108th Scientific Assembly and Annual Meeting
November 27 to December 1

RSNA 2022
Press Kit

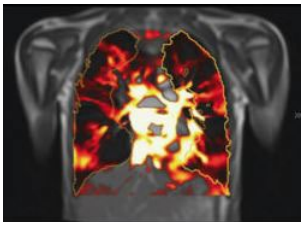
Visit the RSNA Newsroom at
RSNA.org/Press22

RSNA® 2022 | Empowering ***Patients and Partners*** in Care

RSNA® 2022
Technical Exhibits: November 27-30

Empowering **Patients and Partners** in Care

Contact the RSNA media team for help with your medical stories.



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WHY:
Our team can provide you with the experts, the context and the background you need for medical stories related to radiology.

WHO:
Our network of renowned medical experts and thought leaders is ready to provide journalists with authoritative background, commentary and quotes.

WHAT:
Standards, such as mammography, CT, MRI, PET, ultrasound and imaging-guided therapies. The latest technologies and treatments, including artificial intelligence, photon-counting CT, 3D printing and advanced visualization in medicine.

HOW:
Annual Meeting — The RSNA Scientific Assembly and Annual Meeting is the world's largest annual radiology forum and offers more than 3,000 research papers, posters and education exhibits. Our onsite newsroom provides press kits, images, access to radiology experts and media workspace. Visit the RSNA online newsroom: *RSNA.org/press22*.

Publications — News releases and highlights from RSNA's peer-reviewed scientific journals *Radiology*, *Radiology: Artificial Intelligence*, *Radiology: Cardiothoracic Imaging* and *Radiology: Imaging Cancer* are distributed regularly to RSNA media subscribers. Visit *RSNA.org* for access to news releases, journal abstracts and articles from *RSNA News*.

RadiologyInfo.org — Our website for patients offers detailed information about procedures and treatments, diseases and conditions, and screening and wellness written for the general public in English and Spanish.

Images & B-Roll — RSNA has radiologic images for a variety of conditions. RSNA's video library features radiologic procedures and treatments to help television and web producers create timely, realistic medical segments.

Public Service Announcements (PSAs) — RSNA offers scripted and pre-recorded radio PSAs on important issues, such as breast cancer and lung cancer awareness.

RSNA is an association of radiologists, radiation oncologists, medical physicists and related scientists, promoting excellence in patient care and health care delivery through education, research and technologic innovation.

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Looking for Additional Information?

The RSNA 2022 Online Newsroom Provides:

- High-resolution images
- Videos
- Presenter interviews
- Scientific abstracts
- Additional meeting announcements
- Exhibitor news center

All in one convenient location:
RSNA.org/Press22

Media@RSNA.org

RSNA® 2022 | Empowering ***Patients and Partners*** in Care

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RADIOLOGICAL SOCIETY OF NORTH AMERICA
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RSNA
Radiological Society
of North America

November 27, 2022

To: RSNA 2022 Media Attendees

From: Jennifer Kemp, M.D.
Chair, RSNA Public Information Committee

Welcome to the 108th Scientific Assembly and Annual Meeting of the Radiological Society of North America (RSNA), the world's premier annual radiologic meeting. More than 3,000 scientific research presentations and education exhibits will cover the latest developments in radiology and related imaging technologies dealing with diagnosis, intervention and therapy.

RSNA 2022 offers you access to an abundance of compelling medical stories and the latest in artificial intelligence (AI) research and technology.

THE KIT:

The RSNA Board and Public Information Committee are pleased to present the media with 13 news releases on some of the hottest topics from the scientific program. The meeting also provides facilitated access to many of the world's leading radiologic researchers and hundreds of story ideas for now and later.

Here are the topics you'll find in this kit.

- Steroid Injections Worsen Knee Arthritis
- Non-Surgical Treatment Relieves Carpal Tunnel Syndrome
- COVID-19 Patients Show Liver Injury Months After Infection
- Lung Cancer Screening Dramatically Increases Long-term Survival Rate
- Obesity Linked to Poor Brain Health in Children
- Drinking During Pregnancy Changes Baby's Brain Structure
- Researchers Identify Brain Markers of ADHD in Children
- NSAIDS May Worsen Arthritis Inflammation
- MRI Reveals Significant Brain Abnormalities Post-COVID
- High Deductible Leads Women to Skip Testing after Abnormal Mammogram
- Sunny with a Chance of Trauma: CT Scans Spike in Hot Weather
- AI Predicts Heart Disease Risk Using Single X-Ray
- Ultra-high-res MRI Reveals Migraine Brain Changes

You will also find cutting-edge research highlights and a list of additional story ideas from other scientific papers and posters being presented at RSNA 2022 that are of interest to both general and specialized audiences.

I encourage you to attend plenary sessions to hear some of the most influential leaders, physicians and researchers speak on topics important to physicians and their patients. At the Opening Session on Sunday, RSNA President Bruce G. Haffty, M.D., will deliver his President's Address: "Diagnostic Imaging: Value from the Lens of the Patient."

Dr. Haffty will be followed by Elizabeth Morris, M.D., with her illuminating talk, “Doctor as Patient: Imagining Cancer Survival for All.”

On Monday, Pulitzer Prize-winning author Siddhartha Mukherjee, M.D., will share his insights into human health, medicine and science. Later in the day, Mini Pathria, M.D., will moderate the Image Interpretation session.

On Tuesday, Reed A. Omary, M.D., will discuss the responsibility of today’s radiology professionals to create the best possible patient experiences. Also on Tuesday, moderator Amanda Starc, Ph.D., leads an expert panel in an exploration of the latest health care policy developments and their impact on the field of medical imaging in “Medicare and U.S. Healthcare Policy: A National Conversation.”

Wednesday afternoon convenes an expert panel moderated by Quynh-Thu Le, M.D., to discuss the use of machine learning for risk stratification in radiation oncology and optimizing radiation therapy workflows.

Thursday’s RSNA/AAPM Symposium will highlight the successful collaboration between radiologists and physicists in technical developments and clinical translations in medical imaging.

Be sure to check out the other popular sessions like the “Fast 5” and the radiology game show.

The Technical Exhibition, featuring the expansive AI Showcase and Theater, provides attendees the opportunity to see all the innovative products and services being offered by more than 600 exhibitors.

The Imaging AI in Practice demo is an interactive exhibit spotlighting new AI technologies and integration standards needed to embed AI into the radiology workflow.

Stop by the Innovation Theater, where you can be the first to hear about leading edge technology and product launches.

Be sure to take some time to unwind and enjoy some entertainment at the Discovery Theater in Lakeside Center.

For more information about any of these events and sessions, including locations and times, please consult the meeting program, call 1-312-791-6610 or visit the Newsroom staff.

I appreciate your interest in the field of radiology and hope you have a wonderful experience at RSNA 2022!

Policies and Guidelines for News Media Covering the RSNA 2022 Meeting

The Radiological Society of North America is pleased to welcome the world press to its 108th Scientific Assembly and Annual Meeting.

GENERAL INFORMATION The 108th Scientific Assembly and Annual Meeting, Sunday, Nov. 27, to Thursday, Dec. 1, 2022, at McCormick Place in Chicago, is an international forum of peer-reviewed research, state-of-the-art technology and education for radiologists, radiation oncologists, medical physicists and allied scientists. It is a meeting place for medical imaging leaders worldwide. As such, it provides a host of news opportunities.

NEWSROOM LOCATION The RSNA Newsroom is located in the South Building, Level 1 S103. Newsroom facilities include a work area, interview cubicles and food service.

NEWSROOM HOURS Saturday, Nov. 26, 3 - 5 p.m.; Sunday – Wednesday, Nov. 27 – Nov. 30, 8 a.m. - 6 p.m.

MEDIA ELIGIBILITY Press badges are available only to *working press* who can show evidence that their attendance results in original coverage of the RSNA Scientific Assembly and Annual Meeting in print, broadcast or recognized Internet news media. RSNA does not issue press badges to: publishers or a publication's advertising, marketing, public relations or sales representatives; publishers, editors or reporters from manufacturers' house organs or promotional publications; public relations staff of exhibitors or educational institutions; or other individuals who are not actually reporting on the meeting.

To obtain a press badge, identification certifying that you are a working member of the print, online or broadcast news media and/or a letter from an editor stating that you are on assignment to cover the RSNA Scientific Assembly and Annual Meeting is required. Business cards or membership cards from communications or writers' organizations are not sufficient to establish eligibility. If RSNA issues you a press badge, you must not participate in sales or development of ads, products for sale or CME products. Working press may NOT also register as exhibitors. RSNA reserves the right to make final determination of media eligibility.

PROOF OF COVERAGE If you attended a past RSNA meeting as media, you will be asked to furnish a copy of an article or report resulting from that assignment to be credentialed as press at a subsequent RSNA meeting. If a news outlet sends a staff member or freelancer, the outlet must furnish proof of resulting original coverage in order to send a representative in subsequent years. RSNA does not bear the responsibility for locating coverage.

ADVANCE REGISTRATION Advance registration is *strongly encouraged*. Members of the media interested in attending should visit our online registration page to access registration materials.

ONSITE MEDIA REGISTRATION Media must check in at the Newsroom to pick up their credentials or to register onsite. A business card or other proof of identity may be required to obtain credentials. For media registering onsite, proof of eligibility will be required. Television, video crews and photographers covering the meeting are required to check in immediately at the Newsroom each day and must be accompanied by a Newsroom representative when shooting inside McCormick Place. Shooting schedules should be provided by Nov. 1 to ensure Newsroom staff availability.

EXHIBITOR MEDIA INFORMATION RSNA rules prohibit news conferences at hotels or other locations away from the meeting site during meeting hours. Journalists invited to such events are asked to notify RSNA Newsroom staff. As a convenience for journalists, news releases and other information from exhibitors will be displayed in a special area of the Newsroom. Exhibitor representatives are not allowed to distribute press materials outside the Newsroom. It is inappropriate to provide any exhibitor with the news material of other exhibitors. Exhibitor representatives are not allowed in the Newsroom unless accompanied by a journalist who intends to conduct an interview. RSNA advises journalists that it neither reviews for accuracy nor endorses exhibitor news materials. A list of exhibitor press conferences will be posted in the Newsroom.

SCIENTIFIC PAPERS & VISUALS In order to help maintain their eligibility for peer-reviewed journal publication, scientific papers and posters may not be available to media. Reprinting of scientific abstracts or posters is strictly prohibited. Journalists who want to use slides, graphs and other visuals to illustrate coverage must have the presenter's permission. Each presenter has been notified that publication or broadcast of illustrations, tables or other portions of his or her work may adversely affect eligibility for publication in peer-reviewed journals.

CME CREDIT The Radiological Society of North America is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. The Society sponsors this annual scientific assembly, and as an accredited sponsor, designates this educational activity for CME credit. Because RSNA is the sole sponsor of its assembly, and because the ability to offer CME credit for an educational activity rests on integral participation in the planning, implementation and evaluation of that activity, only the Society can designate this meeting or any portion of it for CME credit. To retain its status as an accredited provider, RSNA cannot and does not designate news or promotional stories issued from its meeting for CME credit, nor does it allow press to do so.

MEDIA ACCESS Media may access scientific presentations, plenary sessions, scientific and educational exhibits and technical exhibits during posted hours. Private areas and events, including but not limited to Board and staff offices, physician lounges, Board and committee meetings, and other scheduled private events, are reserved for RSNA representatives and designated professional attendees. RSNA retains final authority in all issues of access. Questions regarding media access should be directed to Newsroom staff.

INTERVIEWS Cubicles will be available in the Newsroom for media to conduct private interviews. Interviews may also be conducted in open, public areas, provided that traffic flow is not impeded. Interview opportunities with RSNA Board members and other Society leaders are extremely limited and must be arranged through RSNA media relations staff at 1-630-590-7762 or *media@rsna.org* prior to October 1. No interviews with RSNA Board members will be available during the annual meeting.

VIDEO/PHOTO REGULATIONS Special audio/video requests, including arrangements for taped interviews, must be submitted in writing to RSNA prior to October 1. Please email audio/video requests to Linda Brooks at *media@rsna.org*.

Scientific Presentations/Plenary Sessions. Television and video crews and photographers must be accompanied by a Newsroom representative when shooting in scientific sessions. Availability of photo escorts is limited. Requests for photo escorts should be emailed along with a planned shooting schedule to Linda Brooks at *media@rsna.org* by November 15, to ensure Newsroom staff availability. As a courtesy to presenters, television and video crews and photographers must obtain the permission of the speaker and moderator before shooting presentations. Television and video crews may not use artificial lights during presentations. Lights may be used only before the session begins or after it concludes. Flash photography is not allowed during scientific presentations and plenary sessions.

Lakeside Learning Center. Crews and photographers are asked not to interrupt physicians and others who are studying education exhibits and scientific posters. Physicians can be interviewed in open, public areas, provided that traffic flow is not impeded, or as they leave the Lakeside Learning Center. Flash photography is not allowed during author presentations.

Scientific Slides or Posters. Photographic or video reproduction of scientific presentation slides or scientific posters for publication without permission of the presenter is strictly prohibited. Presenters have been notified that publication or broadcast of illustrations, tables or other portions of their work may adversely affect eligibility for publication in peer-reviewed journals. Media are permitted to capture images of slides and posters without the presenter's permission as background for reporting accuracy only.

Technical Exhibits. Technical exhibits cannot be videotaped or photographed without the expressed advance consent of the exhibitor. Crews must not enter or walk through the exhibit area with cameras rolling. Arrangements for taping establishing shots of wider areas of the show floor should be made through the Newsroom. Videotaping and photographing of technical exhibits by media must occur during posted exhibit hours. Interviews conducted with exhibitors must be used strictly for news reporting purposes without promotional consideration. Photo escorts are not required on the exhibit floor. However, media wishing to capture images or video on the exhibit floor must provide RSNA Newsroom staff with a planned shooting schedule in advance and a list of interviews conducted before the Newsroom closes each day. Advance shooting schedules should be sent to Linda Brooks via email at *media@rsna.org*.

USE OF AUDIO RECORDING EQUIPMENT Media may not affix taping devices to the speaker, lectern, speaker's table, microphone or McCormick Place power source during scientific or plenary presentations. Audio recordings are to be used for reportorial notes only.

ELECTRONIC EQUIPMENT/POWER SOURCE Media using video cameras, lights, audio recording equipment, computers or any other electronic equipment must provide their own battery-operated power source. Outside of the Newsroom, media may not plug into the McCormick Place power system.

PHOTOCOPYING A photocopier will be available in the Newsroom for the convenience of reporters. Arrangements should be made with the Newsroom receptionist.

EMAIL DISTRIBUTION LIST Press wishing to receive email notifications about upcoming news from future RSNA meetings can opt-in to the distribution list at the Newsroom front desk.

HEALTH & SAFETY As a health care organization, RSNA is strongly committed to protecting the health and safety of all meeting attendees and personnel. We will continue to monitor recommendations issued by the CDC and state/local health authorities and will adjust health and safety protocols as needed.

RSNA will not require vaccine validation for RSNA 2022.

RSNA 2022 will be a mask-friendly environment. Attendees may choose whether to wear a face mask based on their personal health assessment and comfort level onsite. RSNA strives to deliver a welcoming environment for all. We ask attendees to be respectful of other people's choices.

Failure to follow any of the policies outlined above will result in forfeiture of media credentials for RSNA 2022 and denial of credentials for subsequent RSNA meetings.

QUESTIONS CAN BE DIRECTED TO RSNA MEDIA RELATIONS: 1-630-590-7762 or *media@rsna.org*.

RSNA 2022 Press Kit
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Early Releases

Meeting Week

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Embargoed for release on Monday, Nov. 21, 2022, at 5:00 a.m. ET

NSAIDS May Worsen Arthritis Inflammation

AT A GLANCE

- **Long-term NSAID use for osteoarthritis of the knee may worsen inflammation of the joint.**
- **Joint inflammation and cartilage quality were worse at baseline in the participants taking NSAIDs, compared to the control group, and worsened at four-year follow-up.**
- **Osteoarthritis affects more than 500 million people worldwide.**

CHICAGO – Taking anti-inflammatory pain relievers like ibuprofen and naproxen for osteoarthritis may worsen inflammation in the knee joint over time, according to a new study being presented next week at the annual meeting of the Radiological Society of North America (RSNA).

Osteoarthritis is the most common form of arthritis, affecting more than 32 million adults in the U.S. and more than 500 million people worldwide. It occurs most frequently in the hands, hips and knees. In people with osteoarthritis, the cartilage that cushions the joint gradually wears away. Arthritis is often accompanied by inflammation, or swelling, of the joint, which can be painful.

Non-steroidal anti-inflammatory drugs (NSAIDs) are commonly prescribed for osteoarthritis pain and inflammation. But little is known of the long-term effects of these drugs on disease progression.

"To date, no curative therapy has been approved to cure or reduce the progression of knee osteoarthritis," said the study's lead author, Johanna Luitjens, postdoctoral scholar in the Department of Radiology and Biomedical Imaging at the University of California, San Francisco. "NSAIDs are frequently used to treat pain, but it is still an open discussion of how NSAID use influences outcomes for osteoarthritis patients. In particular, the impact of NSAIDs on synovitis, or the inflammation of the membrane lining the joint, has never been analyzed using MRI-based structural biomarkers."

Dr. Luitjens and colleagues set out to analyze the association between NSAID use and synovitis in patients with osteoarthritis of the knee and to assess how treatment with NSAIDs affects joint structure over time.

"Synovitis mediates development and progression of osteoarthritis and may be a therapeutic target," Dr. Luitjens said. "Therefore, the goal of our study was to analyze whether NSAID treatment influences the development or progression of synovitis and to investigate whether cartilage imaging biomarkers, which reflect changes in osteoarthritis, are impacted by NSAID treatment."

For the study, 277 participants from the Osteoarthritis Initiative cohort with moderate to severe osteoarthritis and sustained NSAID treatment for at least one year between baseline and four-year follow-up were included

in the study and compared with a group of 793 control participants who were not treated with NSAIDs. All participants underwent 3T MRI of the knee initially and after four years. Images were scored for biomarkers of inflammation.

Cartilage thickness, composition and other MRI measurements served as noninvasive biomarkers for evaluating arthritis progression.

The results showed no long-term benefit of NSAID use. Joint inflammation and cartilage quality were worse at baseline in the participants taking NSAIDs, compared to the control group, and worsened at four-year follow-up.

“In this large group of participants, we were able to show that there were no protective mechanisms from NSAIDs in reducing inflammation or slowing down progression of osteoarthritis of the knee joint,” Dr. Luitjens said. “The use of NSAIDs for their anti-inflammatory function has been frequently propagated in patients with osteoarthritis in recent years and should be revisited, since a positive impact on joint inflammation could not be demonstrated.”

According to Dr. Luitjens, there are several possible reasons why NSAID use increases synovitis.

“On the one hand, the anti-inflammatory effect that normally comes from NSAIDs may not effectively prevent synovitis, with progressive degenerative change resulting in worsening of synovitis over time,” she said. “On the other hand, patients who have synovitis and are taking pain-relieving medications may be physically more active due to pain relief, which could potentially lead to worsening of synovitis, although we adjusted for physical activity in our model.”

Dr. Luitjens noted that prospective, randomized studies should be performed in the future to provide conclusive evidence of the anti-inflammatory impact of NSAIDs.

Co-authors are Charles McCulloch, Ph.D., Thomas Link, M.D., Ph.D., Felix Gassert, M.D., Gabby Joseph, Ph.D., and John Lynch, Ph.D.

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Note: Copies of RSNA 2022 news releases and electronic images will be available online at *RSNA.org/press22*.

RSNA is an association of 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, Illinois. (*RSNA.org*)

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For patient-friendly information on knee MRI, visit *RadiologyInfo.org*.

RSNA Radiological Society of North America

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Embargoed for release on Monday, Nov. 21, 2022, at 5:00 a.m. ET

MRI Reveals Significant Brain Abnormalities Post-COVID

AT A GLANCE

- **Researchers identified changes to the brain stem and frontal lobe in patients months after COVID-19 infection.**
- **The affected brain regions are linked with fatigue, insomnia, anxiety, depression, headaches and cognitive problems.**
- **Susceptibility-weighted MRI aids in the detection and monitoring of a host of neurologic conditions.**

CHICAGO – Using a special type of MRI, researchers have uncovered brain changes in patients up to six months after they recovered from COVID-19, according to a study being presented next week at the annual meeting of the Radiological Society of North America (RSNA).

About one in five adults will develop long-term effects from COVID-19, according to the U.S. Centers for Disease Control and Prevention. Neurological symptoms associated with long COVID include difficulty thinking or concentrating, headache, sleep problems, lightheadedness, pins-and-needles sensation, change in smell or taste, and depression or anxiety. However, studies have found that COVID-19 may be associated with changes to the heart, lungs or other organs even in asymptomatic patients.

As more people become infected and recover from COVID-19, research has begun to emerge, focusing on the lasting consequences of the disease.

For this study, researchers used susceptibility-weighted imaging to analyze the effects that COVID-19 has on the brain. Magnetic susceptibility denotes how much certain materials, such as blood, iron and calcium, will become magnetized in an applied magnetic field. This ability aids in the detection and monitoring of a host of neurologic conditions including microbleeds, vascular malformations, brain tumors and stroke.

“Group-level studies have not previously focused on COVID-19 changes in magnetic susceptibility of the brain despite several case reports signaling such abnormalities,” said study co-author Sapna S. Mishra, a Ph.D. candidate at the Indian Institute of Technology in Delhi. “Our study highlights this new aspect of the neurological effects of COVID-19 and reports significant abnormalities in COVID survivors.”

The researchers analyzed the susceptibility-weighted imaging data of 46 COVID-recovered patients and 30 healthy controls. Imaging was done within six months of recovery. Among patients with long COVID, the most commonly reported symptoms were fatigue, trouble sleeping, lack of attention and memory issues.

“Changes in susceptibility values of brain regions may be indicative of local compositional changes,” Mishra said. “Susceptibilities may reflect the presence of abnormal quantities of paramagnetic compounds, whereas

lower susceptibility could be caused by abnormalities like calcification or lack of paramagnetic molecules containing iron."

MRI results showed that patients who recovered from COVID-19 had significantly higher susceptibility values in the frontal lobe and brain stem compared to healthy controls. The clusters obtained in the frontal lobe primarily show differences in the white matter.

"These brain regions are linked with fatigue, insomnia, anxiety, depression, headaches and cognitive problems," Mishra said.

Portions of the left orbital-inferior frontal gyrus (a key region for language comprehension and production) and right orbital-inferior frontal gyrus (associated with various cognitive functions including attention, motor inhibition and imagery, as well as social cognitive processes) and the adjacent white matter areas made up the frontal lobe clusters.

The researchers also found a significant difference in the right ventral diencephalon region of the brain stem. This region is associated with many crucial bodily functions, including coordinating with the endocrine system to release hormones, relaying sensory and motor signals to the cerebral cortex and regulating circadian rhythms (the sleep-wake cycle).

"This study points to serious long-term complications that may be caused by the coronavirus, even months after recovery from the infection," Mishra said. "The present findings are from the small temporal window. However, the longitudinal time points across a couple of years will elucidate if there exists any permanent change."

The researchers are conducting a longitudinal study on the same patient cohort to determine whether these brain abnormalities persist over a longer time frame.

Co-authors are Rakibul Hafiz, Ph.D., Tapan Gandhi, Ph.D., Vidur Mahajan, M.B.B.S., Alok Prasad, M.D., and Bharat Biswal, Ph.D.

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For patient-friendly information on brain MRI, visit *RadiologyInfo.org*.

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Embargoed for release on Tuesday, Nov. 22, 2022, at 5:00 a.m. ET

Lung Cancer Screening Dramatically Increases Long-term Survival Rate

AT A GLANCE

- **Early detection of lung cancer with low-dose CT screening drastically improves the long-term survival rate.**
- **The results of the large-scale international study showed that the overall 20-year survival rate for the 1,285 screening participants who were diagnosed with early-stage lung cancer was 80%.**
- **For participants with non-solid or partly solid lung nodules, the 20-year survival rate was 100%.**

CHICAGO – Diagnosing early-stage lung cancer with low-dose CT screening drastically improves the long-term survival rate of cancer patients, according to a large-scale, 20-year international study being presented next week at the annual meeting of the Radiological Society of North America (RSNA).

"While screening doesn't prevent cancers from occurring, it is an important tool in identifying lung cancers in their early stage when they can be surgically removed," said the study's lead author, Claudia Henschke, Ph.D., M.D., professor of radiology and director of the Early Lung and Cardiac Action Program at the Icahn School of Medicine at Mount Sinai in New York.

Lung cancer is the leading cause of cancer death. According to the American Lung Association, the average lung cancer five-year survival rate is 18.6 percent. Only 16 percent of lung cancers are diagnosed at an early stage, and more than half of people with lung cancer die within one year of being diagnosed.

While treatments of more advanced-stage cancers with targeted therapy and immunotherapy have come a long way, the best tool in the fight against cancer deaths is early diagnosis through low-dose CT screening before symptoms appear.

"Symptoms occur mainly in late-stage lung cancer," Dr. Henschke said. "Thus, the best way to find early-stage lung cancer is by enrolling in an annual screening program."

Dr. Henschke and colleagues have been studying the effectiveness of cancer detection with low-dose CT screening for years. The efforts of the researchers to advance CT screening for early lung disease led to the creation of the International Early Lung Cancer Action Program (I-ELCAP). Started in 1992, this multi-institution, multi-national research program has enrolled over 87,000 participants from over 80 institutions.

In 2006, the researchers identified a 10-year survival rate of 80% for the patients whose cancer was identified by CT screening. For this study, they looked at 20-year survival rates.

"What we present here is the 20-year follow-up on participants in our screening program that were diagnosed with lung cancer and subsequently treated," Dr. Henschke said. "The key finding is that even after this long a time interval they are not dying of their lung cancer."

The study found that the 20-year survival rate was 80% for the 1,285 I-ELCAP participants who were diagnosed with early-stage lung cancer. The survival rate for both the 139 participants with nonsolid cancerous lung nodules and the 155 participants with nodules of part-solid consistency was 100%. For the 991 participants with solid nodules, the survival rate was 73%.

The researchers also estimated survival for clinical Stage IA lung cancers and for resected pathologic stage IA lung cancers measuring 10mm or less in average diameter of length and width on the same CT image. A stage I lung cancer is a very small tumor that has not spread to any lymph nodes.

Lung cancer survival for clinical Stage IA participants was 86%, regardless of consistency. For participants with pathologic Stage IA cancers of 10 mm or less, the 20-year survival rate was 92%.

The results show that after 20 years, patients diagnosed with lung cancer at an early stage via CT screening have significantly better outcomes. By surgically removing the cancer when it is small enough, patients can be effectively cured in the long term.

The findings demonstrate the importance of routine and early screening.

"Ultimately, anyone interested in being screened needs to know that if they are unfortunate enough to develop lung cancer, that it can be cured if found early," Dr. Henschke said.

The U.S. Preventive Services Task Force recommends annual lung cancer screening with low-dose CT in adults aged 50 to 80 years who have a 20 pack-year smoking history and currently smoke or have quit within the past 15 years.

Co-authors are David F. Yankelevitz, M.D., Daniel M. Libby, James Smith, M.D., Mark Pasmantier, M.D., and Rowena Yip, M.P.H.

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Embargoed for release on Tuesday, Nov. 22, 2022, at 5:00 a.m. ET

Drinking During Pregnancy Changes Baby's Brain Structure

AT A GLANCE

- **Alcohol consumption during pregnancy can change the unborn baby's brain structure and delay brain development.**
- **Using fetal MRI, researchers observed structural brain changes in regions related to key functions including language development.**
- **Significant changes were seen in fetal brains even when the mothers consumed less than one alcoholic beverage per week.**

CHICAGO – A new MRI study revealed that consumption of alcohol even in low to moderate amounts during pregnancy can change the baby's brain structure and delay brain development. Results of the study will be presented next week at the annual meeting of the Radiological Society of North America (RSNA).

"Fetal MRI is a highly specialized and safe examination method that allows us to make accurate statements about brain maturation prenatally," said study senior author Gregor Kasprian, M.D., associate professor of radiology from the Department of Biomedical Imaging and Image-guided Therapy of the Medical University of Vienna in Austria.

Alcohol consumption during pregnancy can expose the fetus to a group of conditions called fetal alcohol spectrum disorders. Babies born with fetal alcohol spectrum disorders could develop learning disabilities, behavioral problems or speech and language delays.

"Unfortunately, many pregnant women are unaware of the influence of alcohol on the fetus during pregnancy," said lead author Patric Kienast, M.D., a Ph.D. student in the Department of Biomedical Imaging and Image-Guided Therapy, Division of Neuroradiology and Musculoskeletal Radiology at the Medical University of Vienna. "Therefore, it is our responsibility not only to do the research but also to actively educate the public about the effects of alcohol on the fetus."

For the study, researchers analyzed MRI exams of 24 fetuses with prenatal alcohol exposure. The fetuses were between 22 and 36 weeks of gestation at the time of MRI. Alcohol exposure was determined via anonymous surveys of the mothers. The questionnaires used were the Pregnancy Risk Assessment Monitoring System (PRAMS), a surveillance project of the Centers for Disease Control and Prevention and health departments, and the T-ACE Screening Tool, a measurement tool of four questions that identify risk drinking.

In fetuses with alcohol exposure, the fetal total maturation score (fTMS) was significantly lower than in the age-matched controls, and the right superior temporal sulcus (STS) was shallower. The STS is involved in social cognition, audiovisual integration and language perception.

"We found the greatest changes in the temporal brain region and STS," Dr. Kasprian said. "We know that this region, and specifically the formation of the STS, has a great influence on language development during childhood."

Brain changes were seen in the fetuses even at low levels of alcohol exposure.

"Seventeen of 24 mothers drank alcohol relatively infrequently, with average alcohol consumption of less than one alcoholic drink per week," Dr. Kienast said. "Nevertheless, we were able to detect significant changes in these fetuses based on prenatal MRI."

Three mothers drank one to three drinks per week, and two mothers drank four to six drinks per week. One mother consumed an average of 14 or more drinks per week. Six mothers also reported at least one binge drinking event (exceeding four drinks on one occasion) during pregnancy.

According to the researchers, delayed fetal brain development could be specifically related to a delayed stage of myelination and less distinct gyrification in the frontal and occipital lobes.

The myelination process is critical to brain and nervous system function. Myelin protects nerve cells, allowing them to transmit information faster. Important developmental milestones in infants, as rolling over, crawling and language processing are directly linked to myelination.

Gyrification refers to the formation of the folds of the cerebral cortex. This folding enlarges the surface area of the cortex with limited space in the skull, enabling an increase in cognitive performance. When gyrification is diminished, functionality is reduced.

"Pregnant women should strictly avoid alcohol consumption," Dr. Kienast said. "As we show in our study, even low levels of alcohol consumption can lead to structural changes in brain development and delayed brain maturation."

It is unclear how these structural changes will affect brain development in these babies after birth.

"To assess this accurately, we need to wait for the children who were examined as fetuses at that time to get a little older, so that we can invite them back for further examinations," Dr. Kienast said. "However, we can strongly assume that the changes we discovered contribute to the cognitive and behavioral difficulties that may occur during childhood."

Co-authors are Marlene Stuempflen, M.D., Daniela Prayer, M.D., Benjamin Sigl, M.D., Mariana Schuette, M.D., Ph.D., and Sarah Glatter, M.D., M.M.Sc.

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Embargoed for release on Wednesday, Nov. 23, 2022, at 5:00 a.m. ET

Researchers Identify Brain Markers of ADHD in Children

AT A GLANCE

- **Researchers analyzing MRI data on nearly 8,000 children have identified biomarkers of ADHD.**
- **Patients with ADHD had abnormal connectivity in the brain networks involved in memory processing and auditory processing, brain cortex thinning and significant white matter microstructural changes.**
- **MRI provides an objective means of identifying children with ADHD.**

CHICAGO – Researchers analyzing the data from MRI exams on nearly 8,000 children have identified biomarkers of attention-deficit/hyperactivity disorder (ADHD) and a possible role for neuroimaging machine learning to help with the diagnosis, treatment planning and surveillance of the disorder. The results of the new study will be presented next week at the annual meeting of the Radiological Society of North America (RSNA).

According to the Centers for Disease Control and Prevention, ADHD is one of the most common neurodevelopmental disorders in childhood, affecting approximately 6 million American children between the ages of 3 and 17 years.

Children with the disorder may have trouble paying attention and controlling impulsive behaviors, or they may be overly active. Diagnosis relies on a checklist completed by the child's caregiver to rate the presence of ADHD symptoms.

"There's a need for a more objective methodology for a more efficient and reliable diagnosis," said study co-author Huang Lin, a post-graduate researcher at the Yale School of Medicine in New Haven, Connecticut. "ADHD symptoms are often undiagnosed or misdiagnosed because the evaluation is subjective."

The researchers used MRI data from the Adolescent Brain Cognitive Development (ABCD) study, the largest long-term study of brain development and child health in the United States. The ABCD study involves 11,878 children aged 9-10 years from 21 centers across the country to represent the sociodemographic diversity in the U.S.

"The demographics of our group mirror the U.S. population, making our results clinically applicable to the general population," Lin said.

After exclusions, Lin's study group included 7,805 patients, including 1,798 diagnosed with ADHD, all of whom underwent structural MRI scans, diffusion tensor imaging and resting-state functional MRI. The researchers performed a statistical analysis of the imaging data to determine the association of ADHD with

neuroimaging metrics including brain volume, surface area, white matter integrity and functional connectivity.

“We found changes in almost all the regions of the brain we investigated,” Lin said. “The pervasiveness throughout the whole brain was surprising since many prior studies have identified changes in selective regions of the brain.”

In the patients with ADHD, the researchers observed abnormal connectivity in the brain networks involved in memory processing and auditory processing, a thinning of the brain cortex, and significant white matter microstructural changes, especially in the frontal lobe of the brain.

“The frontal lobe is the area of the brain involved in governing impulsivity and attention or lack thereof—two of the leading symptoms of ADHD,” Lin said.

Lin said MRI data was significant enough that it could be used as input for machine learning models to predict an ADHD diagnosis. Machine learning, a type of artificial intelligence, makes it possible to analyze large amounts of MRI data.

“Our study underscores that ADHD is a neurological disorder with neuro-structural and functional manifestations in the brain, not just a purely externalized behavior syndrome,” she said.

Lin said the population-level data from the study offers reassurance that the MRI biomarkers give a solid picture of the brain.

“At times when a clinical diagnosis is in doubt, objective brain MRI scans can help to clearly identify affected children,” Lin said. “Objective MRI biomarkers can be used for decision making in ADHD diagnosis, treatment planning and treatment monitoring.”

Senior author Sam Payabvash, M.D., a neuroradiologist and assistant professor of radiology at the Yale School of Medicine, noted that recent trials have reported microstructural changes in response to therapy among ADHD children.

“Our study provides novel and multimodal neuroimaging biomarkers as potential therapeutic targets in these children,” he said.

Co-authors are Stefan Haider, Clara Weber and Simone Kaltenhauser.

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Embargoed for release on Wednesday, Nov. 23, 2022, at 5:00 a.m. ET

Ultra-high-res MRI Reveals Migraine Brain Changes

AT A GLANCE

- **Researchers using ultra-high-resolution MRI have identified enlarged perivascular spaces in the brains of migraine sufferers.**
- **Perivascular spaces surround the blood vessels and help clear fluids from the brain.**
- **Up to 148 million people worldwide suffer from chronic migraine.**

CHICAGO – For the first time, a new study has identified enlarged perivascular spaces in the brains of migraine sufferers. Results of the study will be presented next week at the annual meeting of the Radiological Society of North America (RSNA).

"In people with chronic migraine and episodic migraine without aura, there are significant changes in the perivascular spaces of a brain region called the centrum semiovale," said study co-author Wilson Xu, an M.D. candidate at Keck School of Medicine of the University of Southern California in Los Angeles. "These changes have never been reported before."

Migraine is a common, often debilitating condition, involving a severe recurring headache. Migraines may also cause nausea, weakness and light sensitivity. According to the American Migraine Foundation, over 37 million people in the U.S. are affected by migraine, and up to 148 million people worldwide suffer from chronic migraine.

Perivascular spaces are fluid-filled spaces surrounding blood vessels in the brain. They are most commonly located in the basal ganglia and white matter of the cerebrum, and along the optic tract. Perivascular spaces are affected by several factors, including abnormalities at the blood-brain barrier and inflammation. Enlarged perivascular spaces can be a signal of underlying small vessel disease.

"Perivascular spaces are part of a fluid clearance system in the brain," Xu said. "Studying how they contribute to migraine could help us better understand the complexities of how migraines occur."

Xu and colleagues set out to determine the association between migraine and enlarged perivascular spaces. The researchers used ultra-high-field 7T MRI to compare structural microvascular changes in different types of migraine.

"To our knowledge, this is first study using ultra-high-resolution MRI to study microvascular changes in the brain due to migraine, particularly in perivascular spaces," Xu said. "Because 7T MRI is able to create images of the brain with much higher resolution and better quality than other MRI types, it can be used to demonstrate much smaller changes that happen in brain tissue after a migraine."

Study participants included 10 with chronic migraine, 10 with episodic migraine without aura, and five age-matched healthy controls. All patients were between 25 and 60 years old. Patients with overt cognitive impairment, brain tumor, prior intracranial surgery, MRI contraindications and claustrophobia were excluded from the study.

The researchers calculated enlarged perivascular spaces in the centrum semiovale (central area of white matter) and basal ganglia areas of the brain. White matter hyperintensities—lesions that "light up" on MRI—were measured using the Fazekas scale. Cerebral microbleeds were rated with the microbleed anatomical rating scale. The researchers also collected clinical data such as disease duration and severity, symptoms at time of scan, presence of aura and side of headache.

Statistical analysis revealed that the number of enlarged perivascular spaces in the centrum semiovale was significantly higher in patients with migraine compared to healthy controls. In addition, enlarged perivascular space quantity in the centrum semiovale correlated with deep white matter hyperintensity severity in migraine patients.

"We studied chronic migraine and episodic migraine without aura and found that, for both types of migraine, perivascular spaces were bigger in the centrum semiovale," Xu said. "Although we didn't find any significant changes in the severity of white matter lesions in patients with and without migraine, these white matter lesions were significantly linked to the presence of enlarged perivascular spaces. This suggests that changes in perivascular spaces could lead to future development of more white matter lesions."

The researchers hypothesize that significant differences in the perivascular spaces in patients with migraine compared to the healthy controls might be suggestive of glymphatic disruption within the brain. The glymphatic system is a waste clearance system that utilizes perivascular channels to help eliminate soluble proteins and metabolites from the central nervous system.

However, whether such changes affect migraine development or result from migraine is unknown. Continued study with larger case populations and longitudinal follow-up will better establish the relationship between structural changes and migraine development and type.

"The results of our study could help inspire future, larger-scale studies to continue investigating how changes in the brain's microscopic vessels and blood supply contribute to different migraine types," Xu said. "Eventually, this could help us develop new, personalized ways to diagnose and treat migraine."

Co-authors are Brendon Chou, Giuseppe Barisano, Raymond Huang, Soniya Pinto, M.D., Daniel Chang Phung, M.D., Soma Sahai-Srivastava, Alexander Lerner, M.D., and Nasim Sheikh Bahaei, M.D., FRCR.

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Embargoed for release on Sunday, Nov. 27, 2022, at 4 p.m. ET

Matthew A. Mauro, M.D., Named President of the RSNA Board

CHICAGO – Matthew A. Mauro, M.D., was named president of the Radiological Society of North America (RSNA) Board of Directors today at the Society's annual meeting.

Dr. Mauro is president of University of North Carolina (UNC) Faculty Physicians and senior physician executive of UNC Health Care System Revenue Cycle. He is the James H. Scatliff Distinguished Professor of Radiology, as well as a professor of surgery at the UNC School of Medicine in Chapel Hill. He has been a faculty member at UNC since 1982.

Dr. Mauro received his medical degree in 1977 from Cornell University Medical College in New York. He completed his residency training in 1980 at the UNC School of Medicine and was chief resident during his last year. Between 1980 and 1982, Dr. Mauro completed fellowships in diagnostic and vascular radiology at UNC and abdominal and interventional radiology at the Mallinckrodt Institute of Radiology at the Washington University School of Medicine in St. Louis.

As RSNA president, Dr. Mauro will support RSNA's mission by shepherding the Society through the evolving health care landscape and advancing the field of radiology through dissemination of high-quality research and education.

"The health care landscape is rapidly changing as we enter our post-pandemic environment," Dr. Mauro said. "In addition to technical and scientific advances, we can anticipate changes to our health care delivery systems, labor management and patient expectations. The RSNA will maintain our position as the great convener for all those who interact with our members to advance the fields of diagnostic radiology, interventional radiology, radiation oncology and medical physics. I am honored to have the privilege of serving as president of the RSNA."

A prolific researcher, Dr. Mauro has published over 150 journal articles and numerous book chapters. He has co-authored five books. His textbook, *Image-Guided Interventions*, serves as a standard reference in the field. Dr. Mauro has given dozens of scientific research presentations nationally and internationally and has been an invited lecturer or visiting professor at over 200 institutions and meetings worldwide. He has served as principal or co-investigator on numerous funded grants, including several grants focused on diagnostic atherosclerosis imaging and treatment of complex pathology of the descending thoracic aorta.

A dedicated RSNA volunteer, Dr. Mauro served on the Scientific Program Committee beginning in 2005, and as chair from 2009 to 2013. He served on the Public Information Advisors Network from 2002 to 2011. Dr. Mauro is a regular faculty member for annual meeting educational courses and was the associate editor

of *Radiology* from 2002 to 2007. He has served on the RSNA Research & Education (R&E) Foundation Public Relations Committee and the Corporate Giving Subcommittee, and as an R&E Foundation grant reviewer. He currently serves on the R&E Foundation's Board of Directors. Dr. Mauro joined the RSNA Board of Directors in 2015, serving as Liaison for Education.

Dr. Mauro has worked extensively with the Society of Interventional Radiology (SIR), where he was on the Board of Directors from 1996 to 2000, serving as president during his last year. With SIR, he served on the Executive Council from 1994 to 2000 and from 2002 to 2006. He was on the Scientific Program Committee from 2000 to 2002, served on the Steering Committee for the World Conference on Interventional Oncology in 2005 and held many other positions between 1992 and 2006.

Dr. Mauro has served on a number of editorial boards, including *Clinical Imaging*, *Applied Radiology*, *American Journal of Roentgenology* and *Seminars in Interventional Radiology*, among others. He has been a manuscript reviewer for several journals, including *RadioGraphics*, *Journal of Interventional Radiology*, *Cardiovascular and Interventional Radiology*, *Journal of Vascular Surgery* and *Pediatrics*. Dr. Mauro has been a book reviewer for *Gastrointestinal Radiology*, *Journal of Vascular and Interventional Radiology*, *Investigative Radiology* and *Academic Radiology*.

Since 2020, Dr. Mauro has been the RSNA Representative to the Academy for Radiology & Biomedical Imaging Research Executive Committee. He was past president of the Southeastern Angiographic Society, where he served on the Board of Directors from 2012 to 2018. Dr. Mauro has served on the American Heart Association's Scientific Sessions Program Committee, as well as the Executive Committee, and he served on the Board of Chancellors of the American College of Radiology from 2003 to 2009. At the American Board of Radiology (ABR), Dr. Mauro served on the Board of Governors from 2015 to 2018 and on the Executive Committee from 2013 to 2015. He was trustee from 2006 to 2015.

He was awarded the gold medal by SIR in 2014. The ABR has presented Dr. Mauro with both the Distinguished Service Award and the Lifetime Service Award.

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Curtis P. Langlotz, M.D., Ph.D., Named Chair of the RSNA Board

CHICAGO – Curtis P. Langlotz, M.D., Ph.D., was named chair of the Radiological Society of North America (RSNA) Board of Directors today at the Society's annual meeting.

A renowned imaging informatics leader and committed advocate for improved clinical communication, Dr. Langlotz is professor of radiology, medicine and biomedical data science, director of the Center for Artificial Intelligence in Medicine and Imaging, and associate chair for information systems in the Department of Radiology at Stanford University. As a medical informatics director for Stanford Health Care, he sets strategy for the computer technology that supports the Stanford Radiology practice.

As RSNA chair, Dr. Langlotz will support the innovative work being done to advance medical imaging technologies—particularly in the areas of informatics and artificial intelligence—and work with the Board of Directors to continue to deliver an outstanding annual meeting experience for attendees.

"In the coming year, RSNA will continue to develop innovative programs, both virtual and in-person, that deliver the latest in education and research," Dr. Langlotz said. "We will continue to evolve our annual meeting, which offers unparalleled educational opportunities, cutting-edge scientific research and a place to connect with industry leaders offering the latest imaging technologies."

Dr. Langlotz received his medical degree, a master's degree in artificial intelligence and a doctorate in medical information science from Stanford University. He completed an internship and radiology residency at the University of Pennsylvania, where he remained on the faculty for 20 years. He accepted his current position at Stanford in 2014.

A longtime RSNA member, Dr. Langlotz served for many years on RSNA's Radiology Informatics Committee and has served the Society as an informatics advisor. He led the development of numerous RSNA informatics initiatives, including the RadLex terminology standard, the LOINC-RadLex Playbook of standard exam codes and the RSNA imaging AI certificate program.

Dr. Langlotz has also served as a member of the RSNA Publications Council, the Research Development Committee, the *Radiology* Editor Search Committee and the Steering Committee for the RSNA Digital Roadmap. He has served on the RSNA Board of Directors since 2016 as the Liaison for Information Technology and Annual Meeting.

His biomedical informatics research laboratory aims to reduce diagnostic errors and improve the accuracy and consistency of clinical communication by developing novel AI algorithms that provide real-time assistance to radiologists, clinicians and patients. In addition to over 150 scholarly publications, Dr. Langlotz authored numerous peer-reviewed research articles, reviews, committee publications and editorials, as well as *The Radiology Report: A Guide to Thoughtful Communication for Radiologists and Other Medical Professionals*. He co-edited *Cancer Informatics: Essential Technologies for Clinical Trials.*

Dr. Langlotz and his trainees have been recognized for their contributions to radiology research with numerous scientific awards, including seven best paper awards and five research career development grants.

He is a principal investigator for several projects funded by the National Institutes of Health (NIH), including the Medical Imaging and Data Resource Center (MIDRC), an open-source database containing medical images from over one hundred thousand COVID-19 patients to help doctors better understand, diagnose, monitor and treat COVID-19.

Dr. Langlotz founded and is a past president of the Radiology Alliance for Health Services Research. He received its career achievement award in 2017. Dr. Langlotz served as chair of the Society for Imaging Informatics in Medicine (SIIM) and as a board member of the Association of University Radiologists and the American Medical Informatics Association. He has served on the external advisory board of the National Cancer Institute's Imaging Data Commons for the past two years.

Dr. Langlotz has founded three health care information technology companies, most recently Montage Healthcare Solutions, which was acquired by Nuance Communications in 2016.

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Obesity Linked to Poor Brain Health in Children

AT A GLANCE

- **Higher weight and body mass index are associated with poor brain health in children.**
- **Researchers observed structural brain changes in overweight children between the ages of 9 and 10, including significant impairment to the integrity of the white matter.**
- **Increased weight was associated with decreased connectivity in the functional networks of the brain that involve cognitive control, motivation and reward-based decision making.**

CHICAGO – Using MRI data from the largest long-term study of brain development and child health in the United States, researchers have found that higher weight and body mass index (BMI) in pre-adolescence are associated with poor brain health. The findings are being presented today at the annual meeting of the Radiological Society of North America (RSNA).

"We know being obese as an adult is associated with poor brain health," said researcher Simone Kaltenhauser, a post-graduate research fellow in radiology and biomedical imaging at the Yale School of Medicine in New Haven, Connecticut. "However, previous studies on children have often focused on small, specific study populations or single aspects of brain health."

Childhood obesity is a growing concern in the U.S. According to the Centers for Disease Control and Prevention, approximately one in every five American children is obese.

Kaltenhauser's study used imaging data from the Adolescent Brain Cognitive Development (ABCD) study that included 11,878 children aged 9-10 years from 21 centers across the country to represent the sociodemographic diversity in the U.S.

"This dataset is unique in that it closely approximates the U.S. population," Kaltenhauser said.

After excluding children with eating disorders, neurodevelopmental and psychiatric diseases, and traumatic brain injury, the study group included 5,169 children (51.9% female). According to the children's BMI z-scores—measures of relative weight adjusted for a child's age, sex and height—the overweight and obesity rates within the study group were 21% and 17.6%, respectively.

To gain a comprehensive view of brain health within the study group, the team evaluated information from structural MRI and 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 researchers also evaluated

data from diffusion tensor imaging—a technique that helps assess white matter—and restriction spectrum imaging, an advanced diffusion MRI technique.

After correcting for age, sex, race-ethnicity, handedness and socioeconomic status, the research team used linear models to determine associations between weight and BMI z-scores and the imaging metrics.

The researchers observed structural brain changes in children with higher weight and BMI z-scores, including significant impairment to the integrity of the white matter. Areas of degradation included the white matter of the corpus callosum, the principal connector between the brain's two hemispheres, and tracts within the hemispheres that connect the lobes of the brain.

"It is striking that these changes were visible early on during childhood," Kaltenhauser said.

The researchers also observed a thinning of the outermost layer of the brain, or the cortex, which has been associated with impaired executive function.

"We expected the decrease in cortical thickness among the higher weight and BMI z-score children, as this was found previously in smaller subsamples of the ABCD study," Kaltenhauser said. "However, we were surprised by the extent of white matter impairment."

Resting-state fMRI images revealed that increased weight and BMI z-scores were associated with decreased connectivity in the functional networks of the brain that involve cognitive control, motivation and reward-based decision making.

"Increased BMI and weight are not only associated with physical health consequences but also with brain health," Kaltenhauser said. "Our study showed that higher weight and BMI z-scores in 9- and 10-year-olds were associated with changes in macrostructures, microstructures and functional connectivity that worsened brain health."

Senior author Sam Payabvash, M.D., a neuroradiologist and assistant professor of radiology and biomedical imaging at the Yale School of Medicine, said the study's findings provide an important mechanistic explanation of other studies that show higher BMI in children is associated with poor cognitive functioning and school performance.

"The longitudinal ABCD study gives us the opportunity to observe any changes that occur in children with higher weight and BMI z-scores," Dr. Payabvash said. "We'll need to watch over the next 6 to 10 years."

Co-authors are Clara Weber, Huang Lin, Ajay Malhotra, M.B.B.S., M.D., R. Todd Constable, Ph.D., Julián N. Acosta, M.D., Guido J. Falcone, M.D., Sarah N. Taylor, M.D., Laura R. Ment, M.D., and Kevin N. Sheth M.D.

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Steroid Injections Worsen Knee Arthritis

AT A GLANCE

- **Compared to patients who received an injection of hyaluronic acid or no treatment at all, patients injected with corticosteroids had significantly more knee osteoarthritis progression.**
- **In one study, hyaluronic injections showed a decreased progression of knee arthritis, specifically in bone marrow lesions.**
- **A second study found that patients who received corticosteroid injections had significantly more medial joint space narrowing.**

CHICAGO – Two studies comparing injections commonly used to relieve the pain of knee osteoarthritis found that corticosteroid injections were associated with the progression of the disease. Results of both studies were presented today at the annual meeting of the Radiological Society of North America (RSNA).

Osteoarthritis is the most common form of arthritis, affecting 32.5 million adults in the U.S. Knee osteoarthritis is a chronic, degenerative and progressive condition with an estimated incidence of 800,000 patients each year. More than 10% of patients with knee osteoarthritis seek noninvasive treatment for pain relief through corticosteroid or hyaluronic acid injections.

Researchers in both studies chose cohorts from the Osteoarthritis Initiative, a multicenter, longitudinal, observational study of nearly 5,000 participants with knee osteoarthritis currently in its 14th year of follow-up.

In the first study, researchers at the University of California, San Francisco included 210 Osteoarthritis Initiative participants, 70 of whom received intraarticular injections, and a control group of 140 who did not receive injections during a two-year period. Of the 70 patients who received injections, 44 were injected with corticosteroids, and 26 were injected with hyaluronic acid. The treatment and control groups were matched by age, sex, body mass index, pain and physical activity scores, and severity of disease.

MRI was performed on all patients at the time of the injection and two years before and after. The MRI scans were assessed using whole-organ magnetic resonance imaging score (WORMS), a grading system for knee osteoarthritis that focuses on the meniscus, bone marrow lesions, cartilage, joint effusion and ligaments. The researchers identified osteoarthritis progression by comparing the imaging scores from the initial scans and two-year follow-up scans.

“This is the first direct comparison of corticosteroid and hyaluronic acid injections using the semi-quantitative, whole organ assessment of the knee with MRI,” said Upasana Upadhyay Bharadwaj, M.D., a research fellow in the Department of Radiology at University of California, San Francisco.

Statistical analysis showed that corticosteroid knee injections were significantly associated with the overall progression of osteoarthritis in the knee, specifically in the lateral meniscus, lateral cartilage and medial cartilage.

Hyaluronic acid knee injections were not significantly associated with the progression of osteoarthritis in the knee. Compared to the control group, the group who received hyaluronic injections showed a decreased progression of osteoarthritis, specifically in bone marrow lesions.

“While both corticosteroid and hyaluronic acid injections are reported to help with symptomatic pain relief for knee osteoarthritis, our results conclusively show that corticosteroids are associated with significant progression of knee osteoarthritis up to two years post-injection and must be administered with caution,” Dr. Upadhyay Bharadwaj said. “Hyaluronic acid, on the other hand, may slow down progression of knee osteoarthritis and alleviate long term effects while offering symptomatic relief.”

In the second study, researchers at the Chicago Medical School of Rosalind Franklin University of Medicine and Science conducted a case-control study comparing the radiographic progression of osteoarthritis in patients who received injections of corticosteroids and hyaluronic acid.

“While these injections provide some patients with short-term pain relief, the effects of the injections on the progression of the disease are unknown,” said researcher and medical student Azad Darbandi.

Darbandi’s team selected a cohort of 150 patients with similar baseline characteristics from the Osteoarthritis Initiative database, including 50 patients who received corticosteroid injections, 50 who received hyaluronic acid injections, and 50 who were not injected over a 36-month time period. The groups were matched by sex, body mass index and X-ray findings.

Patients underwent X-ray imaging of the knee at baseline and two years later. The researchers analyzed the X-ray imaging, including joint space narrowing, formation of bone spurs, and bone thickening around the knee cartilage.

Compared to patients who received an injection of hyaluronic acid or no treatment at all, patients injected with corticosteroids had significantly more osteoarthritis progression, including medial joint space narrowing, a hallmark of the disease.

“Even though imaging findings for all patients were similar at baseline, the imaging hallmarks of osteoarthritis were worse two years later in patients who received corticosteroid injections compared to patients who received hyaluronic acid injections or no treatment at all,” Darbandi said. “The results suggest that hyaluronic acid injections should be further explored for the management of knee osteoarthritis symptoms, and that steroid injections should be utilized with more caution.”

“Knowing the long-term effects of these injections will help osteoarthritis patients and clinicians make more informed decisions for managing the disease and the pain it causes,” Dr. Upadhyay Bharadwaj added.

Dr. Upadhyay Bharadwaj’s co-authors are Thomas Link, M.D., Ph.D., Zehra Akkaya, Gabby Joseph, John Lynch, Ph.D., and Paula Giesler. Darbandi’s co-authors are Sean Hormozian, Atefe Pooyan, M.D., Ehsan Alipour, M.D., Firoozeh Shomal Zadeh, M.D., Parham Pezeshk, M.D., and Majid Chalian, M.D.

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High Deductible Leads Women to Skip Testing after Abnormal Mammogram

AT A GLANCE

- **If they had to pay a deductible, more than 21% of women said they would skip additional testing after an abnormal mammogram finding, and 18% said they would skip the screening mammogram.**
- **Hispanic women were most likely to skip additional testing.**
- **The Affordable Care Act removed out-of-pocket costs for screening mammograms under most health plans but does not cover costs for additional imaging or biopsy.**

CHICAGO – One in five women is likely to forgo additional testing after an abnormal finding on a screening mammogram if there is a deductible, according to a new study presented today at the annual meeting of the Radiological Society of North America (RSNA).

As health care costs and insurance premiums have increased in recent years and with the advent of the Affordable Care Act (ACA), high-deductible health plans (HDHPs) have grown in popularity, particularly among younger, healthy people.

It is believed that HDHPs lower overall health care costs by making individuals more cognizant of their medical expenses. The higher deductible also lowers monthly insurance premiums, making these plans an attractive option for healthy people who may typically need coverage only for preventative care or health emergencies.

But while HDHPs offer some advantages, the high out-of-pocket deductible cost—in excess of $1,400 for individuals and $2,800 for families—may prevent people from seeking necessary care.

"The ACA removed out-of-pocket costs for screening mammograms under most health plans to encourage women to partake in this important preventative health care measure," said the study's lead author, Michael Ngo, M.D., radiology resident at Boston Medical Center and Boston University Chobanian & Avedisian School of Medicine. "However, the screening mammogram is only the first step in detecting breast cancer. If the radiologist detects an abnormal finding on the screening image, then additional images and a biopsy are needed to determine if the patient has cancer. The ACA does not mandate insurance to cover the costs of these additional services."

Dr. Ngo and colleagues set out to determine the relationship between HDHPs and patient's willingness to undergo indicated breast imaging.

"Prior studies have shown that out-of-pocket costs deter patients from attending screening mammography," Dr. Ngo said. "Other studies found that screening rates go down when there is an out-of-pocket cost for follow-up imaging after an abnormal finding on screening mammography. However, there is a lack of

research into patient adherence to the recommended follow-up imaging when there is a deductible. Our research aims to address this paucity."

For the study, the researchers surveyed 932 patients presenting for breast imaging at Boston Medical Center between September 2021 and February 2022. The survey was comprised of demographic questions on race, education level, annual household income and insurance payor, as well as scenarios about utilization of breast imaging. There was a variable response rate on questions.

When asked whether they would skip indicated imaging if they knew they had to pay a deductible, of 714 respondents, 151 (21.2%) said they would skip imaging, 424 (59.4%) said they would not skip imaging, and 139 (19.5%) were undecided.

The groups with the highest percentage of responses indicating they would skip additional imaging were Hispanic (33.0%), high school educated or less (31.0%), household income less than $35,000 (27.0%) and Medicaid/uninsured (31.5%).

The survey also asked whether respondents would forgo the initial screening mammography exam if they knew they would have to pay a deductible for follow-up tests. Of 707 respondents, 129 (18.3%) said they would skip the screening mammography exam, 465 (65.8%) would not skip mammography, and 113 (16.0%) were undecided.

"The results show that a deductible payment for follow-up breast imaging after an abnormal finding on screening mammography discourages 21% of women from returning for additional evaluation and appears to lead 18% of women to skip the initial free screening altogether," Dr. Ngo said.

Identifying socioeconomic barriers to health care is critical in addressing existing disparities and ensuring better outcomes for vulnerable patient populations. The researchers hope that these findings will be useful in efforts to remove financial barriers to care.

"Our study demonstrates that out-of-pocket payments will discourage people, especially those belonging in the most vulnerable populations, from completing the last steps in the breast cancer screening process," Dr. Ngo said. "These results could be used to advocate for legislation that will cover these important follow-up tests and prevent further exacerbation of existing health inequities."

Co-authors are Geunwon Kim, M.D. Ph.D., Priscilla J. Slanetz, M.D., M.P.H., and Muhammad Qureshi, M.B.B.S., M.P.H.

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AI Predicts Heart Disease Risk Using Single X-Ray

AT A GLANCE

- **Researchers developed a deep learning model that uses a single chest X-ray to predict the 10-year risk of death from a heart attack or stroke.**
- **Deep learning is an advanced type of artificial intelligence that can be trained to search X-ray images to find patterns associated with disease.**
- **The model used 147,497 chest X-rays from 40,643 participants.**

CHICAGO – Researchers have developed a deep learning model that uses a single chest X-ray to predict the 10-year risk of death from a heart attack or stroke, stemming from atherosclerotic cardiovascular disease. Results of the study were presented today at the annual meeting of the Radiological Society of North America (RSNA).

Deep learning is an advanced type of artificial intelligence (AI) that can be trained to search X-ray images to find patterns associated with disease.

"Our deep learning model offers a potential solution for population-based opportunistic screening of cardiovascular disease risk using existing chest X-ray images," said the study's lead author, Jakob Weiss, M.D., a radiologist affiliated with the Cardiovascular Imaging Research Center at Massachusetts General Hospital and the AI in Medicine program at the Brigham and Women's Hospital in Boston. "This type of screening could be used to identify individuals who would benefit from statin medication but are currently untreated."

Current guidelines recommend estimating 10-year risk of major adverse cardiovascular disease events to establish who should get a statin for primary prevention.

This risk is calculated using the atherosclerotic cardiovascular disease (ASCVD) risk score, a statistical model that considers a host of variables, including age, sex, race, systolic blood pressure, hypertension treatment, smoking, Type 2 diabetes and blood tests. Statin medication is recommended for patients with a 10-year risk of 7.5% or higher.

"The variables necessary to calculate ASCVD risk are often not available, which makes approaches for population-based screening desirable," Dr. Weiss said. "As chest X-rays are commonly available, our approach may help identify individuals at high risk."

Dr. Weiss and a team of researchers trained a deep learning model using a single chest X-ray (CXR) input. They developed the model, known as CXR-CVD risk, to predict the risk of death from cardiovascular disease using 147,497 chest X-rays from 40,643 participants in the Prostate, Lung, Colorectal, and Ovarian

Cancer Screening Trial, a multi-center, randomized controlled trial designed and sponsored by the National Cancer Institute.

“We’ve long recognized that X-rays capture information beyond traditional diagnostic findings, but we haven’t used this data because we haven’t had robust, reliable methods,” Dr. Weiss said. “Advances in AI are making it possible now.”

The researchers tested the model using a second independent cohort of 11,430 outpatients (mean age 60.1 years; 42.9% male) who had a routine outpatient chest X-ray at Mass General Brigham and were potentially eligible for statin therapy.

Of 11,430 patients, 1,096, or 9.6%, suffered a major adverse cardiac event over the median follow-up of 10.3 years. There was a significant association between the risk predicted by the CXR-CVD risk deep learning model and observed major cardiac events.

The researchers also compared the prognostic value of the model to the established clinical standard for deciding statin eligibility. This could be calculated in only 2,401 patients (21%) due to missing data (e.g., blood pressure, cholesterol) in the electronic record. For this subset of patients, the CXR-CVD risk model performed similarly to the established clinical standard and even provided incremental value.

“The beauty of this approach is you only need an X-ray, which is acquired millions of times a day across the world,” Dr. Weiss said. “Based on a single existing chest X-ray image, our deep learning model predicts future major adverse cardiovascular events with similar performance and incremental value to the established clinical standard.”

Dr. Weiss said additional research, including a controlled, randomized trial, is necessary to validate the deep learning model, which could ultimately serve as a decision-support tool for treating physicians.

“What we’ve shown is a chest X-ray is more than a chest X-ray,” Dr. Weiss said. “With an approach like this, we get a quantitative measure, which allows us to provide both diagnostic and prognostic information that helps the clinician and the patient.”

Co-authors are Vineet Raghu, Ph.D., Kaavya Paruchuri, M.D., Pradeep Natarajan, M.D., M.M.S.C., Hugo Aerts, Ph.D., and Michael T. Lu, M.D., M.P.H. Investigators were supported in part by funding from the National Academy of Medicine and the American Heart Association.

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Sunny with a Chance of Trauma: CT Scans Spike in Hot Weather

AT A GLANCE

- **Researchers have identified specific weather conditions that are associated with the number of whole-body CT scans performed on polytrauma patients.**
- **Hotter weather with more sunshine and UV light, less wind and fewer clouds was associated with a higher volume of polytrauma CTs.**
- **Using multiple machine learning algorithms on the historical data, the researchers' model predicted 74% of the above-normal polytrauma CT days.**

CHICAGO – Using a decade of weather and CT imaging data, researchers have identified specific weather conditions that are associated with the number of whole-body CT scans performed on polytrauma patients. The results of the new study will be presented today at the annual meeting of the Radiological Society of North America (RSNA).

"Trauma accounts for a large portion of hospital admissions, and since polytrauma is particularly time-consuming and unpredictable, we wanted to investigate the association between weather fluctuations and the number of polytrauma CTs performed at our hospital," said study co-author Martin Segeroth, M.D., a radiology resident in the Department of Radiology and Nuclear Medicine at the University of Basel in Switzerland.

Patients who suffer polytrauma sustain multiple traumatic injuries at once and typically require a whole-body CT that includes at least the chest, abdomen and pelvis. The exam requires a radiologist to provide an immediate reading and possible follow-up imaging and interpretation.

The researchers' dataset included 4,613 polytrauma CT scans performed in the Emergency Department of the University of Basel between 2011 and 2020. The median age of patients was 57 years, and 66% were male.

The research team collected daily weather data, including average temperature, total cloud cover, wind speed, sunshine duration and precipitation.

Statistical analysis of the weather and imaging data revealed that hotter weather with more sunshine and UV light, less wind and fewer clouds was associated with a higher volume of polytrauma CTs. Colder, windier, cloudier days with less sunshine and less UV light correlated with fewer polytrauma CTs. More polytrauma CTs were performed at the hospital in the summer months (April through September) compared to the winter months (October through March).

"Many hospital admission rates, most notably those for respiratory and cardiovascular disease, are linked to weather variations," Segeroth said.

The researchers also set out to forecast daily polytrauma CT occurrence by employing multiple machine learning algorithms on the historical data. Their model predicted 73% of the days where polytrauma CT use was higher than average and 83% of days where polytrauma use was lower than average.

“These results imply that our model could predict a higher-than-normal demand for polytrauma CT scanning on 253 days of a calendar year,” he said. “The amount of cloud cover and temperature were the most important parameters for predicting daily polytrauma CT occurrence.”

The exact relationship between hotter weather and the increase in trauma cases remains unclear.

“One speculation is that in the summer, people are engaging in more outdoor activities—for instance sports—whereas in winter people are less often outside,” Segeroth said. “Although we don't have an explanation for it, we’ve observed a strong association.”

Segeroth said the hospital is considering creating a dashboard on its intranet to alert staff when above-normal volumes of polytrauma CTs are expected.

“Our results demonstrate that it’s possible to partially forecast normal or above normal daily numbers of polytrauma CT volume based on weather data,” Segeroth said. “Any approach that helps us be more prepared for polytrauma patients would improve resource planning in the ER and Radiology Department.”

Co-authors are David Jean Winkel, M.D., Joshy Cyriac, Jan Vosshenrich, M.D., Tobias Heye, M.D., Hanns-Christian Breit, M.D., and Jakob Wasserthal.

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Non-Surgical Treatment Relieves Carpal Tunnel Syndrome

AT A GLANCE

- **A minimally invasive treatment for carpal tunnel syndrome provides complete and long-term relief for the condition.**
- **The 15-minute treatment involves injecting saline around a nerve to separate it from the surrounding tissue, effectively treating nerve entrapment of carpal tunnel without the need for surgery.**
- **Carpal tunnel syndrome affects about 3% of the U.S. population.**

CHICAGO –A minimally invasive treatment for carpal tunnel syndrome provides complete and long-term relief to patients without the use of corticosteroids, according to research being presented today at the annual meeting of the Radiological Society of North America (RSNA).

Carpal tunnel syndrome is a form of nerve entrapment neuropathy, which is when one of the body's peripheral nerves is being pressed on or squeezed. It occurs when the median nerves and tendons inside the carpal tunnel, a narrow and rigid passageway that runs from the forearm to the palm of the hand, are being pressed or squeezed at the wrist. This results in tingling, numbness and/or weakness of the fingers and hands. Carpal tunnel syndrome is the most common and widely known form of entrapment neuropathy, affecting about 3% of the U.S. population.

Surgery is often required to treat carpal tunnel syndrome when non-surgical methods, such as physical therapy or corticosteroid injections, are insufficient. The most common and widely used surgical method involves cutting the carpal ligament to reduce pressure on the median nerve. This method requires making an incision into the wrist.

But this new study shows that a technique called hydrodissection effectively treats nerve entrapments without the need for surgery or corticosteroids. It involves the injection of a liquid, usually saline, into a nerve to separate it from the surrounding tissue. Ultrasound guidance is used to accurately identify nerves.

"Previously, the studies that have been done on ultrasound-guided hydrodissection for carpal tunnel syndrome have used corticosteroids either alone or as a part of the injection, making it difficult to assess whether hydrodissection alone was beneficial, or if it was due to the effect of the steroids," said study lead author Anindita Bose, M.B.B.S., M.D., senior resident at the University College of Medical Sciences and Guru Teg Bahadur Hospital in Delhi, India.

For this randomized control trial, Dr. Bose and colleagues enrolled a total of 63 patients suffering from carpal tunnel syndrome. Researchers used the Boston Carpal Tunnel Questionnaire (BCTQ), the Visual Analog of Pain (VAS), and cross-sectional area ultrasounds of the median nerve to assess patient pain and symptoms before and after the procedure. The 63 patients were divided into three groups. Group one

received ultrasound-guided hydrodissection with just a saline injection. Group two received ultrasound-guided hydrodissection with an injection mixture of saline and corticosteroid. Group three received just an ultrasound-guided corticosteroid injection with no hydrodissection.

Follow-up was done at four weeks, 12 weeks and six months. At the four-week mark, all three groups of patients showed a reduction in pain. By the 12-week and six-month mark, both groups that received ultrasound-guided hydrodissection showed further improvement while the group that received just a corticosteroid injection reported a recurrence of symptoms and an increase in BCTQ and VAS scores.

Additionally, ultrasounds showed a significant reduction of median nerve cross-sectional area in both hydrodissection groups. Group one showed a reduction of 43%, and group two showed 46%. Group three showed only an 11% reduction.

The procedure is short, requiring only 10 to 15 minutes. It is also very cost-effective, since it doesn't require any high-end equipment, Dr. Bose said.

"It came as a pleasant surprise when this simple procedure of ultrasound-guided hydrodissection provided patients with long-term relief," said co-author Anupama Tandon, M.B.B.S, M.D., professor at the University College of Medical Sciences and Guru Teg Bahadur Hospital. "The patients were highly satisfied, as the cost was low, no anesthesia or hospitalization was needed, and they could go back in an hour's time and resume their routine work."

Co-authors are Siddharth Maheshwari, Gopesh Mehrotra, M.B.B.S., M.D., and Aditya N. Aggarwal.

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COVID-19 Patients Show Liver Injury Months After Infection

AT A GLANCE

- **COVID-19 infection is associated with increased liver stiffness, a marker of chronic injury, such as fibrosis.**
- **The accumulation of fibrosis can lead to liver cancer and liver failure.**
- **Increased liver stiffness was found with ultrasound elastography exams performed an average of 44 weeks after acute COVID-19 infection.**

CHICAGO – COVID-19 infection is associated with increased liver stiffness, a sign of possible long-term liver injury, according to the results of a new study being presented today at the annual meeting of the Radiological Society of North America (RSNA).

"Our study is part of emerging evidence that COVID-19 infection may lead to liver injury that lasts well after the acute illness," said Firouzeh Heidari, M.D., a post-doctorate research fellow at Massachusetts General Hospital in Boston.

Liver stiffness is a marker of liver damage, such as inflammation or fibrosis. Fibrosis is the buildup of scar tissue in the liver. Over time, healthy liver tissue diminishes, and the liver can no longer function properly. Progressive fibrosis can lead to liver cancer and liver failure.

In the retrospective study, the researchers compared liver stiffness of patients with a history of COVID-19 infection to two control groups. All patients underwent ultrasound shear wave elastography between 2019 and 2022 at Massachusetts General Hospital. Shear wave elastography is a specialized technique that uses sound waves to measure the stiffness of tissue.

The patients were categorized into one of three groups based on when they underwent elastography and whether they tested positive for COVID-19. The COVID-19 positive group contained 31 patients who had a positive COVID-19 PCR test result at least 12 weeks before the elastography exam. The pandemic control group consisted of a random sample of 50 patients who underwent elastography during the COVID-19 pandemic and had a history of only negative COVID-19 PCR test results. The pre-pandemic control group consisted of a random sample of 50 patients who underwent an elastography exam prior to the COVID-19 pandemic.

The mean age was 53.1 years for the COVID-positive patients, 55.2 years for the pandemic control group and 58.2 years for the pre-pandemic control group. Of the total cohort, 67 were women. In the COVID-positive group, elastography exams were performed an average of 44 weeks after a positive PCR test result.

After controlling for age, sex and time period, a statistical analysis of the elastography results revealed that COVID-positive patients had a statistically significant higher liver stiffness than the control patients.

COVID-positive patients had a higher median live stiffness (7.68 kPa) than pandemic control patients (5.99 kPa).

Unexpectedly, the pre-pandemic control group also had a higher median stiffness (7.01) compared to pandemic control group. The reason for this finding is not yet understood but is believed to be a result of changing referral patterns during the pandemic. Additionally, patients referred for elastography before the pandemic were noted to be older than patients referred after the start of the pandemic.

“We don’t yet know if elevated liver stiffness observed after COVID-19 infection will lead to adverse patient outcomes,” Dr. Heidari said. “We are currently investigating whether the severity of acute COVID-related symptoms is predictive of long-term liver injury severity. We hope to enrich our existing database with additional patient data and a broader scope of co-variates to better understand the post-acute effects of COVID-19 within the liver.”

Co-authors are Theodore Pierce, M.D., Anthony Samir, M.D., M.P.H., Arinc Ozturk, M.D., Madhangi Parameswaran, M.B.B.S., M.Res., Marian Martin, M.D., M.P.H., and Hannah Edenbaum, M.S.

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Note: Copies of RSNA 2022 news releases and electronic images will be available online at *RSNA.org/press22*.

RSNA is an association of 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, Illinois. (*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 elastography, visit *RadiologyInfo.org*.

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NEWS

ADDITIONAL STORY IDEAS
RSNA 108th SCIENTIFIC ASSEMBLY AND ANNUAL MEETING

In addition to the presentations described in RSNA news releases, the following presentations have been identified as particularly newsworthy. Times, locations and abstracts for the presentations can be found in the online program at *http://rsna2022.rsna.org/program/*.

FEATURED STUDIES

BREAST
Sun. Nov. 27, #S3B-SPBR-7, *Comparison of Mammography Artificial Intelligence Algorithms for 5-year Breast Cancer Risk*, Vignesh Arasu, M.D., Vallejo, California

CHEST
Tue. Nov. 29, #T5A-SPCH-5, *CT on Lung Cancer Screening is Useful for Adjuvant Comorbidity Diagnosis in Developing Countries*, Bruno Hochhegger, M.D., Ph.D., Gainesville, Florida

PEDIATRICS
Sun. Nov. 27, #S1-SSPD01-1, *Persisting Pulmonary Dysfunction in Pediatric Post-acute COVID-19*, Rafael Heiss, Erlangen, Germany

Tue. Nov. 29, #T1-SSPD03-4, *COVID-19 and the Impact of Health Inequities in Pediatric Radiology Exam Cancellations*, Sebastian Gallo-Bernal, M.D., Boston, Massachusetts

OTHER HIGHLIGHTS

BREAST
Mon. Nov. 28, #M5A-SPBR-4, *Screen-detected and Interval Breast Cancer Rates are Significantly Higher in Women with Dense Breasts Across all Age Groups in a Large DBT Dataset*, Giorgia Grisot, Ph.D., Cambridge, Massachusetts

Wed. Nov. 30, #W5A-SPBR-3, *Factors Associated with Decision to Undergo Mastectomy among Women with Ductal Carcinoma In Situ*, Manisha Bahl, M.D., M.P.H., Cambridge, Massachusetts

CHEST
Mon. Nov. 28, #M5B-SPCH-2, *The Impact of Vaccination on the Incidence and Severity of COVID-19 Pneumonia: Effectiveness of mRNA and Adenovirus Vector Vaccines*, Simone Vicini, M.D., Latina, Italy

Wed. Nov.30, #W5B-SPCH-9, *Opportunistic Detection of Diabetes from Frontal Chest Radiography in 104,473 Patients*, Ayis T. Pyrros, M.D., Hinsdale, Illinois

EMERGENCY RADIOLOGY
Tue. Nov. 29, #T5B-SPER-1, *Brain Hemorrhage and ECMO therapy in Patients with Severe COVID-19-Disease: A Systematic Multicenter Review (First Insights into the COVID-ECMO trial)*, Philipp Josef Kuhl, M.D., Wuerzburg, Germany

HEAD AND NECK
Wed. Nov. 30, #W5B-SPHN-2, *Static And Dynamic Evaluation with MRI of Larynx and Oro-Pharingeal Cavity in Professional Opera Singers*, Marco Di Girolamo, M.D., Rome, Italy

INFORMATICS
Mon. Nov. 28, #M5B-SPIN-2, *A Combined Risk Model Using Imaging and Clinical Parameters in COVID-19 Patients From a Nationwide German Cohort to Predict Disease Progression*, Andreas Bucher, M.D., Frankfurt, Germany

INTERVENTIONAL RADIOLOGY
Sun. Nov. 27, #S3B-SPIR-2, *Genicular Artery Embolization as a Treatment for Symptomatic Knee Osteoarthritis: A Systematic Review and Meta-analysis*, Yan Epelboym, M.D., M.P.H., Boston, Massachusetts

Mon. Nov. 28, #M2-SPIR-8, *The Effect of Music on Patients' Anxiety in CT-guided Percutaneous Interventions: A Prospective Randomized Controlled Trial*, Florian Fleckenstein, M.S., Berlin, Germany

Thurs. Dec. 1, #R5A-SPIR-7, *Short and Mid Term Follow-up of Sympathetic Chain Block with Botox in PAOD and CRPS Patients*, Benjamin Reichardt, Neheim, Germany

MUSCULOSKELETAL
Sun. Nov. 27, #S3B-SPMK-3, *Radiographic OA Progression Following Meniscus Surgery*, Azad Darbandi, Chicago, Illinois

NEURORADIOLOGY
Mon. Nov. 28, #M2-SPNR-14, *White Matter Hyperintensities in Younger Mild Traumatic Brain Injured Patients*, Priya Santhanam, Ph.D., Olney, Maryland

Tues. Nov. 29, #T5A-SPNR-20, *The Effect of Percutaneous Laser Disc Decompression (PLDD) on Pain and Disability in Cervical Disc Herniation: A Double-center Perspective Longitudinal Study*, Laura Gemini, Cercola, Italy

Tues. Nov. 29, #T5A-SPNR-8, *Migraine-Associated Perfusion Changes on 7T MRI*, Brendon Chou, Arcadia, California

Thurs. Dec. 1, #R3-SSNR15-3, *Graph Lesion-Deficit Mapping Uncovers Brain Processing of Fluid Intelligence*, James Ruffle, B.Sc., M.B.B.S., London, U.K.

Thurs. Dec. 1, #R3-SSNR15-5, *Brain Hub Cortical Thickness in Patients with Normal Cognition and Cognitive Impairment*, Nauris Zdanovskis, Riga, Latvia

Thurs. Dec. 1, #R4-SSNR16-3, *Altered Relationship between White Matter Integrity and Interhemispheric Speed of Processing after Mild Traumatic Brain Injury*, Peter Hsu, Stony Brook, New York

OBSTETRICS/GYNECOLOGY
Tue. Nov. 29, #T2-SPOB-1, *Pregnancy Following Hysterosalpingography: From Research to Reality*, Anne P. Hemingway, FRCR, M.B.B.S., London, United Kingdom

PEDIATRICS
Wed. Nov. 30, #W1-SSPD04-6, *Diffusion Tensor Imaging of Opioid Exposed Fetuses*, Usha D. Nagaraj, M.D., Cincinnati, Ohio

Wed. Nov. 30, #W1-SSPD04-1, *Infection With Omicron and Previous SARS-Cov-2 Variants in Pregnancy: Can MRI Recognize Fetal Peril?* Patric Kienast, Wien, Austria

Thurs. Dec. 1, #R2-SPPD-1, *Neurological Consequences of COVID-19 in Children*, Silvia Hidalgo-Tobon, Ph.D., Mexico City, Mexico

PHYSICS

Sun. Nov. 27, #S2-SSPH01-4, *Radiopathomic Correlation for Improvement of Early Diagnosis of Lung Cancer at Baseline LDCT Screening*, Chuan Zhou, Ph.D., Ann Arbor, Michigan

Sun. Nov. 27, #S2-SSPH01-2, *Detection of Colorectal Cancer in Conventional Abdominal CT Scans Without Bowel Preparation Using Deep Learning*, Yingda Xia, B.Eng., Baltimore, Maryland

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NEWS

CUTTING-EDGE RESEARCH HIGHLIGHTS
RSNA 108th SCIENTIFIC ASSEMBLY AND ANNUAL MEETING

More than 80 cutting-edge research papers on the topics of long COVID, photon-counting CT, AI & machine learning, and molecular imaging will be presented in the Learning Center Theater at RSNA 2022. Ten papers identified as newsworthy are highlighted below.

- Session Number: M1-STCE-2

Large-Scale Deployment of Mammography AI Demonstrates Robust Categorization and Suggests Benefit of More Granularity Than Binary Triage Categories
Monday, Nov. 28, 9:00:00 AM

In a group of more than half a million women, AI was able to reliably categorize patients using four cancer suspicion levels. The greater granularity provided by four categories will likely aid radiologists significantly more than a simple binary triage flag.

- Session Number: R3-STCE-2

Longitudinal Assessment of Multi-Institutional Data Diversity in the Medical Imaging and Data Resource Center (MIDRC)
Thursday, Dec. 1, 10:30:00 AM

The diversity of the primary medical imaging datasets in the curated public data commons at MIDRC has evolved over time as both the number of contributing institutions and overall number of subjects grow.

- Session Number: R3-STCE-3

SevScore: An Ai-Based Quantitative Severity Metric for Machine Learning and Statistical Analysis of COVID-19 Disease, Risk Factors, and Clinical Characteristics
Thursday, Dec. 1, 10:30:00 AM

Quantitatively understanding COVID-19 severity based on features extracted from a deep learning U-Net architecture can help predict outcomes and plan/prioritize care for patients (knowing their risk) to increase survival rates and positive outcomes.

- Session Number: R5A-STCE-1

Use of 18F-florbetapir Brain PET/CT to Study the Impact of White Matter Hyperintensity on Amyloid Accumulation
Thursday, Dec. 1, 12:15:00 PM

Patients with high white matter hyperintensity volume show faster amyloid deposition, although once a threshold of approximately 35cm is exceeded, amyloid accumulation decreases.

- Session Number: R5B-STCE-1

Assessment of Aneurysms and Plaque in the Abdominal Aorta Using Deep Learning
Thursday, Dec. 1, 12:45:00 PM

A high-performing abdominal aortic aneurysm (AAA) automated detector has been developed, and a strong statistical relationship between the presence of a AAA and the quantity of abdominal plaque has been observed.

- Session Number: S2-STCE-1

Photon-Counting Cardiac CT - Initial Multicenter Clinical Experience
Sunday, Nov. 27, 10:30:00 AM

Photon-counting CT coronary angiography provides excellent image quality and contrast-to-noise ratio, especially for low and moderately high levels of coronary calcification.

- Session Number: T1-STCE-1

Mammography AI in 147 Clinics Results in Increased Cancer Detection Rate
Tuesday, Nov. 29, 9:00:00 AM

These initial results show that, directionally, radiologists are beginning to detect more cancers even early after the deployment of an AI tool that provides suspicion categories as well as CAD markings.

- Session Number: T5A-STCE-2

Quantitative Chest CT Analysis of Patients with Post-COVID-19 Condition
Tuesday, Nov. 29, 12:15:00 PM

Patients with post-COVID-19 condition (PCC) demonstrate a higher extent of post-COVID-19 parenchymal changes and impaired lung function, including lower DLCO (diffusing capacity for carbon monoxide), FVC (forced vital capacity) and FEV1 (forced expiratory volume) than asymptomatic participants. The PCC group had a significantly lower main bronchial airway area than the asymptomatic group.

- Session Number: T5A-STCE-3

Migratory COVID-19 Pneumonia in B-cell Lymphoma Patients Receiving B-cell Depletion Therapies
Tuesday, Nov. 29, 12:15:00 PM

COVID-19 patients with B-cell lymphoma who had recently received B-cell depleting agents may demonstrate migratory airspace opacities on serial CT with persistent COVID-19 symptoms, which could be interpreted as ongoing COVID-19 pneumonia related to prolonged viral shedding resulting from iatrogenic humoral immunodeficiency.

- Session Number: W3-STCE-2

Sensitivity of Low-Field MRI for Multiple Sclerosis Lesion and Brain Atrophy
Wednesday, Nov. 30, 10:30:00 AM

White matter lesions can be detected using portable MRI, although resolution limits sensitivity. Low-field measurements of thalamic volume correlated with disease severity and patient disability, replicating known MS biomarkers. Sequence optimization and super-resolution approaches can likely improve detection rates and brain atrophy assessment.

Schedule subject to change. Please consult RSNA 2022 Meeting Program for latest information.

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NEWS

RSNA Leads the Field in AI Innovation and Education

The Radiological Society of North America (RSNA) leads the way in providing the knowledge, training and community radiology professionals need to understand the role of artificial intelligence (AI) in medical imaging and the implications it has for radiology practice.

The RSNA AI Certificate Program—the first-ever radiology-specific AI certificate program—blends a case-based curriculum with practical application and delivers a pathway for all radiologists to understand how to leverage AI for their practices and careers.

RSNA's peer-reviewed journal, *Radiology: Artificial Intelligence*, highlights emerging AI research in the field of imaging across multiple disciplines.

RSNA's AI Community allows imaging professionals and AI researchers to connect and discuss AI advances and challenges, while RSNA's comprehensive education program offers live and online AI learning opportunities throughout the year.

RSNA 2022 AI HIGHLIGHTS

RSNA 2022 has an abundance of papers, posters, courses and education exhibits spotlighting AI and machine learning applications.

Imaging AI in Practice Demonstration
The Imaging AI in Practice (IAIP) demonstration is an interoperability demonstration that takes place during the RSNA annual meeting to showcase new technologies and communication standards needed to integrate artificial intelligence (AI) into the diagnostic radiology workflow. The demonstration uses real-world clinical scenarios and interoperability standards to demonstrate new tools and practice enhancements enabled by AI. It includes many steps in the radiology workflow where AI can assist the radiologist and improve the efficiency and quality of care.

The diagrams linked here give a visual overview of the flow of information among systems in a radiology practice with AI tools integrated:

- Imaging AI Workflow
- Post-Imaging AI Workflow

AI Challenge
RSNA organizes AI challenges to spur the creation of AI tools for radiology. This year's challenge focuses on cervical spine fractures. The RSNA Cervical Spine Fracture AI Challenge explores whether AI can be used to aid in the detection and localization of cervical spine injuries.

To create the ground truth dataset, the challenge planning task force collected imaging data sourced from 12 sites on six continents, including more than 1,400 CT exams with diagnosed cervical spine fractures, and an approximately equal number of negative exams. Spine radiology specialists from the ASNR and ASSR provided expert image level annotations to these images to indicate the presence, vertebral level and location of any cervical spine fractures.

For the challenge competition, contestants aimed to develop machine learning models that match the radiologists' performance in detecting and localizing fractures within the seven vertebrae that comprise the cervical spine. Winners will be recognized on Monday, Nov. 28, in the AI Showcase.

AI Showcase
The AI Showcase is the center of all the latest imaging AI technology at RSNA 2022. Connect with industry leaders and visit more than 100 exhibitor booths to see new products and technical solutions in action.

AI Theater
Watch AI come to life in the AI Theater. Located in the AI Showcase, attendees can view daily industry presentations from companies highlighting the innovations fueling the future of AI.

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NEWS

108th SCIENTIFIC ASSEMBLY AND ANNUAL MEETING
RADIOLOGICAL SOCIETY OF NORTH AMERICA

Sunday, November 27 – Thursday, December 1, 2022
McCormick Place, Chicago, Illinois
(as of 10/25/2022)

RSNA FACTS

- RSNA® has over 47,113 members in 148 countries.

- The RSNA Scientific Assembly and Annual Meeting is the leading annual radiology forum in the world, hosting tens of thousands of health care professionals. It has been held consecutively in Chicago since 1985. McCormick Place was first used in 1975.

- Full RSNA members in North America pay 2022 dues of $640 annually. Membership benefits are worth at least $3,440 ($1,155 for annual meeting with advance registration, $840 for virtual meeting, $500 for RSNA Case Collection access, $925 for the digital editions of *Radiology*, *RadioGraphics, Radiology: Artificial Intelligence, Radiology: Cardiothoracic Imaging,* and *Radiology: Imaging Cancer* and $20 for *RSNA News*.) Membership benefits also include free access to CME in the Online Learning Center, spotlight course and certificate discounts, grant funding opportunities and volunteer opportunities.

- Members receive free access to continuing medical education (SA-CME) credit, RSNA CME Repository, grant opportunities and many indirect benefits.

- RSNA publishes five peer-reviewed medical journals.

- Editors:
  - *Radiology,* David A. Bluemke, M.D.
  - *RadioGraphics*, Christine (Cooky) O. Menias, M.D.
  - *Radiology: Artificial Intelligence*, Charles E. Kahn Jr., M.D., M.S.
  - *Radiology: Cardiothoracic Imaging*, Suhny Abbara, M.D.
  - *Radiology: Imaging Cancer*, Gary D. Luker, M.D.

- RSNA offers a comprehensive collection of online continuing education courses covering every subspecialty in radiology.

- Since 1984, the RSNA Research & Education (R&E) Foundation has awarded more than $70 million in grant funding for over 1,600 grant projects.

- RSNA employs 260 people.

- RSNA headquarters is located at 820 Jorie Blvd. Oak Brook, Ill.

RSNA ANNUAL MEETING FACTS

(as of 10/25/22, some numbers subject to change)

The Scientific Assembly and Annual Meeting of the Radiological Society of North America (RSNA) is the world's premier scientific and educational forum in radiology.

Facts about the meeting include:

- Five days of educational programs for radiologists, radiation oncologists, medical physicists, radiologic technologists and allied healthcare professionals
- 642 in-person technical exhibits occupying 366,000 square feet
- 110 first-time exhibitors at RSNA
- 847 scientific papers in 19 subspecialties: breast, cardiac, chest, emergency radiology, gastrointestinal, genitourinary, head & neck, informatics, interventional, multisystem, musculoskeletal, neuroradiology, noninterpretive skills/practice management, nuclear medicine/molecular imaging, pediatric, physics, radiation oncology, obstetrics/gynecology and vascular
- Over 300 education courses and 7 plenary sessions
- 1,455 education exhibits and 1,306 scientific posters featured in the Learning Center

RSNA 2022 November 27 to December 1 | Empowering *Patients and Partners* in Care

Corporate Symposiums and Lunch & Learns

Corporate Symposiums
Check out these one-hour education sessions presented by RSNA exhibitors and sponsors throughout the week. Morning sessions are held from 8 a.m. to noon and afternoon sessions are held from 1 p.m. to 4 p.m. You can also view select symposiums via livestream on the virtual platform or on-demand through May 1, 2023 at noon CT.

Lunch & Learns
Participate in midday panel discussions, demonstrations and lectures with company leaders and medical professionals. Lunch & Learn sessions are held in-person and all are available on demand through May 1, 2023 at noon CT.

Industry Presentation	Time	Sunday	Monday	Tuesday	Wednesday
Morning Corporate Symposiums	60 minute sessions hosted between 8 AM–12 PM; specific times to be determined		Bayer (IM1-CS102) S102AB	Dicom Systems Inc (IT1-CS102) S102AB	AWS (IW1-CS102) S102CD
				Philips (IT1-CS101) S101AB	Siemens Healthineers (IW1-CS103) S101AB
Lunch and Learns	Sunday: 11:45 AM–12:45 PM Monday, Tuesday, Wednesday: 12 PM–1 PM	Dedalus (IS1-LL102) S403B	BD (IM1-LL102) S403B	Hologic, Inc (IT1-LL103) S502	Canon Medical (IW1-LL102) S403B
		Flywheel (IS1-LL101) S403A	Hologic, Inc (IM1-LL103) S502	Nuance Communications (IT1-LL102) S403B	Fortinet, Secure Healthcare everywhere you need it (IW1-LL101) S403A
		Hologic, Inc (IS1-LL103) S502	Intelerad Medical Systems (IM1-LL104) S501	Shimadzu Medical Systems (IT1-LL104) S501	Hologic, Inc (IW1-LL103) S502
		Novartis (IS1-LL104) S501	Konica Minolta Healthcare Americas, Inc. (IM1-LL101) S403A	Subtle Medical Inc (IT1-LL101) S403A	
Afternoon Corporate Symposiums	60 minute sessions hosted between 1 PM–4 PM; specific times to be determined	Open Source Imaging Consortium (IS2-CS104) S101AB	Bayer (IM2-CS105) S102AB	AstraZeneca (IT2-CS104) S101AB	
			Microsoft (IM2-CS106) S101AB	Intel Corporation (IT2-CS105) S102AB	

All times are listed in Central Time (CT). Current as of October 5, 2022.

RSNA 2022
November 27 to December 1
Empowering *Patients and Partners* in Care

Virtual Industry Presentations and Virtual Product Theater Presentations

Attend fully virtual presentations from select companies who are ready to engage with attendees across the globe through our virtual meeting platform. Presentations will be available before and after RSNA 2022 each day and during breaks in RSNA programming. Watch live or view the on-demand recordings through May 1, 2023 at noon CT.

Industry Presentation	Time	Monday	Tuesday
Pre-Show Presentations	7:00 AM–8:00 AM	Philips (IM1-VP101)	
Virtual Product Theater Morning Presentations	10:30 AM–11:00 AM		Bayer (IT2-VT102)
Lunch Hour Presentations	12:00 PM - 1:00 PM	Rhino Health (IM2-VP102)	
Virtual Product Theater Afternoon Presentations	2:30 PM–3:00 PM	Subtle Medical Inc (IM3-VT103)	
	4:00 PM–4:30 PM	XACT Robotics (IM4-VT104)	

All times are listed in Central Time (CT). Current as of October 5, 2022.

RSNA 2022
November 27 to December 1
Empowering *Patients and Partners* in Care

AI Theater Presentations

Stop by the RSNA AI Theater for daily industry presentations from companies highlighting the innovations fueling the future of AI. Presentations run from 10:30 a.m. to 3:45 p.m., Sunday through Wednesday. Don't miss other special AI events happening on select days from 4-5 p.m.

Time	Sunday	Monday	Tuesday	Wednesday
10:30 AM–10:45 AM		Therapixel Inc. (IM1-AI101)	DiA Imaging Analysis (IT1-AI101)	Circle Cardiovascular Imaging (IW1-AI101)
11:00 AM–11:15 AM	Enlitic Inc (IS2-AI102)	Bayer (IM2-AI102)	Blackford Analysis (IT2-AI102)	Subtle Medical Inc (IW2-AI102)
11:30 AM–11:45 AM	Median Technologies (IS3-AI103)	Combinostics (IM3-AI103)	PMX Inc. (IT3-AI103)	RapidAI (IW3-AI103)
12:00 PM–12:15 PM	MEDICAL IP (IS4-AI104)	HeartVista Inc (IM4-AI104)	Lucida Medical (IT4-AI104)	Qure.ai Technologies Inc (IW4-AI104)
12:30 PM–12:45 PM	See-Mode Technologies (IS5-AI105)	contextflow (IM5-AI105)	HEALTHLEVEL (IT5-AI105)	MILVUE (IW5-AI105)
1:00 PM–1:15 PM	DeepHealth, Inc. (IS6-AI106)	Riverain Technologies (IM6-AI106)	OneMedNet Corporation (IT6-AI106)	Shukun (Beijing) Technology Co., Ltd. (IW6-AI106)
1:30 PM–1:45 PM	Quantib BV (IS7-AI107)	AIRS Medical (IM7-AI107)	Whiterabbit.ai (IT7-AI107)	
2:00 PM–2:15 PM	Aidence (IS8-AI108)	CARPL- Caring Analytics Platform (IM8-AI108)	Flywheel (IT8-AI108)	
2:30 PM–2:45 PM	ClariPi Inc (IS9-AI109)	Merative (IM9-AI109)	ScanDiags (IT9-AI109)	
3:00 PM–3:15 PM	Empower Radiology (IS10-AI110)	NEUROPHET (IM10-AI110)	Gesund (IT10-AI110)	
3:30 PM–3:45 PM		annalise.ai (IM11-AI111)	iCAD, Inc (IT11-AI111)	

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RSNA 2022
November 27 to December 1
Empowering *Patients and Partners* in Care

Innovation Theater Presentations

Be the first to hear about the latest innovations in radiology at these industry presentations highlighting cutting edge solutions.

Time	Sunday	Monday	Tuesday	Wednesday
11:00 AM–11:15 AM	Subtle Medical Inc (IS1-IT101)	Fortinet: Cybersecurity, Everywhere You Need It (IM1-IT101)	PocketHealth (IT1-IT101)	3D Systems (IW1-IT101)
11:30 AM–11:45 AM	Hepatiq, Inc. (IS2-IT102)	MEDIMAPS GROUP (IM2-IT102)	Sirona Medical Inc. (IT2-IT102)	ScanMed/Bot Image (IW2-IT102)
12:00 PM–12:15 PM	Agfa HealthCare (IS3-IT103)	MILVUE (IM3-IT103)	Clarix Imaging (IT3-IT103)	ContextVision (IW3-IT103)
12:30 PM–12:45 PM	Clickview Corporation (IS4-IT104)	Hyperfine Portable MRI (IM4-IT104)	ARTERYS (IT4-IT104)	Prodrive Technologies (IW4-IT104)
1:00 PM–1:15 PM	Carestream Health (IS5-IT105)	Guerbet (IM5-IT105)	Promedius (IT5-IT105)	
1:30 PM–1:45 PM	Novarad Corporation (IS6-IT106)	QUIBIM S.L. (IM6-IT106)	GE Healthcare (IT6-IT106)	Novari Health (IW6-IT106)
2:00 PM–2:15 PM	Empower Radiology (IS7-IT107)	Pure Storage (IM7-IT107)	Nuance Communications (IT7-IT107)	TeraRecon (IW7-IT107)
2:30 PM–2:45 PM	Shimadzu Medical Systems (IS8-IT108)	Paragon Consulting Partners, LLC (IM8-IT108)	Softek Illuminate, Inc (IT8-IT108)	InkSpace Imaging (IW8-IT108)
3:00 PM–3:15 PM	Varex Imaging (IS9-IT109)	KA Imaging Inc (IM9-IT109)	Hyland Healthcare (IT9-IT109)	Bayer (IW9-IT109)
3:30 PM–3:45 PM	Kailo Medical (IS10-IT110)	Ethosh Digital (IM10-IT110)	Stratasys (IT10-IT110)	

All times are listed in Central Time (CT). Current as of October 5, 2022.

RSNA 2022
November 27 to December 1
Empowering *Patients and Partners* in Care

Vendor Workshops

Gain first-hand experience on an exhibiting company's proprietary systems by attending user training and product instruction in classroom space in the Technical Exhibits Halls. Workshop sessions may run from 10am to 5pm CT each day, Sunday through Wednesday.

Company	Booth	Hall
GE Healthcare	8349	North Hall, Level 3
GE Healthcare	8355	North Hall, Level 3
Microsoft	5528	South Hall, Level 3
Siemens Healthineers	5521	South Hall, Level 3

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