



# scan Update

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**Bill Jagust, PhD – UC Berkeley**

**Thursday, October 17, 2024**

**2024 Fall ADRC Meeting**



## (Standardized, Centralized Alzheimer's and Related Dementias Neuroimaging)

**Goal: Standardize imaging in the ADRC program, make data broadly available, and harmonize with existing large datasets**

**Bill Jagust, Cliff Jack MPIs**

### **PET**

University of Michigan

Bob Koeppe

UC Berkeley

Bill Jagust

Tessa Harrison

Trevor Chadwick

Lawrence Berkeley National Lab

Suzanne Baker

Wesley Thomas

### **MRI**

Mayo Clinic

Cliff Jack

Bret Borowski

Chris Schwarz

UC Davis

Charlie DeCarli

Pauline Maillard

**Imaging Steering Committee**

Annie Cohen (Chair)

Shannon Risacher (co-Chair)

### **NACC**

Sarah Biber

Brittany Hale

### **LONI**

Arthur Toga

Karen Crawford

### **CLARiTI**

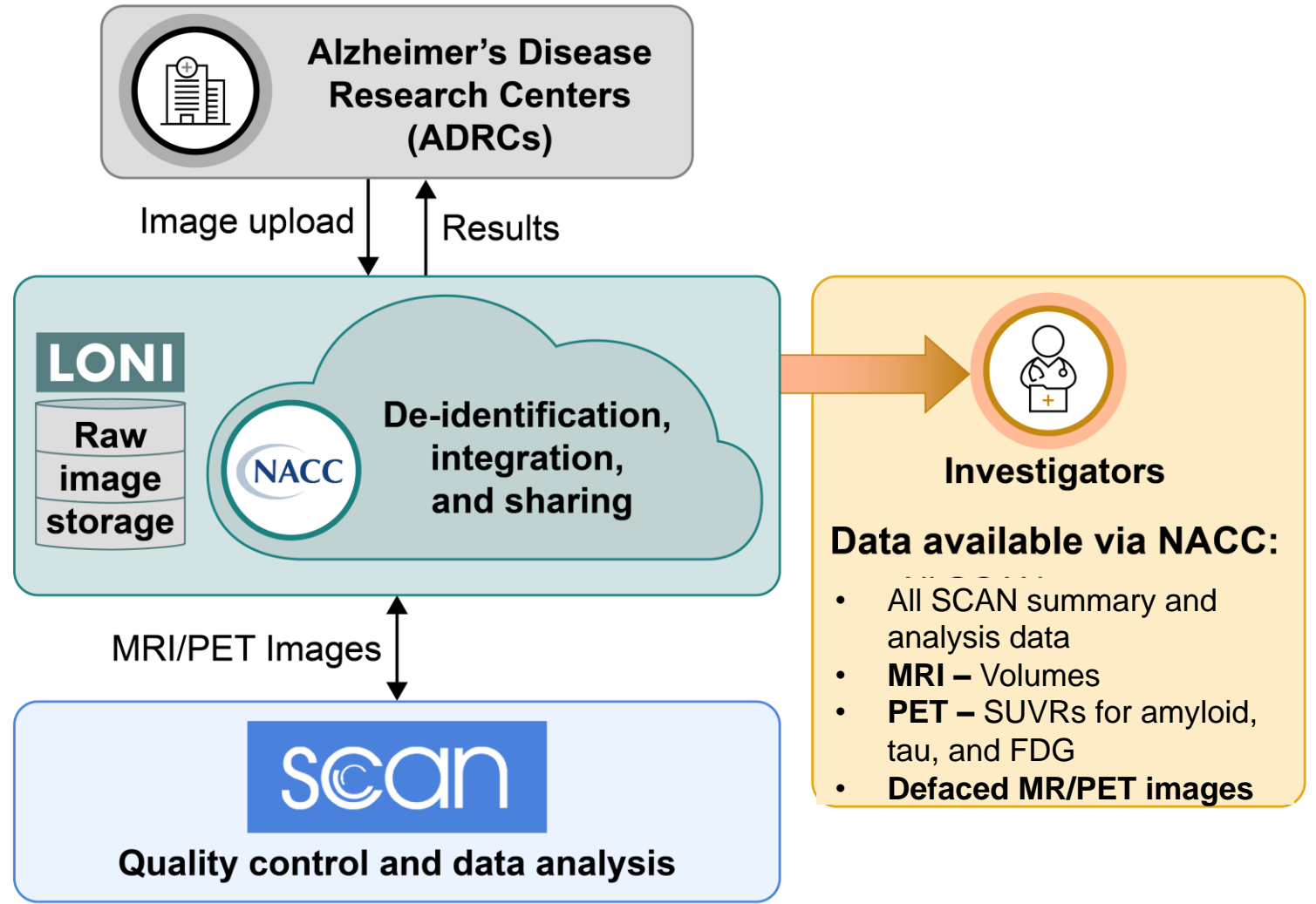
Sterling Johnson

Beth Mormino

# Standardized Centralized Alzheimer's and Related Dementias Neuroimaging

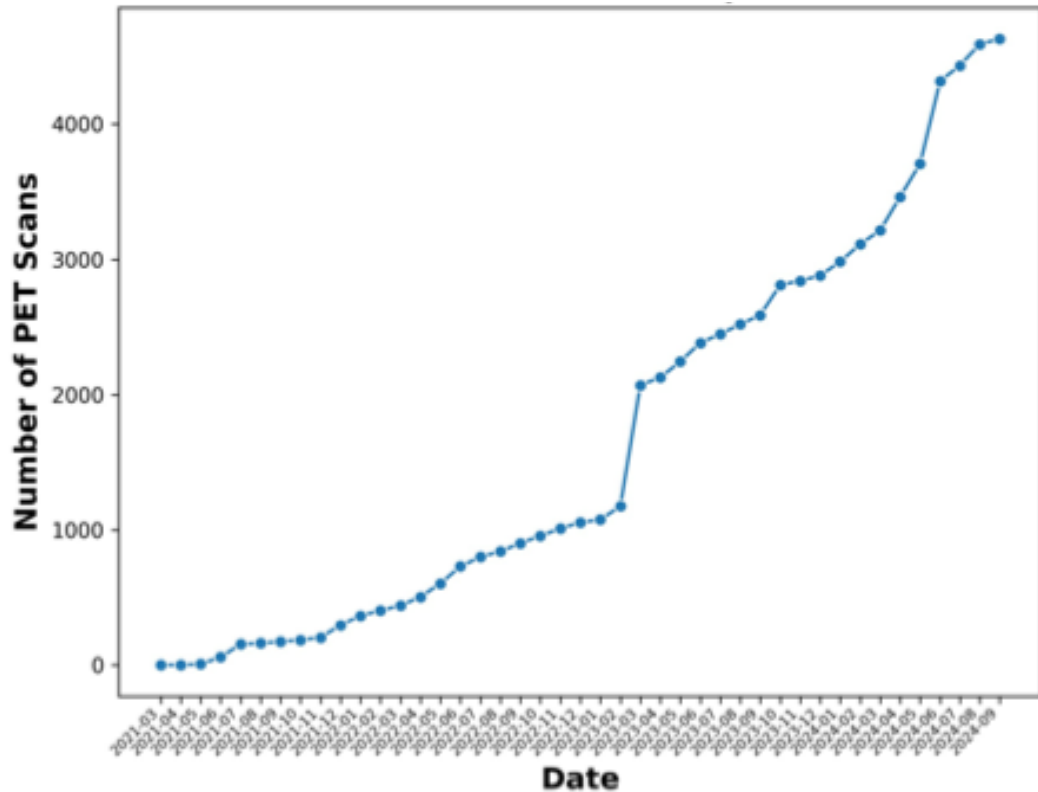


**Mission:** Collect large quantities of standardized imaging data, integrate it with other data modalities available via NACC, and share it with researchers around the world to advance the field.

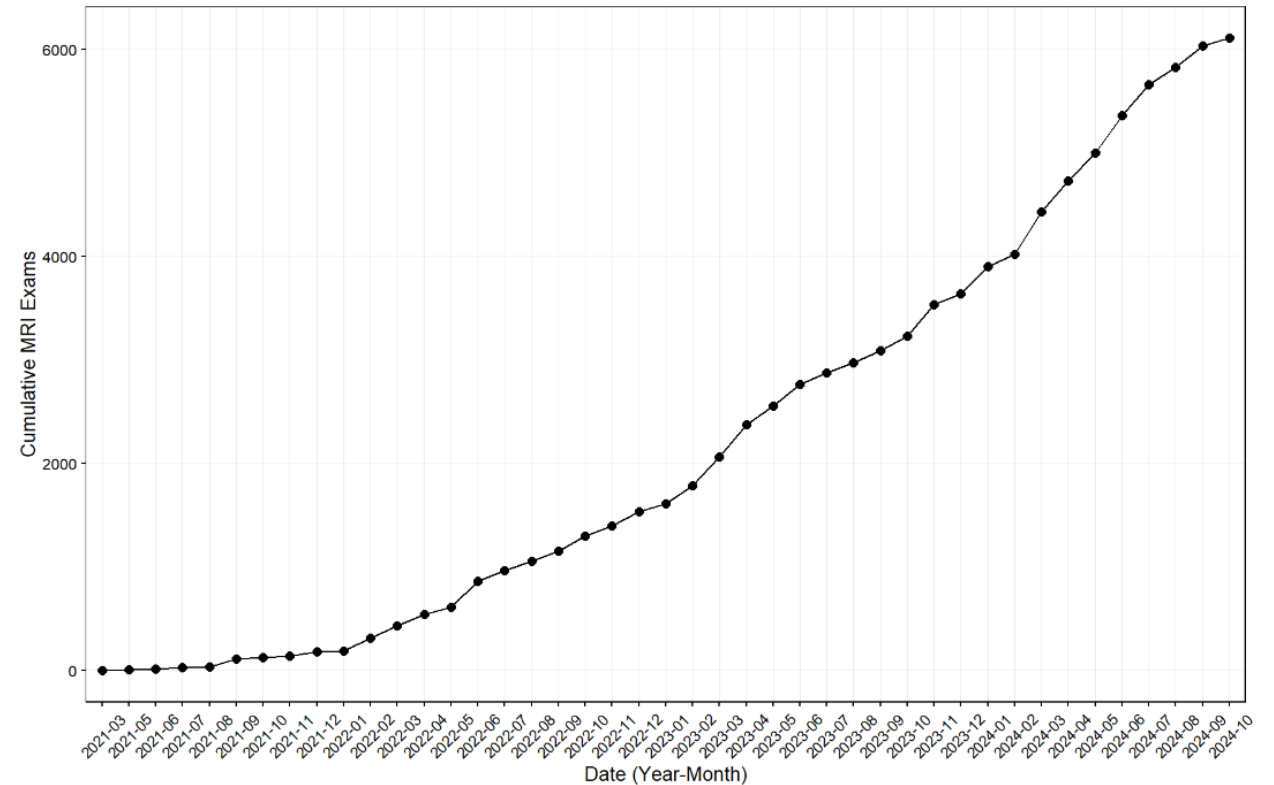


# Cumulative SCAN Uploads (pre-QC)

### Cumulative PET Uploads Total = 4669



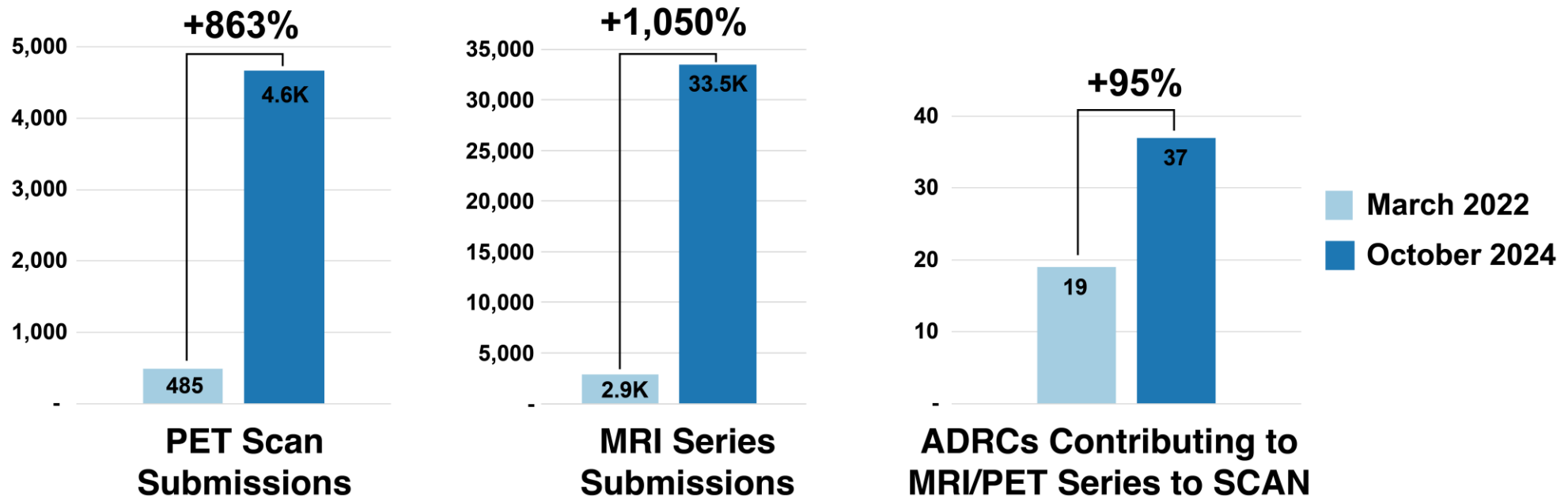
### Cumulative MRI Exam Uploads Total = 6111



# Standardized MRI/PET Data

## A dramatic increase in SCAN submissions

- **PET:** 4,669 PET scans
- **MRI:** 33,470 MRI (all series) / 6,111 MRI (T1)
- **ADRCs:** 37 ADRCs



**MR exam vs series: Each exam submitted has a variable number of series (sequences), on average there are ~5.5 series/exam**

- Number of MR exams submitted to SCAN = 6111
- Number of series submitted to SCAN = 33,470

**Quality Control (QC) is done by series**

- Number of series submitted to SCAN = 33,470
- Number of series that are unusable (e.g., scouts, derived files), or fail QC (wrong parameters, artifact, etc.) = 16,054 (i.e., about half)
- Number of potentially usable series that have passed QC = 12,986

**Number of MR series that passed QC & have been released to users by series type:**

T1w	FLAIR	T2w	MEGRE	T2starw	dMRI	T2w_HighResHippo	BOLD	Total
4807	4338	395	54	1006	835	962	537	12935

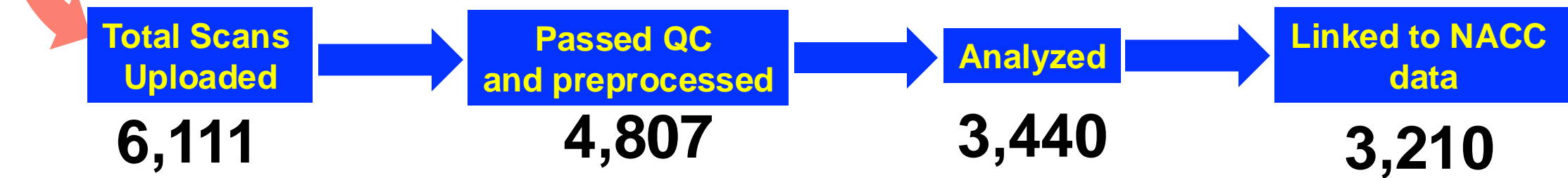
# PET



- P30 Funding
- Affiliated Studies
- CLARiTI

So far, most scans have come from affiliated studies (R01's and other non-ADRC funds)

CLARiTI and P30 funding streams are expected to generate 1700 amyloid PET, 1700 tau PET and 1700 MRI exams per year



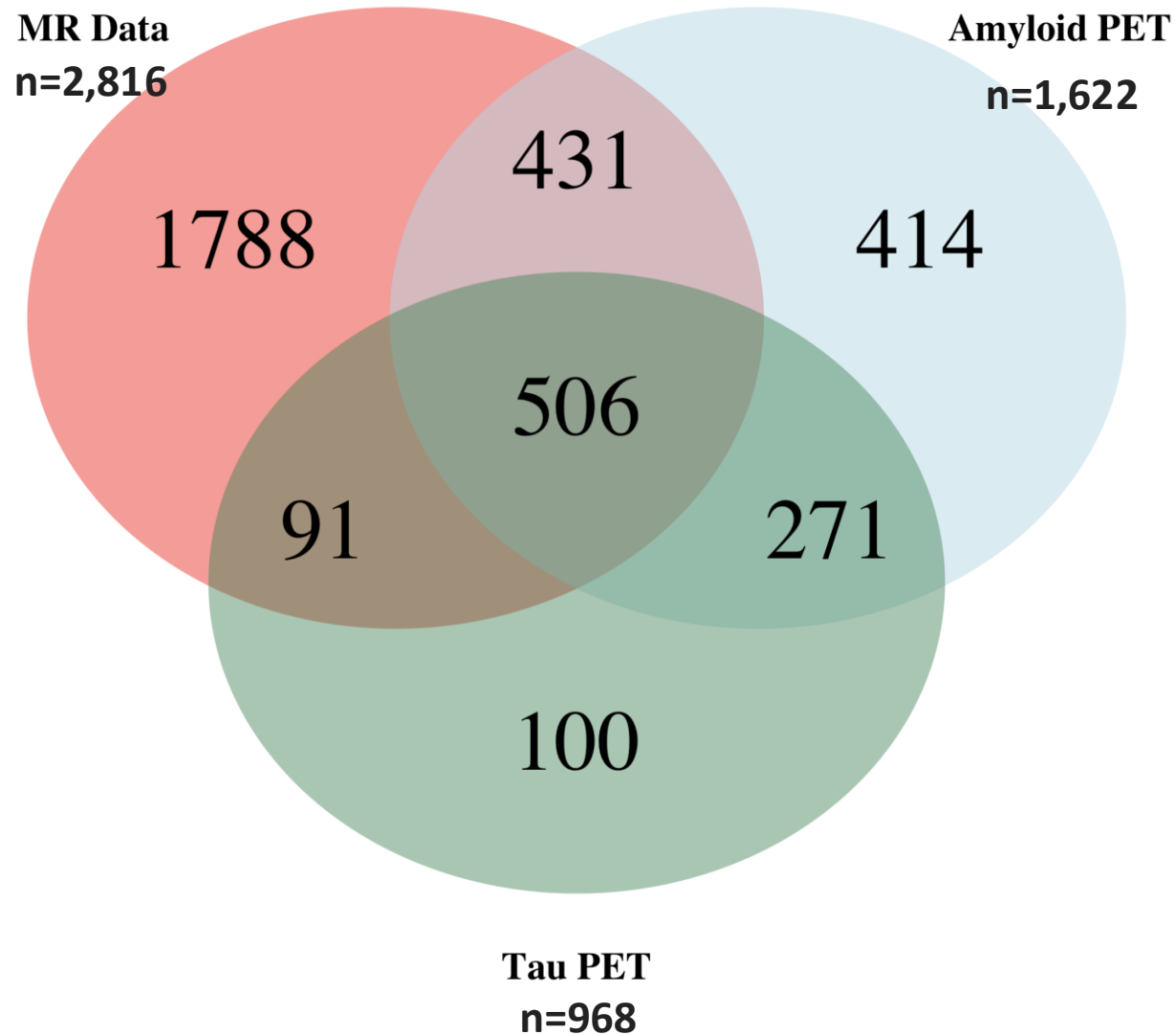
# MRI (T1)

## *Participants* with analyzed data linked to NACC data

Modality	Tracer	Normal	MCI	AD	OTHER	Totals	
Amyloid PET	PIB	356	225	97	39	717	1,622
	FBP	142	38	27	9	216	
	FBB	399	127	49	33	608	
	NAV	74	4	0	3	81	
Tau PET	FTP	300	173	87	47	607	968
	MK6240	286	61	4	10	361	
FDG PET	FDG	130	108	61	66	365	
3D T1 MRI	T1 MRIs	1,868	590	196	162	2,816	



# Scan overlaps in 3601 *participants* with one or more scans

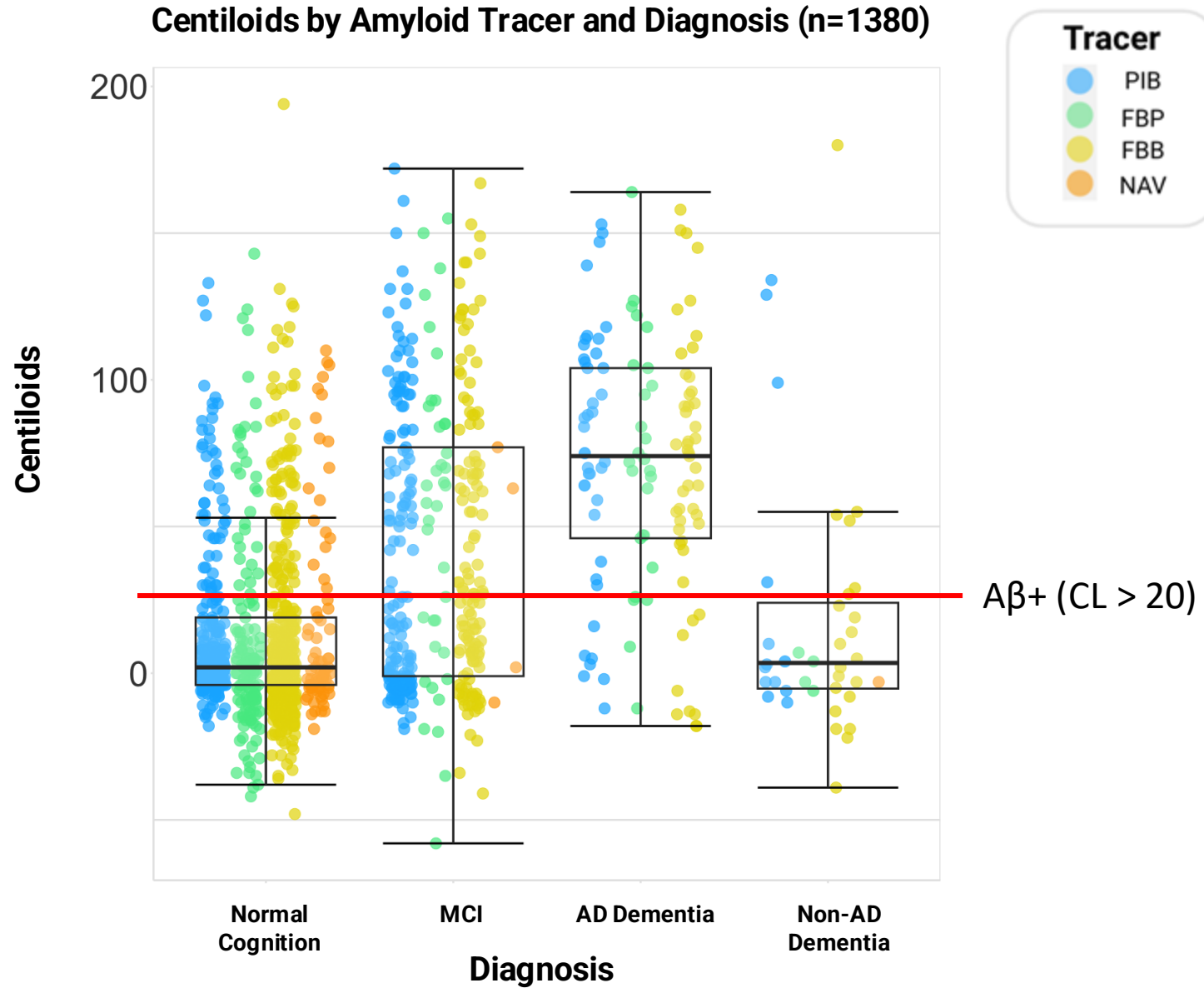


**Limited overlap between modalities**

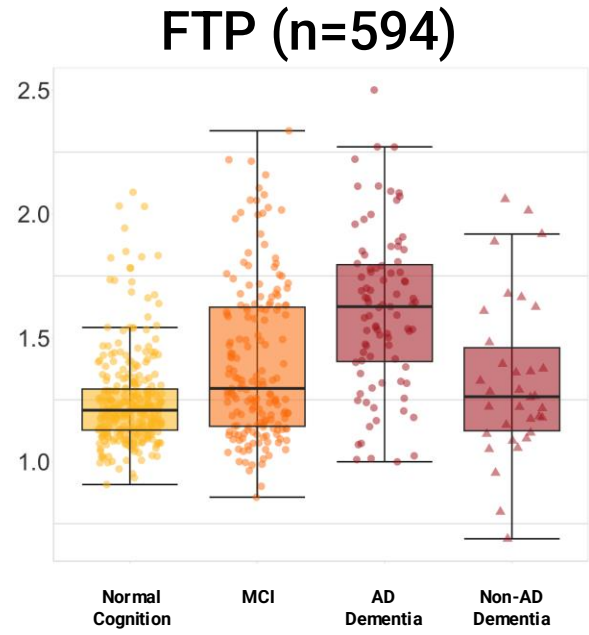
**We will soon be reaching out to ADRCs to find additional scans on participants with only 1 or 2 modalities**

**This will also improve as we move to CLARiTI and P30 funding**

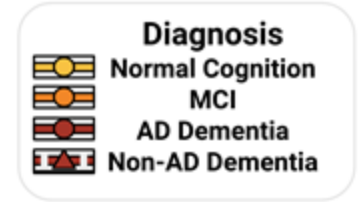
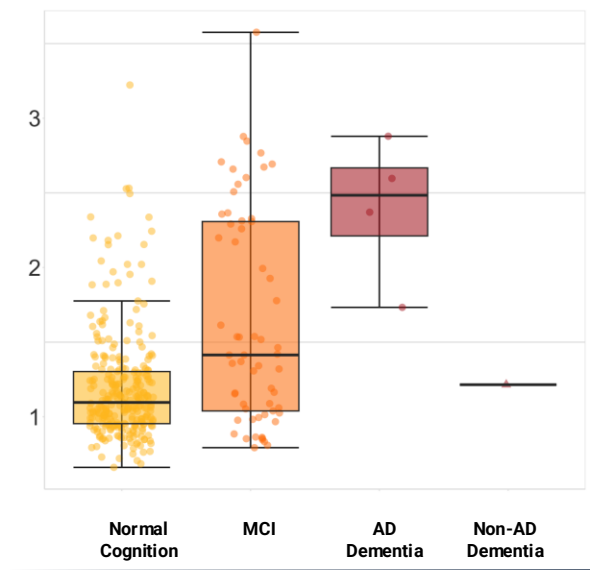
# Data Analysis: Amyloid



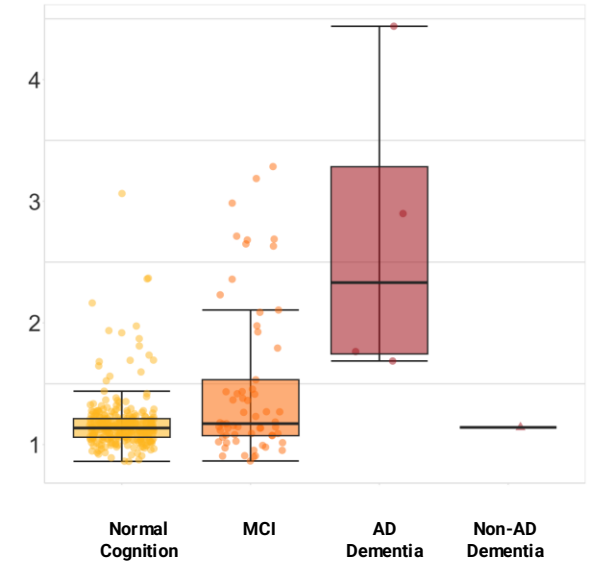
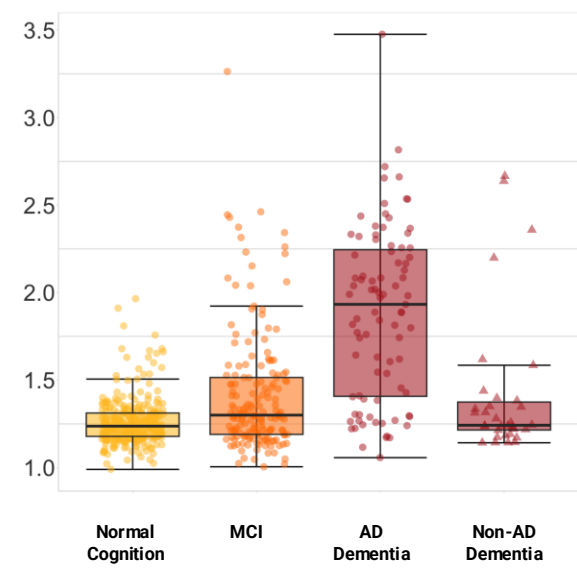
Entorhinal SUVR



### MK6240 (n=352)

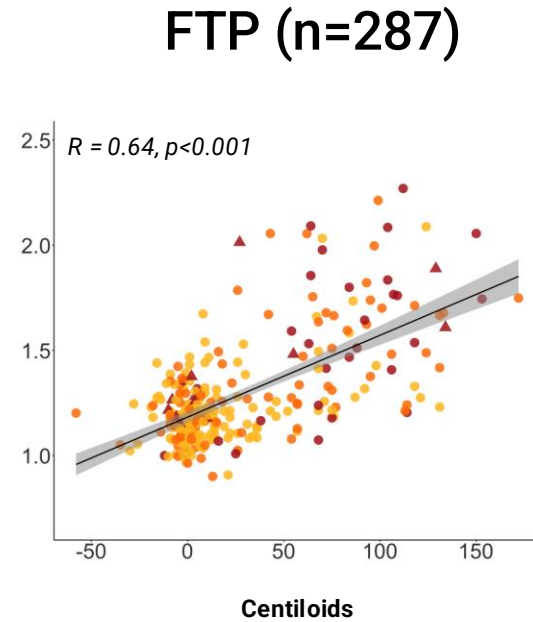


Metatemporal SUVR

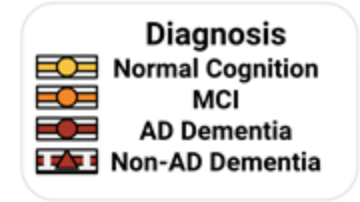
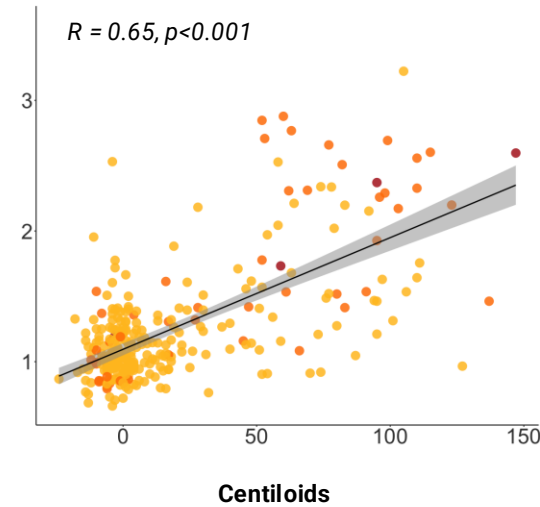


# Tau SUVR vs Amyloid Centiloids

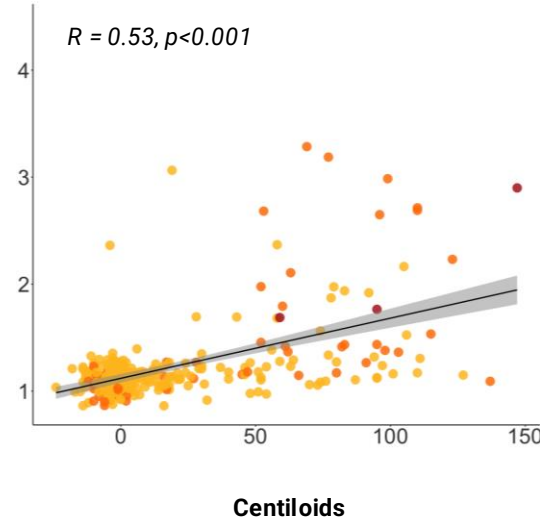
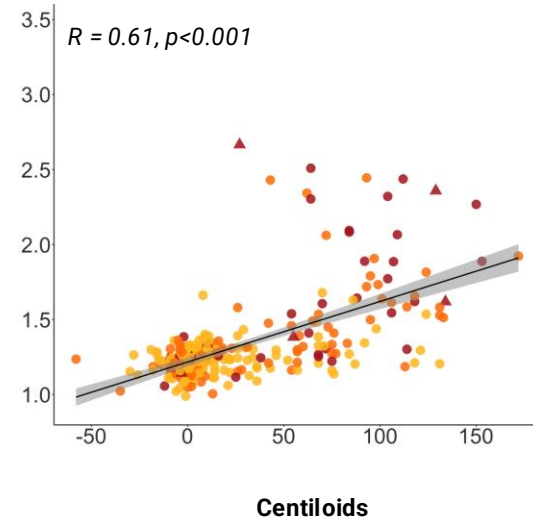
Entorhinal SUVR



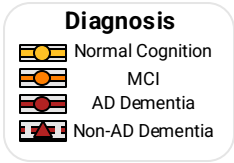
### MK6240 (n=301)



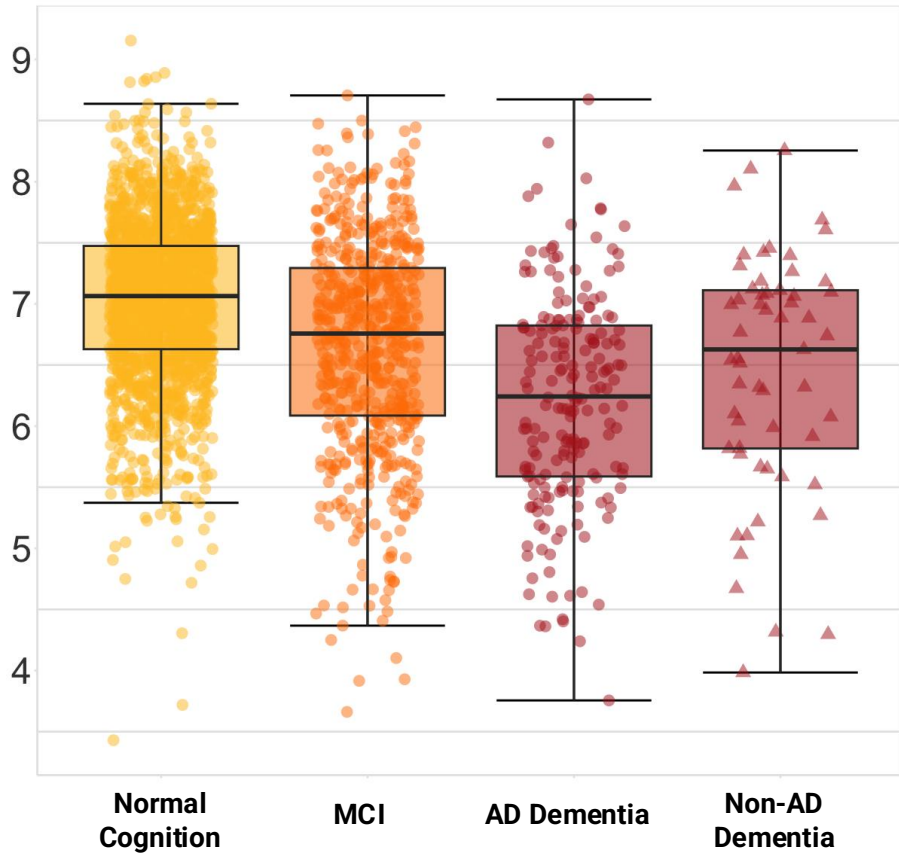
Metatemporal SUVR



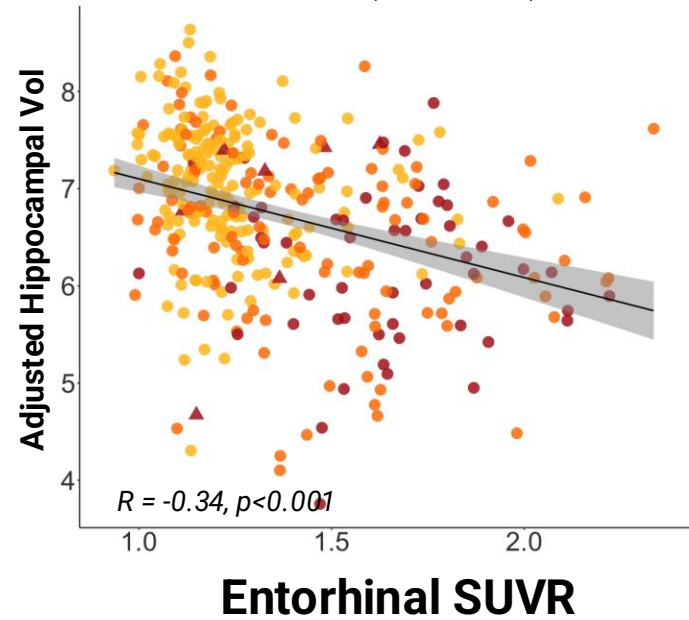
# Adjusted Hippocampal Volume vs Tau



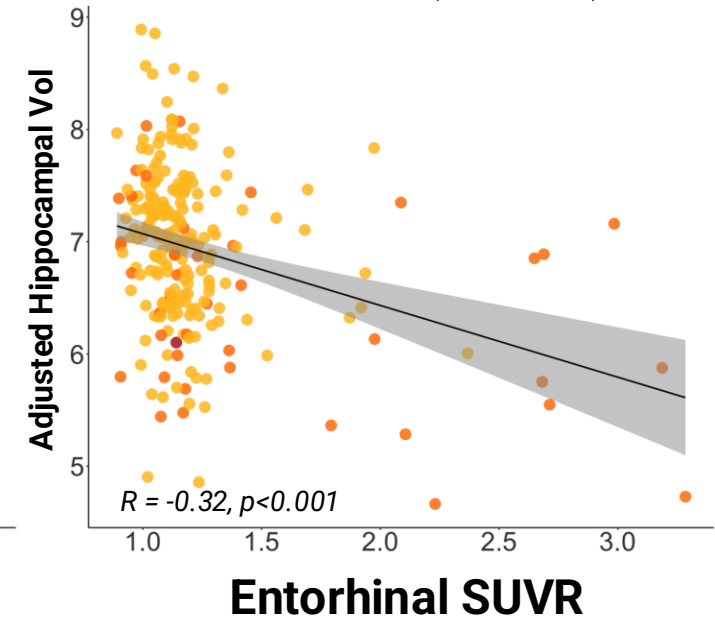
### Adjusted Hippocampal Vol (n=2,812)



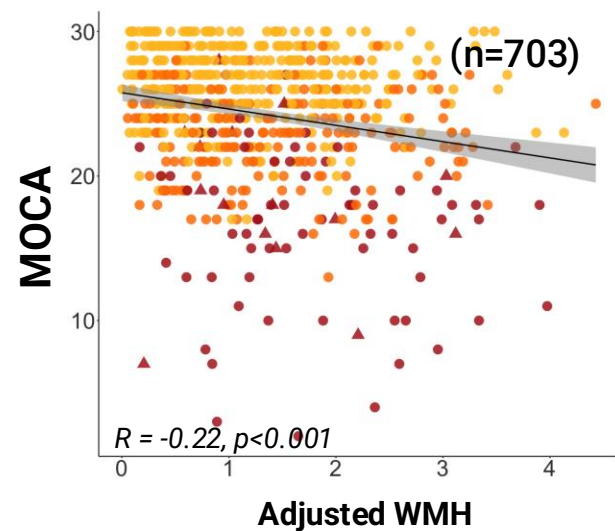
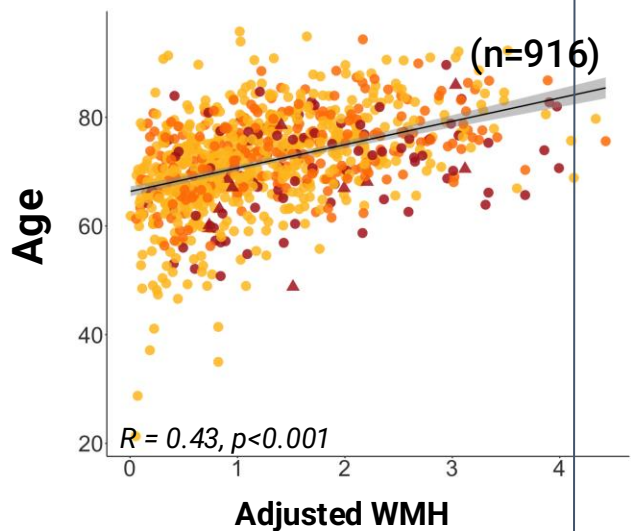
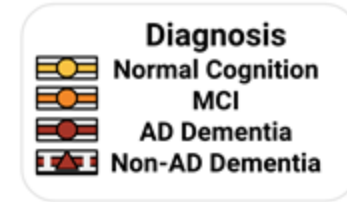
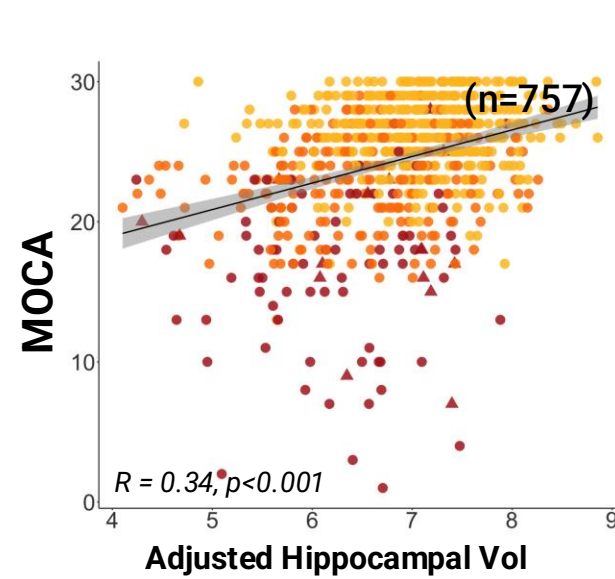
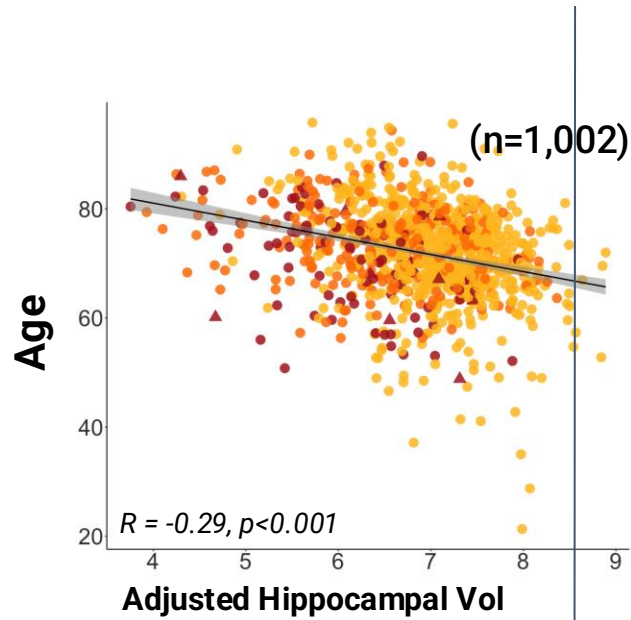
### FTP (n=348)



### MK6240 (n=239)



# Adjusted Hippocampal Volume & WMH vs Age & MOCA



# SCAN medical findings: subcortical infarcts\* and cortical micro bleeds

Findings	Percent of Participants
No FLAIR findings:	89%
1+ Subcortical infarcts:	6%
1+ Hemorrhagic subcortical infarcts:	0%
1+ Other findings:	5%

Findings	Percent of Participants
No T2starw findings:	83%
1+ Developmental venous anomaly:	1%
1+ Hemosiderin deposition:	0%
1+ Superficial siderosis:	0%
1+ Cavernous angioma:	0%
1+ Cerebral microbleeds:	15%
=1 CMB:	7%
2-3 CMB:	3%
4-9 CMB:	2%
10+ CMB:	2%
1+ Other findings:	1%

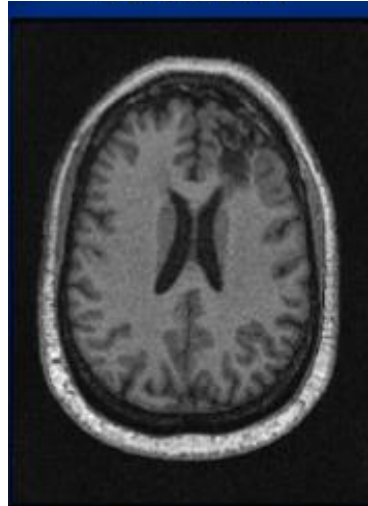
\*Cortical infarcts not shown, see next slide



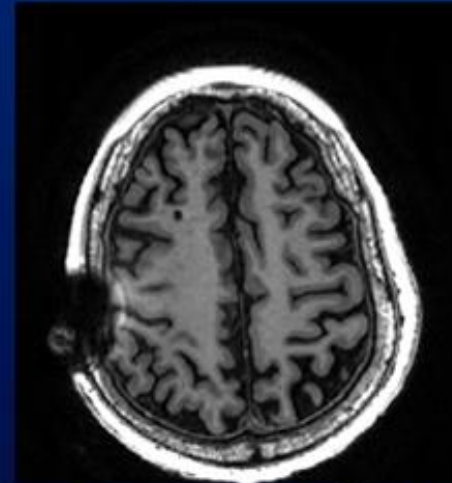
# MRI scans with significant lesions have been uploaded

SCAN does not perform clinical reads with feedback to sites: ADRCs are responsible for their own clinical reads

Images with structural lesions may not be adequate for quantitative analysis



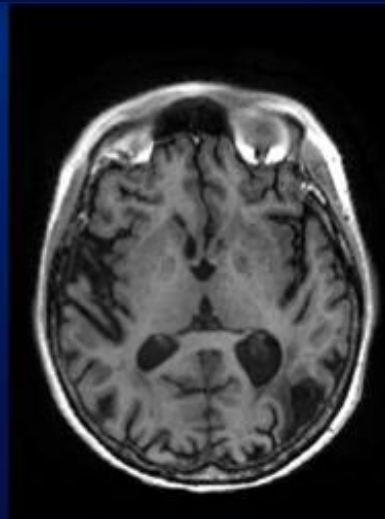
Encephalomalacia



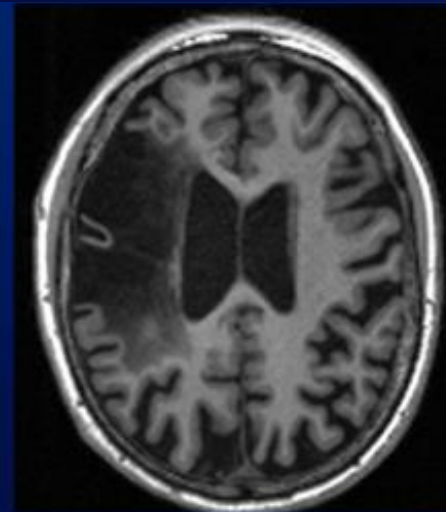
Craniotomy artifact and shunt



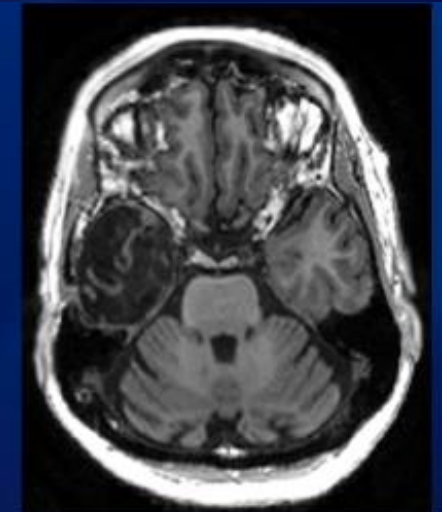
Encephalomalacia



Cortical infarct



Encephalomalacia



Encephalomalacia

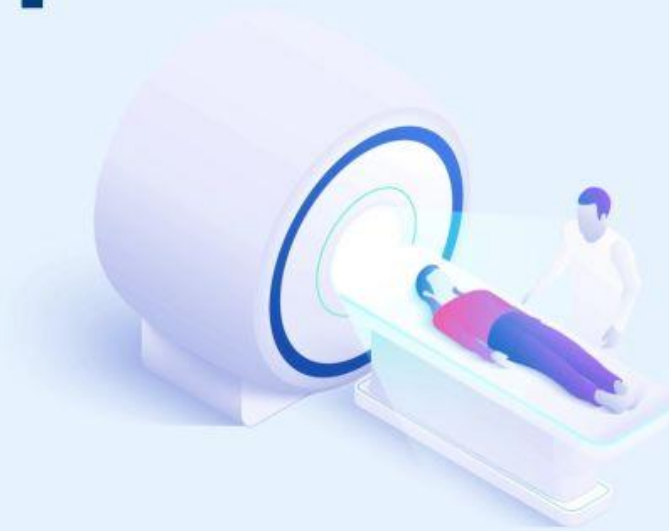


- Continued analysis of incoming PET and MRI data from affiliated studies – plus P30 funding and CLARiTI will generate increased workload: ***8500 amyloid PET, 8500 tau PET, 8500 MR exams***
- Identical processing pipelines and imaging compatibility between all data streams and ADNI
- Visual read of amyloid and tau PET scans provided to ADRCs
- Addition of ultra-fast MRI and myelin imaging as options

# NACC Data Front Door

Visit [scan.naccdata.org/](https://scan.naccdata.org/)

scan  
data is  
available  
at NACC!



SCAN summary and  
analysis data available  
at NACC:

- MRI - Volumes
- PET - SUVRs for amyloid, tau, and FDG
- Defaced MRI and PET images

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# Connect with me

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# Q & A



**Thank you!**

