MRI Reveals Brain Damage in Obese Teens

CHICAGO – Researchers using MRI have found signs of damage that may be related to inflammation in the brains of obese adolescents, according to a study being presented next week at the annual meeting of the Radiological Society of North America (RSNA).

Obesity in young people has become a significant public health problem. In the U.S., the percentage of children and adolescents affected by obesity has more than tripled since the 1970s, according to the Centers for Disease Control and Prevention. Data from the World Health Organization indicates that the number of overweight or obese infants and young children ages five years or younger increased from 32 million globally in 1990 to 41 million in 2016.

While obesity is primarily associated with weight gain, recent evidence suggests that the disease triggers inflammation in the nervous system that could damage important regions of the brain. Developments in MRI like diffusion tensor imaging (DTI), a technique that tracks the diffusion of water along the brain’s signal-carrying white matter tracts, have enabled researchers to study this damage directly.

For the new study, researchers compared DTI results in 59 obese adolescents and 61 healthy adolescents, ages 12 to 16 years. From DTI, the researchers derived a measure called fractional anisotropy (FA), which correlates with the condition of the brain’s white matter. A reduction in FA is indicative of increasing damage in the white matter.

The results showed a reduction of FA values in the obese adolescents in regions located in the corpus callosum, a bundle of nerve fibers that connects the left and right hemispheres of the brain. Decrease of FA was also found in the middle orbitofrontal gyrus, a brain region related to emotional control and the reward circuit. None of the brain regions in obese patients had increased FA.

“Brain changes found in obese adolescents related to important regions responsible for control of appetite, emotions and cognitive functions,” said study co-author Pamela Bertolazzi, a biomedical scientist and Ph.D. student from the University of São Paulo in Brazil.
This pattern of damage correlated with some inflammatory markers like leptin, a hormone made by fat cells that helps regulate energy levels and fat stores. In some obese people, the brain does not respond to leptin, causing them to keep eating despite adequate or excessive fat stores. This condition, known as leptin resistance, makes the fat cells produce even more leptin.

Worsening condition of the white matter was also associated with levels of insulin, a hormone produced in the pancreas that helps regulate blood sugar levels. Obese people often suffer from insulin resistance, a state in which the body is resistant to the effects of the hormone.

“Our maps showed a positive correlation between brain changes and hormones such as leptin and insulin,” Dr. Bertolazzi said. “Furthermore, we found a positive association with inflammatory markers, which leads us to believe in a process of neuroinflammation besides insulin and leptin resistance.”

Dr. Bertolazzi noted that additional studies are needed to determine if this inflammation in young people with obesity is a consequence of the structural changes in the brain.

“In the future, we would like to repeat brain MRI in these adolescents after multi-professional treatment for weight loss to assess if the brain changes are reversible or not,” she added.


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For patient-friendly information on brain MRI, visit RadiologyInfo.org.
Prenatal Opioid Exposure May Alter Brain Function in Babies

CHICAGO – Connectivity in an area of the brain that regulates emotion may be altered in infants exposed to opioids while in utero, according to a new study being presented next week at the annual meeting of the Radiological Society of North America (RSNA).

Opioid use in pregnancy has become a major public health crisis. Opioids can have a devastating effect on maternal, fetal and infant health. When babies who have been exposed to opioids in utero are born, they suffer from drug withdrawal, or a group of conditions known as neonatal abstinence syndrome (NAS). Exposure to opioids in utero is believed to have lasting consequences on brain development and behavior.

According to the researchers, NAS requires prolonged hospital stays, monitoring and, in severe cases, additional treatment with opioids. Understanding how opioids affect the developing brain would be one of the important steps in early identification and management of NAS and in improving neurodevelopmental and behavioral outcomes in these children.

“Little is known about brain changes and their relationship to long-term neurological outcomes in infants who are exposed to opioids in utero,” said Rupa Radhakrishnan, M.D., assistant professor of radiology and imaging sciences at Indiana University School of Medicine in Indianapolis. “Many studies have looked at the impact of long-term opioid use on the adult and adolescent brain, but it is not clear whether social and environmental factors may have influenced those outcomes. By studying infants’ brain activity soon after birth, we are in a better position to understand the effect of opioids on the developing brain, and explain how this exposure could influence long-term outcomes in the context of other social and environmental factors.”

A team of obstetricians, neonatologists, psychologists and imaging scientists collaborated to study the brains of 16 infants using resting state functional MRI (fMRI), which enables researchers to measure brain activity by detecting changes in blood flow. With resting state fMRI, the connectivity between neural regions—known as resting state networks—can be observed while the brain is at rest.

The research team, led by Dr. Radhakrishnan, investigated the functional connectivity of the amygdala, a region responsible for the perception and regulation of emotions such as anger, fear, sadness and aggression.
The study group included 16 full-term infants, including eight exposed to opioids prenatally and eight who were not exposed to prenatal opioids, or opioid naive. Imaging, including fMRI and anatomical MRI, was performed while the infants were naturally asleep.

To determine the participation of the amygdala in the resting state networks, the team created brain maps and applied regions of interest for the left and right amygdala.

“Our early results show significant differences in the way the amygdala connects to different brain regions between the infants exposed to opioids and the opioid-naive infants,” Dr. Radhakrishnan said. “We still need to study what the clinical implication of this finding may be.”

Dr. Radhakrishnan said larger and long-term outcome studies are underway to better understand the functional brain changes in prenatal opioid exposure and their associated long-term developmental outcomes.

“Although our early results showed differences between the two groups in a small study sample, it is very important that we further investigate and validate these findings in larger studies,” she said. “In order to identify the best methods for managing NAS and improving long-term outcomes in these infants, it is critical to understand changes in brain function that may result from exposure to opioids prenatally.”

Co-authors are Nahla Elsaid, Ph.D., Thomas A. Reher, M.D., Andrew J. Saykin, Psy.D., Abbey C. Hines, Psy.D., Izlin Z. Lien, M.D., Emily Scott, M.D., Karmen Yoder, Ph.D., and Yu-Chien Wu, M.D., Ph.D.

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For patient-friendly information on fMRI, visit RadiologyInfo.org.
Biennial Mammography Screening Yields More Advanced-Stage Cancers

CHICAGO – Cancers found in patients undergoing annual mammography screening are smaller and less advanced than those found in patients undergoing screenings every two years, according to a new study presented next week at the annual meeting of the Radiological Society of North America (RSNA).

Breast cancer is the most common non-skin cancer among women in the United States, according to the Centers for Disease Control and Prevention. It is the most common cause of death from cancer among Hispanic women, and the second most common cause of death from cancer among white and black women.

Mammography screening has helped reduce mortality from breast cancer by providing detection of cancer in its earliest stages, when treatment is more likely to be effective. Mammography’s value is widely accepted among professional societies and government agencies, but there is disagreement regarding how often women should get a screening mammogram. For instance, the National Comprehensive Cancer Network recommends annual screening beginning at age 40 for women at average risk for breast cancer, while the U.S. Preventive Services Task Force says screening every two years beginning at age 50 is sufficient for most women.

“These differing recommendations lead to confusion for both referring physicians and patients,” said study co-author Sarah Moorman, M.D., from the Department of Radiology at Michigan Medicine in Ann Arbor, Mich.

Dr. Moorman and colleagues recently compared breast cancer tumor characteristics and treatment regimens among women undergoing annual mammography versus those getting biennial (every two years) screening. The study group included 232 women, ages 40 to 84, who were diagnosed with breast cancer. The two groups had no significant differences in baseline characteristics such as age, menopausal status, hormone replacement use, family history and race.
Of the 232 women, 200, or 86%, underwent annual screening, defined as once every nine to 15 months, while the remaining 32 had biennial screening, or once every 21 to 27 months. Mean age at cancer diagnosis among 232 patients was 62. Almost three-quarters of the cancers were invasive.

Almost half of women in the biennial screening group (14/32; 43.8%) had late-stage cancers, compared with only a quarter of women in the annual screening group (48/200; 24.0%). Interval cancers, or cancers found between screenings, were more prevalent in the biennial screening group. More than a third of those women had interval cancers, compared with only 10.5% of women who had annual screening. Biennial screening was associated with larger tumor size.

“Screening mammography performed once a year resulted in less advanced stage disease in patients diagnosed with breast cancer,” Dr. Moorman said.

The study also found that women who had biennial screening tended to have more aggressive treatment, such as chemotherapy and dissection of the axillary lymph nodes, where cancer from the breast often spreads.

“There were trends toward less frequent axillary lymph node dissection and less frequent use of chemotherapy with annual screening compared with biennial screening,” Dr. Moorman said.

Dr. Moorman hopes the findings of the study will help allow informed decision-making regarding screening frequency.

Co-authors are Akshat C. Pujara, M.D., Michelle D. Sakala, M.D., Colleen H. Neal, M.D., Katherine E. Maturen, M.D., Leigh Swartz, M.D., Heidi Egloff, M.D., and Mark A. Helvie, M.D.

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For patient-friendly information on mammography and breast cancer screening, visit RadiologyInfo.org.
Minimally Invasive Procedure Relieves Tremors in Parkinson’s Patients

CHICAGO – A procedure that applies pulses of focused ultrasound to the brain is safe and effective for reducing tremors and improving quality of life in people with essential tremor (ET) or Parkinson’s disease (PD) tremor, according to a new study being presented next week at the annual meeting of the Radiological Society of North America (RSNA).

Tremors are rhythmic, involuntary muscle movements that cause shaking in one or more parts of the body, usually in the hands. They are characteristic of movement disorders like ET and PD, two progressive conditions that affect millions of people worldwide.

Previous treatment options for reducing tremors in patients who have not responded to medical therapy include deep brain stimulation, a surgical procedure that involves implanting a small electrode in the brain connected to a pulse generator that is implanted in the chest like a pacemaker.

A more recently available option is magnetic resonance-guided focused ultrasound (MRgFUS) thalamotomy, an incisionless interventional radiology procedure in which focused beams of sound energy are used to heat and destroy a small part of a structure in the brain called the thalamus. The procedure gives relief to the opposite side of the body, meaning that treatment to the right side of the brain would relieve tremors on the left side of the body, and vice versa.

As a minimally invasive approach, focused ultrasound has advantages over deep brain stimulation, including a reduced risk of complications from bleeding and infections, according to study lead author Federico Bruno, M.D., a radiologist in the Department of Biotechnological and Applied Clinical Sciences at the University of L’Aquila in L’Aquila, Italy.

“Another advantage is the immediate effect this treatment provides, unlike deep brain stimulation which requires a break-in period for the electrostimulation,” he said. “Additionally, treatment with MRgFUS requires shorter hospitalization and is a fairly well-tolerated procedure even by more fragile patients.”
For the new study, Dr. Bruno and colleagues enrolled 39 patients, average age 64.5 years, with disabling tremors that had not responded to treatment. The people in the study group, including 18 with ET and 21 with PD, had experienced symptoms for an average of more than 10 years.

The researchers evaluated the patients for tremor severity and quality of life before MRgFUS thalamotomy, immediately after treatment and over the course of the ensuing year.

They found that 37 of 39 patients, or 95%, had substantial and immediate reduction of tremor. These reductions in tremor were sustained in follow-up evaluations. Quality of life evaluation showed substantial improvement in both the ET and PD groups.

“The study we present reports our experience of over a year in the treatment of tremor by thalamotomy with focused ultrasound,” Dr. Bruno said. “It is worth noting that we had a high number of patients with Parkinson’s disease in our series, compared to previously published data, where the procedure was used mainly in the treatment of essential tremor patients.”

Currently, MRgFUS thalamotomy is only available at a limited number of sites worldwide, Dr. Bruno said, but may become more widespread as research findings supporting its use are published. Improvements in neuroimaging techniques that allow for greater precision and detail in planning, implementation and monitoring over time of the treatment should also expand its availability.

“The clinical application of this technique for neurological diseases is an absolute novelty—the clinical use was approved by the FDA less than three years ago,” Dr. Bruno said. “Few patients know of this treatment option so far, and there are not many specialized centers equipped with the required technology.”

Future research in this area includes the possibility of treating both sides of the thalamus. MRgFUS is also being explored in areas beyond movement disorders, Dr. Bruno said. Several preclinical studies and clinical trials are looking at the technique for the treatment of other neurological conditions like neuropathic pain, epilepsy and obsessive-compulsive disorders, as well as for treatment of brain tumors.

Co-authors are Luca Panebianco, M.D., Maria Valeria Marcella Micelli, M.D., Antonella Corridore, M.D., Milvia Martino, M.D., Silvia Torlone, M.D., Marco Varrassi, M.D., Alessia Catalucci, M.D., Francesco Arrigoni, M.D., Alessandra Splendiani, M.D., and Carlo Masciocchi, M.D.

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For patient-friendly information on ultrasound and interventional radiology, visit RadiologyInfo.org.
Gunshot Injuries Have Long-term Medical Consequences

CHICAGO – Researchers are trying to identify injury patterns and predict future outcomes for victims of gun violence who are seen in the emergency room and later readmitted to the hospital, according to research being presented next week at the annual meeting of the Radiological Society of North America (RSNA). They found that patients who had gunshot injuries to the chest or abdomen were more likely to be readmitted to the hospital.

“Gun violence is a national health emergency and yet there is a profound lack of research on the long-term consequences of gunshot-related injuries,” said lead researcher and radiology resident Corbin L. Pomeranz, M.D., from the Department of Radiology at the Sidney Kimmel Medical College at Thomas Jefferson University in Philadelphia, Pa. “As a level-one trauma center, we have an opportunity to study the outcomes for this patient population and to look for ways to provide better care to gunshot victims.”

According to Dr. Pomeranz, the bulk of the cost of treating victims of gun violence is spent on ongoing care, including treating the complications associated with gunshot wounds.

“The vast majority of research on gun violence focuses on emergency care, but in reality only a tiny fraction of the billions spent on medical care from gun violence in the U.S is spent on direct expenses for emergency medical care,” he said.

Dr. Pomeranz and a team of researchers performed a retrospective analysis of patients with a history of prior gunshot wounds who were seen in the emergency room at Thomas Jefferson University Hospital between January and April of 2018. During that time, 118 patients with a history of a gunshot injury returned to the hospital and underwent a total of 174 imaging exams. The majority of gunshot-wound patients in the study were men (91.8%), and the average age was 49.7 years.

“Radiology is pivotal in the treatment of these patients because every trauma patient will receive some type of imaging,” he said. “Creating a regional patient database can provide a wealth of knowledge for improving both gun violence research and patient care.”
Using the imaging database, the team collected information on the patients, including age, gender, admitting hospital unit, the number of readmissions and surgeries, imaging data and gunshot wound history.

Of the 110 patients, 36 patients with a history of gunshot wounds were readmitted to the hospital with neurologic, visceral (thorax [chest] plus abdomen) or extremity injuries. Of those, 18 were readmitted due to complications associated with their prior gunshot wounds.

Neurologic injuries were the most common injury in the study group (24 patients), followed by abdominal and chest wounds (9 patients). Three patients had major blood vessel injuries. Eighteen of the patients were readmitted to the hospital with complications associated with their initial gunshot wound injuries. Three surgeries were performed after readmission, two of which were chest surgeries.

A statistical analysis demonstrated that the type of gunshot injury was the strongest predictor of hospital readmission. Patients who had a gunshot wound to the thorax or abdomen were more likely to be readmitted to the hospital.

“Where you are shot has an effect on your long-term health,” Dr. Pomeranz said.

Dr. Pomeranz said the preliminary study is small but warrants additional multi-hospital and regional studies of outcomes for gunshot patients. He hopes future studies collect additional information on gunshot victims, such as whether bullets or bullet fragments remain in the body, and treatment outcomes.

“The outcomes of gun violence can only be assessed once we have a firm understanding of injury patterns,” he said. “A location and injury severity scale based on imaging findings could be used to predict long-term consequences as well as the costs of gunshot wounds.”

The goal of the researchers is to show hospitals how they can build their own database to identify patients at risk for readmission. This information will tell the researchers which patients will need more aggressive home care, Dr. Pomeranz noted.

“We want to help these patients stay of out the hospital, but we also want to help improve their quality of life,” he said. “That’s the physician’s job.”

Co-authors are Hugh Wilkins, Vishal Desai, M.D., Suzanne S. Long, M.D., Diane M. Deely, M.D., and William B. Morrison, M.D.

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For patient-friendly information on medical imaging, visit RadiologyInfo.org.
Imaging Uncovers Secrets of Medicine’s Mysterious Ivory Manikins

CHICAGO – Little is known about the origins of manikins—small anatomical sculptures thought to be used by doctors four centuries ago—but now advanced imaging techniques have offered a revealing glimpse inside these captivating ivory dolls. Researchers using micro-CT successfully identified the material composition and components of several ancient ivory manikins, according to a new study being presented next week at the annual meeting of the Radiological Society of North America (RSNA).

Ivory manikins are typically thought to have been carved in Germany in the late 17th century. They are reclining human figurines, 4-8 inches long, generally female, which open to reveal removable organs and sometimes a fetus attached with a fabric “umbilical” cord. The manikins have intricately carved features, and some even have pillows beneath their heads. It is believed that they were used for the study of medical anatomy or perhaps as a teaching aid for pregnancy and childbirth. By the 18th century, they had been replaced by more realistic teaching tools, such as wax models and cadavers. The manikins then became objects of curiosity and luxury status symbols in private collections.

Duke University in Durham, N.C., holds the world’s largest collection of manikins (22 out of 180 known manikins worldwide). Most of the manikins in the Duke collection were purchased in the 1930s and 1940s by Duke thoracic surgeon Josiah Trent, M.D., and his wife Mary Duke Biddle Trent, prior to the 1989 ivory trade ban. The researchers noted that after being donated to the university by Trent’s granddaughters, the manikins have spent most of their time in archival storage boxes or behind display glass, as they are too fragile for regular handling.

“They are usually stored in a library vault and occasionally rotated into a special display unit in the Duke Medical Library for visitors to appreciate,” said Fides R. Schwartz, M.D., research fellow in the Department of Radiology at Duke.

Non-destructive imaging with X-rays and CT has been used in the past to examine fragile artwork and ancient artifacts. Imaging of relics has been extremely beneficial to the fields of archaeology and paleopathology—the study of ancient diseases.

Micro-CT is an imaging technique with greatly increased resolution, compared to standard CT. It not only allows visualization of internal features, it noninvasively provides volumetric information about an object’s microstructure.
Dr. Schwartz and colleagues hoped that through micro-CT imaging they could determine the ivory type used in the Duke manikins, discover any repairs or alterations that were not visible to the naked eye, and allow a more precise estimation of their age.

“The advantage of micro-CT in the evaluation of these manikins enables us to analyze the microstructure of the material used,” she said. “Specifically, it allows us to distinguish between ‘true’ ivory obtained from elephants or mammoths and ‘imitation’ ivory, such as deer antler or whale bone.”

The research team scanned all 22 manikins with micro-CT and found that 20 out of the 22 manikins were composed of true ivory alone, though materials like antler might have been less expensive in that time. They discovered that one manikin was made entirely of antler bone, and one manikin contained both ivory and whale bone components.

Metallic components were found in four of the manikins, and fibers in two. Twelve manikins contained hinging mechanisms or internal repairs with ivory pins, and one manikin contained a long detachable pin disguised as a hairpiece.

The most established trade routes in the 17th and 18th centuries sourced ivory from Africa, leading the researchers to believe that since nearly all of the manikins were made from true ivory, it is likely that the ivory obtained to craft the manikins was acquired from the African region.

“This may assist in further narrowing down the most probable production period for the manikins,” Dr. Schwartz said. “Once historical trade routes are more thoroughly understood, it might become clear that the German region of origin had access to elephant ivory only for a limited time during the 17th and 18th century, for example, from 1650 to 1700 A.D.”

Additionally, identifying non-ivory components in the manikins may provide more accessibility to carbon dating, allowing the researchers to more accurately estimate the age of some of the manikins without damage to the fragile pieces.

The researchers also hope to acquire 3D scans to create digital renderings and enable subsequent 3D printed models.

“This is potentially valuable to scientific, historic and artistic communities, as it would allow display and further study of these objects while protecting the fragile originals,” Dr. Schwartz said. “Digitizing and 3D printing them will give visitors more access and opportunity to interact with the manikins and may also allow investigators to learn more about their history.”

Co-authors are Susan A. Churchill, B.S.R.T. (R)(N)(CT), Rachel Ingold, M.A., M.L.S., Sinan Goknur, M.S., Divakar Gupta, M.D., Justin T. Gladman, M.A., Mark Olson, Ph.D., and Tina D. Tailor, M.D.

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For patient-friendly information on CT, visit RadiologyInfo.org.
RSNA 2019 Presents Session on Lung Injury from Vaping

CHICAGO – A panel of medical professionals will discuss the public health impact of e-cigarette use, or “vaping,” today during a session at the annual meeting of the Radiological Society of North America (RSNA).

E-cigarette use is on the rise. According to the Centers for Disease Control and Prevention (CDC), more than 9 million adults in the U.S. use e-cigarettes, and vaping has become especially popular among teens. The 2018 National Youth Tobacco Survey reported that in 2018 more than 3.6 million middle and high school students were using e-cigarettes.

E-cigarette inhalants, upon vaporization of the e-cigarette solution, contain potentially harmful toxic substances that can cause lung injury and, in some cases, inhibit vascular function.

In August, a multistate outbreak of lung disease associated with e-cigarette product use began in the United States. The situation is ongoing, and multiple substances and product sources are still under investigation by the CDC. However, most patients involved in the outbreak have reported using products containing tetrahydrocannabinol (THC). Therefore, the CDC recommends that people avoid e-cigarette products that contain THC.

“An outbreak of lung disease associated with vaping has developed recently throughout the U.S.,” said Jeffrey S. Klein, M.D., RSNA Board Liaison for Publications and Communications and A. Bradley Soule and John P. Tampas Green and Gold Professor of Radiology at the University of Vermont College of Medicine in Burlington. “Radiographic and CT findings of diffuse pneumonitis have emerged as characteristic findings in affected patients and are included in the CDC case definition of vaping-induced lung injury.

“In our efforts to educate radiologists about this potentially fatal condition they may encounter in younger patients with acute respiratory symptoms, the RSNA has organized a special session at RSNA 2019 where experts will provide up-to-date information regarding key radiologic, pathologic and physiologic findings associated with this critical public health issue,” he said.

Dr. Klein participated in calls with the CDC, as it worked with various medical specialty groups to investigate and identify potential causes of vaping-related lung injury. In September, Dr. Klein produced a brief educational video aimed at updating radiologists on this topic, so that they could be well positioned to assist in identifying cases.

For the session at RSNA 2019, Dr. Klein will be joined by Mark L. Schiebler, M.D., professor of cardiothoracic radiology at University of Wisconsin School of Medicine and Public Health - Madison, Travis
S. Henry, M.D., associate professor of clinical radiology at the University of California, San Francisco, Seth J. Kligerman, M.D., associate professor of radiology and section chief of cardiothoracic imaging at the University of California, San Diego, Brandon Larsen, M.D., Ph.D., consultant and associate professor of laboratory medicine and pathology at Mayo Clinic in Scottsdale, Ariz., and Alessandra Caporale, Ph.D., post-doctoral researcher in the Laboratory for Structural, Physiologic and Functional Imaging at the University of Pennsylvania Perelman School of Medicine in Philadelphia.

The session will provide a brief introduction, followed by an exploration of the scope of the problem, description of imaging findings and histopathology associated with vaping-related lung injury, a presentation on how vaping affects the vascular system and a Q&A with the panelists.

After attending the session at RSNA 2019, radiologists and other medical professionals should have a greater understanding of the public health implications of the vaping-related lung injury outbreak in the U.S. They will also become familiar with common CT and X-ray findings associated with the condition, and how the pathology helps to define the possible causes of this disorder. Lastly, they will know more about vaping’s impact on vascular function.

“As we learn more, RSNA will continue to keep radiologists informed on this important public health topic,” Dr. Klein said.

“Special Interest: E-cigarette/Vaping-associated Lung Injury (EVALI)” (SPSI27) will be held Monday, Dec. 2, from 4:30 – 5:30 p.m.

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For the latest information from the CDC on vaping-associated lung injury, visit [https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html).

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For patient-friendly information on chest X-ray and CT, visit [RadiologyInfo.org](http://RadiologyInfo.org).
Novel MRI-Guided Ultrasound Treatment Destroys Prostate Cancer

AT A GLANCE

• Transurethral ultrasound ablation effectively treats prostate cancer with minimal side effects.

• Clinically significant cancer was eliminated in 80% of the study participants.

• The noninvasive technique can also treat benign enlargement of the prostate.

CHICAGO – A novel MRI-guided procedure that uses therapeutic ultrasound effectively treats prostate cancer with minimal side effects, according to a new study presented today at the annual meeting of the Radiological Society of North America (RSNA). Researchers said the incision-free technique could also be used to treat benign enlargement of the prostate gland.

Prostate cancer is the second-leading cause of cancer death in men after lung cancer. Treating disease in the small gland that surrounds the urethra just outside the bladder is challenging. Surgery and radiation are not always effective and can result in incontinence, impotence and bowel dysfunction. Other currently available techniques lack sophisticated imaging guidance and temperature monitoring.

In recent years, a minimally invasive method called MRI-guided transurethral ultrasound ablation (TULSA) has emerged as a promising treatment option. TULSA works by delivering precise doses of sound waves to diseased prostate tissue while sparing the healthy nerve tissue surrounding the prostate.

TULSA relies on a rod-shaped device that is inserted into the urethra. The novel device has 10 ultrasound-generating elements that can cover the entire prostate gland. One or more of the elements are used to send out sound waves that heat and destroy the target prostate tissue. The elements are controlled automatically by a software algorithm that can adjust the shape, direction and strength of the therapeutic ultrasound beam. The entire procedure takes place in an MRI scanner so that doctors can closely monitor treatment and assess the degree and location of heating.

“Unlike with other ultrasound systems on the market, you can monitor the ultrasound ablation process in real time and get immediate MRI feedback of the thermal dose and efficacy,” said study co-author Steven S. Raman, M.D., professor of radiology and urology, and director of Prostate MR Imaging and Interventions and Prostate MR Imaging Research at the University of California at Los Angeles (UCLA). “It’s an outpatient procedure with minimal recovery time.”

In the new multicenter study, researchers reported on the 12-month outcomes from the TULSA-PRO® ablation clinical trial (TACT). The trial enrolled 115 men, median age 65, with localized low or intermediate
risk, gland-confined prostate cancer. Clinicians delivered TULSA treatment to the entire gland. Treatment time averaged 51 minutes.

Prostate volume in the study group decreased on average from 39 cubic centimeters pre-treatment to 3.8 cubic centimeters a year after treatment. Overall, clinically significant cancer was eliminated in 80% of the study participants. Seventy-two out of 111 men, or 65%, had no evidence of any cancer at biopsy after one year. Blood levels of prostate-specific antigen (PSA), a marker of prostate cancer, fell by a median of 95%. There were low rates of severe toxicity and no bowel complications.

“We saw very good results in the patients, with a dramatic reduction of over 90 percent in prostate volume and low rates of impotence with almost no incontinence,” Dr. Raman said.

Approved for clinical use in Europe, TULSA has just received FDA 510(k) clearance for prostate tissue ablation in the United States. Assuming follow-up studies support the preliminary results, the technique could develop into an important tool for treating both prostate cancer and benign prostatic hyperplasia, or enlargement of the prostate.

“There are two very unique things about this system,” Dr. Raman said. “First, you can control with much more finesse where you’re going to treat, preserving continence and sexual function. Second, you can do this for both diffuse and localized prostate cancer and benign diseases, including benign hyperplasia.”

TULSA also has the benefit of allowing further treatment if needed, Dr. Raman said. If it fails, then the procedure can be repeated, and more aggressive invasive approaches like surgery and radiation therapy can still be used. Alternatively, TULSA may enable noninvasive treatment for localized radiation failure.

The study also supports the use of MRI for post-treatment monitoring of patients who undergo TULSA. MRI at one year after treatment had a negative predictive value of 93 to 96% for detecting residual cancer, meaning it was very accurate for ruling out disease recurrence in patients.

Co-authors are Aytekin Oto, M.D., Katarzyna J. Macura, M.D., Ph.D., Sandeep S. Arora, M.B.B.S., Temel Tirkes, M.D., Jurgen J. Futterer, M.D., Ph.D., Daniel N. Costa, M.D., David Bonekamp, M.D., Ph.D., Masoom A. Haider, M.D., Derek W. Cool, M.D., Ph.D., Carlos Nicolau, M.D., Thorsten Persieghl, M.D., Kiran R. Nandalur, M.D., Robert Staruch, Mathieu Burtnyk, Dipl.Phys., Marc Serrallach, M.D., Gregory Zagaja, M.D., Gencay Hatiboglu, M.D., James D. Relle, M.D., Allan Pantuck, M.D., Yair Lotan, M.D., Axel Heidenreich, M.D., Michel Sedelaar, M.D., Ph.D., Joseph Chin, M.D., Michael Koch, M.D., Christian Pavlovich, M.D., David Penson, M.D., Laurence Klotz, M.D., and Scott Eggener, M.D.

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For patient-friendly information on prostate cancer and enlargement of the prostate, visit RadiologyInfo.org.
CHICAGO – Artificial intelligence (AI) provides an automated and accurate tool to measure a common marker of heart disease in patients getting chest CT scans for lung cancer screening, according to a study presented today at the annual meeting of the Radiological Society of North America (RSNA).

Low-dose chest CT is approved for lung cancer screening in high-risk people, such as long-time smokers. While these CT scans are intended to diagnose lung cancer, coronary artery calcium, a measure of plaque in the arteries, is also visible on CT. The coronary artery calcium score derived from CT is a well-established measure that helps doctors decide who should get cholesterol-lowering preventive medications called statins.

“The new cholesterol guidelines encourage using the calcium score to help physicians and patients decide whether to take a statin,” said study co-senior author Michael T. Lu, M.D., M.P.H., director of AI in the Cardiovascular Imaging Research Center (CIRC) at Massachusetts General Hospital (MGH) in Boston. “For select patients at intermediate risk of heart disease, if the calcium score is 0, statin can be deferred. If the calcium score is high, then those patients should be on a statin.”

Despite its prognostic value, coronary artery calcium is not routinely measured in low-dose CT lung screening, as the measurements require dedicated software and add time to the interpretation.

“If our tool detects a lot of coronary artery calcium in a patient, then maybe we can send that patient to a specialist for follow up,” said lead author Roman Zeleznik, M.Sc., B.Sc., from the Artificial Intelligence in Medicine (AIM) Program at Boston’s Brigham and Women’s Hospital (BWH) and Dana-Farber Cancer Institute. “This would make it easier for patients to get appropriate treatment.”

The research team, which represents a close collaboration between MGH’s CIRC and AIM at BWH, recently developed and tested a technique that uses deep learning, a sophisticated type of AI, to automatically measure coronary artery calcium on chest CT images. They trained the deep learning system on cardiac CTs and chest CTs in which the coronary artery calcium had been measured manually. They then tested the system on CT scans from thousands of heavy smokers, age 55-74, who were part of the National Lung
Screening Trial (NLST), a major study that established CT’s value in providing early detection of lung cancer.

The results showed that the deep learning-derived coronary artery calcium scores corresponded closely to those of human readers. In addition, there was a significant association between deep learning calcium scores and cardiovascular death over follow-up of 6.5 years.

“There’s information about cardiovascular health on these CT scans,” Dr. Lu said. “This is an automated way to extract that information, which can help patients and physicians make decisions about preventative therapy.”

For instance, automated coronary calcium quantification could be used to segregate people into high- and low-risk groups.

The deep learning system runs in the background and adds no time to the exam. The system’s ability to automate coronary calcium assessment could be a boon to research, as it can evaluate large numbers of patients in a much less time than it would take human readers.

It could also have value outside of the lung screening population. The research team has already demonstrated its effectiveness in people with stable and acute chest pain.

“We have a tool that in the future can be used on almost every chest scan to generate very clinically relevant information for a large number of patients,” said study co-senior author Hugo Aerts, Ph.D., director of the AIM Program at BWH.

The research team has already demonstrated similar results in clinical trial populations in patients with stable (PROMISE Trial) and acute (ROMICAT trial) chest pain.

Co-authors are Borek Foldyna, M.D., Parastou Eslami, Ph.D., Jakob Weiss, M.D., Alexander Ivanov, B.S., Chintan Parmar, Ph.D., Jana Taron, M.D., Julia Karady, M.D., Lili Zhang, M.D., Raza Alvi, M.D., Yasuka Kikuchi, M.D., Dahlia Banerji, M.D., Mio Uno, M.D., Jan-Erik Scholtz, M.D., and Udo Hoffmann, M.D., M.P.H.

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For patient-friendly information on chest CT, visit RadiologyInfo.org.
Focused Ultrasound May Open Door to Alzheimer’s Treatment

CHICAGO – Focused ultrasound is a safe and effective way to target and open areas of the blood-brain barrier, potentially allowing for new treatment approaches to Alzheimer’s disease, according to initial study results presented at the annual meeting of the Radiological Society of North America (RSNA).

There currently is no effective treatment for Alzheimer’s disease, the most common cause of dementia. The blood-brain barrier, a network of blood vessels and tissues that keeps foreign substances from entering the brain, presents a challenge to scientists researching treatments, as it also blocks potentially therapeutic medications from reaching targets inside the brain.

Studies on animals have shown that pulses of low-intensity focused ultrasound (LIFU) delivered under MRI guidance can reversibly open this barrier and allow for targeted drug and stem-cell delivery.

Researchers at three sites have been studying LIFU in humans for more than a year in a clinical trial led by Ali Rezai, M.D., director of the West Virginia University (WVU) Rockefeller Neuroscience Institute in Morgantown, W.Va. For the new study, researchers delivered LIFU to specific sites in the brain critical to memory in three patients with early-stage Alzheimer’s disease. There received three successive treatments at two-week intervals. Researchers tracked them for bleeding, infection and edema, or fluid buildup.

Post-treatment brain MRI confirmed that the blood-brain barrier opened within the target areas immediately after treatment. Closure of the barrier was observed at each target within 24 hours.

“The results are promising,” said study co-author Rashi Mehta, M.D., associate professor at WVU and research scholar at West Virginia Clinical and Translational Science Institute. “We were able to open the blood-brain barrier in a very precise manner and document closure of the barrier within 24 hours. The technique was reproduced successfully in the patients, with no adverse effects.”
MRI-guided LIFU involves placement of a helmet over the patient’s head after they are positioned in the MRI scanner. The helmet is equipped with more than 1,000 separate ultrasound transducers angled in different orientations. Each transducer delivers sound waves targeted to a specific area of the brain. Patients also receive an injection of contrast agent made up of microscopic bubbles. Once ultrasound is applied to the target area, the bubbles oscillate, or change size and shape.

“The helmet transducer delivers focal energy to specified locations in the brain,” Dr. Mehta said. “Oscillation of the microbubbles causes mechanical effects on the capillaries in the target area, resulting in a transient loosening of the blood-brain barrier.”

LIFU could help deliver therapeutic drugs into the brain to improve their effectiveness. Even without drugs, opening of the brain-blood barrier in animals has shown positive effects, Dr. Mehta said. These effects may be due to increased flow of the fluid that cleans the brain of toxic substances, from an immune response triggered by the opening, or by some combination of the two.

While the research so far has focused on the technique’s safety, in the future the researchers intend to study LIFU’s therapeutic effects.

“We’d like to treat more patients and study the long-term effects to see if there are improvements in memory and symptoms associated with Alzheimer’s disease,” Dr. Mehta said. “As safety is further clarified, the next step would be to use this approach to help deliver clinical drugs.”

Co-authors are Marc Haut, Ph.D., Umer Najib, M.D., Manish Ranjan, M.D., Gary D. Marano, M.D., Mor Dayan, B.S., Nathaniel Kelm, Ph.D., Bob Hou, Ph.D., Peng Wang, Ph.D., and Jeffrey S. Carpenter, M.D.

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For patient-friendly information on brain MRI and ultrasound, visit RadiologyInfo.org.
Concussion Alters How Information Is Transmitted Within the Brain

CHICAGO – Damage from concussion alters the way information is transmitted between the two halves of the brain, according to a new study presented today at the annual meeting of the Radiological Society of North America (RSNA).

Research has shown that the corpus callosum, a bundle of nerve fibers that carries signals between the brain’s left and right hemispheres, is vulnerable to damage from mild traumatic brain injury, commonly known as concussion. Less is known about the impact of this damage on cognitive function.

To learn more, researchers at New York University (NYU) School of Medicine in New York City compared the condition of the corpus callosum in 36 patients with recent concussion to that of 27 healthy controls. They studied the participants’ brains with two innovative advances, including an MRI technique that uses measures of water diffusion to provide a microscopic view of the brain’s signal-carrying white matter.

“Looking at how water molecules are diffusing in the nerve fibers in the corpus callosum and within the microenvironment around the nerve fibers allows us to better understand the white matter microstructural injury that occurs,” said study co-author Melanie Wegener, M.D., resident physician at NYU Langone Health in New York City.

Dr. Wegener and colleagues combined the MRI findings with results from the study’s second innovative advance, called an Interhemispheric Speed of Processing Task, a test developed at NYU Langone that evaluates how well the two hemispheres in the brain communicate with each other.

For the test, the participants were told to sit in a chair and focus their gaze on the letter X that was displayed on a screen directly in front of them. The researchers then flashed three-letter words to the right or the left of the X and asked the participants to say those words as quickly as possible. When the researchers evaluated this reaction time in both patients with concussion and healthy controls, they noticed an interesting phenomenon.

AT A GLANCE

- Concussion damage alters the transmission of information between the brain’s two hemispheres.
- Researchers combined MRI findings with results from a processing test that evaluates how well the hemispheres communicate with each other.
- Results from the processing test correlated with injury to the corpus callosum in the brain.
“There is a definite and reproducible delay in reaction time to the words presented to the left of the X compared with words presented to the right visual field,” Dr. Wegener said. “This shows it takes time for information to cross the corpus callosum from one hemisphere to the other, which is measured by the difference in response time between words presented to different sides of our visual field.”

This delay is likely due to the fact that language function is most often located in the brain’s left hemisphere. This means that information presented to the left visual field is first transmitted to the right visual cortex in the brain and then has to cross over the corpus callosum to get to the left language center. In contrast, words that are presented to the right visual field do not need to cross the corpus callosum.

Performance on the test correlated with brain findings on MRI. In the healthy controls, reaction time corresponded with several diffusion measures in the splenium, an area of the corpus callosum located between the right visual cortex and the left language center. No such correlation was found in the concussion patients, suggesting microstructural changes relating to injury.

“We saw a correlation between white matter microstructure injury and the clinical status of the patient,” Dr. Wegener said. “This information could ultimately help with treatment in patients who have mild traumatic brain injury.”

For instance, Dr. Wegener said, patients could undergo MRI immediately after a concussion to see if they experienced any clinically important white matter injury and thus may benefit from early intervention.

“Another thing we can do is use MRI to look at patients’ brains during treatment and monitor the microstructure to see if there is a treatment-related response,” she said.

Co-authors are Joshua Bacon, Ph.D., Sohae Chung, Ph.D., Xiuyuan Wang, M.S., Tamar Bacon, B.A., Joseph F. Rath, Ph.D., James S. Babb, Ph.D., and Yvonne W. Lui, M.D. The study was funded by the National Institutes of Health/National Institute of Neurological Disorders and Stroke.

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For patient-friendly information on brain MRI, visit RadiologyInfo.org.
Imaging Reveals Pathways Behind Depression

CHICAGO – MRI illuminates abnormalities in the brains of people with depression, potentially opening the door to new and improved treatments for the disorder, according to two studies presented this week at the annual meeting of the Radiological Society of North America (RSNA).

Major depressive disorder (MDD) is one of the most common and debilitating mental disorders worldwide. Symptoms include feelings of hopelessness, diminished interest in daily activities, and fatigue. Limited understanding of the brain changes associated with MDD hinders the effectiveness of treatments.

"Unfortunately, with current treatments there is a large chance of relapse or recurrence," said Kenneth T. Wengler, Ph.D., from Columbia University in New York City and co-author of one of the studies. "To develop new, more effective treatments, we must improve our understanding of the disorder."

Dr. Wengler and colleagues at the Renaissance School of Medicine at Stony Brook University in Stony Brook, N.Y., recently studied connections between MDD and disruptions in the blood-brain barrier (BBB), a network of blood vessels and tissue that protects the brain from foreign substances. Using a new MRI technique they developed called intrinsic diffusivity encoding of arterial labeled spins (IDEALS), they looked at BBB water permeability, or the movement of water out of the blood vessels and into the brain tissue.

Comparison of results in 14 healthy individuals and 14 MDD patients found that less water moved from inside the blood vessels to outside in the MDD patients, representing disrupted BBB integrity. This difference was particularly large in two regions of the brain: the amygdala and the hippocampus.

="We observed disruption of the blood-brain barrier in gray matter regions known to be altered in major depressive disorder," Dr. Wengler said. "This study helps improve our understanding of the pathophysiology of depression and can open new avenues of treatment for a disorder that affects over 100 million individuals worldwide."
A second study presented at RSNA 2019 looked at abnormalities in the complex network of connections in the brain known as the connectome for their role in depression. Previous research has focused on characterizing the connections between different brain regions, but this study, from researchers at the University of North Carolina (UNC) in Chapel Hill, N.C., looked deeper within individual brain regions.

The researchers compared 66 adults with MDD and 66 matched healthy controls during wakeful rest using functional MRI (fMRI) and a newly developed multiscale neural model inversion framework that linked the brain’s microscopic circuitry with its larger-scale interactions. As part of the study, the researchers were able to assess excitatory or inhibitory influence between neuronal cell groups. A proper balance between excitation and inhibition is crucial to a well-functioning brain.

Patients with MDD had abnormal patterns of excitation and inhibition at the dorsal lateral prefrontal cortex, a brain area important to cognitive control functions, including the regulation of the amygdala, a key region embedded deep in the brain for expression of emotion. It has long been hypothesized that malfunctioning inhibitory control over the amygdala could result in depressive symptoms.

“In our study, we found that excitation and inhibition in the brain regions in control of executive functions and emotional regulation were reduced in patients with MDD,” said study co-author Guoshi Li, Ph.D., from the Image Display, Enhancement and Analysis (IDEA) group at UNC. “This suggests that control functions in MDD are impaired, which may lead to elevated responses in the amygdala, resulting in increased anxiety and other negative moods.”

In addition, the researchers found that recurrent excitation in the thalamus, an area of the central brain that is also responsible for emotional regulation, was abnormally elevated in patients with MDD.

Dr. Li said the new approach could open the door for a deeper understanding of the mechanisms behind depression.

“Current methods of studying the brain provide a superficial understanding of connectivity,” Dr. Li said. “This method allows us to identify impaired connectivity within each brain region, making it a potentially more powerful tool to study the neuromechanism of brain disorders and develop more effective diagnosis and treatment.”

Dr. Wengler’s co-authors are Kwan Y. Chen, M.D., Christine DeLorenzo, Ph.D., Mark E. Schweitzer, M.D., Turhan Canli, Ph.D., and Xiang He, Ph.D. The study was funded by Stony Brook University.

Dr. Li’s co-authors are Yujie Liu, M.D., Yanting Zheng, Ph.D., Ye Wu, Ph.D., Pew-Thian Yap, Ph.D., Shijun Qiu, M.D., Han Zhang, Ph.D., and Dinggang Shen, Ph.D. The study was funded by the National Institutes of Health.

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For patient-friendly information on brain MRI and fMRI, visit RadiologyInfo.org.
New Study Looks at Motorized Scooter Injuries

CHICAGO – More than half of people who received X-rays or CT scans after electric scooter accidents were found to have injuries, most commonly to the upper extremities, according to a new study presented today at the annual meeting of the Radiological Society of North America (RSNA). Researchers said the findings underscore the need for more public education on the use of these scooters.

Dockless electric motorized rental scooters, also known as e-scooters, have exploded in popularity in recent years. E-scooters are familiar sights in urban areas and on college campuses, where users value them as an inexpensive, convenient and less strenuous alternative to bicycles.

The rapid growth of rental e-scooters in cities across the U.S. has sparked concerns, as hospital emergency departments have reported a growing number of injuries associated with the vehicles. Earlier this year, the Centers for Disease Control and Prevention (CDC), in association with Austin Public Health, released a study assessing the potential public health impact of e-scooter use.

“E-scooters have a narrow platform, can travel up to 15 to 20 miles per hour and require a level of coordination and skill that is often not native to many users,” said study co-author Aiza Ashraf, M.D., diagnostic radiology resident at the Indiana University School of Medicine in Indianapolis. “Whereas physical effort is required to get a bicycle up to speed, e-scooters are self-powering.”

Imaging exams for e-scooter accidents spiked at Indiana University Health System after the scooters were legalized in Indianapolis in 2018. To find out more about this trend, Dr. Ashraf, Mohsin Mukhtar, M.D., and colleagues at Indiana University School of Medicine, studied electronic medical records and radiology archives of people ages 18 and older who had exams ordered for scooter-related injuries over a five-year period.

The researchers identified 69 exams performed on 36 unique Emergency Department patients with involvement of an e-scooter. There were 19 males and 17 females included in the study, and two-thirds were in the 18-30 age range. X-rays of the extremities and CT of the head, face and cervical spine were the most common exams ordered.

AT A GLANCE
- E-scooter accidents spiked at Indiana University Health System after the scooters were legalized in Indianapolis in 2018.
- More than half of people who received X-rays or CT scans after e-scooter accidents were found to have injuries.
- The study findings highlight the importance of using protective equipment, such as helmets and wrist guards, when riding an e-scooter.
Nineteen of the 36 patients were found to have a radiographically apparent injury. The most common injuries involved the upper extremities, particularly the wrist. There were six cases of distal radial fractures, or fracture of the forearm bone close to the wrist, making it the most common injury in the study group. Soft tissue injuries of the head, face, wrist and ankle, were present in five cases.

“We believe that many users are not fully aware of the potential significant injuries that may occur with e-scooter use,” Dr. Mukhtar said. “Raising awareness and doing further research on this topic could inform future policy.”

The study findings highlight the importance of protective equipment such as helmets and hand/wrist guards, researchers said, along with the potential dangers of riding while under the influence of intoxicating substances. In addition, the study suggests that communities should consider imposing speed limits on e-scooter users.

“Limiting e-scooter speed could reduce the overall incidence and severity of injuries in the event of a fall or collision,” Dr. Ashraf said. “And since these e-scooters could be viewed as a potential public health hazard, we would recommend public education on the use of these devices.”

The study also found a lack of adequate and specific documentation of scooter type in the emergency medical records. More than 200 instances found in the search may have been e-scooter-related, but lack of documentation in the records prevented the researchers from making a definitive link.

“A robust ability for more systematic data collection and analysis, for example, performed as a multi-institutional public health study, may be of benefit,” Dr. Mukhtar said.

Co-authors are Mark S. Frank, M.D., and Scott D. Steenburg, M.D.

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For patient-friendly information on X-ray and CT, visit RadiologyInfo.org.
Brachytherapy Proves Effective in Treating Skin Cancer

CHICAGO – The use of high-dose-rate brachytherapy to treat elderly patients with common skin cancers offers excellent cure rates and cosmetic outcomes, according to a new study presented today at the annual meeting of the Radiological Society of North America (RSNA).

Squamous cell carcinoma (SCC) and basal cell carcinoma (BCC) are the most common types of skin cancer, affecting 3 million Americans each year. Although they are highly curable and less dangerous than melanoma, they can be disfiguring and costly to treat. Treatments for squamous and basal cell carcinomas include surgical removal and conventional, or external beam, radiation therapy.

“For elderly patients who don’t heal as well and may have additional medical problems, surgery may not be the best option,” said Ashwatha Narayana, M.D., chairman of the Department of Radiation Oncology at Northern Westchester Hospital in Mount Kisco, N.Y. “If the affected area is the tip of the nose, ear or on the eyelid, multiple surgeries and skin grafting may be required.”

In high-dose-rate brachytherapy, a precise dose of radiation is delivered to the cancerous cells through catheters implanted into a custom-fitted applicator. Unlike six-week external beam radiation therapy, in which treatment sessions can last up to six hours, a course of high-dose-rate brachytherapy includes six three-minute sessions over two weeks.

“Treatment with external beam radiation therapy can be too long and painful for elderly patients,” Dr. Narayana said. “It also exposes healthy tissue around the lesion to radiation, which can increase side effects. Brachytherapy delivers a higher dose of radiation directly to the tumor while sparing healthy tissue nearby.”

According to Dr. Narayana, brachytherapy patients have minimal recovery time and typically experience few or no side effects that can be associated with the treatment, such as nausea, hair loss or diarrhea. They can also return to normal activities after the procedure.

In the study, radiologists used high-dose-rate brachytherapy to treat 70 patients between the age of 70 and 100 (median age 85 years) with early-stage BCC and SCC. A total of 81 lesions (BCC: 53, SCC: 28) on the
nose, face, forehead, scalp, ear, neck and legs were treated between 2013 and 2019. Lesions ranged in size from 3 to 26 millimeters (mm) with a median of 10mm. Patients were followed for up to four years (median follow-up: 2 years).

“We had a cure rate of 96% in patients with squamous cell carcinoma and 98% in patients with basal cell carcinoma, and cosmetic outlook was excellent in 90% of cases,” Dr. Narayana said. “This is a great treatment option compared to surgery.”

Despite being a well-recognized treatment that is used routinely to treat other types of cancers, Dr. Narayana said brachytherapy has failed to catch on for the treatment of non-melanoma skin cancers on the face and neck. He hopes results of his study and future research will help raise awareness of high-dose-rate brachytherapy as an alternative to surgery and external beam radiation therapy.

“High-dose-rate brachytherapy is a powerful way of treating skin cancers in both elderly and younger patients,” he said. “The results are impressive.”

Co-authors are Carolyn Troy, B.S.N., R.N., Judith Hasak, B.S.N., R.N., Samuel Cotte, A.R.R.T., R.T., and Christopher Fey, M.D.

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For patient-friendly information on brachytherapy, visit RadiologyInfo.org.
Study Finds Key Brain Region Smaller in Birth Control Pill Users

CHICAGO – Researchers studying the brain found that women taking oral contraceptives, commonly known as birth control pills, had significantly smaller hypothalamus volume, compared to women not taking the pill, according to a new study presented today at the annual meeting of the Radiological Society of North America (RSNA).

Located at the base of the brain above the pituitary gland, the hypothalamus produces hormones and helps regulate essential bodily functions including body temperature, mood, appetite, sex drive, sleep cycles and heart rate.

Structural effects of sex hormones, including oral contraceptive pills, on the human hypothalamus have never been reported, according to the researchers. This may be in part because validated methods to quantitatively analyze MRI exams of the hypothalamus have not been available.

“There is a lack of research on the effects of oral contraceptives on this small but essential part of the living human brain,” said Michael L. Lipton, M.D., Ph.D., FACR, professor of radiology at the Gruss Magnetic Resonance Research Center at Albert Einstein College of Medicine and medical director of MRI Services at Montefiore Medical Center in New York City. “We validated methods for assessing the volume of the hypothalamus and confirm, for the first time, that current oral contraceptive pill usage is associated with smaller hypothalamic volume.”

Oral contraceptives are among the most popular forms of birth control and are also used to treat a host of conditions, including irregular menstruation, cramps, acne, endometriosis and polycystic ovary syndrome. According to a 2018 report from the Centers for Disease Control and Prevention’s National Center for Health Statistics, from 2015 to 2017 approximately 47 million women aged 15–49 in the U.S. reported current use of contraceptives. Of those, 12.6% used the pill.
In his study, Dr. Lipton and colleagues recruited a group of 50 healthy women, including 21 women who were taking oral contraceptives. All 50 women underwent brain MRI, and a validated approach was used to measure hypothalamic volume.

“We found a dramatic difference in the size of the brain structures between women who were taking oral contraceptives and those who were not,” Dr. Lipton said. “This initial study shows a strong association and should motivate further investigation into the effects of oral contraceptives on brain structure and their potential impact on brain function.”

Other findings from the study, which Dr. Lipton described as “preliminary,” were that smaller hypothalamic volume was also associated with greater anger and showed a strong correlation with depressive symptoms. However, the study found no significant correlation between hypothalamic volume and cognitive performance.

Co-authors are Ke Xun Chen, M.D., Sandie Worley, B.S., Henry J. Foster, B.S., David Edasery, M.D., Shima Roknsharifi, M.D., and Chloe Ifrah, B.A. The study was funded by the National Institutes of Health/National Institute of Neurological Disorders and Stroke and by The Dana Foundation.

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Note: Copies of RSNA 2019 news releases and electronic images will be available online at RSNA.org/press19 beginning Monday, Nov. 25.

RSNA is an association of over 53,400 radiologists, radiation oncologists, medical physicists and related scientists, promoting excellence in patient care and health care delivery through education, research and technologic innovation. The Society is based in Oak Brook, Ill. (RSNA.org)

Editor’s note: The data in these releases may differ from those in the published abstract and those actually presented at the meeting, as researchers continue to update their data right up until the meeting. To ensure you are using the most up-to-date information, please call the RSNA Newsroom at 1-312-791-6610.

For patient-friendly information on brain MRI, visit RadiologyInfo.org.
James P. Borgstede, M.D., Named President of the RSNA Board

CHICAGO – James P. Borgstede, M.D., was named president of the Radiological Society of North America (RSNA) Board of Directors today at the Society’s annual meeting in Chicago.

Since 2008, Dr. Borgstede has been professor of radiology at University of Colorado in Denver. He is also vice chair of professional services, clinical operations, quality and safety for the Department of Radiology at the University of Colorado. He received his medical degree in 1974 from the University of Illinois, Chicago, and completed his residency in 1978 at the University of Colorado Health Sciences Center in Denver.

As president of the RSNA board, Dr. Borgstede will support RSNA’s commitment to promoting innovative educational opportunities and the advancement of radiologic technologies.

“The RSNA is a worldwide leader in radiology clinical practice innovation, research and education,” Dr. Borgstede said. “We are members of a specialty with amazing and unparalleled opportunities for scientific advancement. As an RSNA leader, my goals include advancing the appropriate development and use of radiologic technologies, particularly in relation to artificial intelligence, and assisting with education and radiology development in under-resourced areas of the world. I am honored to have the opportunity to serve our patients, our specialty and the RSNA.”

Over the years, Dr. Borgstede has been very involved with the RSNA annual meeting. Recognized in 2019 as an Honored Educator, he has delivered scientific presentations and refresher courses, participated in symposiums, and was co-presenter in 2005 of a special focus session, “The Diffusion of Imaging and Peril of Inappropriate Utilization.” At RSNA 2007, Dr. Borgstede lectured during the Opening Plenary Session. He has had dozens of articles published and has lectured at more than 120 scientific and educational meetings worldwide.

From 2004 to 2008, Dr. Borgstede was on the editorial board for the Journal of the American College of Radiology, where he currently serves as a reviewer. Since 2004, he has served on the editorial advisory board for American Family Physician.
An RSNA member since 1976, Dr. Borgstede was a member of the Quality Committee from 2009 to 2011. He joined the RSNA Board of Directors in 2013 and served as board chair in 2018. Prior to serving as board chair, Dr. Borgstede was the board liaison for the International Advisory Committee and the Committee on International Radiology Education and was chair of the Board Committee on International Affairs. Dr. Borgstede has been active on many committees of the RSNA Research & Education (R&E) Foundation. He served on the R&E Foundation Board of Trustees from 2008 to 2014, the Corporate Giving Subcommittee from 2009 to 2012, the Finance Committee from 2012 to 2014, and was chair of the R&E Foundation from 2012 to 2014.

Dr. Borgstede has held committee or leadership positions in a number of organizations, including the Colorado Radiological Society (CRS), El Paso County Medical Society, Rocky Mountain Radiological Society and the Society of Radiologists in Ultrasound. He was president of the International Society of Radiology from 2014 to 2016. He was chairman of the Board of Chancellors at the American College of Radiology (ACR) from 2004 through 2006 and president from 2006 through 2007. Since his presidency at ACR, he has continued on various ACR committees, including the Committee on International Service, with which he traveled multiple times to Grace Children’s Hospital Port-au-Prince, where he worked as part of the Haiti Radiology Project.

The recipient of numerous honors and awards throughout his career, Dr. Borgstede has received the gold medal and the William T. Thorwarth Award for Excellence in Economics and Health Policy from ACR. He received service awards from CRS and was the first CRS gold medalist. He is a recipient of the University of Colorado Hospital President’s Award for Leadership, and in 2019 he was awarded a Presidential Citation for Meritorious Service, recognizing his outstanding contributions to organizational performance improvement, patient safety and clinical outcomes at the hospital. In 2015, Dr. Borgstede was included in the “Denver Best Doctors 2015-2016” list by the Denver Business Journal. He has been selected for inclusion in Best Doctors in America from 2001 to 2006, 2009 to 2012, and 2016 to 2018.

Note: Copies of RSNA 2019 news releases and electronic images will be available online at RSNA.org/press19 beginning Monday, Dec. 2.

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Mary C. Mahoney, M.D., Named President-Elect of the RSNA Board

CHICAGO – Mary C. Mahoney, M.D., was named president-elect of the Radiological Society of North America (RSNA) Board of Directors today at the Society’s annual meeting in Chicago.

Dr. Mahoney is the Benjamin Felson Endowed Chair and Professor of Radiology at the University of Cincinnati (UC) College of Medicine in Cincinnati, Ohio. Since 2016, Dr. Mahoney has been chief of imaging services at UC Health in Cincinnati and is on the medical staff of several Cincinnati area institutions, including UC Medical Center and West Chester Hospital in West Chester, Ohio.

After graduating magna cum laude from Brown University in 1979, Dr. Mahoney received her medical degree in 1983 from UC College of Medicine, and is a member of its honor society, Alpha Omega Alpha. She completed her diagnostic radiology residency—serving as chief resident from 1987-1988, followed by a fellowship—at UC Medical Center.

As president-elect, Dr. Mahoney will continue to drive conversations about patient care with a focus on how artificial intelligence can help radiologists incorporate exceptional patient care into their daily practice.

“I am excited to implement the Society’s strategic plan approved by the Board of Directors earlier this year,” Dr. Mahoney said. “I look forward to seeing how newly developed initiatives, specifically initiatives related to artificial intelligence, will unfold and impact our members. I am very interested in the significance artificial intelligence has in helping us analyze the workflow of radiology in order to improve the entire patient experience from beginning to end.”

Dr. Mahoney has published more than 70 peer-reviewed articles and 15 book chapters and has co-authored two books with an emphasis on breast imaging. She has served as principal or co-investigator on numerous funded grants, including several grants focused on imaging modalities and biopsy. Dr. Mahoney has given many scientific research presentations nationally and internationally and has been an invited lecturer at over 280 institutions and meetings worldwide.
She is a graduate of the Executive Leadership in Academic Medicine program for women leaders in medicine. She has been instrumental in building the Advanced Imaging Core Lab at UC College of Medicine and the multidisciplinary breast center within UC Cancer Institute.

Since 2002, Dr. Mahoney has been a manuscript reviewer for Radiology. She is currently on the editorial boards of Cureus and Contemporary Diagnostic Radiology and the editorial advisory board of Radiology Business Journal. Since 2005, Dr. Mahoney has been a Self-Assessment Module reviewer for the American Board of Radiology (ABR).

Over the years, Dr. Mahoney has served RSNA in many capacities. She was the scientific session presiding officer from 2003 to 2009. She has served on many committees, including the Research and Education (R&E) Foundation Public Relations Committee and the Public Information Advisors Network. She has chaired the Public Information Committee, Patient-Centered Radiology Steering Committee and the Radiology Editor Search Committee. She joined the RSNA board in 2014.

Dr. Mahoney has held committee or leadership positions in a number of other organizations, including the Society of Breast Imaging (SBI) and the American Roentgen Ray Society. She served on the ABR Board of Trustees from 2010 to 2015 and the ABR Board of Governors from 2015 to 2018 and currently serves on the American College of Radiology (ACR) Board of Chancellors. Dr. Mahoney is a fellow of both ACR and SBI and is a member of the Society of Chairs of Academic Radiology Departments.

The recipient of many awards and honors throughout her career, Dr. Mahoney was recognized by ABR for her extraordinary service and dedication in 2008 and 2010. She was named a Health Care Hero finalist twice by the Cincinnati Business Courier and received a Marquis Who’s Who Lifetime Award in 2017. She was included on the “Best Doctors in Cincinnati” list and was selected for inclusion in Top Doctors in America in 2019.

Dr. Mahoney has been a nationally recognized proponent and staunch advocate of patient-centered radiology. She has been involved in numerous initiatives campaigning to encourage and facilitate radiologists’ meaningful engagement in the patient experience.

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Bruce G. Haffty, M.D., Named Chair of the RSNA Board

CHICAGO – Bruce G. Haffty, M.D., was named chair of the Radiological Society of North America (RSNA) Board of Directors today at the Society’s annual meeting in Chicago.

Dr. Haffty is associate vice chancellor, Cancer Programs, at Rutgers Biomedical and Health Sciences. He also serves as professor and chairman in the Department of Radiation Oncology at Rutgers Robert Wood Johnson Medical School, Rutgers Cancer Institute of New Jersey and Rutgers New Jersey Medical School.

Dr. Haffty completed his medical school and residency training at Yale University School of Medicine in 1988 and spent the next 18 years specializing in breast, head and neck cancers in Yale’s Department of Therapeutic Radiology. He served on the faculty at Yale from 1988 through 2005. Dr. Haffty was promoted to professor of therapeutic radiology in 2000, served as residency program director from 1992 through 2004, and vice chairman and clinical director from 2002 to 2005.

As RSNA chair, Dr. Haffty will lead the board in its continued focus on bringing value to RSNA membership in North America and throughout the world through its offerings in research and education.

“Over the coming year, we will continue to explore strategies to move the field of radiological sciences forward through cutting-edge research and educational programs,” Dr. Haffty said. “Another goal is to raise the profile of RSNA and radiology outside of the radiologic community to other medical communities and professional societies.”

Dr. Haffty has authored or co-authored 50 books, book chapters and theses, more than 400 peer-reviewed articles and numerous editorials and letters. Dr. Haffty is a leader in national clinical trials and is currently co-investigator on several national clinical trials through the NRG Oncology and Alliance for Clinical Trials in Oncology cooperative groups. He has given many scientific research presentations nationally and internationally and has been an invited lecturer or visiting professor at nearly 180 institutions and meetings worldwide.
At Rutgers Robert Wood Johnson Medical School, New Jersey Medical School and Cancer Institute of New Jersey—now part of Rutgers, Dr. Haffty spearheaded the expansion of the Radiation Oncology Program and developed residency programs in radiation oncology and medical physics—the only such programs in the state of New Jersey.

Through his extensive work with the American Society for Radiation Oncology, Dr. Haffty served as the founding president of the Association of Directors of Radiation Oncology Programs (ADROP) in 2000, providing tools and resources to advance the quality of residency training and education in radiation oncology. He served as ADROP president from 2000 to 2003.

Dr. Haffty’s research on new methods of delivering radiation therapy for breast cancer has focused on molecular and genetic factors as they relate to radiation resistance and outcomes in patients. His *Lancet* – published research on BRCA1 and BRCA2 gene mutations in conservatively managed breast cancer documented high rates of second primary ipsilateral breast cancers (cancers affecting the same side of the body) and has impacted clinical practice. Dr. Haffty’s research has created unique factors associated with outcomes, paving the way for molecular targeted therapies in combination with radiation.

In addition to editing the comprehensive *Handbook of Radiation Oncology*, Dr. Haffty has served on numerous editorial boards, such as *The Cancer Journal, Clinical Cancer Research, Journal of Clinical Oncology, Women’s Oncology Review, Radiation Oncology Investigations* and *Oncology Reports*. He currently serves on the editorial board of *The Breast Journal* and serves as deputy editor of *Journal of Clinical Oncology*. He served on the *RSNA News* editorial board from 2009 to 2015.

Dr. Haffty has volunteered with RSNA in a number of roles, including as third vice president from 2013 to 2014 and as co-chair of the Bolstering Oncoradiologic and Oncoradiotherapeutic Skills for Tomorrow (BOOST) Program. At RSNA 2009, he delivered the Annual Oration in Radiation Oncology, “Genetic Factors in the Diagnostic Imaging and Radiotherapeutic Management of Breast Cancer.” Dr. Haffty was named RSNA Outstanding Educator in 2013. Dr. Haffty has been on the RSNA Board of Directors since 2014, most recently serving as liaison for science.

Among his other leadership positions, and in addition to a busy clinical practice, Dr. Haffty has served on numerous national committees related to research and education in breast cancer and radiation oncology. He is a past president of the American Radium Society, past chairman of the Residency Review Committee in Radiation Oncology, past president of the American Board of Radiology, and past president of American Society for Radiation Oncology.

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