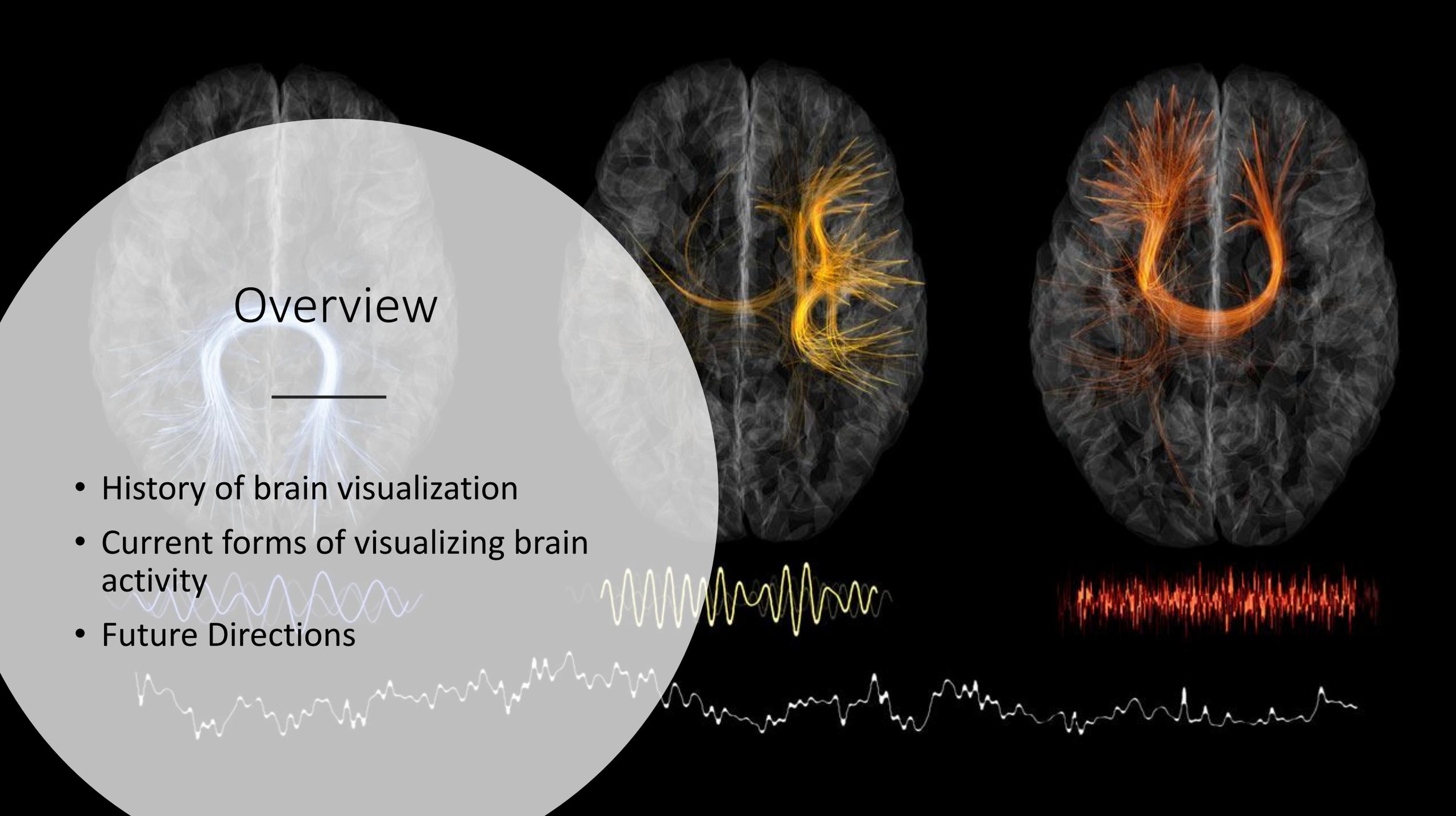


# Data Visualization of Brain Activity

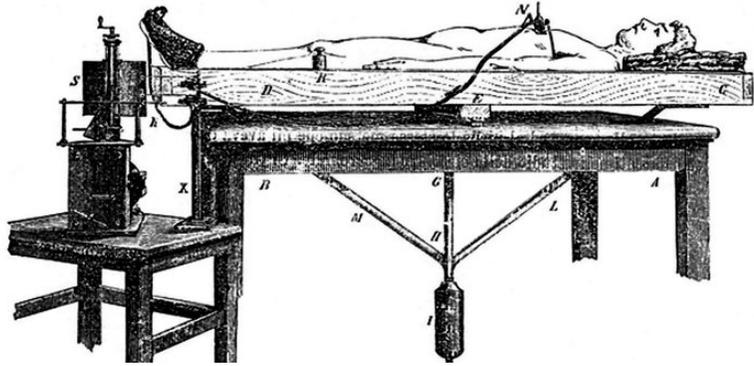
K.B. Zaidi



## Overview

- History of brain visualization
- Current forms of visualizing brain activity
- Future Directions

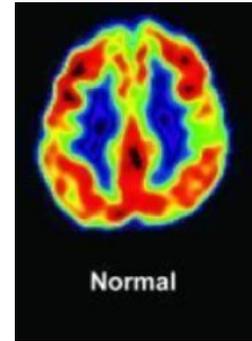
# Visualizing Brain Activity



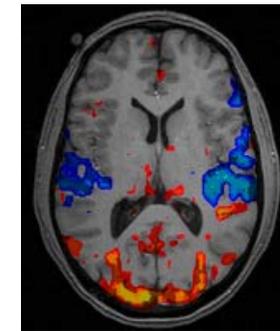
Human Circulation Balance



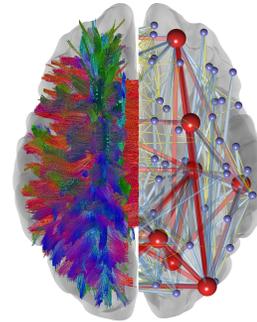
CT & MRI



SPECT & PET



fMRI

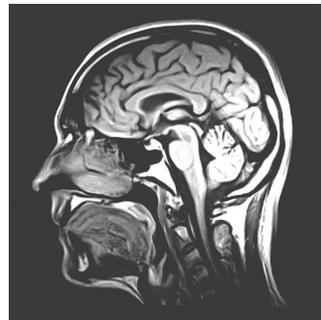


Today!

Pneumoencephalography



Early 1900s



1970s

1980s

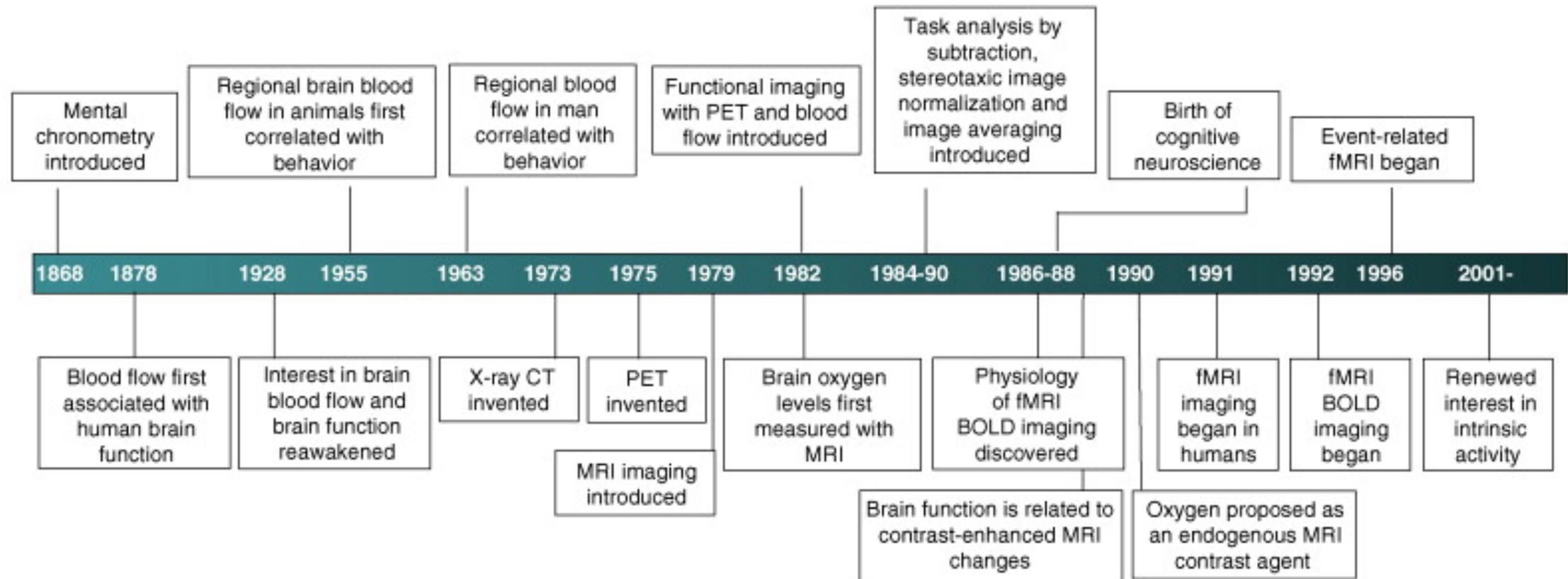
1991

1880

Angelo Mosso

Raichle, 2008

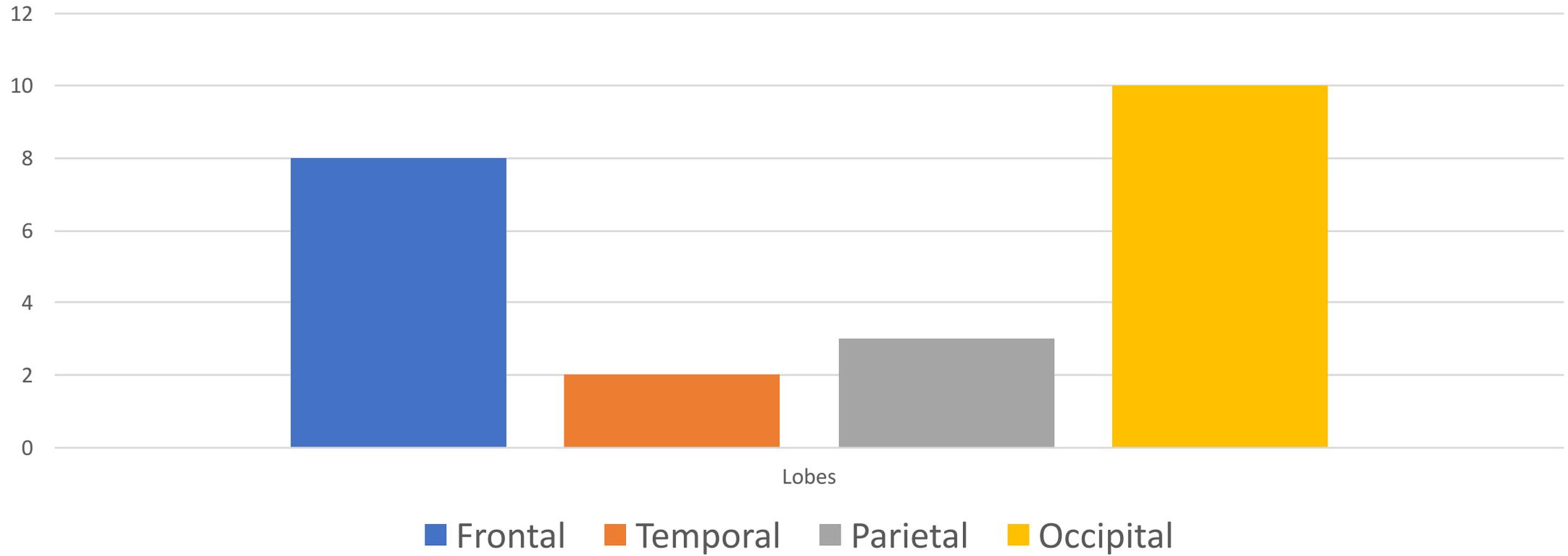
### A chronology of human brain imaging with PET and fMRI



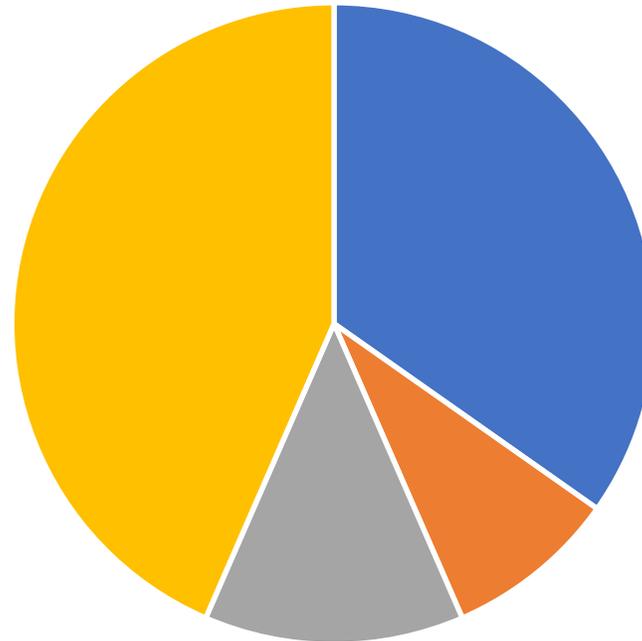
TRENDS in Neurosciences

Why the push to visualize?

## Brain Activation

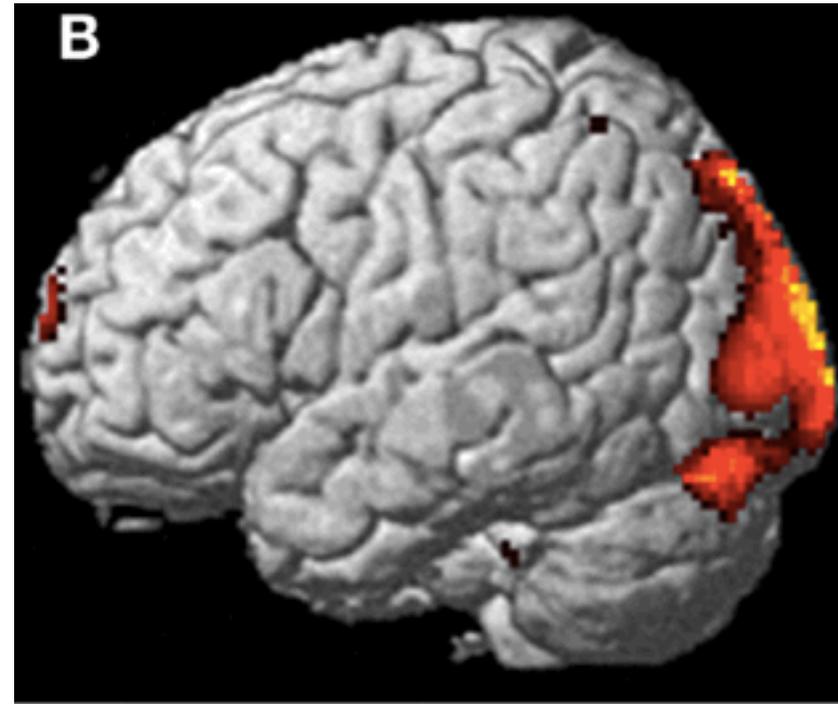


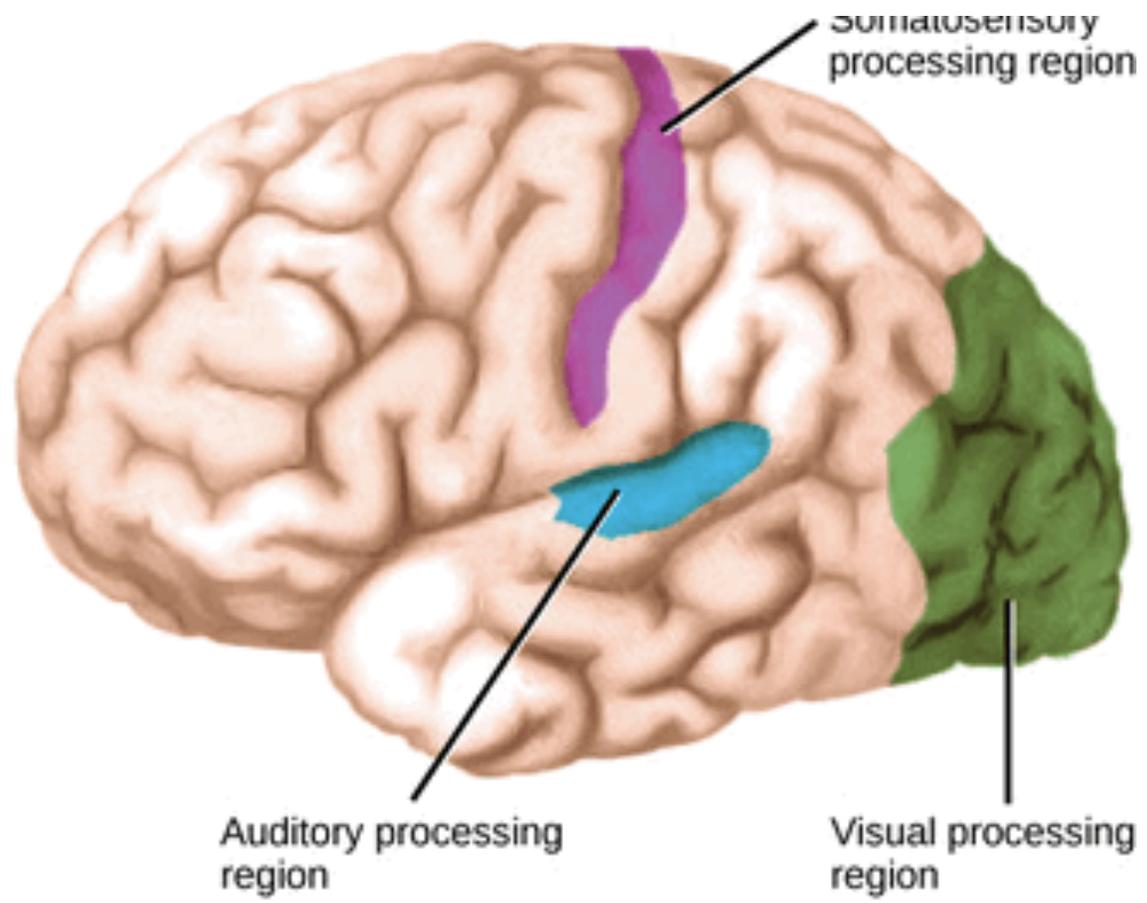
### Brain Activation



■ Frontal   ■ Temporal   ■ Parietal   ■ Occipital

Lobes	Brain Activity
Frontal	8
Temporal	2
Parietal	3
Occipital	10





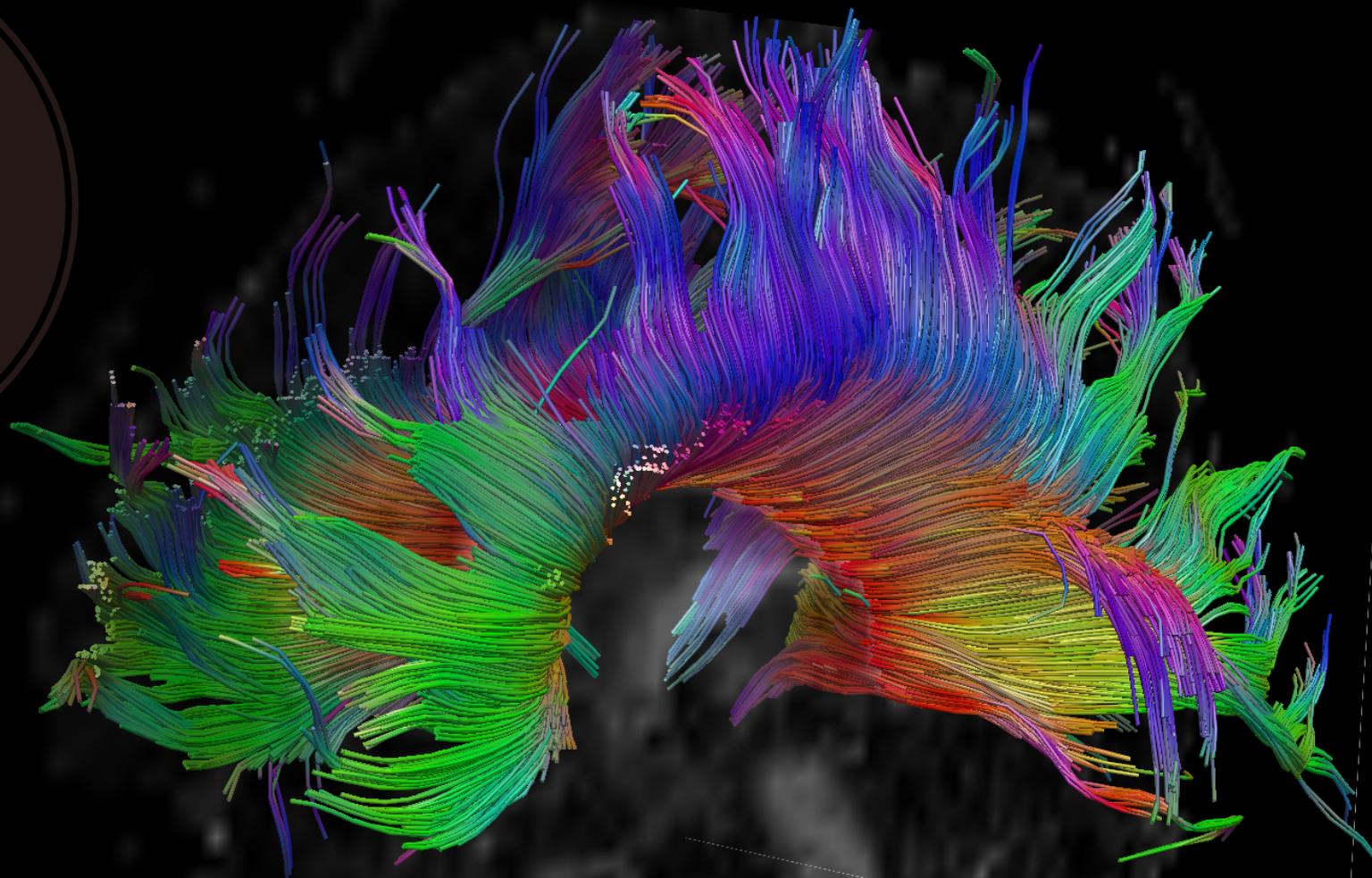
Somatosensory processing region

Auditory processing region

Visual processing region

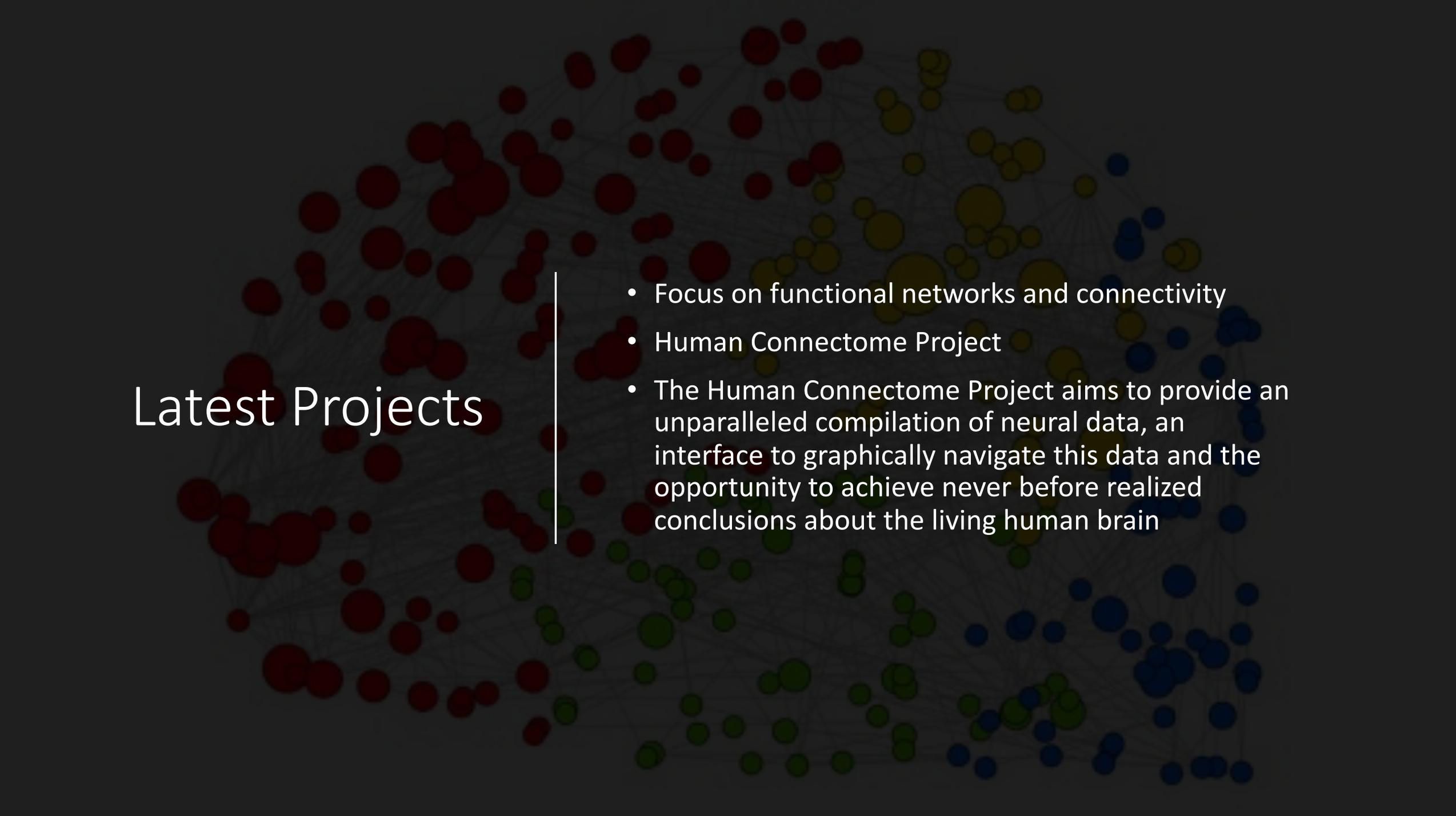
(b)

Diffusion  
MRI



# Human Connectome Project



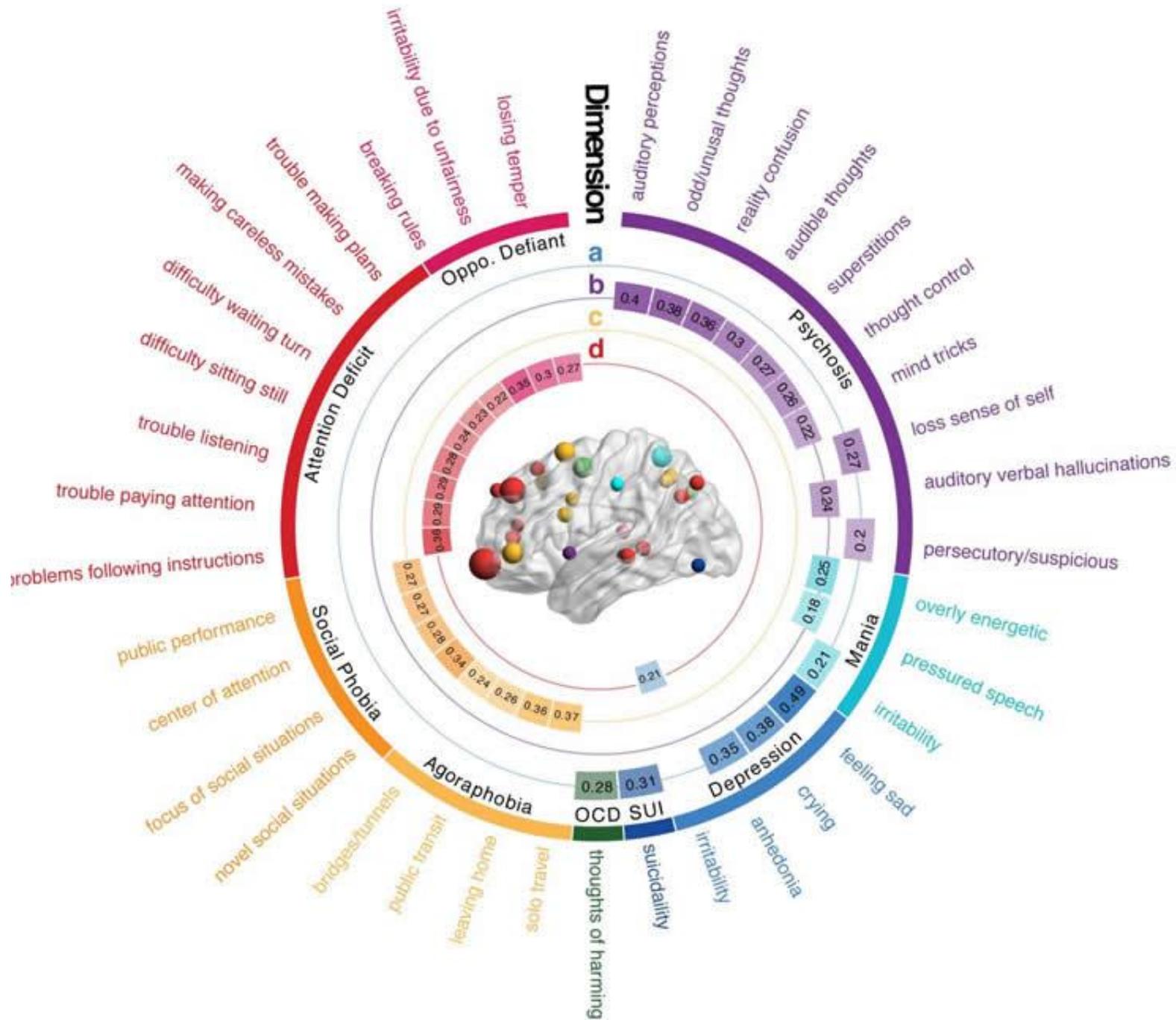


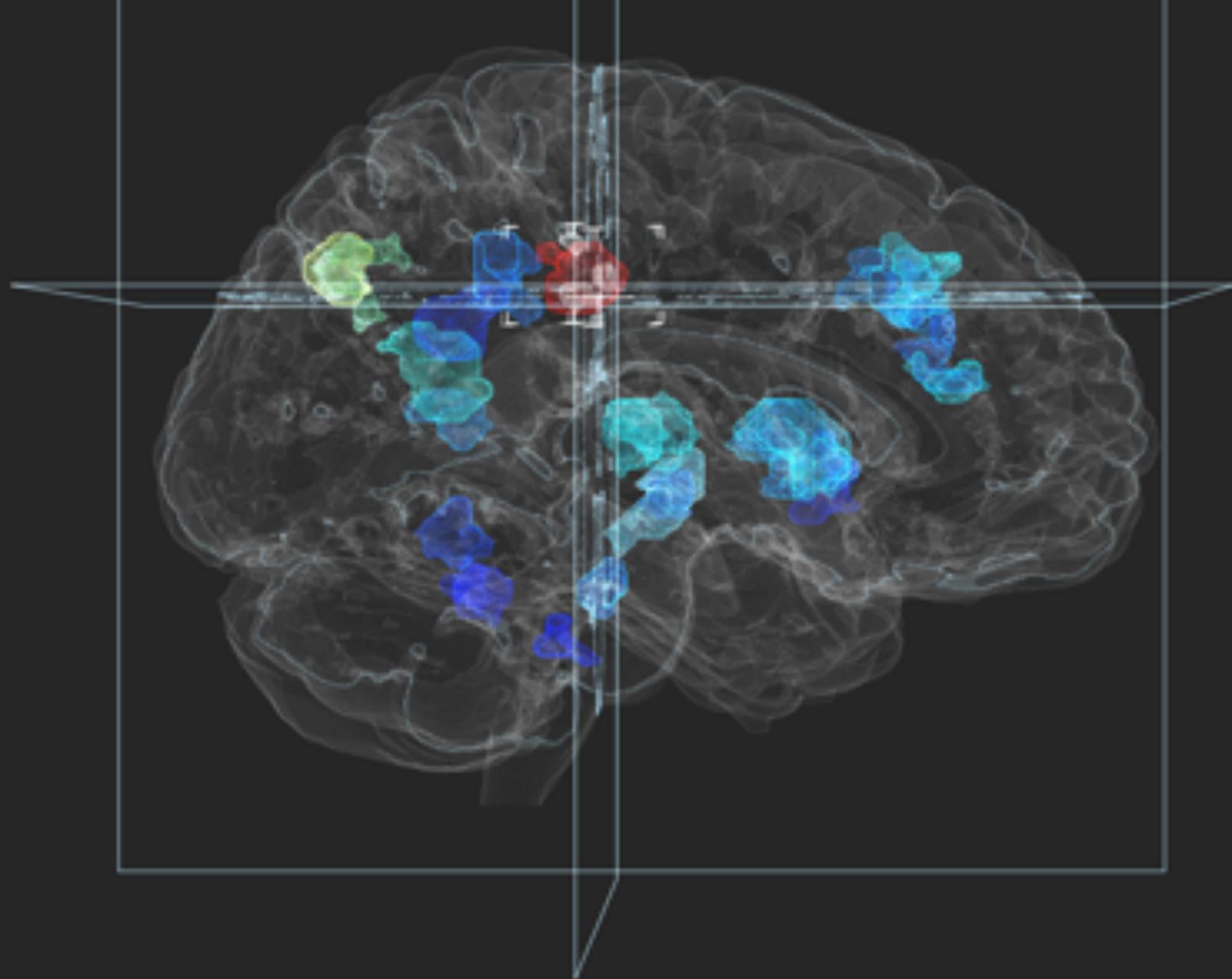
# Latest Projects

- Focus on functional networks and connectivity
- Human Connectome Project
- The Human Connectome Project aims to provide an unparalleled compilation of neural data, an interface to graphically navigate this data and the opportunity to achieve never before realized conclusions about the living human brain

# Precision Medicine Revolution

- Cross-reference an individual's personal history and biology with patterns found worldwide
- Proto-type of healthy and diseased brain
- Utilize that network of knowledge to pinpoint and deliver care that's preventive and targeted





**10.860**

Total Flow

**1.890**

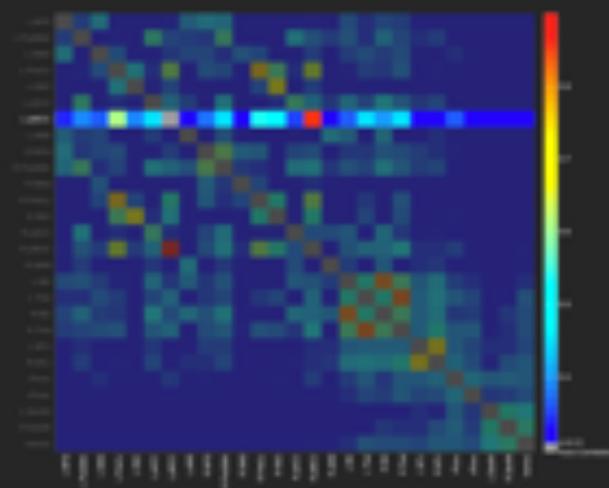
PSP Reduction

**0.380**

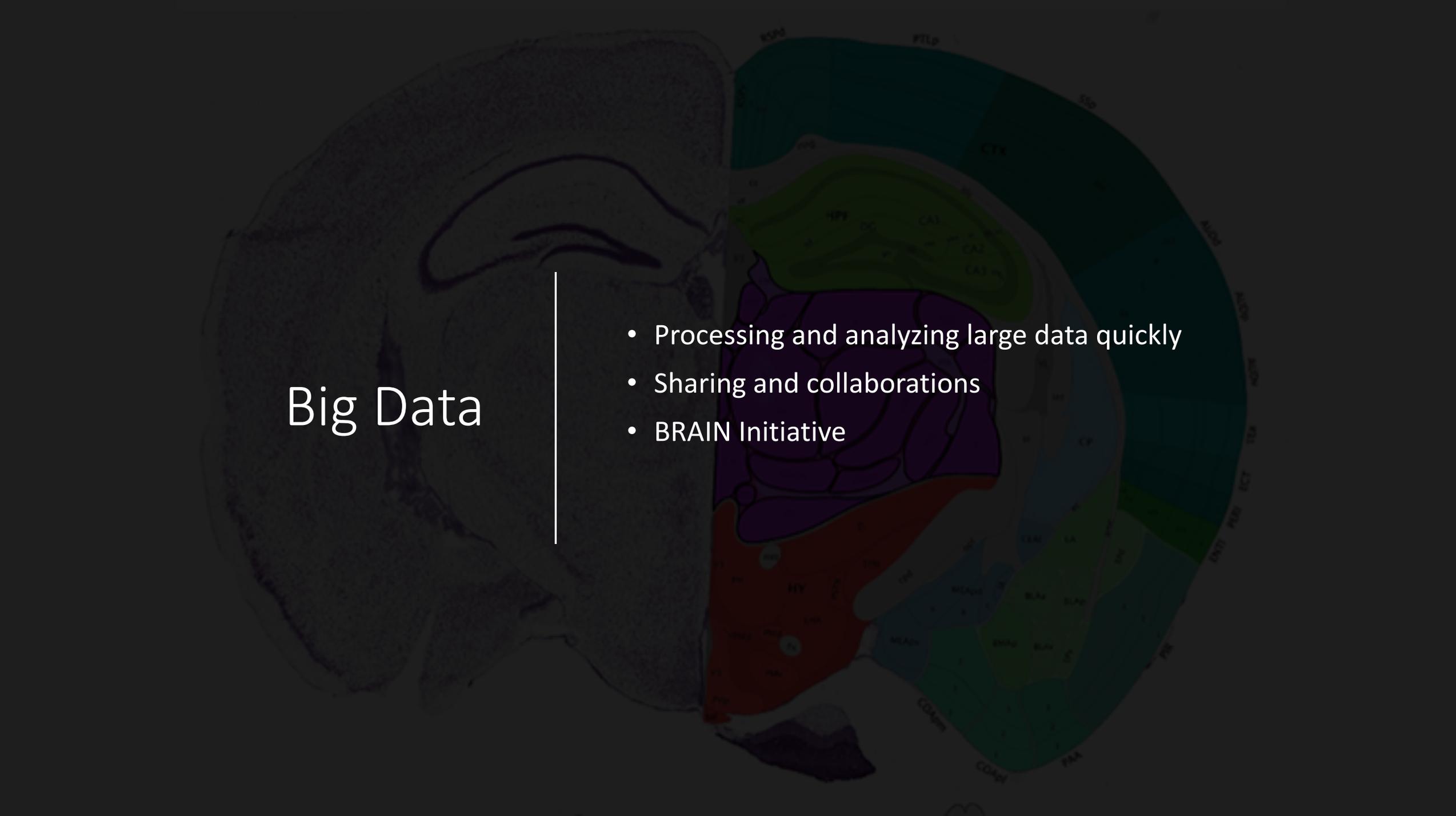
Clustering Coefficient

**9.920**

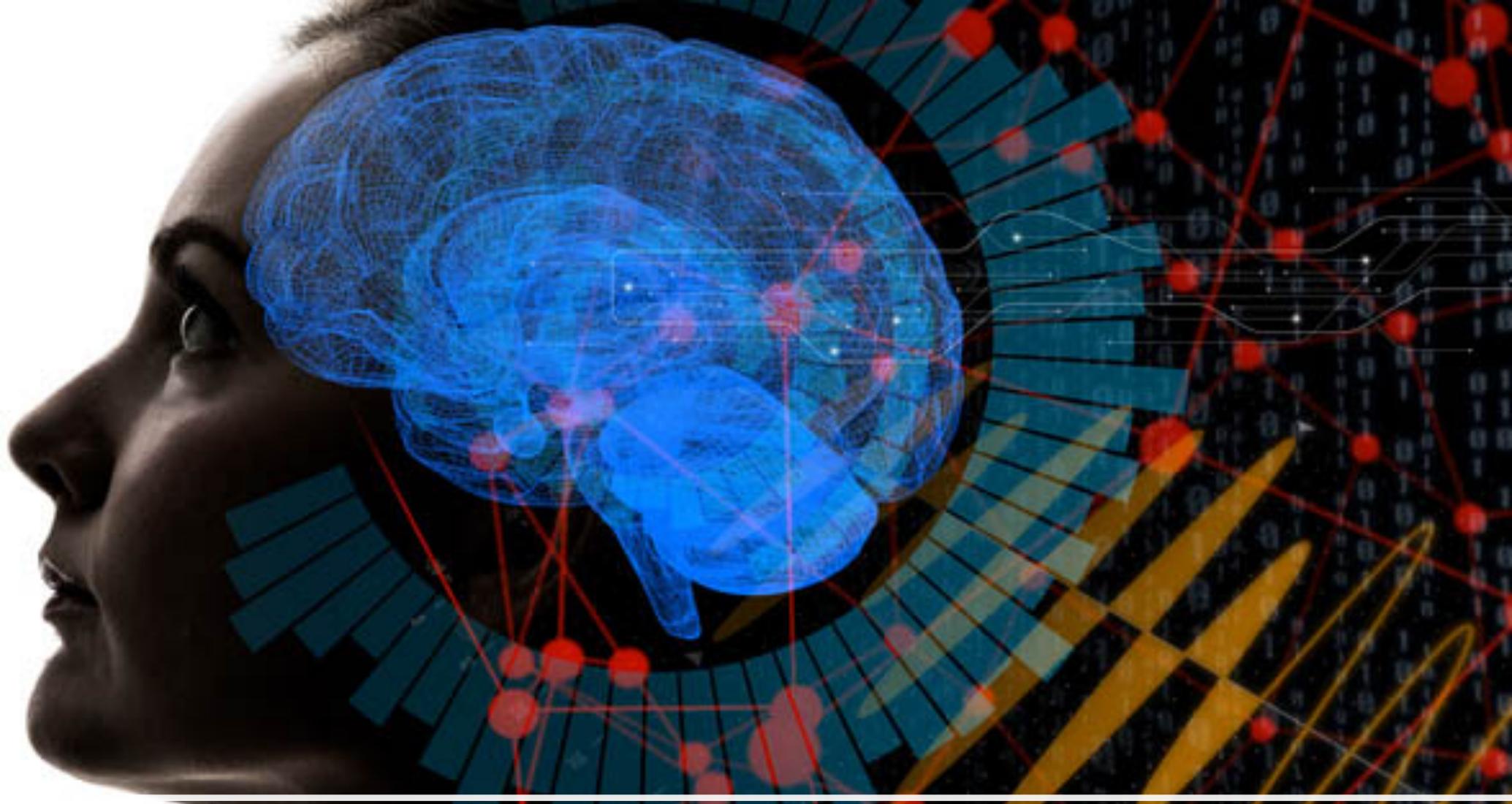
PSP Reduction



# Big Data

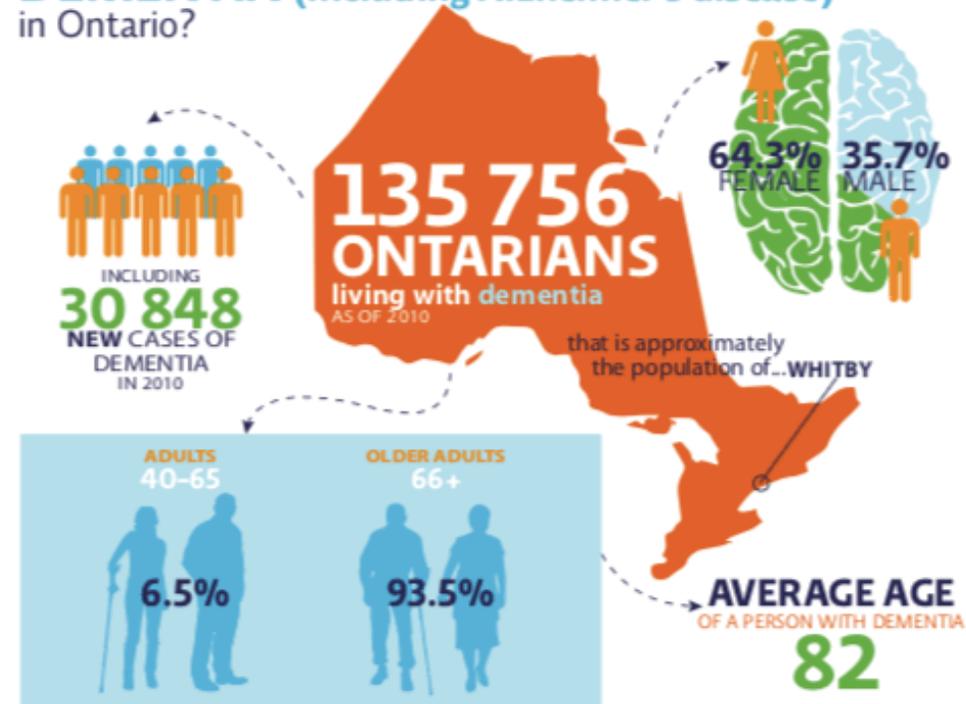


- Processing and analyzing large data quickly
- Sharing and collaborations
- BRAIN Initiative



Future Directions

What is the impact of  
**DEMENTIA** (including Alzheimer's disease)  
in Ontario?



COMPARED TO THE AVERAGE ONTARIAN,  
THE DIRECT COST TO THE HEALTH CARE SYSTEM FOR ONE YEAR IS:

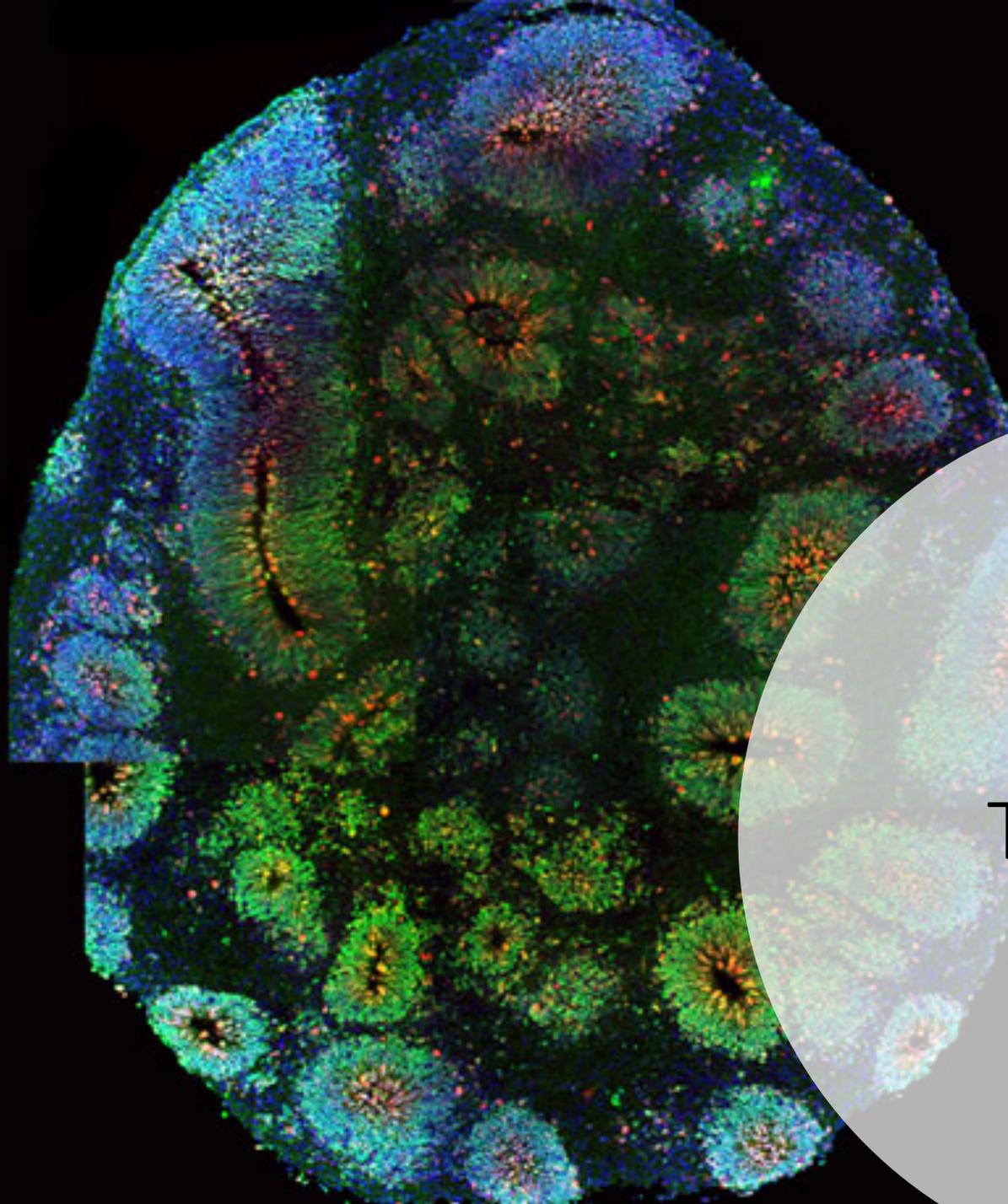
**8.1x**  
FOR EXISTING CASES  
OF DEMENTIA



**7.0x**  
FOR NEW CASES  
OF DEMENTIA

Learn about the 12 other brain disorders [here](#)

The data in this infographic is from *Brain Disorders in Ontario: Prevalence, Incidence, and Costs from Health Administrative Data*, prepared for the Ontario Brain Institute by the Centre for Health Economics and Evaluation, University of Toronto.



Thank you

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