EMORY | medicine

FALL 2011

CONSTRUCTING A BETTER VACCINE

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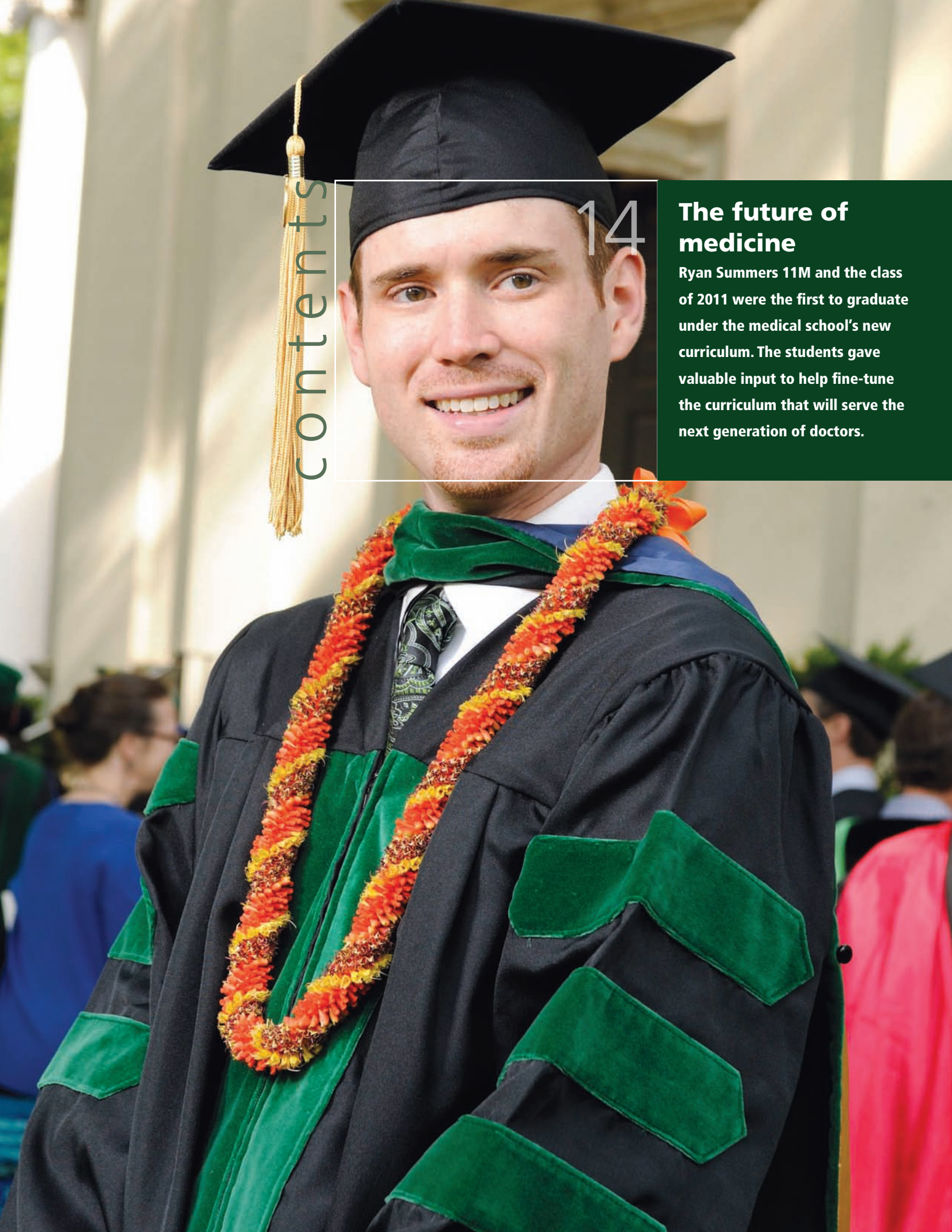

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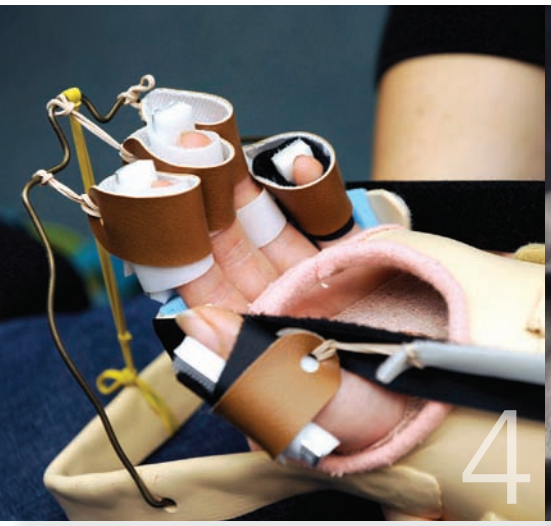

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Dean's Message

Research and patient care, defined

You know that Emory is one of the nation's leading research universities and academic medical centers. You may not know that we have three projects under way that will help us continue our innovative research and high-quality care, so I thought I would take this space to update you on them. Construction on the new Health Sciences Research Building on Haygood Drive began this past June. More than half of the research space will be dedicated to the Emory-Children's Pediatric Research Center, a joint project of Emory and Children's Healthcare of Atlanta. The remaining portion of the building will house research areas such as adult cancer, immunology, and drug discovery. The building will hold 65 researchers and their teams in all.

In a separate redevelopment project, Emory's board of trustees approved a site on Clifton Road in front of The Emory Clinic's building B for a new 210-bed hospital bed tower. The board also approved the expenditures needed to begin planning, such as preparing the site, installing utilities, enhancing parking areas, and updating entrances and exits.

At Emory University Hospital Midtown, another ICU for cardiothoracic patients and a bridge between hospital buildings will be built so that post-operative patients may be transported directly to the ICU without having to enter an elevator. This $8 million project is part of an overall plan to integrate all Emory Healthcare ICUs and standardize the care of critically ill patients.

These infrastructure improvements will help us continue to provide the best care to our patients and carry on the research that transforms health care.

Thomas J. Lawley MD

Thomas J. Lawley
Dean

In Brief

Overheard:

EDs handle 28% of all acute care visits and half of all hospital admissions, says Emory's Ricardo Martinez, advocating for better U.S. emergency care in the *New England Journal of Medicine.*

Escaping medicine, pneumonia bacteria leave **genetic paper trail**

Scientists have constructed a detailed family tree for a nasty strain of *Streptococcus pneumoniae*, allowing them to see how the bacteria have evolved and evaded both vaccines and antibiotics in recent years.

Emory infectious disease specialist Keith Klugman was part of an international team that deciphered the entire genomes of 240 samples of *S. pneumoniae*. The study was published in January in the journal *Science*.

Researchers looked at one particular strain of *S. pneumoniae*, called PMEN1, which was first recognized in a Barcelona hospital in 1984. The team's analysis indicates PMEN1 probably first arose around 1970 and then spread around the world because it was resistant to penicillin.

How PMEN1 and other strains became resistant to antibiotics comes from their ability to give their DNA to other bacteria, the study shows. Klugman says the problem of antibiotic resistance seems to rest largely on the ability of bacteria to "hand over" their DNA to other bacteria. Antibiotic resistance that results from mutations that change bacterial DNA one letter at a time occurs less often, he says.

Vaccines, in contrast, reduce the number of infections caused by *S. pneumoniae* with one kind of outer coat but leave the field clear for those with another kind of coat to take over.

As the cost of whole-genome sequencing continues to fall, Klugman says the study shows how public health officials might be able to more easily track how drug-resistant bacteria are spreading through hospitals or nursing homes.

"I think we've arrived at the point where the standard of how you identify a bacterial strain in this species has shifted to whole-genome sequencing," he says. "In the future, sequencing of whole bacterial genomes will offer insight into the range of strategies that bacteria are able to use to evade human interventions for treatment and prevention."
—Quinn Eastman

New **PhD Options**

This fall Emory is offering two new doctoral programs, in cancer biology and biomedical informatics. The interdisciplinary cancer biology program will allow students to address basic science areas in cancer or clinical aspects of cancer therapy and drug discovery, says the program's founding director, Erwin Van Meir, of Emory's Winship Cancer Institute. The biomedical informatics program will use information systems to improve care of patients, enhance performance of health care systems, and accelerate progress of biomedical research. The medical school also has created a new biomedical informatics department, chaired by Joel Saltz.

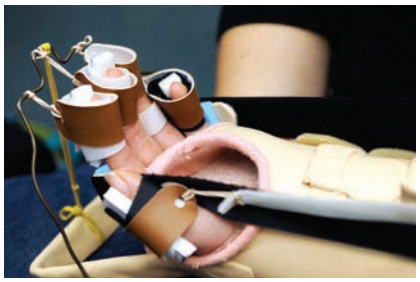
In Brief

New CEO

S. Wright Caughman was named CEO of the Woodruff Health Sciences Center and chair of the board for Emory Healthcare, effective July 1. He served as director of The Emory Clinic and executive associate dean for clinical affairs in the medical school from 2007 to 2011. He joined the medical school faculty in 1990 and served as chair of dermatology from 1997 to 2007. He led a research program in cutaneous biology for many years and co-chaired the medical school's research strategic plans in 1997 and 2003.

Emory completes **hand transplant surgery**

Emory became only the fourth institution in the country to successfully perform a hand transplant. The transplant team, headed by Linda Cendales, performed the operation in March.



Yerkes National Primate Research Center collaborated in the preclinical work, helping develop the protocol for the procedure and allowing the transplant team to study the behavior of these tissues after transplant to minimize the process of rejection. Cendales was part of the team in Louisville, Ky., that performed the first U.S. hand transplant in 1999. To view a video on the surgery, go to **tinyurl.com/transplant2011**.

Exercise protects the heart via nitric oxide

It's well known that exercise is good for the heart and that it helps protect the heart from injury during a heart attack. What was not known was how, until Emory researchers recently found that the nitric oxide produced during exercise is a key factor in this cardiovascular benefit.

Nitric oxide, a short-lived gas generated within the body, turns on chemical pathways that relax blood vessels to increase blood flow. Both the chemicals nitrite and nitrosothiol, where nitric oxide is attached to proteins, appear to act as convertible reservoirs for nitric oxide in situations where the body needs it, such as when a lack of blood flow or oxygen occurs. The team's findings strengthen the case for nitrite and nitrosothiols as possible protectants from damage from a heart attack, says Emory thoracic surgery researcher David Lefer.

The timing of exercise also matters since exercise's benefits don't last. The researchers found that exercise boosted levels of the eNOS (endothelial nitric oxide synthase) enzyme that produces nitric oxide. The levels of eNOS in heart tissue and nitrite and nitrosothiol levels in blood and heart tissue stayed high for a week after exercise ceased, unlike other heart enzymes stimulated by exercise. The protective effects did not extend beyond four weeks after exercise ended, when nitrite and nitrosothiol in the heart returned to baseline.

In mice that lack the eNOS enzyme, exercise did not protect the heart from a coronary blockage. In addition, mice that lacked the beta-3-adrenergic receptor, which allows cells to respond to the hormones epinephrine and norepinephrine, had no beneficial effects from exercise, but stimulating this receptor appears to activate eNOS. Additional animal studies are currently under way in Lefer's lab to determine the potential benefit of drugs that activate the beta-3-adrenergic receptor following a heart attack.

Emory is top contributor to **drug discovery**

Emory University is the fourth largest contributor in the nation to the discovery of new drugs and vaccines by public-sector institutions. The study, published Feb. 10 in the *New England Journal of Medicine*, included federally funded universities, research hospitals, and federal laboratories. The researchers looked at 153 FDA-approved drugs and vaccines that were discovered at least in part by public-sector research institutions during the past 40 years. The top five contributors were the NIH (22), the University of California System (11), Memorial Sloan-Kettering (8), Emory University (7), and Yale University (6).

New clue found for **fragile X syndrome-epilepsy link**

People with fragile X syndrome, the most common inherited form of intellectual disability, often develop epilepsy, but so far the underlying causes are unknown. Emory researchers have now discovered a potential mechanism that may contribute to the link between epilepsy and fragile X syndrome.

The protein that is missing in fragile X syndrome, FMRP, controls the production of a protein that regulates electrical signals in brain cells, the research team has found. In mice missing FMRP, brain cells produced less of a protein called Kv4.2, which regulates the excitability of neurons in the hippocampus, a region of the brain important for learning and memory. A mutation of the gene encoding Kv4.2 leads to temporal lobe epilepsy in people.

FMRP is known to regulate several genes, and for many of those genes, FMRP normally acts as a brake by interfering with the step in which RNA is made into protein. In FMRP's absence, runaway protein production occurs at the synapses, junctions between brain cells where chemical communication occurs. Kv4.2 appears to be an exception, because in FMRP's absence, less Kv4.2 protein is produced.

In laboratory tests, drugs that tamp down glutamate signaling could partially restore levels of the Kv4.2 protein in mice missing the fragile X protein, says Emory cell biologist Gary Bassell, who headed up the research team.

Not all individuals with fragile X syndrome develop epilepsy. The loss of FMRP doesn't shut Kv4.2 production off completely, and other genetic variations and environmental factors probably contribute to the development of epilepsy in people with fragile X syndrome, Bassell says.

In Brief

High levels of **oxidative stress** can predict risk of atrial fibrillation

Measuring oxidative stress may help doctors predict the risk of developing atrial fibrillation, the most common heart beat irregularity. Emory researchers have identified a connection between oxidative stress and enlargement of the heart's left atrium, which leads to atrial fibrillation.

People with high levels of the amino acid cystine in their blood at the start of the study were two times more likely to develop atrial fibrillation over the next three years, even after correction for traditional risk factors. Leakage from a heart valve also increased the risk.

"Our results suggest that increased oxidative stress promotes remodeling of the heart and enlargement of the left atrium, which can increase the likelihood of atrial fibrillation," says Nima Ghasemzadeh, an Emory cardiology researcher. "Studies targeting oxidative stress markers may have a valuable effect in reducing atrial fibrillation risk."

Antidepressants linked to thicker arteries

Antidepressant use may lead to thicker arteries and contribute to an increased risk of heart disease, according to a study by Emory cardiology researchers.

Researchers studied male twins who both served in the Vietnam War to separate the effects of antidepressants from the depression itself, which also can heighten the risk of heart disease. The twin who took antidepressants had higher carotid intima-media thickness, even with standard heart disease risk factors taken into account.

"One of the strongest and best-studied factors that thickens someone's arteries is age, and that happens at around 10 microns per year," says Amit Shah, a cardiology fellow. "In our study, users of antidepressants saw an average 40-micron increase in intima-media thickness, so their carotid arteries are in effect four years older."

Antidepressants' effects on blood vessels may come from changes in serotonin, Shah says. Some antidepressants increase the level of serotonin in the brain, but serotonin also is found in the intestines and in platelets. Serotonin can cause blood vessels to constrict or relax, depending on whether the vessels are damaged.

Lack of D can impair heart health

A lack of vitamin D, even in healthy people, can impair vascular health by stiffening arteries and preventing blood vessels from relaxing to restore blood flow, Emory and Georgia Tech researchers have found.

Study participants who increased their vitamin D levels were able to improve vascular health and lower their blood pressure.

The average level of vitamin D among the participants was 31.8 nanograms per milliliter. Within the group, 14% had levels considered deficient (less than 20 nanograms), and 33% had levels considered insufficient (less than 30 nanograms).

"We found that people with vitamin D deficiency had vascular dysfunction comparable to those with diabetes or hypertension," says Ibhar Al Mheid.

"We found that people with vitamin D deficiency had vascular dysfunction comparable to those with diabetes or hypertension," says Ibhar Al Mheid, an Emory cardiovascular researcher. "There is already a lot known about how vitamin D could be acting here. It could be strengthening endothelial cells and the muscles surrounding the blood vessels. It also could be reducing the level of angiotensin, a hormone that drives increased blood pressure, or regulating inflammation."

Study participants with an insufficient level of vitamin D and whose level later went back to normal, either through dietary supplements or ample sun exposure, had an average drop in blood pressure of 4.6 millimeters of mercury.

World's first center for **pediatric nanomedicine**

Physicians and researchers from Emory, Children's Healthcare of Atlanta, and Georgia Tech are collaborating in a new center for pediatric nanomedicine to develop nanoparticles for use in diagnosing and treating pediatric diseases. The center is the first of its kind in the world. Specific focus areas will include pediatric heart disease and thrombosis, infectious diseases, cancer, sickle cell disease, and cystic fibrosis.

"Because nanoscale structures are compatible in size to the body's biomolecules, nanomedicine provides unprecedented opportunities for achieving better control of biological processes and drastic improvements in disease detection, therapy, and prevention," says Gang Bao, the center's director and a professor in the joint Emory-Georgia Tech biomedical engineering department.

Emory and Georgia Tech already have had significant research partnerships in nanomedicine, including in cancer and cardiology.

In Brief

A custom graft for abdominal aortic aneurysms

Living with an abdominal aortic aneurysm is like teetering on the edge of a cliff, sometimes for years, waiting as the body's largest artery weakens, stretches, and finally bulges to the point of bursting. For patients who also have other serious medical conditions, standard abdominal surgery is often too risky, leaving few, if any, treatment options.

Emory vascular surgeon Joseph Ricotta is one of a handful of surgeons across the United States who repair this critical condition using a custom-made fenestrated and branched aortic endograft (FEN) inserted into the aorta through arteries in the groin. Ricotta fashions each graft himself based on the patient's CT and PET scans. The endograft is a tube of fabric and metal that functions as a sleeve inside the aorta that excludes the aneurysm from blood flow.

The FEN is inserted through needle punctures in the groin arteries. The FEN's holes line up with blood vessels, including kidney and intestinal arteries, and through these holes, additional stents are placed into branch arteries to repair the aneurysm and preserve blood flow to the abdominal organs. "The people who benefit from this procedure the most have no other options for aneurysm repair and could not survive open aortic surgery," says Ricotta. FEN candidates possess large aneurysms likely to rupture and are often too sick from heart, lung, or kidney disease for conventional abdominal surgery.

The FEN procedure offers patients a quicker recovery and a lower risk of complications or death. Approximately 20% to 30% of patients who undergo traditional open thoracoabdominal surgery die within one year, and 10% to 15% will die during or shortly after open surgery. Ricotta reports that only 1% to 2% of his patients who underwent the FEN procedure died. Emory's FEN program, which has done more than 30 procedures since Ricotta arrived from the Mayo Clinic in September 2010, is one of only a few nationwide and the only one in the Southeast.

Approximately 15,000 people die each year of a ruptured abdominal aneurysm, and 200,000 new cases are diagnosed each year. Congress recently revised the SAAAVE ACT (Screen Abdominal Aortic Aneurysms Very Effectively) to include ultrasound screening for at-risk Medicare recipients aged 65 to 75 years.

"Screening is crucial, because abdominal aortic aneurysms are asymptomatic, silent killers," Ricotta says. "That's why early detection with ultrasound is key."—Valerie Gregg

To watch a video on this procedure, access **tinyurl.com/endografts.**

Flu vaccine protects **expectant mothers**

Women who are immunized with inactivated flu vaccine during pregnancy may reduce the likelihood of a premature birth, an Emory research team has found.

Babies born during the flu season from October through May to mothers who were vaccinated against the flu were less likely to be premature compared with infants of unvaccinated mothers born in the same period, with an adjusted odds ratio of .60, says Saad Omer, an Emory pediatrics researcher who headed up the team.

Progesterone inhibits growth of neuroblastoma cancer cells

High doses of the hormone progesterone can kill neuroblastoma cells while leaving healthy cells unscathed, Emory scientists have found in laboratory research. The results suggest that progesterone could be used to fight neuroblastoma, the most common form of cancer affecting small children.

More research is necessary to determine the optimal dose, how long progesterone treatment should last, and if it should be used alone or in combination with radiation or chemotherapy. Progesterone also has been reported to slow growth of several other types of cancers in the laboratory but has not been used clinically against neuroblastoma.

In a mouse model, progesterone treatment cut tumor growth in half over eight days, while no drug toxicity was seen with healthy neurons or in live animals. The researchers showed that progesterone can decrease the levels of proteins produced by tumor cells that attract new blood vessel growth and help tumor cells invade other tissues.

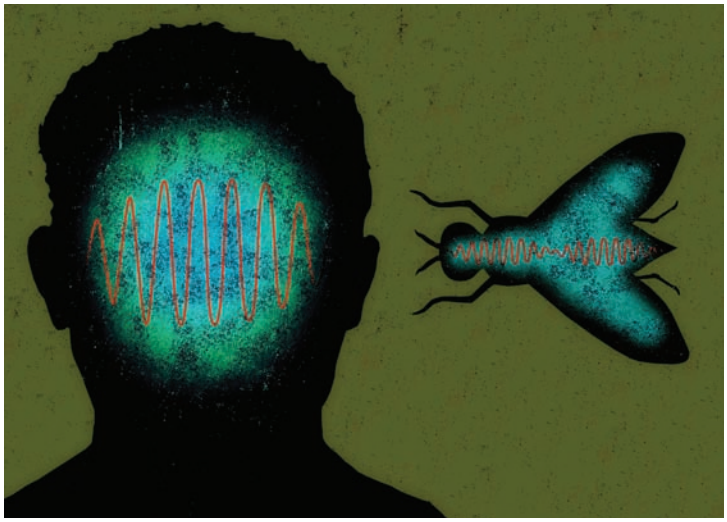
What can scientists studying cancer biology **learn from fruit flies?**

Quite a bit, it turns out. At a time when large projects such as the Cancer Genome Atlas seek to define changes in DNA that drive cancer formation, the insight gained from smaller arenas, such as fruit flies, is helping make sense of the mountains of data.

Emory cell biologist Ken Moberg crafted a fruit-fly–based strategy to identify growth-regulating genes that previous researchers may have missed. His approach allowed him to begin defining the function of a gene that is often mutated in lung cancer.

"Many screens have been carried out in flies looking for single gene lesions that drive tissue overgrowth," Moberg says. "But a fundamental lesson from years of cancer research is that many and perhaps most cancer-causing mutations also drive compensatory apoptosis, and blocking this apoptosis is absolutely required for cancer outgrowth. We reasoned that this class of 'conditional' growth suppressor genes had been missed in prior screens, so we designed an approach to look for them."

Moberg identified the fruit fly gene Myopic as one of these conditional growth regulators. He used a system where mutations in Myopic drive some of the cells in the fly's developing eye to grow out more, but only when apoptosis is disabled.



Myopic's counterpart in humans is the gene His-domain protein tyrosine phosphatase, or HD-PTP. This gene is located on the part of the human genome that is deleted in renal cancer cells and in more than 90% of both small cell and non-small cell lung cancers. How HD-PTP, when it is intact, controls growth of cells in the human lung or kidney is unknown, but Moberg's findings suggest that HD-PTP may function through a mechanism that is similar to Myopic's functions in the fly.—Quinn Eastman

CONSTRUCTING A BETTER VACCINE

Emory scientists are deconstructing viruses to find the keys to improve longevity and efficacy of vaccines

By Martha Nolan McKenzie | Illustrations by Justin Metz

British doctor Edward Jenner is credited with creating the first vaccine in the 1790s when he inoculated a hapless young boy with cowpox and then exposed him to smallpox. The boy did not fall ill with the dreaded disease, and modern vaccinology was born.

Since that day, countless vaccines have been created, reshaping the public health landscape. "Today a child gets his first vaccine on the day he is born, and he will go on getting vaccines for the rest of his life," says Bali Pulendran, a pathologist and a researcher at the Emory Vaccine Center. "Many of these vaccines are highly successful in controlling infectious diseases that plagued mankind for ages."

Yet vaccinology can still come up short, as the 2009 H1N1 pandemic, which resulted in about 16,500 deaths worldwide, painfully clarified. Some diseases, such as malaria, HIV, and tuberculosis, have proven resistant to efforts to develop an effective vaccine. And some vaccines work well in certain segments of the population but fail to provide adequate protection in others, such as the elderly.

Emory researchers are seeking solutions to these vexing problems. They have identified broadly protective antibodies in patients infected with the 2009 H1N1 virus—a promising first step toward a universal flu vaccine. They are testing man-made nanoparticles to boost the potency and longevity of other vaccines. And they are using new technology to develop biomarkers to predict a vaccine's eventual effectiveness within a day or two of vaccination.

"There are places doing great immunology research, and there are institutions developing vaccines," says Pulendran. "What is unique here at the Emory Vaccine Center is that we really try to fuse those two efforts. We have top-notch immunologists who are focusing their research on vaccine-related problems.

"We also have the clinical infrastructure and expertise for vaccine testing and evaluation at the Hope Clinic," continues Pulendran. "We have access to the public health expertise at the CDC, and we have a close collaborative relationship with Georgia Tech, which is probably one of the best bioengineering places in the world. So Emory is a special place for immunology and vaccinology."

Universal flu vaccine

Ideally, a vaccine should provide protection for a lifetime, or at least for several decades. And many do. But flu virus has proved an elusive prey for vaccinologists, endlessly morphing into new strains that require new vaccines each year. Researchers at the vaccine center, in collaboration with the University of Chicago, have taken a significant step along the path that could lead to development of a single vaccine to provide permanent immunity to all strains of influenza.

They discovered that patients with the 2009 H1N1 flu strain produced antibodies that were protective against a wide variety of flu strains. In fact, these antibodies could protect against all the seasonal H1N1 flu strains from the past decade, the devastating "Spanish flu" strain of 1918, and a pathogenic H5N1 avian flu strain.

The finding was quite a surprise. Normally a flu infection leads to production of antibodies that are specific to that particular strain—they are useless against a different flu strain. The fact that the 2009 H1N1 strain produced such broadly protective antibodies suggests that scientists might be able to reproduce that response with a vaccine, essentially creating a universal flu vaccine.

But first scientists have to understand exactly how the 2009 H1N1 antibodies work their magic. They discovered that these antibodies attack flu differently from the way other antibodies do, aiming at a different target. Protective immune response is directed against a protein on the virus called hemagglutinin, or HA. This protein is responsible for binding the virus to other cells and infecting them. When you knock out the infective capacity of the HA, you knock out the virus.

The actual HA molecule resembles a tree, with a long stalk area and a rounded head. Almost all antibodies attack the head region, which is the section that binds the virus to other cells. However, the head is also the section that is constantly changing, evolving into new strains. An H1N1 antibody, or vaccine, that recognized and attacked the virus one year would not recognize it again one or two years later.

The antibodies produced by those infected with the 2009 H1N1 virus, however, preferentially attacked the stalk section of the HA. This section is much more stable than the head.

"Since these antibodies attach to the stalk, which doesn't really change from year to year, they were able to recognize all the H1N1 strains from the past decade, including even older ones from the 1960s and 1970s and even the 1918 strain," says Jens Wrammert, an Emory microbiologist and immunologist. The task ahead for scientists is to design a completely new type of vaccine that targets this stalk region of the HA. "If we could do that, it would suggest that we could make a vaccine that was effective against most flu strains and last, if not a lifetime, at least a very long time," says Wrammert.

Stimulate long-lasting immunity

The Holy Grail for vaccine scientists is to create vaccines that provide protection for a lifetime. And many live-virus vaccines, such as smallpox and yellow fever, do just that. Yet

scientists don't understand how these vaccines work. Perhaps more important, they also don't understand why some diseases, such as malaria, HIV, and tuberculosis, remain resistant to vaccines. If researchers could discover how successful vaccines like yellow fever stimulate protective immune responses, they might be able to apply that knowledge to design new vaccines against resistant diseases.

Several years ago, Pulendran and researchers in his lab found that yellow fever vaccine triggered four different receptors, called TOLL-like receptors (TLRs), in the innate immune system. "TLRs are like the sixth sense in our bodies because they sense viruses and bacteria and convey this information to stimulate the immune response," says Pulendran. "But we wondered, why does the yellow fever vaccine trigger four? Why not just one? Was the clue to its great immune response that it activated more than one TLR?"

To test this theory, Pulendran's lab created a nanoparticle that looked like a virus and was studded with molecules that activated two different TLRs. The particle contained two components, both already FDA-approved for human use. One was MPL, an adjuvant already licensed for use with the cervical cancer vaccine and shown to activate one TLR. The second is a small molecule called imiquimod (R837), which activates another TLR. It too has been licensed for clinical use to treat certain diseases of the skin but not for vaccines. The particle itself is made from PLGA, poly(lactic acid)-co-(glycolic acid), a synthetic polymer used for biodegradable grafts and sutures.

The lab first tested the nanoparticle-based vaccines in mice, inoculating the animals with a flu vaccine containing the particle. Nanoparticles that activated both TLRs stimulated greater and longer-lasting immune responses than those that activated only one TLR. Strikingly, the former could stimulate immune responses that lasted nearly 500 days—the lifespan of a mouse. The researchers also injected monkeys with a swine flu vaccine with the particle, generating an immune response greater than that generated in monkeys given a dose of the inactivated virus without the nanoparticle. These results, which were published recently in *Nature*, address one of the more important questions in vaccinology.

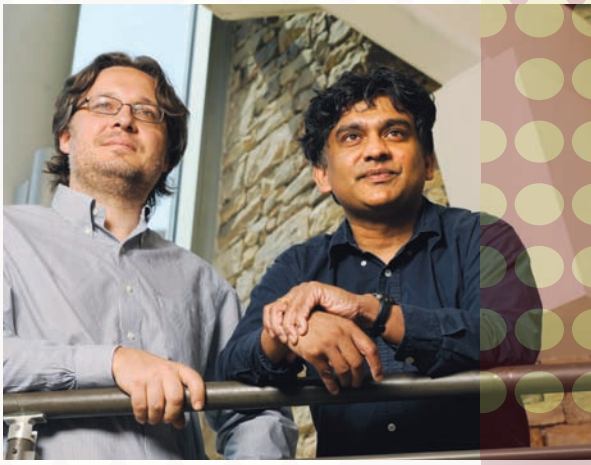
Predicting vaccine efficacy

A major problem with vaccines is that you have to wait until the person is actually exposed to the virus or pathogen to be sure they really work. But what if you could test a person a day after being vaccinated and tell whether or not that vaccine was going to give effective protection?

Pulendran's lab is trying to devise such a test. Different fields of biology have been using new approaches, such as microarray analysis, to measure the expression of all 25,000 genes in our genome in one instant by putting a cell on a gene chip. "A computer can scan this chip and say, 'Gene #15,891 is turned on. Gene #2 is turned on. Gene #9,678 is switched off,'" says Pulendran.

Although this technology had been applied to identifying biomarkers of cancer progression, it had not been applied to vaccines, until recently. Pulendran's lab vaccinated a group of 15 healthy, young adults with the yellow fever vaccine. Scientists drew blood from the subjects before the vaccine, one day after, three days after, and at varying intervals for one year, studying the T cell and antibody responses. They saw a striking variation in these responses among individuals, and they were able to identify gene signatures that correlated to these responses. To determine whether these signatures could, in fact, predict immune responses, they vaccinated a second group and were able to predict with up to 90% accuracy who would develop a strong immune response.

These results suggest that vaccine immunity can indeed be predicted. Such a test would be a huge benefit to populations who typically don't mount protective immune responses, such as the elderly and those with autoimmune disorders. It also could speed up the often-glacial process of clinical trials. "In some clinical trials, you are working with thousands of people over two to five years or more before you have data on effectiveness," says Pulendran. "A biomarker that could predict vaccine effectiveness could shorten that process considerably."



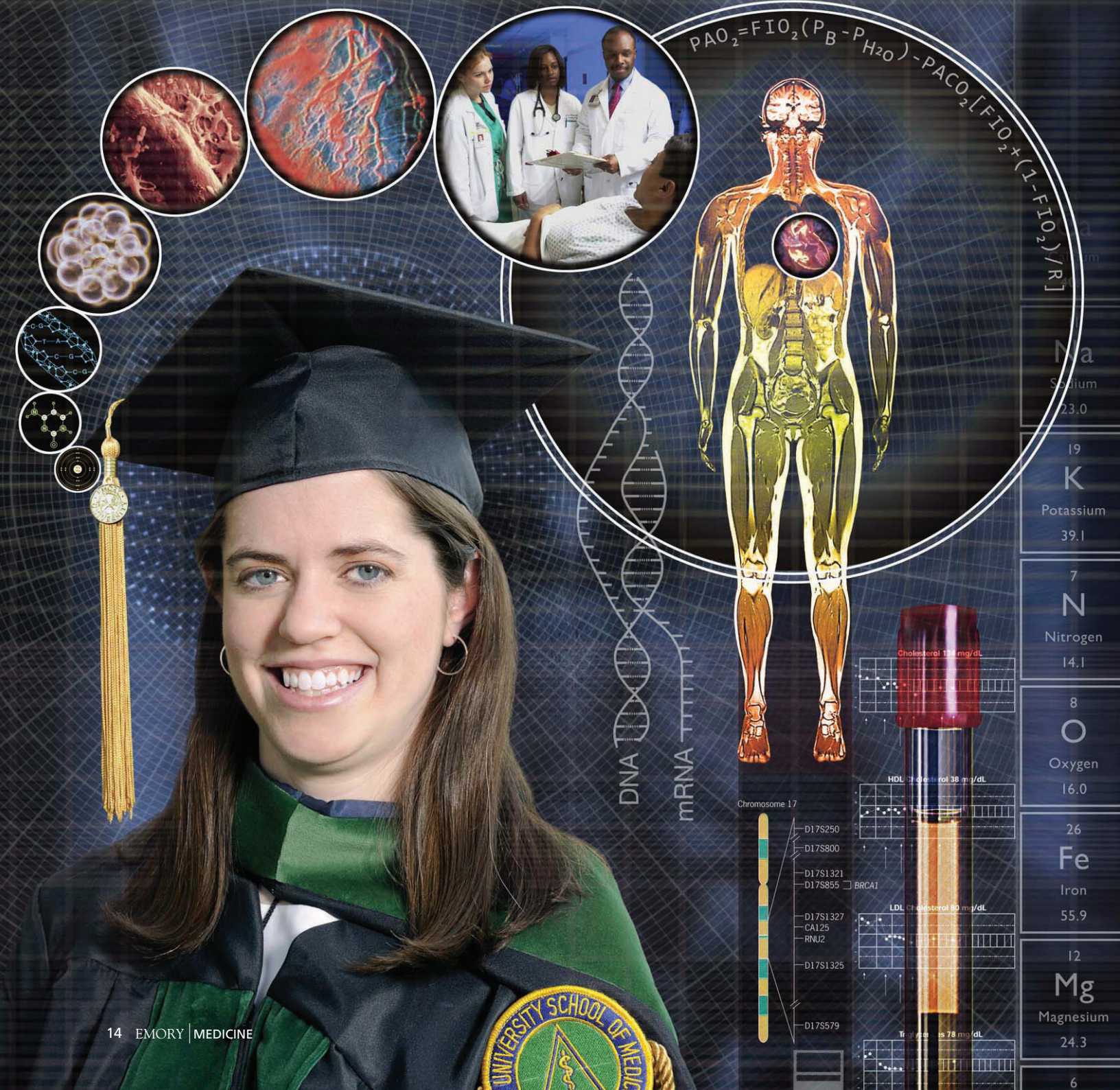
Researchers Jens Wrammert and Bali Pulendran are working to create vaccines that provide long-term protection.

Pulendran's lab is currently working to establish biomarkers for vaccines for flu, pneumonia, malaria, and shingles. "This topic seems to have captured the imagination of the field, and there are a lot of people working on it right now," he says.

But Pulendran is confidant that Emory will continue to lead the way in vaccine research. He says. "If Louis Pasteur were living today, he'd want to be at Emory!" **EM**

A new prescription

New alumni are joining the ranks,
and their education was nothing like yours.



for medical education

By Kay Torrance | Illustrations by Ralph Kelliher

Marybeth Sexton adjusted her black cap as she stood in line with her fellow medical school graduates this past May. She and others chatted about their upcoming residencies and summer vacation plans as they waited outside Emory's Glenn Memorial Church for commencement to begin. They seemed to pay little attention to the historic nature of the day.

Though the medical school dean likes to say that every graduating class is special, this particular one will go into the history books. The class of 2011 is the first class to graduate under the school's new curriculum—one that was envisioned eight years ago as a new way to educate future doctors.

Across the country, a number of top-tier medical schools have overhauled their curricula to meet a medical landscape that has changed drastically in the past decade. Students today need to be prepared for continually evolving technology, care that is more "patient-centered" in the context of clinician shortages, an aging population, increased attention to health policy, diminishing reimbursements—the list goes on and on.

Before this year's class joined the ranks, Emory's medical alumni predominantly sat through traditional lecture-based courses their first two years, with patient contact largely confined to the second half of the medical curriculum. Emory's new curriculum throws tradition to the wind, with less focus on disease and more emphasis on patients. Old-school courses have given way to more engaging modules that go from person to cell on topics such as aging and cardiology, where students not only learn the science of disease but also work with patients to understand first-hand experiences. Students also had more outpatient experience than previous classes to mimic how most doctors see patients.

"I liked that the curriculum was designed to be 'systems-based,'" says Sexton, now an internal medicine resident at NewYork-Presbyterian Hospital-Columbia University Medical Center. "Instead of studying microbiology, pathophysiology, and pharmacology separately, we would focus on cardiology, for example, and examine how each of those topics related to the heart. We would have lectures on bacterial infections of heart valves, the causes of coronary artery disease, and drug treatments for high blood pressure. Studying the material in that way gave me a great framework for evaluating patients in the hospital later on."

Providing good models Ryan Summers 11M sat in a small classroom recently with seven other students as they waited for their faculty adviser to arrive. They talked with the ease of lifelong friends even though they had known each other only four years, since the first month of medical school, which now seemed like a lifetime ago.

Summers' society group is one of 16 in the Class of 2011. The societies often function as a mini-class, covering a number of non-traditional subjects, such as doctor-patient communication, including using open body language, how to break bad news to a patient or discuss the results of genetic tests, or talking about adherence to a medication regimen. The small groups allow more participation from each student, but perhaps more important, the groups provide emotional support.

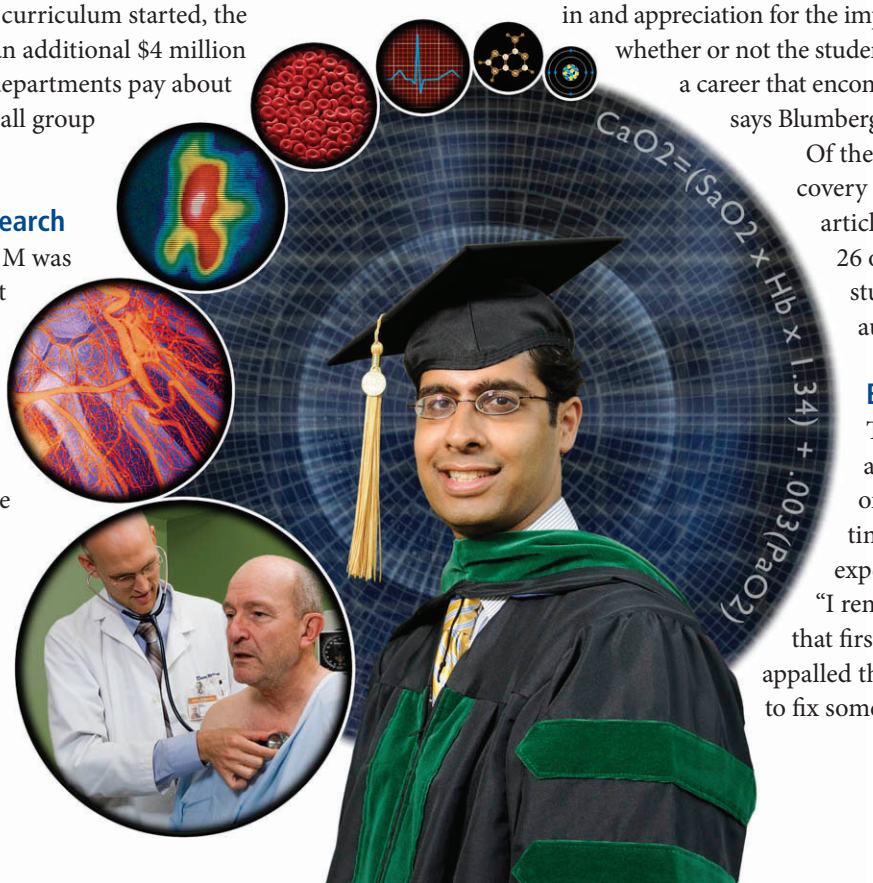
"The society group experience has been one of the most meaningful experiences in medical school," says Summers, who is now an Emory pediatrics resident. "Your society adviser becomes your closest friend on the faculty, and the society group is a safe place to share your thoughts and experiences. Your mentor also has the advantage of having been through it all before and can offer insights gained from experience."

That's exactly how Monica Farley and Jerry Boss envisioned the society system. Six years ago, Farley, an Emory infectious disease specialist, and Boss, an immunologist, co-chaired a committee of faculty that looked at how to integrate mentoring into the curriculum. "In our minds, the most important thing was to incorporate mentoring into the curriculum—not just a hit or miss thing where students would have to schedule an appointment with an adviser," Farley says. "We wanted students to have much longer and more quality exposures to faculty and physicians so they can really model themselves after someone whom they have worked with for a long time. I think it's one of the biggest achievements of this curriculum."

While other medical schools have societies, "no one does this as robustly as we have," says Bill Eley, executive associate dean for medical education and student affairs. Emory's society groups of approximately eight students each spend all four years with the same faculty adviser, mirroring the ideal longtime relationship between patient and doctor. At this year's commencement, faculty advisers hooded their graduates, assuming a role traditionally held by Eley and Ira Schwartz, associate dean for student affairs.

Farley's committee strongly recommended salary support for the 64 society group leaders that the school would need. Advisers would be devoting at least three half-days a week for the first two years. "I know that it was one of the first times that the medical school said that we are going to free up clinical time and provide salary support for physicians to mentor and teach medical students," Farley says.

Since the new curriculum started, the school has spent an additional $4 million annually to help departments pay about a third of each small group leader's salary.



Discovering research

Sameer Nagpal 11M was ecstatic to find out that he matched with Yale-New Haven Hospital for a residency in internal medicine. He thinks the medical curriculum's Discovery Phase, in which students work for five months on a research or creative writing project, helped tip the scales in his favor to secure a top-notch residency.

"The Discovery Phase gave me a mentor who worked with me one-on-one every day for five months, and because of that, allowed me to get a strong letter of recommendation that had substantial weight and meaning behind it," Nagpal says. "I was asked about my research project at nearly every interview I attended, and everyone, including several cardiologists I interviewed with, was very impressed with the in-depth experience that the Discovery Phase afforded me.

"During medical school, you are forced to learn a little bit about everything in medicine, and the Discovery Phase gives you the chance to go into great detail about a part of medicine that you are really enthusiastic about," Nagpal says. "I felt very much in charge of my project, from submitting an IRB proposal, to presenting at a national meeting, and writing the manuscript for publication. Because my project was clinically based, I spent lots of time with my attending faculty mentor in the cardiac cath lab, the operating room, the echo lab, and also in the clinic, seeing patients involved in our research project."

Medical schools typically offer opportunities in research, but few make research or a creative writing project a requirement for graduation, outside of an MD/PhD degree. The medical school decided to institute the intense, five-month experience during the third year, based on faculty's desire to graduate students who will be lifelong learners, says Henry Blumberg, an infectious disease specialist.

"Our hope is that Discovery will help stimulate an interest in and appreciation for the importance of inquiry, whether or not the student ultimately ends up in a career that encompasses investigation," says Blumberg.

Of the Class of 2011's Discovery Phase, 29 published articles have resulted, with 26 of those listing the student as first or second author, Blumberg says.

Before they leave

The first six months as a new resident was one of the rockiest times Jason Liebzeit experienced as a doctor. "I remember being on call that first month and feeling appalled that I didn't know how to fix someone's potassium level,"

says Liebzeit, a 2002 medical school graduate who is now an emergency department physician at Grady Hospital. So Liebzeit jumped at the chance to work with Sheryl Heron, assistant dean for medical education and student affairs, to create a month-long capstone course for graduating students.

The capstone is "everything medical students need to translate into being a good resident," Heron says. How to give a five-minute consult to an attending. Leading a balanced life. Credit scores and retirement planning. Malpractice and mandatory reporting. Palliative care. Leadership skills. Drug and alcohol abuse among physicians. Nuances of the most commonly prescribed medications. New restrictions on resident hours. How to manage patient hand-offs. Integration of laboratory and clinical science.

The course, titled "Passion, Purpose, and People," runs the month of April, typically a month of electives for M4s. In discussions about the new curriculum, residency program directors wanted more time devoted to issues of professionalism, and faculty overall wanted to revamp the ill-defined fourth year, Heron says.

Needless to say, students were not happy to lose a month defined by themselves. "They were a little frustrated," Heron concedes. "It may sound dramatic, but they don't know what they don't know. "We told them, 'You won't get the importance of this month until your first day of residency.' It's good to have a healthy sense of self-importance, but some will be humbled very quickly."

Heron believes that once the new demands of residency are under way, her former students will have an aha moment and realize how valuable that month of April was.

So what do you think? Four years ago, Eley and Gordon Churchward, a microbiologist who oversees the first 16 months of the curriculum, met every two weeks with a small group of first-year students. Since the students were the first to experience the new curriculum, Eley and Churchward wanted to know what they liked and what they didn't.

"By and large, they liked what we were doing," Eley says.

The students did ask for, and got, an additional week of reproductive science, more time devoted to the subject of pregnancy in the "Human Disease" module, and the first three semesters changed from a graded to a pass/fail system.

"Since our new curriculum had no letter grades for the first 18 months, I suspect there was less competitiveness and more cohesiveness amongst the class," says Nagpal, the internal medicine resident at Yale-New Haven Hospital. "I think it promoted learning for the sake of learning, rather than simply to achieve an 'A.' Medical school will always be medical school—we had to memorize vast amounts of information in a short amount of time, but I felt I had freedom and time to really understand the concepts behind the physiology without sacrificing a potential grade."

Now, four years later Sarah Rae Strunk stood in the crowd of medical students on March 17 as she carefully watched the hands of the clock. She was lucky enough to get a spot at the front of the group, close to the tables of envelopes that revealed the names of residency matches.

As the clock struck high noon, Strunk grabbed the envelope with her name on it and made her way back to her family. She opened the envelope to reveal the name of the teaching hospital where she would be doing an obstetrics/gynecology residency. The name listed was indeed the one that she was hoping for all along, Brigham & Women's Hospital in Boston.

Strunk was one of 50 students in this year's class who matched with a teaching hospital affiliated with a top 20 research medical school. A quick look at this year's Match Day results indicates that the medical school is on the right track with its new curriculum.

The number of students going to top 20 research medical schools (using 2011 *U.S. News & World Report* rankings) for residency this July increased since last year, 50 students this year, or 40% of students matching, up from 40, or 33% last year.

This year's Match Day results came as no surprise to Eley. The Class of 2011 seemed better composed for the challenges of medical school because of the society groups, he says. The societies require each student to be responsible to the others in the group and to support one another.

Looking back to consider the past four years, Eley says, "We made a dent. We still have more to do." This curriculum isn't finished, he says. The curriculum is, and should be, ever changing, just like medicine. EM


Collaborate
Ingenuity
Solution

Engineering the Perfect Match

What happens when engineers and clinicians get together

By Dana Goldman | Illustrations by Anne Wertheim

Larry McIntire never intended to get into matchmaking. A chemical engineer, he chairs the biomedical engineering department shared by Emory and Georgia Tech, and his interests always have been more academic than amorous. But every year, he finds himself standing in a room full of Emory clinicians and Georgia Tech engineers, breaking the ice, and helping them find potential partners as part of a day-long workshop.

In this case, the matchmaking is for science. "Engineers say the different things they can do, and the clinicians say the kinds of problems they have," McIntire says. The clinicians and engineers scope each other out, looking for signs they'll be compatible with someone who has a complementary skill set. They're hoping that together they'll be able to solve medical puzzles with engineering solutions.

After all, that's what the biomedical engineering department (BME) was designed for—uniting Emory doctors with Georgia Tech faculty who have the technical skills to engineer practical, important medical tools.

Setting up relationships isn't all McIntire does. Since BME is one of just a few jointly run departments between a private and a public university, McIntire and his team cope with situations that never come up anywhere else: How do you maintain relationships when staff members work at campuses six miles apart? Or with colleagues 7,000 miles away where Emory and Georgia Tech have a third partner in Peking University's biomedical engineering department? Which school pays for what expenses?

When the collaboration first started 13 years ago, even coming up with a name got complicated. At Emory, programs like biomedical engineering are called "departments." But at Georgia Tech, BME is the only engineering program not called a "school."

And yet despite the two different shades of red tape that McIntire sorts through on a daily basis, the consensus is that the biomedical engineering department at Georgia Tech and Emory has been a phenomenal success. The department is ranked as 2nd in the nation for biomedical engineering graduate programs by *U.S. News & World Report*, and it has spawned countless medical advances in areas ranging from veterinary science to cardiology. Its benefactor, the Wallace Coulter Foundation, for whom the department is named, has helped many of these advances get off the ground. Almost a third of its $25 million grant to the department in 2001 serves as an endowment to provide ongoing funding for translational research.

A PRODUCTIVE PARTNERSHIP

What faculty and students are doing in BME spans the gamut. In 2009, a BME team responded to a plea from Zoo Atlanta and successfully created the world's first-ever blood pressure cuff to be used with an unsedated gorilla. In 2010, faculty created software that allows pediatric cardiac surgeons to perform virtual surgery on a patient before making a single incision. The 3-D computer program helps doctors foresee how each patient's unique blood flow patterns and anatomy might impact clinical decisions in the operating room.

And then there's the work of BME faculty member Shuming Nie, who directs the cancer nanotechnology programs at Emory's Winship Cancer Institute. For a long time, he had been troubled by the difficulty that surgeons face trying to visualize the entirety of cancerous tumors. "We realized the urgent need for new tools to detect and identify tumors in real time during surgery," he says.

Nie approached his BME colleagues at Georgia Tech, and together they developed the SpectroPen, a handheld device that detects fluorescent dyes and miniscule light-reflecting gold particles that stick more easily to cancer cells than to healthy cells. "It could help surgeons see the edges of tumors so they can more reliably remove all of it," Nie says.

The gold particles also were developed by Nie. They consist of polymer-coated gold, coupled to a reporter dye and an antibody that sticks to molecules on the outsides of tumor cells more so than to normal cells. The gold in the particle amplifies the signal from the reporter dye, and those signals are picked up by the SpectroPen, which is connected by a fiber optic cable to a spectrometer.

Shuming Nie believes that SpectroPen wouldn't have been possible without the engineering/medicine interface. "In a traditional, narrowly focused academic department," Nie says, "this work would most likely have stopped at the device fabrication step, without the ability for clinical translation."

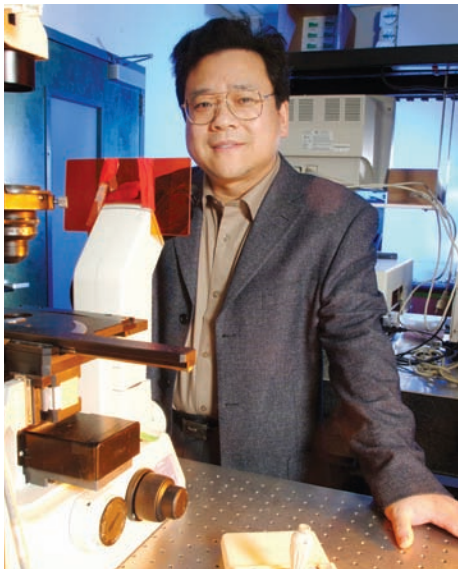
SpectroPen already has been tested successfully in mice, and Nie is preparing for clinical trials in humans. He believes that SpectroPen wouldn't have been possible without the engineering/medicine interface. "In a traditional, narrowly focused academic department," Nie says, "this work would most likely have stopped at the device fabrication step, without the ability for clinical translation."

OFF THE SIDELINES

Another BME success story started in an unlikely place: Grady Hospital's emergency room. Emergency physician, clinical researcher, and avid sports fan David Wright kept seeing young football players come in to be evaluated for concussions.

"The problem with concussions and sports is there's really no good way to evaluate someone on the sidelines,"

Larry McIntire chairs the 13-year-old biomedical engineering department, one of the few jointly run departments between a private and a public university.



Shuming Nie's SpectroPen, which helps detect tumors during surgery, was developed as a result of his collaboration with Georgia Tech engineers.

says Wright, a specialist in traumatic brain injury. "At high school games, there usually are no trained people on the sidelines who know how to evaluate the kids."

In fact, the gold standard for assessing concussions has long been psychological testing, which requires hours in a quiet room with a trained examiner—an impossible situation in the middle of a tight game.

Inspiration hit on an airplane about 10 years ago, when Wright saw a fellow passenger wearing noise-cancelling headphones. "What if we created a test that blocked out external sights and sounds that we could use on the sidelines?" Wright wondered.

Wright and biomedical engineer Michelle LaPlaca applied for funds from BME's Coulter Translational Research Partnership to make that test a reality. The Coulter grants provide $100,000 for a year's work on a translational project that includes collaboration between an Emory clinician and a BME engineer.

The collaboration was the first time Wright had worked with an engineer. "They approach things by applying algorithms and math," says Wright. "They look at problems and figure out mathematical solutions to those problems. But when you put us together it's synergistic."

Flash forward to today, and LaPlaca and Wright are patenting DETECT, a helmet-like computerized device that can accurately test for mild cognitive impairment (seen in concussions and early dementia) within about 10 minutes in any location. "We wanted it to be accurate, and we wanted it to be objective. Our goal was that it had to be functional on the sidelines," says Wright. In fact, some of the prototype testing was done with the Georgia Tech football team, with other research done with seniors at Emory's Wesley Woods Center.

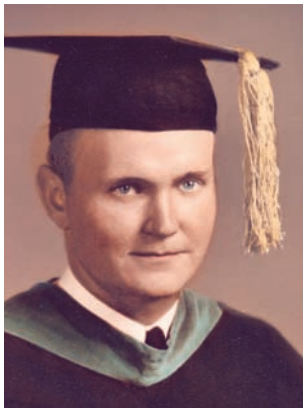
DETECT is currently being tested in doctors' offices around the Southeast, and Wright says it's all thanks to BME. "This could not have happened without the Emory/Georgia Tech collaboration," he says.

FROM ACADEME TO COMMERCE

If going from idea to solution is the job of the BME department, going from prototype to product takes the help of Emory's Office of Technology Transfer. This year, the office gave its "Start-Up of the Year" award to another BME brainchild, Apica Cardiovascular, a company specializing in tools to make heart surgery more effective and less dangerous. Emory cardiothoracic surgeon Vinod Thourani co-founded the company with biomedical engineering colleagues after a Coulter grant kicked off their collaborative research in 2002. Apica is one of nine companies that have emerged from BME so far.

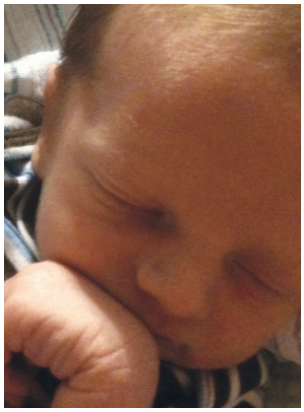
And more are likely to follow. Soon McIntire will find himself standing, once again, in a room full of folks looking for the perfect professional partner. Those newly paired collaborators will figure out the logistics of an inter-university partnership—coordinating schedules, deciding on meeting places, working around one another's institutional responsibilities. Sure, there's red tape. But at the end of the day, says McIntire, the outcomes make it all worthwhile. EM

Class Notes | alumni news



Kenneth Wing 56M

David Fiellin 91M



Jacob Thomas, born to Tom Connolly 95M and his wife, Mequel

Raymond Barfield 93M 96MR 00G 01G

1950s

J. Orson Smith 52C 56M 59MR, of Tallahassee, Fla., retired from Southern Medical Group after 48 years of service and began the Tallahassee Memorial Lipid Center in association with the Tallahassee Memorial Diabetic Center.

Kenneth Wing 56M, of Sanford, Fla., was included in this year's *The Universal Who's Who Among Business and Professional Achievers*. He is a general surgeon near Orlando.

Jay Williams Jr. 55C 59M 64MR, of Pensacola, Fla., was admitted to the Bar of the U.S. Supreme Court in November 2010. He retired from his internal medicine practice in 1995 but continues to practice health law. He received his law degree in 1988.

1970s

Charles Ferguson 71Ox 76M joined the Emory Clark-Holder Clinic in LaGrange, Ga. He previously served as surgical residency program director at Massachusetts General Hospital and Harvard Medical School.

Ramon Suarez 74C 78M 82MR was awarded the Montague-Boyd Award from Piedmont Hospital in Atlanta for excellence in writing for his textbook chapter, "Surgical Technique of Abdominal Hysterectomy." In 2010, he received the American College of Obstetricians and Gynecologists Outstanding Service Award for District IV, one of 10 national awards. He also received his third outstanding faculty award from Emory's obstetrics and gynecology department.

1980s

David W. Smith 87M, of Anniston, Ala., was named CEO of the Medicare Quality Improvement Organization of Alabama. He joins the organization from Northeast Alabama Surgical Associates where he was a partner.

1990s

David Fiellin 91M was promoted to professor of medicine at Yale University.

Raymond Barfield 93M 96MR 00G 01G has a new book, *The Ancient Quarrel between Philosophy and Poetry*, coming out in early 2012 from Cambridge University Press. He is an associate professor of medicine and Christian philosophy at Duke University.

BORN: Jacob Thomas to **Tom Connolly 95M** and his wife, Mequel, on May 25, also the date of Tom's birthday. In June, Connolly was named president of the Northeast Florida Pediatric Society. The family lives in Jacksonville, Fla.

Christopher Kersey 96M was re-elected to another term on the board of trustees of Johns Hopkins Medicine. He also was elected chair of the board of Johns Hopkins Medicine International and to a three-year term on the board of trustees of Johns Hopkins Hospital. He is a partner in Camden Partners Holdings, a Baltimore-based private equity and investment management fund. He focuses on investments in health care and life sciences industries.

BORN: Henry Chester to **Leslie Anne Choy-Hee 91Ox 93C 97M 01MR** and her husband, Kevin Geurtsen, on March 29, 2010. The family lives in Jacksonville, Fla., where

Class Notes | alumni news

André Churchwell

Keith Churchwell

The Emory urology department established an endowed chair in March to honor Fray Marshall. The Fray F. Marshall Chair in Urology will be devoted to research. Marshall, who is on medical leave as chair of the department, came to Emory in 1998. He took Emory urology from a divison of general surgery to a nationally recognized department to which more than 400 medical school graduates apply each year for three available residency slots. Marshall has co-authored more than 300 papers and book chapters and produced more than 10 videos on new operative procedures.

Choy-Hee is an obstetrician hospitalist.

2000s

MARRIED: Padmashree "Champa" Chaudhury 01C 05M 09MR to Daron Woodham on May 29, 2010. She is a maternal-fetal medicine fellow at the University of North Carolina in Chapel Hill.

MARRIED: John Chenevey 07M 08MR 11MR and Kim Ann Tyson 02Ox 04B on Nov. 6, 2010. The couple lives in Atlanta.

Residency Notes

André Churchwell (cardiology) and **Keith Churchwell** (cardiology) were honored in January with Trumpet Awards for Medicine. The awards honor African American achievers. André is associate dean for diversity in graduate medical education and faculty affairs at Vanderbilt University School of Medicine. Keith is executive director and chief medical officer of the Vanderbilt Heart & Vascular Institute.

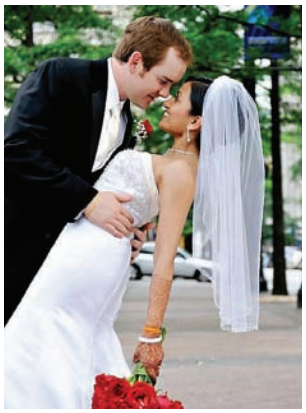
Alexander Gross (internal medicine) of Atlanta, was elected chair of the Georgia Composite Medical Board for 2010-2011. He was appointed to the board by Governor Sonny Perdue in 2008.

Valerie Montgomery Rice (obstetrics/gynecology) was appointed dean of Morehouse School of Medicine. Rice formerly was dean of Meharry Medical College in Nashville, Tenn. and directed its Center for Women's Health Research.

Michael Sandborn (medicine) joined Three Rivers Health Rehab Pavilion in Three Rivers, Mich., as medical director.

Christopher Kersey 96M

Henry Chester, born to Leslie Anne Choy-Hee 91Ox 93C 97M 01MR and her husband, Kevin Geurtsen



Married: Padmashree Chaudhury 01C 05M 09MR to Daron Woodham

Deaths | alumni news

Frederick Boykin 45M

James Matheny 49M

George Katibah 51C 55M

Fred Greiner 58C 61M 62MR

Deaths

1940s

James Garner Jr. 43M, of Trion, Ga., on May 18. He was 93. He is survived by three children. He was preceded in death by a daughter, son, and two grandchildren.

William Garvin Jr. 42C 44M 45MR 46MR, of Jacksonville, Fla., on May 8. He served in the Army during WWII and in the Air Force during the Korean conflict. He later established a dermatology practice in Jacksonville. He is survived by his wife, Sarah, two sons, and two grandchildren.

James Morgan 41C 44M, of West Point, Ga., on Oct. 27, 2010. He was 90. He practiced ophthalmology at the former Clark Holder Clinic in LaGrange. He is survived by his wife, Jeanette, and two children.

Frederick Boykin 45M, of Pensacola, Fla., on Dec. 29, 2010. He practiced neurosurgery in Shreveport, La., from 1953 to 1985, when he retired to Florida. He is survived by his wife, Lois, a son and daughter, and three grandchildren.

David Hallstrand Sr. 45M, of Pinecrest, Fla., on Dec. 1, 2010. He served as chair of the founding board of South Miami Hospital in 1959 and through the years served as its president of the staff, chair of the surgery department, treasurer of the board of governors, and interim CEO. He is survived by his wife, Marcy, and a son.

James Matheny 49M, of Rome, Ga., on Nov. 26, 2010. He practiced pediatrics in Rome before retiring in 1985. He was preceded in death by his wife, Virginia, and is survived by three children, seven grandchildren, and 13 great-grandchildren.

1950s

Margaret Palmer Ayres 51M, of Ocala, Fla., on May 25. She was 85. She was preceded in death by her husband, Willard. She is survived by her brother and sister.

George Katibah 51C 55M, of Jacksonville, Fla., on Jan. 21. After serving in the Navy, he practiced pathology at Baptist, Memorial, Riverside, and Flager hospitals. He is survived by his wife, Victoria, and three children.

Carl Schleifer 55M, of Moss Point, Miss., on Feb. 20. He was 82. He was an assistant professor of psychiatry at the University of Maryland from 1961 to 1967, when he entered private practice until his retirement in 1997. He and his wife, Hilma, then moved to the arts community of Moss Point, where he pursued his interest in painting. In addition to his wife, he is survived by four children, and nine grandchildren.

F. William Sunderman Jr. 52C 55M, of Middlebury, Vt., on April 1. He was 79. He was on faculty of Thomas Jefferson University, University of Florida (1964 to 1968), and the University of Connecticut as chair of pharmacology (1968 to 1997). From 1997 until his death, he was a research professor of pathology at the University of Vermont and a visiting scholar at Middlebury College. He was preceded in death by his wife, Carolyn. He is survived by three children and five grandchildren.

Robert Arnall 53C 57M 59MR, of Fort Lauderdale, Fla., on Oct. 29, 2010. He was chair of pediatrics and later, the first medical director, at Lee Memorial Hospital. After he retired in 1999, he was asked to

Deaths | alumni news

John Hall 61M 62MR 64MR

William Bootle

serve as medical director of the Children's Hospital of Southwest Florida and then retired in 2008. He is survived by his wife, Sarah, two children, and two grandchildren.

Malcolm Williams 58M 63MR, of Dawsonville, Ga., on Dec. 5, 2010. He served as a flight surgeon in the Air Force and then practiced internal medicine at Kennestone and Emory-Adventist hospitals. He retired in 1996 but continued to volunteer at Saint Joseph's Hospital Mercy Clinic and Meals on Wheels. He is survived by his wife, Anne, and four children.

1960s

James Armistead 60M 65MR, of Lakeland, Fla., on Feb. 27. He practiced internal medicine at Lakeland Regional Hospital. He is survived by his wife, Rita, four children, and eight grandchildren.

Saul Eisen 56C 60M, of Jacksonville, Fla., on April 12. After moving to Jacksonville in 1969, he joined a radiology practice at St. Vincent's Medical Center, where he remained for 30 years. He also directed the School of Radiologic Technology at St. Vincent's. He is survived by his wife, Judy, two children, and five grandchildren.

Paul White Jr. 60M, of Little Rock, Ark., on March 11. He served in Vietnam and then joined the U.S. Public Health Service. He later served with public health departments in Virginia, Arkansas, and Georgia. He was preceded in death by his wife, Celine, and is survived by two children and four grandchildren.

Gordon Gershon 56C 61M, of Mishawaka, Ind., on May 13. He served as an orthopaedic surgeon during the Vietnam War and then set up a practice in Austell, Ga., in 1971. He retired and moved to Indiana in 2004 to be closer to his alma mater, the Culver Military Academy. He is survived by three children and two grandchildren.

Fred Greiner 58C 61M 62MR, of North Hutchinson Island, Fla., on April 10. He was a psychiatrist in private practice in Atlanta. In the 1970s, he invested in commercial real estate in Atlanta and Florida and used his investments to support international medical charities.

In the 1980s, he started breeding Andalusian horses in Costa Rica, a country he became fond of when he attended a medical conference there. He also went on to pursue cattle breeding and formed a Costa Rican company that eventually owned four farms and more than 2,000 cattle.

Four years ago, he developed polycystic kidney disease and had been preparing for a kidney transplant from his wife shortly before his death. In addition to his wife, Gaylyn, he is survived by two sons and eight grandchildren.

John Hall 61M 62MR 64MR, of Vancouver, British Columbia, on Nov. 2, 2010. He practiced internal medicine and gastroenterology at Northside Hospital in Atlanta for 25 years and then retired to Vancouver but recently moved to North Carolina for treatment of leukemia. His wife, Myrtis, passed away in February. He is survived by two sons and six grandchildren.

Robert Wight 59C 62M 64MR, of Fernandina Beach, Fla., on May 7 of brain cancer. He trained under Willis Hurst and later practiced cardiology in Tifton, Ga. He is survived by his wife, Sara, two children, and three grandchildren.

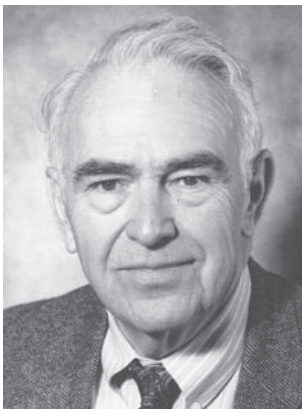
1970s

Jerome McCuin 73M, of Los Angeles, on Aug. 25, 2010. He was 63.

Residency Deaths

William Bootle (radiology) of Bonaire, Ga., on Dec. 17, 2010. He was 78. He practiced in Macon and Warner Robins, and most recently, he taught radiology at Mercer University.

Robert Robertson Jr.



Joseph Wilber

Ira Ferguson 48C 52M

Charles Gilbert 67MR

Robert Currin (pediatrics), of Raleigh, N.C., on Nov. 19, 2010. He was preceded in death by his wife, Anne, and is survived by three children.

Cleothus Duncan (obstetrics/gynecology) of Smyrna, Ga., on May 12, 2010. He is survived by his wife, Sunny, and two children.

William Illig (pathology) of Tulsa, Okla., on April 13. He is survived by his wife, Hannah, three daughters, and four grandchildren.

Carroll Moody (medicine) of Fort Lauderdale, Fla., on Dec. 26, 2010. He founded the Greater Ft. Lauderdale Heart Group. He is survived by his wife, Barbara, three children, and six grandchildren.

Robert Robertson Jr. (cardiology) of Virginia Beach, Va., on Dec. 22, 2010. He practiced internal medicine and cardiology in Virginia Beach for more than 40 years.

Joseph Wilber (cardiology) of Atlanta, on April 3 from complications of ALS. He was 86. He served as a clinical associate professor at Emory. In 1989, he helped establish Jerusalem House, an AIDS hospice, and after he retired in 1994 he volunteered in AIDS clinics in north Georgia. He also volunteered at the Good Samaritan clinic in Jasper for nine years. He is survived by his wife, Patricia, three sons, and daughter **Martha 85M 88MR**.

Faculty Deaths

Ira Ferguson 48C 52M, of Atlanta, on April 22. He was 81. After serving two years in the Navy, he joined Emory's surgery department. He served on faculty for 30 years and was honored in 1990 for his service. He also was an avid bridge player and competed in national and regional bridge competitions. He was preceded in death by his wife, Anne, and is survived by three children, five grandchildren, and one great-grandchild.

Charles Gilbert 67MR, of Decatur, Ga., on Dec. 13, 2010, of prostate cancer. He was 76. He trained under Willis Hurst and then served on faculty for 12 years, practicing at Grady Hospital. He and fellow researcher Nanette Wenger completed a landmark study that showed exercise was beneficial after a heart attack. "It took a lot of persuasion with students when we started in the mid-1960s because the conventional wisdom back then was that heart attack victims and heart surgery patients should follow a sedentary regimen," Wenger says.

Gilbert then opened a private practice at DeKalb Medical Center. He is survived by his wife, Carolyn, three children, and six grandchildren.

Stephen Holtzman, of Decatur, Ga., on April 23. He was 67. He joined Emory's pharmacology department in 1969 as a postdoctoral fellow and then spent his entire career at Emory, retiring as a professor in 2007. His research contributed significantly to the widespread adoption of drug discrimination methodology, which now is standard in the pharmaceutical industry in preclinical development. He was a proponent of "small science"—all but a handful of his more than 230 publications had not more than three authors. From his graduate school days to his retirement, he had a 42-year record of continuous NIH funding. He is survived by his wife, Yung-Fong Sung, a son, and three grandchildren.

Deaths | alumni news

Dorothy Jaeger-Lee 68MR, of Marietta, Ga., on Dec. 8, 2010. She was 93. She practiced pediatrics in Washington and Atlanta for 29 years. After completing a second residency at Emory, she practiced child and adolescent psychiatry in Atlanta for 28 years until she retired at age 80. She was on faculty of Emory's psychiatry department.

Maurice Jurkiecicz, of Atlanta, on May 29. He was 87. He established Emory's division of plastic surgery during his tenure as its first chief from 1971 to 1993. He served as president of the American College of Surgeons from 1989 to 1990 and remains the only plastic surgeon to date to have attained the office. He also was president of the American Society of Head and Neck Surgeons, first vice-president of the Southern Surgical Association, scientific councilor for the National Institute of Dental Research, member-at-large of the National Board of Medical Examiners, and an honorary fellow of the Royal Australasian College of Surgeons. He retired in 1993 as professor of surgery emeritus but continued to educate and advise medical students and residents up until his death.

He is survived by two children and two grandchildren. His wife of 57 years, Mary, died in 2008.

Shanthi Sitaraman, of Atlanta, on April 9, of cancer. She was 48. She was a professor in the division of digestive diseases whose research and clinical practice was devoted to inflammatory bowel diseases. "She embodied the school's vision for excellence in service, teaching, and research, and she received numerous awards, including the Crohn's and Colitis Foundation of America 2011 Premier Physician Award, the Nanette Wenger Distinguished Service Award, and the Dean's Teaching Award," says Dean Thomas Lawley. Her research led to publication of more than 200 articles. She is survived by her husband, Suresh, a professor at the Georgia Institute of Technology, and a son.

J. Cecil Toole 53M, of Marietta, Ga., on April 24. He was 85. He practiced obstetrics and gynecology at Crawford Long and Kennestone hospitals and then retired in 1986. In 1988, he pursued teaching and secured an assistant professorship at Emory from 1990-2000, working out of Grady Hospital. He is survived by his wife, Carleen, three children, and five grandchildren.

William Waters III 50C 58M 60MR, of Newnan, Ga., on March 29 from prostate cancer. He was 81. As an Emory faculty member in the 1960s, he helped develop the chronic renal dialysis program in Atlanta and was the nephrology team leader of the first kidney transplant program in the Southeast. In 1963, he published the first clinical description of spontaneous lactic acidosis. During the 1970s and 1980s, he taught residents at Grady Hospital and then practiced at Piedmont Hospital from 1989 to 2002. He served as chair of internal medicine at Piedmont for seven years and a member of the governing board for 20 years. He retired in 2002. In 2007, the hospital opened the Waters Pavilion in his honor.

He received the first Internist-Laureate award from the Georgia Chapter of the American College of Physicians in 1990, and in 1996 he was elected a master of the American College of Physicians.

After he retired in 2002, Waters began writing on medical issues for the general public and published three books. He also wrote a column for the local Newnan newspaper.

He is survived by his wife, Sarah Ann, two children, and two grandchildren.

Maurice Jurkiecicz

Shanthi Sitaraman

William Waters III 50C 58M 60MR

Have a plan.

BY THE TIME HE ENTERED COLLEGE, Carl C. Hug Jr. 74MR had stocked grocery shelves, delivered newspapers, pumped gas, clerked in his father's drug store, and cleaned cages in a science lab. When he heard his first college lecture, he knew he would become a teacher. "I suddenly realized there's a job where you tell people what you know," he says.

Hug became a professor of anesthesiology at Emory, where he has taught for nearly 40 years. Now a professor emeritus, Hug and his wife of 56 years, Marilyn, are leaving an IRA to the School of Medicine to help young physicians.

A tax-wise gift, the Carl and Marilyn Hug Faculty Development Fund will support the career development of promising new anesthesiology faculty.

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The class of 2011 is the first to graduate under the new curriculum—a new way of educating doctors first envisioned eight years ago. The class provided valuable feedback to administrators to help tweak the curriculum for future students. Read about their experience on page 14.