

Describing Brain Activity of African-American Older Adults with Alzheimer's Disease

A Pilot Study

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Acknowledgment

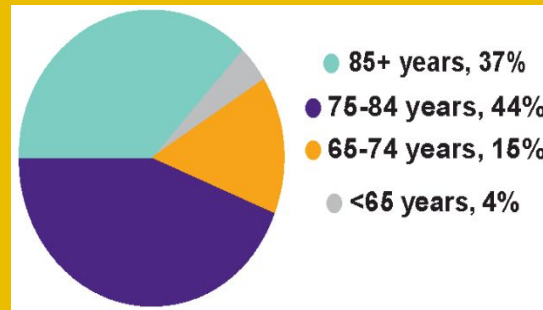
- **Ethnic Minority Fellowship Program sponsored by the American Nurses Association and funded by the Substance Abuse and Mental Health Services Administration**
- **Drs. Leslie S. Prichep and E. Roy John, Directors, Brain Research Laboratories, New York University School of Medicine, New York University**
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- **The College of Nursing, New York University**

AD Known Facts

- **Most common type of dementia** (Alzheimer Association, 2016; news-medical.net, July 2016)
- **Over 32 million have AD worldwide** (news-medical.net, July 2016)
- **By 2030, over 50 million with AD;** (Alzheimer Association, 2016; news-medical.net, July 2016)
- **Now 5.6 million live with AD in US;** (Alzheimer Association, 2016)
- **To date, no TX stops or reverses AD progression** (Prof. Gunhild Waldemar, 2nd Congress of European Academy of Neurology, 2016)
- **“We need a better understanding of neurodegenerative mechanisms—beyond memory disorders”** (Prof. Gunhild Waldemar, 2016)

AD Known Facts

- **6th cause of death in US;** (CDC, 2016.)
- **2nd cause of death for cents in US;** (Xu, 2016)
- **Every 71 secs, elderly person gets AD;** (CDC, 2016)
- **1 in 9 persons 65 and older has AD;** (Alzheimer Association, 2016)



- **African Americans with AD have highest mortality rate than older adults with other dementia** (Alzheimer Association 2021; Fortune et al , 2013)

AD Known Facts: African-Americans

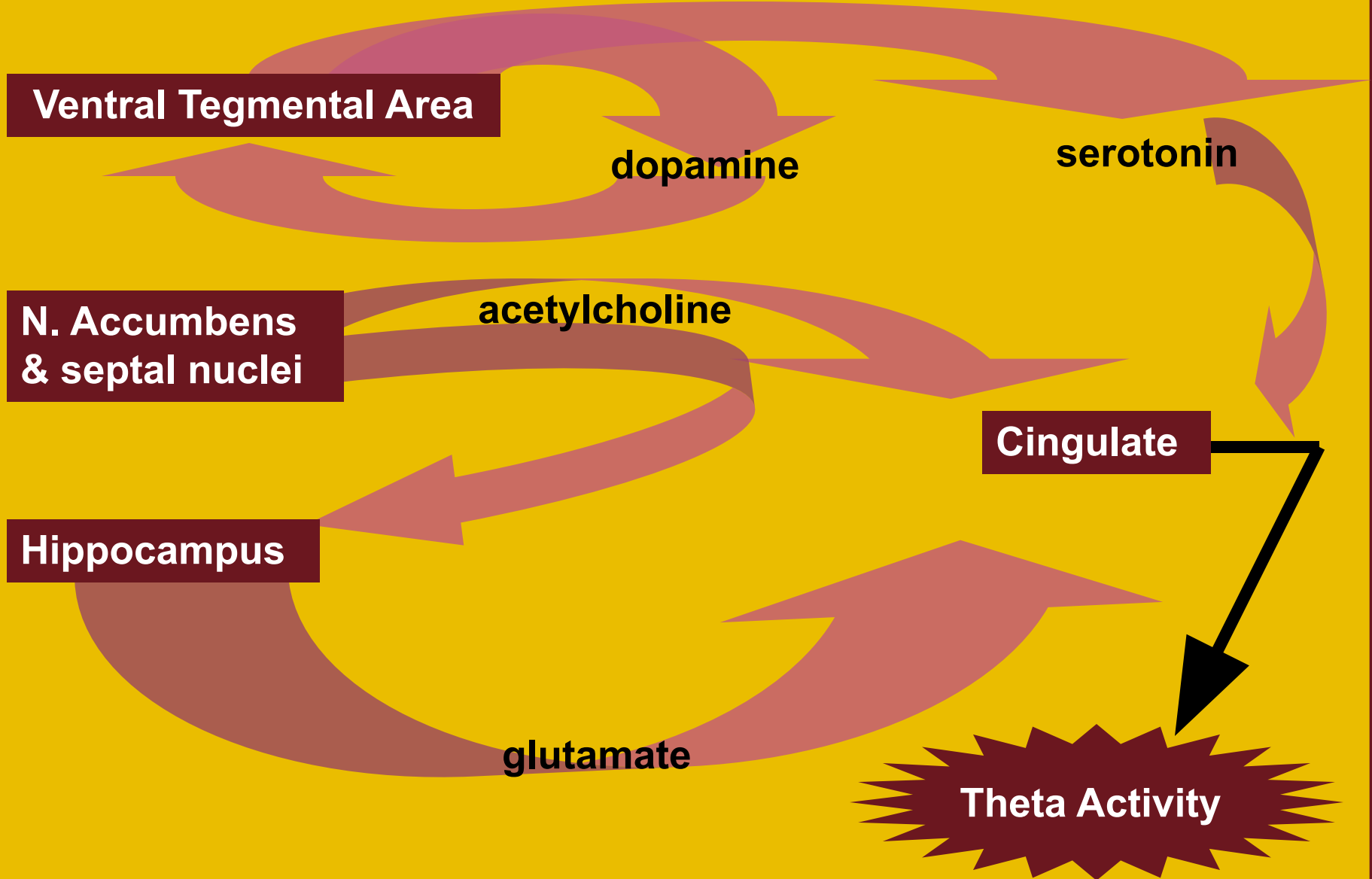
- **Silent epidemic in minority older adults—2030, over 6 million diagnosed with AD;** (Alzheimer's Association, 2004.)
- **No change in assessing for AD in minority older adults since 1992;** (Hall, et al., 2009.)
- **Non-cognitive changes occur prior to memory complications;** (Holston, 2008; Smith-Gamble, et al, 2002)
- **Measurement bias/social constraints limit assessment accuracy** (Shadlen, et al., 2000)
- **Higher risk of death than any other older adults with other dementias;** (Freels, et al., 2002.)

Brain Activity Wise: Caucasian

- **Change in brain's bioelectricity prior to signs of neuropathological changes** (Bobinski, et al 1998)
- **Prior to MCI/AD, increased theta observed in normal-functioning older adults** (Holston, 2003; Prichep, et al 2006)
- **MCI hallmark sign linked to increased theta (impairment measurable)** (Prichep, et al 2006)
- **Neuropsych & functional symptoms linked to brain activity changes** (Holston, 2003; Soininen, et al 1992)

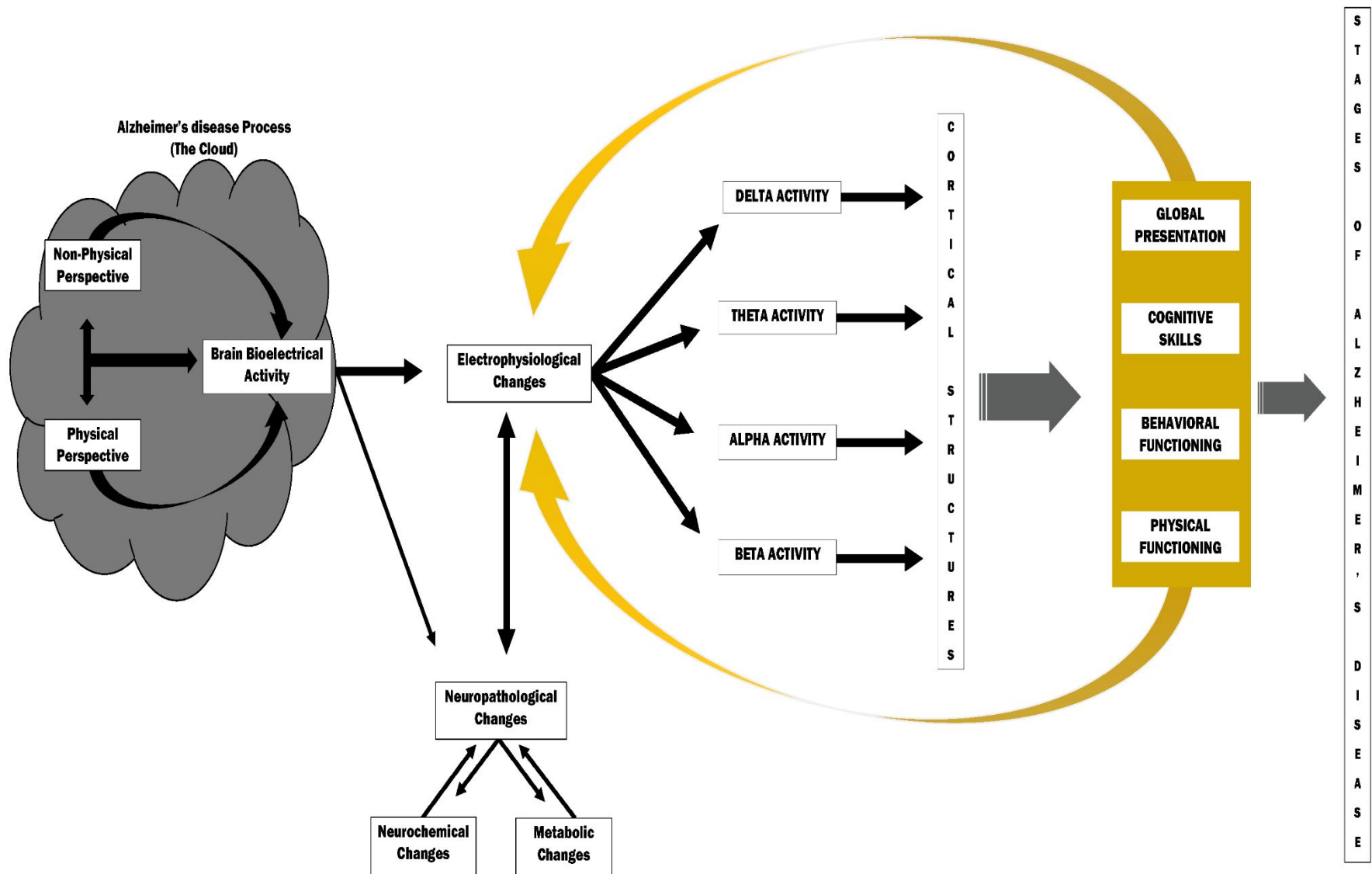
Theta Activity Generator

(John 2002.)



The EPAD Theory

Holston, 2015. The Electrophysiological Phenomenon of Alzheimer's Disease.



Objective of Pilot Study

To identify a reliable electrophysiological biomarker that will reduce race-based, AD-related health disparity, leading to early and accurate AD screening and diagnosing of older African-American adults.

Specific Aims

1. **Describe brain activity changes across 2 groups of older adults with and without AD (African-American and Caucasian).** *Hypothesis: Brain activity changes consistent with AD will be observed only in groups with a diagnosis of AD.*
2. **Describe differences in brain activity across the 2 groups of older adults with AD.** *Hypothesis: Brain activity changes for African-American older adults with AD will differ from the brain activity changes for Caucasian older adults with AD.*

Sample

- **Two main groups by ethnicity: Older African-American adults and older Caucasian adults; age ≥ 65 years.**
 - **Two sub-groups for each main: older adults with AD and older adults without AD.**
- **Total sample size: 76 (38/main group).**
 - **Power: .69-.70,**
 - **Moderate effect size: .25,**
 - **Moderate correlation of relative measures: .50,**
 - **Significance level: .05.**

Raw EEG Data

Name:
GE-4-08425-D

Elapsed Time
00:09:20

Epoch #18 out of 48

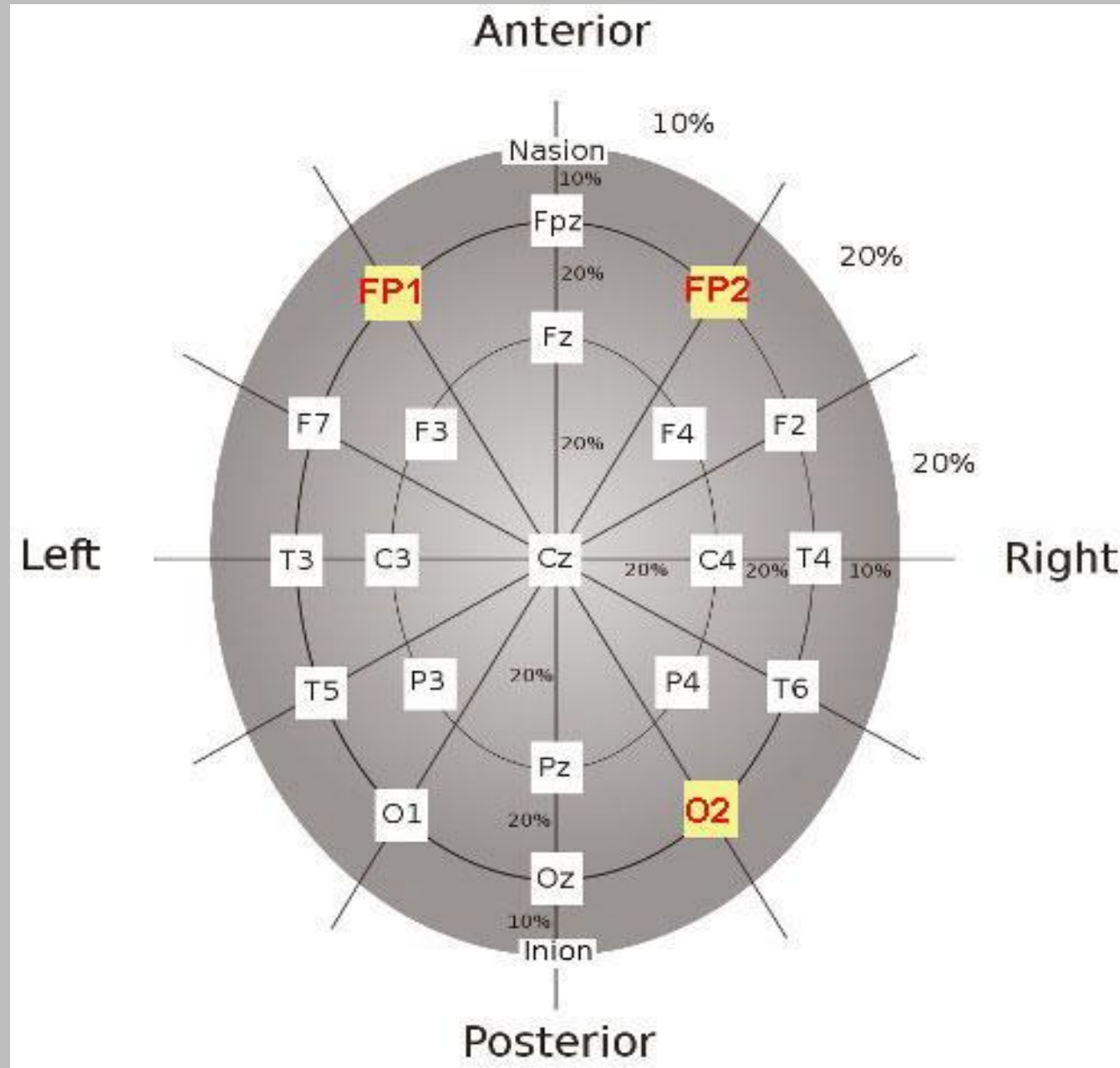
MONTAGE

Fp1-A1A2
Fp2-A1A2
Fpz-A1A2
F7-A1A2
F8-A1A2
F3-A1A2
F4-A1A2
Fz-A1A2
T3-A1A2
T4-A1A2
C3-A1A2
C4-A1A2
Cz-A1A2
T5-A1A2
T6-A1A2
P3-A1A2
P4-A1A2
Pz-A1A2
O1-A1A2
O2-A1A2
Oz-A1A2
ACT1-Fp
ACT2-RE



SECONDS

International 10/20 System EEG Recording



Analyzing Data-EEG Data

- 24-48 artifact-free epochs (2.5 secs each),
- Quantify epochs into monopolar and bipolar derivations,
- Calculate power, coherence, asymmetry for cortical regions,
- Computer power for parietotemporal strip (T5,P3,Pz,P4,T6) and alpha/theta ratio

Analyzing Data-Statistical Analysis

- Use SPSS and SAS,
- Descriptive statistics,
- Analysis of Variance (ANOVA),
- Internal consistency.

Aim	Procedure	Rationale
1	Descriptive statistics	Characterize brain activity changes for the 2 groups of older adults within each ethnic group.
2	ANOVA	Determine the difference in brain activity changes for the 2 groups of older adults with AD.

Results

- **No data collection or analyses.**
- **All paperwork printed, numbered, collated, and distribution-ready.**
- **Recruitment & data collection sites prepped.**
 - **Cleveland Clinic Lou Ruvo Center for Brain Health,**
 - **Sanford Center for Aging,**
 - **UNLV Simulation Center, and**
 - **UNR Neurology Core.**

Results

- **Supplier, Applied Neuroscience, Inc., registered with NSHE,**
- **Portable EEG acquisition systems purchased,**
- **Software licenses secured**
 - **NeuroGuide,**
 - **NeuroStat,**
 - **LORETA Current Density Normative Database.**

Conclusion

- **Get funding for recruitment and data collection.**
- **Analyze data and disseminate findings in presentations and publications.**
- **Use findings as preliminary data for**
 - **R21: Relating Electrophysiological Biomarkers to Clinical Symptoms of Alzheimer's disease (AD) in Older African-American Adults with/without AD.**
 - **Design: Repeated measures design over 2-year period.**
 - **Sample: 62 participants.**
 - **Power = .80; small effect size = .15; moderate correlation among representative measures (based on preliminary findings) = .50; significance level = .05).**