quantitative imaging. She has also enjoyed working with a large multidisciplinary team across divisions in exciting collaborations with the National Aeronautics and Space Administration (NASA) on two funded projects investigating imaging and biofluid biomarkers of cardiac and neurocognitive toxicity following radiation exposure.

With the turn of events in 2020, she has been working to support the institutional Data Driven Determinants for COVID-19 Oncology Discovery Effort (D3CODE), which includes a COVID-19 project in partnership with Microsoft AI for Good. Working with the Natural Language Processing (NLP) and Data Science (DS) teams at MD Anderson, they have built a pathway or “pipeline” to sift through thousands of publications to extract insights around the pandemic. “This project was motivated by the rapidly evolving body of literature around COVID-19 at a rate that was just not consumable by human reading speeds,” Chung explains. With the recently funded grant, the Microsoft AI for Good team will be working with Chung and the NLP/DS teams at MD Anderson to automate this pipeline to facilitate sifting through the immense amount of literature to help answer many research questions. “We also hope to use and modify this automated pipeline to interrogate other bodies of literature including cancer publications,” Chung adds.

She also leads the Advanced Imaging pillar for the Radiation Oncology Strategic Initiatives (ROSI). “The greatest accomplishment of this pillar has been how it has brought together an engaged and growing multidisciplinary community (radiation oncology, medical physics, imaging physics, radiology, imaging technology, and radiation therapy) focused on learning,

researching and implementing advanced imaging,” Chung says. Over the past several years Chung has worked to grow the field of advanced imaging, specifically with magnetic resonance imaging (MRI). Most notably, Chung and other faculty within the advanced imaging pillar catalyzed the collaboration that brought Elekta’s MR-Linac to MD Anderson as the first site in North America to treat a patient with radiation therapy coupled with the improved imaging quality and tumor tracking capability provided by MRI. Other achievements that have sprouted from this pillar are the industry alliances with RaySearch Laboratories and Siemens Healthineers. Chung and other faculty are collaborating with RaySearch to develop tools to help standardize and automate radiation treatment protocols and also integrate quantitative imaging for radiation treatment planning and better estimates of delivered radiation in patients. Within the Siemens partnership, the overarching goal is to improve the quality of imaging data captured and used in cancer care and research in order to improve the measurement of outcomes and enable precision medicine.

With her efforts divided among clinical care, research, and other academic pursuits, Chung additionally invests time to serve as Co-Chair of the Tumor Measurement Initiative, which aims to build an institutional platform to support standardized, automated, quantitative imaging-based tumor measurement across each patient’s journey to advance multidisciplinary, data-driven, high precision cancer treatment. More recently, she is also Co-Chair of the Data Governance Program version 2.0, which aims to build a comprehensive and systematic data governance program grounded in team data science principles. “I want to improve the quality of research that we carry out in medicine so that we can efficiently make progress and generate robust insights from our observations and measurements so that we can learn as much as we can from each patient encounter,” Chung adds. From inspiration to innovation, Chung is indeed continually pushing the field of radiation oncology, imaging, and mining the rich data to find more solutions that benefit our patients.



Caroline Chung, M.D. Image taken pre COVID-19 pandemic (10/16/2019)



Dr. Moaaz Soliman, Radiation Oncology Resident

Insights Into the Radiation Oncology Residency Program

Educational opportunities at MD Anderson are incredibly unique. Physicians come from all over the globe to master a skillset and engage in valuable educational opportunities through the residency program.

EDUCATION

Particularly special for our division, is the Radiation Oncology Residency Program, arguably one of the best in the nation. Chelsea Pinnix, M.D., Ph.D. serves as program director and embraces the time she spent as a resident at MD Anderson, which now drives her passion to make a positive impact on this thriving program.

“I learned a lot as a resident at MD Anderson,” says Pinnix. “Beyond the stellar clinical training, I learned how effective and rewarding collaboration can be. Multidisciplinary care is a pillar at MD Anderson, and I witnessed firsthand as a trainee how this results in exceptional outcomes for our patients.”

“It is an absolute honor to lead a program with such a rich history and allegiance to training the most skilled, compassionate and innovative radiation oncologists in the world,” says Pinnix. “Our program hosts physicians preparing to practice radiation oncology, who work hand in hand with seasoned faculty to receive comprehensive clinical training as well as participate in clinical, translational, and/or laboratory-based research.”

Pinnix takes a multidisciplinary approach to training and developing the careers of future oncologists by including experts in medical oncology, surgical oncology, pathology and radiology to support residents as they work toward ambitious goals.

Andrew Bishop, M.D. and Emma Holliday, M.D. work alongside Pinnix as the associate program directors, and alumni of the Radiation Oncology Residency Program. They aim to optimize the program and provide robust training to prepare residents for their lifelong careers in radiation oncology. “We attract talented trainees. We are given the opportunity to teach them how to be

better clinicians, academicians, and radiation oncologists,” says Bishop. “That has exponential impact on patients across the world, as our excellent trainees take the learned skills and education from here to then provide the highest quality care they can to the many patients they will see over their careers.”

The COVID-19 pandemic has not significantly stalled these efforts as the team has discovered new and creative ways of executing the program - remote teaching and web interactions are routine, and mentorship remains a focus.

Perspectives of a resident researcher

Olsi Gjyshi, M.D., Ph.D. is a third-year resident and has a special interest in improving treatment options and quality of life for patients with the human papilloma virus (HPV)- associated cancers. Working under the mentorship of radiation oncologist and physician scientist Ann Klopp, M.D., Ph.D. in a phase II clinical trial, they are evaluating the safety and efficacy of a therapeutic HPV vaccine for patients with cervical cancer.

“Beyond the stellar clinical training, I learned how effective and rewarding collaboration can be.”

Approximately 30-40% of cervical cancer patients may have recurrence; therefore, Gjyshi is investigating new ways to detect cervical cancer recurrence earlier than traditional techniques allow.

“Few places enable residents to gain both a rigorous clinical training and a formidable research experience.” Gjyshi says. “Through departmental support, unparalleled research opportunities, and strong clinical curriculum, I believe that the experience I have gained during residency will be invaluable in future long-term career plans to treat cancer patients.”

Launching Nanomedicine in Radiation Therapy

The Division of Radiation Oncology has partnered with Nanobiotix, a nanotechnology company, to test the safety and efficacy of NBTXR3, a radio enhancer that could potentially boost the effects of radiation therapy.

STRATEGIC ALLIANCE

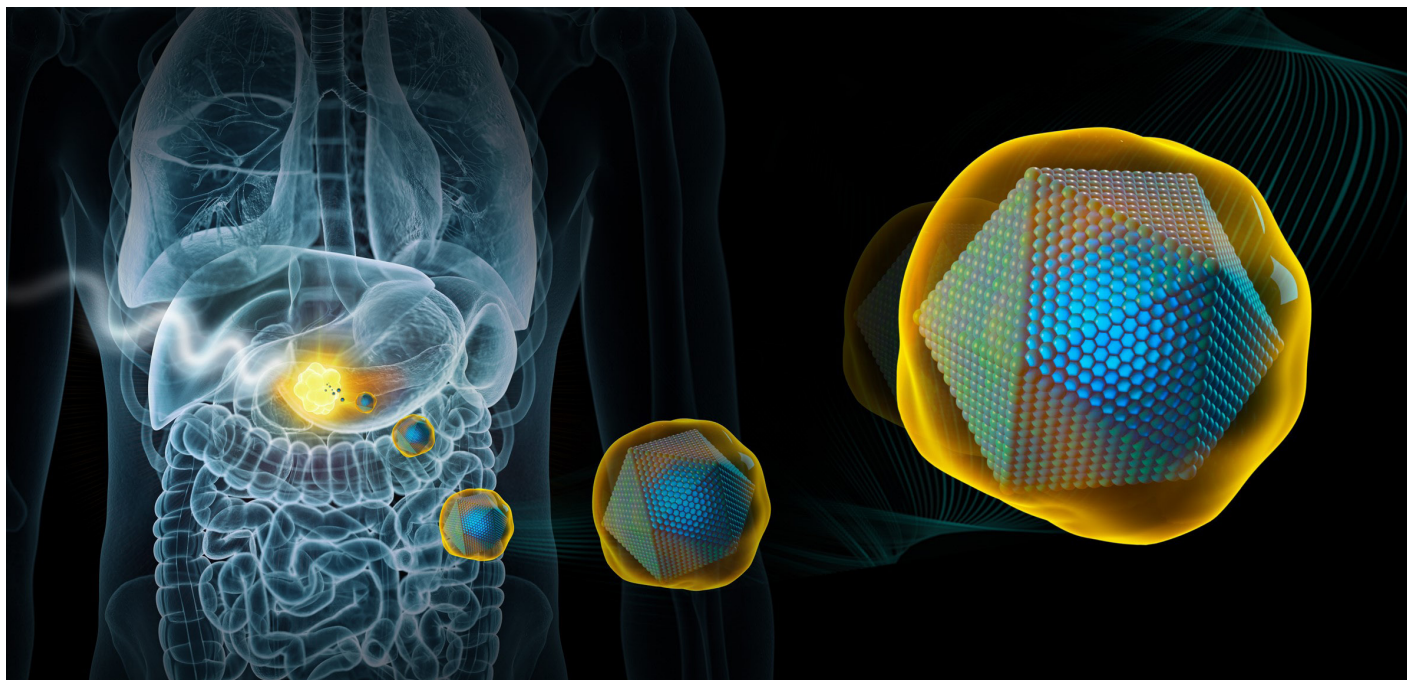


Image courtesy of Nanobiotix

NBTXR3 is made up of hafnium oxide nanoparticles that are injected into the tumor before radiation treatment. When irradiated, these nanoparticles enhance the radiation dose to aggressively destroy the tumor while causing little damage to the surrounding tissue. This drug is still in testing stages and will be piloted in phase I and II studies for multiple disease sites including head and neck, lung, esophagus, and the pancreas.

Zhongxing Liao, M.D. is leading this effort as the alliance principal investigator. With her vision of an efficient and productive academia-industry strategic collaboration, the possibility of a new treatment option is within reach. “The goal, in partnership with our sponsor, is to demonstrate the efficacy of NBTXR3 to improve tumor control in selected hard-to-treat cancers, and to work toward a new treatment option for our patients.”

NBTXR3 pancreatic cancer trial underway

Pancreatic cancer is a major focus of research in the gastrointestinal (GI) section of radiation oncology. This type of cancer has a low survival rate (general 5-year survival rate is less than 10%) and few effective therapies.

Eugene Koay, M.D., Ph.D., a physician scientist in the GI section, is exploring new ways to treat this deadly disease. “If there’s anything that we can do to improve the responses of pancreatic cancer to radiation therapy or chemotherapy, we know those are the first studies that we need to support and be engaged in,” Koay says.

The primary objective of this phase I trial is to evaluate the safety and feasibility of NBTXR3 intratumoral injection and subsequent activation with radiotherapy. The secondary objective of this study is to evaluate the effectiveness of this treatment.

“We know that the major pathological response rate is associated with better long-term outcomes in terms of survival so if we can improve that response rate and show that this is a safe treatment, this could be a major improvement in the long term for patients with pancreatic cancer,” explains Koay. “The major pathological response rate is a measurement of how many tumor cells are eliminated by treatment. A successful response rate is indicated by showing less than 5% tumor cells viable after treatment.”

The pancreas, located in the middle of the body, is surrounded by delicate tissue that is at risk for damage during radiation treatments. For this reason, it is challenging to give higher doses of radiation therapy without affecting the surrounding areas. By studying NBTXR3, radiation oncologists may be able to enhance the local effect of radiation therapy to improve patient outcomes.

“That’s what gets us excited about delivering higher doses of radiation for pancreatic cancer. We’ve observed that patients with pancreatic cancer seem to live longer when we are able to safely escalate the dose,” says Koay. “If radiation therapy along with NBTXR3 is proven to work in safely eliminating tumors, then this could be a major breakthrough in pancreatic cancer treatment and survival outcomes.”

2020: The Year in Photos



Diana Tompkins, Esmeralda Gonzalez and Denise Jones



Judges viewing the ROSI Shark Tank Competition *Image taken pre COVID-19 pandemic (10/2019)*



Sherry Garcia, A Physicians Assistant speaks with a patient in the Proton Therapy Center.



Proton Therapy Center 2 foundation is being poured.



Dr. Brandon Gunn, Dr. Steven Frank, Dr. Albert Koong, President Peter Pisters, Rosanna Morris, and Chris McKee visit the construction of the PTC2 where they witnessed the raising of a signed iBeam.



Dr. Seungtaek Choi, Dr. Albert Koong, Dr. Shalini Moningi, Dr. Prajnan Das and, Dr. Chelsea Pinnix pose for a photo during a drive-by graduation celebration.



Dr. Bouthaina Dabaja and her son Abbas Salehpour participate in the Boot Walk.



Courtney Vogelsang, Jeffrey Judge, Stephanie Bazille, Houari Ouis, Vita Hickman, Denise Jones, and Esmeralda Gonzalez (Nurses) at the Proton Therapy Center (PTC) pose for a group photo.



Sheeba Saji, RN, Dametria Robinson, RN (Assistant Nurse Manager) Tenna Vogel, RN, and Shontornia Collins, RN pose for a photo.



Pediatric nurse practitioner Unnati Desai at the Proton Therapy Center.



Radiation Therapists in Albuquerque, New Mexico.



Clinical research staff Rejani Varghese, Lindsey Garcia RN, Geena Mathew work as screeners in the Main building.

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