

GROWING GREAT RESEARCHERS

The art of mixing the clinical and scientific sides of cancer medicine

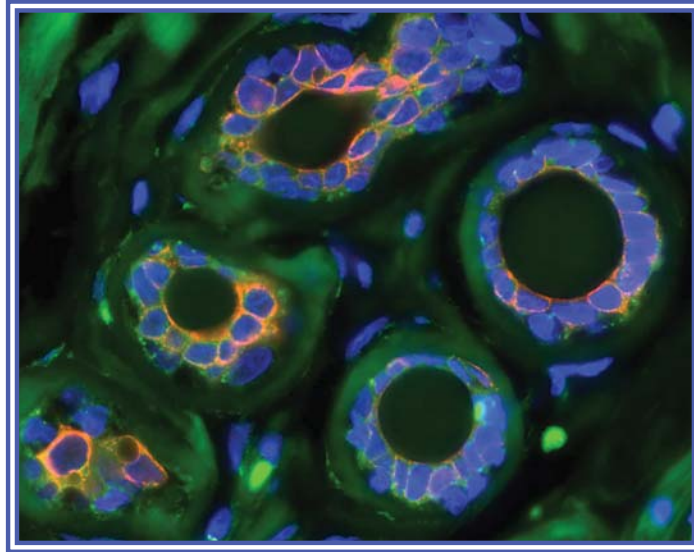
By Mary Ann D'Urso

Gwen Mahon, PhD, looks up from her desk and sees a whale swimming, its body awash in circles and swirls. Inuit-inspired, she calls her painting “Ode to British Columbia,” a fanciful appreciation of the mammals seen from the ferry which crosses between Vancouver and Victoria. On another wall is another bridge to her native Canada: a framed scene of sheep, luminous and grazing under starlight in a field of deep blues and oranges—a reminder of her sister’s place in Chilliwack, about 100 kilometers east of Vancouver. On other walls, other images shine brightly. A faculty administrator at the New Jersey Medical School – University Hospital Cancer Center, Mahon loves painting, creating images from nothing and vibrant colors.

Outside her office in Newark, artful images of human cells hang on a corridor wall. Their colors—the result of staining, when a scientist attaches dyes to antibodies that light up red, green, blue as they recognize different proteins in a cell’s architecture—are striking, almost fluorescent, like Mahon’s paintings. She has pulled together this hallway art exhibit by calling on basic scientists, students and clinicians to submit their work, turning scientific applications into art and forming a bridge to the paintings of Newark artists, which hang on the opposite wall. The outpouring from Mahon’s scientist-artists and their Newark neighbors prompted plans for a gallery opening held in late spring.

Enthusiastic and energetic, Mahon relishes when people come together. She is the anti-stereotype of an isolated researcher alone at her bench in the lab—work she pursued for 15 years before becoming director of research program development and planning for the NJMS-UH Cancer Center.

Her colleague Charles Cathcart, MD, NJMS assistant professor and medical director of radiation oncology at the Cancer Center, is a study in über organization. His day goes something like this: Up at 5:30 a.m. for a short run, he makes lunch for his six kids—though the 17-year-old is on his own—before showering and sharing school



drop-offs with his wife, also a cancer doc. A clinician as well as a teacher, Cathcart sees radiation oncology patients and students all day. In late afternoon, he picks up the kids and piles them back into the minivan, shuttling to points like dance, basketball and soccer before gathering the troops for nightly family dinner at 7 p.m. Dishes are not as daunting as pinning down nimble children for

baths, books and bedtime. While others, he said, might be bored to tears by the routine of his typical day, he loves every second of it. His life is fun, alive and maybe the antidote to radiation oncology, where he doesn’t see many happy endings.

Mahon and Cathcart are people-driven. Called by science, medicine and the humanity of cancer patients, they are also the point in the road where the bench meets the bedside. Stemming from the tradition of physician-scientists, this bench to bedside idea is also referred to as translational research and is gaining ground across the country through innovative programs like the one Mahon and Cathcart tested this past spring with graduate students and NJMS faculty members on the Newark campus through the UMDNJ-Graduate School of Biomedical Sciences.

Talk to this duo and they’ll tell you, this translational course is about forming a bridge between scientists and clinicians so each can learn the language and feel of the other’s country. Such interplay between investigators and clinicians is designed to inspire people’s work, to get them thinking even further outside their boxes and to offer a rich connection and understanding of what is happening to a person living with cancer. The hope is that it will lead to innovative science and discoveries, linking biomedical science with clinical applications.

When Mahon was involved in a faculty mentoring program, she realized that both clinicians and scientists felt that something was missing. “Collaboration between the clinic and the lab was something everybody wanted but there was no clear mechanism to do it,” Mahon says.

She got an idea and in Cathcart, she found an ally.



Charles Cathcart, MD, and Gwen Mahon, PhD

Health (NIH) initiatives and funding that began in 2004, translational research training was once aimed primarily at medical students. Back in the day when science was not as sophisticated technologically and medicine not so specialized, a physician could regularly build time for lab research into his or her schedule. Today, given the time spent pursuing careers as either PhD scientists or MDs—on average 18 years from undergraduate through post-doc or residency work—plus money and insurance issues, compartmentalization happens. The opportunity for PhD level scientists to receive training in clinical medicine is gaining ground because a cancer researcher's career could end up spanning academic, pharmaceutical and biotechnology areas.

“By building bridges and demystifying things on both sides, you present the opportunity for something else to happen down the road,” explains Harvey Ozer, MD, director, NJMS-UH Cancer Center. “I feel that the program provides an added dimension for attracting outstanding students and faculty. Its success will provide a further indication that the Cancer Center serves as a force for innovation as well as excellence.”

When she approached him about offering Masters and PhD students a translational research program, Cathcart was all for it. They literally brainstormed for an hour and came up with the framework, including his lecture series, Introduction to Clinical Oncology; attendance at weekly tumor board conferences, where doctors from all oncology disciplines collaborate on patient cases and protocols; and six months of multidisciplinary shadowing rotations, where researchers and docs are paired up.

Having worked in a lab for two years between college and medical school, Cathcart has long favored giving basic scientists a clinical vocabulary and a sense of how physicians think about problems. Several years ago he invited researchers to attend the weekly tumor boards. “People would come and discover that our languages were so different. I think we scared researchers out of the room to some degree,” says Cathcart. He likens translational researchers to engineers who design and refine cars. At the end of the day, these engineers also drive in traffic or get flat tires. “They understand the practical side of what they're trying to fix,” he explains.

Cathcart says he hopes that his course, which will resume next spring as a graduate school requirement for the Cancer Research Training Program, will break down barriers. He wants basic scientists to feel confident approaching clinicians for whatever they might need, from cancer tissue samples to more information and feedback.

Emerging as a field of its own, largely due to National Institutes of

Lawrence Harrison, MD, associate director of clinical services at the Cancer Center, agrees. “The more the clinician and the basic scientist communicate, the more relevant the research becomes,” Harrison says. He ought to know. According to his colleagues, Harrison, who is also chief of surgical oncology and a principal investigator heading one of the center's 12 labs, is one of those rare exceptions on today's medical landscape: He's fluent in both languages. Harrison was recently awarded a \$100,000 grant from the New Jersey Commission on Cancer Research to continue laboratory studies aimed at helping patients with terminal abdominal cancers.

This training program, Harrison says, offers a context for the basic scientists and provides a window into the clinical world where their research will have an effect. “The scientist sees the clinical problem, the clinician has a better understanding of the researcher and most importantly, the patient will eventually benefit from the collaboration,” says Harrison, one of 10 docs who signed up within hours to be a clinician mentor in the shadowing program.

Real and raw is how Mahon describes the lectures and her attendance at the tumor boards. “Literally, for two nights I couldn't sleep thinking about these people and I had done cancer research for 15 years. I was aware of these diseases,” she says.

Cathcart didn't pull any punches.

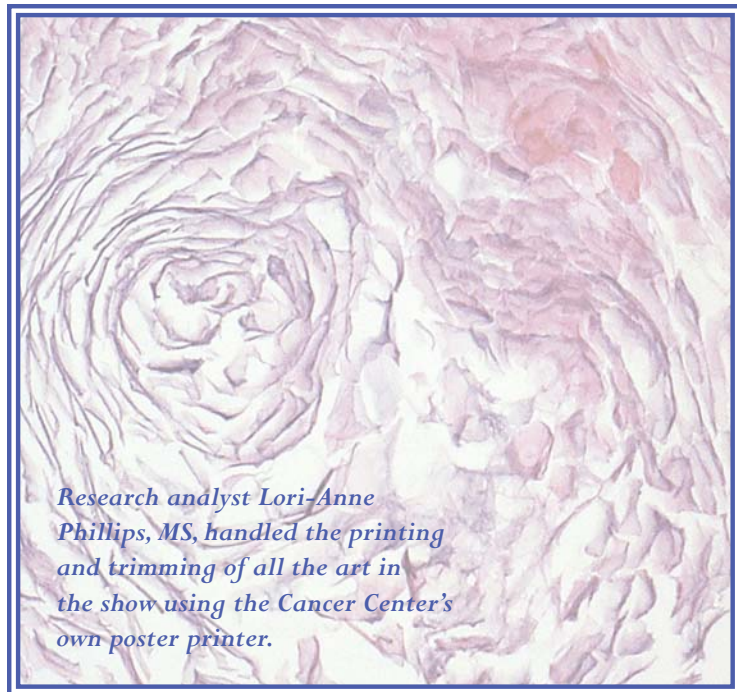
“I love the patients. I wanted to impress these basic scientists with the sheer volume of cancer, with how many people die every minute. Here at UH, we are largely taking care of people no one else wants to

treat. They are diagnosed with cancer in late stages because they don't have insurance coverage for routine screenings, which could have led to an earlier diagnosis with a better outcome. I feel like I'm curing very few people," Cathcart says.

"I wanted to frame how pervasive this disease is in our community and show pictures of patients who are very brave, very accepting. They appreciate anything you can do for them," he explains. Seeing pictures of patients. Listening to their stories. Hearing about Newark's local and ethnic issues. Learning how to tell someone they're going to die. Understanding how doctors speak to each other. All of it is exposure that scientists would not otherwise have.

Pedro Rodriguez, a fifth year PhD student who was in the new program, reports, "In a matter of minutes, you are introduced to a person with a family and a past. In many cases, you learn how the doctors plan to take action in treating these patients and sometimes the prognosis can be dismal.

"To have some connection to the clinical side can be profound. You get motivated and inspired. You remember who you're doing this work for. Sadly, in the lab, people tend to forget this," says Rodriguez, whose research concentrates on cancer cell signaling, the molecular language of cancer cells.



Deborah Lazzarino, PhD, NJMS assistant professor, neurology and neurosciences, also participated in the course and says she became "much more aware of how limited the tools are when aggressive measures don't work." Lazzarino wants to establish an ongoing collaboration with a breast cancer clinician so she can look at gene expression.

Rodriguez also hopes to collaborate with clinicians and obtain real patients' tissue samples. "It's a huge thing to be able to work with

patient samples because they are more relevant," Rodriguez explains. Researchers prefer these real cells because they retain their unique lineage and profile. Over time, commercially available cancer cell lines used most often in labs worldwide become very different from their tumor of origin.

Like the tumor boards, the shadowing rotations will further draw scientists into the world of cancer doctors and their patients. "The impact is almost overwhelming for the non-clinician," Cathcart explains. "Not to overstate it, but I think that a non-clinician leaves the patient's room after face-to-face encounters realizing that they are 1,000 times more powerful interactions than they originally thought." Participants like Lazzarino are often in awe of the positive attitude and psychological balance physicians maintain while dealing with such disheartening real-life situations.

According to Ozer, the course and translational work will form a bridge to the 220,000 square-foot, state-of-the-art Cancer Center, originally conceived as the building that would, in its very design, provide a shared space for researchers and clinicians in which to see patients. Since October 2006, scientists and their labs, which fall under the medical school's umbrella, have set up shop on four of the center's nine floors. About 100 people, including 13 faculty investigators from nine medical school departments and 35 graduate students, call it home. Their funding now totals \$7,695,000 a year. The center also houses NJMS core facilities and common labs.

Course lectures, seminar series and tumor conferences regularly meet at the center, which will eventually be home to clinical oncologists and staff who will treat patients there.

Receiving a Best of 2006 award for its innovation in architecture from *New York Construction*, a publication for the tri-state construction area, the \$79 million center includes features such as open lab design and informal group spaces—infrastructures that support translational work. Designated as an NIH Center of Excellence, the center serves the city of Newark, which is visible, like the natural lighting, from many angles of the building and to many scientists at their benches.

By year's end, two more labs are expected to relocate there and two new faculty recruits doing cutting-edge science will join the Cancer Center. "We have a ripe opportunity to recruit new talent," Cathcart says. "Here, the scientists and clinicians help each other out. We're in the trenches together."

For Mahon, patient-driven research is today's touchstone for bringing basic science to clinical care. "PhD scientists are often isolated working on cures for diseases. They don't necessarily know what it's like to be a patient or what it's like for doctors to treat patients." In Canada, she had trained at the Terry Fox Laboratory in Vancouver where investigators saw patients as part of their education and clinicians routinely attended lab meetings and lectures. The stark cells she investigated as a cancer researcher have a human face, which is never far from her focus and still inspires her work, just like the art on the Cancer Center walls. ●