

Training the Next Generation of Cancer Researchers

Staffed by nearly 250 principal investigators (PIs) and linked to the world's largest, publicly funded research hospital, CCR offers a wealth of opportunities for graduate and postgraduate training. At CCR, predoctoral students along with postdoctoral and clinical fellows work at the intersection of basic science and clinical medicine. And with ready access to patients, clinical trials, tumor samples, and advanced technology, CCR's aspiring investigators pursue translational research in a collaborative setting that puts a high priority on professional development.

Students and postdoctoral fellows come to CCR with wide-ranging backgrounds and goals. Some medical doctors (MDs) come for the clinical experience, and the chance to put new treatments to work at the bedside, whereas some PhDs come for translational research experience. Others lean towards more basic research in the laboratory and the promise of developing life-saving therapies for patients with cancer.

Taking the Clinical Track

Nirali Shah, M.D., was drawn to CCR for the clinical research training opportunities. After finishing her combined residency in pediatrics and internal medicine, Shah knew that she still wanted to care for patients, but she also envisioned a career in cancer research. So three years ago, Shah came to CCR—with its stellar record for training physician-scientists—for a fellowship in pediatric hematology/oncology. Administered by CCR's Pediatric Oncology Branch (POB) and The Johns Hopkins University, the fellowship has been, Shah reports, “the right fit for her career goals.” It gives her training in oncology, in



Alan Wayne, M.D., Narali Shah, M.D., and Kara Jarnagin, a patient.

addition to extensive clinical trial experience.

Guided by her mentor, Alan Wayne, M.D., formerly of POB, Shah focuses on new treatments for pediatric leukemia. And over time, she has worked up to her current role: Serving as a lead associate investigator responsible for interfacing with patients, enrolling them in clinical protocols, administering daily care, and mentoring first-year fellows. Meanwhile, Shah also finished a

Masters of Health Science degree in Clinical Research, which is offered by the NIH through Duke University. For her thesis project, she focused on the evaluation of pediatric leukemia patients who relapse after bone marrow transplant.

“I think the resources here are unparalleled,” Shah said. “When you start a fellowship, you envision some specific goals that you would like to achieve. For a physician who wants to pursue clinical research,

(Photo: B. Brantson)

CCR leadership supports mentoring not just with words, but with specific initiatives designed to enhance the training experience and smooth transitions towards employment.

no other institution offers as broad an experience in clinical trials and protocols as CCR, making this the best place to train.”

Training in Basic Research

While Shah was drawn by CCR’s clinical training opportunities, Willie Wilson, Ph.D., was attracted by a postgraduate position that could enable him to develop his basic research skills in cancer biology. As a postdoctoral fellow with Glenn Merlino, Ph.D., a CCR Deputy Director and Chief of the Laboratory of Cancer Biology and Genetics, Wilson investigates surface markers on melanoma cells that might predict their response to treatment. “Our overall aim is to see if the markers can guide precision

therapy,” he said. For him, training at CCR poses a number of advantages: The core facilities in flow cytometry, histology, sequencing, and microarray analysis are key for his research, and so is his proximity to the NIH Clinical Center, which supplies him with human melanoma samples. Wilson explains, “We work with animal models for melanoma, but we also need to see if the markers they express are found in human specimens.”

CCR’s translational focus is such that PIs and their trainees interact routinely with clinical-based scientists. “And in that sense, the clinical staff also help with mentoring,” Merlino said. For instance, Wilson works with Nicholas Restifo, M.D., a Senior

Investigator in CCR’s Surgery Branch, on efforts to find surface markers that suppress antitumor T-cell activity.

A Commitment to Mentoring

Jonathan Wiest, Ph.D., Director of CCR’s Office of Training and Education, emphasizes that students and fellows depend on mentoring as much as they do on CCR’s technical and scientific resources. Mentoring is built into the culture at CCR where hundreds of postdoctoral fellows, clinical fellows, postbaccalaureate students, and even high school students train every year. “CCR leadership supports mentoring not just with words, but with specific initiatives designed to enhance the training experience and smooth transitions towards employment,” Wiest explains. Some of these initiatives include courses on scientific management, grant-writing workshops, and a peer-based editorial board that offers input on submitted manuscripts. But Wiest also points out that initiatives such as this can only go so far. Mentoring’s most important aspect is the communication between PIs and their trainees. “Without productive communication, it is difficult for students and fellows to set long-range goals that go beyond those of the next experiment,” he said.

Merlino feels that a good mentor bears responsibility for the job prospects of the staff scientists, postdoctoral fellows, and graduate students who work with him. “I measure my mentoring success by their success when they leave my laboratory,” he said. “That is the litmus test.” And effective mentoring, Merlino adds, has both passive and active components. The passive component entails making the laboratory an exciting place to work. Ideally students and fellows

(Photo: R. Baer)



Glenn Merlino, Ph.D., speaks with Postbaccalaureate Fellow Pravin Mirsha, Postdoctoral Fellow Willie Wilson, Ph.D., Postdoctoral Fellow Prasun Mishra, Ph.D., and high school student trainee, Azam Husain.

will absorb that experience and try to emulate it in their own careers. And the active component occurs when PIs and other senior-level scientists help students and fellows recognize and build on what they do best.

Crystal Mackall, M.D., also mentors young investigators, specifically the physician-scientists training in the Pediatric Hematology/Oncology Fellowship Program. As Chief of POB, Mackall bears overall responsibility for that program and accepts six new fellows every year. Some, like Shah, gravitate towards clinical research, while others lean more towards basic research. What makes clinical fellows unique, Mackall said, is that despite years spent in medical school and residency, they have little to no experience in research. Already confident and insatiably curious, these fellows must now cultivate a high tolerance for frustration. “Research does not always produce the results you are looking for, and that can be upsetting,” Mackall said. “As a mentor and an intellectual guide, my role is to keep fellows stimulated and working. But I also see myself as a coach who reassures them when an experiment does not work out the first time around despite the best of intentions and preparation.” Mackall emphasizes that CCR’s commitment to training physician-scientists is important, in part, because clinicians have a unique ability to identify shortcomings and research needs in cancer. “We are the largest producer of doctors who are also top-notch scientists,” she said. “This is why so many physician-scientists have gone through CCR at some point during their careers.”

High-School Interns Make the Grade

CCR also remains committed to a much younger group of future scientists and offers opportunities for high school students to get a head start on their research careers. One



(Photo: R. Bauer)

Crystal Mackall, M.D., (second from right), CCR Clinical Fellows Diana Steffan (left) and Orly Klein (right) examine their patient Jake Schafer in the CCR Pediatric Clinic.

example is the Werner H. Kirsten Student Internship Program at the NCI laboratories in Frederick, Md. Available to local high school seniors, this program has trained nearly 700 interns since it was created in 1989. Interns work full-time for pay during the summer and then for three hours unpaid every day during the academic year. “Training and developing the next generation of biomedical scientists is a proactive way for CCR to give back to the taxpayers,” said Howard Young, Ph.D., Deputy Chief of CCR’s Laboratory of Experimental Immunology, who helped launch the program. High-school interns in Young’s laboratory extract DNA, and set up sequencing reactions that segregate wild-type mice from mice bred to express inflammatory factors involved in cancer and other diseases. “Colleges love these kids,” Young said. “They leave CCR with high-level abilities in gel electrophoresis, restriction enzyme digestion, polymerase chain reaction (PCR), and other analytical methods.”

Brittney Reichelt, a senior at Middletown High School in Frederick, and an intern working in Young’s laboratory, says the program has also improved her science communication

skills. “I am learning how to present my results,” she said. “To me, that is really important. And I only knew the bare minimum about PCR when I came here, but now I feel comfortable doing it on my own.”

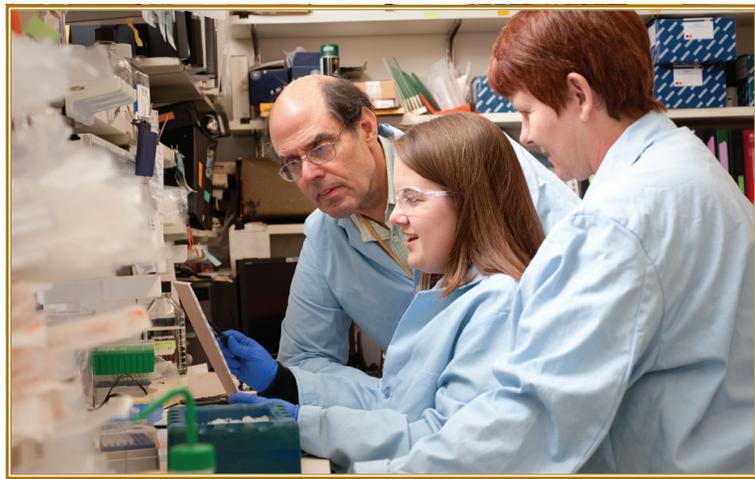
Wilson and Shah also say they are being well prepared at CCR for the careers that await them. Shah, who completed her fellowship last June, plans to stay at CCR to work on new treatments for patients who relapse after receiving bone marrow transplants. Wilson pointed out that CCR’s location in Maryland—a hub for biotechnology companies, universities and government health agencies—allows him to network in ways that promote future job prospects. He hopes to transition into a regulatory position working on investigational new drug reviews with the FDA. Ideally, both scientists

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will achieve their professional goals and join the ranks of so many who trained at CCR and then met with success in their subsequent careers.

“Mentoring is not easy, but it is one of the most important things we do,” Merlino said. “That is why we have an institutional commitment to it.”

To learn more about training opportunities, please visit CCR's fellowships and positions Web site at <http://ccr.cancer.gov/careers>.



(Photo: R. Baer)

Howard Young, Ph.D., high school student trainee, Brittany Reichelt, and Staff Scientist Deborah Hodge, Ph.D., discuss lab results.

Equal Opportunity for Deaf Fellows at CCR

In 1998, Peter Blumberg, Ph.D., recruited his first deaf postbaccalaureate fellow, and he has since continued a commitment to mentoring deaf fellows. Many of them are drawn from Gallaudet University, the leading institution for the deaf and hard-of-hearing, located in Washington, D.C. Over the years, Blumberg's lab technician, Larry Pearce, who is also deaf, and these fellows have co-authored 55 research papers.

“Disabilities are only relevant if they affect skills that you need

for a particular task,” Blumberg said. “None of my fellows have a disability relevant to science, so they do just fine in the lab.”

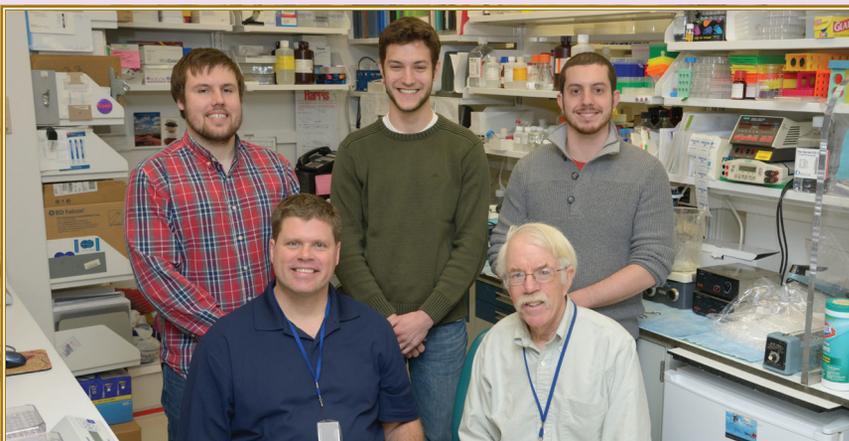
Blumberg, who taught himself sign language, was inspired to recruit deaf fellows after seeing sign language interpreters at large NIH lectures who had no one for whom to sign. “It seemed like a missed opportunity for the CCR if we did not take advantage of our proximity with Gallaudet,” he said. Today, Blumberg has a broad network of contacts at Gallaudet who know his research

and who help identify highly qualified candidates interested in the NIH postbaccalaureate fellowship program.

Currently, three deaf postbaccalaureate fellows are working in Blumberg's lab, assisted by a sign language interpreter who facilitates communication with other scientists. “Having multiple deaf fellows working together creates an environment in which no one feels like he or she stands out for being different,” said Blumberg.

Many of Blumberg's fellows have pursued scientific careers after finishing the two-year program. Several have gone to medical school, others have pursued doctoral research or industry careers, and one has since joined the faculty at Gallaudet.

(Photo: E. Branson)



First row, from left to right: Larry Pearce, Lab Technician, and Peter Blumberg, Ph.D.
Second row: Colin Hill, Timothy Esch, and Ian DeAndrea-Lazarus

To learn more about Dr. Blumberg's research, please visit his CCR Web site at <http://ccr.cancer.gov/staff/staff.asp?name=blumberg>.