



**Stanford**  
MEDICINE



*Dr. Cellas A. Hayes*



*Dr. Cellas A. Hayes*

# *Success Looks Like Us*

*MINDS 2023 Talk*

Cellas Ari'ka Hayes, PhD

Postdoctoral Research Fellow  
Propel Scholar

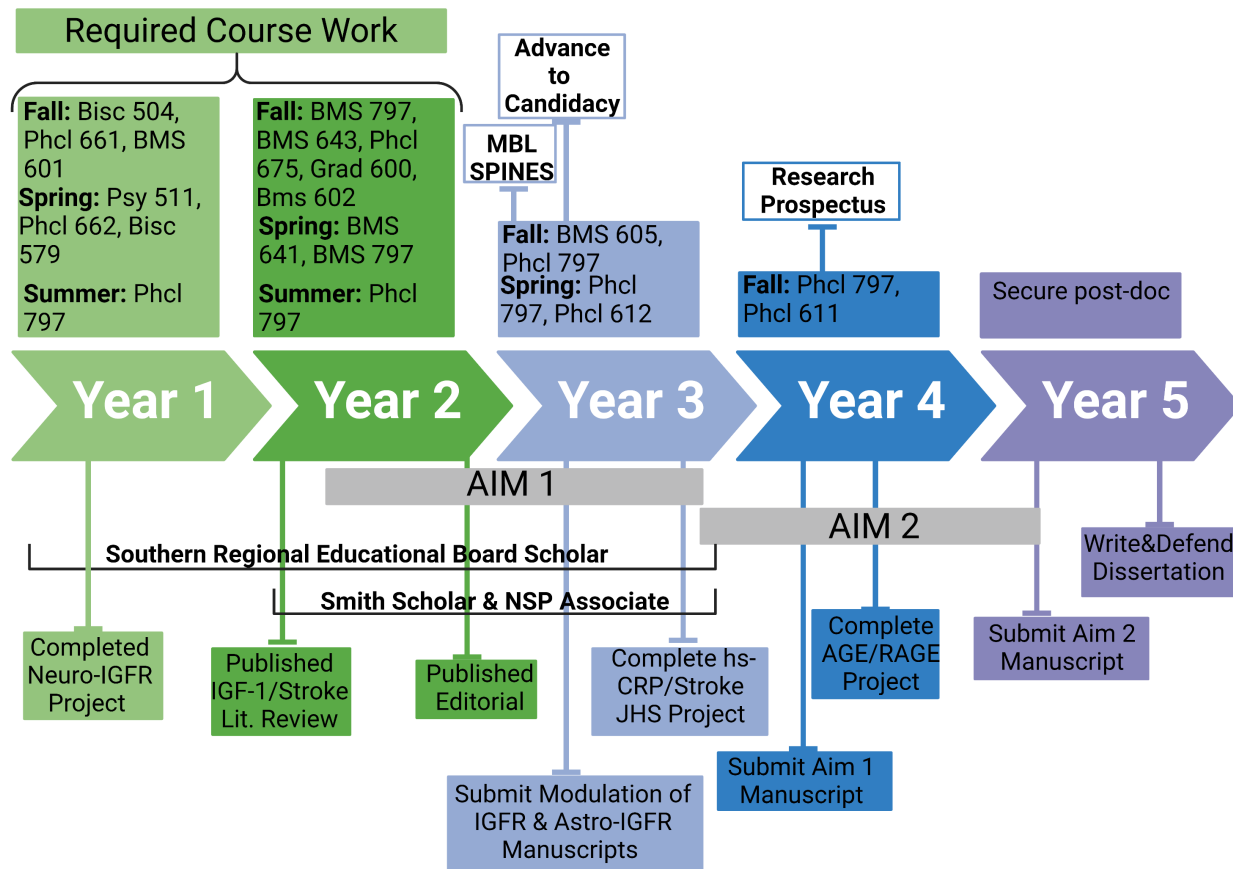
Department of Neurology and Neurological Sciences  
School of Medicine  
Stanford University

# Life goes on but the scars remain – Lil Wayne

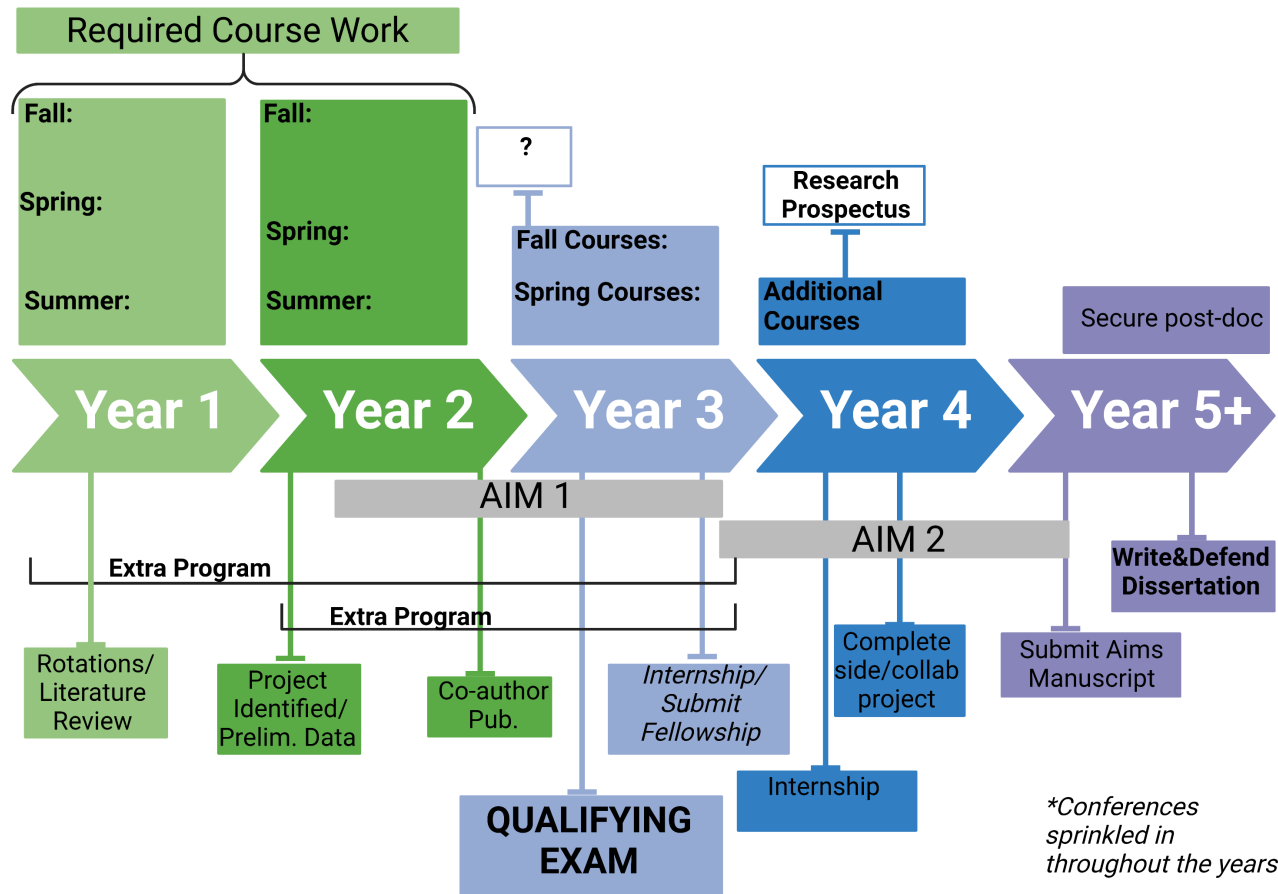
- Ludlow, MS
- Farm/rural life
- Single parent household
- Small K-12 school
- Gifted program
- Psychosis event
- Undergrad @ UofM
- First-Gen college graduate
- Graduate school @ UofM
- Finished in 3.5 as the 1<sup>st</sup> Black Male in History
- The Fam



# The Graduate School Snap Shot

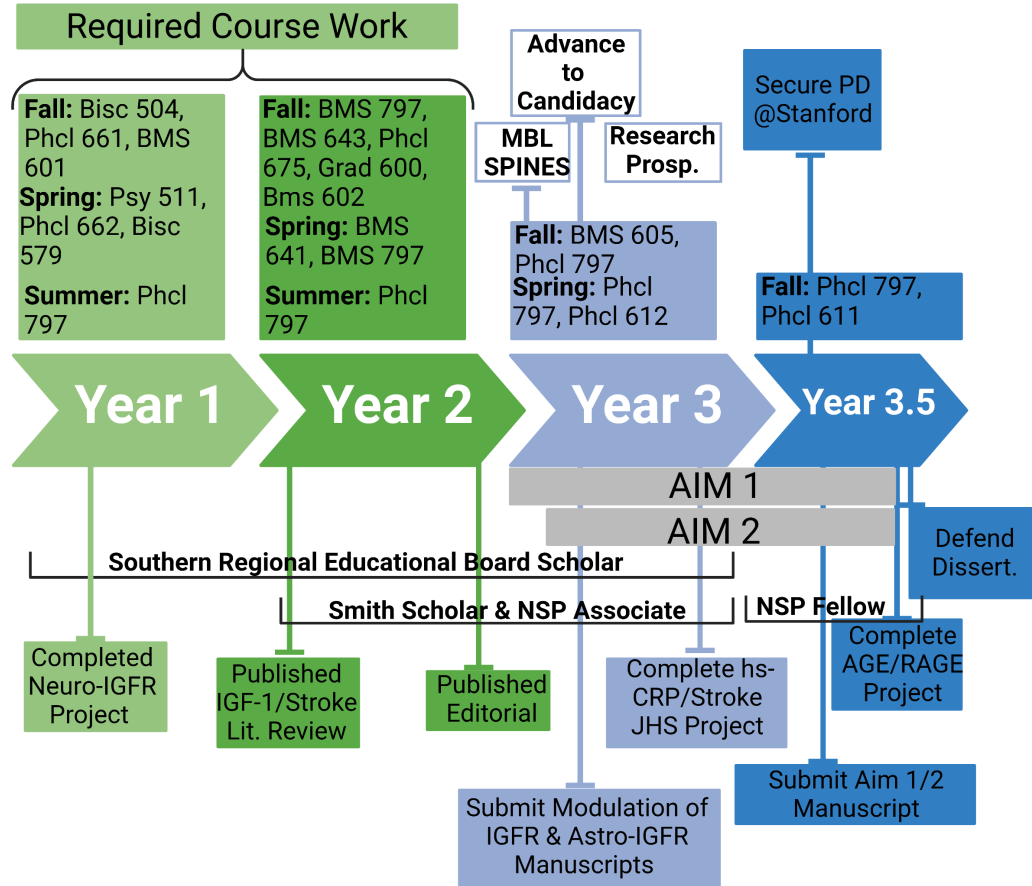


# The Grad School Template



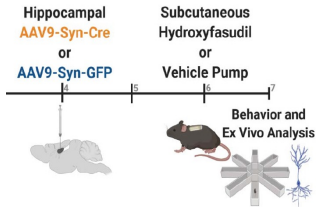
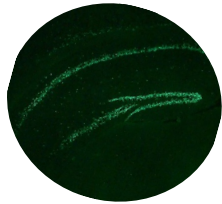


# So... what did it actually look like for me ?

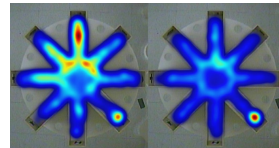
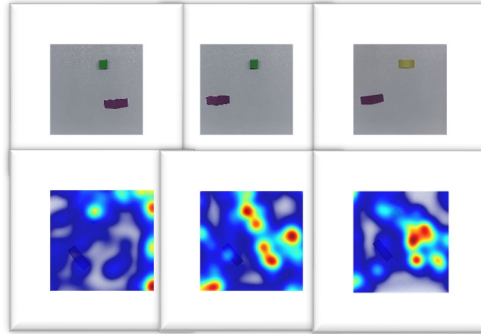


# Fall 2016 – Spring 2019 Ashpole Lab University of Mississippi

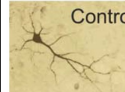
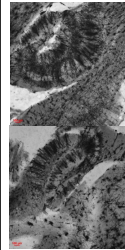
## Design



## Methods



## Images



## Research Findings

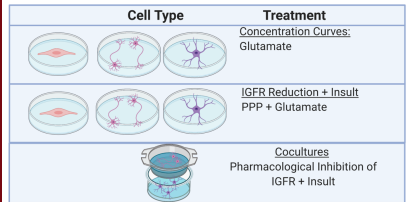
- Male Cognitive Impairments in RAWM
- IGFR inhibition reduces neurite outgrowth
- IGFR inhibition alters Rho-Kinase Pathway

## The Start of Belief

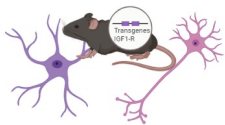
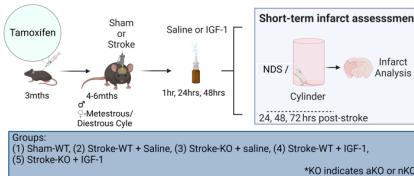


# Graduate Research ~ University of Mississippi Ashpole Lab (2019-2022)

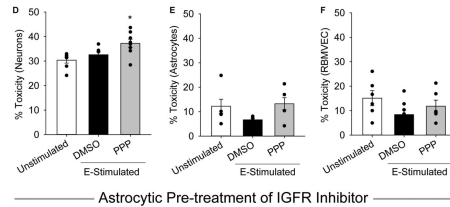
## Design



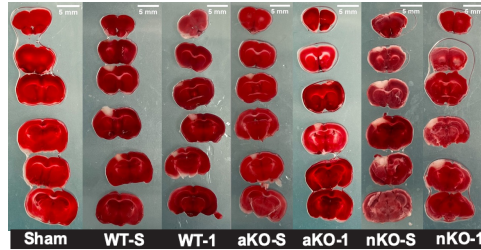
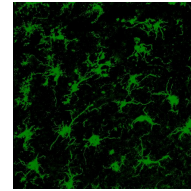
## Experimental Design



## Results



## Images



## Key Findings

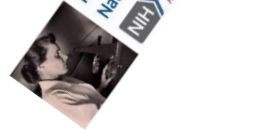
- IGFR inhibition in astrocytes reduce neuronal protection against glutamate toxicity.
- Astro-KO have numerous neuroprotective phenotypes

## Adversities Come To Fruition



Neuroscience  
2022

Ruth L. Kirschstein  
National Research Service Awards



Graduate School Expectations? Is your neuroscience fulfilling? Navigating Challenges?

# You Learn More In Failure Than You Ever Do In Success – Jay Z

## Successful Grants

- UM Grant
- NIH NRSA F31

## Failed Grants

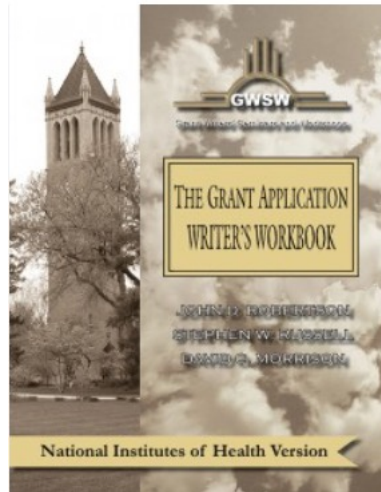
- NSF GRFP
- NSF GRFP
- Ford Predoctoral Fellowship
- American Heart Association  
Predoctoral Fellowship
- NIH NRSA F31

*The Key: Grant and manuscript writing is code  
cracking. Once you get it, then you get it.*

# 2019 Strength: Science Communication

## 2019 Weakness: Scientific Writing

- Scientific reading takes more strategy than it does skill.
- To develop a strategy, you need practice and time.



big summary/  
importance statement  
for the science

scientific findings  
as extension of  
previous work

findings' scientific  
implications

how this engineering  
will facilitate future  
research

forward-looking state-  
ments about the field as  
a whole

a summary/  
importance of the  
engineering  
aspect of the  
work

### DISCUSSION

These results show that the capacity to induce  $T_{reg}$  and modify their phenotype is a characteristic of more effector strains than was appreciated previously. Our findings concerning the role of human gut bacteria in shaping features of the gut mucosal immune system complement and extend the elegant work by Atarashi *et al.* (16). They used a single selective condition (chloroform treatment) to recover a group of 17 strains (all of which were described as members of the class Clostridia) from the human fecal microbiota of a single donor and showed that the consortium was capable of expanding the colonic regulatory T cell compartment in gnotobiotic mice. The fact that we found this effector activity among gut species belonging to other bacterial phyla suggests that distribution of this functional capacity may be beneficial in ensuring that this tolerogenic cell type is consistently and persistently maintained in different microbial community and host contexts. The approach we describe allows systematic follow-up analyses of the extent to which the  $T_{reg}$  response is affected by factors such as age at colonization or by different diets that produce abrupt and substantial alterations in microbiota configurations (45–47). Despite identifying members of different human gut bacterial phyla that shape the  $T_{reg}$  response, our study and that of Atarashi *et al.* revealed that intestinal short-chain fatty acid concentrations increased upon colonization. Given the substantial amount of data supporting a role for short-chain fatty acids in the induction of  $T_{reg}$  (42–44), this suggests a common pathway by which different microbes converge to modulate this facet of the host immune system. The genetic manipulability of some of the bacterial strains identified here, notably the *Bacteroides*, affords an opportunity to test this and other hypotheses, and advance our knowledge about the molecular underpinnings of microbiota- $T_{reg}$  crosstalk.

As the field of human microbial ecology research moves from observational studies to hypothesis-driven experiments designed to directly test the contributions of the microbiota and its components to health, there is a growing need to develop and transition to a modernized set of Koch's postulates (48) where the groups of microbes that modulate host phenotypic responses are identified along with the environmental factors (for example, dietary) necessary for the response to be fully manifest. We have developed a platform for systematically identifying microbe-host phenotype interactions in different (human) donor microbiota using gnotobiotic mice that can represent different host genetic features and different environmental conditions of interest. With the 17 strains in our culture collection, there were more than 100,000 possible combinations to search for effector strains. Using the mathematical and experimental strategies described, we only needed 100 combinations to identify multiple effector microbes for

three very diverse biological responses (metabolic, adiposity, and  $T_{reg}$ ). This represents a 1000-fold reduction in the search space compared to what would be required theoretically. By testing these 100 combinations of microbes in an out-of-the-isolator gnotobiotic caging system rather than in traditional flexible film isolators, we overcame what would have been an insurmountable practical barrier to performing these studies for most groups. Our entire study could have been completed with a single flexible film isolator to generate the required germ-free mice. This feature suggests that our overall approach should be accessible to many investigators because animal facilities with small numbers of gnotobiotic isolators already exist in numerous universities.

Although identifying effector strains represents a critical first step in mechanistic analyses of how the gut microbiota affects various facets of host biology, once such strains are identified, much additional work needs to be done. For example, numerous other important components of the intestinal immune system may also be affected by colonization with the strains we identified, including B cell class switching to IgA, macrophage/dendritic cell effector or migratory properties, and  $\gamma\delta$  T cell function. Another important goal is to identify the effector molecules produced by the identified effector strains and the host signaling pathways through which these molecules act. Using gnotobiotic mice genetically deficient in various components of the immune system (such as Toll-like receptors or inflammasomes) and effector strains that are genetically manipulated (for example, through whole-genome transposon mutagenesis) represent ways for pursuing this goal. Although additional elements of these mechanistic analyses will be dependent on the biological processes being interrogated, in principle this platform can be applied to any microbiota-associated phenotype. Finally, our approach has therapeutic implications because it represents an enabling system for identifying and characterizing next-generation probiotics or combinations of pre- and probiotics (synbiotics).

how it facilitates scientific research

limitations of the platform show which questions would be unanswered

how it will facilitate medical research

Faith *et al.*, *Science Translational Medicine* (2014)  
doi:10.1126/scitranslmed.3008051

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# Then & Now

## ■ Paper Tracking

Time Started Reading:

Time Finished Reading:

Article Analysis-Title of Article: \_\_\_\_\_

Abstract summary:

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Hypothesis of article:

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Figures analysis:


Summary of Article and Analysis of Results:

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### Thomas 2021

Title: Thomas 2021

Date: 2022-12-28

Time: 18:13

NEUROPATH

### Association of TDP-43 proteinopathy, cerebral amyloid angiopathy, and Lewy bodies with cognitive impairment: individuals with or without Alzheimer's disease neuropathology

#### Authors:

David X. Thomas<sup>1,3\*</sup>, Sumali Bajaj<sup>2,3</sup>, Kevin McRae-McKee<sup>2</sup>, Christoforos Hadjichrysanthou<sup>1</sup>, M.Anderson<sup>2</sup> & John Collinge<sup>1</sup>

#### Year: 2021

tags/ key terms

[#tdp43](#) [#caa](#) [#lb](#) [#AD](#)

#### Introduction

Objective: Compare the association of common neuropathologies with pre-mortem cognitive decline in the presence vs absence of concomitant Alzheimer's disease.

#### Methods

- NACC 2005-2018 [#NACC](#) [#np](#)
- CDR-SOB & MMSE
- Bayesian Hierarchical regression models to estimate the association of Alzheimer's disease neuropathology, TDP-43 proteinopathy, cerebral amyloid angiopathy (CAA), and Lewy t with cognitive trajectories after accounting for the covariates consisting of demographic features, and other neuropathologies
- *SIMILAR VARIABLES AS CELLAS MANUSCRIPT PLAN AND DATA PROCESSING*
- Binary categories were created for Alzheimer's disease neuropathological change, Lewy bodies, CAA, and TDP-43 proteinopathy using cut-of values which led to reasonably balanced groups.

#### Statistics

[#bayesianhierarchicalregression](#)

linear mixed effect models in a Bayesian framework

[#linearmixedeffectregression](#)

[#chisquare](#)

#### Results

In ADNC+ individuals, we assessed if the rate of cognitive decline was the same in the presence/absence of a co-pathology, using one model each for TDP-43, CAA and Lewy Bodies. We estimated the two way interactions of TDP-43 proteinopathy and time ( $\beta$ MMSE = -0.34, 95% BCI (-0.64, -0.04);  $\beta$ CDR-SB = 0.33, 95% BCI (0.13, 1.47)), CAA and time ( $\beta$ MMSE = -0.04, 95% BCI (-0.42, 0.35);  $\beta$ CDR-SB = 0.09, 95% BCI (-0.11, 0.29)) and Lewy bodies and time ( $\beta$ MMSE = -0.29, 95% BCI (-0.57, -0.01);  $\beta$ CDR-SB = -0.19, 95% BCI (-0.01, 0.39)) (Fig. 2). These results suggest that ADNC+ individuals with these pathologies have a steeper rate of cognitive decline compared to those without co-morbid pathologies.

However, our data showed no association of Lewy bodies with cognitive impairment over time ADNC- individuals.

#### Main Findings

ADNC+ individuals with these TDP-43, CAA, and Lewy bodies individually have a steeper rate of cognitive decline compared to those without co-morbid pathologies. No association of Lewy bodies with cognitive impairment over time in ADNC- individuals.

#### IDEAS

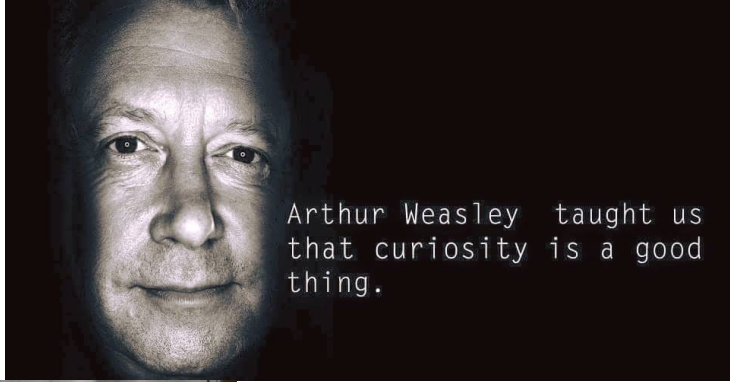
non-binary dichotomizing variables to capture complexity of neuropathologies.

#### PDF



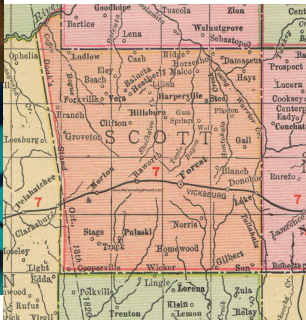
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Where does your curiosity stem from?

Bernard Denson Road produces new arrest



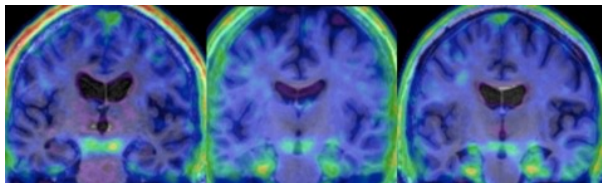
A Series of Unfortunate and/or Fortunate Events



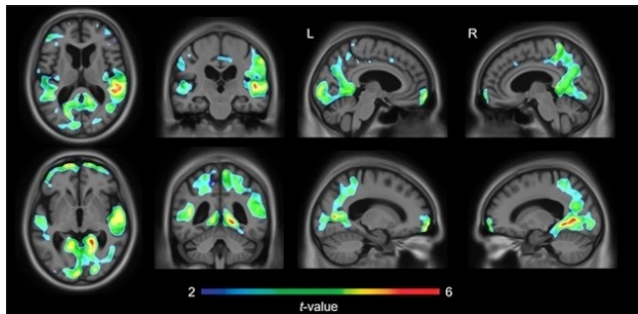
Why do you do what you do?

# Postdoc Work- AD & Neurodegeneration & Vasculature & Neuroimaging

## Research Interests



## Techniques and Imaging



## Support and Recruitment

Postdoctoral Recruitment Initiative in Science and Medicine

Stanford PRISM 

## Funding

Propel,

Postdoctoral Scholars Program

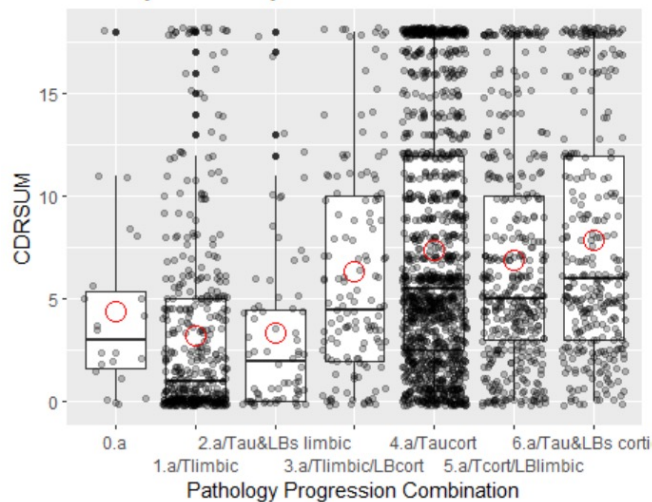
<https://propel.stanford.edu/>



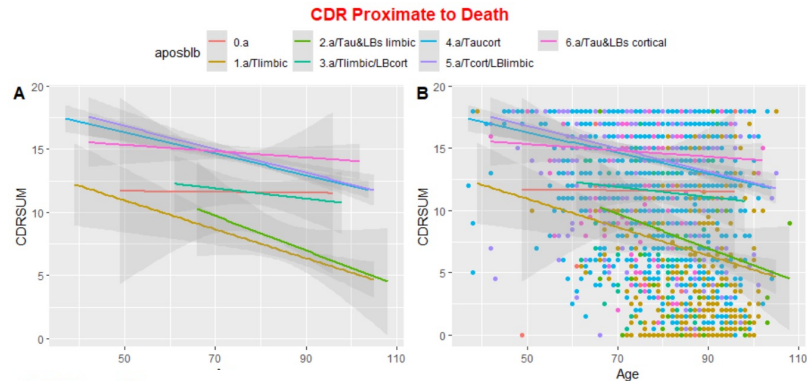
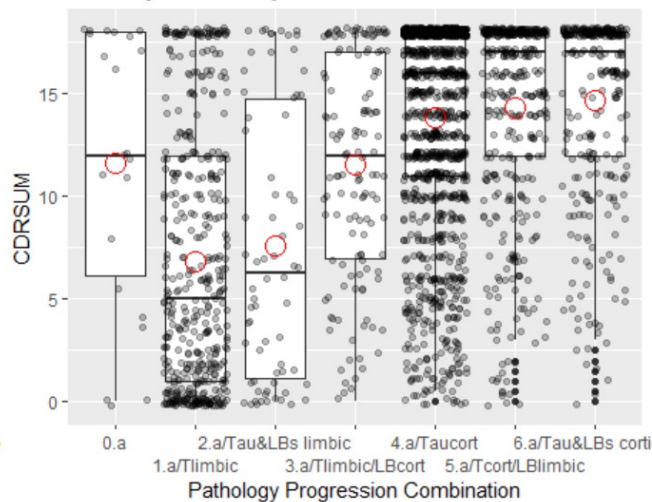
# Postdoc Research

- Utilize NACC data to understand neuropathology of aging/AD

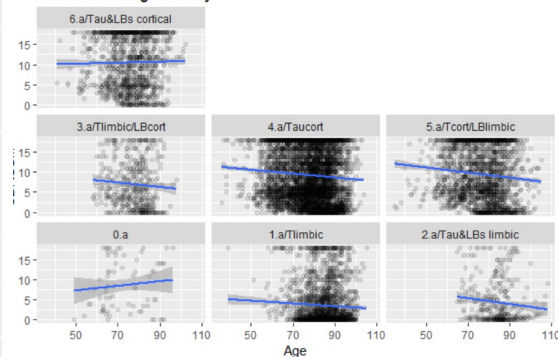
**A** CDRSUM Changes b/w tau/LB Location in Amyloid + Subjects First Visit



**B** CDRSUM Changes b/w tau/LB Location in Amyloid + Subjects Proximate to Death



CDRSUM Longitudinally



# Greatest lesson was time management and self-preservation through self-investment



- Pre-pandemic work hours
- Pandemic work hours
- Post-pandemic work hours
- Graduate school hours
- Postdoc hours

Theoretical Expectations? Realistic Expectations? Self Expectations

# My Rewards versus Pitfalls of Academia

- 3 1<sup>st</sup> author publications
- 1<sup>st</sup> black trainee and 3<sup>rd</sup> in history (37 years)
- 5 1<sup>st</sup> coauthor manuscripts under review/in-prep
- 25 honors, award, and features
- 9 noteworthy features, videos, sci-comm opportunities
- 6 oral presentations/ 6 poster presentations
- 120+ hours of community service
- 27 RCR hours
- 4 teaching hours
- 3 professional appointments
- 13 mentees



# You are who you hang around -Whoever

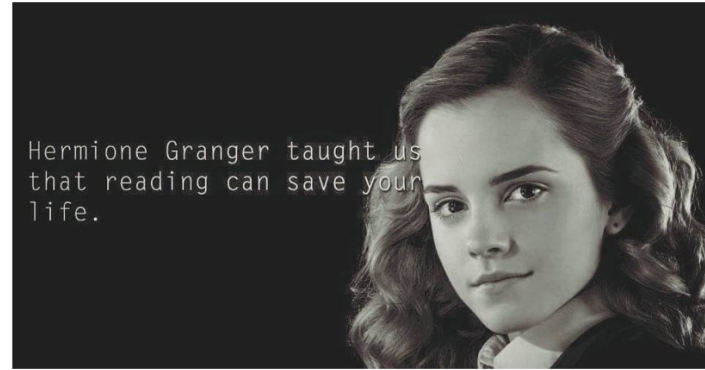
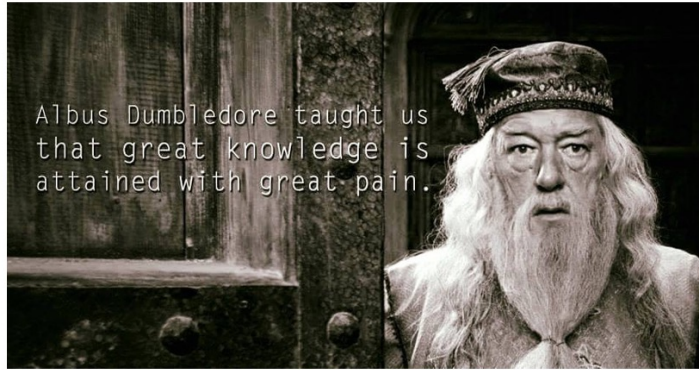
*Identifying good mentors?*

Kreacher taught us that "if you want to know what a man's like, take a good look at how he treats his inferiors, not his equals."  
Sirius Black





# “Obstacles” = “Opportunities”



## Reading, Consolidating, Asking Questions, Opportunities

**BMBH Emerging Scholars Program**

**himi**  
Gilliam Fellowships  
for Advanced Study

51 Subarea Studies  
Starts in 2022

401 Fellowships in 100+ Areas  
of Study

\$53k Stipend per award

Building a community committed to advancing science through diversity and inclusion

**NIH Blueprint for Neuroscience Research**

**AAAS** | Science & Technology Policy Fellowships

**ABRCMS**  
ANNUAL BIOMEDICAL RESEARCH CONFERENCE FOR MINORITY STUDENTS

Apply for an oSTEM Scholarship  
Applications Close Friday, June 10th, 2022  
\$70k in Scholarships available

**NSF** Graduate Research Fellowship Program

**THE FORD FOUNDATION**  
PRE-DOCTORAL FELLOWSHIP

Apply with confidence. Get Accepted. [www.accepted.com](http://www.accepted.com)

**Ruth L. Kirschstein**  
National Research Service Awards  
NIH National Institutes of Health  
Research Training and Career Development

**SPINES**  
Summer Program in Neuroscience, Excellence, and Success  
Maine Biological Laboratory  
Woodville, ME  
[gn.mbl.edu/SPINES](http://gn.mbl.edu/SPINES)

**Neuroscience Scholars Program**  
Enhancing Diversity in the Field

**ENDURE**  
NIH Blueprint for Neuroscience Research

**SREB** | Southern Regional Education Board

# M.D. vs. Ph.D.

## M.D.

- MCAT
- Years of courses where grades truly define you
- No room for extracurriculars
- Few research opportunities
- STEPS after STEPS
- Matching
- \$\$\$
- No room for intellectual development
- Few skills gained
- Stringent timeline
- Limited post-graduate opportunities

# If you do choose a Ph.D., BE PREPARED

RETURN TO ISSUE | < PREV EDITORIAL NEXT >

## Black Scientists Are Not the Door to Diversity

Cellas A. Hayes

Cite this: *ACS Chem. Neurosci.* 2021, 12, 13, 2256–2260

Publication Date: June 11, 2021

<https://doi.org/10.1021/acscchemneuro.1c00375>

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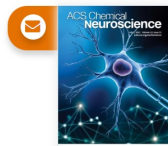
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**79**

Citations  
**-**

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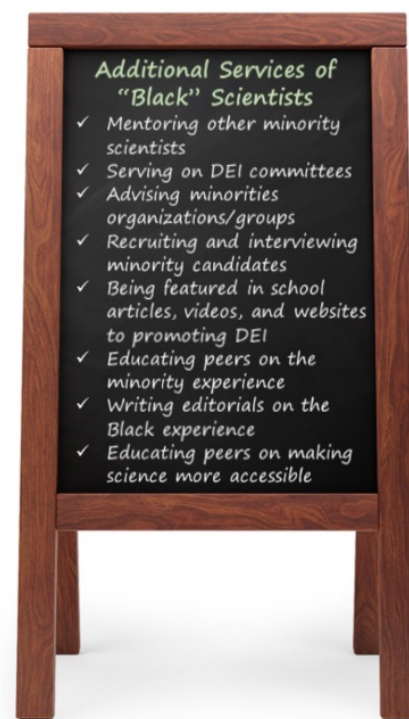


ACS Chemical Neuroscience

PDF (5 MB)

SUBJECTS: COVID-19, Graduate education, Isolation, Students

- THE UPROAR OF 2020, AN INTRODUCTION
  - A GRADUATE STUDENT PERSPECTIVE
- THE ADDITIONS OF BEING A MINORITY GRADUATE STUDENT
  - ARE BLACK STUDENTS THE BENEFICIARIES TO DEI WORK?
- THE FEELING OF OBLIGATION AND PROVING SELF-WORTH
  - BEING A SCIENTIST AND BEING A “BLACK SCIENTIST”
- BLACKNESS AS A STEPPING STONE AND THE REAL-WORLD PERSPECTIVE
  - BLACK STORIES AS TOKENS AND SPOTLIGHTS
- MAKING THE SYSTEM BETTER: A CONCLUSION AND GUIDE FOR THE FUTURE



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# A guide for applications

CELLAS HAYES, PHD

Be Genuine. Be Relatable. Build Your Life on Being Different.

[Home](#) [Research](#) [Core Philosophies](#) [More](#) [in](#) [twitter](#) [instagram](#)

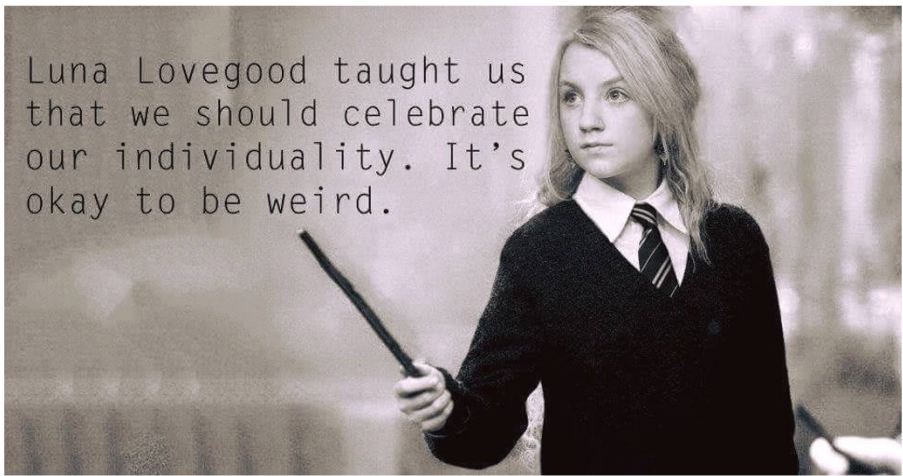
## CV AND APPLICATIONS AND PORTFOLIOS

<https://www.cellashayes.com/cv-and-applications>



[https://ars.sf.ucdavis.edu/sites/g/files/dgvnsk2741/files/inline-files/pre-grad-guide\\_1.pdf](https://ars.sf.ucdavis.edu/sites/g/files/dgvnsk2741/files/inline-files/pre-grad-guide_1.pdf)

**Bling Me**

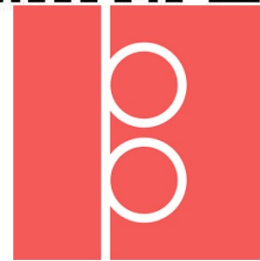


Luna Lovegood taught us that we should celebrate our individuality. It's okay to be weird.

**Bling Me**



**Be Genuine  
Be Relatable  
Build Your Life on Being Different**



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