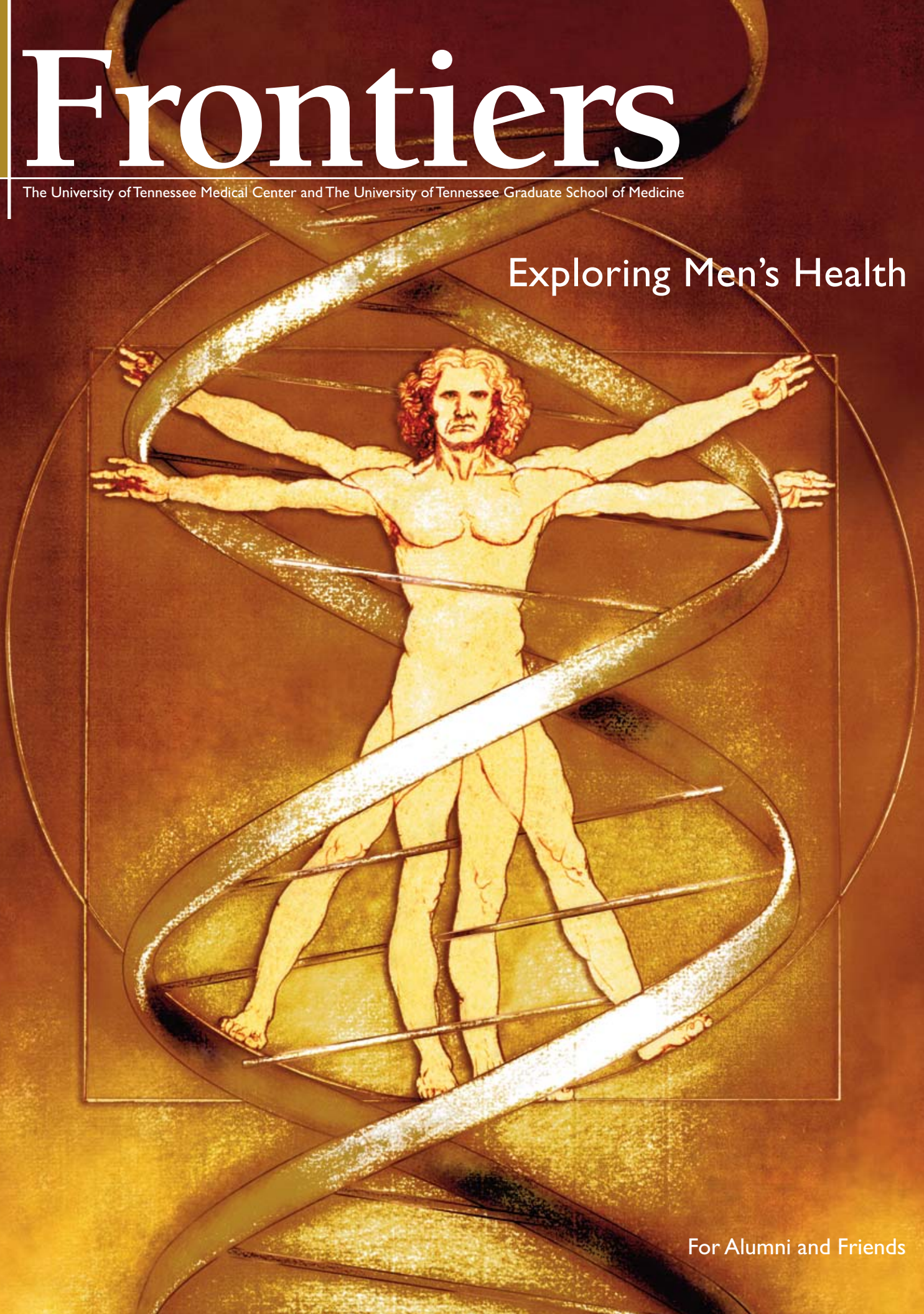
3rd Quarter 2007

Frontiers

The University of Tennessee Medical Center and The University of Tennessee Graduate School of Medicine

Exploring Men's Health



For Alumni and Friends

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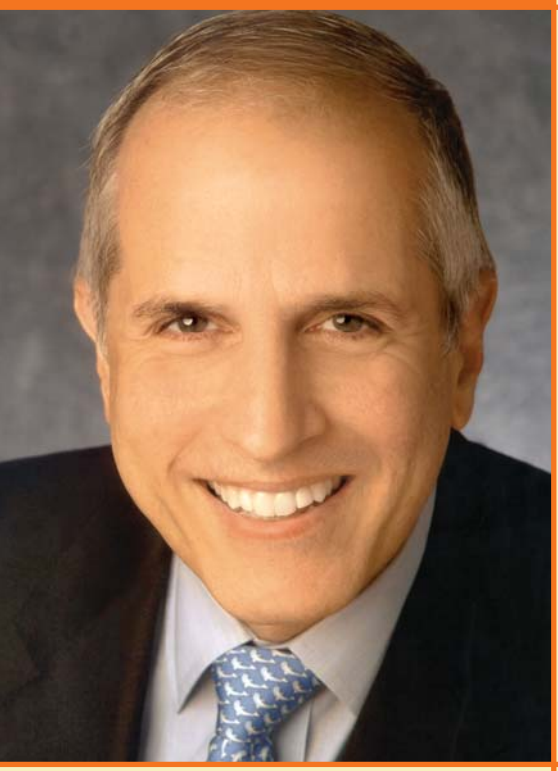
Friday, October 26, 2007



Creating a Culture of Health

to Improve Your Bottom Line

Presented by:

Michael J. Critelli
Executive Chairman of Pitney Bowes
Recipient of the Boling Distinguished
Visiting Professorship in Health Policy

Michael J. Critelli, CEO, Pitney Bowes is committed to promoting a "culture of health" and believes employers should view their employees' healthcare as an investment.

Friday, October 26, 2007
Knoxville Convention Center

7:30 A.M. Registration
8:00 A.M. Program
9:30 A.M. Breakout Sessions

Fee $30 includes breakfast

For more information,
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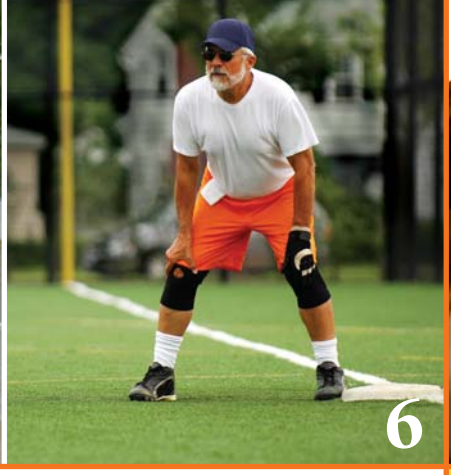



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UT Graduate School of Medicine
Top Professionals Shine





The University of Tennessee Medical Center and The University of Tennessee Graduate School of Medicine Frontiers

3rd Quarter 2007

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THE UNIVERSITY of TENNESSEE GRADUATE SCHOOL OF MEDICINE

THE UNIVERSITY OF TENNESSEE MEDICAL CENTER
EXPANDING THE FRONTIERS OF MEDICINE



Dear Alumni and Friends,

One of the continuing challenges in healthcare is to convince men to take advantage of available preventive and routine medical opportunities. Even in today's world of information and technology the male population is not as diligent as they should be in scheduling annual physical exams, recommended screenings, and tests.

This issue of *Frontiers* is focused on men's health. It's important to know about and understand warning signs for diseases and conditions, but it is also important to change old habits and be proactive in managing one's health. We are happy to be available to the men of East Tennessee to help them break old habits and establish new healthy benchmarks.

We have talented physicians and other medical professionals who can provide preventive care, diagnostics, and treatment for a wide range of diseases and conditions impacting men's health. Our hope is to encourage men to take full advantage of the talents and resources available to them at The University of Tennessee Medical Center.

Sincerely,

Joseph R. Landsman, Jr.
President and Chief Executive Officer
University Health System, Inc.

This issue of *Frontiers* highlights men's health where prevention and screenings are of the utmost importance since the top ten health threats are mostly preventable. The articles within provide both care and research perspectives. Cancer, one of the leading causes of death for men, is given a research vantage point through the efforts of Dr. David Townsend working with imaging and biomarkers. Urologic health concerns, including prostate cancer, are reviewed as is our excellent residency training program—a relatively new training program initiated in response to the needs of Tennesseans. The article on orthopedics and sports medicine obviously looks at athletics but also serves as notice to you that unintentional injuries rank high as a health threat to men. Our feature on Boy Scout camp explains how we contribute to the welfare of the young men of tomorrow by providing care for some of these unintentional injuries.

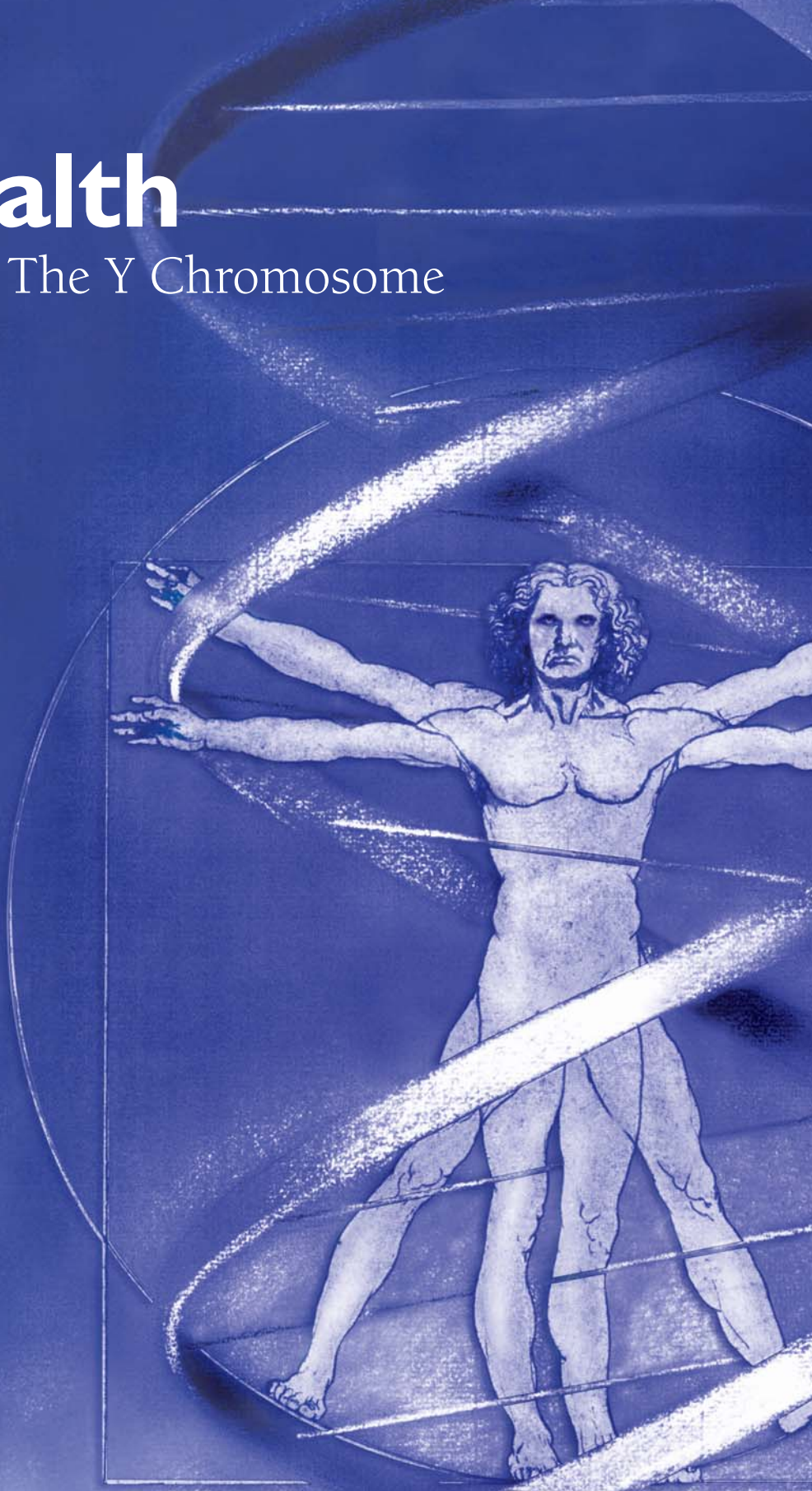
Each day, UT Graduate School of Medicine positively affects men's health through clinical care, physician training, and research, and we are proud to have an opportunity to give you a look into our efforts.

Sincerely,

James J. Neutens, PhD
Dean
UT Graduate School of Medicine

Men's Health

Understanding The Y Chromosome



There have been many books written about the differences between men and women—how they think, act, and relate to one another. But when you delve into genetic makeup, there's one thing that stands out: the Y chromosome. Both men and women have 23 pairs of chromosomes, of which 22 pairs are essentially identical. In the 23rd pair, however, women have an XX chromosome combination and men have an XY combination. It's that Y chromosome that holds the genes necessary to form testes and make sperm—in essence, to determine maleness.

Having the Y chromosome, however, shortens life expectancy in comparison with a woman's by 5.3 years, according to the most recent study by the Centers for Disease Control and Prevention (CDC). Could the Y chromosome and the male sex hormones that come with it (such as testosterone) affect the way men approach their overall health?

A June 2007 study by the American Academy of Family Physicians (AAFP) indicates that many men do a poor job of managing their personal health and have an inaccurate idea of their health status. Almost 79% of men surveyed describe themselves as being in excellent, very good, or good health.



However, the AAFP findings indicate the following:

- 55% of the men surveyed have not seen a primary care physician for a physical exam in the past year.
- 42% of them have been diagnosed with a chronic condition such as high blood pressure, heart disease, cancer, or diabetes.
- 18% of those age 55 and older have never received the recommended screening for colon cancer.
- More than 29% say they wait as long as they can before seeking help when they feel sick, are in pain, or are otherwise concerned about their health.

What's more, while Leonardo da Vinci's "Vitruvian Man" depicts what the Y chromosome is capable of—a perfectly proportionate male—the CDC researchers found that most men come in larger proportions. They estimate that 71% of American men are overweight, a factor contributing to heart disease, diabetes, and stroke. Today's man doesn't eat healthfully, exercise regularly, or get recommended screening tests that can improve his quality and length of life. And without proper care, the good things that come from the Y chromosome, like strength, endurance, and muscle mass, become vulnerable to attack.

The CDC reports that the leading killers of American men are heart disease, cancer, unintentional injuries, stroke, and chronic obstructive pulmonary disease. But with proper screening and healthy living, a number of deaths resulting from these diseases and conditions can be prevented.

Although men can do a lot to reduce risks by changing their personal health habits, the Medical Center is here to help them to meet health challenges head-on. Our primary care network and wide range of specialists, along with our screening and educational programs in the community and in workplaces, give men easier access to the tools for improved health. As a man takes the necessary steps toward better healthcare, he should come closer to da Vinci's idea of proportionate man and the strength and health he displays.

John W. Lacey, MD

Recommended Screenings for Men

Screening Tests	Ages 18-39	40-49	50-64	65 & Older
General Health:				
Full checkup, including weight and height	Discuss with your doctor or nurse	Discuss with your doctor or nurse	Discuss with your doctor or nurse	Discuss with your doctor or nurse
Heart Health:				
Blood pressure test	At least every 2 years	At least every 2 years	At least every 2 years	At least every 2 years
Cholesterol test	Start at age 20, discuss with your doctor or nurse	Discuss with your doctor or nurse	Discuss with your doctor or nurse	Discuss with your doctor or nurse
Diabetes:				
Blood sugar test	Discuss with your doctor or nurse	Start at age 45, then every 3 years	Every 3 years	Every 3 years
Prostate Health:				
Digital Rectal Exam (DRE)		Discuss with your doctor or nurse	Discuss with your doctor or nurse	Discuss with your doctor or nurse
Prostate-Specific Antigen (PSA) blood test			Discuss with your doctor or nurse	Discuss with your doctor or nurse
Colorectal Health:				
Colonoscopy			Every 10 years	Every 10 years
Rectal Exam	Discuss with your doctor or nurse	Discuss with your doctor or nurse	Every 10 years with each screening	Every 5-10 years with each screening

Leading Killers of American Men

Heart Disease

Heart disease is the leading cause of death in both males and females, yet men usually develop the condition 10 to 15 years earlier than women. A good way to reduce the risk of dying of heart disease is to get proper screenings and treatments for conditions that cause coronary artery disease, like high cholesterol, diabetes, and high blood pressure. Other ways to improve heart health are to eat a healthful diet, maintain a healthy weight, exercise regularly, and quit smoking.

Cancer

The American Cancer Society estimates that more than 289,000 men will die of cancer in 2007. Lung, prostate, and colon cancer are the most common forms of the disease. In addition to healthy habits, regular screenings are a vital tool in detecting cancers early. Digital rectal exam, prostate-specific antigen, and colonoscopy are among the screening tests men should discuss with their primary care physician.

Unintentional Injuries

The CDC reports that motor vehicle crashes are the leading cause of unintentional deaths in men, and that more than twice as many men as women die in traffic accidents each year. At The University of Tennessee Medical Center alone, men accounted for almost 70% of admissions to the Trauma Center in 2006. Unintentional injuries can also take the form of falls, poisonings, and drownings. Proper safety precautions, especially during risky activities, and the use of protective equipment when necessary, help prevent these types of deaths. Also important are always wearing a seat belt, obeying the speed limit, and not driving under the influence of drugs or alcohol.

Stroke

The American Heart Association reported in its most recent survey that more than 58,000 men died of stroke in 2004. Controlling such risk factors as high blood pressure, smoking, and diabetes can help reduce that number. And when symptoms of a stroke arise, it's crucial to get to a certified primary stroke center like The University of Tennessee Medical Center for immediate intervention.

Chronic Obstructive Pulmonary Disease (COPD)

COPD is a group of chronic lung conditions including chronic bronchitis and emphysema. Typically caused by smoking, it is also associated with lung cancer. According to the American Lung Association, men who smoke are 12 times as likely to die of COPD as men who have never smoked. Some preventive measures: Don't smoke, avoid second-hand smoke, and minimize exposure to workplace chemicals.



Weekend Warriors

Pushing It to the Limit



Gregory Mathien, MD, orthopedic surgeon, points out the mechanics of the knee.

The term "weekend warrior" is a way of referring to people who don't have time during the workweek to push their bodies to the limit, and thus compress all their physical activity into the remaining two days of the week. Those are the days when these fighters have the free time to give it all they've got—and they do. Unfortunately for some, that jam-packed two days of high activity is too much for a body to handle, *and* research has shown that it actually doesn't do much to increase overall fitness.

Weekend warriors come in many types. Among them are the busy guys who "don't have time" during the week to exercise, and the guys who decide that after years of inactivity they're going to do something to get back into shape. Some just need to get work done around the house, and others are inspired by a favorite athlete. The problem is that they don't have the experienced athletic trainers of those at the level of university or professional play and they end up getting injured as a result of improper training or activity.





Michael Holt, MD, orthopedic surgeon.

> "We have an aging population that is mentally younger than their physical age—a fifty-year-old thinking that he's 30 and that he can do what he did when he was younger. And I'm right there with them."
>
> Michael Holt, MD

The body is designed for activity, but consistency is important. A consistent exercise program strengthens the muscles so that when you go out and participate in strenuous activities, work or play, the muscles will remember how to perform accurately. Many people jump into a sport or activity when they aren't physically prepared (in fact some aren't prepared for activity of any kind), and that leads to injury.

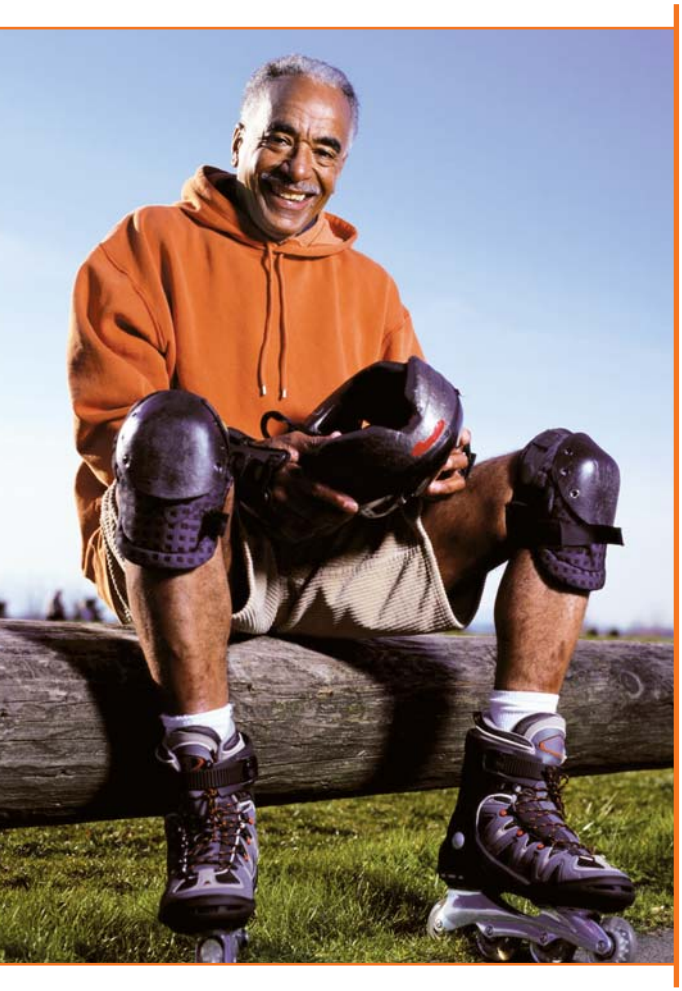
The injuries common in weekend warriors can be classified as two kinds, acute and chronic. Acute injuries can be caused by high-energy mishaps like all-terrain vehicle (ATV) crashes or falls, or relatively low-energy ones like basketball, running, or soccer. Chronic injuries can be caused by repetitive motion, overuse, or improper training.

The University of Tennessee Medical Center is a Level I Trauma Center and treats a majority of the more serious high-energy warrior injuries in the region. According to Dr. Michael Holt, an orthopedic surgeon, injuries from ATV crashes are now more common than those from motorcycle crashes. People may come in with any number of orthopedic injuries, like a broken leg or back or a dislocated knee or shoulder. And that doesn't even include the internal injuries some patients also suffer.

When asked what he believes is the cause, Holt says, "Many problems stem from people becoming too confident too quickly and being overconfident beyond their skill set. Some are also thrill-seekers and enjoy a challenge." He recommends that before taking off on that jet ski or mountain bike, people remember that the greater the amount and intensity of exercise, the greater the risk of running into trouble. That's why proper, gradual training and preparation are so important. Holt says, "We have an aging population that is mentally younger than their physical age—a 50-year-old thinking that he's 30 and that he can do what he did when he was younger. And I'm right there with them."

Holt says that the most common low-energy injuries are knee problems, tears of the Achilles tendon, ankle sprains, and rotator-cuff tears in the shoulder. Dr. Gregory Mathien agrees. Mathien, an orthopedic surgeon who treats the University of Tennessee athletes in addition to weekend warriors, reports that the most common injury he sees in the latter group is a torn meniscus in the knee.

As people age, their joints may become arthritic with wear and tear and can't tolerate as much pounding and stress as they could at a younger age. Mathien equates this joint wear to a paved road.



He tells his patients, "When a road is freshly paved, the ride is smooth. However, as it ages with more and more travel, it develops pits and potholes, making for a rougher surface. The same holds true for the cartilage in our knees. As we age, the wear and tear from years of travel causes the surface not to be as smooth as in a young child." Arthritis can be a gradual condition that develops as a person gets older, not something he just wakes up with one morning.

Several weekend-warrior problems are seen in people who start exercising to lose weight after years of inactivity. They end up injured because of wear on their joints caused by the additional weight, in combination with doing too much too soon. One of the best prevention methods is making gradual increases in activity. Mathien advises, "The most effective exercise is walking, and for those who have a dog, take it along too."

Chronic injuries from overuse and overtraining can start slowly and flare up after a weekend of activity. These injuries usually affect the knee, ankle, shoulder, or elbow. Many warriors will push the limits one weekend and a few days later feel the results of that excess. Running too many miles or putting in a marathon session of yardwork get a lot of people in trouble, again because the body is being asked to do more than it's capable of in a short period of time.

So how do you know when you should go to the hospital and when it's okay to wait to see your physician? With some injuries—a broken bone, an injury that causes deformity, a case of head trauma—the answer is obvious. Others are a little more difficult to judge. If you're in doubt, it's always better to be safe than sorry and to seek immediate care. When the injury is a mechanical one resulting from running an additional five miles or a playing a particularly intense game of basketball, it may be painful, but may not require an immediate trip to the hospital. Only you can be the judge of what kind of pain you're feeling and what is right for you.

Heather Grieve

R.I.C.E. First Aid Treatment for Minor Injuries Like Strains and Sprains

Rest Rest to reduce the stress to the injured area.

Ice Apply ice to the injured area for 20 minutes at a time 4 times per day.

Compression Apply an elastic bandage to the injured area. Do not sleep with the elastic bandage on.

Elevation Raise the injured body part above the level of the heart to decrease blood flow.

*Seek medical attention if necessary.



Common Urology Problems For Men





Men are less likely than women to talk to their physicians about matters of personal health, especially when those have to do with urology and the stigma of urology related problems. But because urological problems, both benign and serious, typically have similar symptoms, it's important for a man not to feel embarrassed or anxious about speaking openly to his doctor.

Urology is the medical specialty focusing on the urinary tracts of men and women and on the male reproductive system. In men, the reproductive and urinary systems overlap. Urologists can manage both surgical and nonsurgical problems ranging from urinary tract infection to cancer.

Dr. Fred Klein, a urologist at The University of Tennessee Medical Center, says the most common problems his patients come in with are voiding dysfunction, sexual dysfunction, prostate infection, cancer, male infertility, and kidney stones. For the aging male, the issues are usually categorized into two groups: prostate health and sexual health.

> "Men should not be shy about going to a doctor and describing their problems… I see a lot of men relying on their wives instead of taking initiative themselves."
>
> Fred Klein, MD

The prostate, an organ about the size of a walnut, consists of fibrous, muscular, and glandular tissue. Located just below the bladder, it secretes prostatic fluid as a medium for sperm. Its functions are controlled by nerves and hormone influences. Benign enlarged prostate, cancer, and prostatitis are the most common prostate related problems.

Benign prostatic hyperplasia (BPH), an enlargement of the prostate, is caused when cells in the organ begin to reproduce more rapidly. As the tissues grow, they often compress the urethra and partly block the flow of urine. The truth is, almost all men will develop some enlargement of the

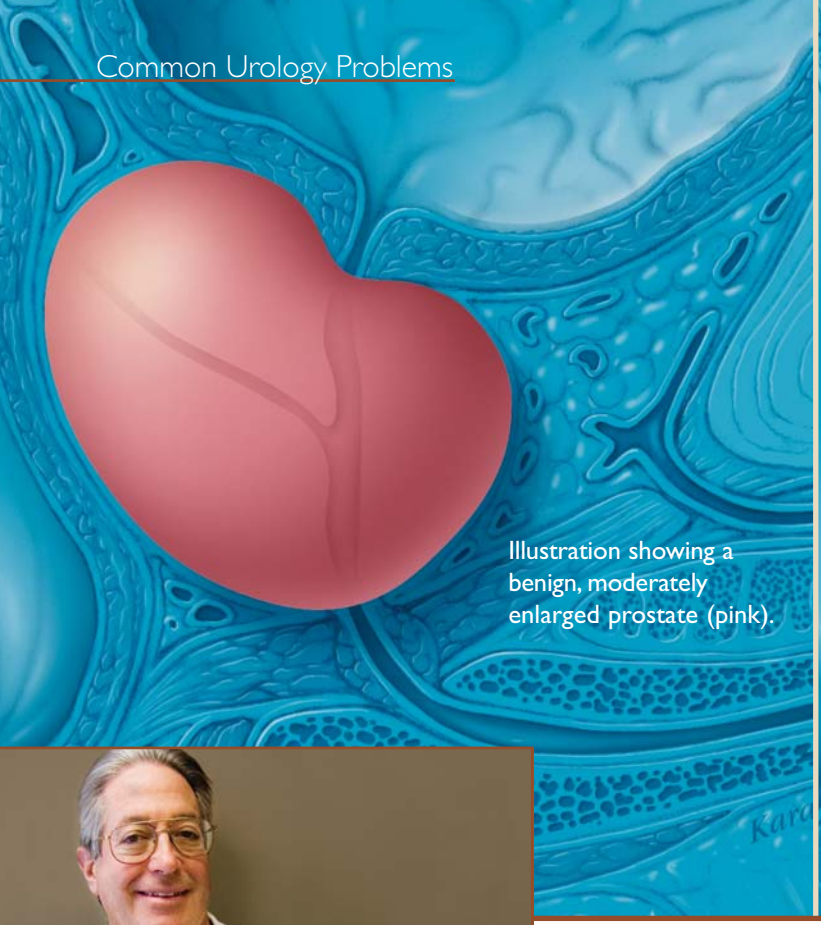


Illustration showing a benign, moderately enlarged prostate (pink).

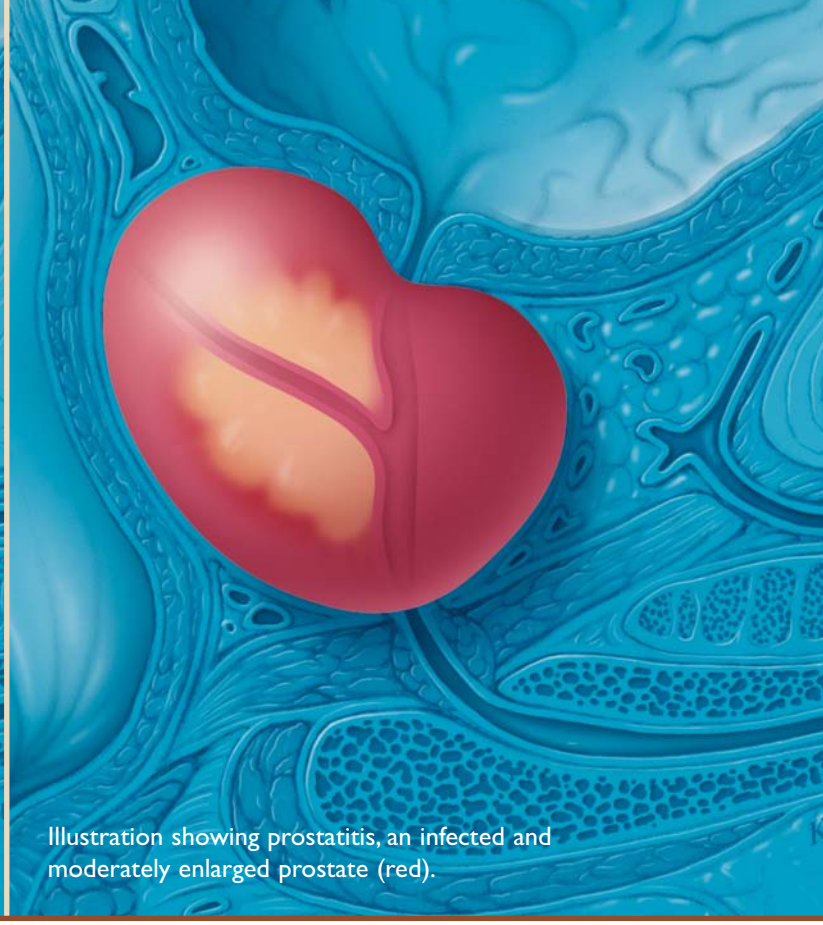


Illustration showing prostatitis, an infected and moderately enlarged prostate (red).



Fred Klein, MD, Urologist

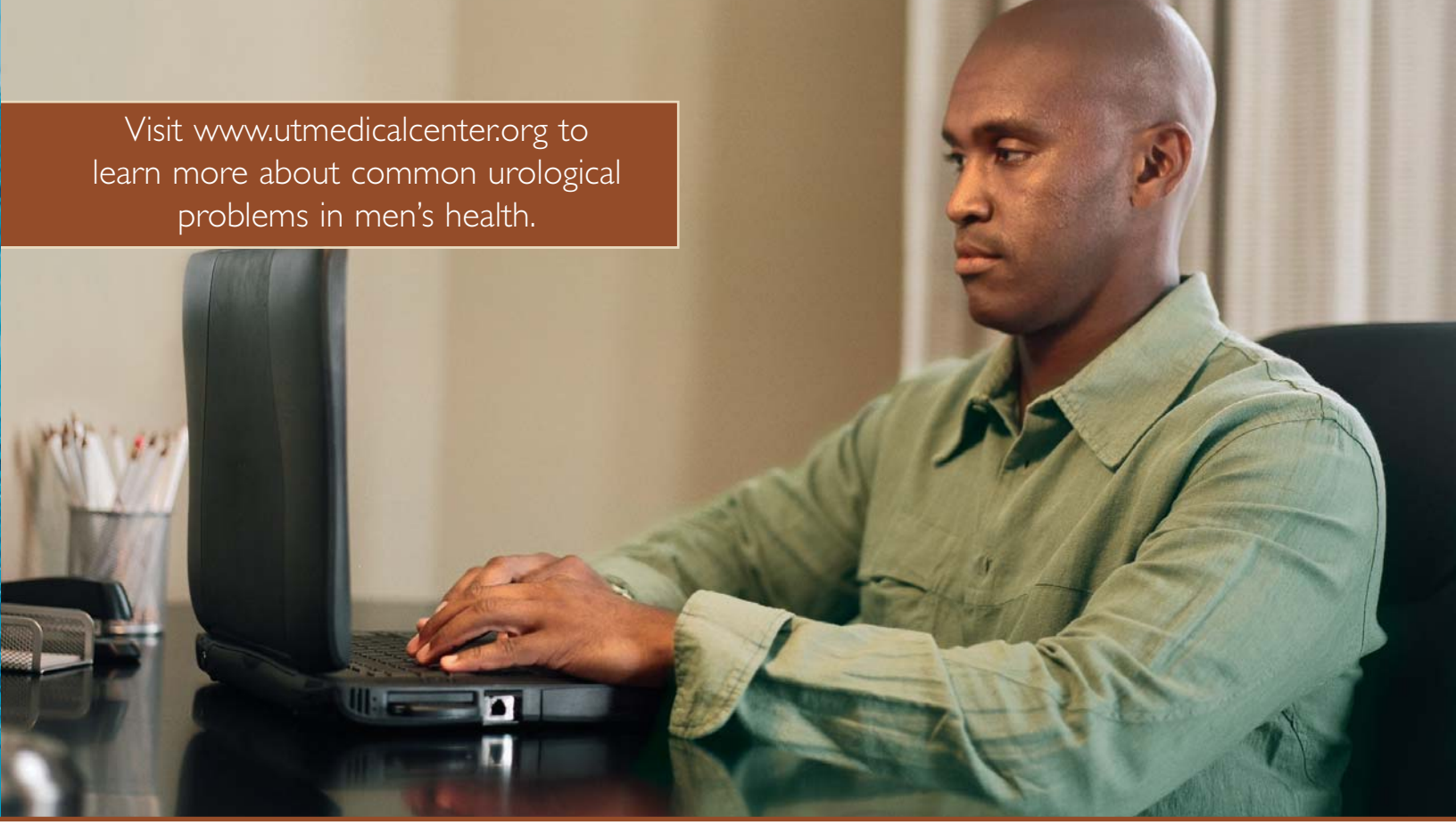
prostate as they get older. By age 60, 50% of men will show some signs of BPH; and by age 85, that figure will rise to 90% of men. The important thing to know is that BPH is not cancer, and it doesn't increase the risk of developing prostate cancer.

Treatments for an enlarged prostate are determined by the signs, symptoms, and severity of the condition. They can include medication, nonsurgical therapies, and surgery. The most common symptoms of BPH include delayed beginning of urine flow, a weak urine stream, a strong urge to urinate, frequency of urination, and incontinence.

According to the American Cancer Society, prostate cancer, the most frequently diagnosed cancer in men, will cause an estimated 27,000 deaths in 2007. But thanks to screening tests (digital rectal exams and prostate-specific antigen blood test), those death rates have been declining since the early 1990s. Now the five-year survival rate for localized prostate cancer is approaching 100%—and that's good news.

To diagnose prostate cancer early, men must talk to their doctors and get tested. The early stages of prostate cancer usually don't have any symptoms, and people with more advanced stages of the disease experience symptoms similar to those of BPH or other benign conditions. Prostatitis, an infection or inflammation of the prostate, can cause pain during urination, occasional blood in the semen or urine, and painful ejaculation, as well as accompanying pelvic, groin, or low back pain. The infection or inflammation could stem from bacterial or nonbacterial causes and may be difficult to diagnose, since the signs and symptoms often resemble those of other conditions. It's important to see a physician, however; if left untreated, the infection can lead to more serious problems throughout the body.

Having prostatitis may sometimes increase the level of prostate-specific antigen in the bloodstream, which is a gauge of prostate cancer. However, no evidence indicates that prostatitis increases the risk of developing this cancer. It is recommended that PSA testing not be performed during prostate infections.



Visit www.utmedicalcenter.org to learn more about common urological problems in men's health.

Sexual issues and erectile dysfunction are also common problems for the aging male. Erectile dysfunction (ED) is the No. 1 topic of concern to patients. The problem affects 15 million to 30 million men in the U.S., and 50% of American men between the ages of 40 and 70 will experience ED in their lifetime.

Often ED is caused by organic diseases (diabetes, hypertension, heart disease), surgical procedures, or injuries that damage nerves, arteries, or tissues, crucial to having or maintaining an erection. Such lifestyle factors as smoking, alcohol consumption, and lack of exercise can also play a role, and so can some prescription and non-prescription medications and psychological factors. It's important to discuss any problems with your physician in order to rule out other underlying medical conditions.

"Men should not be shy about going to a doctor and describing their problems," says Klein. "I see a lot of men relying on their wives instead of taking the initiative themselves in addressing health issues." And that seems to be an important aspect of a man's overall health.

Although prostate and sexual health are the two most common problems for aging men, many other health issues can arise, from minor to severe. The University of Tennessee Medical Center has specialists available to treat all these urological conditions. Don't let fear or embarrassment hinder a discussion with your doctor about common urological conditions.

Treatment Options for ED:

- *Hormone or Testosterone Therapy*
  Often this is an enticing choice for men because of the possibility of increased muscle mass, an improved energy level, and a boost in libido. However, the long-term effects of testosterone therapy are unknown but may include infertility and prostate problems. A testosterone blood level should be checked before starting hormone therapy.
- *Oral Medications*
  Phosphodiesterase-5 inhibitors (PDE-5) like Cialis, Levitra, and Viagra increase blood flow to the penis and relax smooth muscles. This is a popular treatment option for healthy men.
- *Vacuum or Suction Devices*
  Vacuum or suction devices can be used to increase blood flow to the penis.
- *Intracorporeal Injection*
  Medication is injected with a needle to relax smooth muscles and allow for improved blood flow.
- *Penile Implant Surgery*
  Inflatable or semi-ridged prostheses are a less popular choice for treatment because of the invasiveness.


CAMP BUCK TOMS

Docs Go To Camp

Life Lesson Partners: UT and the Boy Scouts

The early morning dew has been gone for hours, and the sun casts a brilliant path across glassy Watts Bar Lake as it stretches to the shore. Already spirited young men have made good use of the beautiful day, blending chores and skill-building with fun and camaraderie.

By midmorning, activity abounds. Team leaders coax a group of blindfolded, rope-linked wanderers to safely traverse steps, rocks, and tree roots in an exercise teaching trust and confidence. Deep in the woods, a younger group uses fingers to mimic the archery instructor showing them how to pull a bow string. Standing in knee-high water, another group listens intently as the nuances of paddling a canoe are reviewed.

It's summer in America, where similar adventures are blossoming for boys of all ages. It's a time when the men of tomorrow explore the world with wide-eyed exuberance. It's camp time.

Every summer a pristine 750-acre lakeside forest called Camp Buck Toms, in Rockwood, Tennessee, becomes home to more than 3,000 Boy Scouts looking for fun while learning life skills during a weeklong outdoor camping experience. And each summer, as they pursue this experience, these same young men get cuts and bruises, develop strains and sprains, or show up in the camp's healthcare facility with a multitude of other injuries and illnesses. Fortunately, the doctor is always in.

This week Roger Gaddis, DO, resident physician with UT Graduate School of Medicine's Department of Family Medicine, is staffing the Health Lodge on 24-hour call. He is just one of several UT physicians enrolled in an elective course that allows them to gain valuable experience in adolescent medicine while fulfilling a public service for the Great Smoky Mountain Council of The Boy Scouts of America.

Already today, Gaddis has seen a few cases of stomach distress, one of which he attributes to a probable bout of homesickness. "I was a Boy Scout once myself," he explains with a chuckle. "I can relate to being away from home for the first time."

Gaddis's enthusiasm for the course is easily explained. "The Graduate School faculty are very active in public service and encourage us to be involved," he says. "I found working at Camp Buck Toms lets me meet my training needs, provide a much-needed service to a great group of young men, and play in the woods, all at the same time."



Dr. Roger Gaddis treats a sprained ankle.



Jane White, PhD, RD, and Roger Gaddis, DO.

Throughout the season, Gaddis and his UT colleagues will treat lacerations, burns, insect bites, stings, rashes, dehydration, GI distress, and occasionally diabetes, asthma, hemophilia, or a physical disability. In more complex cases, the camp-based doctor can consult with faculty physicians located in Knoxville via a telecommunications link. Real-time visuals can be broadcast between the locations, ensuring that the best possible care in a wilderness setting is provided to the campers.

> "Scouting not only teaches wilderness skills, it prepares these young men for the path ahead."
>
> Jane White, PhD, RD

National Boy Scout inspectors reviewing the camp's certification recently praised UT's unique program. "The inspectors raved about the medical service available at this camp. They said it was the best medical facility at any Boy Scout camp in the South. And I can believe it," says Health Lodge officer David Clary proudly. "A few years ago we were sending 10 to 12 guys per day to Harriman Hospital for treatment. Now we send maybe one or two per week, if any."

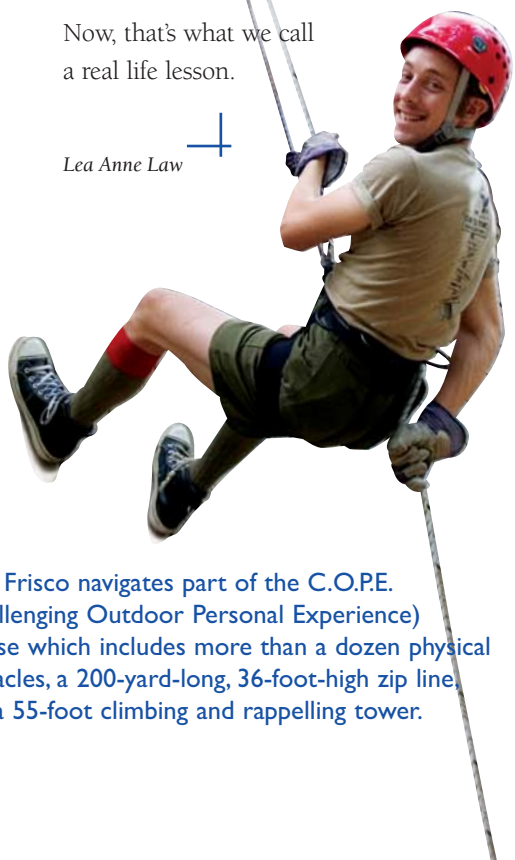
In 1999, UT Graduate School of Medicine's Department of Family Medicine faculty members Ken Bielak, MD, and Jane White, PhD, RD, developed the Adolescent Health elective for Family Medicine physician residents and emergency room physician fellows. The program provides medical care for the 300 to 600 Scouts, 100 counselors, and 70 to 150 Scoutmasters in attendance each week from Memorial Day through mid-July.

White is proud of this win-win collaboration. "Most physicians have limited exposure to this age group, since adolescents are infrequently ill and are rarely seen in a clinic setting," she explains. "This way the physicians interact with teens, and in turn these Scouts, some of whom are earning merit badges, can meet and learn from our physicians. In fact, many of them are Life or Eagle Scouts. There's no better program than Scouting for leadership development. Scouting not only teaches wilderness skills, it prepares these young men for the path ahead."

Now, that's what we call a real life lesson.

Lea Anne Law





Evan Frisco navigates part of the C.O.P.E. (Challenging Outdoor Personal Experience) course which includes more than a dozen physical obstacles, a 200-yard-long, 36-foot-high zip line, and a 55-foot climbing and rappelling tower.



Pure Science to Pure Compassion

David Townsend Leads a Multidisciplinary Team to Reach Earlier Diagnosis and Improved Treatment of Disease



David Townsend, PhD, director of the UT Molecular Imaging and Translational Research program, leads a multidisciplinary team of physicists, engineers, chemists, biologists, physicians, and others to advance PET/CT technology at UT Graduate School of Medicine and The University of Tennessee Medical Center.

You can sense the intense focus in him. He's a man of vision. Of drive. Of compassion. His early years of school were spent pursuing the arts, but at the last minute he switched to math and physics. Funny thing is, he struggled a bit in his first year of college, and his tutor informed him that he was in the wrong field of study. With a new tutor—namely Professor Cecil Powell, recipient of the 1950 Nobel Prize for Physics—and armed with drive and perseverance, he graduated with honors in physics, and by the age of 25, he had earned a PhD in Elementary Particle Physics.

A man of this caliber leads the Molecular Imaging and Translational Research program at UT Graduate School of Medicine. David Townsend, PhD, elected an Institute of Electrical and Electronic Engineers Fellow, and a recent presenter at a Nobel Conference in Stockholm, Sweden, has a small, windowless, calmly lit office right here at The University of Tennessee Medical Center.

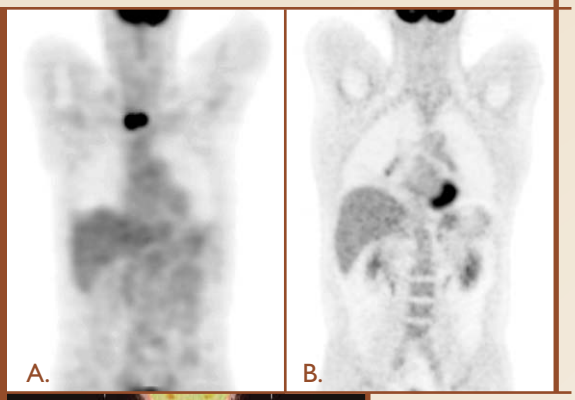
Across the Pond… and Back

Townsend was born in Liverpool and attended the universities of Bristol and London to earn his degrees in physics. In 1975, while he was working at the European Center for Nuclear Research in Geneva, a colleague introduced him to Positron Emission Tomography (PET). "For the first time I became interested in applied physics—technology applied to medicine," Townsend says. "I saw that I could make more useful contributions in applied science than in pure science. I could actually do something for people."



A Decade of Progress

in Whole-Body PET Image Quality:





A. PET scan from 1998 acquired on an ECAT EXACT

B. PET scan from 2007 acquired on a Siemens Biograph 6 PET/CT scanner

C. PET/CT scan corresponding to (b).

PET images metabolic (chemical) processes of the body and provides physicians with 3-D images that allow them, for example, to better diagnose and stage cancers. In contrast, Computed Tomography (CT—also called CAT) uses X-rays to reveal anatomical (structural) details of the body. Until 1998, the two pieces of equipment were completely separate, forcing patients to endure two tests and the stress and anxiety that accompany them.

Two separate machines also meant that physicians had to combine images from separate CT and PET scanners by using visual or software methods that didn't always work well. "I believed the two technologies could be combined into one machine," says Townsend. It was this belief that has made medical history.

From the late '70s through 2001, Townsend's passion to find a way to make PET imaging work better for patients drove him to premier medical facilities in Europe, then to America, then back across the "pond" to Europe, and finally emigrating to the U.S. in 1993. "One of the motivational forces for me has always been designing and building technology and then getting it into a hospital so it can be used for patients," Townsend says.

Technologies Combined

In 1991, he and Dr. Ron Nutt, R&D director at CTI Inc., at that time the world leader in the manufacture of PET imaging technology headquartered in Knoxville, conceived the idea for the combined PET/CT. Ten years later, the first commercial PET/CT system became available. It made such an impact on medical imaging that Time magazine named the PET/CT as the medical invention of the year in 2000, and within five years, the PET/CT had entirely replaced PET-only scanners.

The PET/CT scanner collects both structural and molecular information about the body and translates it into images. In less than 30 minutes, a patient has painlessly and noninvasively experienced two powerful diagnostic imaging tests that once could not be



acquired in the same device. With the combination of the two scanners accomplished, Townsend's attention turned to getting more from PET/CT.

Townsend Comes to UT

In 2003, Townsend was recruited to lead the Molecular Imaging and Translational Research program at UT Graduate School of Medicine.

This multidisciplinary group of physicists, chemists, biologists, technologists, and physicians works to find ways to more accurately diagnose and stage disease and to provide patients and their physicians with more knowledge to impact treatment decisions. And the PET/CT equipment at The University of Tennessee Medical Center—based on the original PET/CT designed by Townsend and Nutt—is at the center of their clinical work.

"Most people don't know that UT has some of the best PET/CT technology anywhere in the world," Townsend says.

Biomarkers and Hot Spots

"We inject biomarkers to make the PET process work," he explains. "We typically use a compound that's part of one of the physiologic processes of the body, such



UT Graduate School of Medicine has the best PET/CT technology in the world. This Siemens scanner (shown left) is one of only a few of its kind across the globe, and it is in use at The University of Tennessee Medical Center.

Left: David Townsend, PhD, discusses PET/CT capabilities with Darlene Beeler, and Misty Long, RT(R)(N), PET/CT research technologist.
Above: Long and Townsend review a PET/CT scan.

as glucose metabolism, and tag this compound, a glucose analog in this case, with a radioactive isotope—fluorine-18, for example. The human body is not transparent. We cannot look through a body and see a tumor, but the PET/CT can. It captures the radiation emitted from the disintegration of the fluorine-18 within the body."

Scans from the PET/CT provide physicians with a roadmap of a patients' condition. By seeing "through" the body, physicians can identify the location, activity, and size of cancers and can therefore diagnose and stage them more accurately than ever before. This information helps them and their patients determine the most appropriate treatment and can lead to a better prognosis.

"CT cannot accomplish this alone because CT tells the physician only about the anatomy of the body," Townsend says. "Unfortunately, because of lack of awareness about PET, many physicians across the U.S. still rely more on CT than on PET or PET/CT. It is part of our mission to try and rectify this situation."

Last year, only about 1.5 million PET scans were done, compared with 62 million CT scans.

PET Technology Redefined

Getting more from PET/CT also includes developing new PET biomarkers to image other aspects of disease. Once a new biomarker is developed, it is evaluated in a pre-clinical animal model to determine whether the biomarker performs correctly. The biomarker development program is led by UT's Claude Nahmias, PhD, and the pre-clinical imaging facility by Jon Wall, PhD.

"Our eventual goal is to translate the pre-clinical work into the clinic, so the biomarkers can be used to image disease in patients," Townsend says.

The group also is working to use PET/CT to image cardiac disease and to determine how patients with certain kinds of lung cancer respond to chemotherapy early in their treatment regimen. "Every success brings us closer to providing personalized and effective treatment for each patient," Townsend concludes.

In 1998, Nutt and Townsend built a good thing, a gift to the world. Ten years later, Townsend's intense focus remains: Build something that makes a difference in how we care for our fellow humans.

Amanda Johnson

How
Do Biomarkers Work?

David Townsend, PhD, explains the amazing process that allows the PET/CT scanner to give physicians a picture of the inside of the human body, as if it were indeed transparent. Once a biomarker, such as a type of glucose, is injected into the patient, the same as an ordinary injection, the substance travels throughout the body in the blood. The glucose—which is tagged with a radioactive isotope—is absorbed into the cells of the body. Cancer cells are voracious for energy and consume more glucose than most normal cells, so more glucose is absorbed where the cancer cells are localized. The glucose, concentrated in the "hot spot," emits radioactivity that is detected by the PET/CT machine. These emissions are reconstructed by the PET/CT's computer to form 3-D images of the body—in this case, a 3-D map of glucose usage.



The Encouraging Side of Prostate Cancer

Think of the last time you and your buddies got together for a guys' night out. Think of who was there, and then think of this: one in every six American men will be diagnosed with prostate cancer in their lifetime. That's not meant to discourage you; it's simply something you should know. In fact, recent developments in diagnosis and treatment are actually encouraging.

Recent studies indicate substantial swings in the incidence of prostate cancers. The current detection rate is 165 men per 100,000 annually. This is an increase of 65% from 1970, which reflects the advances that have been made in diagnostics and early detection of the disease. And it's those diagnostic tools that are enabling doctors at The University of Tennessee Medical Center to provide early treatment for prostate cancer.

What is Prostate Cancer?

It's a cancer of the prostate, the gland in men that produces seminal fluid, which is responsible for nourishing and transporting sperm. There are usually no symptoms in the early stages of prostate cancer, however, more advanced stages may cause pain in the pelvic area, an urgent need to urinate, blood in the urine, and painful ejaculation.

Prostate cancer grows relatively slow and in the early stages remains confined to the prostate. If left untreated, however, it can spread to other areas of the body. Early detection is your best defense against prostate cancer.

How is it Detected?

Prostate screening consists of a digital rectal exam and a test for the level of prostate-specific antigen (PSA) in the blood beginning at age 50 (or age 45 for African Americans or men with a family history of prostate cancer). These tests and an early diagnosis provide encouraging news.

Dr. Paul A. Hatcher, a urologist at The University of Tennessee Medical Center reports that in the 1980s, 60% of prostate cancer was found while localized, meaning that it was discovered before it spread to other areas of the body. Now 91% of diagnosed cases are localized to the prostate gland.

How is Prostate Cancer Treated?

Several treatment options are available, and for some men a combination of treatments may work best. Treatment for localized prostate cancer includes

Above: Daniel Green, MD, performs a seed implant, one of the treatments for prostate cancer.

Above Left: Paul Hatcher, MD, explains a diagnosis to a patient.

surgery and radiation therapy along with hormonal therapy, in some cases.

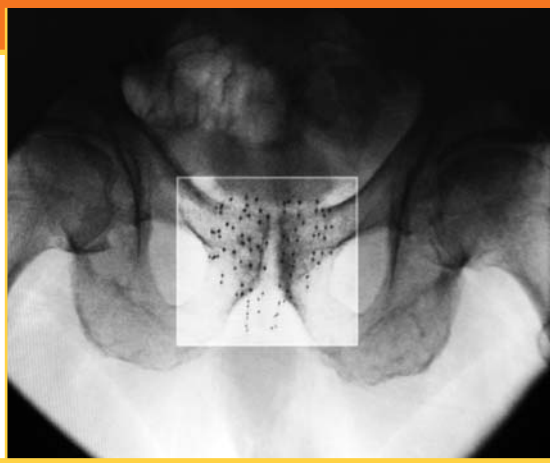
Surgery

Surgery can be in the form of open, laparoscopic, or laparoscopic robotic-assisted radical prostatectomy which involves removal of the prostate gland. In laparoscopic robotic-assisted surgery, small, fine incisions are made using computer-assisted instruments. Hatcher, who performs robotic prostate surgery, says, "This kind of surgery has been found to reduce blood loss, provide an earlier return to urine control function, and provide an earlier ability to return to work." He also reports that patients tend to be delighted with the outcomes. Most patients age 55 and younger choose a surgical option for treatment.

Radiation Therapy

Radiation therapy causes DNA damage to the cancer, which kills it. Among the choices for radiation therapy are external beam radiation, brachytherapy, and CyberKnife® Radiosurgery. Typically, men age 65 and older choose radiation therapy over surgery.

External beam radiation uses high-powered X-rays to kill cancer cells and is an effective way to treat prostate cancer. New techniques, such as intensity modulated radiation therapy (IMRT), also allow for more precise focusing, so a higher concentration of radiation can be administered directly to the tumor while sparing normal surrounding tissues.

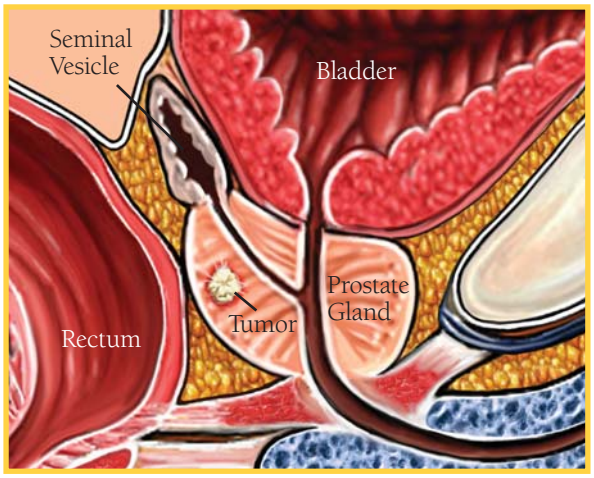


X-ray of newly implanted radioactive seeds.

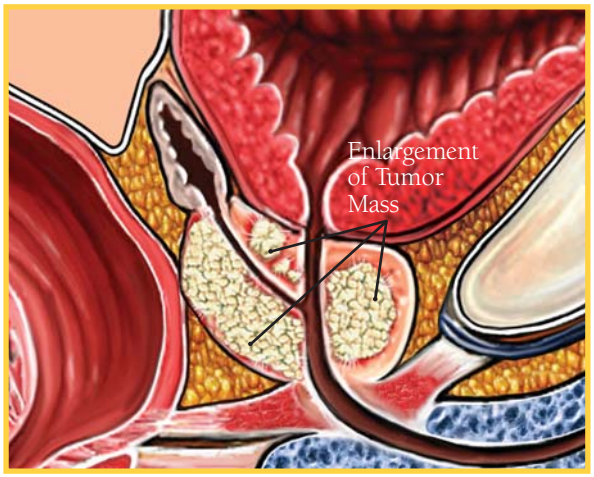
Compare the size of the seeds to the size of a dime below.



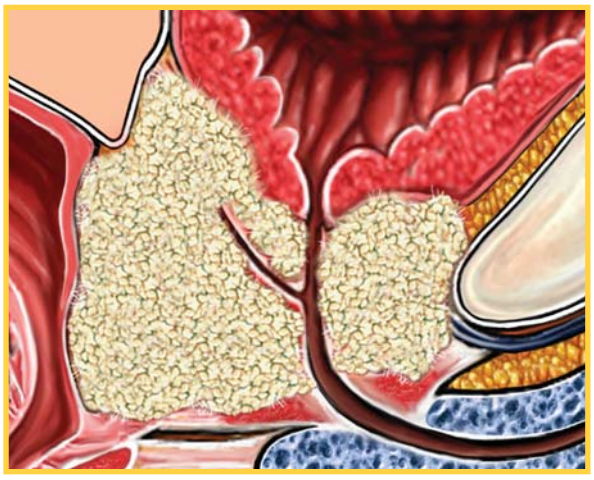
Progression of Prostate Cancer



Early Stage Prostate Cancer



Subsequent Condition



Eventual Condition

Brachytherapy, also called radioactive seed implants, is a way to administer higher doses of radiation directly to the tumor. The procedure involves placing an average of 40 to 100 rice-size radioactive seeds in the prostate through ultrasound-guided needles. The seeds may contain one of several radioactive isotopes, including iodine and palladium, which emit radiation over time to kill the cancer cells. This is a popular choice among patients. In fact, Dr. Daniel Green, a radiation oncologist at The University of Tennessee Medical Center has performed more than 1,200 seed implant procedures to date.

CyberKnife, a stereotactic radiosurgery system that uses very accurately targeted high doses of radiation to achieve surgery-like outcomes noninvasively, is another radiation treatment for prostate cancer. Because of an image-guidance system and robotic arm, the CyberKnife can reach tumor sites not accessible by other means. As a treatment option, CyberKnife is gaining in popularity.

Other Options

Treatments for more advanced prostate cancer may involve the use of the above mentioned treatments as well as leutinizing hormone releasing hormone (LH-RH) agonists, anti-androgen therapy, or chemotherapy. LH-RH therapy uses drugs to decrease the body's production of testosterone, while anti-androgen therapy, also using drugs, blocks the body's ability to use testosterone and thus prevents it from reaching cancer cells. Anti-androgen medications are usually given in conjunction with an LH-RH agonist. Chemotherapy uses chemicals to destroy rapidly growing cells. It has more side effects than LH-RH or anti-androgen therapy, so it is usually reserved for men who have hormone-resistant prostate cancer.

Although many options for treating prostate cancer are available, the best option is early detection combined with healthy lifestyle choices. Getting proper screenings and taking your family history into account go a long way toward reducing your chances of getting prostate cancer. So how can you find out if you're at risk? Talk to your doctor about risk factors for prostate cancer that include age, race, family history, and diet. With simple screenings, you can get the answers you need and, if necessary, the treatment to keep you healthy.

Heather Grieve

September: Prostate Cancer Awareness Month

During Prostate Cancer Awareness Month in September, a number of free screenings are available to the public. To schedule a screening appointment, call 1-800-UT-CARES.

Our Employees Care

We at the University of Tennessee Medical Center and Graduate School of Medicine take pride in our innovative research, our outstanding education opportunities, and our excellent patient care. Too often, however, we neglect to express adequately the enormous sense of pride we derive from our greatest asset—our employees.

It is the passion and dedication of these employees that enable us to continue expanding the frontiers of medicine. Our employees demonstrate their commitment to our patients, one another, and our mission every day in innumerable ways. Whether going above and beyond the call of duty, volunteering on a committee, or simply offering a smile and a kind word, they care about creating a positive environment conducive to healing and well-being.

One of the most tangible expressions of employee support is exemplified in the tremendous success of the Torch Campaign, our annual employee giving program. Each year, over 40% of our employees participate, and these donations support many programs throughout the Medical Center and Graduate School of Medicine.

In 2006, some of the money raised by the Torch Campaign helped fund

- The Jane Hudson Nursing Education Fund, which helps our nurses earn advanced certifications and degrees.
- The Chaplains Pastoral Care Fund providing counseling to our patients and their families.
- The Graduate School of Medicine Research and Education Fund to advance medical education and research initiatives.

All told, our employees gave nearly $135,000 to support the Medical Center and Graduate School of Medicine in 2006. This year will mark the advent of The New Torch Campaign—Employees Care. We're challenging our employees to raise $1 million by 2011 through generous gifts to the campaign.

The Medical Center and Graduate School of Medicine are exceptionally grateful to our employees who donate their time and talents so generously. We will continue striving each day to show our appreciation for them—but we also encourage members of the community who know our employees to take a moment and thank them for their commitment and exceptional work. That passion is what enables us as a community of caregivers to provide excellence in patient care, education, and research.



Thank You

The University of Tennessee Medical Center and Graduate School of Medicine extend our great appreciation to the following people, who were omitted from our previous article, for their generous commitments to The 1956 Society. It is through the kindness of these individuals that we are able to continue our tradition of excellence in patient care, education, and research.

Gold Level
(gifts of $5,000 & over)
Dr. and Mrs. Mitchell Goldman
University Anesthesiologists

Silver Level
(gifts of $1,000 to $4,999)
Dr. and Mrs. Robert F. Elder
Dr. Charles W. Mercer & Dr. Alice Mercer



Claude Nahmias, PhD

UT Researchers Demonstrate
Response to Chemotherapy for Lung Cancer Can be Predicted

Graduate School of Medicine researchers, led by Claude Nahmias, PhD, professor of radiology and medicine, have identified a way to predict how well patients fighting certain lung cancers are responding to chemotherapy within a few weeks of the patients starting their treatment.

By using Positron Emission Tomography (PET) imaging to measure metabolic activity, the scientists learned that patients who respond well to chemotherapy are those whose non-small cell lung cancer becomes less active as early as three weeks into the course of their treatment as evidenced by prolonged overall survival.

"Because the number of patients in our study was small, we must be cautious with our interpretation, but these results are very exciting," explained Nahmias, whose findings appeared in the May 2007 issue of the Journal of Nuclear Medicine. "This discovery can guide physicians in determining whether to continue chemotherapy with its associated toxic side effects or if it would be more beneficial for the patient to move on to a different approach treatment, thereby offering patients better care and greatly enhancing their quality of life as well."

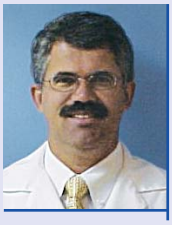
Nahmias and his fellow researchers evaluated 15 patients weekly for seven weeks as each patient started their chemotherapy regimens and discovered that PET studies done in the first and third weeks can predict success or failure of the therapy.

UT Graduate School of Medicine Top Professionals Shine

Annually UT Graduate School of Medicine recognizes the time and talents graciously shared by its teaching physicians, dentists, researchers, and volunteer faculty physicians.



This year, the GSM Spirit Award was presented to John Neff, MD, Professor and Director of the Pathology Residency Program and Professor of Pathology, who exemplifies the spirit of the UT Graduate School of Medicine by upholding the institution's mission to colleagues, resident physicians, students, staff, and the community.



Volunteer faculty donate their time and effort to further the mission of the Graduate School of Medicine. This year's Excellence in Teaching Award for Volunteer Faculty was presented to Robert D. Thomas, MD, Adjunct Assistant Professor of Radiology.



The Excellence and Leadership in Basic Science Research Award went to Brian O'Nuallain, PhD, Assistant Professor, Department of Medicine, Human Immunology and Cancer Program. This award recognizes an outstanding principal investigator for excellence in basic science research.



Nikki Zite, MD, MPH, Assistant Professor and Associate Residency Director for the Department of OB/GYN, received the Excellence and Leadership in Clinical Research Award. This award is offered to recognize, reward, and reinforce outstanding investigators and to promote excellence in clinical research at the Graduate School of Medicine.



The Graduate School of Medicine's 200 teaching physicians shape the education of our resident physicians, dentists, and fellows, which in turn, impacts the quality of healthcare across the state and nation. The Excellence in Teaching Award is given to a faculty member who serves as a role model for residents, students, and colleagues. This year's recipient is Henry S. Nelson, MD, Professor and Vice Chair of the Department of Surgery.

Gala Chairs Beverly Bell and Leslie Klein
along with The University of Tennessee Medical Center
and The University of Tennessee Graduate School of Medicine

cordially invite you
to the Inaugural Gala of

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Saturday, October 13, 2007
Cherokee Country Club

Cocktails and Silent Auctions 6:30
Dinner 8:00 pm
Live Auction 9:00 pm
Dancing 9:30 - midnight
Music by Familiar Faces
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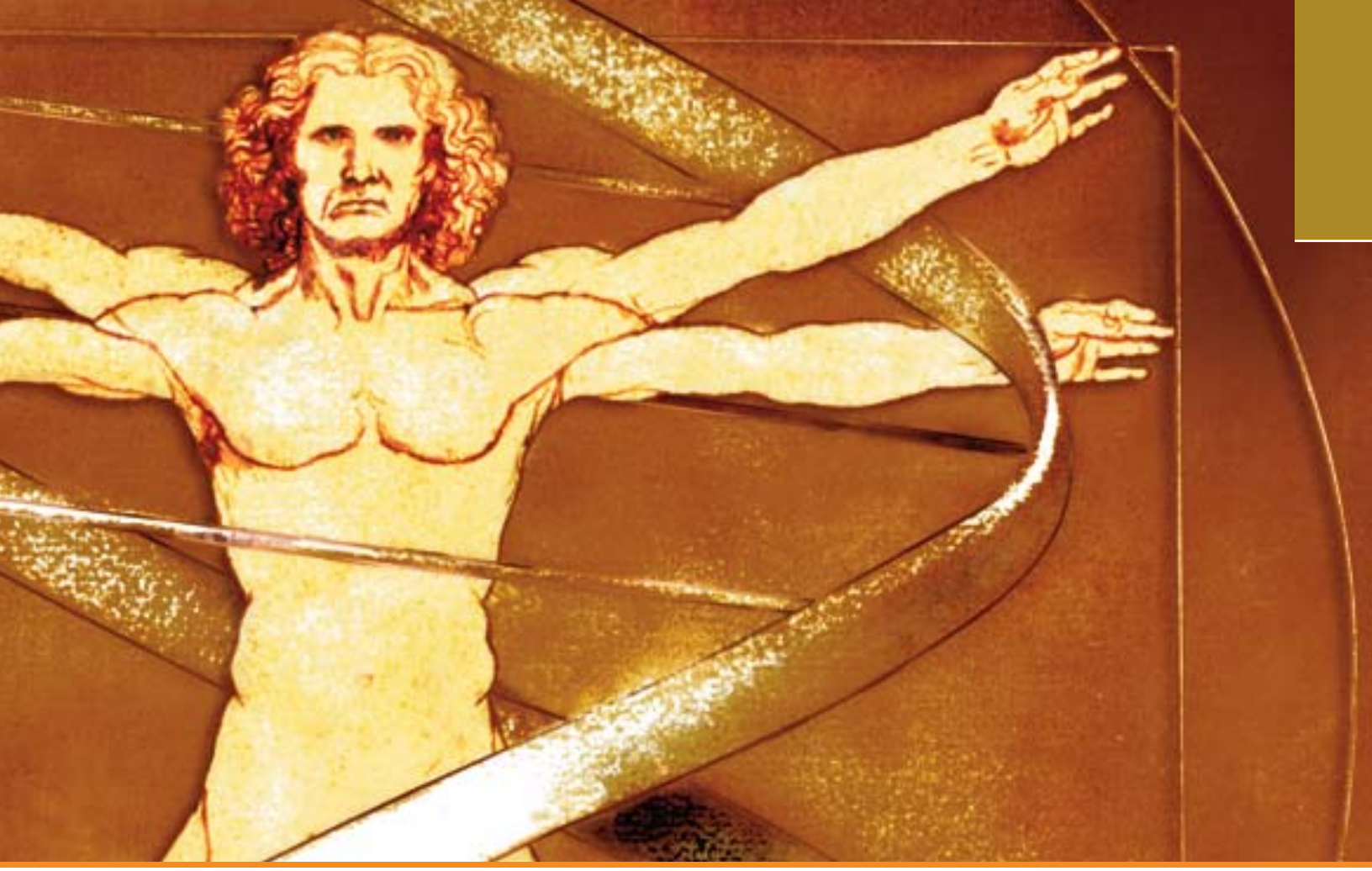
For more information about Evening in Orange
Please call 544-6611





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