

Exercise for Brain Health

J. Carson Smith, PhD, FACSM

Director | Exercise for Brain Health Laboratory | carson@umd.edu



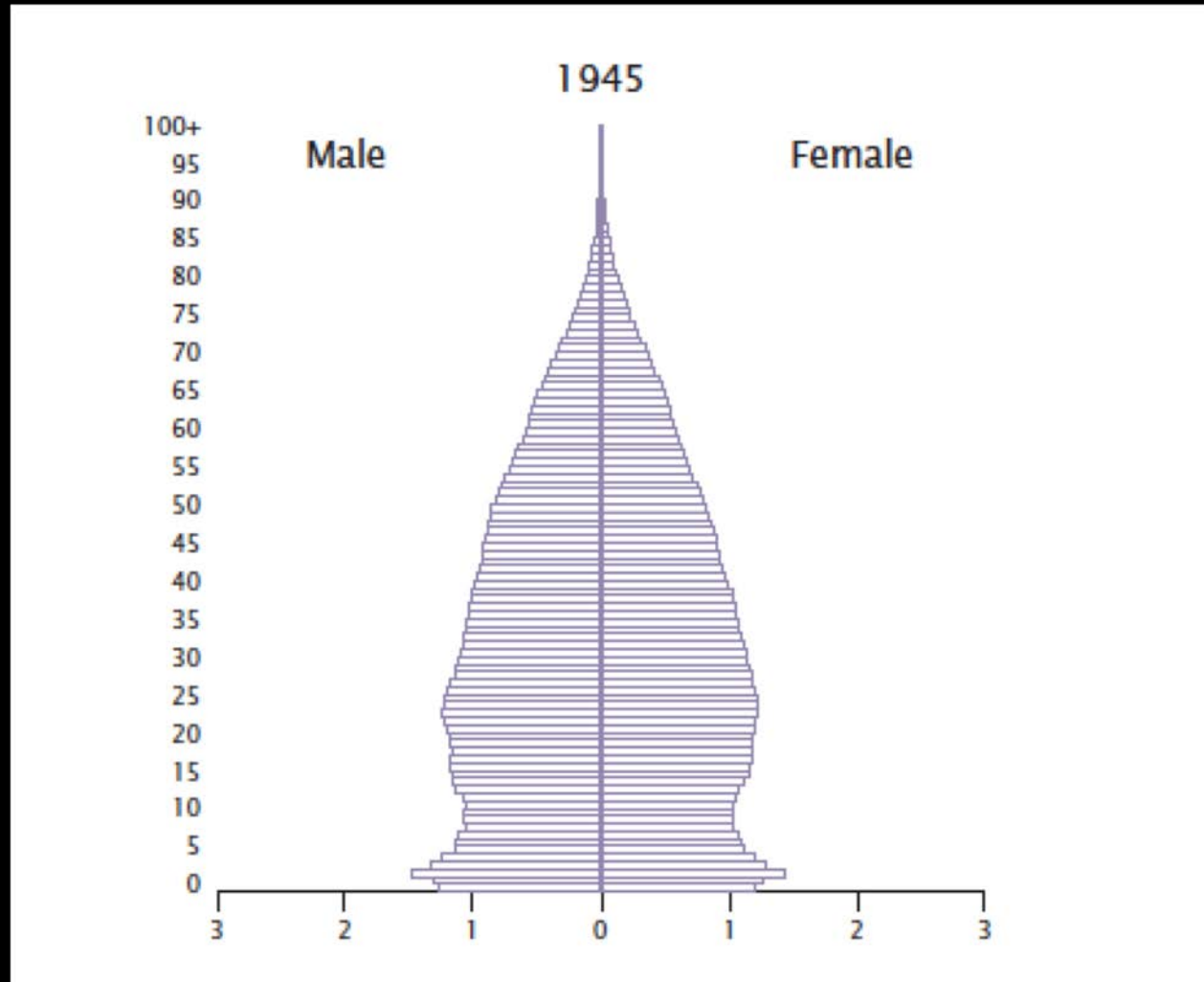
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DEPARTMENT OF KINESIOLOGY

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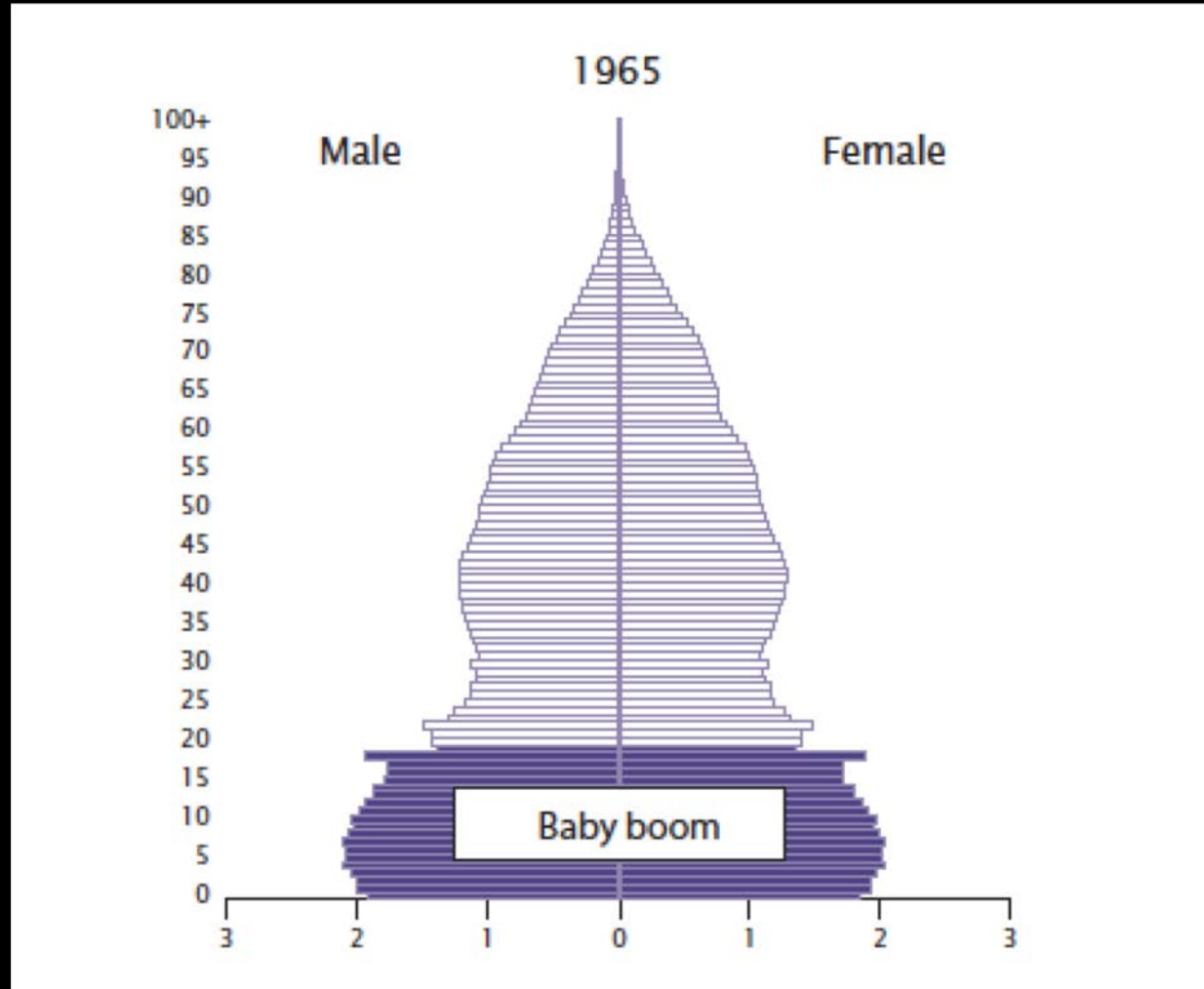


Age Trends: U.S. Population



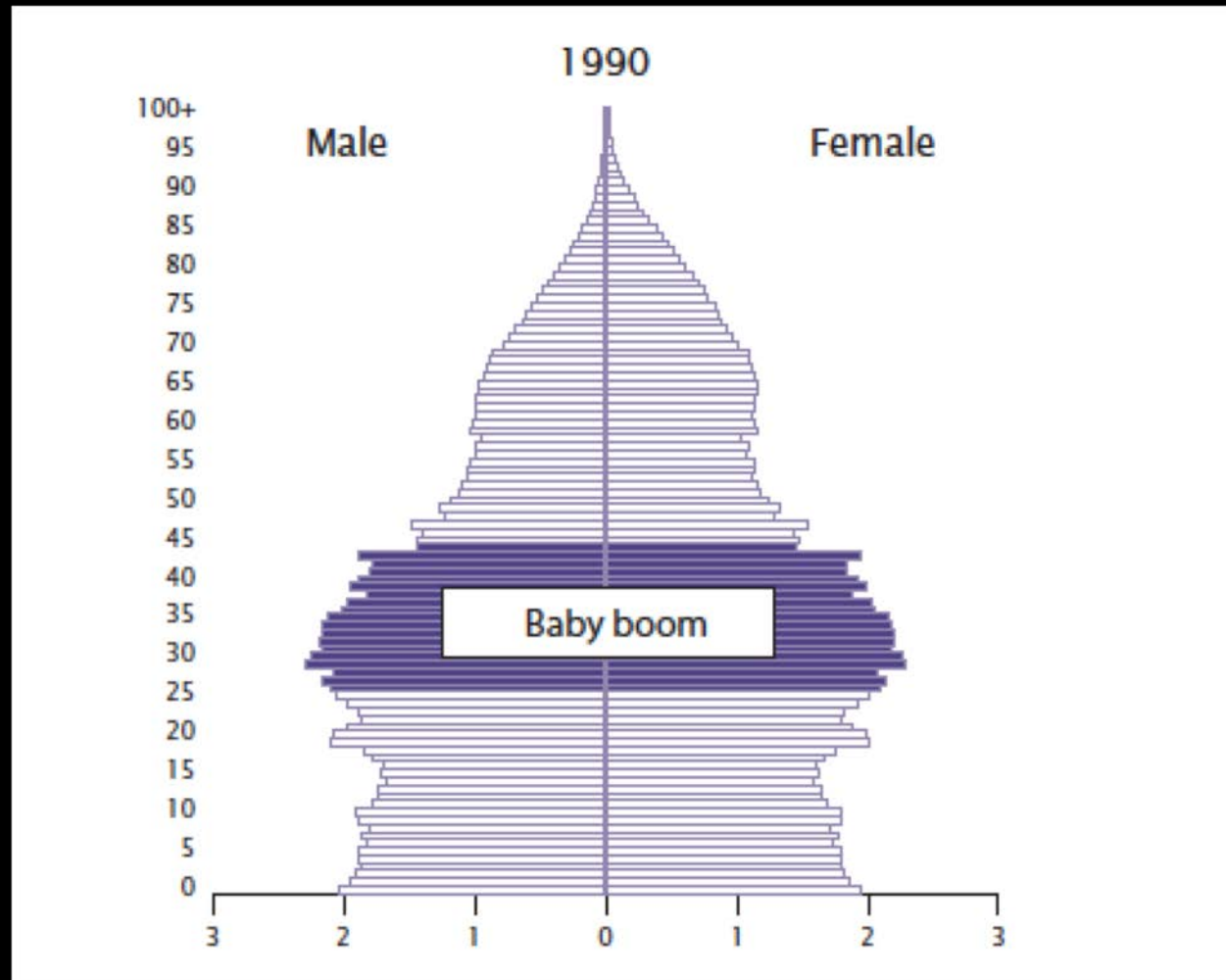
Colby, Sandra L. and Jennifer M. Ortman. The Baby Boom Cohort in the United States: 2012 to 2060. Current Population Reports, P25-1141. U.S. Census Bureau, Washington, DC. 2014.

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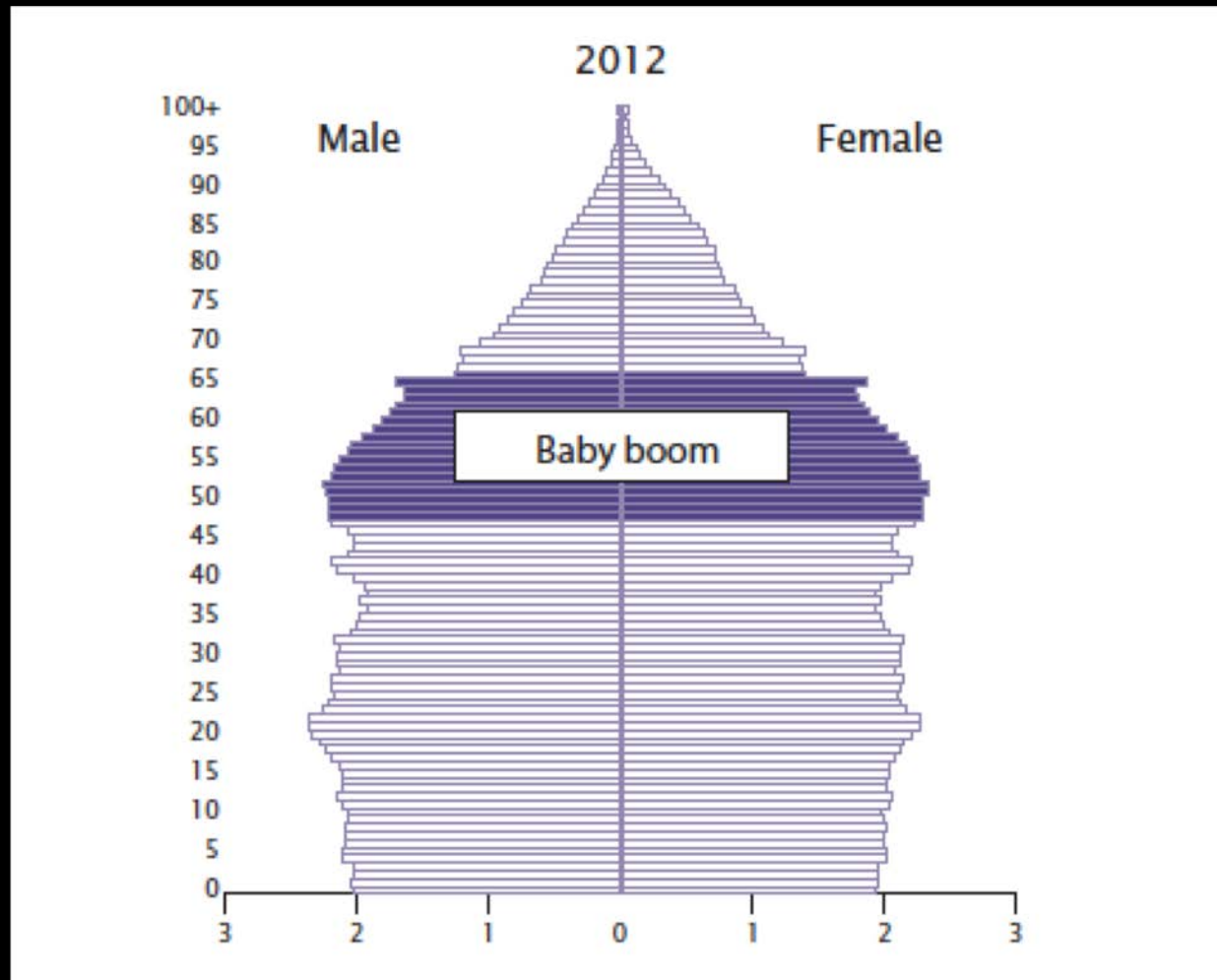
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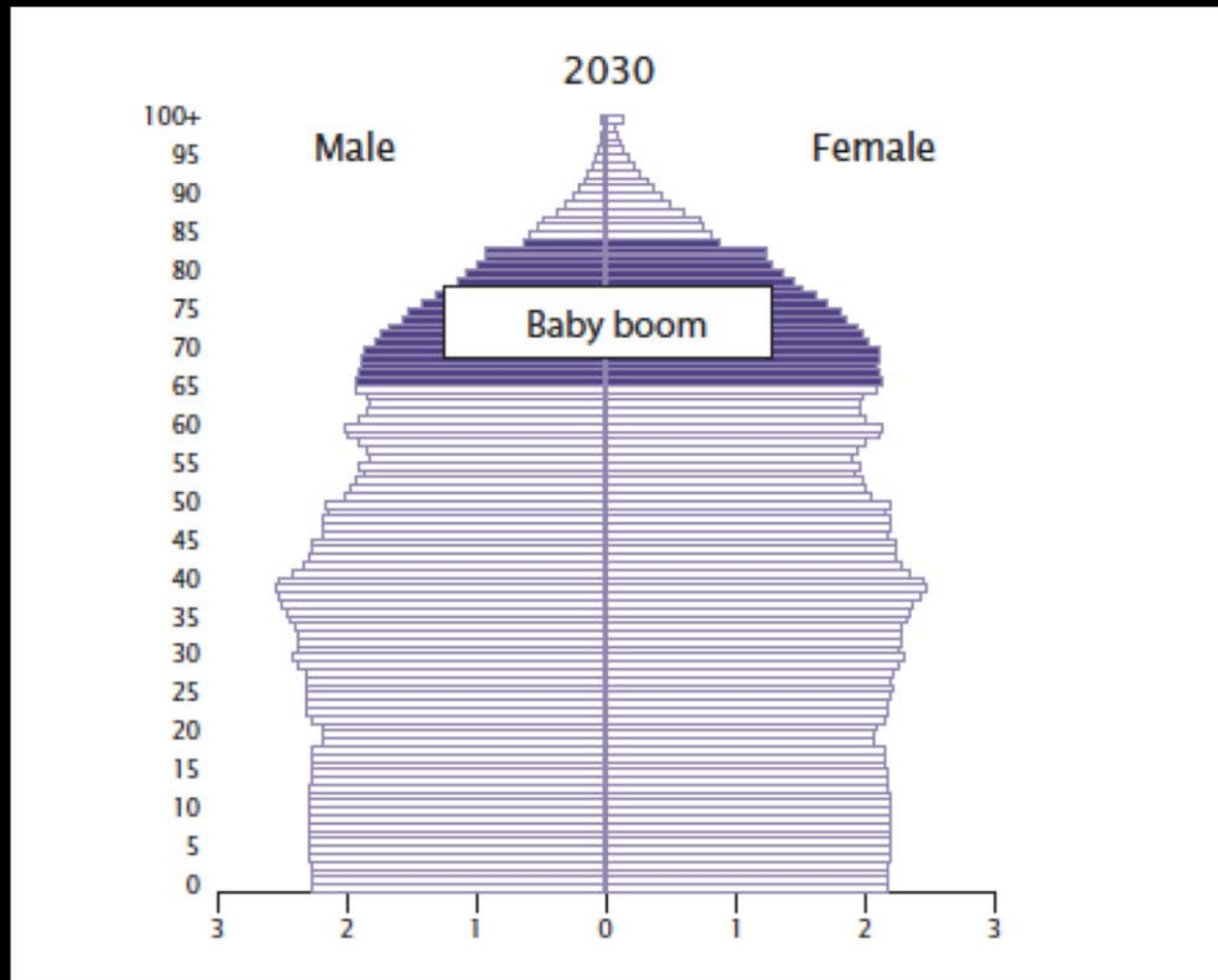
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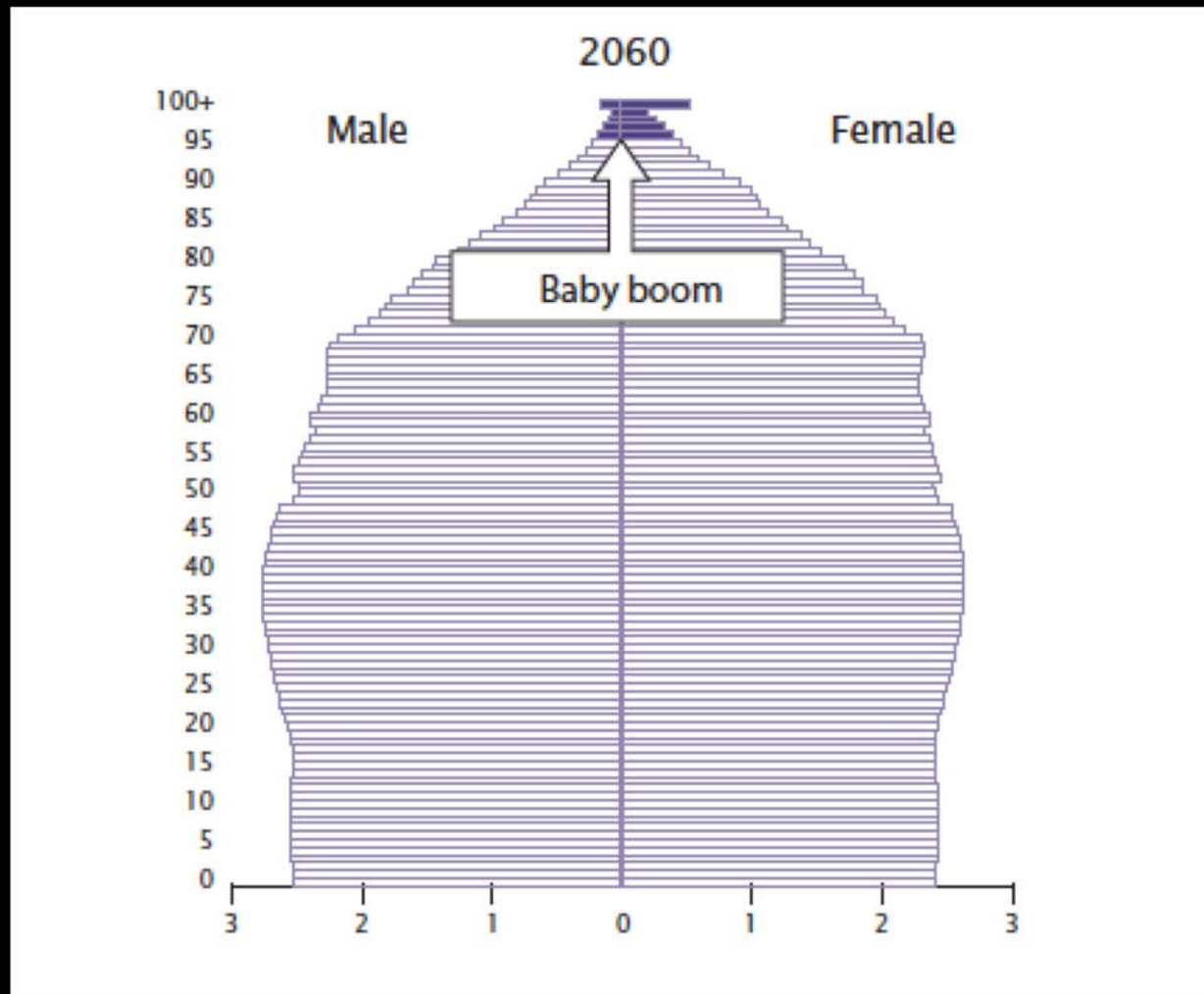
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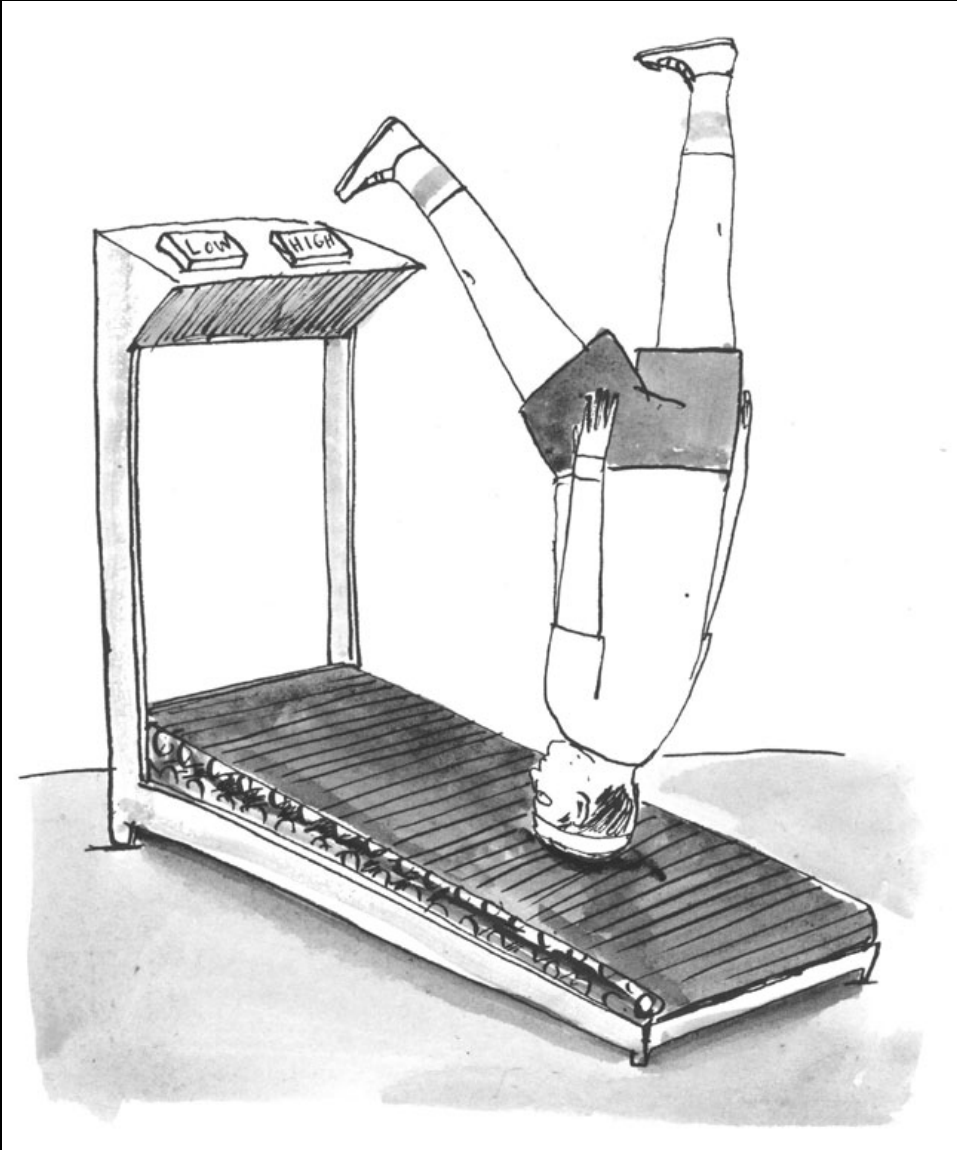
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Exercise attenuates age-related declines in brain tissue volume & cognitive function

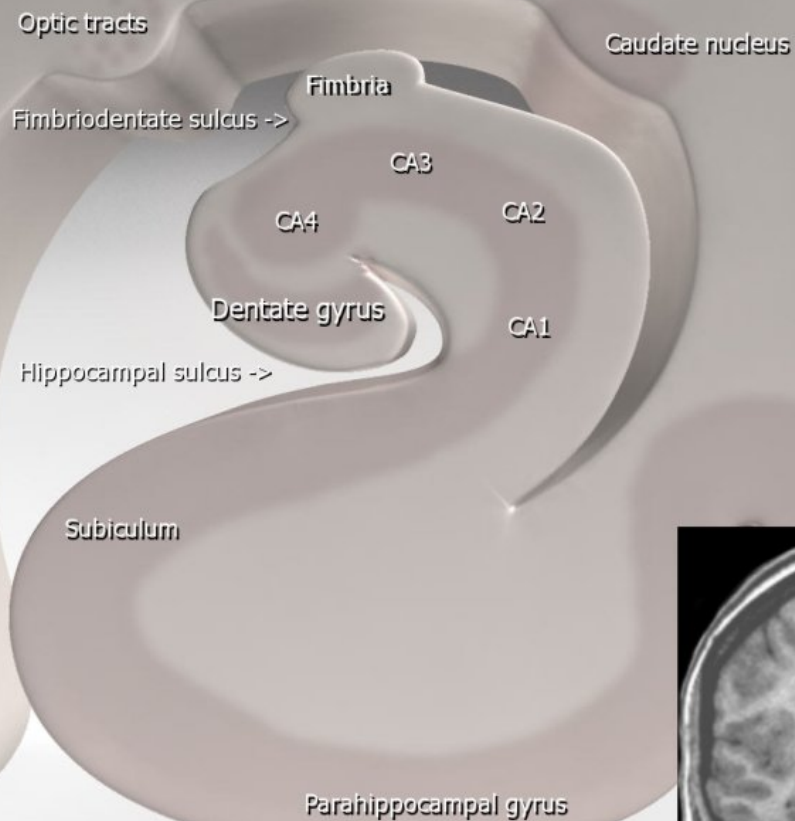


In healthy older adults:

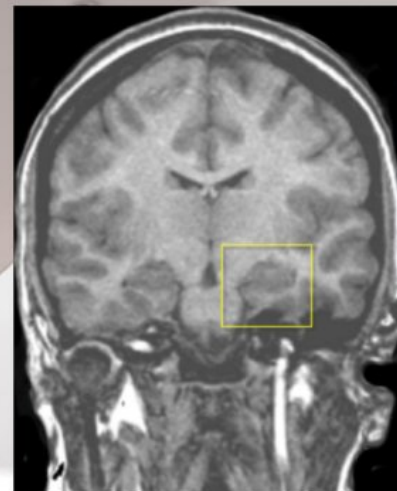
- Active vs Inactive
- Fit vs Unfit
- Exercise Training vs Control

- Better cognitive performance
- Preservation of cognitive function
- Enhanced brain activation during executive control tasks
- Greater preservation of brain tissue volume

Hippocampus

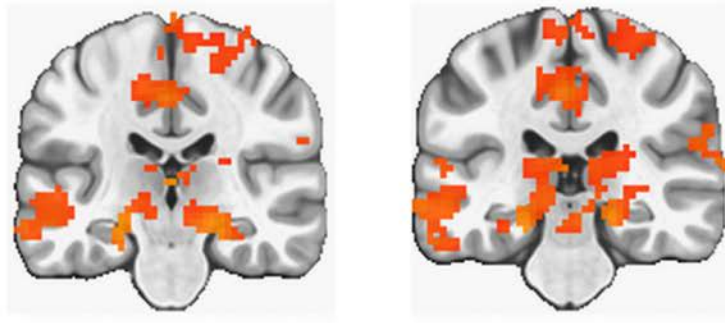


Hippocampus Syngnathidae

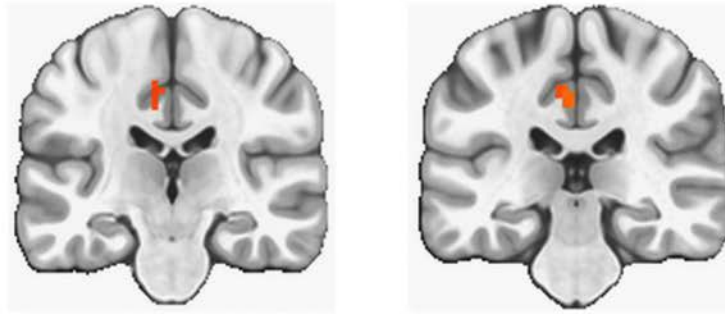


Acute exercise increases hippocampal activation during memory retrieval

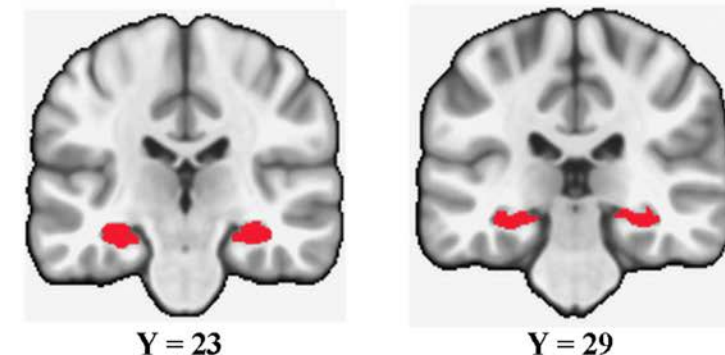
A) Exercise



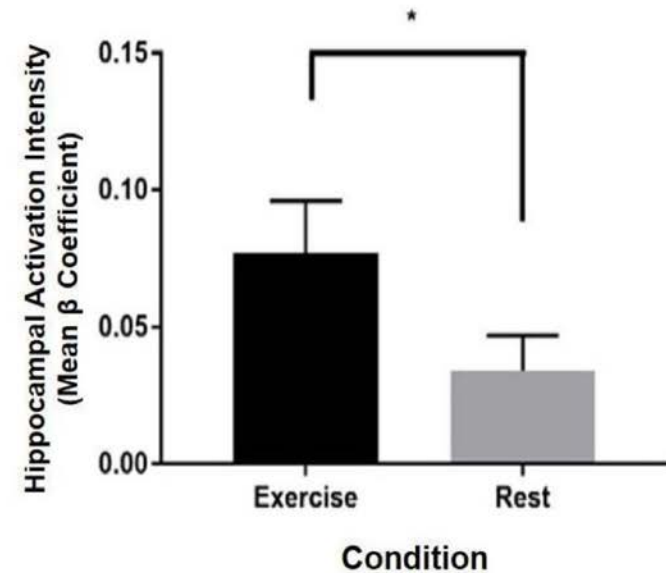
B) Rest



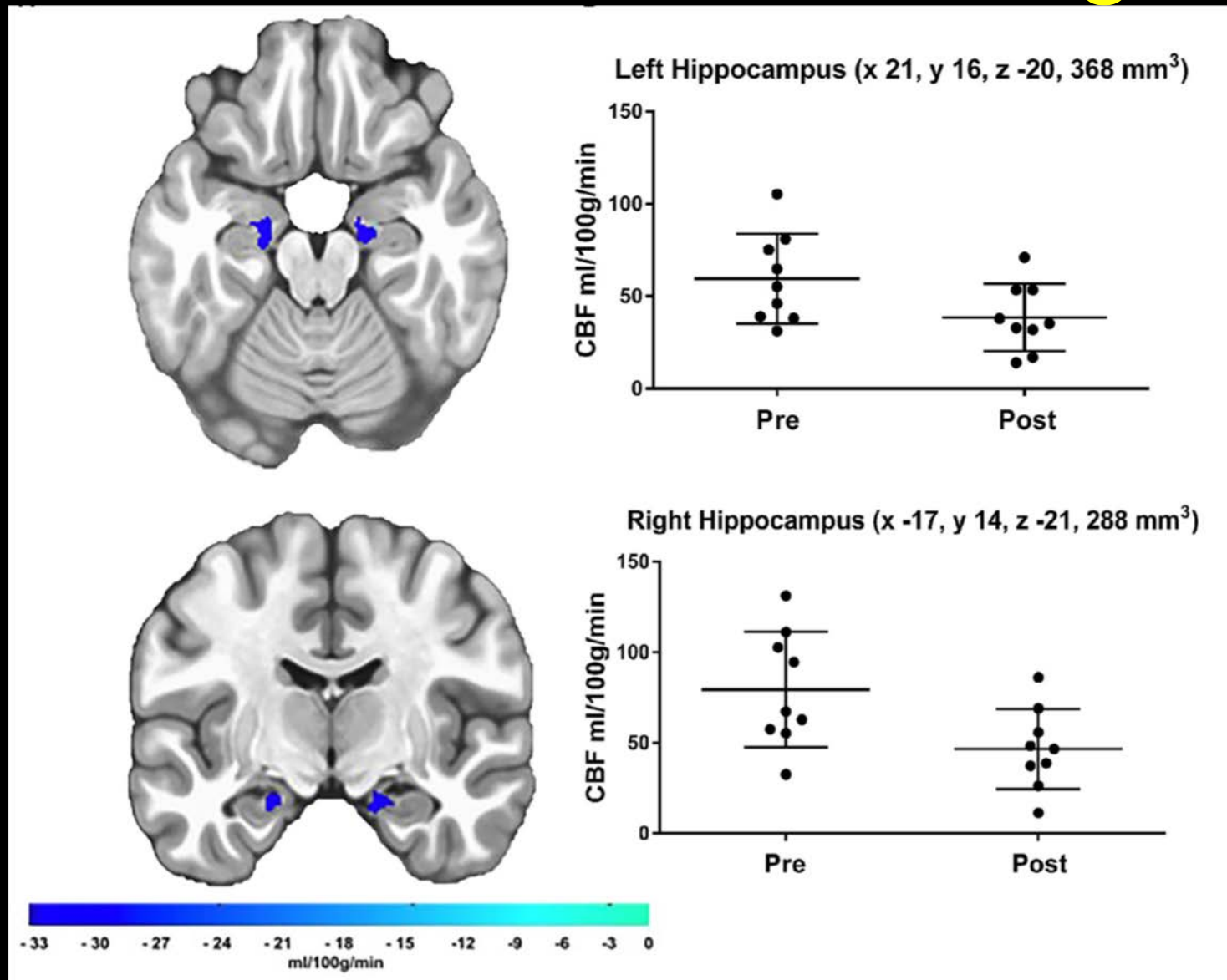
C) Hippocampal Mask



D) Mean Hippocampal Activation



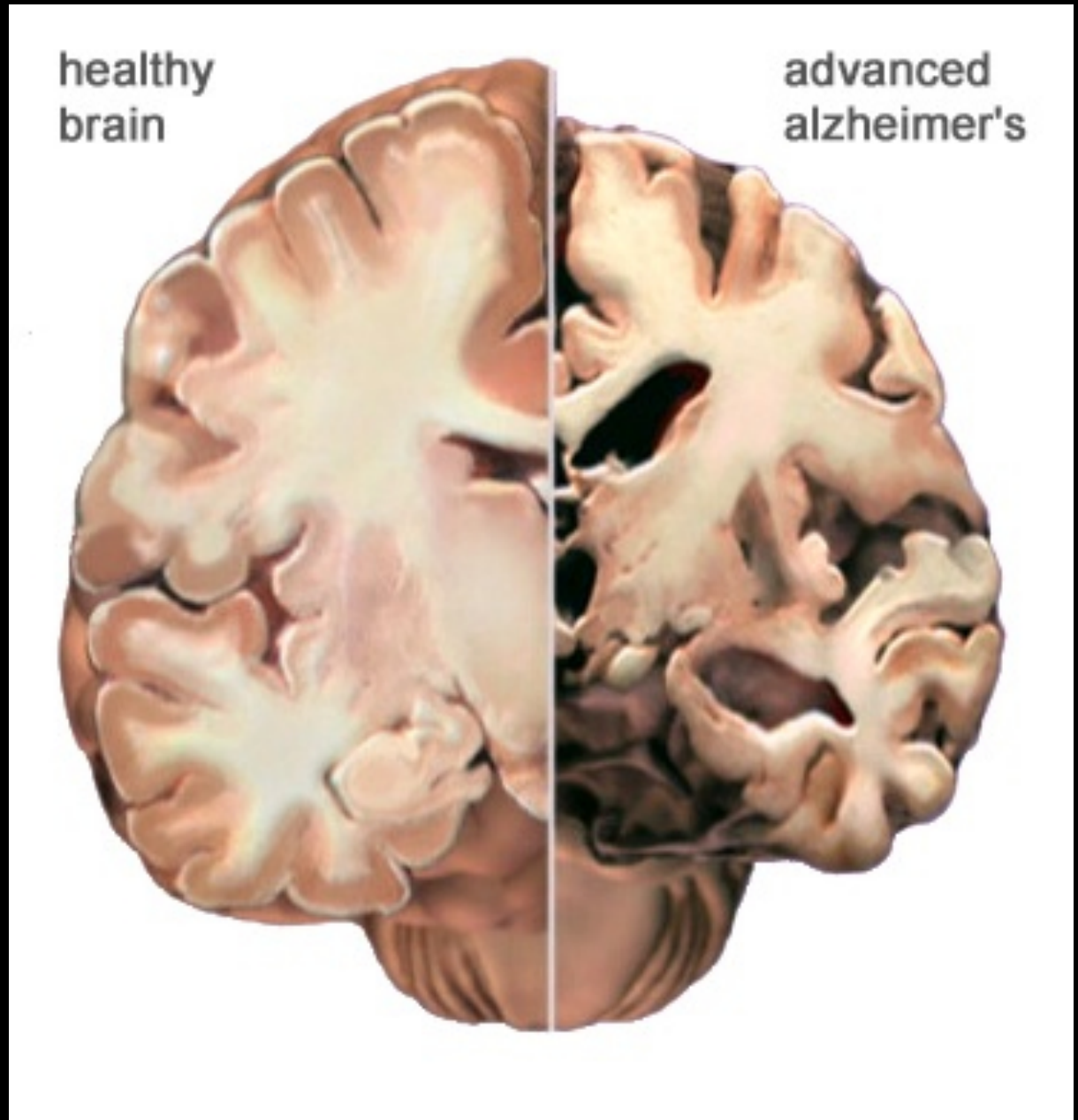
Master Athletes Cessation of Training



AD Associated Neurodegeneration

Massive atrophy

- Medial temporal
- Hippocampus
- Cortical thinning
- Ventricular expansion
- Loss of neural network connectivity



Small et al., 1997

Arnold, Hyman, Flory, Damasio, & Van Hoesen, 1991

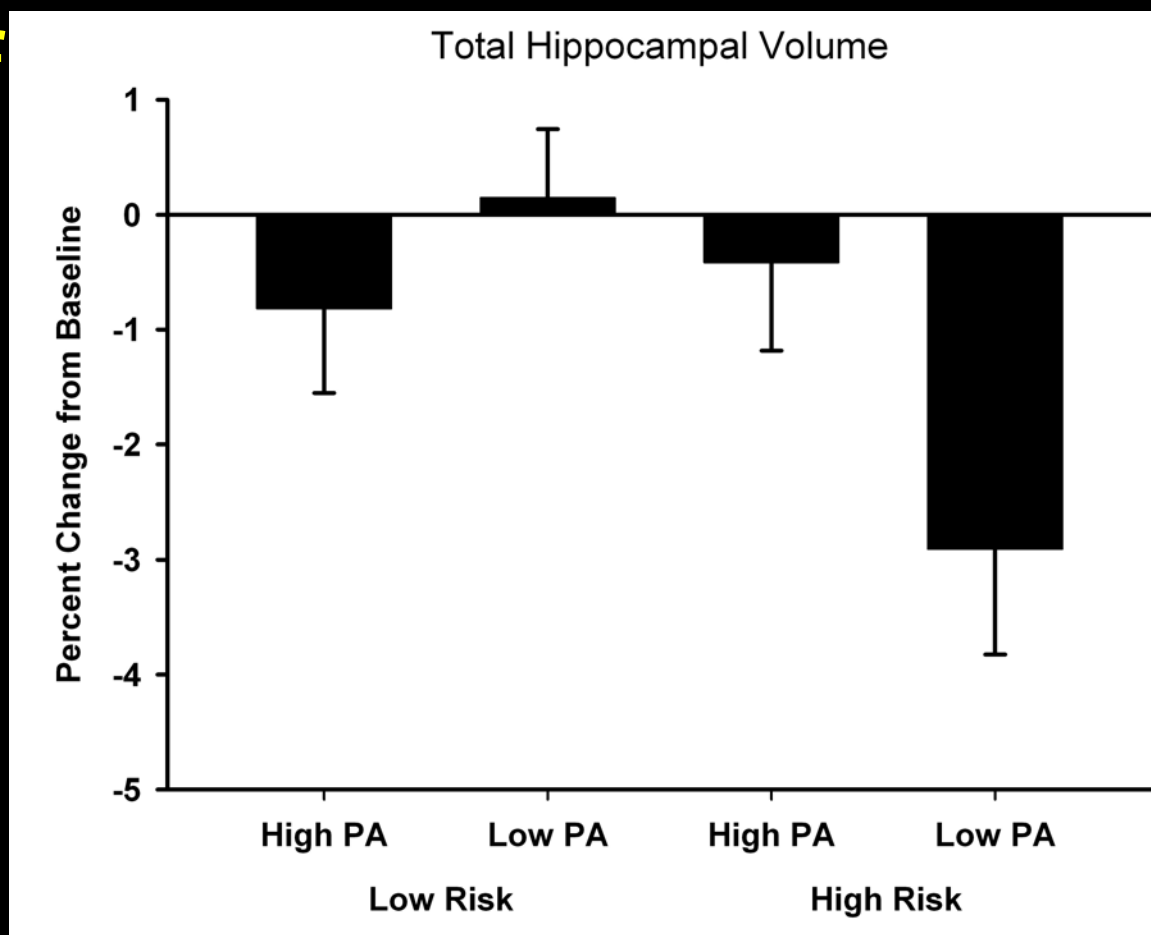
Source: Alzheimer's Association, www.Alz.org



Physical activity reduces hippocampal atrophy in elders at genetic risk for Alzheimer's disease

J. Carson Smith¹, Kristy A. Nielson^{2,3}, John L. Woodard⁴, Michael Seidenberg⁵, Sally Durgerian³, Kathleen E. Hazlett², Christina M. Figueroa², Cassandra C. Kandah⁵, Christina D. Kay⁵, Monica A. Matthews⁵ and Stephen M. Rao^{6}*

Greater levels of physical activity associated with hippocampal volume preservation in $\epsilon 4$ carriers



Semantic Memory Functional MRI and Cognitive Function after Exercise Intervention in Mild Cognitive Impairment

J. Carson Smith^{a,c,*}, Kristy A. Nielson^{b,c}, Piero Antuono^c, Jeri-Annette Lyons^d, Ryan J. Hanson^e,
Alissa M. Butts^b, Nathan C. Hantke^b and Matthew D. Verber^a

^aDepartment of Kinesiology, University of Maryland, College Park, MD, USA

^bDepartment of Psychology, Marquette University, Milwaukee, WI, USA

^cDepartment of Neurology, Medical College of Wisconsin, Milwaukee, WI, USA

^dDepartment of Biomedical Sciences, University of Wisconsin-Milwaukee, Milwaukee, WI, USA

^eDepartment of Psychology, University of Wisconsin-Milwaukee, Milwaukee, WI, USA

Improved Cardiorespiratory Fitness Is Associated with Increased Cortical Thickness in Mild Cognitive Impairment



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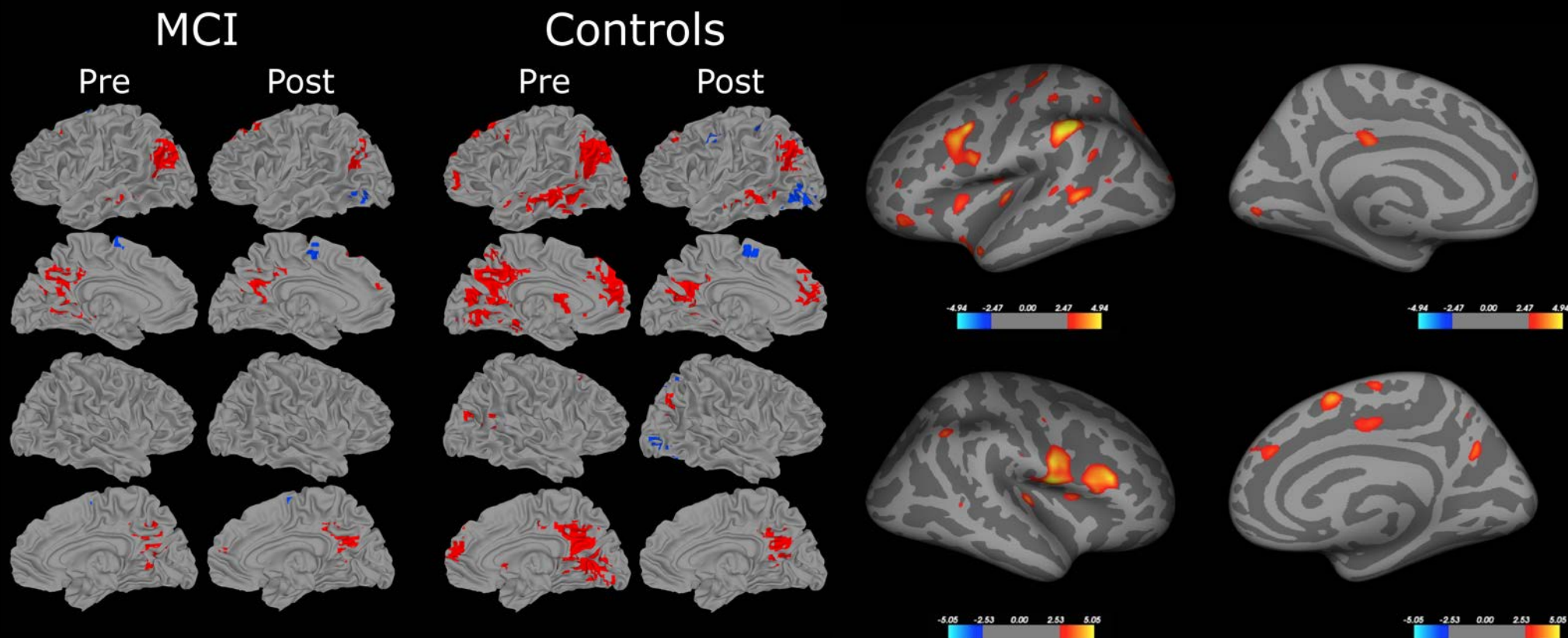
Katherine Reiter,¹ Kristy A. Nielson,^{1,2} Theresa J. Smith,³ Lauren R. Weiss,³ Alfonso J. Alfini,³ AND J. Carson Smith³

¹Marquette University, Milwaukee, Wisconsin

²Medical College of Wisconsin, Milwaukee, Wisconsin

³University of Maryland, College Park, Maryland

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Yet Unknown



- Does exercise training maintain neural network integrity and protect healthy APOE- ϵ 4 carriers from developing AD?

If so, how?

Current Funding:

National Institutes of Health, National Institute on Aging

- R01 AG057552 (J. Carson Smith, PI)
- R01 AG022304 (Stephen Rao, Cleveland Clinic, and Bruce Lamb, Indiana University, Co-PIs)

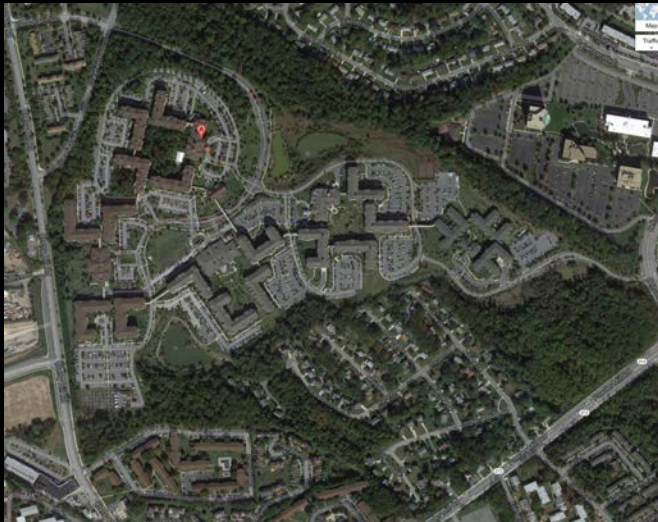
NIH-NIA R01

Exercise for Brain Health in the Fight Against Alzheimer's Disease

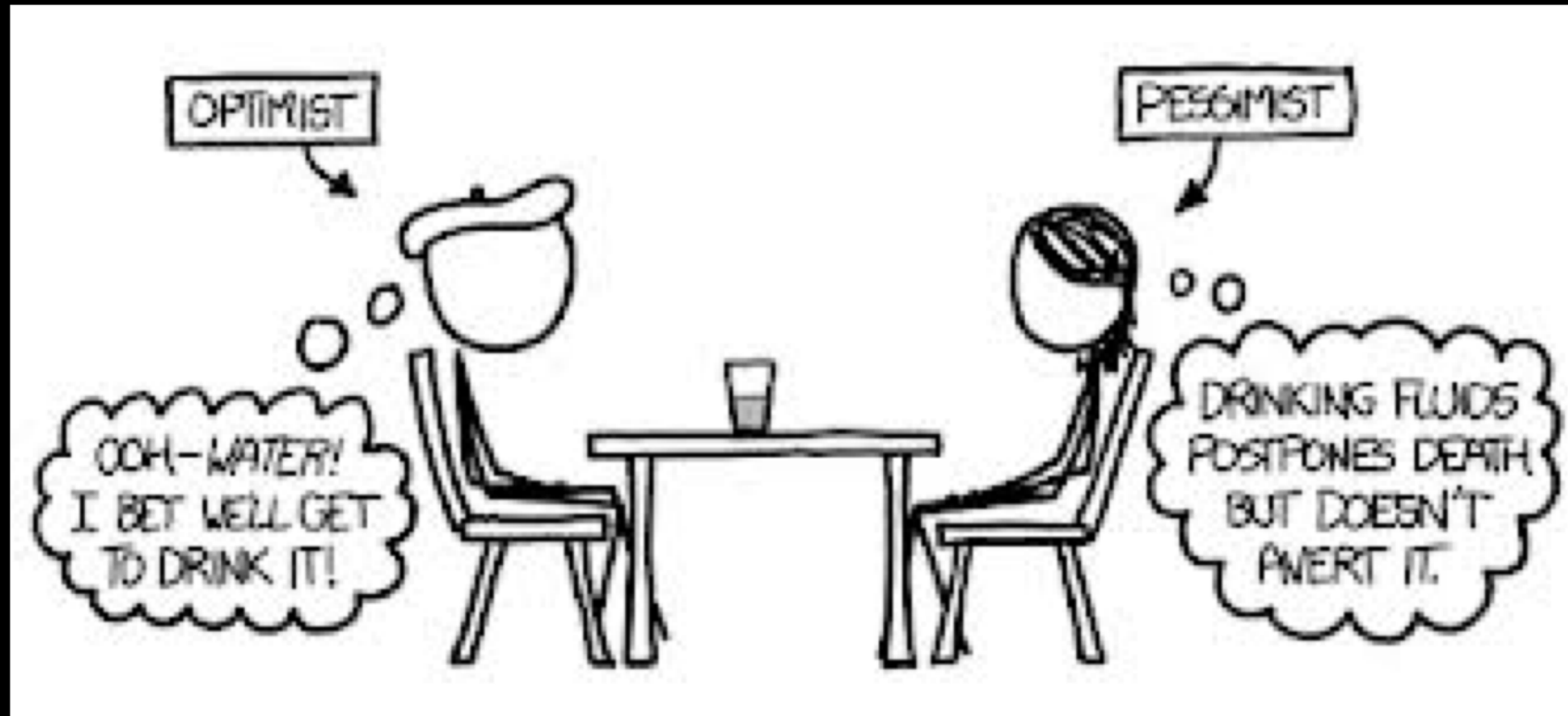


Riderwood Village, Silver Spring

University of Maryland
Dept. of Kinesiology | School of Public Health



There is hope for exercise in the Fight Against Alzheimer's Disease!



www.exerciseforbrainhealth.com

Collaborators



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Marquette University

Kristy A. Nielson, PhD

Medical College of Wisconsin

Piero Antuono, MD

Sally Durgerian

Wayne State University

John L. Woodard, PhD

Rosalind Franklin University

Michael Seidenberg, PhD

Cleveland Clinic

Stephen M. Rao, PhD

James Leverenz, MD

Lynn Bekris, PhD

University of Maryland

Wang Zhan, PhD

James Hagberg, PhD

Stephen Roth, PhD

Graduate Students:

Alfonso Alfini

Theresa Smith

Lauren Weiss

Junyeon Won

Daniel Callow

Johns Hopkins University

Marilyn Albert, PhD

Indiana University

Bruce Lamb, PhD

Current Funding:

National Institutes of Health

National Institute on Aging

- R01 AG057552
- R01 AG022304

Thank you



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