

Dartmouth Cancer Center's Global Oncology Program

Perspectives on Global Cancer

Globally, cancer is rising in the very locations where resources are most limited. In the US, most individuals can prevent 40-50% of cancer by screening, early detection, and lifestyle choices. Tragically, 80% of the world's population who live in less-developed countries have no access to those options. The tests, techniques, and lifestyle choices we benefit from often do not translate to low- and middle-income countries (LMICs) because of costs, lack of supporting infrastructure/technology/expertise, or local differences in disease.

Developing options tailored to be effective for the 3.4 billion people living in poverty and extreme poverty is the responsibility of well-trained cancer teams working at the forefront of science and oncology. Since the Dickey presidency (1945-1970), Dartmouth College has been committed to solving the world's most challenging problems. Currently, Dartmouth Cancer Center (DCC) teams are leveraging our strength as an NCI-designated comprehensive cancer center to impact two areas of global oncology relative to LMICs significantly:

- Research for prevention and treatment of cancer to benefit patients wherever they are, and
- Education and capacity building for international faculty.

These goals directly relate to DCC's Equity in Rural Cancer Health and Professional Training strategic objective. These objectives are also consistent with the policies and priorities of our partner institution, the Dartmouth Center for Global Health Equity. We do this by focusing on solving linked problems identified with partners in Rwanda, Honduras, Kosovo, and Tanzania. Dartmouth and DCC's commitment to relationship and capacity building has yielded beneficial relationships that make successful research and training possible.

DCC is an emerging leader in global oncology education as a partner with the Ministry of Health of Rwanda and the launch of student exchange and subspecialty training programs, including fellowships in Gastroenterology and Medical Oncology fellowship training programs in Rwanda. These fellowships are staffed by international faculty from all over the world.

Our determined approach prioritizes evidence-based solutions that can be applied in real-world settings. DCC's nimble interdisciplinary group maximizes opportunities and leverages contacts. In 2020, we founded the Global Oncology Disparities of Care monthly symposium, which continues to meet monthly on Zoom. In the next three years, we are poised to make substantial contributions to optimizing adherence to cervical cancer surveillance recommendations in women with HIV and testing innovative biomarkers to optimize appropriate treatments for advanced breast cancer. Student programs are advancing research and scientific knowledge of genotypes and other cervical cancer biomarkers in Honduras. The Arctic, Peru, and Haiti are other sites with strong Dartmouth connections.



Doctors at Butaro Cancer Center of Excellence (BCCOE) in Butaro, Rwanda, being trained in bedside ultrasound.



Global Oncology fellowship Alum (Class of 2020) and Assistant Professor of Medicine at UConn Victoria Forbes, MD, working with doctors and nurses at the BCCOE to set up the day's chemotherapy orders.

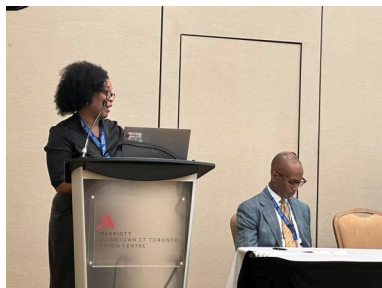
The international gold standard for global health is achieving equity in health for all people. Collaborations with local philanthropy allow us to sponsor research and thought leaders as visiting Dartmouth Scholars, allowing them to complete their PhD research with access to state-of-the-art Dartmouth Molecular Pathology and other resources.

DISTINCTLY DARTMOUTH Interdisciplinary Team Science

Team science is so much a part of our DCC culture that a warm welcome to a request for specialized help is standard. The answer is always, “Sure, I’ll help.” Our diverse Global Oncology team has Members from all four DCC Scientific Research Programs, including CPS: Christensen, Rees, Romano, and Tosteson; ICI: Wira; TEC: Barth, DiFlorio-Alexander, Pogue, and Williams; and SGN: Chamberlin, Dragnev, Kettenbach, and Lansigan. Additionally, 22 investigators and clinicians who meet the criteria of “associate members” include Bensen (Medicine), Bruce (Psychiatry and TDI), Carlos (Geospatial), Cervinski (Pathology), Chapman (Surgery), Davis (Medicine), Bentz (Pathology), Golder (Tuck), Faris (Medicine), Huyck (Medicine and TDI), Lefferts (Pathology), Li (Biostatistics), Liu (Pathology), Marotti (Pathology), Muller (Pathology), Palumbo (Medicine and Pediatrics), Reichstetter (Tuck), Shi (Geography), Suriawinata (Pathology), Tafe (Pathology), Thomson (Medicine), Tirado-Ramos (Biomedical Data Science and Epidemiology), and Vaickus (Pathology)—participants from undergraduates to the most senior faculty hail from all five schools at Dartmouth.



Dr. Ivy Riano Monsalve with Dr. Rubagumya in Kigali, Rwanda.



Dr. Buteau presented her work at ICEC at the Dartmouth Cancer Center Global Oncology Forum on Global Oncology and Disparities of Care.

We function collaboratively with shared effort, data, and findings to inform contemporary projects. Coordinated studies and storage of de-identified data benefit multiple investigators from many perspectives. In just one example, on a weekend in Honduras, a large-scale multi-organ cancer screening trial with IRB approval from Dartmouth and in Honduras was built and coordinated to gather data on environmental exposures for epidemiology; the feasibility of harnessing sunlight for treatment for an engineering team, concordance in pathology throughput; to gauge pre- and post- knowledge, attitudes, and behaviors for psychology and implementation science; the prevalence of certain skin cancers for dermatology; and male participation in self-care for medical oncology. This team science paradigm allows investigators to piggyback their experiments on planned projects, which saves money and will enable them to participate with or without traveling.

Faculty appreciate the rare opportunity DCC provides to participate in translational global oncology training, lecturing, and research mentorship.

GLOBAL PARTNERSHIPS

Our primary global oncology locations leverage long-term Dartmouth relationships, often cultivated by Dartmouth’s Center for Global Health Equity, resulting in collaborations where we are invited and have existing scientific and clinical colleagues. Currently, the primary locations (with a sample of studies) are Honduras (hrHPV in tumors vs screening samples, multi-organ screening for rural population, operationalizing a mobile workplace screening innovation); Rwanda

(Pyruvate kinase to risk stratify in patients with symptoms of gastric cancer; optimizing cervical cancer surveillance for women with HIV; HPV genotyping and Head and Neck Cancer; research mentoring; faculty teaching collaborations; biospecimen banking, environmental exposure, and lung cancer, and palliative care); Kosovo (HPV genotyping studies). Plans are to include existing Dartmouth sites in Peru, the Arctic, and Haiti when appropriate comparative studies are being designed. Inter-institutional collaborations are essential, and they vary from other US-based universities (UConn, Yale, Harvard, UCSF) to international universities in Kigali, Rwanda; Dar es Salaam, Tanzania; Pristina, Kosovo; and San Pedro Sula, Honduras. Whether healthy or sick with cancer, people everywhere are often pleased to be asked to contribute to improving health by participating in clinical research. When they understand they are doing something meaningful that will potentially help people worldwide, they are proud to contribute.

WHAT WE DO

RESEARCH FOR PREVENTION AND TREATMENT

DCC is at the forefront of evidence-based solutions for outreach to people with limited access to surveillance of cervical cancer recurrence in women with HIV in rural Rwanda. Our commonsense approach utilizes existing healthcare infrastructure at a decentralized village level to build capacity for cancer surveillance. By involving local leaders, medical students, pathologists, and clinicians, we have designed an approach for cancer surveillance that can be applied to screening, implementation, and pathology in the most challenging locations of the globe.

DCC RESPONDS TO THE NEED TO BUILD CAPACITY IN LOW-INCOME COUNTRIES.



From left to right, in January 2024, are Dr. Fidel Rubagumya, Dr. Mary Chamberlin, Dr. Yvan Butera, Minister of State of the Ministry of Health of Rwanda, and Dr. James Cusack, Colorectal surgeon at Harvard Medical School.

Trained scientists are scarce in low-income countries, and we build local capacity by facilitating communication, mentoring, and investment in future collaborators. In Rwanda, we have over nine years of building human capacity in education, therapeutics, hospital administration, and research through affiliation with Dartmouth, onsite teaching, and internet-enabled case conferences. The research platform in Honduras has similarly been enabled by short-term training for pathologists at D-H, a lively research association of a hundred Honduran medical students, and another group of 40 well-trained medical students experienced at enrolling participants and obtaining samples. Medical graduates from Kosovo, Tanzania, Rwanda, and Honduras have come to DCC for specialty training experiences. The Global Oncology and Disparities of Care international forum enables monthly DCC and UConn faculty-led live international medical education sessions and research collaboration virtually.

DCC OFFERS OPPORTUNITIES FOR TRAINING WITH WORLD-CLASS FACULTY

Among US-based trainees, the opportunity to participate in global oncology with an organized and successful established group of faculty members is a priority for applicants and an advantage in recruiting. Recent top recruits, including Ivy Riano, Hugo Pomares-Millan, Marie Anne Christine Buteau, Louis Vaickus, and others, are involved in collaborative DCC global oncology projects. They appreciate being welcomed into team science and provided the opportunity to access patient populations with tremendous cancer burdens and established collaborators in LMICs.

Faculty Recruitment: The distinctive DCC Hematology-Oncology Fellows training program offers a unique global oncology elective featuring Dartmouth-mentored onsite clinical training at the Rwanda Cancer Center in Kigali, Rwanda

for our Fellows, who experience learning oncology as practiced in a low-income country and teaching it to a multinational cadre of African MDs. Dr. Ivy Riano Monsalve joined the DCC faculty in 2024 in Melanoma and Thoracic Oncology after completing a fellowship at DHMC with a global oncology focus in Rwanda. Dartmouth Health is recognized in Rwanda as a leading partner in innovative translational oncology research.

Our faculty's commitment to global work has resulted in international recognition of our fellowship program, which attracts highly skilled graduates interested in pursuing their global oncology careers at Dartmouth-Hitchcock Medical Center. With broadening research interests in Global Oncology, Dartmouth is uniquely poised to obtain external funding in collaboration with our colleagues in Low-Resource settings through Fogarty Grants and other NIH or NCI-sponsored funding platforms.

Among more junior trainees, Geisel students participate as investigators in faculty-led global oncology projects and, in some cases, embed for several years. When polled, 13/15 undergraduate Dartmouth Cancer Scholars ranked “participate in global oncology” as their top choice of cancer-related activities; two Scholars had significant in-country experiences enabled by observing DCC studies. Beyond the clinical sciences, DCC collaborates across the institution to offer unparalleled opportunities for future leaders to engage in oncology work.

Thayer Engineering School doctoral students in device development represent their PIs onsite in Honduras and manage DCC's Honduran global oncology data warehouse. The Tuck Global Onsite program is partnered with a novel cancer screening program in Honduras to evaluate its business plan and provide consultation on the value proposition. This business consulting opportunity in global oncology, and others in the formative stages, meet Tuck's critical need in response to student demand for experiences in global health in low-income countries. The POWERED and TOPS summer programs embedded Dartmouth and Geisel students in ongoing global oncology projects, and they continue meaningful engagement in mentored labs.

DARTMOUTH WITHOUT BORDERS

Dartmouth Without Borders (DWB) is a Prouty team formed in 2019 by Dr. Chamberlin and Jane McLaughlin to unite the myriad international projects the Dartmouth community is involved in. 2022 was an exciting year as we were able to resume our annual trip to Rwanda, joining the Rwanda Endoscopy Week of the Dartmouth Gastroenterology team led by Steve Bensen, Joel Goldberg from Harvard (Pictured above with Dr. Chamberlin), Tim Gardner, and others to offer endoscopy training to Rwandan doctors. DWB has joined GI Rising, LLC to provide oncology lectures and research collaborations to kick off the new Gastroenterology Fellowship Program at the University of Rwanda. Thanks to the generosity of Jane and Peter McLaughlin, we can sponsor our first Dartmouth Cancer Center Global Oncology Visiting Research



Dartmouth Global Oncology Fellowship elective alum and faculty at UConn, Victoria Forbes, senior DHMC global oncology fellow Marie Anne Christine Buteau, MD, and Dr. Chamberlin at the International Cancer Education Conference, Toronto Ontario Canada, October 2023.



Steve Bensen, Joel Goldberg, and Mary Chamberlin at Rwanda Endoscopy Week 2022

Scholar, Dr. Fidel Rubagumya, for an education and research exchange over three years as he finishes his PhD in Medicine. With his leadership, Dr. Chamberlin and others launched the first Medical Oncology Fellowship program at the University of Rwanda in May 2024. DWB provides research funds to our Global Oncology Fellows at Dartmouth to foster international collaborations.

STRUCTURE



Oluwatoyin Asojo, Dartmouth Cancer Center's Associate Director for Diversity, Equity, Inclusion, and Belonging, provides a central point of contact and creates synergies among investigators and clinicians by sourcing and connecting talent and opportunities. This includes working relationships at the Center for Global Health Equity, Mary Chamberlin, and the Research and Patient Support philanthropic fund. Our Global Oncology programs at DCC have been critical to recruiting a diverse and intellectually rigorous faculty. Internationally, our focus is relationship building to facilitate high-quality science that meets DCC standards and operationalizing studies to limit PI time out of labs.



Mary Chamberlin, Associate Professor of Medicine and Medical Oncologist, is responsible for DCC's platform in Rwanda, which includes training, capacity building, translational research, and fundraising. Specifically working in Rwanda since 2015, she built the DCC Global Oncology fellowship elective and contributed to the recruitment of brilliant and diverse fellows and faculty, strategic relationships with the Ministry of Health of Rwanda to provide multi-disciplinary training opportunities for oncology Fellows and general practitioners from all over the globe. Dr. Chamberlin is our expert on Rwandan oncology capacity building and training.



Jessica Bentz, MD, Assistant Professor of Pathology and Laboratory Medicine, is a subspecialty-trained gynecologic and perinatal pathologist interested in global health. She oversees HPV genotyping studies with collaborators at the Rede D'Or Hospital system in São Paulo, Brazil, and projects examining HPV prevalence in Kosovo. She contributes expertise to cervical cancer surveillance in HIV patients in Rwanda. Dr. Bentz will deliver a lecture to the Congress on Diagnostic Medicine in Prishtina, Kosovo, in October 2024.



Frederick Lansigan, Director of the Hematology Oncology Fellows Program at DCC. Dr. Lansigan's vision for the fellowship program is to train conscientious physician researchers, educators, health equity champions, social justice advocates, and clinicians who will continue to advance the care of cancer patients. Through a holistic approach to nurturing each trainee, we are effective at maximizing the potential of each of our fellows. Their diverse interests guide our mentorship efforts, and fellows engage in all aspects of learning through clinical practice, formal didactics, research projects, case presentations, quality improvement work, health and workforce diversity, equity and inclusion projects, advocacy work, community engagement, and global outreach.

Spotlight on Dr. Fidel Rubagumya, Dartmouth Cancer Center's inaugural Global Oncology Visiting Research Scholar**Fidel Rubagumya, MD, MMed, MPH***Oncologist, Educator, Researcher*

Dr. Fidel Rubagumya is an oncologist with extensive experience in both clinical practice and academia. Currently, he serves as a Senior Consultant Clinical and Radiation Oncologist at Rwanda Military Referral and Teaching Hospital (RMRTH), where he provides expert care for patients diagnosed with cancer. His clinical focus centers on the management of gastrointestinal and hepatopancreaticobiliary cancers.

Dr. Rubagumya holds a Bachelor of Medicine and Surgery from the University of Rwanda, a Master of Medicine in Clinical Oncology from Muhimbili University of Health and Allied Sciences (MUHAS), and a Master of Public Health from Queen's University, Canada. He also completed clinical and research fellowships in Medical Oncology at Queens University/Kingston General Hospital, gaining specialized expertise in gastrointestinal cancers and health services research. He is currently pursuing a PhD in cervical cancer survivorship care in Rwanda.

In his role as an educator, Dr. Rubagumya is the Founding Program Director of the Medical Oncology Fellowship at the University of Rwanda and a Senior Lecturer at the School of Medicine and Pharmacy. He has been instrumental in

developing oncology education programs and has a passion for training the next generation of oncologists in Rwanda and beyond.

Dr. Rubagumya has published in high-impact cancer journals such as *Lancet Oncology*, *Journal of Clinical Oncology*, *Nature*, *Cancer*, and others, with over 46 papers at the intersection of cancer care delivery, financial toxicity, cancer policy, and global oncology. His work aims to address disparities in cancer treatment in low- and middle-income countries. He has received multiple research grants and awards, including the National Institute of Health (NIH, USA), American Cancer Society (ACS) Global Scholar Award, the Union for International Cancer Control (UICC) African Cancer Fellowship award, and the American Society of Clinical Oncology (ASCO) Career Development Award, among others, underscoring his commitment to advancing oncology research. **Dr. Rubagumya is the Dartmouth Cancer Center's inaugural Global Oncology Visiting Research Scholar.**

He also contributes to the academic and research community as an Associate Editor at the *Journal of Oncology Advances* and serves on the editorial board of several high-impact journals, including the *Journal of Global Oncology*, *ecancer journal*, and *PLOS Global Public Health*. Additionally, he is an active member of several professional committees, such as the ASCO Research Committee.

Beyond his clinical and academic responsibilities, Dr. Rubagumya is dedicated to volunteerism. He is the Founder of Rwanda Cancer Relief (RCR), a non-profit organization that raises cancer awareness and supports patients diagnosed with cancer in Rwanda. His volunteer work reflects his dedication to improving cancer care and support for patients and families in Rwanda.