Why do voles fall in love?
And what that means for human health.
Where animal research is taking us

Imagine one entity tackling some of the most troubling medical and social issues of our time, from AIDS to Alzheimer’s to addiction. Imagine one place in which fundamental questions about the causes, prevention, and treatment of some of the most devastating diseases are being answered. Now imagine such a lifesaving and life-affirming facility operating right in our own backyard.

That’s just what has been unfolding at Emory’s Yerkes National Primate Research Center for decades. Founded in 1930, acquired by Emory in 1956, and moved to Atlanta in 1960, Yerkes is a valuable resource to Emory, to the community, and most important, to science.

One of only eight NIH-accredited national primate research centers in the country, Yerkes helps provide elemental understanding of the behavior and biology that informs and shapes clinical and translational research. Yerkes also demonstrates how a comprehensive center can work through alignment and synergy across disciplines and units. In fact, Yerkes’ diverse teams from many departments and schools across the university are behind some extraordinary animal studies that have had enormous human impact.

In this issue, for example, you’ll read about some of the discoveries being pioneered at Yerkes—discoveries with implications for treating autism and schizophrenia, understanding the physical effects of stress, and combating the obesity epidemic.

Other Yerkes research programs are seeking ways to develop effective vaccines, address vision disorders, and treat degenerative diseases such as Alzheimer’s.

And the influence of Yerkes research extends well beyond our campus boundaries. Yerkes researchers serve as collaborators and resources to other research institutions worldwide. As an intersection of people and programs of the highest quality, Yerkes is a valuable contributor to the Woodruff Health Sciences Center’s vision of transforming health and healing … together.

Fred Sanfilippo, MD, PhD

Please share your feedback at emoryhealth@emory.edu.

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Monogamy—vole style

What does love—or at least monogamy—have to do with autism, schizophrenia, and other conditions with deficits in social awareness and attachment? Larry Young (left) believes his quirky little prairie voles hold some answers.

Once mating is over, fidelity does not come naturally to the vast majority of species. Even within species whose members do engage in social bonding, like humans, some individuals are better at it than others.

In the 1990s, Young (William F Timmie Professor of Psychiatry at Emory and chief of behavioral neuroscience at Yerkes National Primate Research Center) and Tom Insel (then director of Yerkes and now director of the National Institute of Mental Health) created a scientific and media storm when they reported that the surprisingly ubiquitous and long-lasting monogamy exhibited by a species of voles is attributable to hormones. The popular question was, "Why do voles fall in love?" The answer, said the scientists, was that oxytocin created lifelong attachment. A related hormone, vasopressin, causes the male prairie vole to cling to the female with whom he has just had sex, forsaking all others as long as they both shall live.
In nature, the production of these hormones occurs in response to events like birth or sex. But remember the beauteous queen in A Midsummer Night’s Dream, who becomes besotted with the clodhod, donkey-headed Bottom the Weaver after she consumes a love potion designed to make her fall for the first creature she sees? When Young gives a female prairie vole a dose of oxytocin or a male a dose of vasopressin, the animal bonds on sight with the nearest potential mate, even before mating occurs. Young believes similar processes are going on in the human brain, which also contains oxytocin and vasopressin receptors. Previous studies conducted at other institutions have shown that sniffing oxytocin (pills would not make it past the blood-brain barrier) causes the human brain to pay more attention to the fine details of social signals. Eye contact increases. Individuals become better at deciphering emotions from facial expressions and body movements, more likely to remember faces as being familiar, even more likely to trust.

One predictable response to this research was the sudden availability of pricey oxytocin sprays for dating, business meetings, or other situations in which a little instant bonding might come in handy.

In compounds at the Yerkes field station, as in natural forest habitats, a strong unyielding hierarchy of dominance governs rhesus macaque behavior. It takes work to maintain a place at the top. Subordinate animals—subject to continual harassment and continually vigilant for threats of aggression—experience constant psychological stress, evident in elevated levels of stress hormones and anxious behaviors. The research of Yerkes neuroscientist Mark Wilson involves “watching what these magnificent animals do to each other naturally and learning the mechanisms through which subordination impacts their health—and ours.”

One of Wilson’s ongoing studies asks why subordinate female rhesus monkeys go through puberty later than the offspring of more dominant females. He wants to understand how this delay affects brain development and behavior and why these subordinates ovulate less often and have fewer offspring. Wilson believes the work is directly translatable to human patients seen by his research collaborator, Emory chair of OB/Gyn Sarah Berga, a leading expert on stress-induced failure to ovulate.

The aspect of this work that may have the largest implication for humans is not infertility, however, but obesity. Concerns of what, when, and why subordinate female rhesus monkeys eat compared with the eating behavior of dominant monkeys hold important clues for human overeating.

Ordinarily, the macaque colony at the Yerkes field station forages from a common feeding tray filled with low-fat high-fat, high-sugar foods—and how they behaved when the yummy stuff was taken away—may offer clues as to why people overeat.

FEATURE | LISTENING TO THE HORMONES

But the story is not so romantic for all voles. Unlike the highly social, monogamous, and shared-parenting prairie voles, meadow voles couldn’t care less about past sexual partners or, for that matter, pretty much any other animal in the colony. Meadow voles are solitary and promiscuous. Males are unmoved and seemingly unaware of their offspring. In a finding that could have interesting implications for humans, Young next discovered that the chief difference between the two species centers on the number and location of neuroreceptors that select, bind, and respond to oxytocin and vasopressin. While both species of voles have these receptors, the prairie voles’ receptors are concentrated in the brain’s pleasure regions, the same regions involved in addiction. Young believes that activation of these receptors during mating is more likely to trust.

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Second, the Yerkes collaborators developed the first transgenic voles, a technology that will help them manipulate individual genes to understand their effect on social bonding and other complex social behaviors. Eventually, he believes the model could be used to improve social cognition. The next step will be to apply the discoveries made in voles to non-human primates, whose brain function is more similar to that of humans. Young already is working with other Yerkes investigators to examine the role of oxytocin and vasopressin in non-human primate social behavior.

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Interestingly, the subordinates’ mounting weight had no effect on their social status, but it did substantially increase their levels of fat-derived hormones. Had this diet continued, those hormones, combined with existing high levels of the stress hormone cortisol, would almost certainly have caused the new fat to settle around abdominal organs, increasing the risk for diabetes and other metabolic problems—just as in people.

The increase [in food intake] suggests that the subordinate animals’ set point had changed, as did their view of food as something to alleviate their chronic stress and make them feel better.

That scenario, however, didn’t develop because after three weeks, the researchers switched the available chow back to the high-fat version. That’s when things got really interesting. Having no access to the high-fat monkey chow caused the subordinate monkeys to become even more emotional and anxious when confronted with a stressful situation (for example, when an unfamiliar human intruder stared at them, something monkeys hate). Astonishingly, the subordinate monkeys now ate the low-fat monkey chow in large quantities, much more than the dominant monkeys, far more than they themselves ate before having been introduced to the high-calorie chow.

Wilson says the increase suggests that the subordinate animals’ set point had changed, as did their view of food—any food—as something to alleviate their chronic stress and make them feel better. The findings parallel work at Wake Forest’s primate center in which subordinate rhesus monkeys self-administer more cocaine than dominant ones. Wilson believes stress related to subordination diminishes the animals’ ability to find rewards in natural stimuli, causing them to seek out other things to increase activity in the brain’s reward pathways. He is now collaborating with another Yerkes researcher in the neuro-imaging center to literally watch what happens to the reward pathways in the brains of the subordinate animals when they eat high-fat, high-sugar foods.

Yerkes at a glance

One of eight NIH-funded national primate research centers, Yerkes has been dedicated to advancing scientific understanding of primate biology and behavior and to improving human health for nearly eight decades. Today, the center’s collaborative studies focus on development of an AIDS vaccine, insights on aging and drug addiction, understanding progressive illness such as Parkinson’s and Alzheimer’s, the role of hormones and behavior in health, and evolutionary links between biology and behaviors like conflict and resolution. Almost two-thirds of the 3,300 non-human primates at Yerkes live in social colonies at a 117-acre field station in Lawrenceville, Georgia. Yerkes, which is part of the Woodruff Health Sciences Center at Emory, is the only U.S. primate center to have its own MRI, PET, and cyclotron (an accelerator that makes possible the study of subatomic structures in the cells).

“We have tremendous collaborative energy and scientific expertise at Yerkes,” says director Stuart Zola, “which we combine with a well-established animal colony and technical capabilities to advance science and ultimately improve human health.”

What women want

Sigmund Freud complained that he couldn’t figure it out. But when it comes to when to have sex or other matters, Yerkes neuroendocrinologist Kim Wallen knows what gets females’ interest.

Another gender study in monkeys by Wallen and other Yerkes researchers looked at toy preferences of male and female macaques. As any human parent might have predicted, the 11 young rhesus males in the study never hesitated when given a choice between plush doll-like toys or ones with wheels. The 23 females, however, were far less constrained in their preferences, playing almost equally with plush and action toys. Wallen says the males’ strong, stereotypic preference for action toys parallels the action-packed way they play, just as the 23 young females’ greater interest in the plush toys parallels their greater interest in real infants. Such preference differences are unlikely to have occurred through socialization (monkeys don’t watch ads or suffer teasing from their playmates). Instead they may reflect permanent changes in preference resulting from the hormones they were exposed to in their mother’s womb.

When researching the role of hormones and behavior in health, and evolutionary links between biology and behaviors like conflict and resolution, the researchers looked at how hormone regulation affects gender differences in cognition and behavior. The Yerkes field station houses rhesus monkeys in social groups of 50 or more, allowing the colony to establish social structures and relationships similar to those in nature. That makes it a big challenge for researchers to study the impact of hormones on behavior.

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In a downtown Atlanta clinic, Emory alums, volunteers, and students offer the indigent and working poor something they can’t find elsewhere.

Bargain health care

By Mary Loftus • Photography by Jack Kearse

The waiting room of Good Samaritan Health Center in Atlanta is nearly full at 10:30 this Tuesday morning: A young couple holds a baby with a cough, passing her back and forth. A woman sits wrapped in a plaid blanket. Two elderly patients discuss their medications. A toddler with a Spiderman backpack hangs upside down while his dad ties his sneakers.

A donation basket in the corner holds travel-size soaps and shampoos. A sign for the dental clinic reads: "$50 flat fee unless destitute—must bring current letter from shelter." On the wall is a plaque of donor names, and beside them, a quote from Matthew 25:40: "I tell you the truth, whatever you did for one of the least of these brothers of mine, you did for me." Fifteen years ago, Good Samaritan’s founder and president, William Warren IV, decided to leave a successful pediatrics practice to provide primary care to people who were unable to afford it otherwise. A fifth-generation Atlantan and a 1979 graduate of Emory’s medical school, Warren is the son of William C. Warren III (an Emory business school graduate), grandson of William C. Warren Jr. (a 1922 Emory medical school graduate), and great-grandson of Coca-Cola founder Asa Candler.

“The idea of philanthropy was ingrained in me,” he says. “I sensed in my heart the need to do this, as a Christian and as a human being.” In 1998, after volunteering at several free clinics and churches, Warren left called to open his own private, nonprofit health care clinic in a renovated warehouse near Centennial Olympic Park to serve the indigent and working poor.

This spring, just 12 years later, Good Samaritan moved into a new building that has allowed it to triple its space. With 18 treatment rooms, 15 dental chairs, and a mental health suite, the clinic is staffed by 30 paid employees and several hundred volun-
Clinic coordinator Jonathan Beus began volunteering at Good Sam in 2007 during his first year of medical school. He believes student-run clinics provide a win-win situation for students and patients, with the quality of patient care protected by preceptors (usually from the Emory faculty) that students recruit.

Volunteer Marisa Rea, who will receive her master’s of medical science in Emory’s physician assistant program in December, selected the program for a similar reason: its focus on providing primary care to underserved populations.

“Like most people who go into a health care profession, I want to help people in need,” she says. “Because Good Samaritan is a learning environment, we are encouraged to take our time and form a relationship with patients. Many of the patients come to the clinic on a regular basis, and I find myself looking forward to seeing them.”

And when those patients leave the clinic with medicine in hand and a greater knowledge of how to care for themselves, Rea feels the clinic is performing “a tremendous service to the Atlanta community.”

Spreading the good news

The need for the Good Samaritan Health Center is apparent in its rapid growth.

Starting with only eight staff members and a handful of volunteers, it has an annual budget today of $2.5 million and 25,000 patient visits a year. The center charges reduced fees based on a sliding scale that considers income and family size.

Because there are no geographic restrictions, patients often make a long trek. For example, Bernice Byans, 42, has been coming to Good Samaritan for her health and dental care for nearly five years, even though the facility is an hour’s drive from her house.

“When I lived in Alabama for a few years, I had no dentist, so when I got back here I had 11 cavities,” says the single mother. Her oldest son, who has asthma, comes to Good Samaritan for his health care too.

Good Samaritan has two affiliates, in Gwinnett and Cobb counties. Although those centers have separate boards, they “cross-pol- linate” with the original clinic, Warren says. “We helped birth them.”

Low-cost clinics have been hard hit by the recession, both in increased need for services and decreased donations, according to Warren. “We are filling a need that is not met elsewhere. People come to us because they have nowhere else to go,” he says. The staff and volunteers see patients for everything from earaches to cancer, providing vaccinations and minor trauma care. Warren describes the center as “a health care home for the needy from cradle to grave.”

The only basic medical services the center is unable to provide are surgery and deliveries. However, retired physician Ed Slappy—who practiced in Macon for 29 years—now volunteers a half-day each week, providing ob/gyn and prenatal care. Good Sam, says Slappy, lets him continue with his favorite part of his career: patient care.

Likewise, Angela Mendez, a certified translator and medical interpreter fluent in Spanish, German, French, and English, began volunteering 16 hours a week at the clinic in May after retiring. “I take it as seriously as a job,” she says. “I had many volunteer options, but here I can donate my skills and do what I’m trained to do.”

As director of the center, Warren enjoys seeing this productive confluence of retirees and students, staff and volunteers, patients and care providers. “We make a true difference in people’s lives,” he says.

Janice Whitaker, who was referred to Good Samaritan by a friend after she lost her job in the mortgage loan business—along with her medical insurance—can testify to that. The staff has provided both health care and neighborhood support for her during troubled times.

“I’ve had some personal things that have happened—I lost my father right before Thanksgiving and everybody here knew what I was going through, and they were so very nice,” says Whitaker, who lives with her mother and helps care for her 101-year-old grandmother. “You just don’t find that much anymore.”

To see a slideshow about the Good Samaritan Center, visit whsc.emory.edu/goodsam. For more information, to volunteer, or to support the center, call 404-523-6571 or visit goodsamatlanta.org.

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When life goes on

By Robin Tricole • Photography by Jack Kearse

Darren Johnson spent his 19th birthday undergoing a bone marrow transplant. A few weeks earlier, Johnson had been diagnosed with myelodysplasia, a form of leukemia in which the bone marrow fails to produce enough normal blood cells. He endured a year of treatment and then a lengthy recovery.

Now 26, Johnson attends the Medical University of South Carolina, where he is studying to become a physician assistant, a very different career from the one he had in mind when he was diagnosed with cancer eight years ago. "It was a really important experience I had to go through. It changed my outlook. It changed my life," he says. "Don't think I would have done that."

Like Johnson, people diagnosed with cancer undergo fundamental life changes, each with a personal experience of the disease and treatment. They face a multitude of issues: changes in personal relationships and careers, financial pressures, physical difficulties, concerns about sexuality, and emotional fallout.

Fallout shelter

Only relatively recently have health care providers turned serious attention to the emotional well-being of cancer patients. They have realized that easing the emotional burden of a cancer diagnosis for patients and families may actually improve treatment and outcome. The Winship Cancer Institute offers a collaborative approach for dealing with its treatment. And options for patients and families may actually improve treatment and outcome.

And even when patients get beyond the initial diagnosis and treatment, they still know they are at risk of a cancer recurrence. "That's always in the back of your mind," Johnson says. "Whenever a simple thing comes up, a muscle ache or a bump, you think this could be a sarcoma or who knows what?"

Learning from other survivors

Although family and friends often rally around patients, talking with others who have been diagnosed with cancer is invaluable. "That's where cancer support groups come in, such as the one at Winship that pairs a newly diagnosed person with a mentor who has been through it," says Johnson.

Cancer changes people, and when they survive, they face a raft of physical and emotional issues. Emory offers programs to help them cope. Here's the journey of one pediatric cancer patient, Darren Johnson, who made it.
patient with a partner who has recovered from cancer. Survivors can share their own experiences and listen empathetically as a new patient begins a process that is fraught with anxiety. Studies have shown that support groups like this one help participants feel happier, less isolated, and more hopeful. Port groups like this one help participants with anxiety. Studies have shown that support groups can be of age to have some sperm frozen, “he says. “The doctors at Children’s Hospital of Atlanta said, you really want to think about issues with intimacy, his treatment did altering treatment, premature symptoms of menopause, and infertility. While Johnson hasn’t encountered any issues with intimacy, his treatment did leave him infertile. “I was lucky enough to be of age to have some sperm frozen,” he says. “The doctors at Children’s Hospital of Atlanta said, you really want to think about this because you’re going to care about this later on in your life. And they were right.” Although cancer survivorship in kids is now greater than 80%, the side effects of treatments can cause difficulties later in life. Children’s growth can be stunted, internal organs damaged, cognitive development delayed or squelched, and fertility lost. Many of chemotherapy’s long-term effects are silent for years before they rear up to cause heart issues or other problems elsewhere in the body. Johnson, for example, has had two hip replacements because of the side effects of the drugs that cured his cancer. The replacements have allowed him to stay physically active by participating in low-impact sports such as swimming and biking, but high-impact sports such as basketball are no longer a part of his life.

Finding a reset button
Andrew Miller and his colleagues have an idea about why some cancer patients continue to suffer from emotional and physical problems even after their cancer is cured. It rests in what he and other researchers in Emory’s Mind Body Program are learning about the effects of the immune system on the brain and behavior.

When the immune system is activated, it triggers a series of events leading to the release of cytokine molecules that cause inflammation. These cytokines can get into the brain and wreak havoc, in essence changing the chemistry and circuitry of the brain and resulting in depression, fatigue, and impaired memory and concentration. “We believe this process is activated in cancer treatment when surgery, chemotherapy, radiation, or even psychological stress, set the immune system in motion,” says Miller.

After care
More and more people are living longer after being diagnosed with cancer thanks in part to better treatment. But researchers have also found improved outcomes for patients receiving physical and emotional support before, during, and after treatment.

That’s why Emory’s Winship Cancer Institute (left) offers patients and their families a wide variety of programs and services aimed at improving outcomes and quality of life. For example, patient and family psychologic counseling, financial services, support groups, and nutritional advice are some of the many services available through Winship.

For a complete list of support services, please visit: whsc.emory.edu/csu/support.html.
Playing fertility in a different key

Sometimes a couple can’t get pregnant although anatomically everything seems normal. Emory reproductive endocrinologist Sarah Berga may be able to explain why:

Stress.

Berga has been working on research that backs up this hypothesis since 1984. What she’s found is that chronic stress acts on the main messengers in the brain that send signals to the body. The process of changing the brain message in turn changes the hormones involved with reproduction.

Specifically, gonadotropin-releasing hormone (GnRH) released from the hypothalamus in the brain sends signals to the pituitary, which then sends signals to the ovaries, affecting ovulation and menstrual cycles. Chronic stress causes these brain messages to slow down, and if the ovaries receive too few signals, ovulation and menses may cease.

Berga likens what happens to a musician playing a piano. The hands play a melody, interpreting the music and affecting the mood of the score. While the musician’s hands don’t change the piano—a solid, fixed instrument—the way they play the piano affects the way the music sounds.

The same with genes, which are static, until manipulated, again 10% of the monkeys stopped menstruating. However, when nutrition and social stressors were combined, more than 70% of the monkeys were affected by amenorrhea. In further studies with colleagues at the Yerkes National Primate Research Center, Berga has found that the social status of premenopausal monkeys influences their risk of atherosclerosis with colleagues at the University of Pittsburgh and the Oregon Health and Sciences University, Berga has found that 10% of a group of monkeys stopped ovulating when subjected to social stress. When their food intake and exercise was manipulated, again 10% of the monkeys stopped menstruating. However, when nutrition and social stressors were combined, more than 70% of the monkeys were affected by amenorrhea. In further studies with colleagues at the Yerkes National Primate Research Center, Berga has found that the social status of premenopausal monkeys influences their risk of atherosclerosis and other chronic conditions.

In research in people, Berga has found parallel results. She took the “garden-variety woman” who was missing menstrual periods and studied possible anatomical causes, brain messages to the ovaries, levels of cortisol (a stress hormone), and thyroid function. Stress will always reduce thyroid function, she says.

Then she tried cognitive behavioral therapy in some of the women to see if it could influence their menstrual cycles. This talk therapy covered elements of good nutrition and appropriate amounts of exercise, problem-solving strategies and coping mechanisms, realistic attitudes and expectations, and ways to deal with common stressors.

It worked. Ovulation was restored in seven of eight women who underwent cognitive behavioral therapy, compared with only two of the eight women who did not get the therapy.

The way the hormone keys are played, i.e. the effects of stress, also has implications that extend well beyond pregnancy. “Maternal health is critical for fetal health,” says Berga. “Health begins in utero, not at birth, and there are long-term health consequences for women after pregnancy and for the child, continuing into adulthood.”

Berga believes that stronger support for women’s health offers an opportunity to improve the general health of the state and the nation. “To reduce disease burden, we must invest in maternal and paternal health before, during, and after conception,” she says. —Rhonda Muller

WEB CONNECTION For more information, call 404-778-7777 to attend a free fertility seminar. To hear Sarah Berga discuss stress and infertility, visit youtube.com/watch?v=PF9gAA5i4kU. To learn more about declining reproductive health rates in the U.S., see youtube.com/watch?v=G0uBbJPFlFA.

A better bath: Soap and water have always been essential elements to bathing. But in the ICUs at Emory University Hospital, the traditional approach has been replaced by something better—chlorhexidine gluconate (CHG), an antimicrobial. Emory clinical nurse specialists Carolyn Holder and Mary Zelling set out to see if they could decrease hospital-associated bloodstream infections in ICU patients by using CHG. Along with teams in the Emory Hospital cardiovascular and medical ICUs, they trained staff to use warm CHG cloths for patient baths and identified skin-care products that were compatible with CHG. Six months after their intervention was implemented, bloodstream infections were down by 50%. The research team next hopes to expand the CHG daily baths to general units at the hospital.

Emory researchers also have shown that using CHG to cleanse a patient’s skin prior to surgery instead of the more commonly used povidone iodine also reduces surgical infections by 41%. (Of 1.7 million health care-associated infections each year in U.S. hospitals, 400,000 involve infections at surgical sites.) The findings, by Emory surgeon Alexandra Webb and research teams at six university-affiliated hospitals, were published in the Jan. 7, 2010, issue of the New England Journal of Medicine.
New campus pharmacy

Rather than making the trek to a retail pharmacy off campus, Emory patients now have access to a full-service pharmacy onsite.

The Pharmacy at Emory opened for business in March on the second floor of The Emory Clinic, building A, near the skywalk to Emory University Hospital. It offers prescription drugs that patients would find at a local pharmacy, over-the-counter medications, and that patients would find at a local retail pharmacy off campus, Emory rather than making the trek to a New campus pharmacy

For many people living in a rural area, life can be quiet, peaceful, and uncomplicated. But when a health crisis strikes, the lack of specialists in the area can make health care challenging. Patients often have to travel dozens or even hundreds of miles to see a specialist in a large city for treatment and follow-up. But in Georgia, that may not always be necessary, thanks to a new development.

The nonprofit Georgia Partnership for Telehealth allows patients in rural areas to seek specialized care close to home. The organization contracts with medical practices and hospital systems throughout Georgia. The hospitals, including those in Emory Healthcare, provide a range of specialists that connect virtually with patients.

Patients go to a medical office in their area. Both the local office and the Emory office are equipped with computer cameras with live video. The patient and the nurse at the local office can see the Emory doctor on their screen. The nurse performs the exam and can move the camera at the doctor’s request. Special equipment allows the doctor to see the heartbeat in the patient’s neck and listen remotely to heartbeats and lungs.

Got computer? See doctor

“IT’s really everything we could do in the office,” says Rashell Stephenson, the telehealth coordinator for Emory’s Heart and Vascular Center. “One of the biggest benefits is that it reduces health care disparities in rural Georgia. Some people can’t get to Atlanta to see a specialist—they can’t pay for travel or lose the time at work. This lessens the patient’s burden.”

Of the 159 counties in Georgia, 66 lack medical centers and 47 have no acute care hospitals. Emory markets its telehealth services in areas at least 75 miles from Atlanta. The service doesn’t seek to replace the patient’s home physician.

Emory Healthcare offers telehealth services in cardiology, transplant, and genetic psychiatry. The Emory Transplant Center began using telehealth in 2009 for pre- and post-transplant appointments.

“At first we thought that the younger computer-savvy patients would be the ones who would most like telemedicine,” says Virginia Bowen, nurse manager of the outpatient transplant clinic at Emory University Hospital, “but it turns out that telemedicine has multi-generational interest.” — Kay Torrance

HEAD CONNECTION For more information on telehealth, call Emory Health Connection at 404-778-7777 or visit emoryhealthcare.org/connecting/healthconnection.html.

A new dimension in surgery

Although the size of a pea, the pituitary gland, located deep within the skull at the base of the brain, is indispensable. Known as the master gland, it directs other glands to produce hormones that affect metabolism, blood pressure, sexuality, reproduction, and development and growth, as well as other bodily functions.

So when something goes wrong with the pituitary, such as the development of a tumor, the consequences can be serious, even life threatening. Relatively common, pituitary tumors initially can be difficult to diagnose and, once found, difficult to remove because they are surrounded by so many nerves, such as those that supply the eye with movement and vision and blood vessels that supply the brain with blood.

Emory’s Pituitary Center is one of a handful of medical centers across the country using the latest 3-D endoscope for removal of pituitary tumors, a delicate and precise procedure. Having the new 3-D endoscope is a tremendous aid for a surgeon when operating on a small organ at the base of the brain, says Emory neurosurgeon Nelson Oyesiku (above right).

“This really is a dramatic game-changer,” Oyesiku says. “For many years, the standard has been to use traditional 2-D endoscope technology, which had drawbacks because of the distortion and lack of depth. The 3-D imaging gives the surgeon depth perception, extremely important in a sensitive area like the pituitary.”

The latest evolution of this technology provides surgeons with the best visuals, which in turn means better clinical outcomes, safer operations, better patient satisfaction, less time in the operating room, shorter hospital stays, and quicker recovery time, according to Oyesiku. — Robin Tricoles

HEAD CONNECTION To see endoscopic pituitary surgery, visit whem.emory.edu/pituitary. To learn more, visit emoryhealthcare.org/connecting/healthconnection.html. To make an appointment, call 404-778-5770.

Emory’s biggest losers

What transpired from January through March in Emory’s internal medicine department at the 1525 Building may not have been up to reality TV standards, but it was a successful attempt to get healthy and shed some weight. The group of the 42 doctors, nurses, and staff members undertook resulted in a total weight loss of 352 pounds, and they are still counting.

Spearheaded by Rachel Scott, the effort required participants to eliminate two foods from their daily diets that might be harmful to health. Fried foods, chocolate, “bad” carbs, and sodas were among those that many gave up to promote healthy eating. In addition to improving the health of the staff, the promotion had a positive impact on patients, who learned by example, Scott says.
At the University of Virginia.

Specific recommendations of the Blue Ridge insurance, regulations, and policies. To see the Blue Ridge report authors. Social determinants of health, according to Americans. What accounts for this disparity in health care systems around the world, including the United States.

For example, in Montgomery County, Maryland, an affluent suburb of Washington, D.C., the average life expectancy for whites is 80 years but only 63 years for African Americans. What accounts for the disparity of almost 22% is the substantial yet less than fully understood contribution of the social determinants of health, according to the Blue Ridge report authors.

While health care reform is an important part of the solution of eliminating disparities, it can't succeed unless widespread social conditions underlying these disparities are addressed, say the Blue Ridge co-chairs Fred Sanfilippo, Emory executive vice president for health affairs, and Don Detmer, professor of medical education at the University of Virginia.

The report calls for further research to better answer how the social determinants of health affect people's health and well-being of society. These social determinants—as defined by the WHO—include access to health care, poverty, education, and work, leisure, and living conditions. These factors substantially impact the health of people and nations, and they contribute to disparities in health care systems across the world, including the United States.

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Cancers’ sweet tooth may be weaknesses

Cancer cells prefer to turn glucose into energy with a process known as glycolysis, says hematologist/oncology researcher Jing Chen. This tendency is known as the “Warburg effect.” Honoring Otto Warburg, a German biochemist and 19 Nobelist.

Now a team led by Emory’s Winship Cancer Institute has identified an enzyme called PKM2, which governs cancer cells’ preference for glucose and may be a valuable anti-cancer drug target. The results were published November 2019 in the journal Science Signaling.

In many types of cancer, proteins called tyrosine kinases became overactivated. Chen’s team showed that tyrosine kinases turn off PKM2 in lung, breast, prostate, and blood cancers. Introducing a form of PKM2 that is insensitive to tyrosine kinases into cancer cells forces the cells to grow more slowly and be more dependent on oxygen, they found.

Because the active form of PKM2 consists of four protein molecules stuck together, having a tyrosine kinase flip the “off” switch on one molecule can dampen activity for others. “People know for decades that tyrosine kinases might modify PKM2, but they didn’t think it mattered,” Chen says. “We showed that such a modification is important. You even don’t need that much modification of PKM2 to make a difference in the cell’s metabolism.”

PKM2 could be a good drug target to slow down cancer cell growth. Activating PKM2 will force cells to grow more slowly—as in Chen’s experiment—and blocking it completely could also impede cells from processing nutrients.

Biotechnology companies are already searching for ways to do both, Chen says. —Quinn Eastman

Matching patients with studies

People who want to participate in studies of treatments for heart disease, cancer, stroke, and depression can now connect online with researchers nationwide by joining ResearchMatch.org. The new website, sponsored by the National Center for Research Resources (NCRR) of the NIH, brings together researchers and people who would like to learn more about available clinical research studies.

Emory University is one of 51 institutions participating in this first national, secure, volunteer recruitment registry.

“This is a wonderful opportunity for those who are interested in participating in clinical research—young or old, healthy or sick,” says Arlene Chapman, Emory professor of medicine and co-principal investigator of the Atlanta Clinical and Translational Science Institute (ACTSI). “By participating in researchmatch.org, those with a rare disease or condition can find out more about available clinical research studies being conducted throughout the United States.”

ResearchMatch will connect any interested U.S. resident with researchers who are approved to recruit potential research volunteers through the system. When an individual registers at the ResearchMatch website, personal information is protected until the volunteer authorizes the release of his or her contact information to a specific study of interest. Volunteers are notified electronically that they are a possible match and then can decide whether to provide their contact information to a researcher.

ResearchMatch is the product of the NCRR’s Clinical and Translational Science Awards Consortium (CTSA). The group is a national network of 46 medical research institutions working together to improve the way biomedical research is conducted across the country. Emory leads the ACTSI, a CTSA partnership including Morehouse School of Medicine, Georgia Tech, and Children’s Healthcare of Atlanta.
Miracle-Gro for brain cells

That’s how scientists have described BDNF (brain-derived neurotrophic factor), a protein produced by the body that helps brain cells grow and withstand stress. A lack of BDNF is thought to lie behind depression and several neurodegenerative diseases.

Emory pathologist Keqing Ye has discovered a compound that can mimic the effects of BDNF on brain cells. The compound holds promise as a foundation for a new class of brain-protecting drugs.

For most of the 20th century, scientists commonly believed that people were born with all the brain cells they would ever have. However, with the discovery of neurogenesis—the creation of new brain cells—adults, that belief has recently changed. BDNF appears to play a critical role in that process.

This potential for treating neurologic diseases with BDNF has led to clinical trials, in which the protein is injected into patients’ spinal fluid. But the side effects—sensory alterations, weight loss, or nausea—are unpleasant. At this point, “there is no way of delivering BDNF,” Ye says. “It’s a protein, so it can’t cross the blood-brain barrier, and it degrades quickly.” The discovery of easy-to-deliver molecules that have the same effects as BDNF gives Ye a way around that obstacle. He and his team have identified a compound, 7,8-dihydroxyflavone, that can partially prevent the death of nerve cells in animal models of seizure, stroke, and Parkinson’s disease. They are now conducting additional studies in animals to see which forms of this compound are likely to be the least toxic and the most stable.

In 1991, Emory human genetics chair Stephen Warren and his colleagues discovered the mutated gene on the X chromosome that causes this disorder. The scientists helped develop a screening test for the condition. They chose the three areas containing each outbreak. Five months later, when war fever was at a peak, we were working on smallpox not because it was being talked about every day. The reason the people had changed their minds about smallpox was being talked about every day. That’s how scientists have described BDNF (brain-derived neurotrophic factor), a protein produced by the body that helps brain cells grow and withstand stress. A lack of BDNF is thought to lie behind depression and several neurodegenerative diseases.

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That night we knew exactly where smallpox was. “That night we knew exactly where smallpox was,” Forge says. “Our strategy was to use as much of the vaccine in the villages where we knew that smallpox existed.”

No one was having a medical emergency. Spreading out maps, he assigned each mission a geographic area to send runners to every village to locate any smallpox cases. Twenty-four hours later, at the next nightly radio time, he had his answers.

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They believed the virus would need susceptible hosts to continue spreading, so they began to track where people were likely to go based on market and family patterns. They chose the three areas that seemed the most susceptible and used the rest of their vaccine supply in those areas.

The smallpox outbreak came to a full halt in four weeks, even though only a small portion of the population had been vaccinated.

Ring vaccination was a key strategy in turning the epidemic. In this approach, direct contacts of diagnosed cases were identified and vaccinated.

“We began to wonder if this new strategy might be worth trying in larger areas,” Forge remembers. “We talked to the Ministry of Health. It was a very crucial time, because war was being talked about every day. The reason the people had changed their minds about smallpox was being talked about every day.”

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The Global Health Chronicles gives an overview of the smallpox eradication effort through video, interviews, previously unpub- lished field reports, and digitized books. Compiled by staff at the Emory Libraries, Emory’s Global Health Institute, the Rollins School of Public Health, and colleagues from CDC, the project features oral histories of the people who played a significant role to stop the spread of smallpox in 22 countries in Africa, as well as in India, Bangladesh, and Nepal.—Rhonda Mullen
At the beginning of 2010, Children’s Healthcare of Atlanta made a major announcement that we would invest $75 million over the next five years in pediatric research. Specifically, we committed to investing in eight initial key priority areas (see box, facing page).

Why did we take on this big commitment? The short answer is that the health of Georgia’s children depends on it. Our mission is to provide the best clinical care that children are able to receive with partners in Atlanta, not only Emory and Children’s, but also Georgia Tech, Morehouse, the CDC, and others. By leveraging our relationships, we think we can have a real impact.

For example, at Children’s at Hughes Spalding, which Children’s began managing for Grady in 2006, Emory and Morehouse contribute doctors who help treat more than 50,000 children each year. The facility, which treats primarily indigent children (91% are uninsured or on Medicaid), has garnered the support of Atlanta’s business and philanthropic community since Children’s took over its operation. And the substantial turnaround that we were able to provide with our partners has made all the difference in the quality of care that children are able to receive there.

When two powerhouses come together

Children’s Healthcare of Atlanta collaborates with Emory every day. The Emory-Children’s Center (a joint venture between Emory pediatrics and Children’s) is the largest pediatric multispecialty group in the state, and the vast majority of physicians who work at Children’s at Egleston are Emory faculty. The partners also benefit from shared leadership. Barbara Stoll, the first chair of pediatrics to be jointly recruited and hired by Emory and Children’s, is now senior vice president and chief academic officer for Children’s. In March 2009, Emory and Children’s jointly recruited and hired Paul Spearman as chief research officer at Children’s and as vice chair of research in Emory’s department of pediatrics. These appointments solidify a long-standing commitment between the two partners to expand pediatric research in Georgia.

Emory helps lead the Atlanta Clinical and Translational Science Institute (ACTSI), in which Children’s participates. The ACTSI is an NIH-sponsored partnership of Atlanta research and health care institutions working to accelerate basic research findings into new treatments. The collaboration has enabled the first dedicated pediatric clinical research unit to open at Children’s.

Also Children’s and Emory are making plans for a joint research building, funded in part by a $25 million grant from the Joseph B. Whitehead Foundation to Children’s. Many other places in the country focused on pediatric research lack a structure that allows them to work collaboratively. Children’s and Emory are lucky in that regard. We have cultures that are interwoven, allowing us to have a true joint focus.

The second fastest growing institution in NIH funding in 2009, Emory’s Woodruff Health Sciences Center has a proven capacity for quality research and clinical studies as well as a nationally respected pediatrics department. Add to that the clinical strengths of Children’s and the sheer volume of patients we see (including the largest pediatric sickle cell patient population in the United States), and the result is a chance to make dramatic improvements in children’s health in just a short time. By leveraging our abilities, we hope to transform pediatric health care, to become a real catalyst for change for children in Georgia and well beyond state borders.

A catalyst for children

What a growing partnership between Children’s Healthcare and Emory means for Georgia’s children

By Donna Hyland

Dr. Donna Hyland, shown here with her own children, is president and CEO of Children’s Healthcare of Atlanta, the country’s largest pediatric health system. Managing more than 680,000 patient visits annually at three hospitals (Scottish Rite, Egleston, and Hughes Spalding) and in neighborhood locations, Children’s is ranked among the top children’s hospitals by Parents magazine and U.S. News & World Report.
By the time he entered college, Carl C. Hug Jr. 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 53 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.

Find out more about gift planning. Visit www.emory.edu/giftplanning or call 404.727.8875.

Plan to share what you love.