ADRC Digital Pathology Working Group Updates

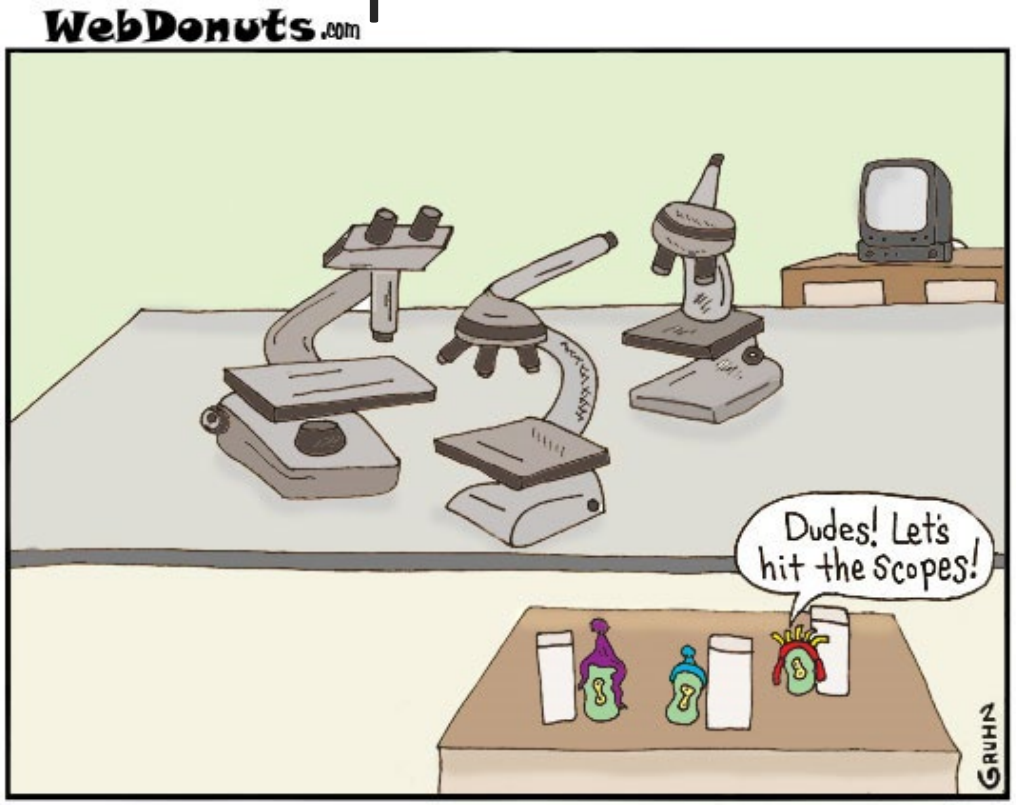


Image from: https://www.webdonuts.com/2012/12/slide/

ADRC FALL MEETING

OCT 21 2022

Brief history of the Digital Pathology Working Group

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

Image from: https://www.globalharmonization.net/working-groups

June 17, 2019-1st group meeting

Meets on monthly basis

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

Special thanks to Dr. Nina Silverberg

Attendance from across many institutions/centers!!!

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:

Dr. Rebecca Scalco

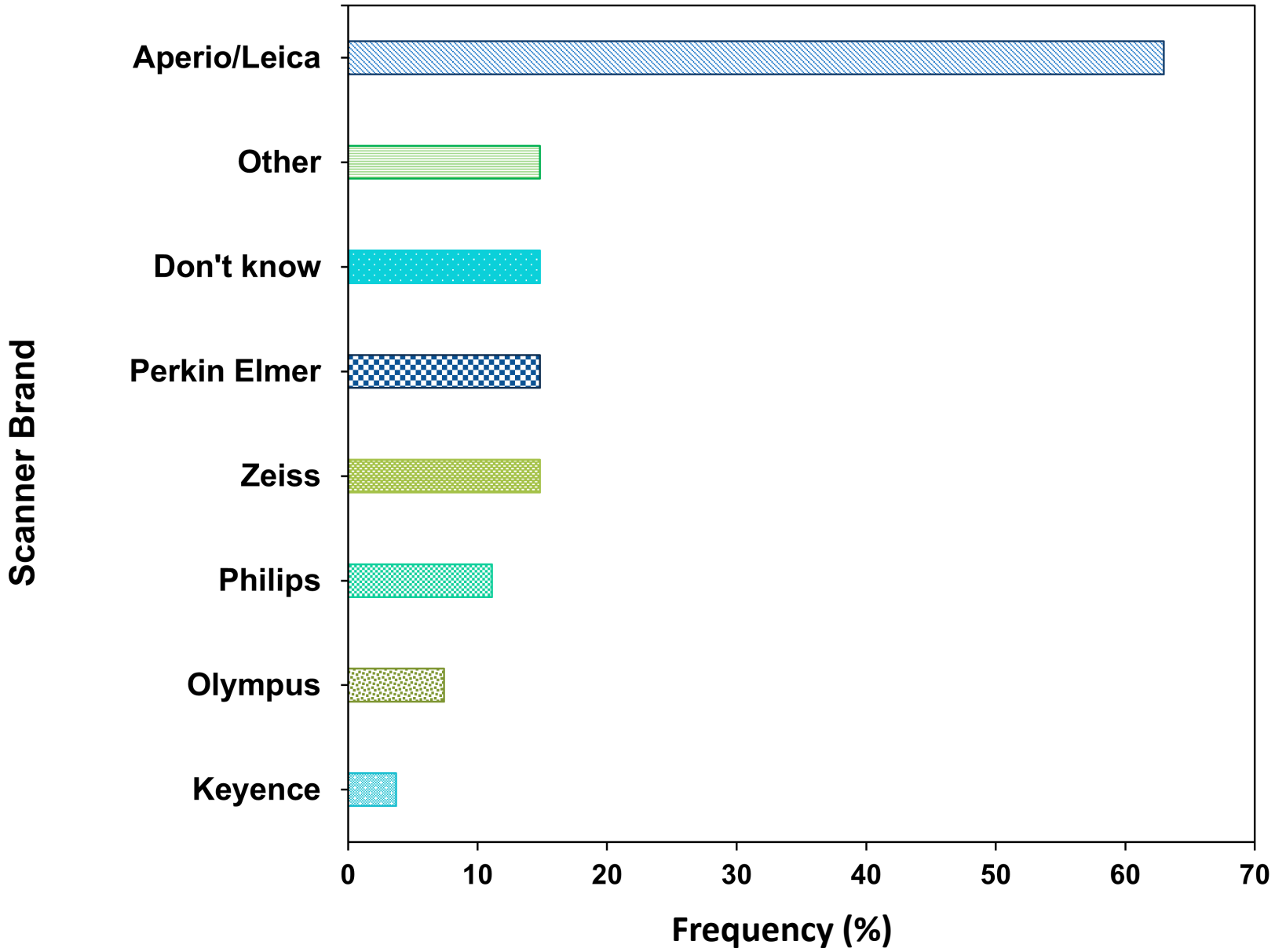
Yamah Hamsafar

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

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

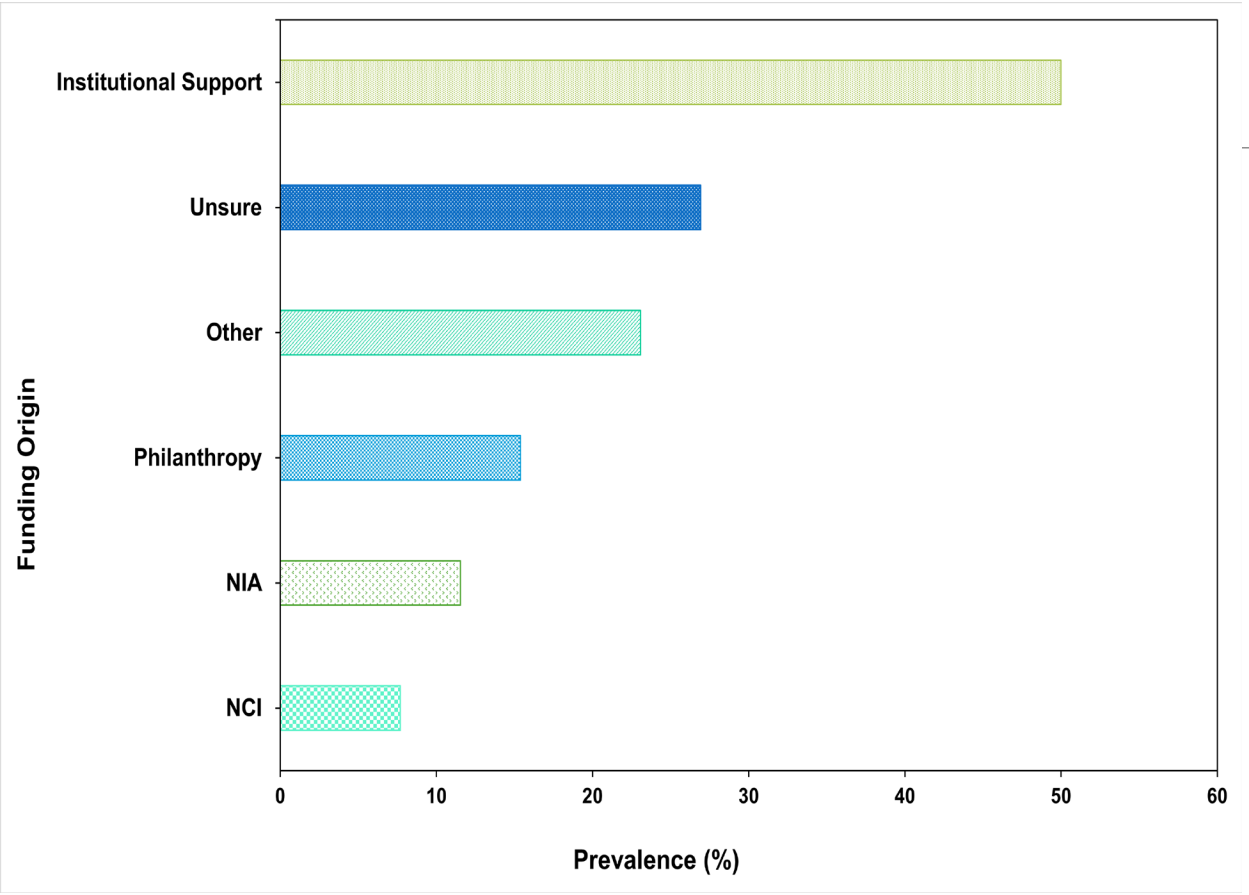
Scalco R. *et al.* under review



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

Scalco R. *et al.* under review

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

Scalco R. *et al.* under review

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

Scalco R. *et al.* under review

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

Dr. Margaret Flanagan

Northwestern University

Hannah Rosentreter

NACC National Alzheimer's Coordinating Center

https://www.youtube.com/watch?v=fNadBSxjAyI&list=PLxZHxTrYnx--xdXxjxCElKD6FtJU1zE8P&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 Khalilia[1], Sanghoon Lee[1], Michael Nalisnik[2], Zach Mullen[4], Jonathan Beezley[4], Deepak R. Chittajallu[4], David Manthey[4], 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)

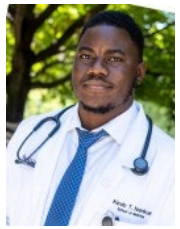
Pilot Study on feasibility of Slide Sharing and associated data across ADRCs

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

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

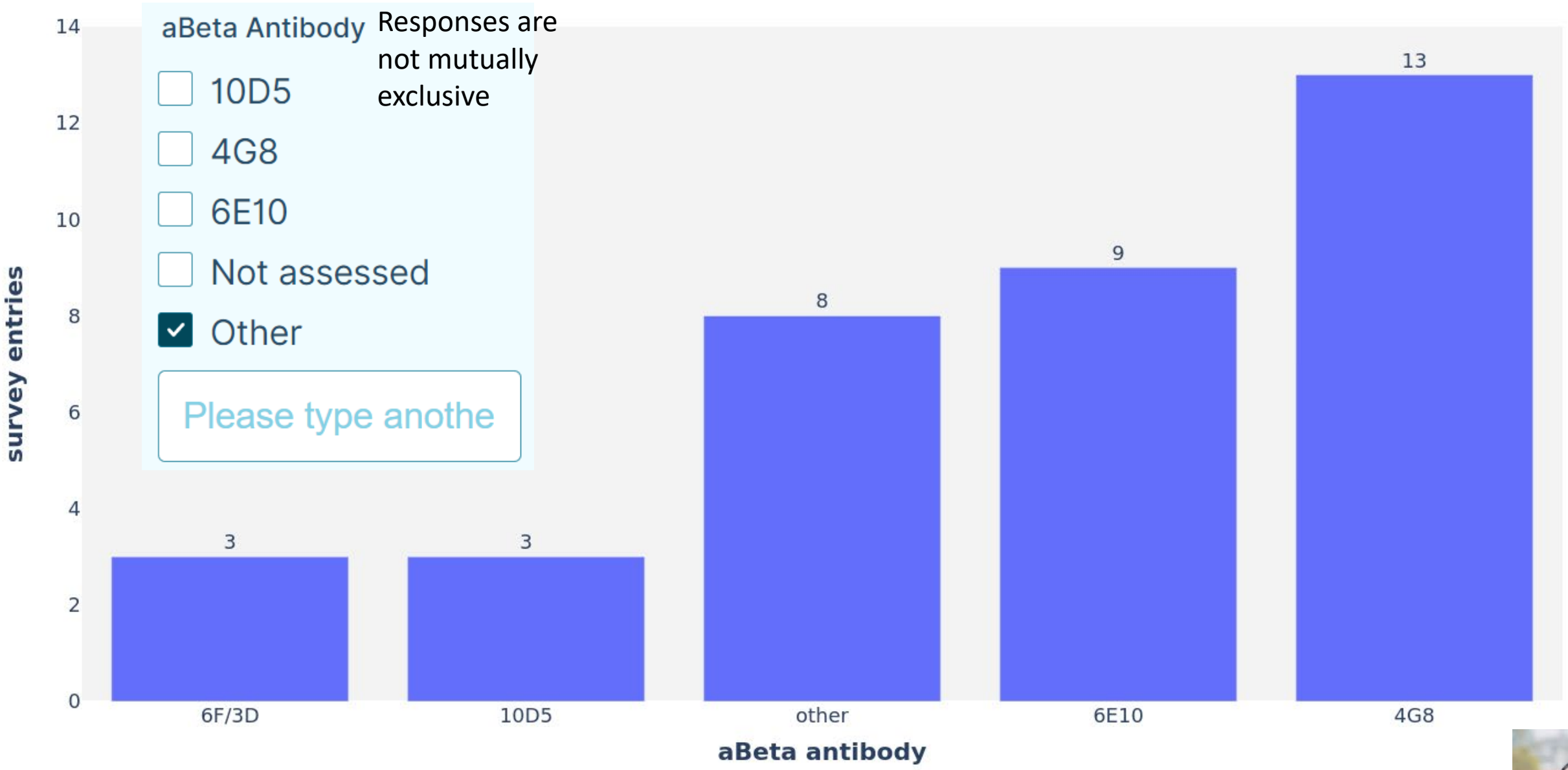
How do you currently process / counterstain your IHC slides? Check all that apply.

	Yes	No
Hematoxylin Counter Stain Used	○	○
DAB as chromogen (brown) with no enhancement:	○	○
DAB as chromogen with nickel enhancement	○	○

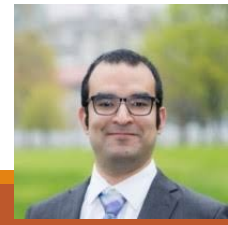
Dr. David Gutman

Dr. Andy Teich

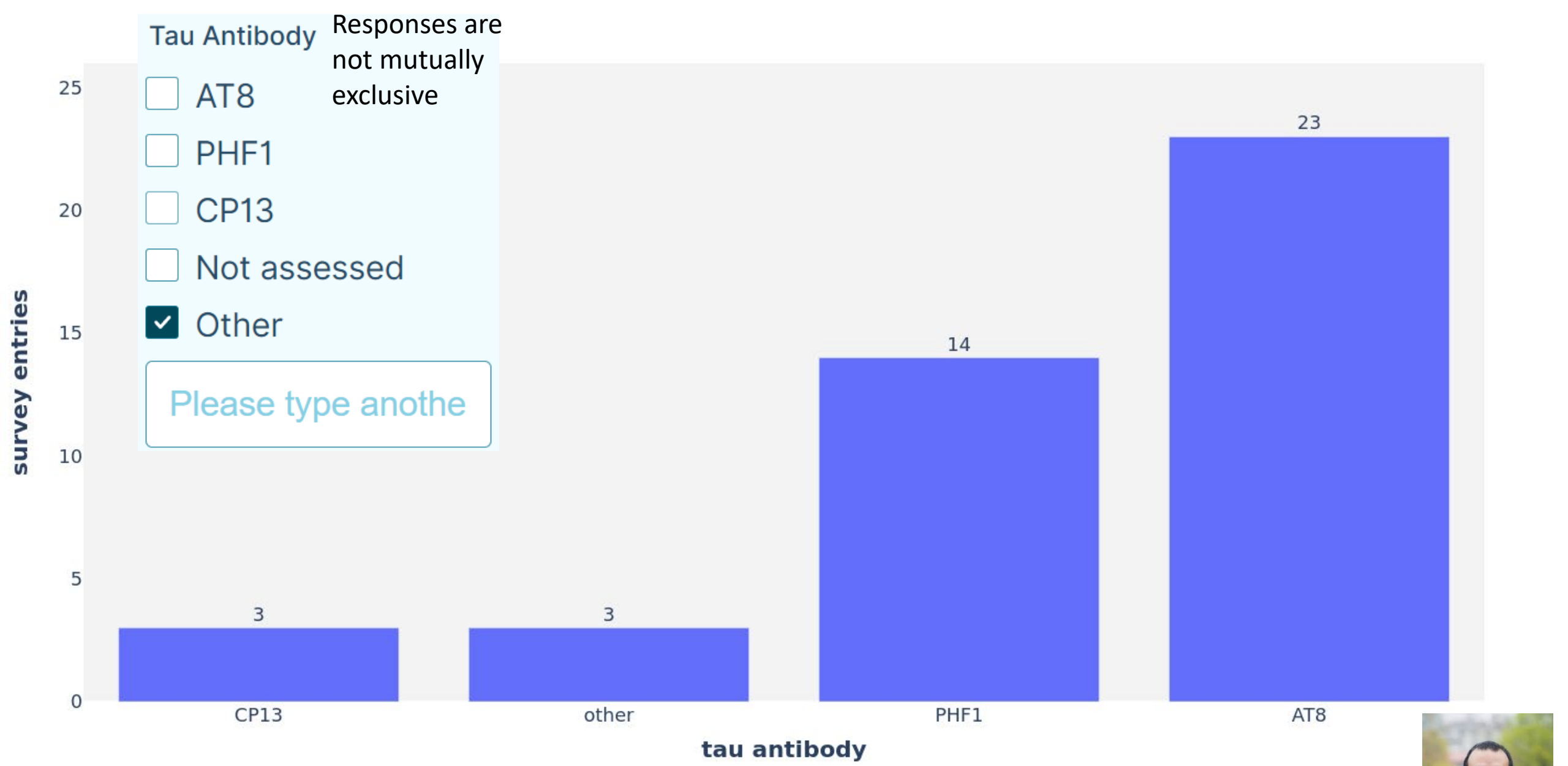
Dr. Brittany Dugger



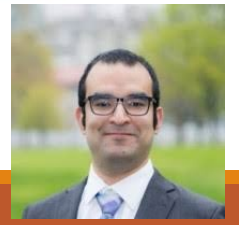
"other" group includes: APP, mOC98, Ab69d, Ab5, DE2, NAB228



JC Vizcarra



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



JC Vizcarra

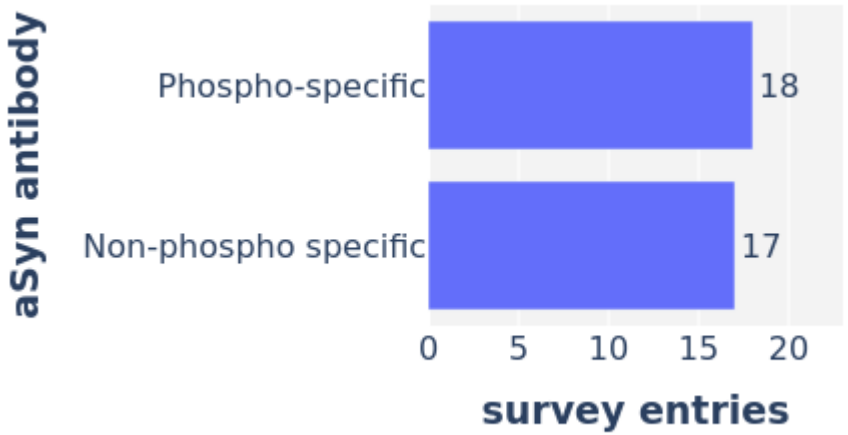
JC Vizcarra

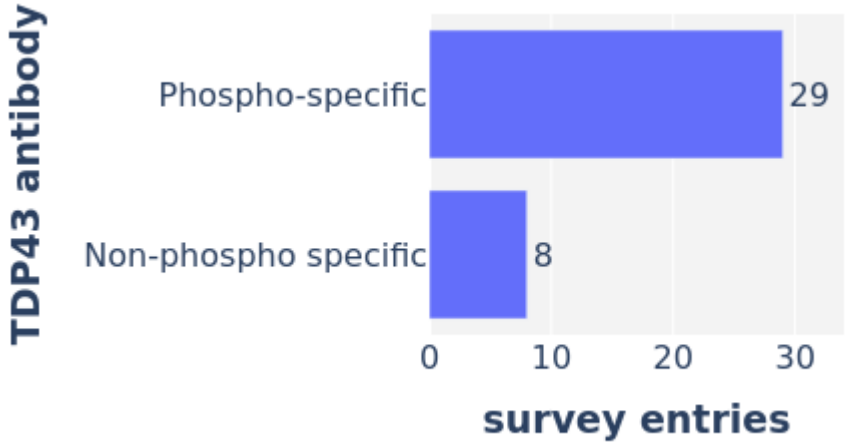
Alpha Synuclein Antibody

- [ ] Non-phospho specific
- [ ] Phospho-specific
- [ ] Not assessed

TDP43 Antibody

- [ ] Non-phospho specific
- [ ] Phospho-specific
- [ ] Not assessed





Responses are not mutually exclusive

JC Vizcarra

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

custom stain

"other" group includes: *LHE, P62, CD68, LFB, & HELFB*

Number of ADRCs by brain region & stain

Brain Region	other	thios	silver	TDP-43	aSyn	tau	aBeta	H&E
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!