Inside



# The Whistle

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http://www.whistle.gatech.edu/archives

## Mathematics of cancer treatment: a new weapon against prostate cancer

*John Toon*
*Research News and Publications*

A merger of advanced mathematical techniques with cutting-edge computer technology may give doctors a powerful new weapon in the battle against prostate cancer.

Researchers have developed a computerized expert system that would help radiation oncologists optimize placement of radioactive "seeds" for prostate brachytherapy, a non-surgical treatment that has been growing in popularity. Beyond providing treatment more precisely tailored to each patient, the system targets escalated doses of radiation at tumor pockets, and accounts for changes that occur in the prostate volume during treatment. Utilization of the system has the potential to improve tumor control and reduce uncomfortable side effects.

For the cost-conscious medical industry, the automated system offers a dramatic reduction in the time required to design radioactive seed treatment, allowing optimized plans to be created in minutes — and revised as the procedure proceeds.

"The system allows us to effectively manipulate the large number of variables involved, something that is far too complex for even the best human experts," said Eva K. Lee, assistant professor of industrial and systems engineering at Georgia Tech and of radiation oncology at Emory University School of Medicine. "We can deliver better precision and create the optimal plan for each patient. This system should help cut the recurrence rate for prostate cancer and reduce toxicity to healthy tissue."

Lee presented details of her treatment planning system February 19 at the 167th annual meeting of the American Association for the Advancement of Science (AAAS) in San Francisco.

Prostate brachytherapy involves implantation of tiny radioactive seeds in the cancerous prostate. Continuous radiation from the seeds kills the cancer cells, allowing patients to avoid surgery that can produce such complications as incontinence and impotence.

To successfully treat the cancer, however, physicians must carefully design the radiation dose, balancing the high radiation levels needed to eradicate the cancer against the need to protect nearby tissue, including the urethra and rectum. Further complicating treatment is the edema that occurs as needles are inserted to place the seeds. Resulting changes in prostate volume can mean delivering too little radiation at the beginning of treatment and too much as the swelling subsides.


Photo by Gary Meek

**Eva Lee shows an ultrasound image of a prostate, as a computer monitor displays prostate structures and another ultrasound image.**

"It is very complicated to

*Brachytherapy continued, page 3*

## New parking deck expected to bring a measure of relief

*Barbara Wilson*
*Auxiliary Services*

In February of 2000 construction for the centrally located North Campus Parking Deck broke ground. Next month, the deck will open, providing an additional 850 parking spaces on campus.

Surface lots are at a premium on campus, according to Parking and Transportation Director Rod Weis. By creating a multitiered project, it allowed for better use of the land available.

"The North Campus Parking Deck is a welcome addition to our parking inventory, and a model for future parking deck design on campus," said Rosalind Meyers, associate vice president of Auxiliary Services.

Photo by Peter Lange

**Because of its location on campus, the new north deck will allow many people to park closer to their building.**

The cost of the project was $10.75 million and was funded through capital bonds. The deck is cheduled to open between April 16 and April 20.
E-mail notification to the first priority group is expected to begin as soon as the deck is turned over to Parking and Transportation from the design team and engineers.

Vehicles will enter and exit the deck through the northern entrance located on Peachtree Place. This entrance and exit will be accessible from the north end of State Street and Atlantic Drive. When the State Street Beautification Project is completed, the southern entrance and exit on State will reopen.

Security also factored into the planning process, according to Weis. Emergency call boxes are in the elevators and at the entrance to each stairwell on every level, adding the new deck will be the "best lit parking structure on campus."

Parking deck B07 permits will be sold to current GT parking permit holders based on registration priorities until full. Each priority group will be given one week to change to the deck, a system that was previously agreed upon by the university.

"Parking will attempt to accommodate all current permit holders who wish to move to the

*Deck continued, page 2*

# Two Tech coaches take top honors

Photo by Stanley Leary

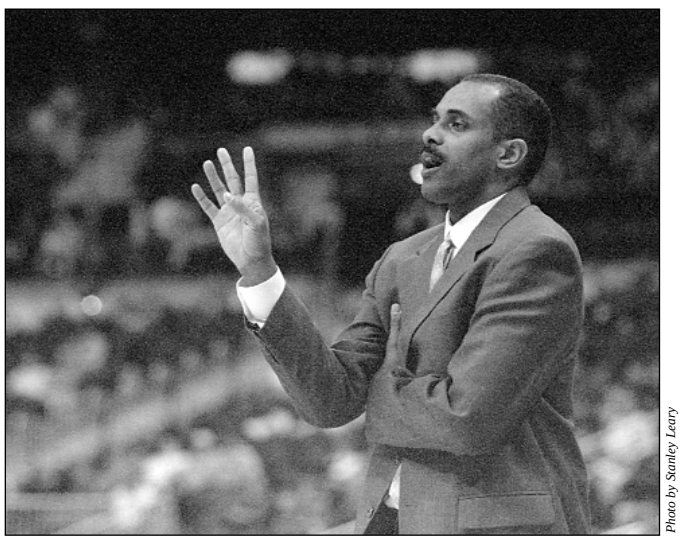

Photo by Stanley Leary

**The past two weeks have been very good to Georgia Tech athletics. First, Head Football Coach George O'Leary was honored by the Bobby Dodd Foundation on March 6 as the 2000 Coach of the Year. The Foundation established this award in 1976 to honor the Division I college football coach whose programs represent quality on and off the field. O'Leary is the second coach from Tech to win the award after Bobby Ross in 1990.**

**On the hardcourt, the Jackets finished an impressive run through the ACC Tournament with a record of 17-12 and gained their first NCAA Tournament berth in four years. Then, Head Coach Paul Hewitt began last week by being named Conference Coach of the Year by the Associated Press. The 37-year-old Hewitt received 41 of a possible 72 votes cast, beating out North Carolina's Matt Doherty, who received 26 votes in his first season with the Tar Heels.**

*Deck, continued from page 1*

new deck," Weis said. "If demand does exceed supply, we will begin a wait list."

If a faculty or staff member decides to move into the new deck, and there is an increased parking cost, then they will have to pay the difference accordingly. Parking cannot add the cost to payroll deduction this year.

The new deck has 850 spaces of which 550 are planned for permit holders. The remaining spaces will be used for daily parking and SmartPark parking (see related story, right). Weis does not anticipate customers having to move their cars for sporting events.

For more information...
Parking and Transportation
**http://www.parking.gatech.edu/**

## BuzzCard acts as permit in new SmartPark program

A pilot project that interfaces the technologies of the BuzzCard vending reader to the parking gates at the North Parking Deck together will create SmartPark — a more flexible parking permit option.

The vision of combining these technologies came from Jim Pete, director of the BuzzCard Office, and Peter Lange, technology coordinator for Parking and Transportation. They have successfully altered the Blackboard Inc. BuzzCard single price vending card reader to interface with a parking gate.

"SmartPark participants will now be able to drive up, swipe their BuzzCard, and have their SmartPark account debited for the gate activation," Pete said.

The deck operates as a card-in and card-out for two reasons; first, to help prevent illegal entry into the deck, and, second, to facilitate the mixing of visitor and permit parking.

The permit will help monitor the flow of daily parking on the deck. Money placed into SmartPark goes into an account separate from the other Buzz, according to Pete. Pete says that the project was made possible by the use of "reverse engineering" through the hard work of Wayne Hammerstrom, computer specialist for Auxiliary Services.

Additional Information on the SmartPark option may be found at **http://www.buzzcard.gatech.edu**.

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# Police Department arrests suspect for recent break-ins

The Tech Police Department has announced an arrest in connection with a rash of break-ins that have occurred across campus in the past month.

Chief of Police Jack Vickery confirmed that the suspect had also been arrested in early December for theft from the Success Center and the Weber Building. Officers recognized him, stopping him along North Avenue in the early hours of March 11. Allegedly, the suspect had just stolen athletic apparel from the Athletic Association when he was approached.

The suspect, who attempted to flee, was apprehended by the officers shortly thereafter. Once in custody, he admitted to several of the recent burglaries, including those at Student Services, the Weber Building, the Groseclose Building, College of Computing, Success Center, the Athletic Association, and a couple fraternity houses.

Vickery noted that the suspect's record of petty theft can be attributed to drug addiction.

***Correction:*** *A story in the March 12 issue related to the restoration of Brittain Dining Hall contained two factual errors. It misstated the name of a donor. The $100,000 for the renovation of the President's Dining Room was given by alumnus Richard A. Beard, Class of 1967. Roane Beard is his uncle.*

*Additionally, it should be noted that the Class of 1974 has donated $125,000 for the restoration of the staircase, not the $52,000 that was initially reported. We regret the errors.*

*Brachytherapy, continued from page 1*

produce a successful implant," explained Lee, who collaborated on the work with Macro Zaider, professor and head of brachytherapy physics at Memorial Sloan Kettering Cancer Center in New York. "Proper coverage of the entire prostate is very important, but it can be very difficult to carry out the plan. The seeds cannot always be placed in the location you want, so you must be able to compensate for that. Our system allows real-time planning, and corrections can be made as you proceed."

Ultrasound images of the patient's prostate are used by the system to help determine optimal radioactive seed placement based on such variables as prostate volume, location of tumor pockets, radioactivity levels of the seeds, location of the urethra (which passes through the prostate) and regions of the organ that may be unreachable by placement needles.

Woven into the system are a dose-calculation engine, a modeling module, an optimization engine, and a graphical evaluation tool.

"To the physician, this will be a black box," Lee explained. "They will not need to know what is going on with the mathematics. All they will have to do is tell the system what they want in the plan."

Less experienced oncologists working in remote areas could use the system to aid in producing high-quality treatment plans.

In most current treatments, seed placement is determined manually based on a simulation of the patient's prostate. Done days or weeks ahead of the operation, this "pre-plan" takes hours to produce. By cutting the planning time to as little as 15 minutes, the system should reduce costs and allow physicians to spend more time with their patients, Lee noted.

Though the expert system is ready for commercialization, it will have to receive FDA approval before being made available to treatment centers. However, Lee has used real patient data to compare her system against treatment plans designed by radiation oncologists. Those results suggest the system will provide significant improvements in treatment outcomes.

The system operates on a wide range of computing platforms, including Windows NT personal computers.

As a student, Lee struggled to choose between interests in both medicine and mathematics. Ultimately, her mathematical aptitude won out, but her interest in medicine drew her to look for applications of advanced techniques.

While working with radiation oncologists at Memorial Sloan Kettering, she realized the placement of radioactive seeds was essentially a binary problem: Physicians had to decide whether or not to place a seed in each of some 300 possible positions in the prostate. From that realization grew a collaboration that began in 1995 and continued after she moved to Georgia Tech.

Though prostate cancer has so far provided the primary focus for her work, Lee is now working with researchers at the Emory University Department of Radiation Oncology on a similar approach to planning external beam radiation treatment for brain and other types of cancer.

"The intricacy and complexity in radiotherapy treatment planning requires sophisticated mathematical modeling and advanced computational optimization techniques," Lee explained. "This is a way I can contribute to the medical field even though I am not a physician. It's a good collaboration."

The work is sponsored by the National Science Foundation, the Whitaker Foundation, and CPLEX, a division of ILOG Inc.

**Five "Women of Distinction" were recognized as outstanding female role models at the fourth-annual Women's Leadership Conference held on campus last month. From left to right, they are: April Brown, associate dean in the College of Engineering; Jennifer Jordan doctoral student in the School of Materials Science and Engineering; Eden M. Hunt, alumna and physicist with Columbian Chemicals; Carolyn Wierson, associate director of the Georgia Tech Counseling Center; and Rebecca K. Glatzer, graduating senior in public policy. In keeping with this year's theme, "Beyond the Glass Ceiling: Thriving Not Just Surviving," the conference student organizing committee and advisory board awarded women who inspire their peers through their leadership and involvement in the community.**

*Photo by Curtis Compton*

# Did You Know?

### What's your opinion?

The **Student Center Expansion Task Force** would like your input. While this group is not considering specific space allocation requests at this time, it is their mission to assist the administration in a "needs assessment" to help determine how the current bookstore space should be used, and what functions should reside in this building after the bookstore moves to Fifth Street.

Submit your ideas following these guidelines:

• Include a contact person's name, phone number, and e-mail address (anonymous proposals will be ignored);

• If this proposal is from a campus department, include the name of the department;

• Be sure to concentrate on big picture ideas — how the space should be used, what kind of atmosphere you would like to see achieved, what kind of functions you would like to see occur;

• Avoid direct requests for space, this is not the group that will make these decisions; and

• Restrict your proposal to no more than one page or about 250 words maximum.

Proposals should be submitted by March 30 to stucencomments@stucen.gatech.edu.

### Change of address

The **Office of International Education** has moved from the J.S. Coon Bldg. to room 211 of the Savant Building.

### Manage your assets

Fidelity Investments will be on-site for **One-on-One consultation sessions** regarding Workplace Retirement and/or Savings Plan(s) on Friday, March 23. To schedule an appointment for a consultation with Jason Friday, Fidelity Investments Retirement Counselor, call 1-800-642-7131.

### Curriculum vitae

Applications are now being accepted for 2002-2003 **Fulbright Scholarships**. A number of deadlines are approaching, including a May 1 deadline for the Fulbright Distinguished Chairs Program. Interested faculty may access all information relevant to this and other awards at the Council for International Exchange of Scholars (http://www.cies.org) or by calling the Office of International Education at 385-1225.

### A chaotic collection

The Georgia Tech Library & Information Center's Archives Department now offers researchers, scholars and other interested parties access to the **Joseph Ford Papers**. A pioneer in the field of chaotic dynamics, Ford was a world-renowned physicist and a Regents' Board Professor at Georgia Tech. The availability of this collection is made possible, in part, by a grant from the Friends of the Center for the History of Physics. For more information, refer to http://gtel.gatech.edu/archives/ford/index.html.