For the Tri-Institutional Program’s future physician-scientists, an MD and a PhD are greater than the sum of their parts.

On a Wednesday afternoon in February, seventeen students arrange themselves around a seminar table according to a time-honored student tradition: squished on the other side of the room from the speaker. Today their lecturer is Jim Darnell of the Rockefeller University, a pioneer in the field of cell signaling. He discovered a cascade of chemical signals that act as on/off switches for genes, some of which regulate how cells become cancerous, and he’s there to explain his findings. Making shapes with his hands to simulate the binding of molecules, he describes how the basic biology behind his work might lead to the design of effective medicines.

“Somebody’s got to do something about this,” Darnell says. “We need to interrupt Stat-3 if we’re going to interrupt cancer.” He speaks with an urgency that implies the needed person might be there in the room. And although it could take a decade or so before they’re up to the challenge, one of these students—first-years in the Tri-Institutional MD-PhD Program—just might be that “somebody.”

The Program consists of two years of medical school coursework followed by three or four years of doctoral research, topped off with one-and-a-half years of clinical clerkships. What sets this program above others of its kind is the combination of a medical school education and training with the outstanding array of research opportunities its students have at their disposal: because it is a collaboration among Weill Cornell Medical College, the Rockefeller University, and the Sloan-Kettering Institute, students can choose their mentors from more than 250 faculty at the three institutions. Although there is no formal ranking system for MD-PhD programs, evaluations by the National Institutes of Health consistently put the Tri-Institutional Program on top. And since the class that matriculated in 1997, not one of its students has dropped out.

The Program’s success has helped lay the groundwork for another joint venture—a $160 million collaboration between the Tri-Institutional campus at the corner of 68th and York and Cornell’s Ithaca campus, announced in June 2000, to pursue research in chemical and computational biology. “This project leverages the talents, expertise, and resources across the four campuses,” says Dean Antonio Gotto. “You simply can do more together than you can with any of the institutions alone.”

Biomedical research and clinical practice require different skills. Researchers, by the very definition of their job, are iconoclastic: they must pose novel questions to uncover basic scientific principles. Clinicians tend toward the other extreme; with the patient’s well-being the first priority, there’s only so much room to diverge from treatment protocols—yet they must be cognizant that patients may not agree with “conventional thinking.” Students who are trained in both—those who will become physician-scientists—develop the versatility to move between the big picture and the biological mechanisms upon which it rests. Though one often tends to focus on the laboratory research credentials of MD-PhD students, Program participants note that the PhD training has a major impact on the graduates’ approach to clinical problems—MD-PhD students know enough biology to recognize that they do not know all the answers, and each patient poses a unique combination of problems.

“As science and technology move forward, there are ever more exciting opportunities to translate fundamental basic science back into medicine and improve the care of our patients,” says Dr. Craig Basson, a clinician and researcher studying the molecular genetics of heart disease, who serves as the Tri-Institutional Program’s research advisor for Weill Cornell. “These students, when they fin-
advantage of the program’s flexibility by entered a PhD program directly. “He took from different areas of research if I had PhD. I think I would have cut myself off pursue another avenue of research for my fifth-year student, “but I knew I wanted to Alzheimer’s disease,” says Joe Mancias, a in college, I worked in a lab that focused on time to explore different research areas to specific departments, MD-PhDs have provides to explore many basic research areas. Unlike graduate students who apply to specific departments, MD-PhDs have time to explore different research areas before choosing a thesis topic. “When I was in college, I worked in a lab that focused on Alzheimer’s disease,” says Joe Mancias, a fifth-year student, “but I knew I wanted to pursue another avenue of research for my PhD. I think I would have cut myself off from different areas of research if I had entered a PhD program directly.” He took advantage of the program’s flexibility by doing rotations in virology and cell biology before settling on a PhD project in structural biology at Sloan-Kettering. Although his is a basic research field, he explains, structural biology is crucial to understanding the molecular mechanisms of disease. “How a protein is shaped impacts its function,” he says. “I feel it’s a definitive answer to what’s going on.” According to conventional wisdom, combining clinical work with research usually results in a workload that is about 80 percent lab time and 20 percent clinical time. But over the course of the training program, each student must develop a personal sense of how the strands of the clinic and the laboratory will intertwine. Sixth-year student Kenolisa Onwueme became fascinated with medicine and chemistry as a child growing up in Nigeria, where he saw people fall ill with infectious diseases like malaria. Recently, he finished his PhD at Weill Cornell Graduate School of Medical Sciences and returned to medical school with no doubt that he wants, above all, to be a good doctor, his earnest charm and good-natured familiarity with the hospital café’s cashiers seem to predict a great bedside manner. But he credits the space of “weird diseases” he saw in his pediatrics rotation with awakening a deep appreciation for his scientific training. “It wasn’t enough for me to just treat the acute condition and send them home,” he says. “There’s really a scientific curiosity that I didn’t know I had, but it’s there and I’m going to have to satisfy it.” Although many medical students do both research and clinical work early on, over time the two often diverge, roughly a quarter eventually settle on pure research. “A few people I’ve met have successfully combined their research and their medicine,” says eighth-year student Katie Hisert, “and they do it by studying an esoteric disease.” In her case, the solution might be a far-off location. After completing her PhD in the microbiology of tuberculosis and salmonellia, Hisert, an avid traveler, went back for nine months of medical school before taking a leave of absence to do an international elective in Cambodia. She joined a team composed of researchers from the Institut Pasteur and Dr. Anne Goldfeld of Harvard, who had been working with TB patients and their families in remote villages of Cambodia, looking for ways of ensuring that they would stick with the long course of antibiotics required to treat the disease. During her work, Goldfeld began to notice that the immune systems of some villagers infected with TB did not produce the anticipated reaction in response to the diagnostic skin test. Hisert is now studying samples of the villagers’ immune cells in the laboratories of the Institut Pasteur du Cambodge in Phnom Penh to try to determine the cause of these patients’ anomalous response. “I’ve always worked with mice, which are great because they’re all genetically the same and easy to manipulate,” she says. “But the idea of actually studying how human beings differ from each other and why some are more susceptible is exciting.”

he notion of the physician-scientist was developed by the National Institutes of Health shortly after World War II, when Congress authorized a dramatic budget increase for the biomedical sciences. In 1953, the NIH opened a center in Bethesda, Maryland, that housed research labs and clinical facil- ities under the same roof, to stimulate interaction between the two, and gave patients free treatment in exchange for their participation in clinical trials. A decade later, the agency began funding pro- grams at major universities that stream- lined research and clinical training into a combined MD-PhD degree. Such programs have since mushroomed around the coun- try: presently there are forty-one funded by the NIH and more than eighty others sup- ported by their home institutions. Because the expense of medical tuition often lures graduates into lucrative private practices, many MD-PhD programs, including the

Role model: Dr. Olaf Andersen has directed the Tri-Institutional Program since 1996.

Problem solver: Ruth Gatian’s behind-the-scenes efforts keep the Tri-Institutional Program running smoothly.
The Tri-Institutional Program, providing full funding so students can leave almost debt-free—and motivated to apply their medical knowledge to a research career.

One reason for the Tri-Institutional Program's stellar reputation is the diversity of first-class research opportunities open to students. The combined faculties of Weill Cornell Graduate School of Medical Sciences, the Sloan-Kettering Institute, and the Rockefeller University comprise a research community of more than 2,000 people. As a medical school dean, Olaf Andersen, M.D., Ph.D., says, “Each of the institutions has its own history, but that continuity is part of the package.”

Training Program (MSTP) grant two years earlier, he validated it with a Medical Scientist Training Program. As he walks into a meeting of the 1987, Kettering program, established in 1987, and NIH Sloan-Kettering, another with its own PhD programs—one in collaboration with Sloan-Kettering Institute, and the Sloan-Kettering Institute, and the Rockefeller University comprise a research community of more than 2,000 people. As a medical school dean, Olaf Andersen, M.D., Ph.D., says, “Each of the institutions has its own history, but that continuity is part of the package.”

Within the Program’s structure, students decide to pursue several different research rotations, as well as internships, to gain a broader understanding of the various fields of medicine. The Program’s structure allows students to take advantage of the unique strengths of each institution, which can result in a more personalized education.

Ariel Levine, who received an individual grant from the National Institute of General Medical Sciences, the Sloan-Kettering Institute, and the Rockefeller University, for example, decided to pursue research in cell membrane biology. He found that by working with investigators from different institutions, he was able to gain a deeper understanding of the complex processes that regulate cell function.

The Program constantly pushes students to define the trajectory of their careers. It forces them to take advantage of its strategic smorgasbord by requiring that they conduct their rotations at a minimum of two institutions—one of the ways that the Program has validated its effectiveness is by ensuring that the students have been eliminated.

Frontiers in Biomedical Sciences, the two-year, graduate-level, journal club-style seminar, which Andersen initiated for all first- and second-year students, exposes them to key areas of research—and, just as important, creates opportunities for them to meet scientists from all three institutions as they decide where to do their dissertation research and ultimately their PhD research.

A more informal venue is the weekly summer lunch series, where first- and second-year students chat with such luminaries as Dr. David Ho, head of the Aaron Diamond AIDS Research Center, Harry Hamann, president of Sloan-Kettering, and Dean George J. Costello about how they got where they are. “We have so many people interested in our decisions that it keeps us thinking about our goals,” Mancillas says. “The whole hospital is at our disposal. If you want to see some surgeries, you call ahead and arrange it.”

Andersen meets with students individually at least once a year to discuss their plans. Sometimes, he says, they see a particular institutions are well aware of the importance of collaboration, and they work hard to ensure that students have access to a wide range of opportunities.

The Program’s constant pressure to define the trajectory of one’s career can be daunting, but it also provides students with the opportunity to define their own path and pursue their own interests. The Program’s structure, which allows students to take advantage of the unique strengths of each institution, is designed to help students find their own way.

It’s a well-oiled machine,” says Olaf Andersen, M.D., Ph.D., director of the Tri-Institutional Program. “The electronic system is designed to handle the vast amounts of information generated by the Program, and it allows students to access the resources they need in a timely manner.

The Program’s success is due in large part to the dedication and hard work of the many people who work behind the scenes to ensure that it runs smoothly. From the directors and administrators to the faculty and staff, everyone plays a vital role in making the Program a success.

The Tri-Institutional Program is an example of what can be achieved when institutions work together to benefit their students. It is a model that other institutions can follow, and it is a testament to the power of collaboration and cooperation.