New Investigator Award Program Past Awardees

Yuriko Katsumata, PhD & Corey McMillan, PhD

2022 New Investigator Award Winner

Yuriko Katsumata, PhD

Assistant Professor, University of Kentucky

University of Kentucky ADRC

Application Strategies for NIAP

Presented by: Yuriko Katsumata (University of Kentucky)

Personal Introduction

2013

PhD program
Epidemiology and Biostatistics
University of Kentucky

2018

Research Assistant Professor
Biostatistics
University of Kentucky

2022

NACC New Investigator Award

2024

Research Associate Professor
Biostatistics
University of Kentucky

Dr. David Fardo
Statistical Geneticist

Sanders-Brown Center on Aging

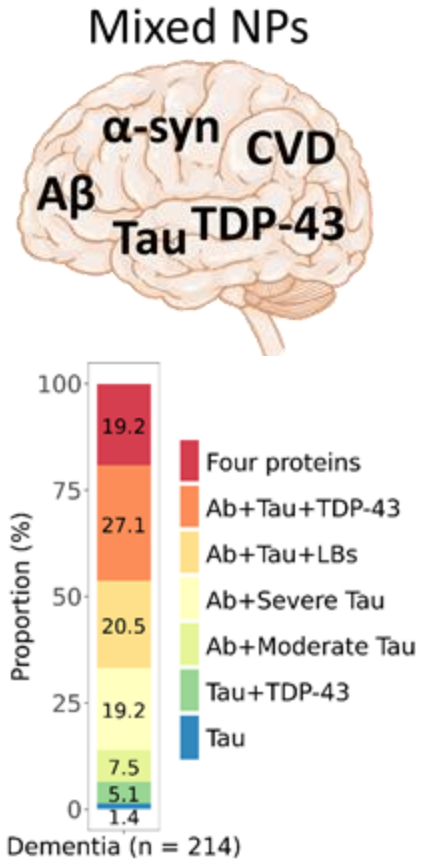
University of Kentucky
College of Public Health

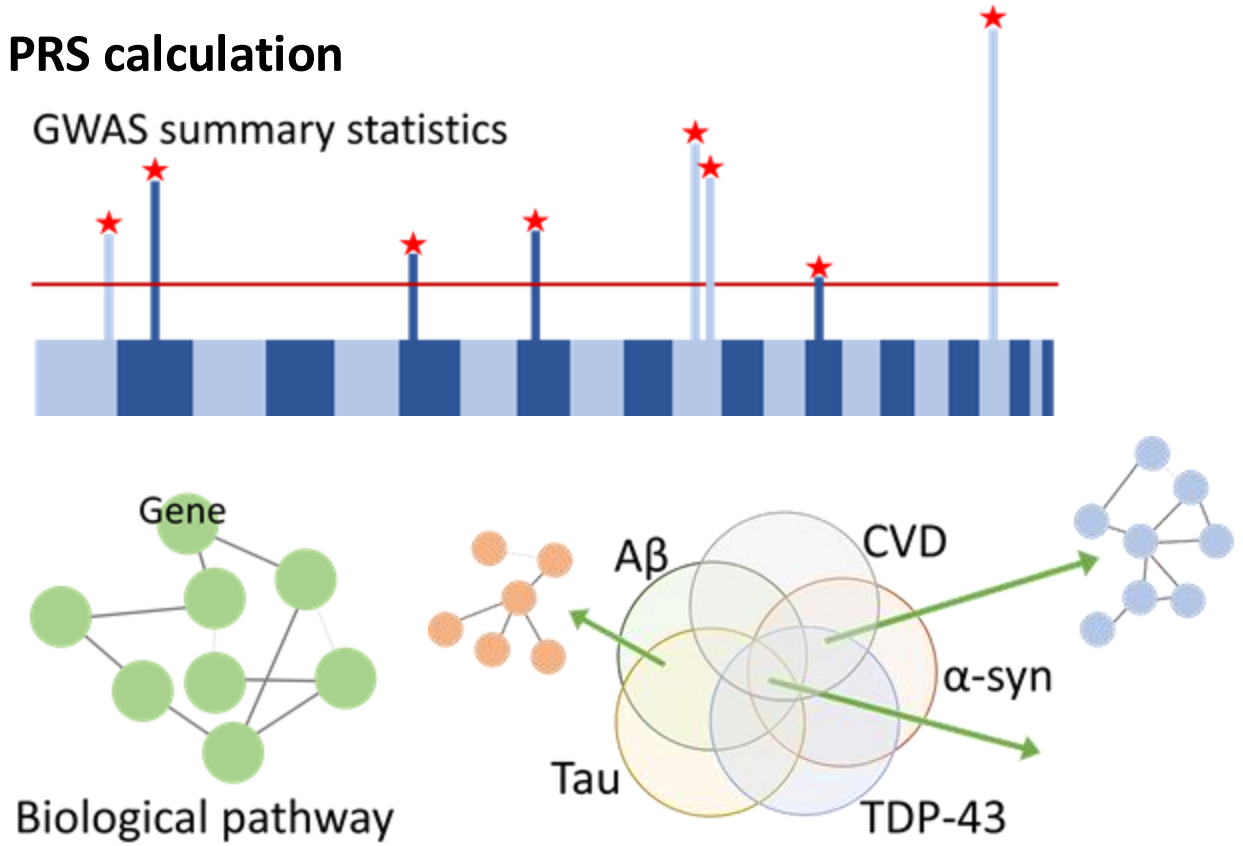
New Investigator Award Project

2022

NACC New Investigator Award

Pathway-specific polygenic risk scores on mixed neuropathologies





New Investigator Award project

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RESEARCH ARTICLE

Alzheimer's & Dementia®
THE JOURNAL OF THE ALZHEIMER'S ASSOCIATION

Genetic associations with dementia-related proteinopathy: Application of item response theory

Yuriko Katsumata[1,2] | David W. Fardo[1,2] | Lincoln M. P. Shade[1] | Xian Wu[1,2] | Shama D. Karanth[3,4] | Timothy J. Hohman[5] | Julie A. Schneider[6,7,8] | David A. Bennett[6,7,8] | Jose M. Farfel[7,8] | Kathryn Gauthreaux[9] | Charles Mock[9] | Walter A. Kukull[9] | Erin L. Abner[2,10] | Peter T. Nelson[2,11] | The Alzheimer's Disease Neuroimaging Initiative[12] | The National Alzheimer's Coordinating Center

Scan Me

ALZHEIMER'S ASSOCIATION AAIC 24

Proteinopathies and Biological Pathway-based Alzheimer's Disease Polygenic Risk Score

Yuriko Katsumata[1,4], Xian Wu[1,4], Khine Zin Aung[1,4], Inori Tsuchiya[1,4], Lincoln M. Shade[1,4], Shama Karanth[5,6], Kathryn Gauthreaux[7], Charles Mock[7], Walter A. Kukull[7], Erin L. Abner[2,4], Peter T. Nelson[3,4], David W. Fardo[1,4]

1 Department of Biostatistics, 2 Department of Epidemiology and Environmental Health, 3 Department of Pathology, 4 Sanders-Brown Center on Aging, University of Kentucky, Lexington, KY 5 Department of Surgery, 6 UF Health Cancer Center, University of Florida, FL, 7 National Alzheimer's Coordinating Center, Department of Epidemiology, University of Washington, WA

Application Experience and Strategy

- Specific Aims
  - What is my interest?
  - What are knowledge gaps?
- Approach
  - To fill the knowledge gaps, what should I do and what can I do?

Application Experience and Strategy

- Specific Aims
  - What is my interest?
    - **Mixed neuropathologies** and **genetics**

Keywords

  - What are **knowledge gaps**?
    - What we know and what we don't know?

Spec Aim1

- Pure Alzheimer's disease is not common
- There is no optimal classification criteria for mixed neuropathologies

Spec Aim2 and 3

- Genetic risks of mixed neuropathologies are unknown
- Diverse biological pathways may be differentially responsible for mixed neuropathologies

Application Experience and Strategy

- Approach
  - To fill the knowledge gaps, what should I do and what can I do?
    - How to define mixed neuropathologies

Application Experience and Strategy

- Approach
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Neuropathology	NACC variable	0	1	2	3
A score	NPTHAL	Phase 0	Phase 1/2	Phase 3	Phase 4/5
B score	NAC				Stage 5/6
C score	NAC				Frequent
TDP-43 in amygdala	NPT				
TDP-43 in limbic	NPT				
TDP-43 in Neocortex	NPTDPE	No	Yes		
Lewy bodies	NACCLEWY	No	Others	Neocortex	
HS	NPHIPSCL	No	Yes		

# of combinations of NPs

3,072 ways

Application Experience and Strategy

- Approach
  - To fill the knowledge gaps, what should I do and what can I do?
    - How to define mixed neuropathologies

Describe
- Dimensionality reduction
- # of dimensions

Application Experience and Strategy

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1. We will apply a dimensionality reduction method…

Application Experience and Strategy

- Approach
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Describe
- Dimensionality reduction
- # of dimensions

1. We will apply a dimensionality reduction method…
2. We will apply the item response theory which is a dimensionality reduction method…

Application Experience and Strategy

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  - To fill the knowledge gaps, what should I do and what can I do?
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Describe
- Dimensionality reduction
- # of dimensions

1. We will apply a dimensionality reduction method…
2. We will apply the item response theory which is a dimensionality reduction method…
3. We will apply a generalized partial credit model (GPCM) within the item response theory framework which is a dimensionality reduction method…

Application Experience and Strategy

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  - To fill the knowledge gaps, what should I do and what can I do?
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Describe
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1. We will apply a dimensionality reduction method…
2. We will apply the item response theory which is a dimensionality reduction method…
3. We will apply a generalized partial credit model (GPCM) within the item response theory framework which is a dimensionality reduction method…
4. We will apply a generalized partial credit model (GPCM) within the item response theory framework which is a dimensionality reduction method… The GPCM will be run with the "mirt" R package…

Mentorship and Support

Dr. David Fardo
Statistical Geneticist

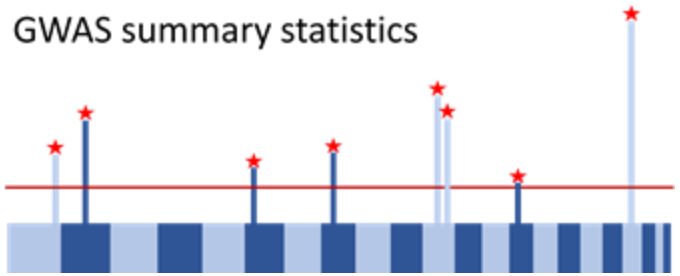
Dr. Peter Nelson
Neuropathologist

Dr. Erin Abner
Epidemiologist

Polygenic risk score

Mixed neuropathology

Statistical Modeling



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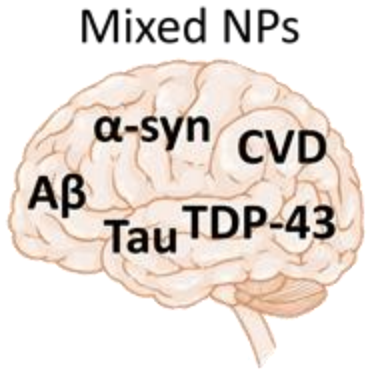

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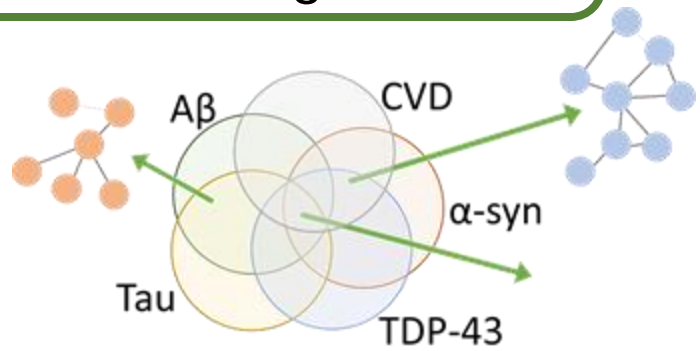

Career Impact

2024

Research Associate Professor
Biostatistics
University of Kentucky

Mentee

↓

Mentor

Xian Wu, PhD #

University of Kentucky ADRC

Rather than looking at how just one factor influences Alzheimer's disease onset, Wu wants to look at how both genetic and environmental factors, like a particular mutation in a gene or exposure to smoking, interact in the context of Alzheimer's. In particular, she will look at this genetic-environmental overlap in late-onset Alzheimer's disease, during midlife and later life, and across ethnoracial groups.

https://naccdata.org/nacc-productivity/2024-new-investigator-award-winners

Advice for Prospective Applicants

- Have multiple mentors with different expertise
  - Sign up for the NIAP Mentorship Program
  - Reach out to other mentors
- Generate an attractive specific aim page
- Write detailed approach
- Do not procrastinate
  - Polish your proposal again and again
  - Get suggestions and comments from as many people as possible

Acknowledgment

NACC

THE NIA ALZHEIMER'S DISEASE RESEARCH CENTERS PROGRAM
National Alzheimer's Coordinating Center

Sanders-Brown
Center on Aging

PI & Director

Dr. Linda Van Eldik

Mentors

Dr. David Fardo

Dr. Peter Nelson

Dr. Erin Abner

Thank you!

Connect with me!

Yuriko Katsumata, PhD

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