Scientists develop high-performance MRI scanner in effort to define microscopic brain structures

BETHESDA, MD — A scientific team supported in part by the National Institutes of Health (NIH) has developed a new, ultra-high-resolution brain imaging system that can reconstruct microscopic brain structures that are disrupted in neurological and neuropsychiatric brain disorders. The new system is a significant advance over conventional magnetic resonance imaging (MRI) scanners that cannot visualize these tiny but clinically important structures.

The system, called the Connectome 2.0 human MRI scanner, overcomes a significant hurdle for neuroscientists: being able to bridge different brain regions and probe tiny structures necessary to define the "connectome," the complex matrix of structural connections between nodes in the nervous system, and to do it noninvasively in living humans.

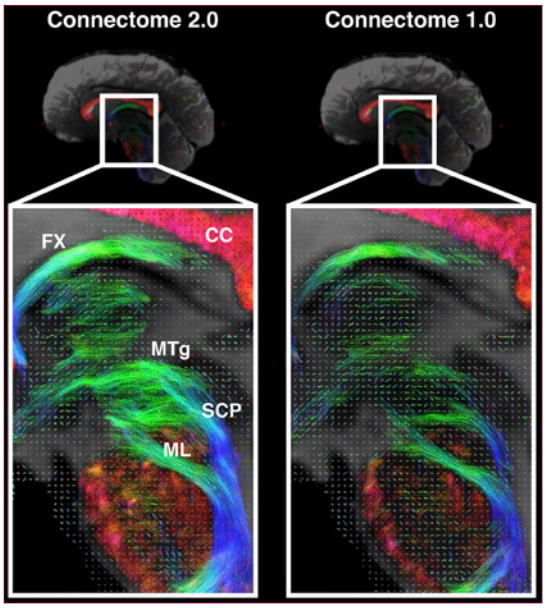
"This research is a transformative leap in brain imaging – pushing the boundaries of what we can see and understand about the living human brain at a cellular level," said **JOHN NGAI, PhD**, Director of NIH's Brain Research Through Advancing Innovative Neurotechnologies® Initiative, or The BRAIN Initiative®. "The new scanner lays essential groundwork for the BRAIN CONNECTS program's ultimate goal of developing a wiring diagram for the human brain."

The scanner is innovative in two major ways: it fits snugly around the heads of living people, and it has many more channels than typical MRI systems. These advances greatly increase the signal-to-noise ratio of the system, providing much sharper images of very small biological brain structures than previously possible. These technical upgrades will enable scientists to map human brain fibers and cellular architecture down to nearly single-micron precision to study how subtle changes in cells and connections relate to cognition, behavior, and disease.

In addition, the team showed that the scanner was safe in healthy research volunteers, revealing subtle microstructural differences (individual axon diameter or cell size) between individual brains. Before this new system, this was only feasible in postmortem or animal studies.

"Our goal was to build an imaging platform that could truly span scales – from cells to circuits," said senior author **SUSIE HUANG, MD, PhD**, of the Department of Radiology at Mass General Hospital. "It provides researchers and clinicians with a powerful new tool to study brain architecture in health and disease, in real time."

The research was funded in part by The BRAIN Initiative®. It supports the BRAIN Initiative Connectivity Across Scales (BRAIN CONNECTS) program, which aims to develop the research capacity and technical capabilities to generate wiring diagrams that can span entire brains across multiple scales. The findings were reported July 16 in Nature Biomedical Engineering.[1] ❖



Close-ups of the midline sagittal view for Connectome 2.0 (left) and Connectome 1.0 (right) protocols, showing diencephalic and brainstem pathways. Tractography results are shown superimposed onto the underlying fibre orientation distribution functions. [IMAGE BY CHIARA MAFFEI, PhD]

Reference

1. Ramos-Llordén, G and Lee H-H, et al. Ultra-high gradient connectomics and microstructure MRI scanner for imaging of human brain circuits across scales. Nature Biomedical Engineering. 2025. https://www.nature.com/articles/s41551-025-01457-x

AMA, 79 medical societies back vaccination against respiratory viruses

CHICAGO — With respiratory viruses expected to surge this fall, the American Medical Association (AMA) and 79 leading medical societies, including the Rhode Island Medical Society, reaffirm their support for vaccination as the best way to protect against the flu, COVID-19, and RSV and their potentially serious complications. The organizations call on partners – insurers, hospitals, and public health agencies – to ensure these life-saving vaccines remain available to patients without cost sharing.

The open letter from the American Medical Association and medical society partners is available **here**.

The full text is below:

An open letter to the American people:

With the severe influenza season the U.S. experienced during the 2024–25 respiratory virus season, and the recognition that we will likely see another surge in respiratory viruses this fall, we know strong physician leadership is essential to reducing preventable illness, hospitalizations, and death. Vaccines for influenza, RSV, and COVID-19 remain among the best tools to protect the public against these illnesses and their potentially serious complications – and physicians are among the most trusted voices to recommend them. We come together as physicians from every corner of medicine to reaffirm our commitment to these lifesaving vaccines.

Recent changes to federal immunization review processes raised concerns across the medical and public health community. In this moment of uncertainty, physicians must align around clear, evidence-based guidance for patients.

We commit to working together to promote public understanding and confidence in the use of vaccines to avoid another severe respiratory virus season and resurgence of vaccine-preventable illnesses and deaths. We call on our partners – from insurers to hospitals to public health agencies – to ensure vaccines remain available to patients without cost sharing.

The health and safety of the public remains our top priority, and we will continue to support evidence-based immunizations to help prevent severe disease and protect public health. ❖

Leading medical professional societies sue HHS for unlawful, unilateral vaccine changes

BOSTON — On July 7th, the American Academy of Pediatrics (AAP), American College of Physicians (ACP), American Public Health Association (APHA), Infectious Diseases Society of America (IDSA), Massachusetts Public Health Alliance (MPHA), Society for Maternal-Fetal Medicine (SMFM), and a pregnant physician, filed suit in American Academy of Pediatrics v. Robert F. Kennedy, Jr. in the U.S. District Court for the District of Massachusetts to defend vaccine policy.

The lawsuit charges that a coordinated set of actions by HHS and Secretary Kennedy were designed to mislead, confuse, and gradually desensitize the public to anti-vaccine and anti-science rhetoric, and that he has routinely flouted federal procedural rules. These actions include blocking CDC communications, unexplained cancellations of vaccine panel meetings at the FDA and CDC, announcing studies to investigate non-existent links between vaccines and autism, unilaterally overriding immunization recommendations, and replacing the diverse members of ACIP with a slate of individuals biased against sound vaccine facts.

The anonymous individual plaintiff in the lawsuit is a pregnant woman who is at immediate risk for being unable to get the Covid-19 vaccine booster because of the Secretarial Directive, despite her high risk for exposure to infectious diseases from working as a physician at a hospital.

"This administration is an existential threat to vaccination in America, and those in charge are only just getting started. If left unchecked, Secretary Kennedy will accomplish his goal of ridding the United States of vaccines, which would unleash a wave of preventable harm on our nation's children," said **RICHARD H. HUGHES IV**, partner at Epstein Becker Green and lead counsel for the plaintiffs. "The professional associations for pediatricians, internal medicine physicians, infectious disease physicians, high-risk pregnancy physicians, and public health professionals will not stand idly by as our system of prevention is dismantled. This ends now."

The plaintiff organizations urge parents and patients to follow their qualified medical professionals' vaccine guidance. AAP, ACP, APHA, IDSA, and SMFM websites provide evidence-based resources to help patients make decisions grounded in facts, not fear. ❖

W.M. Keck Foundation awards $1.3M grant to Christopher Moore, PhD, to study how brain blood vessels relay real-time signals across the blood-brain barrier (BBD)

LOS ANGELES, CA — In June 2025, the W.M. Keck Foundation's Board of Directors awarded grants to 17 organizations, totaling $19.6 million. Eleven grants were awarded in the Research Program, totaling $12.8 million.

A $1.3 million grant from the Foundation was awarded to Brown University for a research study led by **CHRISTOPHER MOORE, PhD**, associate director of the Carney Institute for Brain Science. It will fund research on how brain blood vessels relay real-time signals across the blood-brain barrier (BBD) directly to the brain. Dr. Moore's research team has found that blood vessels send signals through "plume events" that allow flashes of permeability across the BBD.

The abstract for the grant reads as follows:

Discovery of dynamic processes that enable rapid and focal brain-body communication

The brain evolved to meet challenging biological needs, with the mammalian forebrain integrating lifelong experience, ongoing sensations, and future predictions. This powerful computation relies on the quality of body information received at moments of choice and learning. Brain vasculature contains a rich supply of such body signals, delivered in their native chemical format, but researchers view this pathway as sluggish and diffuse, unsuited to real-time behavior due to the blood-brain barrier (BBB).

The recent discovery of Plume Events – rapid, local increases in BBB permeability timed to relevant behavioral events – suggest a dynamic solution for forebrain computation: brief vascular access when the risk is worth the information value. An investigator at Brown University and several of his collaborators will test key predictions, such as whether transient electro-calcium 'spikes' in vessels trigger these events, if Plume Events deliver impactful bio-active signals such as oxytocin, and if they are expressed across the forebrain.

The collaborative team, bringing diverse computational and biological expertise, will also create a broader community for insight through colloquia and retreats focused on understanding this new discovery.

Abstracts for all of this cycle's Keck research grants are available here: https://www.wmkeck.org/our-focus-research/#focus-abstracts-research ❖

AMA deeply concerned by eported USPSTF changes

Letter to HHS secretary urges retaining previously appointed Task Force members

CHICAGO – The American Medical Association (AMA) expressed "deep concern" directly to U.S. Health and Human Services Secretary **ROBERT F. KENNEDY** about news reports that he intends to remove all members of the U.S. Preventive Services Task Force (USPSTF).

"USPSTF plays a critical, non-partisan role in guiding physicians' efforts to prevent disease and improve the health of patients by helping to ensure access to evidence-based clinical preventive services," the AMA said in its letter. "As such, we urge you to retain the previously appointed members of the USPSTF and commit to the long-standing process of regular meetings to ensure their important work can continue without interruption."

The full text of the letter is below.

Dear Secretary Kennedy,

On behalf of the physician and medical student members of the American Medical Association (AMA), I am writing to express our deep concern with the recent reports of your intention to remove all of the members of the United States Preventive Services Task Force (USPSTF). As you know, USPSTF plays a critical, non-partisan role in guiding physicians' efforts to prevent disease and improve the health of patients by helping to ensure access to evidence-based clinical preventive services. As such, we urge you to retain the previously appointed members of the USPSTF and commit to the long-standing process of regular meetings to ensure their important work can continue without interruption.

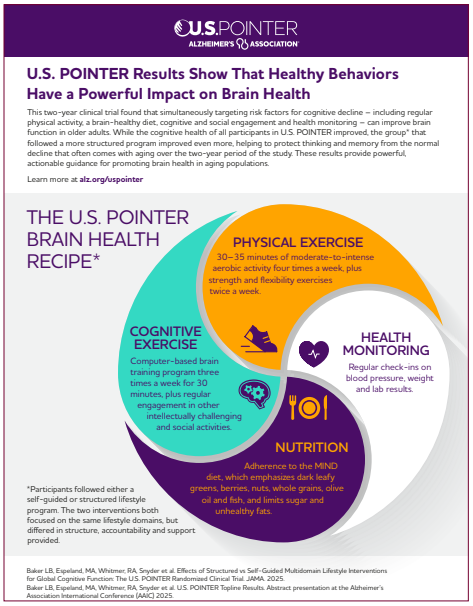
The USPSTF has long played an essential role in making evidence-based recommendations for clinical prevention of disease. USPSTF members have been selected through an open, public nomination process and are nationally recognized experts in primary care, prevention and evidence-based medicine. They serve on a volunteer basis, dedicating their time to help reduce disease and improve the health of all Americans—a mission well-aligned with the Make America Healthy Again initiative.

Importantly, the USPSTF puts forth recommendations that dictate coverage policy for health insurers nationwide. By law, insurers must cover USPSTF-recommended services without cost sharing. This means that patients have access to services such as screenings for colon, breast, and lung cancer; screenings for anxiety and depression in children; and screenings and preventive services for cardiovascular disease. Access to these services without cost sharing plays a critical role in keeping patients healthy and reducing the burdens of disease.

The most important role physicians play is improving the health of patients. Given the essential role USPSTF members play in weighing the benefits and harms of preventive services such as screenings, behavioral counseling, and preventive medications, and making evidence-based recommendations for implementation in primary care settings, we urge you to keep the previously appointed USPSTF members and continue the task force's regular meeting schedule to ensure recommendations are put forth, updated, and disseminated without delay. ❖

U.S. POINTER Alzheimer study results released

PROVIDENCE — Butler Hospital's Memory and Aging Program (MAP) is proud to share the results of the US Study to Protect Brain Health Through Lifestyle Intervention to Reduce Risk (U.S. POINTER). The New England Rhode Island site, based at Butler and Miriam Hospitals, is one of five sites that participated in the Alzheimer's Association study, which was a landmark, two-year clinical trial designed to evaluate whether healthy lifestyle changes can protect memory and other thinking abilities in older adults.



"We are opening a new era in promoting brain health, and it is encouraging that this study proves and gives further evidence that focused lifestyle intervention with exercise, diet, brain training, and heart health can improve memory," said **STEPHEN SALLOWAY, MD**, Principal Investigator, New England RI site of U.S. POINTER, and Founding Director, Memory and Aging Program at Butler Hospital.

Butler Hospital's MAP recruited 376 participants and now has over 250 participants in the U.S. POINTER Alumni extension, which is another four years of collecting more data on participants and their lifestyles. These participants are all local – within New England – RI, MA, and CT.

The U.S. POINTER study has been the largest participant research trial in Memory and Aging history.

From the Alzheimer's Association International Conference 2025

The U.S. POINTER study shows structured lifestyle program targeting multiple risk factors improves cognition in older adults at risk of cognitive decline.

Key Takeaways

- Two lifestyle interventions in U.S. POINTER improved cognition in older adults at risk of cognitive decline. A structured intervention with more support and accountability showed greater improvement compared to a self-guided intervention.
- In a large, representative group of older adults at high risk for cognitive decline, multidomain lifestyle interventions were delivered with high adherence and safety.
- Cognitive benefits were consistent across age, sex, ethnicity, heart health status, and apolipoprotein E-e4 genotype.

Full Alzheimer's Association Press Release: https://aaic.alz.org/downloads2025/USPOINTERALZNewsRelease.pdf ❖

WalletHub finds Rhode Island second-best state for health care

MIAMI, FL — With the average American spending nearly $14,600 per year on personal health care, the personal-finance website WalletHub recently released its report on 2025's Best & Worst States for Health Care, as well as expert commentary.

In order to determine where Americans receive the highest-quality services at the best prices, WalletHub compared the 50 states and the District of Columbia across 44 key measures of health care cost, accessibility and outcome. The data set ranges from the average monthly insurance premium to physicians per capita to the share of insured population.

Rhode Island

Rhode Island is the second-best state for health care, and its residents have the lowest out-of-pocket medical spending in the country, at just 5.6% of their income. Rhode Island also has a lot of medical professionals, with the sixth-most physicians per capita and sixth-most geriatricians per capita, so it's easier to get seen in a timely manner and get second opinions.

In addition, 94% of adults and 97% of children in Rhode Island have health insurance, the fourth-highest and fifth-highest percentages in the country, respectively.

To top things off, Rhode Island residents clearly have good access to preventative medical care. The Ocean State has the fourth-lowest percentage of people without a routine doctor visit in the past two years and the sixth-lowest share of people who haven't visited a dentist in the past year. The state also has a very high vaccination rate for children, which contributes to the 13th-lowest child death rate in the nation.

Health Care in Rhode Island (1=Best; 25=Avg.)

Overall Rank: **2nd**

11th	Avg. Monthly Insurance Premium
19th	Hospital Beds per Capita
6th	Physicians per Capita
6th	Dentists per Capita
4th	% of Insured Adults
5th	% of Insured Children
4th	% of At-Risk Adults with No Routine Doctor Visit in Past Two Years
6th	% of Adults with No Dental Visit in Past Year

For the full report, visit: https://wallethub.com/edu/states-with-best-health-care/23457