Dr. J. Adrian Lunn had a plan. He’d come to America from his home in the Bahamas, study medicine, earn a degree and return home to practice medicine.

For Dr. Lloyd Miller, his specialty, dermatology, provided a tempting opportunity for a lucrative private practice. Many of his contemporaries already were pulling down good salaries.

With a master’s in business administration, a medical degree and master’s degree in public health already behind him, Dr. John FitzGerald came to UCLA to do his internal medicine residency and decide on his next direction.

For all three of these highly trained and competent physicians—and for many others over the last 11 years—a unique and nationally lauded program to train physician-scientists changed everything.

Because of the UCLA Specialty Training and Advanced Research (STAR) program, Lunn, Miller, FitzGerald and dozens of others are conducting leading-edge research in laboratories across the country—work that most likely will lead to better ways to prevent, detect and treat a variety of illnesses and diseases.

Lunn, Miller and FitzGerald were among 24 STAR fellows who graduated from the program in June. This set of STAR graduates was the third group to complete the program, which can take between four and seven years.

Since its inception in 1994, UCLA’s STAR program has trained 60 physician-scientists, and an unprecedented 87 percent have remained in academic medical research. Graduates from 2004 and 2005 earned an impressive $4.5 million in grant support to fund their research. And top academic medical centers across the country are working to develop similar programs to train the next generation of physician-scientists.

“The program has met my expectations in producing exceptionally well-trained physician-scientists,” says Dr. Alan Fogelman, executive chair of the UCLA Department of Medicine, who along with Dr. Linda Demer, vice chair of cardiovascular and vascular medicine, launched STAR 11 years ago.

“The value of our STAR graduates is as an important part of a research team,” Fogelman says. “Successful research teams are comprised of physician-scientists working alongside Ph.D.s. STAR graduates have a background in disease, and working with those trained in basic science creates a team synergy.”

Although more than a decade old, the STAR program is still in its adolescence. But Fogelman believes it will continue to be the most successful training program for physician-scientists in the nation.

“Our STAR fellows are sought after,” Fogelman says. “We’ve lost some of our graduates to outstanding competing institutions across the nation. We’ve also been fortunate to recruit a significant number to UCLA positions. Almost all of the STAR graduates are successful in obtaining National Institutes of Health (NIH) career development awards and grants from other sources such as the American Cancer Society.”

For Dr. Sanjiv “Sam” Gambhir, a former UCLA physician-scientist who now is director of the molecular imaging program at Stanford University, STAR already is a proven success. Stanford is considering developing a similar program, according to Gambhir.

“STAR will be important in advancing clinical medicine,” Gambhir says. “STAR graduates see both worlds, the clinic and laboratory, and serve as a bridge between the two.”

UCLA’s STAR program provides highly individualized research training and career development counseling to physicians who earn Ph.D.s or Master of Science degrees in clinical research while completing their fellowship training. It differs from programs such as the Medical Scientist Training Program (MSTP) in that STAR fellows already are practicing doctors. MSTP students earn their Ph.D.s during medical school.

The result is that STAR students are more focused and mature and better equipped to translate science from the lab bench to the patient bedside, says Dr. Enrique Rozengurt, a professor of medicine and a STAR mentor.

“The idea of having people who understand disease but also understand how to do research is very, very important,” says Rozengurt, who has been involved with STAR for eight years. “Great advances will come from having that kind of background. STAR offers a very organized and structured vehicle for physicians to become proficient at doing research.”

Gambhir agrees.

“In my experience, STAR graduates and MSTP students look at things very differently,” he says. “STAR graduates have a wealth of experience to draw on, having already finished medical school. They’re more confident and certain about what sort of clinical problems they want to solve in the lab.”

STAR’s structure and operation are unique, says Dr. Joy
Frank, a professor of medicine and physiology and the program’s director since 1997.

One of the most important aspects of the program, Frank says, is the intense mentoring trainees receive. They undergo career development training, are taught how to write successful grant applications and learn how to negotiate for their first jobs and advance through the ranks in academia.

“STAR trainees are mentored all the way through the process, in their divisions, by their research mentors and by the STAR program itself,” Frank says. “We do one-on-one mentoring, hold group workshops. We’re with them every step of the way, and that’s a big reason we’re so successful.”

Frank personally meets with each STAR trainee every three months.

In addition to the mentoring, STAR fellows are supported financially throughout their training by their clinical departments. They receive their complete fellowship salary, and their tuition is covered. Fellows are placed in top research labs and receive guidance from UCLA’s best scientific mentors, who teach them how to do research and advise them on grant writing and making presentations at scientific meetings. Upon graduation, STAR fellows often have a wealth of job offers.

Because of its proven success, spots in the STAR program are highly coveted.

“We receive hundreds of applications a year now,” Frank says. “STAR has developed a national reputation, and we now are attracting participants from the best institutions. We can be very selective and look for those unique people who are solely dedicated to academic medicine.”

The STAR review committee, for example, interviewed 30 applicants for STAR cardiology fellowships to fill only two positions. In all, STAR admits between eight and 11 new STAR fellows a year, Frank says.

STAR fellows choose one of three research pathways that are combined with their clinical specialty training to obtain either a Ph.D. in basic biomedical science from the David Geffen School of Medicine at UCLA, the life sciences in the College, the School of Engineering or at the California Institute of Technology (Cal Tech); a Ph.D. in health services/outcomes or epidemiology from the School of Public Health or the RAND Graduate School; or a master of science in clinical research from the Department of Biomathematics in the school of medicine.

The third research pathway was added in 2002, Frank says, in keeping with a national campaign by the NIH to encourage the training of more physician-scientists to do clinical research.

A 2003 article in *Journal of Clinical Investigation* stated that there are about 25 percent fewer physician-scientists on medical school faculties now than there were two decades ago. The article cited several reasons for this decline—the heavy accumulation of debt through many years of training, the difficulty in providing a sustained research experience in the modern training curriculum and reaching trainees who have no real understanding of what it means to be a physician-scientist before their career choices are made. The STAR program addresses all three of those issues, Frank says.

The clinical research focus is very popular, with about 25 of the current 48 STAR fellows enrolled in that pathway.

“That pathway has grown enormously in a short time,” Frank says. “Adding it has had a tremendous impact on the STAR program.”

Graduates of the third pathway will conduct or design clinical trials, Frank says.

On average, it costs about $240,000 to put a physician through the STAR program, a cost that is primarily borne by the participant’s home department. The willingness of the various UCLA departments to absorb the cost of training shows a strong commitment to the program, Fogelman says.

However, as STAR fellows become more successful, and
the program’s stellar reputation grows, trainees are finding it easier to apply for and receive grant funding, which relieves some of the departments’ financial burden.

The STAR program, Fogelman is happy to point out, costs participating UCLA departments much less today than it did 11 years ago.

In the last two years, Rozengurt has mentored three fellows who successfully earned Ph.D.s in the molecular biology program. Two have been recruited at UCLA as assistant professors. The third took a job at the University of Texas M.D. Anderson Cancer Center.

Lunn is among the STAR graduates staying at UCLA. An assistant professor of digestive diseases, he’s one of the three STARs recently mentored by Rozengurt.

Lunn attended Yale Medical School, where he also earned a master’s degree in experimental pathology. He came to UCLA to do his gastroenterology training and was immediately interested in STAR.

“I had started a Ph.D. program at Yale, but dropped out,” Lunn says. “For me, this was an excellent opportunity to complete what I had started.”

Lunn did about 18 months of his three-year subspecialty training, then spent nearly six years doing laboratory research as part of the STAR program, while concurrently completing the remaining 18 months of his clinical training. He studied a protein called focal adhesion kinase, thought to be important in how cancer cells invade and survive. His research sought to test a theory that a high salt diet increases the risk of stomach cancer. He answered part of the question and completed his dissertation, and will now continue his research.

He says STAR’s structure allowed him to do what he couldn’t do while he was a medical school student—finish his Ph.D.

“When you’re a medical student, you have no idea what you’ll end up doing down the road,” Lunn says. “With STAR, I already knew what my interest was, and I knew what I was giving up when I decided to do research. The salary in private practice is about three times what I’ll make as a researcher. But I discovered through STAR that research is what I really want to do.”

The same proved true for Miller, another STAR graduate who is staying at UCLA in the dermatology division.

“One of the strengths of STAR is that participants see the actual diseases they’re trying to understand in the lab,” Miller says. “There’s a real need, especially in dermatology, for basic science researchers to facilitate understanding of skin diseases. Most dermatologists go into private practice. They don’t opt to do research.”

Miller was mentored by Dr. Robert Modlin, chief of dermatology. He earned an NIH career development grant, published an article in the Journal of Immunology and won two dermatology foundation awards while in the STAR program. He currently is researching immune response to skin infection, with a focus on Staph infections. He hopes to discover a way to boost immune response to fight skin infections.

“My experience in STAR was outstanding,” Miller says. “It will be very easy to transition into a career in research.”

Like his colleagues, FitzGerald had his career course changed by the STAR program. He had signed up to do health services training when he met a rheumatology fellow already enrolled in STAR. He applied to and joined the program in 1998. During the next seven years, he completed his clinical training and did research on a Medicare policy change and how it affected medical practice patterns.

FitzGerald earned a career development grant from the Agency for Healthcare Research and Quality, under the Department of Health and Human Services, as well as an Arthritis Foundation Investigator Award. Now a UCLA assistant professor, FitzGerald will continue his health policy research with a goal to improve process of care.

“STAR provides a structure that helps move participants forward,” FitzGerald says. “It’s a huge help.”

Dr. Joseph Wu and Dr. Sushovan Guha are among the STAR graduates who landed coveted positions at other high-profile institutions, due in large part to their participation in the program, they say. Wu will be working alongside Gambhir at Stanford, while Guha has joined the faculty at M.D. Anderson.

Wu, a faculty member in the departments of cardiovascular medicine and radiology, says it takes an enormous commitment to participate in the STAR program.

“There are a lot of temptations … you see your colleagues graduating and launching their careers, and you’re still in training,” Wu says. “But I knew I was going to stay in academics. I knew I loved research and the STAR program gave me the time and support to do that research.”

At Stanford, Wu will use molecular imaging to track embryonic stem cell therapies in the heart. He hopes to conduct translational research.

“I don’t think any other institution in the country could have offered me the caliber of clinical training in adult con-
genital heart disease and research training in molecular imaging that I got in the STAR program,” Wu says.

After graduating from STAR, Guha received job offers from Yale, the Mayo Clinic and M.D. Anderson. He chose M.D. Anderson, where he runs his own lab and continues his research into pancreatic cancer. He focuses on a particular group of proteins called G protein-coupled receptors. He hopes to develop new ways to detect pancreatic cancer at an earlier stage, when it is more treatable.

An assistant professor, Guha credits STAR with giving him the ability to win grants and awards.

“This program is widely known,” Guha says. “Once you’re STAR trained, you can go anywhere.”

STAR has had a great impact in the Department of Medicine’s physician training, Frank says, since two-thirds of STAR fellows are in the department’s specialties of cardiology, digestive diseases, hematology/oncology, infectious diseases, dermatology, endocrinology, geriatrics, general internal medicine and rheumatology. The program also has had a major impact on other clinical departments such as obstetrics and gynecology, surgery, pediatrics and pathology.

The program has virtually transformed UCLA’s obstetrics and gynecology department, according to Dr. Gautum Chaudhuri, executive chairman.

The department, Chaudhuri says, will have more physician-scientists on staff than any other ob-gyn department in the country. To date, the department has three STAR graduates on faculty, with another three on the way.

“Normally, very few gynecologists become investigators,” he says. “But we’re going to have a number of gynecologists at UCLA trained to do outstanding basic science and clinical research. They’ll be on the cutting edge of research and on the front lines of translating the latest advances to our patients in clinical trials.”

Recent STAR graduate Dr. Oliver Dorigo is joining UCLA’s ob-gyn department. Under his mentor, Dr. Arnold Berk, Dorigo worked on a novel virus-based gene transfer tool to correct genetic defects. One day, it may be used to replace missing genes and have implications in cancer, diabetes and other metabolic disorders. He’s also studying molecular pathways in ovarian cancer.

“I’m one of the biggest supporters of the STAR program,” Dorigo says. “It was fantastic. It gives you a tremendous science background and a lot of credibility.”

So much credibility, Dorigo says, that he was able to secure a three-year grant from the Ovarian Cancer Research Foundation.

“To be a well-funded scientist, to be published in peer-reviewed journals, you have to have an interesting project that will generate widespread interest. STAR gave me the ability to take on such a project,” he says. “If I can come up with something that influences the way we understand and treat ovarian cancer, I will be a happy man.”

Dr. Kathleen Sakamoto, head of the pediatric oncology division at UCLA, is not your typical STAR graduate.

Sakamoto has been with the pediatric oncology division since 1993 and was a faculty member when she joined STAR. She already was conducting research as well as seeing patients.