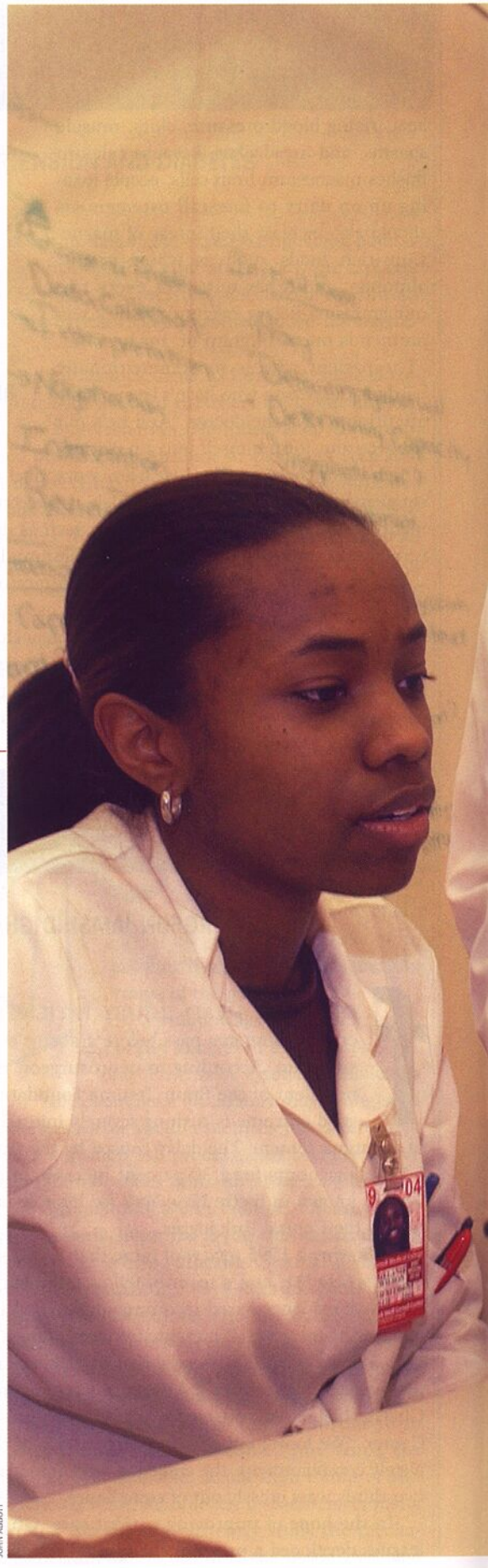
building a better doctor



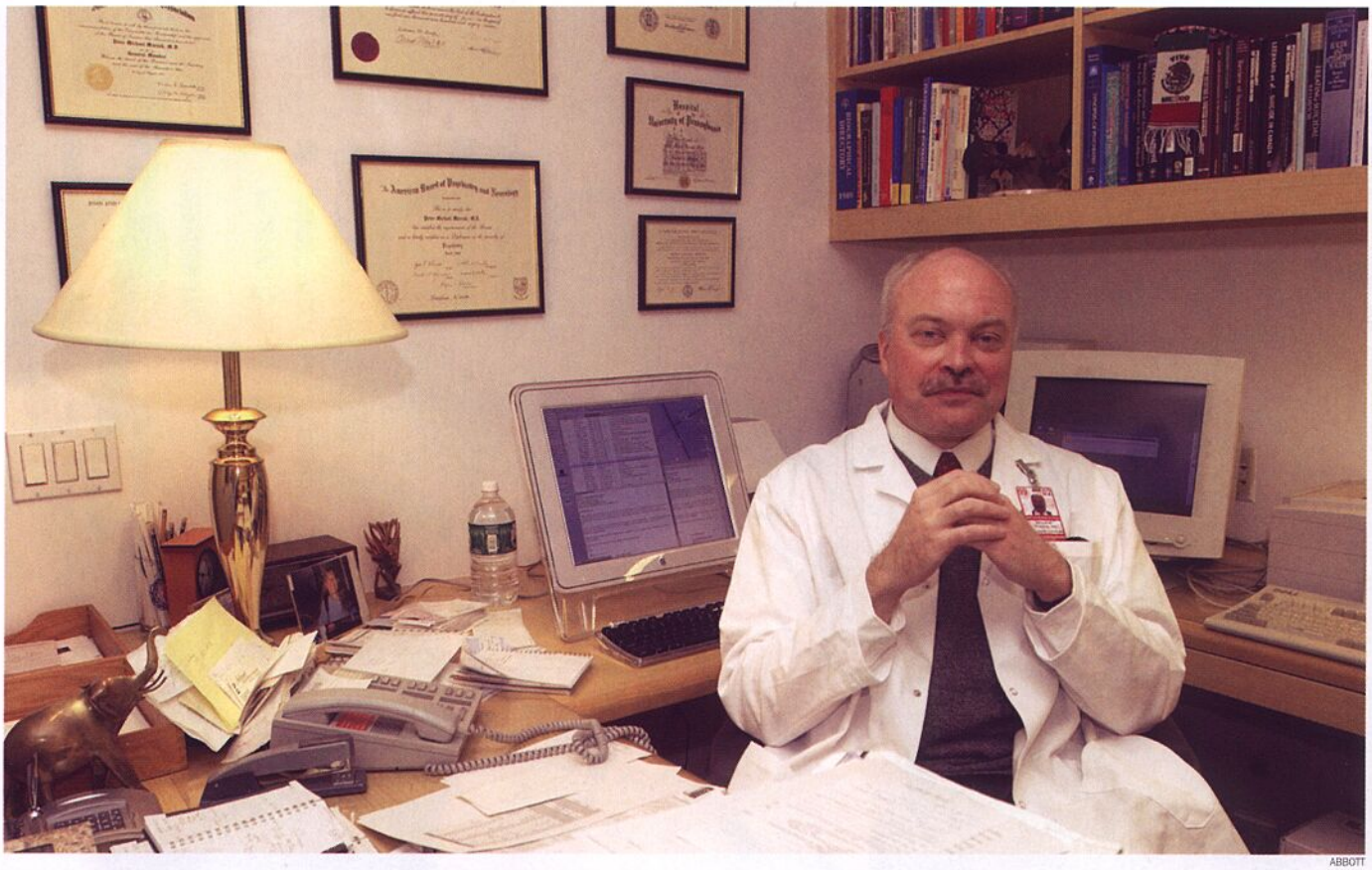
JOHN ABBOTT

A new problem-based curriculum turns medical education on its head.

By Paul Zakrzewski

A dozen medical students have filed into a corner classroom at Weill Cornell Medical College for the last session of a two-week seminar on lung disease. It's 8 a.m., but they look eager and alert, chatting amiably among themselves and joking with associate professor of pathology Dr. Mark Edgar. Today the class will wrap up the hypothetical case of a patient whose symptoms suggest sarcoidosis. They begin with a review of the woman's ACE levels to determine a differential diagnosis.

Education revolution: Dr. Mark Edgar consults with students in the Weill Education Center.



ABBOTT

Intricate connections: Associate Dean Peter Marzuk calls the goal of medical education building bridges among the disciplines.

"Is there anything in the patient's history that would suggest the peculiar side effects of ACE inhibitors?" asks Edgar, whose retro-styled, black-rimmed glasses and dyed blond hair make him look more like a young Elvis Costello than a pathologist. A student opens "Robbins"—affectionate shorthand for *Robbins Pathologic Basis of Disease*—and with Edgar at her side, offers an explanation to the class. Edgar brings in the case of a fashion model who's recently gone public with her diagnosis of sarcoidosis, and the class digresses to some of the more obscure lung diseases and their treatments.

Then Edgar flashes a copy of *Patient: The Story of a Rare Illness*, the memoir of pop group Everything But the Girl's bass player, Ben Watt, and his battle with Churg-Strauss syndrome.

Physicians who haven't set foot in a classroom in the past decade might be in for something of a shock on their next visit. Until the early 1990s, the college's curriculum featured the same educational model employed in medical schools across the country for the past hundred years. Under this lecture-based approach, academic disciplines were taught by the relevant department—biochemists taught biochemistry, anatomists taught anatomy. It was a method ideally suited to medical schools, since the curriculum emphasized the acquisition of facts, and lectures offered an efficient strategy for delivering a large amount of information.

> 'The goal is to have an integrated course to show students the links between structure and function, both normal and pathologic.'

"What the courses failed to do was build bridges among the disciplines," says Dr. Peter Marzuk, Weill Cornell's associate dean for curricular affairs. "Clearly the body isn't just a bunch of chemicals sitting here and a structure there and a function over there. These things are all intricately connected. The goal is to have an integrated course to show students the links between structure and function, both normal and pathologic."

While medical students still study traditional disciplines such as gross anatomy and physiology—and they still see plenty of slides, dissections, and clinical cases—the look, feel, and approach of medical education these days couldn't be further from a previous generation's lecture-based curriculum. "When I was in school, we didn't see patients until the third year, and we were surprised they were real people with real problems," says Marzuk. "Today, students actually see patients in the first year. Not as much of the teaching happens in lectures anymore. The students are in small groups and they know each other's names. Students also have more personal interaction with faculty, something you didn't

beyond the horizon

International experience lends new perspective for doctors in training

On the way to earning their degrees, Henry Wei, MD '02, and Naomi Hayashi, MD '02, spent two months studying traditional Chinese medicine in Taiwan and accompanying a medical team on house calls in the mountains of rural Hualien County. At a Weill Cornell-affiliated research center in Brazil's jungles, Alexander Greenstein '03 researched leptospirosis while classmate Bradford Hoppe studied leishmaniasis. Their research posters earned the two awards from the International Health Medical Education Consortium.

Such experiences are part of a growing trend at Weill Cornell, as students incorporate international medical experiences into their education. Such opportunities have flourished under the college's revised curriculum: one-third of the college's Class of '02 studied abroad—in Mali, Laos, Cuba, and more than a dozen other countries. "We have an obligation to prepare our students for practice in a wide variety of settings and to interest some of them in treating patients with diseases that have a tremendous impact on quality of life in the world, but which may not be prevalent in the United States," says Dr. Peter Marzuk, the college's associate dean for curricular affairs. "We want our students to be leaders in medicine, which requires that we give them a chance to see beyond the horizon."

As visitors at Tzu Chi General Hospital, Wei and Hayashi explored how Chinese academics, fleeing their own country's revolution in 1949, brought traditional medicine to their new land. Assigned to a hospice with terminally ill patients, Wei studied pain rating, placebos, and acupuncture. "By the time you finish medical school, you've spent years developing a whole Western-medicine frame of reference," says Wei. "This program was my last chance to broaden that frame of reference, to push the envelope of what's considered medicine." On visits to the homes of Bunun villagers—a trip which took six hours by train, plus three more by van—Wei saw first-hand the influence of culture on doctor-patient relations. "We learned about the ethics involved in an entirely different system, one where autonomy is not guaranteed," he says. "The collective interests of the family are what count."

On site: Henry Wei examines a patient during his two-month fellowship in Taiwan with classmate Naomi Hayashi.

Like his classmates, Wei developed his own fellowship proposal, with help from the office of international medical education. "We really don't have to direct the nature of their electives," says office coordinator Joan May. "We tell them what we know, what we recommend, but they often come back to us with new ideas." Many, she says, already have significant international experience by the time they apply for their fellowships. This year, May's office considered proposals from two fourth-year students headed to Cameroon and the Solomon Islands. The students, each of whom had served in the Peace Corps before enrolling at Weill Cornell, hope to take their enhanced medical understanding back to the communities in which they completed their original Peace Corps assignments.

Patient contact throughout the four years of medical school—one of the most significant effects of the new curriculum—has made it easier for doctors in training to gain the clinical experience necessary for study abroad. As a result, last year the international office made first-year students eligible for fellowships as well. Among those who took advantage of the opportunity were four students who summered in Guatemala before their second year at Weill Cornell, helping to establish health clinics at rural coffee plantations, where the need for free services by the country's poor is the greatest. They also researched prenatal care and childhood diseases and provided health-care-related worker education. "The international experience," says May, "depends on a skill students learn through the problem-based learning curriculum—how to pull together information from a lot of sources. When you go to a new country, you find a new language, a new culture, and very different attitudes toward health care."

Senior Associate Dean of Education Dr. Carol Storey-Johnson

tion for years and the field is advancing so rapidly," he says. "We train our students to find good information from many sources—in a world that's flooded with information."

Problem-solving and critical thinking skills are at the core of Weill Cornell's reformed curriculum. "Fundamentally, the new curriculum produces a different kind of student," says Carol Storey-Johnson, MD '77, the college's senior associate dean of education. "They are much better equipped to delve into a problem and solve it for themselves, as opposed to being spoon-fed the information by faculty in a lecture-based setting."

Back in Edgar's lung disease class, a soft-spoken second-year student in jeans and a sweatshirt delivers a short presentation on sarcoidosis. Edgar asks her which diagnostic tests she might run on the hypothetical patient, then asks the class to evaluate her response. Only when they begin to stumble does Edgar interrupt. With a few taps on his computer keyboard, a gross cross-section of granuloma flashes across each of the six computer screens installed around the classroom and Edgar prompts the group with a question about the pathophysiology of sarcoidosis.

Like most PBL cases, the fictitious patient's lung disease has occupied the class for three sessions. During the first two, students worked through the case history to understand its main elements. Between class meetings, they've used a variety of methods, including online resources, to add to their understanding of the symptoms. By now they're expected to have a working hypothesis, which in this case Edgar has helped them refine. "Dr. Edgar is very detail-oriented, and he helps us widen the scope of the problem," says Lian Sorhaindo '05. "What's good about his style is that he prompts you to think on your feet."

This is exactly what Weill Cornell administrators hoped PBL would accomplish. "In many ways, PBL is designed to mirror the clinical thinking processes a physician encounters—to be confronted by a problem, bring to bear 'old' information to get new information, consult with colleagues, and work it through," says Marzuk. If competition among medical students was once a given in the traditional lecture-based approach, then it is cooperation that is at the heart of the new curriculum. The reasoning behind the shift is simple. "Most of medicine is a team effort," says Marzuk. "Students need this experience from the start."

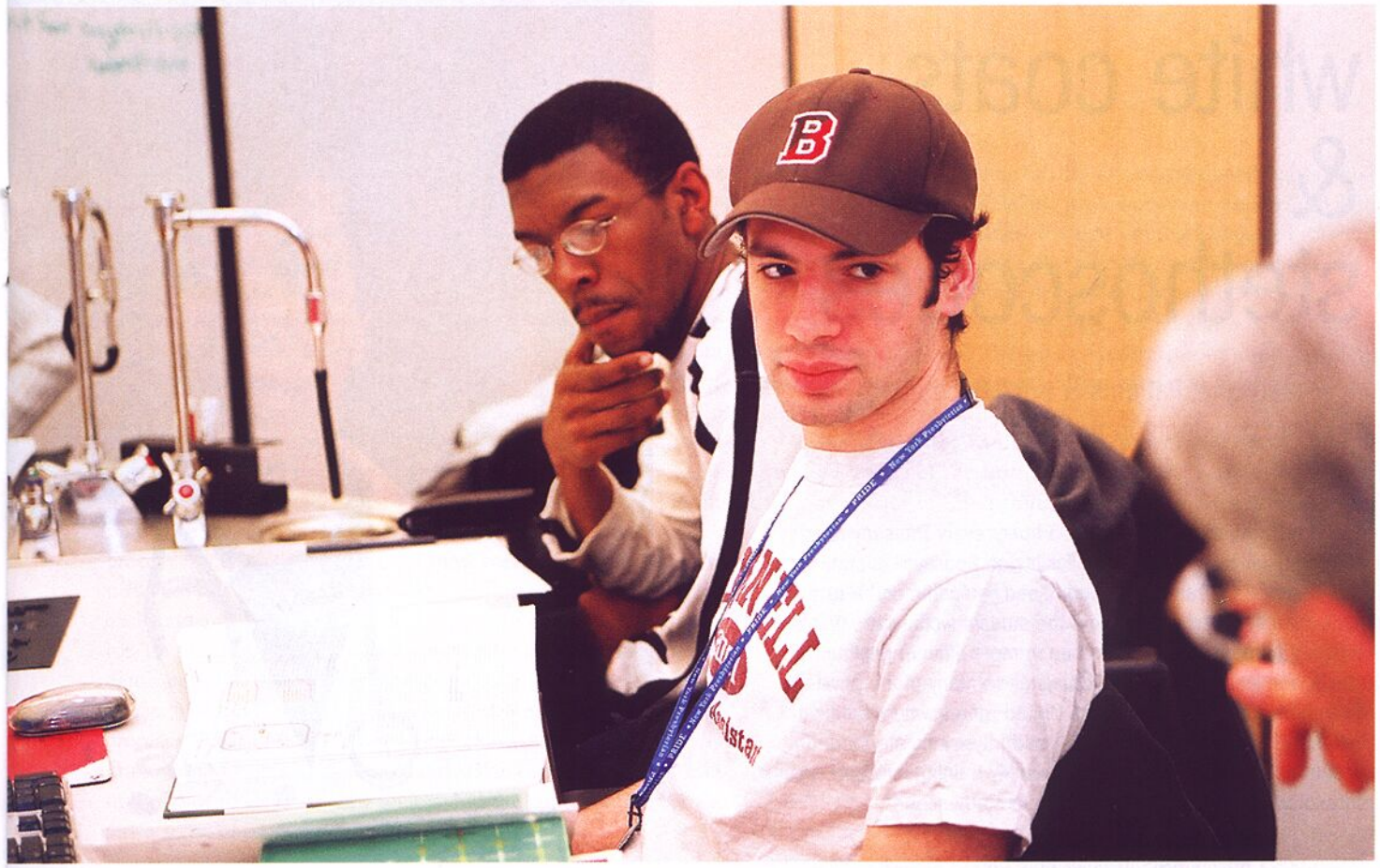
Although each group has a designated faculty facilitator, or tutor, that physician is not expected to provide factual information or medical expertise. Rather, he or she helps students navigate their way through the case, refocusing a discussion that has strayed. The key is to aid the group process, not to lecture or dom-

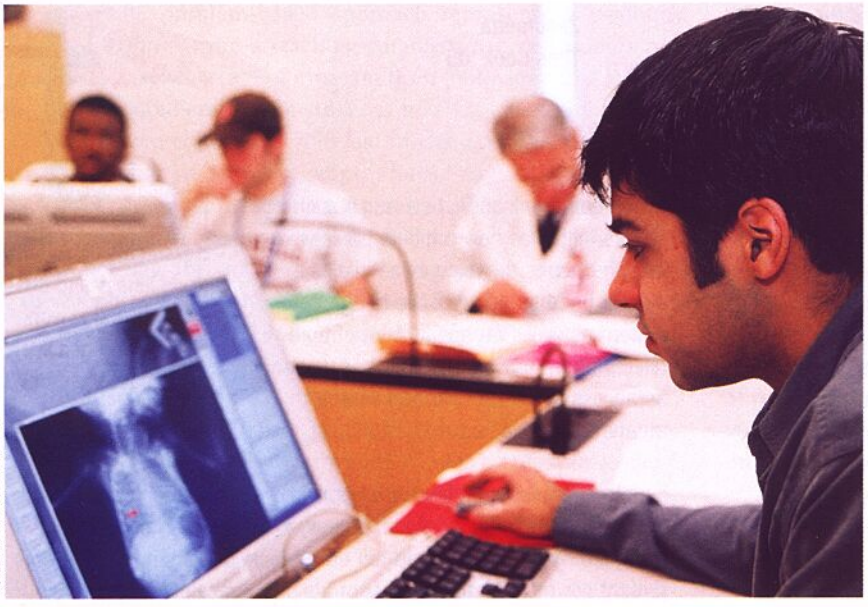
'The students are much better equipped to delve into a problem and solve it for themselves, as opposed to being spoon-fed the information by faculty in a lecture-based setting.'

have in my day."

The cornerstone of this new curriculum is an educational approach known as problem-based learning, or PBL, in which a faculty facilitator helps a small group of students work their way through a variety of hypothetical patient cases. By teaching students to identify the features of a case history, along with its underlying issues, the strategy helps them simultaneously gain basic science and clinical knowledge, improve problem-solving abilities, and enhance diagnostic skills.

At Weill Cornell, administrators designed a model that combines PBL sessions, lectures, and small-group sessions. "The hybrid method allows students who learn in different ways to experience different formats," says Marzuk, who helped oversee the transition to the new curriculum in 1996. In journal club, for example, students study scientific and clinical papers and analyze their methodology, hypotheses, and conclusions. "Many textbooks are out of date as soon as they've come out, especially since they've been in prepara-





PHOTOS THIS PAGE BY JANET CHARLES

Collaborative approach: On a Friday morning at 8 a.m., first-year students in Dr. Erich Windhager's Human Structure and Function class discuss "The Boulder's Early Arrival," the case of a premature infant with respiratory distress.

inate the classroom. "We want facilitators to make the environment for students comfortable, so they'll open up and think," says Marzuk. "We don't want them to grill students or put them on the hot seat."

Indeed, students say a facilitator's skill can greatly contribute to the success—or failure—of the PBL process. "My experience in PBL classes really depended on the tutor," says Marc Meyer '04, "and some were definitely better than others." Each professor incorporates his or her own training and interests into the classroom, personalizing the material and adjusting to the approach students take. "There are two types of instructors," says Meyer. "There are the physicians, who are good teachers but like to use their own clinical cases to teach you. Then there are the basic-science types, such as research professors or MD/PhDs, and these sorts of facilitators really force us to think about the problem in a way that allows us to teach each other. Their emphasis is on critical-thinking skills."

Along with the new curriculum has come a change in student

white coats & stethoscopes

Medicine, Patients & Society course puts students in the field

Last year Zandraetta Tims Cook '05 spent every Thursday afternoon at Coler Hospital, a public facility on Roosevelt Island. "Name a disease," says Tims Cook, "and you could find a textbook case at Coler." Not only did the student work with patients suffering from diseases uncommon in more affluent neighborhoods, she learned a lot about diagnosis. "Many of the physicians were trained outside of the United States, where medical technologies are not as accessible and physicians are more dependent on the physical symptoms. My training included exposure to diagnosis using no more than a stethoscope."

Tims Cook's weekly visits to Coler were part of Medicine, Patients, and Society, a course that runs through three years of the curriculum, developed to complement Weill Cornell's problem-based learning approach and third-year clerkships. At the center of the first-year component is the office preceptor session, a semester-long random assignment of each student to one of nearly 100 faculty mentors in the Bronx, Brooklyn, Queens, and Manhattan. On each visit to their preceptor, students shadow the physician in his or her office, learning to take histories and practicing physical exam techniques.

"From virtually the beginning of medical school, our students get white coats and stethoscopes and spend every Thursday in a clinical setting," says Dr. Lyuba Konopasek, director of the program. In addition to office visits, students attend small seminar discussions, debriefing each other on their clinical experiences and collaborating to connect their classroom studies with the real world. In the second-year version of Medicine, Patients, and Society, students take histories and perform physical exams on their own, reporting back to a clinical diagnosis tutor.

Like the revised curriculum, the preceptor course incorporates several subjects once taught separately—physical diagnosis, public health, biostatistics, and epidemiology. Administrators say the course is more than just an introduction to clinical medicine; it's an opportunity to train future doctors in the subtler aspects of physician-patient interactions. "We talk a lot about what it means to be a patient," says Konopasek. "We talk about verbal and nonverbal communication, how much such factors influence how patients perceive us." She hopes the experience instills a greater understanding of the health care system as well. "We spend a lot of time talking about cross-cultural issues, such as access to health care and what it means to have insurance or not."

Zandraetta Tims Cook '05

JANET CHARLES

Practical education: Tims Cook and her classmates don't just study illness and disease; they also work directly with patients throughout their four years of training.

Finally, administrators hope that both the office preceptor visits and the weekly seminars will foster increased empathy. In one exercise designed by Konopasek and her colleagues, doctors in training wore patient gowns to lecture, and kept hospital bracelets around their wrists for twenty-four hours. Then they wrote about the experience. "We had a whole range of reactions to that exercise," says Konopasek. "Some thought it was valuable, others thought it was stupid—pretty much what patients will say after going to the doctor's." Yet, she says, the exercise made her point. "It made them aware of empathy as an issue. I don't know if you can teach empathy, but you can teach people to be reflective and think critically about what they're doing."

evaluation. Gone are the days of extended, comprehensive, multiple-choice exams and the sleepless nights of preparation at the end of the semester. In their place, students take weekly quizzes, as well as the Triple Jump Exam, administered at the end of each of the four courses taught in the first and second years. The exam derives its name from the three "jumps" or hurdles it places before students over a two-day period. During the first phase, students analyze a case similar to those they've seen in their PBL sessions, and have two to three hours (depending on the course) to answer a series of essay questions. At the end of the exam, students receive part two of the case. Later the same day, they gather in groups to review both parts. This is the second jump, and in this phase the goal is to share information and work collaboratively, a process intended to mirror the clinical consultation process. The next day, after an opportunity for additional study and research, each student sits for an individual oral exam with a faculty preceptor. In addition to answering a series of uniform questions, students have the opportunity to modify their essays from the first phase, based on what they've learned through the consultation process. "Most of life is not multiple choice," says Marzuk. "The Triple Jump Exam allows students who don't do their best on multiple choice to show us they understand the concepts—and it fosters a sense of cooperation in an exam setting."

The problem-based approach represents a profound shift—from a teaching paradigm, where students passively absorb information from professors, to a learning paradigm, where students take responsibility for their own education. "The old model made the assumption that students are empty slates," says Marzuk. "It also assumed that there's a pre-defined body of information out there, and all we have to do is stick it in a student's head. But that's not how the world is. Medicine is changing constantly, and there's no way students will learn everything they need to know."

Indeed, by the late 1960s, medical educators around the country had begun realizing that much of what students are taught in medical school is quickly forgotten, or outdated. Searching for a solution, they examined the principles behind such cognitive psychology theories as self-determination, which suggests students retain more knowledge when they're responsible for their own learning. In 1969, a group of medical educators at McMaster University in Hamilton, Ontario, adopted PBL to make their curriculum more engaging. Over the next decade, McMaster, Limbrey/Maastricht in the Netherlands, and Southern Illinois developed pure PBL curriculums. By the 1990s, many American medical schools had adopted some kind of PBL curriculum; most implemented a hybrid model like Weill Cornell's, incorporating PBL sessions, lectures, labs, and small-group sessions.

At Weill Cornell, several working groups developed overall guidelines for a reformed curriculum in 1994, and by the 1996–97 academic year it had been launched for first-year students. Its implementation was far from smooth. "We spent the first year just trying to fix major problems," says Storey-Johnson. Among the challenges was getting faculty to work with colleagues outside their own departments. While professors were used to collaborating within their specialties, the new approach required interdisciplinary efforts. And there's also something of a learning curve for faculty leading a PBL module for the first time. Much of the faculty at Weill Cornell went to medical school at a time when professors lectured, and the art of facilitating—guiding students, knowing when to interrupt a discussion and when to leave students alone—is an acquired skill.

Four years after Weill Cornell students took their first PBL module, many of the initial glitches have been resolved. "We're now at a place of fine-tuning," says Storey-Johnson. Earlier this year, the office of curriculum and educational development designed a program to help faculty learn more about PBL, with an orientation, a mentoring program that pairs new faculty with seasoned instructors, and a detailed guide. Each year administrators and faculty review the case studies used within the curriculum.

The challenge for Weill Cornell faculty is to remain attentive to opportunities for improvement. "There's always a danger of re-equilibrating into complacency after a massive revolution—and in many ways it was a revolution when we brought PBL here in 1996," says Marzuk. "Science is changing and approach to practice is changing, so the curriculum must be constantly reinventing and renewing itself. If it remains static, that's not good, but if it changes too fast, that's not good either. The trick is striking a balance between the two."

Even with the new curriculum running smoothly, some bigger questions remain. Is PBL better than a traditional lecture-based curriculum at training medical students to become doctors? The jury is out—and there may never be a clear answer. For one thing, measuring the sorts of critical-thinking and problem-solving skills enhanced by PBL is harder than measuring the knowledge-retrieval skills emphasized in lectures and multiple-choice tests. For another, most U.S. medical schools, including Weill Cornell, offer a hybrid curriculum of multiple formats including lectures, so the school's administrators say it's unlikely a valid comparison of pure PBL to traditional curricula could ever be done. The few independent studies currently available show that when tested on multiple-choice exam questions, students from pure PBL programs haven't learned as much in the first week as students in a strictly lecture-based format. However, after several months, the test scores are nearly equal.

Then there's the greater personal satisfaction PBL students report with their training. "PBL was painful at first," says Henry Wei, MD '02, "because you really don't know how to work through medical cases. It's so foreign to what you did as a college student: learn information, feed it back to demonstrate you've learned it, and then forget about it." Now that he's a first-year resident, Wei says he sees how well prepared he was for medical practice. "It's eerie how well PBL replicates the process of life on the wards." ■

PAUL ZAKRZEWSKI *is a freelance journalist and editor of the forthcoming HarperCollins anthology* Lost Tribe.