

ADRC Digital Pathology Working Group Updates



ADRC FALL MEETING

OCT 21 2022

[Image from: https://www.webdonuts.com/2012/12/slide/](https://www.webdonuts.com/2012/12/slide/)

Brief history of the Digital Pathology Working Group

Spring 2019 - email sent to Neuropathology Core Leaders soliciting for interested personnel.

June 17, 2019-1st group meeting
Meets on monthly basis

- Second Monday of every month 8-8:45am PST



[Image from: https://www.globalharmonization.net/working-groups](https://www.globalharmonization.net/working-groups)



Special thanks to Dr.
Nina Silverberg

Attendance from across many institutions/centers!!!



NIA



Georgetown University



And many others!!!!

Goals of the group

- Assess needs and potential uses of digital neuropathology within ADRCs
- Evaluate feasibility of implementation of technology across centers
- Develop recommendations for the use of digital pathology by Neuropathology Cores

Milestones:

- 2019 survey on digital pathology benchmarks in ADRC Neuropathology Cores
- Digital pathology webinar series - collaboration with NACC
- Pilot study of sharing digital slides with the Digital Slide Archive
- 2022 survey on sampling parameters/workflows in Neuropathology Cores- collaboration with NP steering committee

A Guide to Digital Slide Scanners and Associated Infrastructure, Frequently Asked Questions

On behalf of the Alzheimer's Disease Research Center Digital Pathology Working Group

<https://www.alz.washington.edu/BIO/slide-scanner-faq.pdf>

Table of Contents:

1. How can I afford a WSI digital slide scanner and what should I include in my budget?
2. What personnel and other infrastructure should be consideration?
3. What hardware features should I consider for a WSI digital slide scanner?
4. Where should I place my slide scanner?
5. What viewing/analysis software options (proprietary or open-source) are available-- and what file formats are compatible?
6. What cloud-based file storage or server/file-sha
7. How should one approach file organization and
8. Should I opt-in for a slide scanner service contra out?
9. Are there any additional resources for digital pa

The status of digital pathology and associated infrastructure within Alzheimer's Disease Centers



Dr. Rebecca Scalco

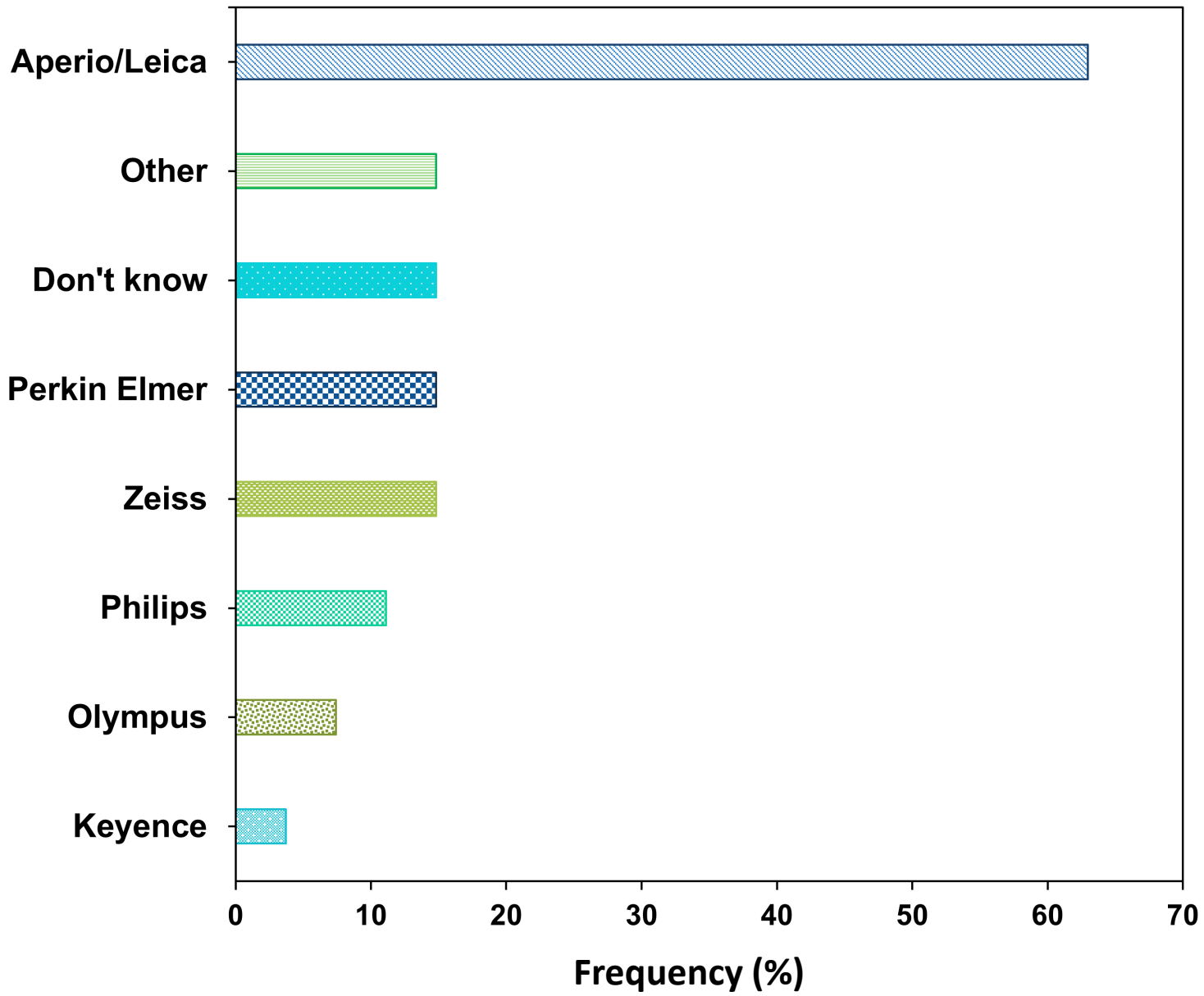


Yamah Hamsafar

Rebeca Scalco DVM 1, Yamah Hamsafar BS 1, Charles L. White, III, M.D. 2 , Julie A. Schneider, MD, MS 4 , R. Ross Reichard, MD 5 , Stefan Prokop, MD 6 , Richard J. Perrin, MD, Ph.D. 7 , Peter T. Nelson, MD, Ph.D. 8, Sean Mooney Ph.D. 3, Andrew P. Lieberman, MD, Ph.D. 9 , Walter A. Kukull, Ph.D. 3 , Julia Kofler, MD, 10 , C. Dirk Keene, MD, Ph.D. 11 , Alifiya Kapasi, Ph.D. 4 , David J. Irwin, MD 12 , David A. Gutman, MD 16, Margaret E. Flanagan, MD 13 , John F. Crary, MD, Ph.D. 14 , Kwun C. Chan, Ph.D. 3, Melissa E Murray, Ph.D. 15, Brittany N Dugger, Ph.D. 1*

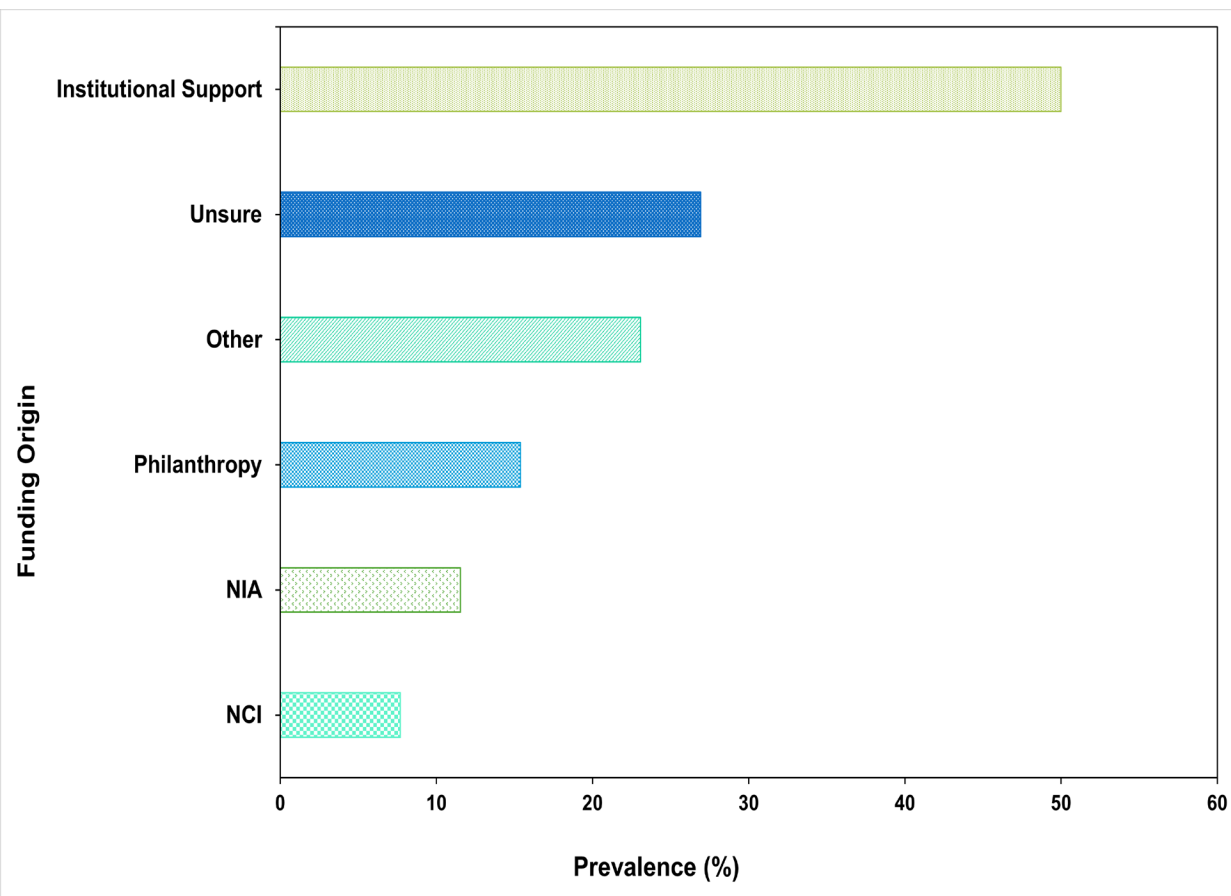
on behalf of The Alzheimer's Disease Center Digital Pathology Working Group 17

Scanner Brand



Most respondents (81%) stated they had access to a digital slide scanner, most common brand was Aperio/Leica

Funding for Digital slide scanners



50% of individuals with slides scanners had **institutional support** for equipment

Other funding sources:

- National Institute on Aging
- Philanthropy
- National Cancer Institute
- Departmental funds for recruitment
- s10 Large Instrument Grant

Infrastructure/Workflows for digital pathology within ADCs

63% have scanned in **less than 10%** of their current ADRC slide inventory

50% were **unsure of total storage space** scanned slide files occupy

53% would find the option of a **centralized scanner service useful**

47% **did not have any of their ADRC's budget** allocated to digital pathology and/or machine learning

50% noted digital slides files were shared outside of the institution

Digital Pathology Webinars on YouTube!!! More popular than select videos of cats being scared by cucumbers!!!



Dr. Margaret Flanagan



Hannah Rosentreter



The screenshot shows a YouTube video player for a webinar titled "Overview of Machine Learning in Digital Pathology: Research Settings". The video is part of the "Digital Pathology Webinar Series" by NACC - National Alzheimer's Coordinating Center. The video features Dr. Brittany N. Dugger, PhD, an Assistant Professor at UC-Davis. The video description lists her roles: Department of Pathology and Laboratory Medicine, Neuropathology Core Co-Leader, UC-Davis Alzheimer's Disease Center, UC-Davis Women in Medical and Health Sciences Department Liaison, and Co-Leader of the UC-Davis School of Medicine Machine Learning Working Group. Her email is bndugger@ucdavis.edu. The video has 217 views and was uploaded on Feb 17, 2022. The right sidebar shows a playlist of 9 other webinars in the series, including topics like "Selecting the best slide scanner", "History and Overview of Digital Pathology Webinar", "HALO Software Overview", "Halo Modules Applied to Neuropathology Research", "Quantitative Digital Pathology Methods Applied to...", "Aperio Software Overview & Applications for...", "QuPath Software Overview and Applications for...", "Overview of Machine Learning in Digital Pathology: Research...", and "General Troubleshooting in Digital Pathology".

<https://www.youtube.com/watch?v=fNadBSxjAyl&list=PLxZHxTrYnx--xdXxjxCEIKD6FtJU1zE8P&index=8>

Upcoming Webinar November 14th! 8-9am PST

Digital pathology infrastructure and informatics



Dr. Brittany
Dugger
UC Davis



Dr. David
Gutman
Emory



Dr. Mike
Bienkowski
USC



Dr. Melissa
Murray
Mayo



Dr. Sean
Mooney
NACC



Dr. Margaret
Flanagan
Moderator
Northwestern

Email announcements coming soon!!!

Pilot Study on feasibility of slide sharing and associated data across ADRCs

Focus on Computer Resources

Cancer
Research

The Digital Slide Archive: A Software Platform for Management, Integration, and Analysis of Histology for Cancer Research

David A. Gutman^{1,2,3}, Mohammed Khalilia¹, Sanghoon Lee¹, Michael Nalisnik², Zach Mullen⁴, Jonathan Beezley⁴, Deepak R. Chittajallu⁴, David Manthey⁴, and Lee A.D. Cooper^{2,3,5}



driving the road to identify pain points!

Tiger team

Dr. David Gutman (Emory)

Dr. Brittany Dugger (UC Davis)

Dr. Melissa Murray (Mayo)

Dr. Margaret Flanagan (Northwestern)

Dr. Thomas Pearce (Pitt)

Dr. Dirk Keene (Washington)

Dr. Sean Mooney (NACC)

JC Vizcarra (Emory)

Pilot Study on feasibility of Slide Sharing and associated data across ADRCs



ADRC Pilot Study Metrics

Cohort	# of cases	# of WSIs
Emory University	2	213
Mayo	2	82
Northwestern University	1	134
UC Davis	1	45
UCSD	3	88
UCSF	1	53
University of Washington	1	50

Filters

- META
- + [stain](#)
- + [region](#)
- + [brain_region](#)
- + [Braak Stage](#)
- + [Clinical Dx](#)
- + [artifacts](#)
- + [Age Death](#)
- + [CERAD](#)

ADRC Image Explorer View [grid icon] [list icon]

Found 1391 results! [close icon]

summer of 2022, developed and distributed a survey to gather information on:

- Antibodies used
- Areas stained
- Landmarks used for sampling



Kevin Nzenkue



Dr. Katherine Lucot



JC Vizcarra

Staining And Preparation of Slides

We appreciate your time to fill out this survey. We are collecting these data to understand current sampling/staining practices across ADRCs. All questions below are based on formalin fixed paraffin embedded (FFPE) standard microscope slides. If utilizing other types of cutting methods, please describe below in appropriate sections. There are places to upload current protocols you have if you wish. Please remember this is an overview survey, so we want to know the general/current processes your ADRC are using for brains. We realize there are always exceptions / special cases, so this is just to capture the most commonly used parameters.

What ADRC are you affiliated with?

- What is your role in the ADRC?
- ADRC Director
 - Neuropathology Core Leader
 - Neuropathology Core Staff
 - Other

How do you currently process / counterstain your IHC slides? Check all that apply.

	Yes	No
Hematoxylin Counter Stain Used	<input type="radio"/>	<input type="radio"/>
DAB as chromogen (brown) with no enhancement:	<input type="radio"/>	<input type="radio"/>
DAB as chromogen with nickel enhancement	<input type="radio"/>	<input type="radio"/>



Dr. David Gutman

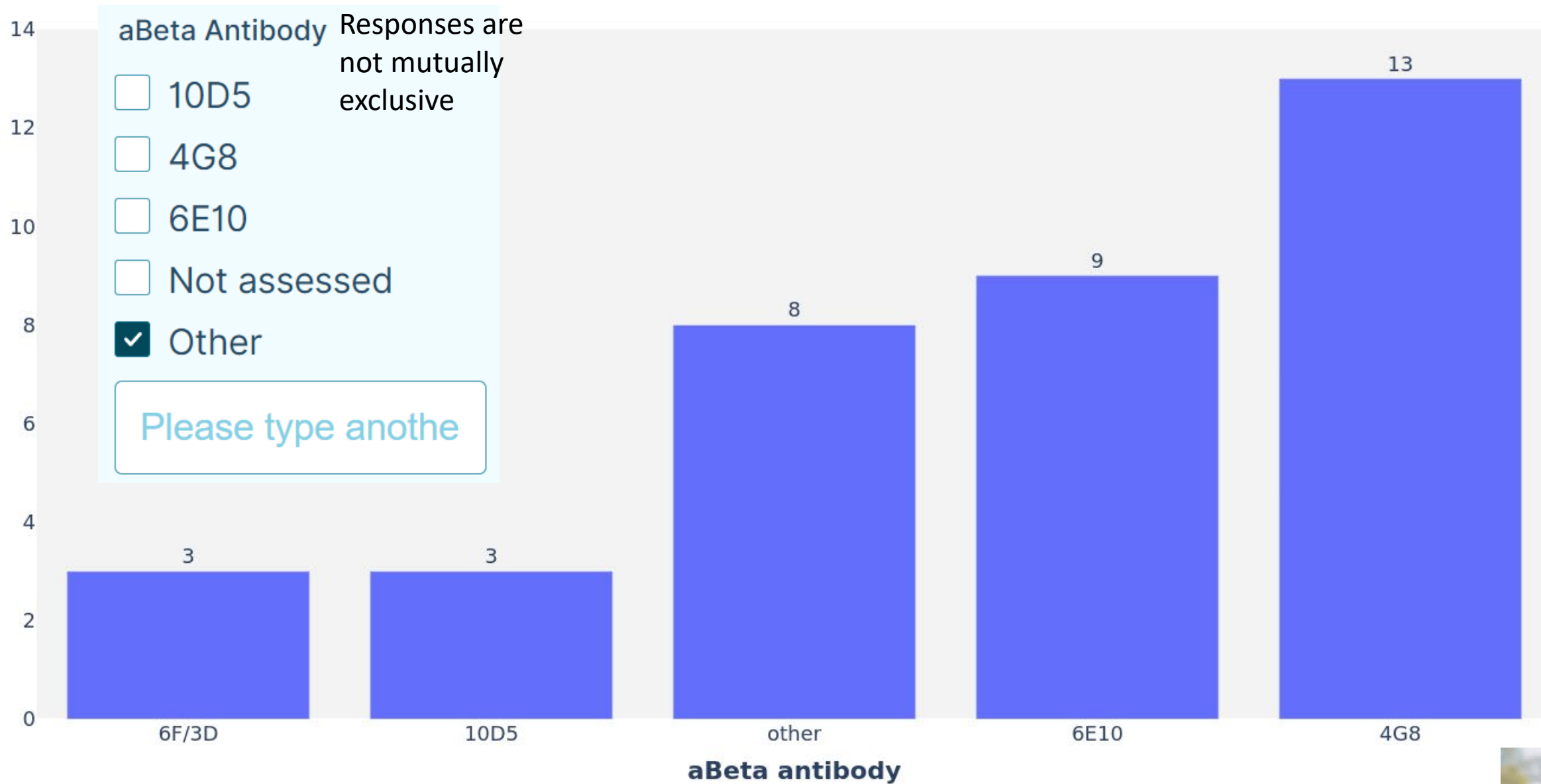


Dr. Andy Teich



Dr. Brittany Dugger

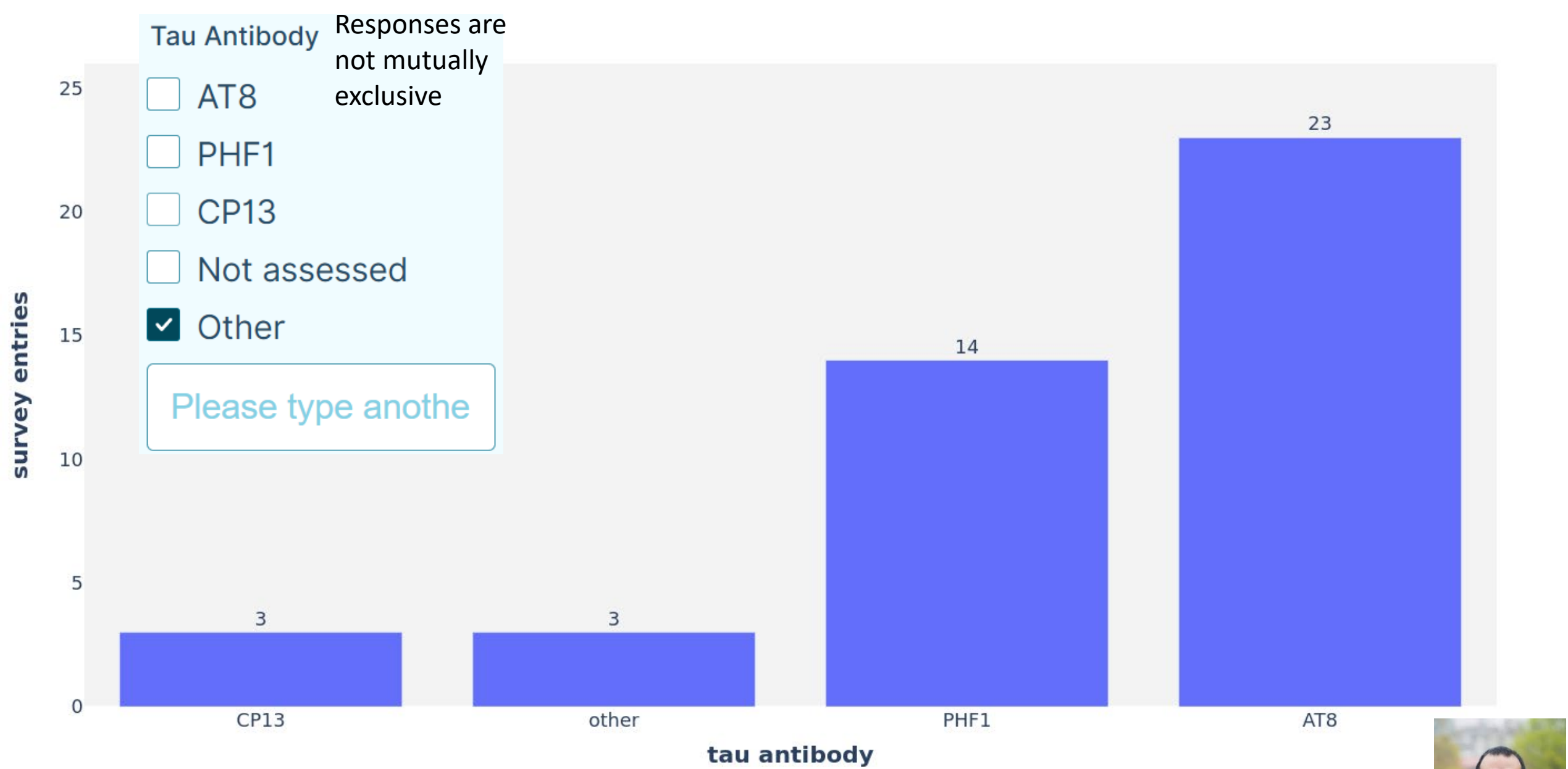
survey entries



“other” group includes: APP, mOC98, Ab69d, Ab5, DE2, NAB228



JC Vizcarra



“other” group includes: total tau, Agilent Technologies cat# A0024, & RD3 / RD4



JC Vizcarra



JC Vizcarra

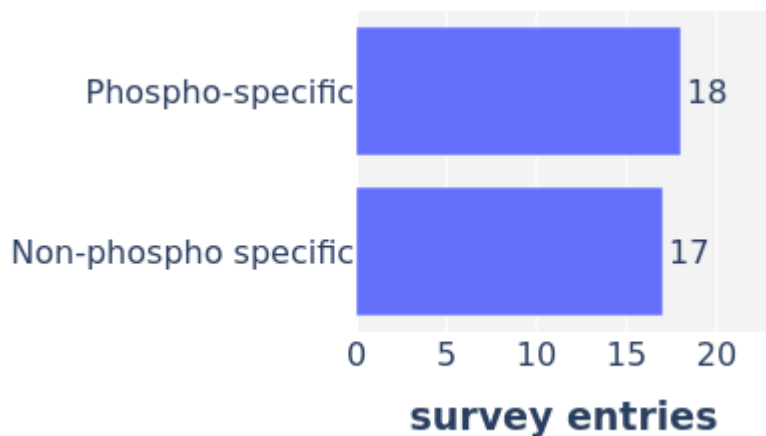
Alpha Synuclein Antibody

- Non-phospho specific
- Phospho-specific
- Not assessed

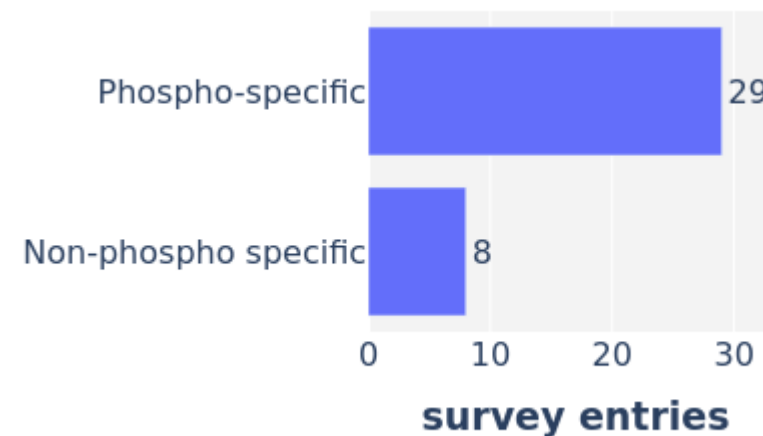
TDP43 Antibody

- Non-phospho specific
- Phospho-specific
- Not assessed

aSyn antibody



TDP43 antibody



Responses are not mutually exclusive



JC Vizcarra

For each brain region, survey provided a multi-select option for the following stains:

Stains

- H&E
- Aβ Stain
- Tau Stain
- α-Synuclein
- TDP-43
- CD68
- Silver
- Other

custom stain

“other” group includes: LHE, P62, CD68, LFB, & HELFB

Number of ADRCs by brain region & stain

Brain Region

Striatum	3	2	1	7	8	16	32	34
Midbrain	4	1	1	5	32	15	26	34
Visual Cortex	3	4	7	3	6	32	24	34
Amygdala	4	2	7	33	33	29	19	34
Frontal Gyri	3	5	11	30	27	36	34	33
Posterior Hippocampus	4	5	8	32	24	33	29	33
Parietal Gyri	3	6	9	5	14	26	25	33
Anterior Cingulate Gyrus	3	1	2	6	31	16	13	33
Pons	3	0	0	3	15	14	6	33
Cerebellum	5	2	3	2	2	9	30	32
Temporal Lobe	3	5	6	12	18	31	27	32
Thalamus	4	1	2	3	5	14	8	32
Medulla	4	0	0	5	19	11	6	32
Central Gyri	5	3	4	8	4	10	7	22
Periventricular White Matter	3	1	2	5	5	5	4	20
Olfactory Bulb	3	1	1	3	16	7	4	18
Anterior Hippocampus	2	3	1	8	5	12	6	19
Posterior Cingulate Gyrus	3	1	1	2	7	5	5	15
Temporal Pole	3	1	1	3	4	10	6	13

Stain



Feel free to contact us!!!

For webinar info/ideas:

Dr. Flanagan

margaret.flanagan@northwestern.edu

For the digital pathology working group:

Dr. Dugger bndugger@ucdavis.edu

or

Dr. Murray murray.melissa@mayo.edu

For the Pilot project:

Dr. Gutman dgutman@emory.edu

Thank you!

