Today's Tomorrows

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Competitive Program Attracts Next Generation Of Cancer Researchers

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H. LEE MOFFITT Cancer Center & Research Institute

The End Of Cancer Begins Here.

A National Cancer Institute Comprehensive Cancer Center

At the University of South Florida

FROM THE Center Director

William S. Dalton, Ph.D., M.D.

Dear *Today's Tomorrows* Reader:

The mission of Moffitt Cancer Center is to contribute to the prevention and cure of cancer. And while all of our efforts are devoted to that mission on a daily basis, we must also keep our eye on the future – looking to new resources, new advances and new ways of thinking to solve this difficult puzzle.

In this issue of *Today's Tomorrows*, our cover story (page 15) features the new Cancer Biology Ph.D. Program at Moffitt Cancer Center and the University of South Florida, which is helping to prepare the next generation of doctorate-level cancer researchers.

It is a unique program in that its sole focus on cancer biology allows students who have demonstrated an interest in medical research to channel that energy directly into the field of cancer research. The sooner they can begin their work, the sooner their discoveries can make a real difference in cancer care and prevention. And that progress is important in a state where 91,000 cases of cancer are diagnosed every year.

Scientists in our Digital Medical Imaging Program are likewise looking ahead, this time to the next generation of computer-assisted mammography (page 9). Mammography, while an advanced science, is far from perfect. Isolating suspect masses from normal tissue in an x-ray remains a tremendous challenge. Today's best computer-assisted diagnosis systems still distress patients and overwork radiologists with more false positives than real tumors.

The DMIP team, led by Maria Kallergi, Ph.D., is working to improve the CAD process by creating better and more accurate pictures and combining them with non-image data that could greatly refine diagnosis and risk assessment.

And lastly, addressing the needs of diverse populations continues to be a top priority for Moffitt Cancer Center. It is a troubling fact that minorities face a higher likelihood of developing cancer and lower chances of surviving it than the general population. Moffitt has created the Office of Institutional Diversity to focus on diversity issues in the areas of patient care, research, community outreach, employees and faculty (page 18). In *Lifetime* Choices (page 11), you'll learn more about what Moffitt and *Lifetime* Cancer Screening & Diagnostic Center are doing to meet the needs of high-risk, underserved populations. And you'll also meet Wilma Warren, an inspiring woman who devotes her time to cancer education, believing that knowledge is power in this cancer fight.

Stayed tuned for the next issue of *Today's Tomorrows*, where we'll introduce the new Vincent A. Stabile Research Building and the expanded Moffitt Clinic, adding an additional 350,000 square feet to the Moffitt campus.

William S. Dalton, Ph.D., M.D.
Center Director, Chief Executive Officer

H. Lee Moffitt Cancer Center & Research Institute

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New Cancer Biology Ph.D. Program Attracts Next Generation Of Cancer Researchers

By Rick Stone

Although they may look like typical students, Rachel Radbourne and Joe Wahle's goals and life work are far from ordinary.

As part of the next generation of doctorate-level cancer researchers, they have been accepted into the highly competitive Cancer Biology Ph.D. Program at Moffitt Cancer Center and the University of South Florida. Their studies are helping to unravel the molecular and biological basis for tumor development – findings that may translate into lifesaving cancer therapies.

British student Radbourne, 28, was one of the first to be accepted in the program two years ago. At the Moffitt Research Center, she spends hours searching for the minute differences between cancer cells and normal cells.

"The problem with most chemotherapy at the moment is that it affects the normal cells as well as the cancer cells, which causes side effects such as nausea and hair loss," she explains. "Our aim is to identify targets that are unique to the abnormal (cancer) cells."

With a resume that included a bachelor's degree in medical biology from Brunel University in London, three years of laboratory research in the United Kingdom and mentor endorsements, Radbourne fit the profile of star-quality student that the developers of the Moffitt/USF graduate program were searching for.

"The students are not simply receiving training in their courses," says Kenneth Wright, Ph.D., director of the Cancer Biology Ph.D. Program. "They also are doing research, research that drives progress at Moffitt Cancer Center.

Dick Dickinson

Dick Dickinson

Clockwise from upper left: Jenelle McQuown, Scott Freeman, José Rodriguez, Joe Wahle, Pan Yu, Cynthia Lebron, and Rachel Radbourne, combine cancer biology class work with hands-on research at Moffitt Cancer Center.

"It takes a lot of perseverance to stick it out in the research field. There can be a lot of frustration for students if experiments do not progress rapidly. Experiments have to be refined, sometimes multiple times. Students must have the fortitude to stick with it until eventually, all of a sudden, things start to work. They have to have the determination to solve the problem," Dr. Wright says.

Proportionally, few are chosen for the program. By late April 2003, approximately 150 students had applied for the upcoming fall class. Of those, 15 were invited to Tampa to be interviewed for the five available positions.

The original idea for this Ph.D. program grew quickly out of conversations that developed among former Cancer Center Director John C. Ruckdeschel, M.D., Deputy Director Jack Pledger, Ph.D., USF Executive Associate Dean John Curran, M.D., and Julie Y. Djeu, Ph.D., leader of Moffitt's Immunology Program.

Many others were involved, including USF President Judy Genshaft, Ph.D., former President Betty Castor, USF Provost S. David Stamps, Ph.D., and other faculty members and administration figures.

But Dr. Djeu was the key player as an insistent, energetic, and determined advocate. In 1999, she conceptualized a multidisciplinary graduate research program focusing exclusively on cancer biology and achieving "critical mass" with support from USF's Colleges of Medicine, Engineering, and Liberal Arts and Sciences.

Many levels of approval would be required before the program could begin operating. Dr. Djeu would have to seek ascending levels of approval along parallel tracks at Moffitt and USF and then sell the idea to the Florida Board of Regents, then the governing

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body of the state university system. She anticipated a long and difficult road.

Dr. Djeu remembers Dr. Curran telling her it would take her four years. "He asked me, 'Are you sure you want to do this?' I said, 'Just let me start!'"

Dick Dickinson

Julie Djeu, Ph.D., was instrumental in developing the Cancer Biology Ph.D. Program, now directed by Kenneth Wright, Ph.D.

Remarkably, the track was faster than anyone imagined. Scarcely a year later, in one of its last acts before being legislated out of existence, the Board of Regents approved the Cancer Biology Program. In the fall of 2001, it recruited its first four students.

The speed of creation was amazing but not altogether a puzzle, according to Jack Pledger, Ph.D.

"It is cancer," explains Dr. Pledger. "It was and remains one of the most significant problems here in Florida. Ninety-one thousand cases are diagnosed every year, and there are about 41,000 deaths. Logically, one of the major emphases of the state should be trying to spearhead the research that will lead to the cure of cancer."

According to the American Cancer Society, only California has higher rates of cancer incidence and mortality than Florida.

A sole focus on cancer biology is relatively new thinking in the research community, and there are a limited number of programs focusing specifically on cancer biology. The aim of such programs is to find students who already have demonstrated an interest in medical research and channel them directly into the field of cancer research. This eliminates the downtime of students having to reorient themselves after earning their doctorates in other biological science programs.

The sooner they can begin their lives' work, the sooner their discoveries can make the jump from the laboratory to the patients' bedsides. "One of Moffitt's biggest strengths," says Dr. Wright, "is a very tight integration between basic science and the clinic. The goal is to translate basic findings into trials for patients as soon as possible."

In "translational research," findings are evaluated for their patient-care potential and relevance. Moffitt researchers have shown, for instance, that shutting down a signal-carrying cell protein called STAT3 can kill myeloma cells.

Student Rachel Radbourne is studying STAT3 in the molecular oncology laboratory of Richard Jove, Ph.D. Her hypothesis is that manipulating STAT3 signaling can stop the formation of tumors in breast, ovarian and prostate cancer as well as melanoma and leukemia. "I am fascinated by my work because it does have a direct link to the clinic and it could potentially affect patient therapy," she says.

Student Joe Wahle, 23, is studying stem cells in the immunology laboratory of William Kerr, Ph.D. He believes that stem cell research can expand the potential of transplants to rejuvenate systems and organs that have been destroyed by cancer or cancer treatment. Wahle, who earned a B.S. in marine biology at Eckerd College, says an ideal outcome would be "to give a person an injection that will actually be able to re-grow a functioning liver after it has been destroyed."

Acceptance in the Cancer Biology Program is the beginning of a five-year process with requirements that include a dissertation and presentations at two or more formal seminars. The training also requires students to have at least one research paper accepted for publication in a peer-reviewed journal.

During the first year, students migrate among two or three laboratories, refining their research skills and defining their interests, before deciding on a research specialty and a mentor professor who will guide their studies. Throughout their entire time in the program, the students have their tuition either waived by the University or paid from program funds supported by Moffitt

Profile Of Two Cancer Biology Graduate Students: Determination Is Vital To Their Success

"I was the annoying little kid who had to know the answer to everything," says Joe Wahle, first year student in the Cancer Biology Ph.D. Program at Moffitt Cancer Center. "I had the little microscope and a chemistry set. I love tough questions and figuring out a way to answer them."

Joe Wahle

Wahle, 23, and Rachel Radbourne, 28, are both students in the Cancer Biology Ph.D. Program at Moffitt Cancer Center and the University of South Florida. Although their respective paths to this destination were different, their missions have united in this program. As with all persons at the Moffitt Cancer Center, their goal is to "contribute to the prevention and cure of cancer." Radbourne began her journey in the biological sciences with the goal of becoming a dentist. "But then I decided that I didn't want to look into somebody's mouth for the rest of my life," she says. "I thought about medicine, but decided it wasn't really for me. Research suits me much better."

As an applicant for the charter class of the Moffitt/USF Cancer Biology Ph.D. Program, Radbourne had the right degree, the right experience, the right grades and the right test scores from her undergraduate career, as did Wahle the following year. Wahle hails from Eckerd College in St. Petersburg, Florida, and Radbourne from Brunel University in London.

But they also had the right measures of a particular intangible that developers of the program knew would be the deciding factor: the research mindset.

"We look for students who already have research experience," says program director Kenneth Wright, Ph.D. "It means a lot. Not only do

Cancer Center. In addition, each student receives an annual stipend of $20,000 and health insurance. This large financial commitment by Moffitt and USF is a key component that allows the students to focus all of their efforts on making new research discoveries.

After only two years, the program's student population is still small, with only nine students. But with five or six students entering the program each fall, Dr. Wright predicts a "steady state" of 25 to 30 students as the Cancer Biology course reaches maturity. At the end of their five years, most will move on to different institutes for post-doctoral fellowships and ultimately to yet other institutions as faculty members. "The entire scientific community benefits by encouraging such student movement and collaborative work," says Dr. Wright. "Programs like ours have an interest in supporting the whole field of research."

Meanwhile, the Moffitt/USF Cancer Biology Program is gaining recognition. "We're getting known," says its conceptual founder, Dr. Djeu, "and students are coming from all across the country, which is important." Current enrollment includes six U.S. citizens and one each from Britain, China and Spain.

For more information about the Cancer Biology Ph.D. Program, visit http://hsc.usf.edu/com/iop/cancer/.

Dick Dickinson

In his first year of the Cancer Biology Ph.D. Program, Joe Wahle says he enjoys intense, focused research. He currently studies stem cells in one of the immunology research laboratories at Moffitt.

they have a clear concept of what they're getting involved with, it also shows commitment."

Grades and scores suggest a basic suitability for the research life, but what matters most are the letters of recommendation from their past mentor professors in whose laboratories the students have worked. According to Dr. Wright, it's the only way to tell whether a prospective student has the natural intuition and the experience to design experiments, interpret results and implement controls.

This year, when 150 students apply to the program, only five will be accepted.

Last year, Wahle, his annoying-kid-with-a-microscope years far behind him, was studying marine biology at Eckerd and wondering if the field was truly for him. "When I was a sophomore, I started working in a molecular immunology lab at All Children's Hospital," he recalls. "We worked on a lot of marine organisms, and we were trying to figure out a model system, an immune model, in lower animals.

"I enjoy marine science quite a bit, but a lot of it is catching and counting fish… numbers. It's fun, but I prefer more intense, focused research."

Rachel Radbourne

Radbourne came to the Moffitt Ph.D. program through a combination of personal experience and blind chance. The death of a family friend from breast cancer had already awakened her interest and guided her toward cancer biology courses as an undergraduate in London. After graduation, she did research for three years and then began looking in Florida for doctoral training opportunities.

"I applied to USF for a course that no longer exists," she said with a laugh. "It was in biological science, a course that was in the graduate directory, but they lost funding and the office of graduate studies sent my file over here."

At the time, Dr. Wright's committee was assembling the first class for the brand new Cancer Biology Program. Being from London, Radbourne had never heard of the program and had only a vague awareness of Moffitt itself. She was accepted, but she still had an important choice to make.

"I had also been accepted at the University of Miami. The reason I chose USF over Miami was that it was specifically focused on cancer biology and the Miami program wasn't. It wasn't until I got here that I realized how prestigious and well known Moffitt is."

Both students are now immersed in the research fields they chose after 10 weeks of laboratory rotations in their first year. Wahle is working on stem cells in the immunology laboratory of William Kerr, Ph.D. He hopes that his research will contribute to transplant solutions for organs and systems destroyed by cancer and cancer treatment.

In the laboratory of Richard Jove, Ph.D., Radbourne is trying to figure out how cancer cells get their "orders" to proliferate malignantly and how this signaling system can be disrupted. She says the research could lead to halting tumor formation as well as to the development of chemotherapies with fewer side effects.

Their hopes and expectations have been seasoned by years of mixed research outcomes and an experienced understanding of the immensity of the challenge. You have to be realistic, says Wahle, but remain optimistic at the same time.

A Cancer Biology doctoral student's life at Moffitt is one of stress, hope, work, frustration and potential success. There is a difficult balance to maintain – encompassing classwork, research, and a personal life. Radbourne, at the time of this interview, was preparing for her qualifying exam, which would give her 60 days to write a grant proposal and prepare a defense…not to mention prepare for her upcoming wedding.

Bearing in mind all of the struggles, frustrations, sacrifices, and stress, Radbourne and Wahle have succeeded in remaining optimistic, and they have developed a good understanding of the road ahead. "Cancer research is like a baseball batting average," Wahle says. "If you're batting .500, you're really good."