



2024 Mass General Research Institute

IMAGE AWARDS FINALISTS

The Mass General Research Institute Image Awards were established in 2018 to celebrate the depth and breadth of research happening across Massachusetts General Hospital. Every day, our clinicians and investigators are pushing the boundaries of science and medicine to develop solutions to the world's most pressing health challenges. From intricate cell close-ups to stunning painted masterpieces, what better way to provide a window into their world?

Beauty of Neurodiversity

MEGHAN MCCARTHY



EVERY PERSON HAS A UNIQUE WAY of thinking, acting and feeling. This concept, known as neurodiversity, often describes individuals with intellectual disabilities but applies to all individuals. Our differences enhance the evolution of ideas and relationships. This painting celebrates neurodiversity, using Cubist style to depict the brain’s anatomy through repeating shapes and colors. As disability advocate Neil Marcus said, “Disability is not a brave struggle or courage in the face of adversity. Disability is an art. It’s an ingenious way to live,” highlighting the creativity and strength in diverse ways of living.

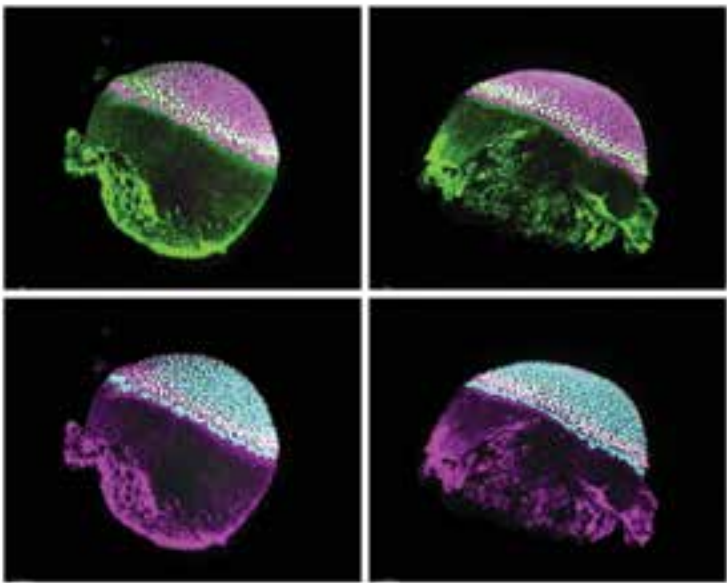
Department of Thoracic Surgery

A CLOSER LOOK

A Planet or a Zebrafish Embryo?

MANJARI TRIVEDI, PHD

YOU MAY THINK IT IS an image of a weird, colorful, deep-sea jellyfish, but what if I tell you that it is actually a zebrafish embryo? The specks on the top are cells that become a fish. The bottom pink/green is yolk, just like chicken egg yolk. It provides nutrients until the embryo develops a mouth and gut. For an embryo to grow into a fish, many protein and DNA events need to happen. This picture was taken to study where the DNA and a protein are located within the cell.



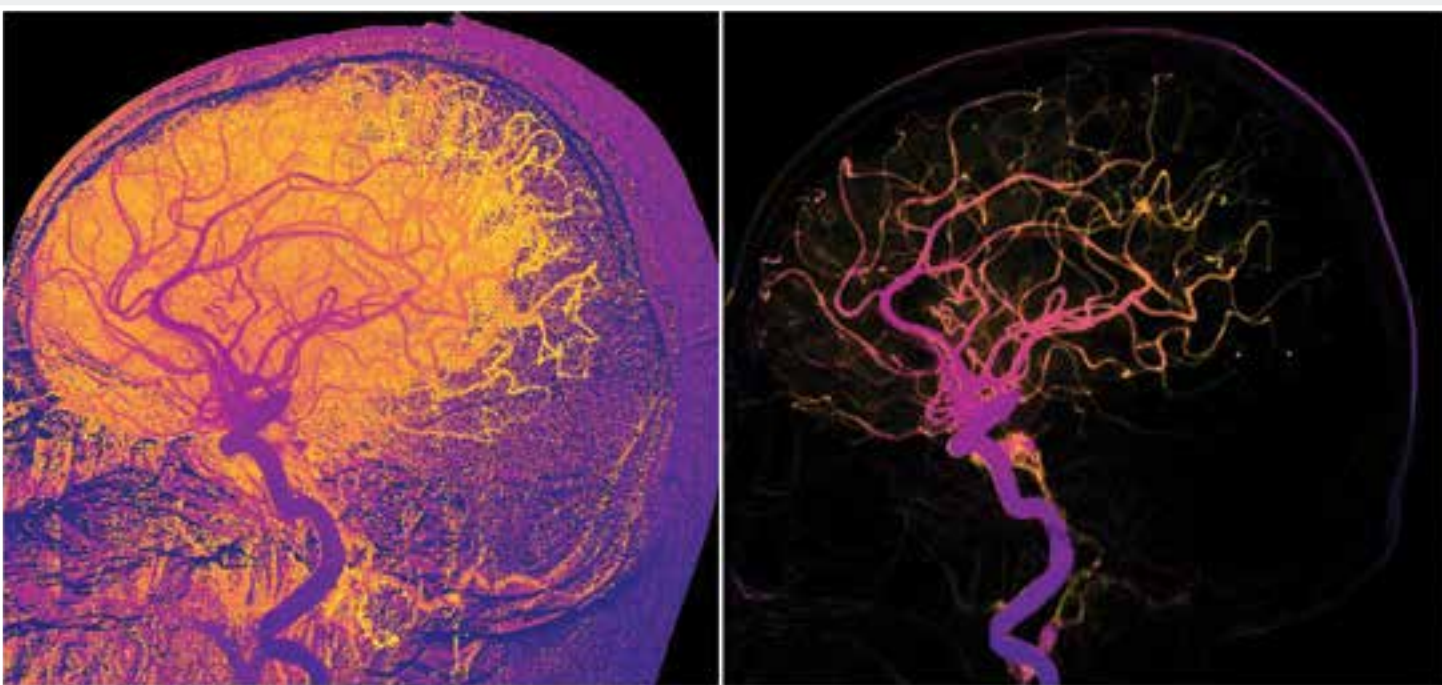
Top panel: DNA in magenta; protein in green. Bottom panel: DNA in cyan, protein in magenta.

Principal Investigator: Wolfram Goessling, MD, PhD
Division of Gastroenterology

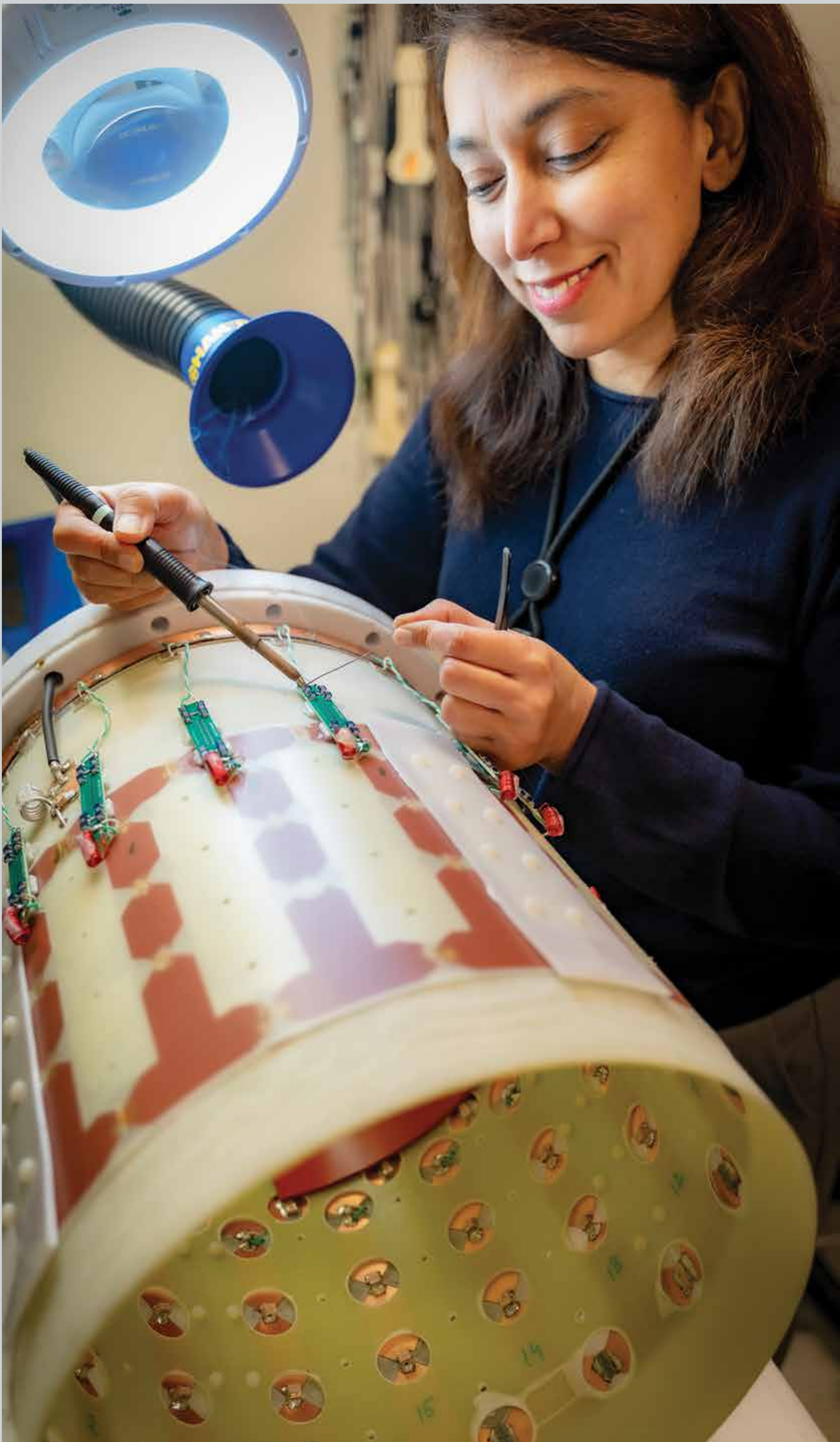
Envisioning Time | SARAH FRISKEN, PHD

THIS COMPOSITE IMAGE is derived from fluoroscopy of the brain taken while a radio-opaque dye was injected into the internal carotid artery. The color of each pixel in the left image encodes the time that pixel was darkest in the fluoroscopic image sequence. On the right, this color is modulated by the intensity variance of each pixel to produce a clear image of the cerebral arteries and when the dye reaches each arterial branch. These images can help detect problems in blood flow or vascular structure.

Principal Investigator: Sarah Frisken, PhD
Image-Guided Neurosurgery Lab, Department of Radiology, Brigham and Women’s Hospital



Azma, Crafter of Coils | MICHAEL DATKO, PHD



AZMA MAREYAM IS A senior research and design engineer at the MGH Martinos Center. In her workshop she handcrafts the incredibly intricate wiring for custom-built radiofrequency coils that enable state-of-the-art biomedical imaging at the Martinos Center. Her work contributes to so many research projects, including my own work with Dr. Vitaly Napadow, where we have used Azma’s 64-channel coil to investigate brain mechanisms and treatments for individuals with migraine disorders. Azma says, “I love the work I do at the Center because of the amazing team of colleagues. Seeing their neuroscience work makes all the effort worthwhile.”

Principal Investigator: John Kirsch, PhD
Athinoula A. Martinos Center for Biomedical Imaging, Department of Radiology

Yawkey 8A | ANDREW CAO

AS A CLINICAL RESEARCH COORDINATOR who works with cancer patients, the infusion center is where much of our patient recruitment for our research occurs. Each time I see the view, I am always stunned. It serves as a reminder that despite how devastating cancer can be, there still exists such beauty in the world. I decided to paint this view to capture this feeling as it fills me with hope for the patients and in their battle against cancer. I hope that this view can provide patients and their families with the strength in this difficult time in their lives.

Principal Investigator: Meghan Sise, MD
Mass General Cancer Center, Division of Nephrology



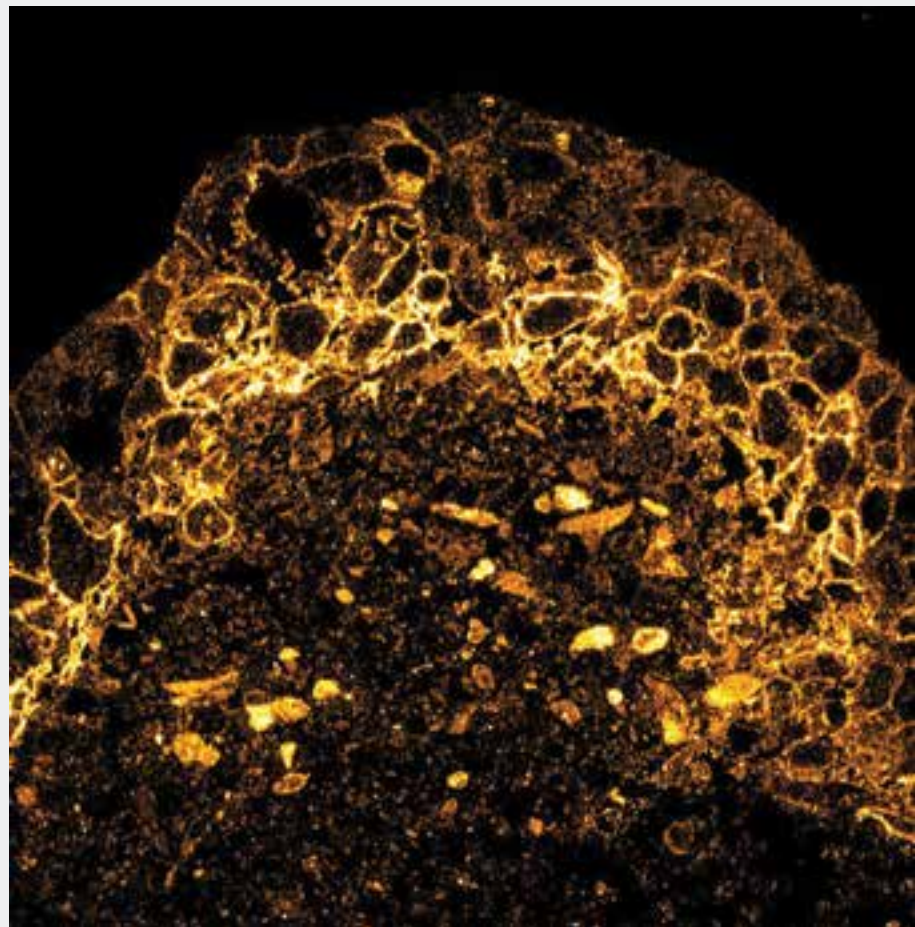
Villani Lab Takes Solar Eclipse | THOMAS CHAN



PHOTO OF LAB MEMBERS equipped with “eclipse glasses” to watch the 2024 solar eclipse.

Principal Investigator: Alexandra-Chloé Villani, PhD
Center for Immunology & Inflammatory Diseases

Floor is Lava | RADHIKA KORANNE, PHD



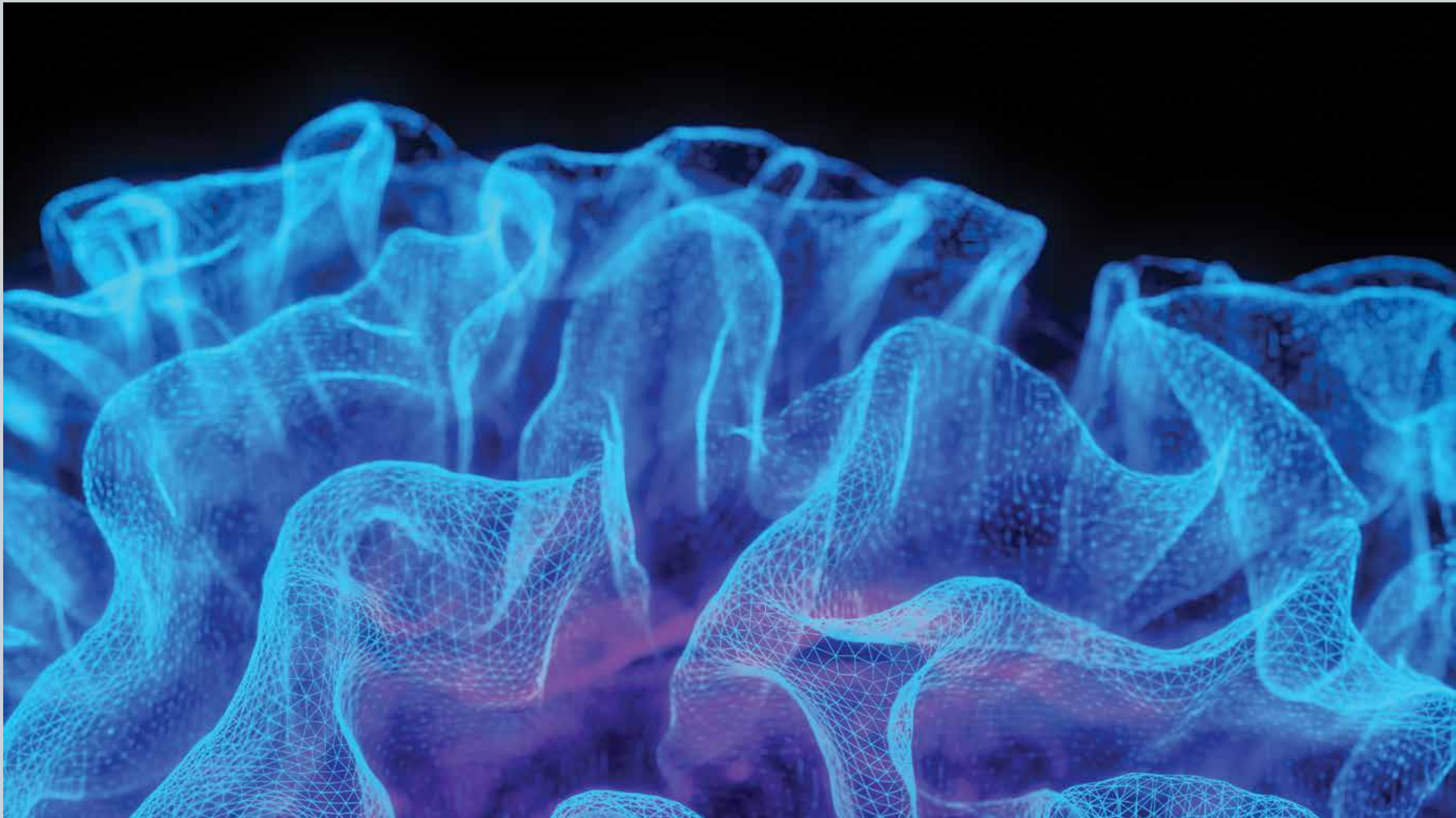
NAVIGATING A HOSTILE LANDSCAPE: Like avoiding ‘the floor is lava,’ cancer cells adapt and manipulate their microenvironment to survive, creating safe zones and pathways for growth within a reactive, often antagonistic space.

Principal Investigator: Aaron Hata, MD, PhD
Krantz Family Center for Cancer Research

Brain Waves | ALEXANDER ATALAY

THIS CLOSE-UP REPRESENTATION of the sprawling white matter surface of the human brain was generated using MRI data and rendered as a wireframe mesh. This view provides perspective on how the relatively large surface area of the cerebral cortex can fit into our skulls.

Principal Investigator: Brian Edlow, MD
Laboratory for NeuroImaging of Coma and Consciousness, Department of Neurology

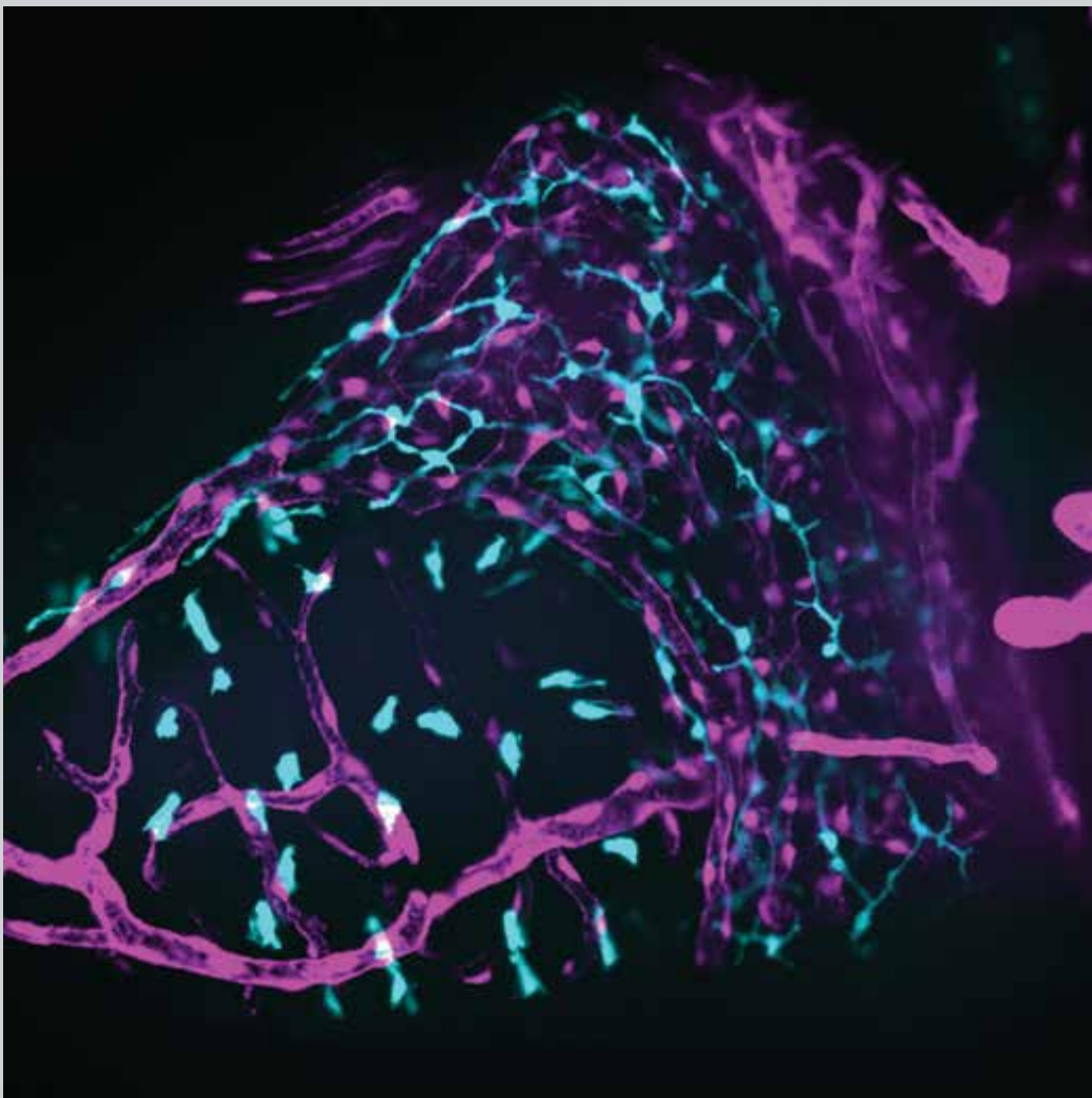


A CLOSER LOOK

Blood and Bile: The Networks of Liver Function | PATRICE DELANEY, PHD

THE LIVER IS LIKE A BUSY CITY with two main highways: one for blood and one for bile. Blood flows into the liver (shown in magenta), carrying important nutrients and oxygen. At the same time, the liver produces bile, a special juice that helps digest fats, which travels along its own highway (shown in cyan). Scientists study these highways using zebrafish livers to learn how they can get clogged or damaged, which can affect how well the liver functions. This research helps us find ways to keep our livers healthy and functioning properly.

Principal Investigator: Wolfram Goessling, MD, PhD
Division of Gastroenterology



A CLOSER LOOK

An Ode to Hidden Threads: Collagen Fibers | MAXWELL ROTH, MD

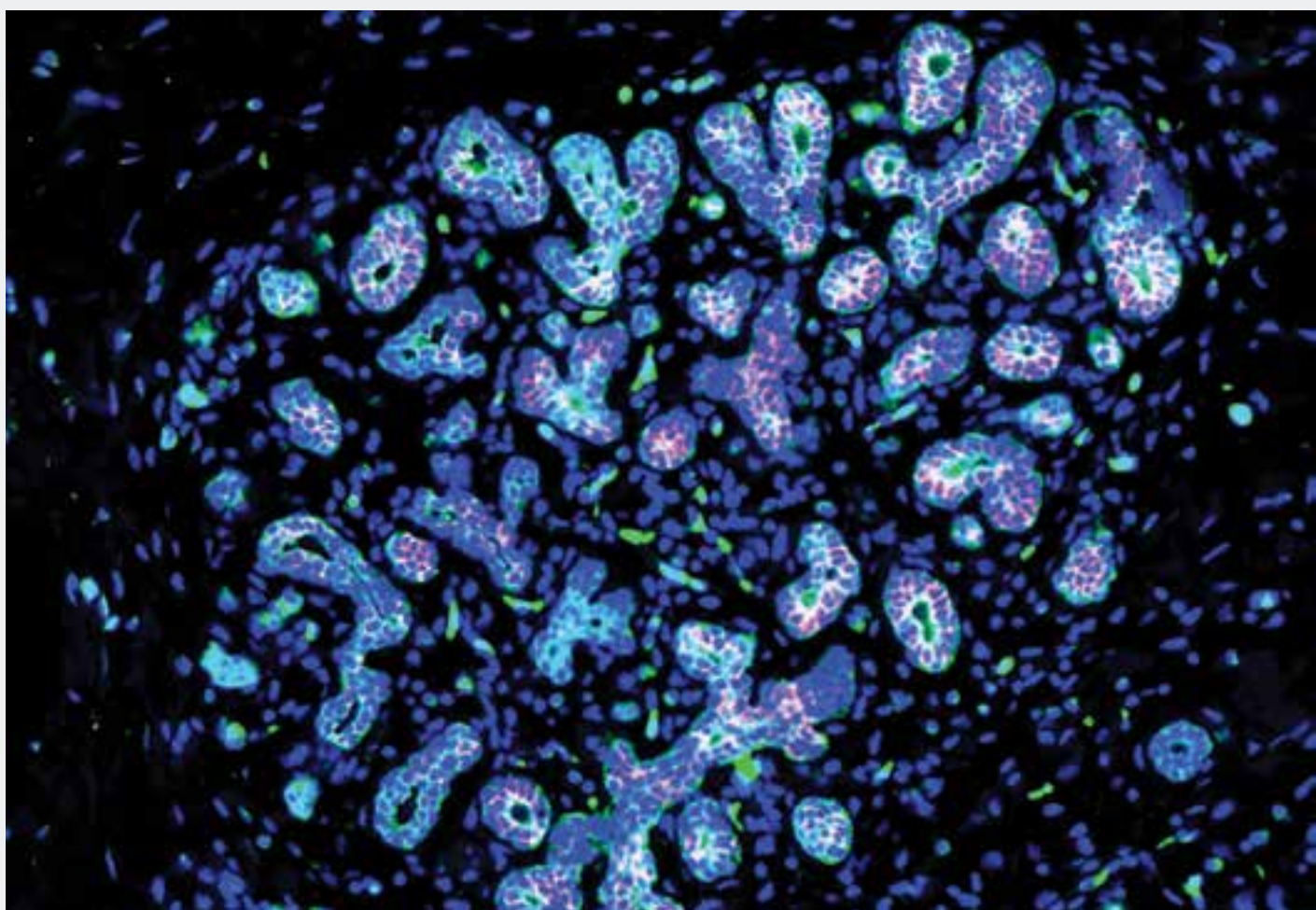


A tapestry of silent strength,
Binding bone to spirit,
Flesh to memory.
Holding us together in the tender
bond of humanness.
We are each a thread in this
ancient loom,
Stitched by unseen hands,
Scaffolding of a deep lineage.

THIS IMAGE CAPTURES the intricate, fibrous structure of collagen, a key protein that gives strength and flexibility to our skin, bones, and tissues. By revealing its delicate, repeating patterns, this photo highlights collagen’s structural role as the body’s natural scaffold for growth and healing.

Principal Investigator: Martin Selig
Diagnostic Electron Microscopy Unit,
Department of Pathology

Hearts of a Breast Gland | XUTU ZHAO, MD



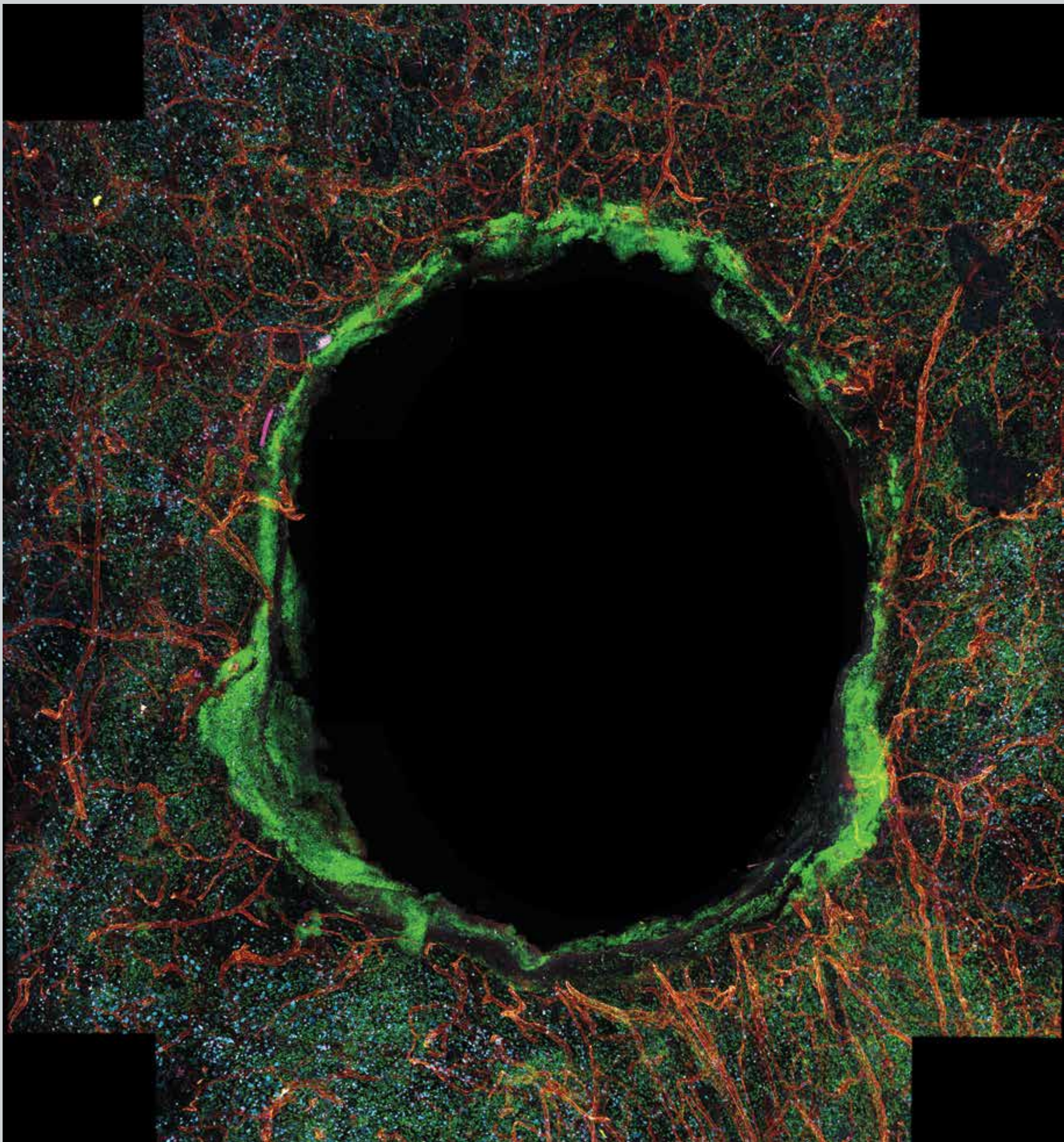
STAINED WITH IL-4 RECEPTOR-α (green) and CD117 (marker for luminal progenitors, red), a few normal human breast glands exhibit the shape of a heart in the cluster by chance.

Principal Investigator: Shawn Demehri, MD, PhD
Krantz Family Center for Cancer Research

Orchestrating Repair: An Immune Concert | ANIKA WADHERA

THIS IMAGE SHOWS IMMUNE CELLS – our body’s defenders – gathering around a small injury in a mouse’s skin. By studying the spatial and temporal immune dynamics at different stages of wound healing, we aim to understand how these cells work together to fight germs and create new tissue. We hope this more complete picture of wound healing will not only provide us with insights about cell-to-cell communication, but also lead to better treatments for chronic wounds and identify factors that might increase the risk of diseases like cancer that can develop from non-healing wounds.

Principal Investigator: Harikesh Wong, PhD
Ragon Institute of Mass General Brigham, Harvard and MIT



CT Vision: A Closer Look at CACTI

FIDES REGINA SCHWARTZ, MD

THIS IMAGE SHOWS a tiny cactus on the left, a thin CAT scan (CT) slice at 0.4 mm scale of the cactus in the middle, and a 3D picture made from the CT slices on the right. CT-scans let us look inside things without opening them up. Here, we can see hidden parts of the cactus, like its spine (black and dark gray) and roots. Just like with this cactus, CT helps doctors see hidden details inside people to find injuries or illnesses. Our center, CACTI—Center for Advanced CT Translation and Innovation—uses CT to explore these unseen details.

Principal Investigators: Fides Regina Schwartz, MD, and Aaron Sodickson, MD, PhD
Center for Advanced CT Translation and Innovation – CACTI, Department of Radiology, Brigham and Women’s Hospital



The Art of Segmentation

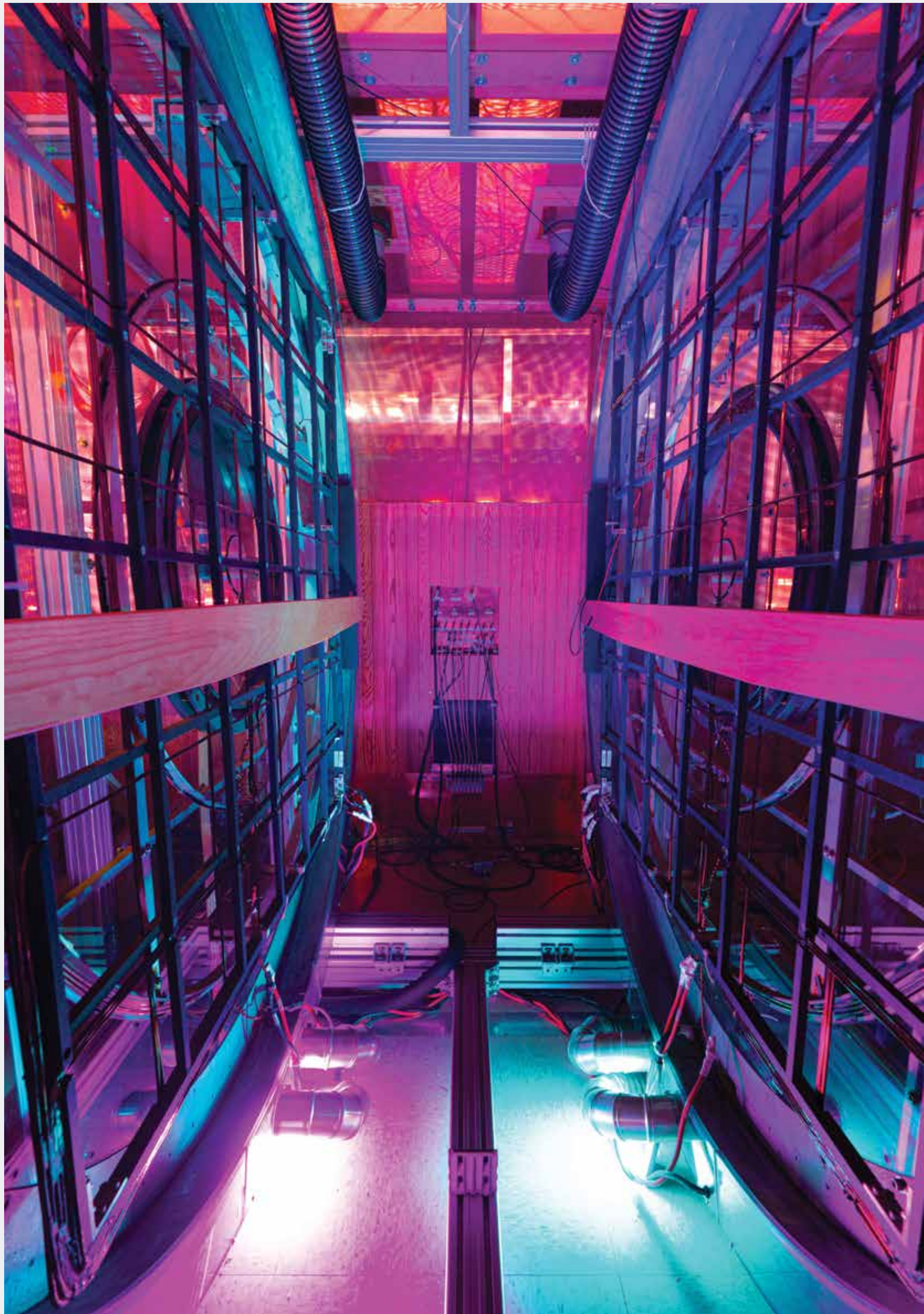
HOLLY FREEMAN, MS



THIS HAND-PAINTED artwork is a tribute to the meticulous craft of neuroimaging segmentation. As a researcher focused on improving these tasks, I wanted to honor the time, care, and precision that manual segmentation demands. Each vivid color and deliberate line reflects my appreciation for the artistry involved in mapping the brain’s intricate structures.

Principal Investigator: Brian Edlow, MD
Laboratory for NeuroImaging of Coma and Consciousness, Department of Neurology

Gateway | MICHAEL DATKO, PHD



MAGNETIC RESONANCE IMAGING is a powerful non-invasive technology that provides a unique window to the structure and function of the body. Dr. Matt Rosen’s research focuses on new methods and tools to enable unconventional approaches to MRI scanner construction. This photo shows a low-field MRI scanner made in-house in the Rosen Lab which is used as a test bed for these novel approaches including brain imaging and a more comfortable approach to breast imaging. The goal of this research is to provide a gateway to make medical imaging more accessible for patients and health care systems.

Principal Investigator: Matt Rosen, PhD
Athinoula A. Martinos Center for Biomedical Imaging,
Department of Radiology

Miracle of Science | MEG BUTLER SMITH

AFTER ALMOST THREE YEARS of IVF treatments, this image was captured in September 2024 by my MGH reproductive endocrinologist, Shruthi Mahalingaiah, MD, MS. At 10 weeks pregnant, I was technically a “graduate” of IVF, but Dr. Mahalingaiah squeezed me in for an extra viability scan while I was waiting to have my first appointment with my OB at 12 weeks. I had never gotten this far in a pregnancy before, and my husband and I were overjoyed to see this image of our baby. After four miscarriages and two failed embryo transfers, I credit Dr. Mahalingaiah’s commitment to research and openness to trying new methods with finally making it this far on a very long road of infertility. Baby Smith is due in March 2025, and we will be forever grateful to Dr. Mahalingaiah for making this little life a possibility!

Principal Investigator: Shruthi Mahalingaiah, MD, MS
Department of Obstetrics and Gynecology



MIXED MEDIA

Mona-Photo-Lisa | FRIEDRICH LEONHARD PIETSCH
AND JAVIER CONTRERAS YAMETTI, MD

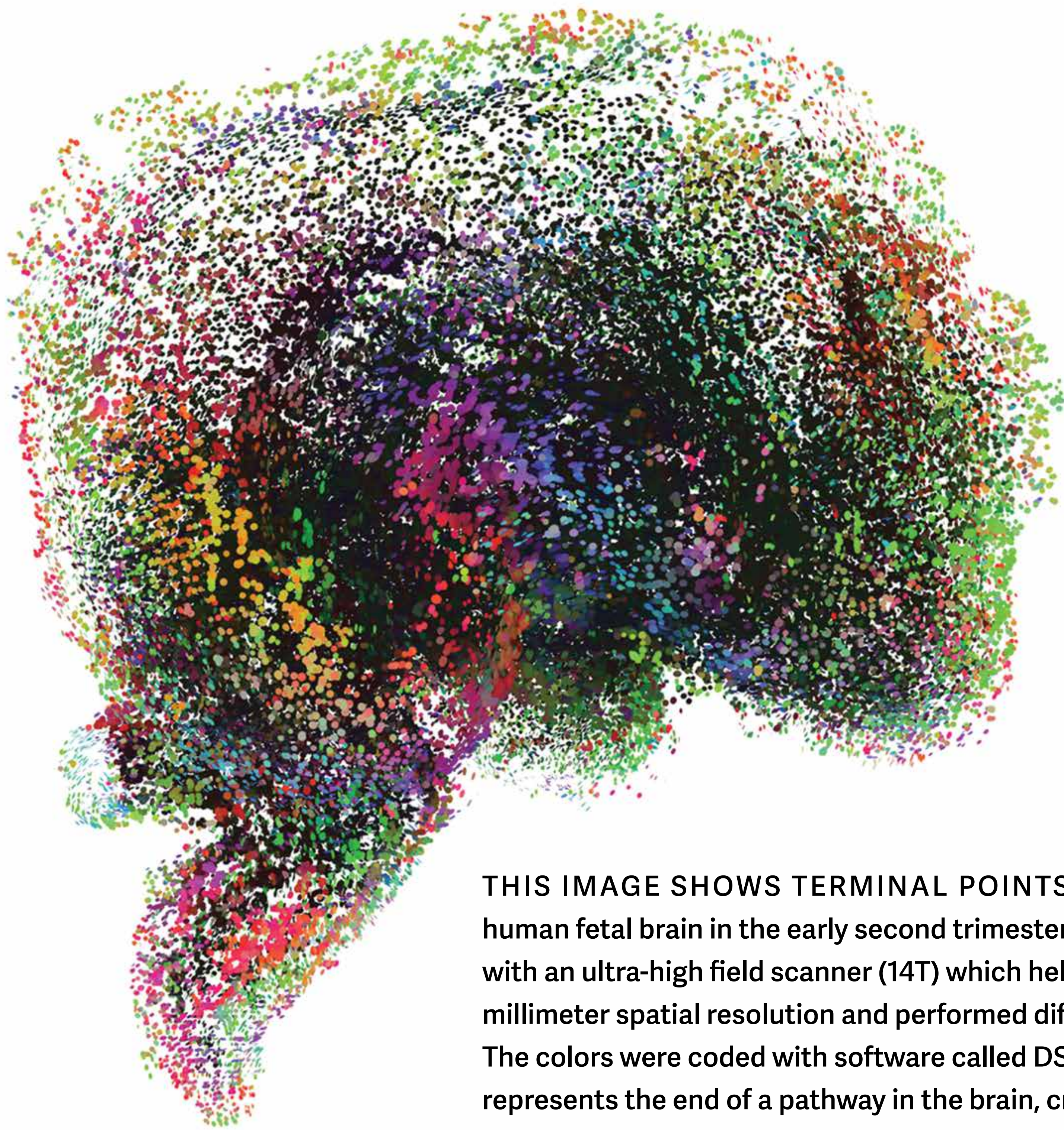


EVERY ARTIST HAS DREAMS OF MONA LISA – the one that the world will remember her or him for. We took a Mona Lisa sketch, put it in a plastic bowl, baked agar-agar jelly in it, sculpted the jelly with a surgical knife, put iron, iodine, calcium, and gadolinium pastes in the scooped-off places, and scanned it with a multi-color CT scanner (photon counting CT). We created Mona-Photo-Lisa from thousands of CT images, where each hue/shade stands for a different material. Mona-Photo-Lisa’s collage of hues/shades and materials will help make invisible diseases visible in the not-so-distant future.

Principal Investigators: Mannudeep K. Kalra, MD, and Matthias Froelich
MGH Webster Center for Quality and Safety, Department of Radiology

SCIENCE AS ART

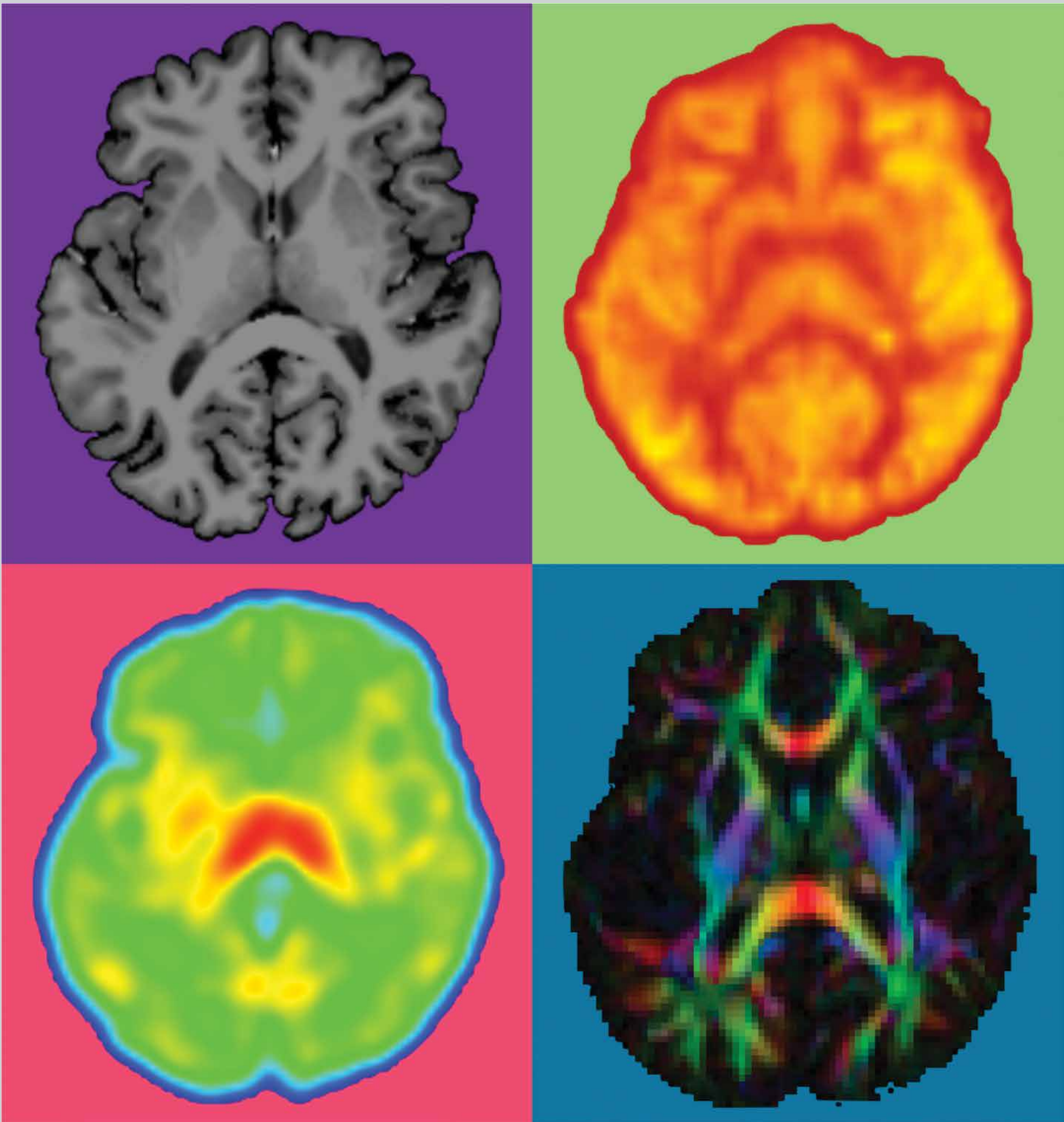
The Art of the Developing Brain | ALPEN ORTUG, PHD



THIS IMAGE SHOWS TERMINAL POINTS of pathways of a human fetal brain in the early second trimester. We scanned the brain with an ultra-high field scanner (14T) which helps to obtain a sub-millimeter spatial resolution and performed diffusion MRI tractography. The colors were coded with software called DSI Studio. Each dot represents the end of a pathway in the brain, creating a “dot painting” effect, with the colors showing the direction of the pathways. The bottom right corner shows the different color orientations, and the mixed colors represent intermediate orientations.

Principal Investigator: Emi Takahashi, PhD
Athinoula A. Martinos Center for Biomedical Imaging, Department of Radiology

Multimodal Imaging | CHIEH-EN (JANE) TSENG, PHD



THE SCANNER THAT WE USE at the Martinos Center for our research is one of the first prototypes of a combined positron emission tomography (PET) and magnetic resonance imaging (MRI) scanner. With this scanner, we are able to acquire different types of imaging data to characterize the brain from different angles in one scan session. Images in this figure show brain anatomy (top left), blood flow (top right), and white matter structure (bottom right) obtained using MRI, and the distribution of proteins involved in immune function (bottom left) obtained using PET.

Principal Investigators: Nicole Zurcher, PhD, and Jacob Hooker, PhD
Athinoula A. Martinos Center for Biomedical Imaging, Chemical Neuroscience Program