THE ART of the BRAIN
EXHIBITION

In honor of this year's Brain Awareness Week (March 16-22, 2020), Mount Sinai's **Friedman Brain Institute** joins the Dana Foundation in its global efforts to increase public awareness of the progress and benefits of brain research.

The Art of the Brain is an exhibition of photographs and illustrations that celebrate the beauty of the brain as seen through the eyes of some of the world's leading researchers and medical illustrators.

With the aid of the latest technological advances, as symbolized by these images, scientists are better able to understand how the brain works and to accelerate the development of new treatments for many brain disorders including Alzheimer's disease, autism, drug addiction, schizophrenia and Parkinson's disease, among many others.

If you have an interest in making a donation through the purchase of any of these images, please contact Veronica Szarejko at veronica.szarejko@mssm.edu

For further information, please visit the Friedman Brain Institute's website:
www.mountsinai.org/FBI

Icahn School of Medicine at Mount Sinai

The Friedman Brain Institute

THE ART of the BRAIN EXHIBITION

Diversity in Neuroscience

Diversity issues is a leading topic of concern within and among scientific institutions. During the last two decades, women and minority groups have made gains in their representation among medical and graduate students, postdocs, and assistant professors. Despite these gains, however, we still have a small number of senior women faculty and far fewer faculty from under-represented minority groups at Mount Sinai and nationwide. Recent studies continue to document implicit biases in the scientific workplace, and concerns remain around quality-of-life issues and obstacles to faculty retention and promotion. This affects everyone.

While we can't solve societal issues, perhaps we can serve as a smaller focus group and demonstrate the kinds of tangible actions that lead to real improvements. In order to accomplish this, the Friedman Brain Institute has initiated a discussion to formulate positive steps by which we can make progress in these areas.

In support of this effort, all of the images, unless otherwise noted, are available for purchase. The proceeds from the sale serve as a donation to the Friedman Brain Institute and will be used to further the "Diversity in Neuroscience" initiative.

All images are photo inkjet prints.

Minimum donation of $150.00 per image (unframed)

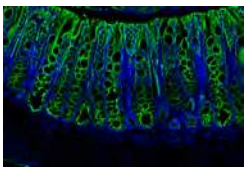
Canvas artwork is a minimum donation of $300.00.

If you have an interest in making a donation through the purchase of any of these images, please contact Veronica Szarejko at veronica.szarejko@mssm.edu

#DiverseBrains

THE ART of the BRAIN EXHIBITION

List of Works

1. 

Kenny Chan, PhD
Nash Family Department of Neuroscience

The second brain

Assessment of cell death in the large intestine following chronic stress.
“They say the gut is the 'second brain', as it acts as an interface between the host and environment, where nutrients and commensal bacteria can influence mood and behavior.

NFS

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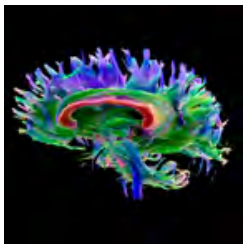
2. 

Klaus Engel
BioMedical Engineering and Imaging Institute

Fiber bundles in the white matter of the human brain

Fiber bundles in the white matter of the human brain. Cinematic Rendering based on data gleaned from magnetic resonance imaging.

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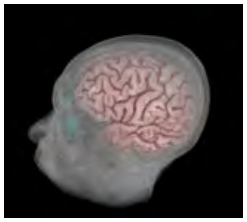
3. 

Holly Oemke Madarash
Department of Neurosurgery

Outside In

3D visualization of a patient's brain, skin for surgical planning.

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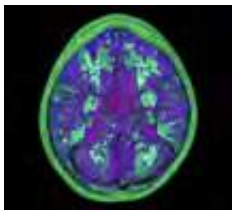
List of Works

4. 

Holly Oemke Madarash
Department of Neurosurgery

Emerge

3D visualization of a patient's intracranial anatomy with tumor for surgical planning.

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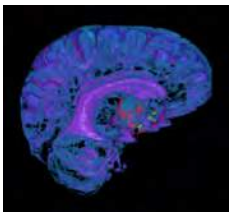
5. 

Holly Oemke Madarash
Department of Neurosurgery

Escape

Recolored 3D visualization of a patient's brain anatomy.

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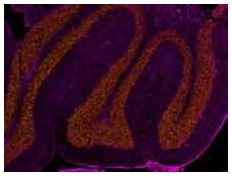
6. 

Shalaka Wahane, PhD
Nash Family Department of Neuroscience

Waveform

The mouse brain cerebellum imaged for the Purkinje neurons and long, dense Bergmann Glia.

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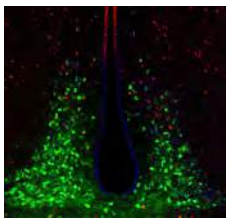
7. 

Long Li, PhD
Nash Family Department of Neuroscience

Christmas Tree

cfos and oxytocin expression pattern in PVH region(unside-down) after social behavior.

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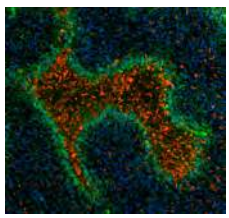
8. 

Anirudh Sattiraju, PhD
Nash Family Department of Neuroscience

Scavengers

Macrophages (red) inside a necrotic region of glioblastoma with tumor cells within surrounding peri-necrotic region expressing a genetic reporter for hypoxia (green).

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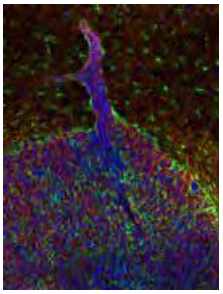

Shalaka Wahane, PhD
Nash Family Department of Neuroscience

Hand of Tumors

A glioblastoma progressing through the brain parenchyma utilizing the brain's vascular structure (not imaged here). The myeloid cells stand guard outside as well as inside the tumour.

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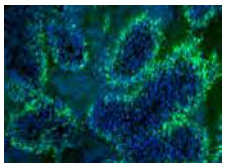
10.



Anirudh Sattiraju, PhD
Nash Family Department of Neuroscience

Unsustainable desire to proliferate

Hypoxic glioblastoma cells, that have been engineered to fluoresce (green), separate necrotic tumor tissue from healthy tumor cells (blue).

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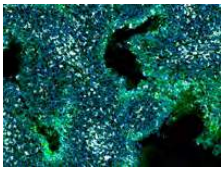
11.



Anirudh Sattiraju, PhD
Nash Family Department of Neuroscience

Enablers

Tumor-associated Macrophages (TAM) (white) infiltrate an aggressive glioblastoma containing numerous hypoxic tumor cells (green).

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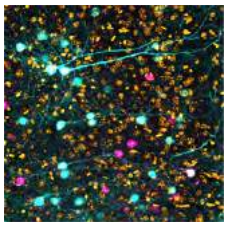
12.

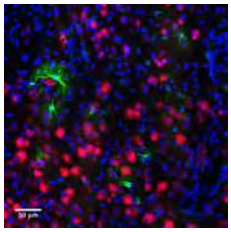


Long Li, PhD
Nash Family Department of Neuroscience

May the 4th be with U

Local infection of excitatory neurons(1st panel blue color) and their input neurons from hippocampus (green neurons in the other 3 panels, the red ones are projecting neurons to LS).

13.



Eric Parise, PhD
Nash Family Department of Neuroscience

Virally targeted astrocytes within the nucleus accumbens

Astrocytes (star-shaped support cells of the brain that are influenced by stress and depression) labeled with a virus expressing green fluorescent protein (GFP) in a deep brain reward center of mice. Astrocytes are in green; Neurons are in red; and Cell nuclei, are in blue.

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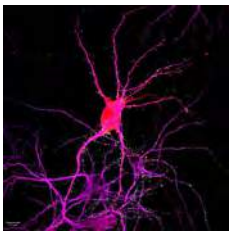
14.

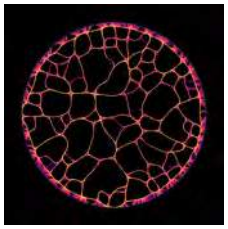


Devina Ung, PhD, Andrea Boitnott and Danielle Mendonca
Department of Psychiatry

Itsy Brainy Spider

Mouse cortical neuron expressing mCherry (red) immunostained for dendritic marker MAP2 (magenta), synaptic marker PSD95 (green), and axon marker Tau in blue.

15.

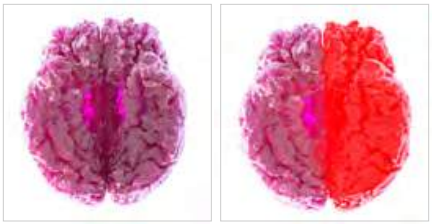


Brian Schilder, M.Phil
Department of Genetics & Genomic Sciences

Wildfire

Transcriptomic data from 16k+ individual brain cells (shown as points) after reducing the dimensionality with an autoencoder and UMAP. 5 million tracts are shown interconnecting these cells, where shorter tract length represents greater similarity in their molecular profiles.

16.



Jacob Wolf
Department of Neurosurgery

Hot Thoughts

MRI of Joe Borrellos Sliced and Renderd In CAD and manipulated in Photoshop

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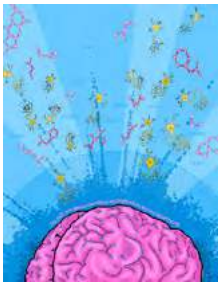
17.



Jessica Johnson, MFA, MPH
Department of Genetics and Genomic Sciences

102 ASD risk genes discovered through whole exome sequencing

Artist depiction of a manhattan plot of 102 newly-identified ASD risk genes with neurons and molecules depicting different functional groups.

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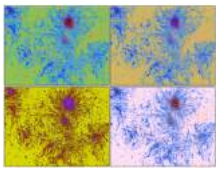
18. 

Shalaka Wahane, PhD
Nash Family Department of Neuroscience

Astra

Astrocytes - one of the more abundant cell types from the mouse brain are cultured in the lab and imaged using the astrocyte marker GFAP

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19. 

Davide Provasi, PhD (Filizola lab)
Department of Pharmacological Sciences

The drug, the target, and their environment at atomic resolution

The image represents a snapshot from computer simulations capturing the binding of an opiod molecule (in orange) to its protein target (in pink) bound to G protein (in green) and embedded in the cell membrane (in grey, blue, and yellow).

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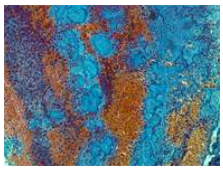
20. 

James Vicari, (Kellner Lab)
Department of Neurosurgery

The Deadly Wanderer

This image is of a human acute ischemic stroke clot using MSB trichrome staining to visualize RBC, WBC, platelet and fibrin composition in stroke clots.

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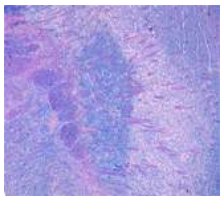
21. 

Estrella Lopez-Gordo, PhD
Department of Cardiology

When science meets art in a mouse brain

This image illustrates the brain of a healthy adult CMAH knock-out female mouse. The diversity and dynamism of structures in the depicted brain shows us how science can both educate us and inspire us to find beauty beyond the obvious. Maakia amurensis II (MALII) staining in blue and nuclei in pink. Magnification 5x.

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22.

Genoveva Uzunova, MD, PhD
Department of Pathology

Glioblastoma cells braid

Phase contrast photomicrograph of primary human glioblastoma cells dissociated from a tumor obtained at surgery and grown for 2 weeks in vitro in cell culture. The image is taken with the new Leica PAULA imaging system.

23.

Leslie Schlachter PA-C
Department of Neurosurgery

Elegent Eloquence

Segmented bundles of cerebral tracts in a normal brain.

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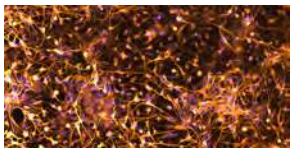
24.

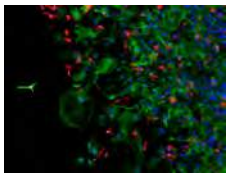


Chrystian Junqueira Alves, PhD
Nash Family Department of Neuroscience

Golden neurons

Plexin-B2-mediated cell-intrinsic stiffness leading to spontaneous neuronal differentiation upon neural induction. β-III tubulin (TUJ1; gold) and DAPI (blue).

25.



Mickael Audrain, PhD
Department of Neurology

The U.S. Border

Primary microglia and astrocytes.

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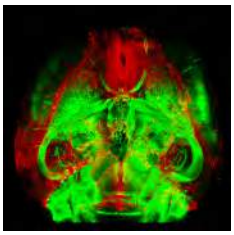
26.

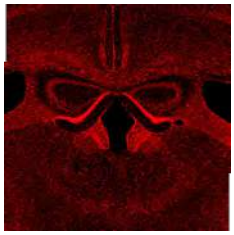


Alexander Smith, PhD
Nash Family Department of Neuroscience

Reward on the Brain

This is an image of a cleared mouse brain, with the green channel representing autofluorescence, primarily in white matter axon tracts. The red channel is immunofluorescence indicating c-Fos immunoreactivity, showing cells that were activated following a novel reward learning task.

27.



Shalaka Wahane, PhD
Nash Family Department of Neuroscience

Darth Matter

Nuclei from the adult murine Hippocampus imaged using DAPI.

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28.

Amy Zhong
Instructional Technology Group

How to Maximize Your Productivity

There are countless articles listing helpful tricks to maximize productivity. In this Rube Goldberg inspired illustration I've depicted an artist putting these tricks into practice. Attempting to start her day off early (tip #1), the artist sets her phone alarm (A) to go off at 4AM. Annoyed by the noise, the artist (B) picks up the baseball bat (C) and smashes the phone not only eliminating the distractions (tip #2) of social media, but also completing her exercise (tip #3) for the day. Whilst picking up the baseball bat, the string attached is lifted, thus lowering the thinking cap (D) onto her head allowing her to focus (tip #4). Now that the artist's stress level has been lowered and has got her blood flow pumping, she gets out of bed and reaches for her robe (E), upsetting the coatrack (F), frightening the chicken (G) atop to hatch an egg (H), or idea. The egg is accidentally kicked into a glass of orange juice (I) which is high in Vitamin D allowing it to give off natural sunlight (tip #5) thereby keeping the artist's circadian clock in check. A goldfish (J) that just happens to be swimming in this glass of orange juice is irritated by the floating egg. The freshness of an egg can be tested by placing it in a bowl of water. If the egg is buoyant, or stays afloat, it means air has entered the shell and the egg is no longer fresh. The fish slaps the egg out from within the \glass hitting the canvas (K), thereby creating the next Unicorn of the Modern Art World. The remaining eggs, which are high in protein, provide valuable nutrients as part of a balanced diet (tip #6).

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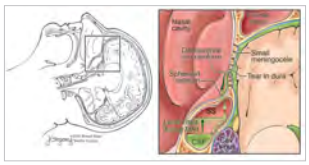
29.



Jill K Gregory, CMI, FAMI
Instructional Technology Group

CSF Leak through the Cribriform Plate

Cerebrospinal Fluid (CSF) leakage is a potentially fatal condition that may result when a skull base dural defect permits CSF communication between the cranial vault and sinonasal cavities. Flow rate is an important property of CSF leaks that can contribute to surgical decision-making and predispose patients to complications and inferior outcomes. This illustration depicts a dural tear along with cribriform dehiscence that allows CSF to trickle into the sinonasal cavity. Middle and posterior cribriform leaks tend to pool in the sphenoid sinus (SS), which is measurable by the change in fluid level during the course of an imaging session. This provides a non-invasive means to measure CSF flow rate. This illustration appears in the Journal of Neurosurgery, in the article "Correlation of spontaneous and traumatic anterior skull base CSF leak flow rates with fluid pattern on early, delayed, and subtraction volumetric extended echo train T2-weighted MRI" by Rutland et al.

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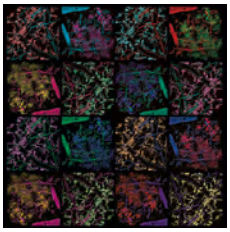
30.

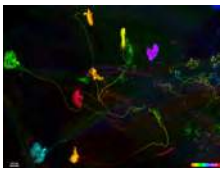


Jillian Beroza; Dolores Hambardzumyan, PhD; Zhihong Chen, PhD
Department of Neurosurgery

Macrophages Clinging Mashup

The image shows tumor-associated macrophages clinging to the blood vessels in glioblastoma. These macrophages derive from either brain microglia (the bushy ones) or circulating monocytes (the rounder ones), and they behave differently in tumor development.

31.



Zhuhao Wu, PhD
Department of Cell, Developmental and Regenerative Biology

Cerebellar Purkinje Cell Projections in 3D

This picture is a volume imaging of sparsely labeled Purkinje cells in an adult mouse brain to reveal their full morphology in 3D. Color indicates the image depth (bottom right scale). The whole tissue was rendered optically transparent with iDISCO techniques and imaged with light-sheet fluorescent microscope to visualize individual Purkinje neurons for their entire long and curved projections from the cell bodies near the surface of the cerebellum to the deep cerebellar nuclei.

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32.

Esther Cheng
Nash Family Department of Neuroscience

Cerebral Brain Organoid

Immunocytochemistry of a cerebral brain organoid cultured from induced pluripotent stem cells.

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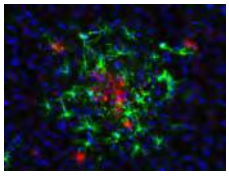
33.



Jean-Vianney Haure-Mirande, PhD
Department of Neurology

Astrocytes around Amyloid plaque

GFAP positive astrocytes (green) recruited around Aß plaque (red) in the APP/PS1 mouse model of Alzheimer's pathology

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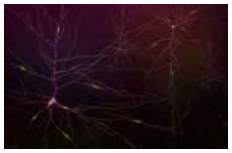
34.

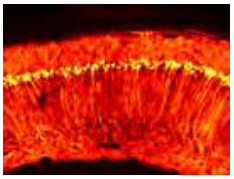


Ni-ka Ford
Instructional Technology Group

Inside the Neocortex

A prominent neuron found in the neocortex is the pyramidal neuron. It is located in subcortical structures such as the hippocampus and the amygdala. This image strives to capture the intricate beauty and bountifulness of the pyramidal neuron which is responsible for many important cognitive processes. The neurons were generated from data of human pyramidal cells from NeuroMorpho.org and imported into Cinema 4D as accurate 3D models. The image was composited further in photoshop for the finishing touches such as the neural signaling and atmospheric perspective.

35.



Anthony Lacagnina, PhD
Nash Family Department of Neuroscience

Fear memory-related neurons

Using an activity-dependent tagging genetic mouse (the ArcCre mouse), neurons that were active during a contextual fear conditioning session were permanently tagged with a fluorescent reporter. These are hippocampal CA1 neurons that were active during that fearful experience.

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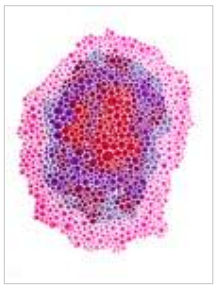
36.

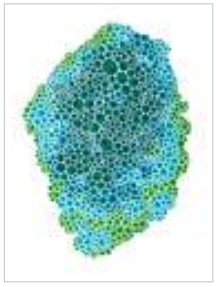


Jessica Johnson, MFA, MPH
Department of Genetics and Genomic Sciences

Untitled (Cells #2)

Abstract depiction of cells under a microscope.

37.



Jessica Johnson, MFA, MPH
Department of Genetics and Genomic Sciences

Untitled (Cells #4)

Abstract depiction of cells under a microscope.

38.

Paloma Bravo, MS
Department of Cell, Developmental and Regenerative Biology

...am I being clear?

Microglia in adult female zebrafish brain