

Physics and *Fastballs*

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Executive Director for
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It's a sunny Saturday morning, so the staff's parking garage is nearly empty.

He swipes his card, punches in a code and, flipping on lights as he walks, leads the way through a labyrinth of halls to his office and labs beneath Emory University School of Medicine.

It's been almost 17 years since Dr. Tim Fox ('90) graduated from Austin Peay, but this morning, fresh from a swim and dressed in shorts, T-shirt and worn jogging shoes sans socks, he looks more like a lanky college student than an internationally renowned medical physicist.

Just as he once successfully juggled a major in physics and a double minor in computer science and mathematics while pitching for the Govs, Fox still thrives on keeping lots of balls, no pun intended, in the air.

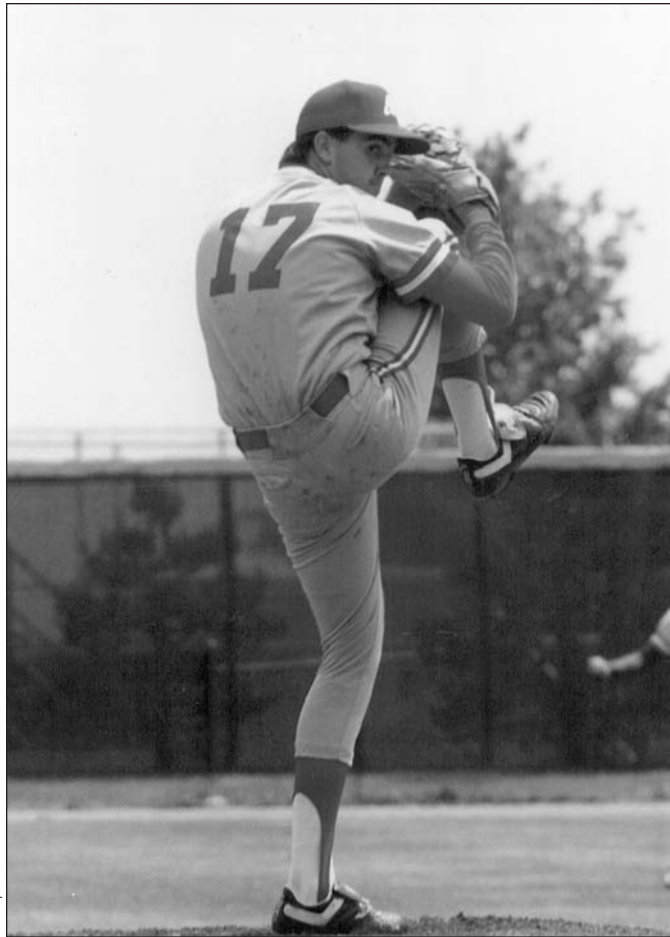
As quiet and unassuming as he was as an award-winning student-athlete, Fox says little about his career achievements, but his resume says it all. He's director of medical physics for three clinical facilities affiliated with Emory University's Department of Radiation Oncology as well as for Atlanta's Veterans Administration Hospital.

In Emory's School of Medicine, he's an associate professor of radiation oncology and director of both the Division of Medical Physics and Division of Computational Research and Informatics in the Department of Radiation Oncology. He's also an adjunct associate professor of nuclear engineering in the medical physics program of the Georgia Institute of Technology.

Playing in the big leagues

Emory was named one of 25 "New Ivies" by the 2006 Kaplan/Newsweek college guide. "New Ivies" are colleges whose first-rate academic programs and boom in top students have increased their national stature to a level rivaling traditional Ivy League schools. And in its 2006 college-quality listings, U.S. News and World Report ranked Emory No. 18 among 248 national universities. Emory has ranked in the top 20 since 1994 — the year Fox joined Emory's staff.

Clustered near the U.S. Centers for Disease Control and



APSU Sports Information

Tim Fox winds up to deliver his famous fastball—one of the pitches he used to help the Gobs advance to the 1989 Ohio Valley Conference Championship game.

Prevention and the American Cancer Society, Emory sprawls along what's called the Clifton Corridor, an area increasingly reminiscent of North Carolina's famed Research Triangle Park.

For Emory, growth is a front-burner issue. The board of trustees has authorized preparation of schematics for a new hospital and outpatient facilities—the anchor of a plan for a new \$1.2 billion health sciences complex, designed to set the standard for teaching hospitals.

Emory is a good fit for Fox, who gives his best as part of a winning team. “Tim was never satisfied and continued day in and day out to work hard to improve his game,” says his former APSU baseball coach Gary McClure. “Some guys are quick to point the finger or make an excuse, but Tim was a hard worker who continued to prepare himself.

“He’s a great team guy, an encourager ... always in the game, mentally, whether it was his day to pitch or not. That alone will make your teammates respect you.”

As McClure puts it, “with all the chips on the line,” Fox stepped up in the championship game of the 1990 Ohio Valley Conference

Tournament and pitched the best game of his career. “Guys like Tim seem to respond when they’re in the toughest situations,” McClure says.

Fox’s stellar performance in class and on the field garnered him the 1990 OVC Scholar-Athlete Award—recognition that called his academic acumen to the attention of his baseball buddies and, conversely, his physics and computer science classmates became aware of his athletic abilities. Although surprised, both groups realized Fox had raised the bar in both arenas.

Today, just as he was with his baseball team, Fox is an encourager to his research team, the medical residents he teaches and patients whose treatment protocols rest in his hands.

Making the right call

Some might say Fox’s ending up at Emory, a private university affiliated with the Methodist church, was providential. After all, his father not only attended graduate school at Emory, but he’s now the world director of evangelism for the World Methodist Council.

Both of Fox’s parents, Dr. and Mrs. H. Eddie Fox, Nashville, always set a high premium on education. His father holds a Master of Divinity from Emory University and a Doctorate of Ministry from Vanderbilt University, and his mother received a bachelor’s degree in business education from East Tennessee State University.

The parents’ modeling took root in their children. After his APSU graduation, Fox earned a Master of Science in Radiological Engineering/Health Physics and a Ph.D. in Nuclear Engineering, both from the Georgia Institute of Technology. His twin brother, Tom, who played baseball for Birmingham Southern College, is a Nashville banker. Their sister, Gaye Nell, who received her bachelor’s and law degrees from Emory, is a practicing attorney in California.

Because of his father’s ministerial work, the family settled in Nashville when Fox was

6. His passion for computers flourished at McGavock High School, where he learned four computer languages—COBOL, RPG, Fortran and BASIC—while using an IBM System 3 mainframe.

Unlike most teens, he never liked playing computer games. For him, the fun was in writing and debugging the programs—a harbinger of things to come.

Fox came to APSU on both a baseball and a Presidential Scholarship. Although he planned to major in computer science, he fell in love with physics, thanks to the late Dr. Robert Sears, professor of physics. Sears passed on his love for physics to Fox and his friend, Dr. Jaime Taylor, now professor of physics and chair of the APSU Department of Physics and Astronomy.

In upper-division classes, Fox and Taylor were Sears’ only students. Fox says, “Dr. Sears met with us three hours a week, made up our exams just like a regular class. It was a lot of work for two students, but it demonstrated Dr. Sears’ dedication and care.”

Sears refused to allow Fox to drop physics as a major. One day Fox told Sears he was going to have to quit physics because of baseball. “Dr. Sears told me, ‘No. I want you to be a physics major,’” Fox says. “So I showed him my baseball schedule. He had no idea we not only practiced every day, but also played 50 games a season.”

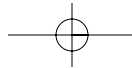
After that revelation, Sears gave Fox a key to the physics lab so he could work on weekends and at night after games. Often Fox would get back from an away game at midnight and head to the lab where he might work into the wee hours.

Fox managed and maximized his time, becoming a master at multitasking, long before that word entered the vernacular. He was focused, hard working, committed—just as he is today.

Swing, batter, batter

According to McClure, Fox’s best two pitches were his fastball and curve ball. “He threw a fastball with good velocity and good movement, which in a lot of cases is more important than velocity,” McClure says. “His curve ball was a 12-6 breaking ball—he released it at 12 o’clock and finished down through the pitch at 6 o’clock. Both pitches were very effective for him, especially when he had both of them going.”

And that’s what happened in 1990 when Fox pitched the best game of his career, firing fastballs and curve balls over the plate—exactly where he wanted them.



“Tim led a split life, almost three lives. He had the baseball group, the physics group and the computer science group.”

—Dr. Jaime Taylor ('90)

Professor of physics and chair of the
APSU Department of Physics and Astronomy

When Fox started working at Emory, he continued to push himself to achieve just as he did at APSU. During 1994-2000, he developed a treatment-planning software system that enabled him to aim a radiation beam precisely where he wanted for better cancer treatment. His unique background in both physics and computer technology made it possible to create a treatment-planning system that enabled radiologists to treat a brain tumor via a precise radiation treatment method called radiosurgery or bloodless brain surgery.

After 2000, Fox and his colleagues worked with leading medical industry companies as early adopters of technology for intensity modulated radiation therapy (IMRT). Through various kinds of medical imaging studies, Fox and his team can generate anatomical maps of a tumor and surrounding tissue. After creating the map, they employ IMRT, which wields an external radiation beam like a knife.

“We break the beam into several pencil beams, and computer optimization algorithms modify the intensity of each pencil,” Fox says. “This helps conform the dose and match it to the shape of the tumor—with a different intensity for each beam. It’s a precise radiation dosage, which allows us to deliver personalized radiation therapy for our patients.”

In 2004, Fox and colleagues made Emory the first site in North America to implement the On-Board Imager (Varian Medical Systems) for delivering real-time image-guided radiation therapy (IGRT). Using the precision of IMRT, the real-time imaging system allowed his clinicians to focus the most potent radiation treatment directly on the tumor while minimizing interaction with critical organs and tissues. With IMRT and IGRT, they can deliver radiation with the precision of image-guided missiles used for their accuracy in striking enemy targets.

After the Department of Radiation Oncology’s groundbreaking advance in personalized cancer treatment, Fox was interviewed several times on the nightly news on Atlanta’s NBC and ABC affiliates.

Was that the summit of Fox’s career? Hardly. Given his reputation for never being satisfied, for always pushing the envelope in research, what’s he working on now?

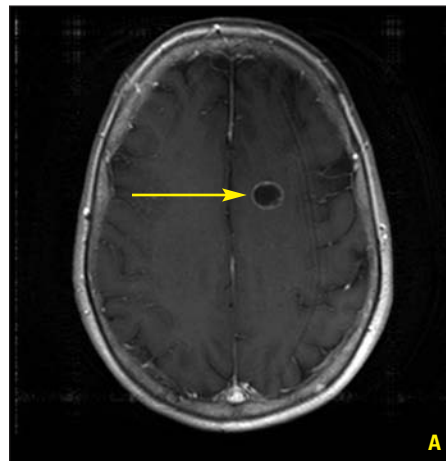
“Adaptive radiation therapy using molecu-

lar imaging,” he says with a shy smile. “It’s the new wave, and it’s very exciting. We want to see and treat the tumor better.”

As a leader in medical physics research, Fox has published many professional articles, abstracts and book chapters. He is a manuscript reviewer for the International Journal of Radiation Oncology Biology Physics as well as Medical Physics and Physics in Medicine and Biology, and he’s a former editor of the Vascular Radiotherapy Monitor.

Fox has been an oral examiner for the American Board of Radiology. In 2005 and 2006, he was invited to participate as an expert reviewer and panelist for the National Institutes of Health’s National Library of Medicine Special Emphasis Panel. He’s authored grants that received funding for scientific research at Emory and Georgia Tech.

Because Fox married physics and information technology successfully, he was granted two U.S. patents for treatment planning proto-

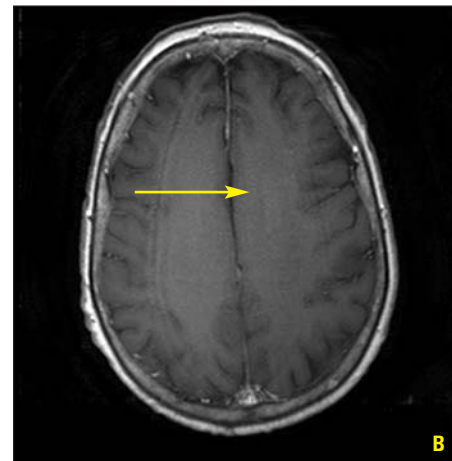


cols in intravascular brachytherapy, a technique that uses radiation therapy to keep blocked heart arteries open.

In recognition of his outstanding work, Fox also has received numerous honors, including the 2005 Coulter Translational Research Award for using magnetic resonance spectroscopy to improve the delineation of tumor volumes for treatment planning.

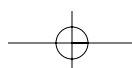
Fox’s award-winning research, intelligence and intrinsic “likable factor” have made him a favorite among medical physicists and oncologists worldwide.

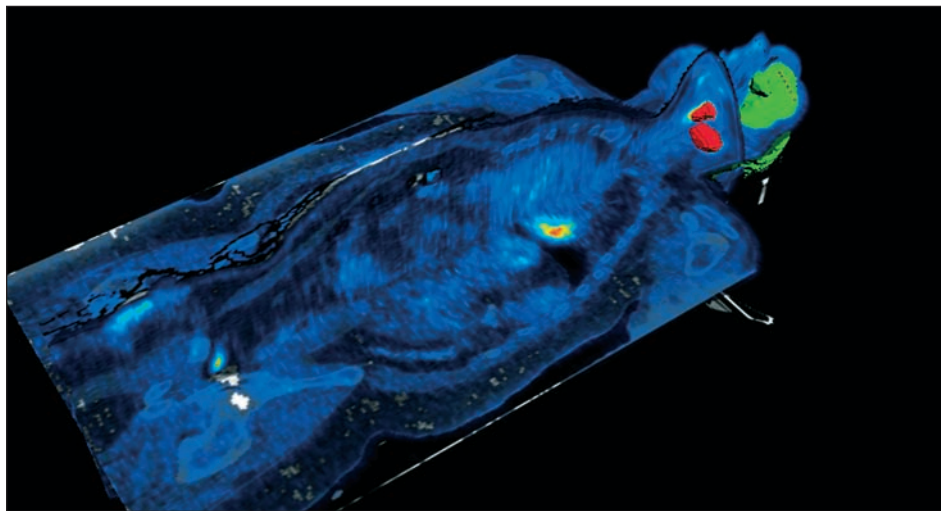
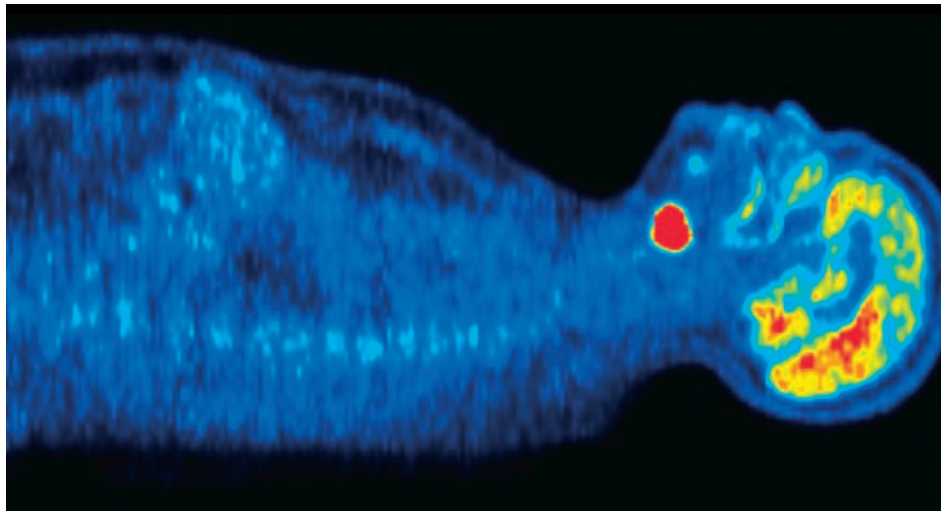
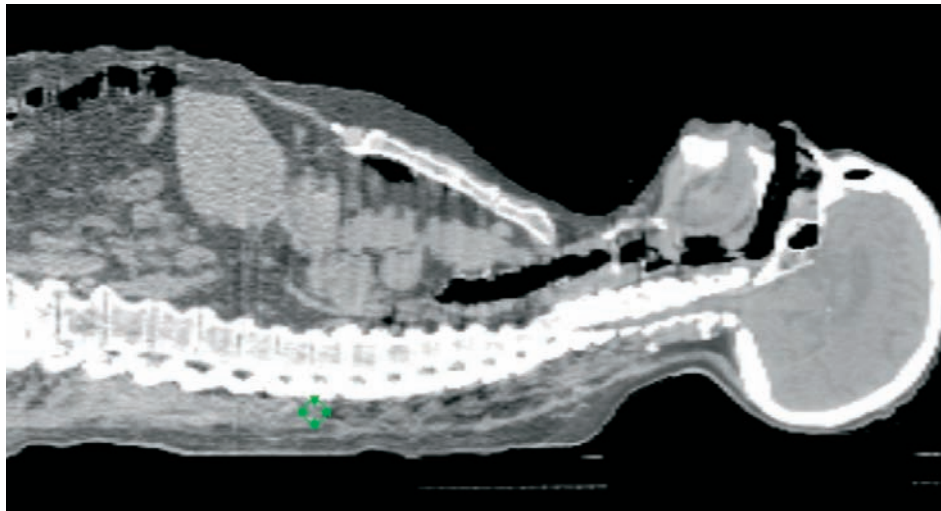
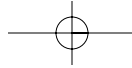
As a result, he’s become an evangelist,



A female lung cancer survivor developed metastatic disease in the brain, seen easily in A. Using the world’s first Trilogy Radiosurgery system installed at Emory in 2004, the lesion was treated with a single high dose of radiation. After six months, the brain lesion is not visible on the follow-up MR imaging study, in B, indicating a complete response to the radiosurgery treatment.

Tim Fox/Emory University





Molecular imaging software—designed by Fox and his radiation oncology colleagues—uses molecular imaging (positron emission tomography or PET imaging) combined with computed tomography (CT) imaging to assess the metabolic activity of lymph node metastases for improved tumor delineation in treatment planning. These pictures represent a CT (top), PET (middle) and 3-D combined PET/CT view (bottom) of a 47-year-old head-and-neck cancer patient with a left tonsillar squamous cell carcinoma. PET imaging highlights the tumor volume in the neck for assessment by physicians. The 3-D view shows the tumor volume as a red surface after delineation by the software system.

somewhat like his father. While his father is charged with sending out the message about a soul-saving God to the far corners of the earth, his son is spreading the good news about life-saving research and advances in cancer treatment.

And Fox is in demand as a speaker—often taking the red-eye to Los Angeles, Buenos Aires or elsewhere. In fact, he has more invitations than time, especially now that he's set a high priority on participating in family activities with his wife, Joelle, daughter, Jasmine, 6, and son, Riley, 3. Although spending time now with his young family often means declining speaking trips to Europe, Australia and other countries, Fox is confident those invitations will continue to arrive long after his children are grown.

And he's learned, if he spends time with his family and also allows time for activities that rejuvenate his mind and body, he performs better at work, so he bikes and runs regularly.

This week, however, his workout is a bit more serious. He's training for the Peachtree City Triathlon. In a triathlon, athletes only compete against themselves in running, biking and swimming, but Fox has been concerned because he doesn't swim regularly.

"If you're in a triathlon and you get tired biking or running, you can take a break. But if you get tired in the middle of the lake... well, you can't stop." As those who know him would expect, Fox has tested the waters—literally.

Early on this Saturday morning, while others were deep in sleep, Fox drove to the lake and practiced swimming the required routine.

Whether training for a triathlon, studying late at night for a physics exam or practicing his fastball for hours on end, he wants to know, beyond a shadow of a doubt, that he is ready for the game. It gives him the kind of confidence that makes him someone others can depend on "when the chips are down," as his former baseball coach said.

Fox brings this same level of personal dedication to his work. No half-hearted attempt. No hoping. No second-guessing. No fingers crossed.

The nod Fox gave his catcher at Austin Peay means the same as the nod he now gives his research team, his medical residents and his patients: Batter up!

Tim Fox has taken the mound, and he's ready to deliver. **AP**

Tim Fox/Emory University

