



# Longevity and cognition

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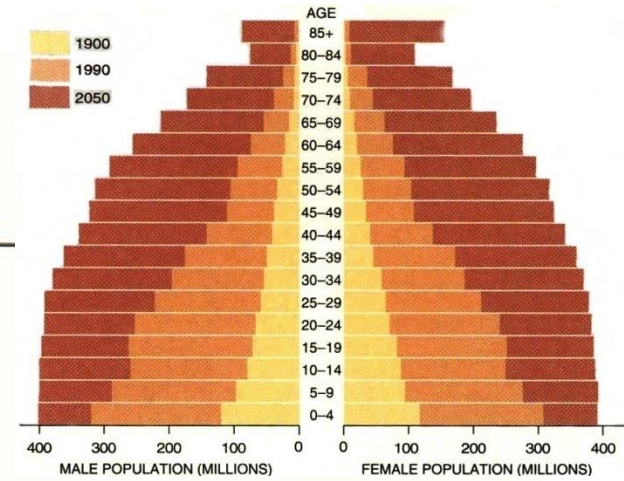
Director

Geriatric Services

*Rambam Health Care Campus*

Faculty of Health Sciences

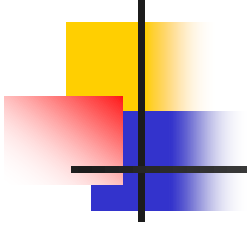
*Technion*



# The Aging of the Human Species

*Our species has modified the evolutionary forces that have always limited life expectancy. Policymakers must consequently prepare to meet the needs of a population that will soon be much older*

by S. Jay Olshansky, Bruce A. Carnes and Christine K. Cassel



Verified oldest people

# Emma Morano



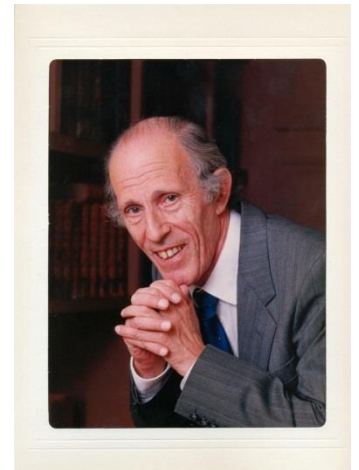


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# The Giants of Geriatrics: A Study of Symptoms in Old Age

By  
**Bernard Isaacs**

Birmingham 1976





# Giants of Geriatrics

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- **I**mmobility
- **I**nstability
- **I**ncontinence
- **I**ntellectual **I**mpairment



# Why “Giants”

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- Gigantic number of old people afflicted
- Gigantic effect on independence

# Giants – multifactorial



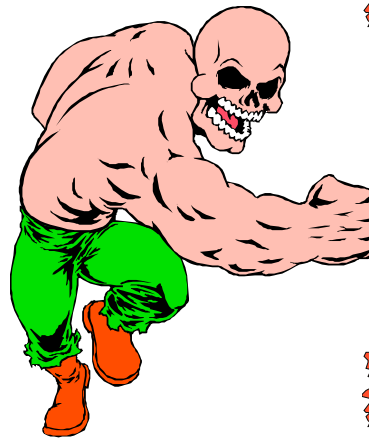
Disease



Polypharmacy



Nutrition



Giant



Social





# Giants – the concept

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Disease(s)

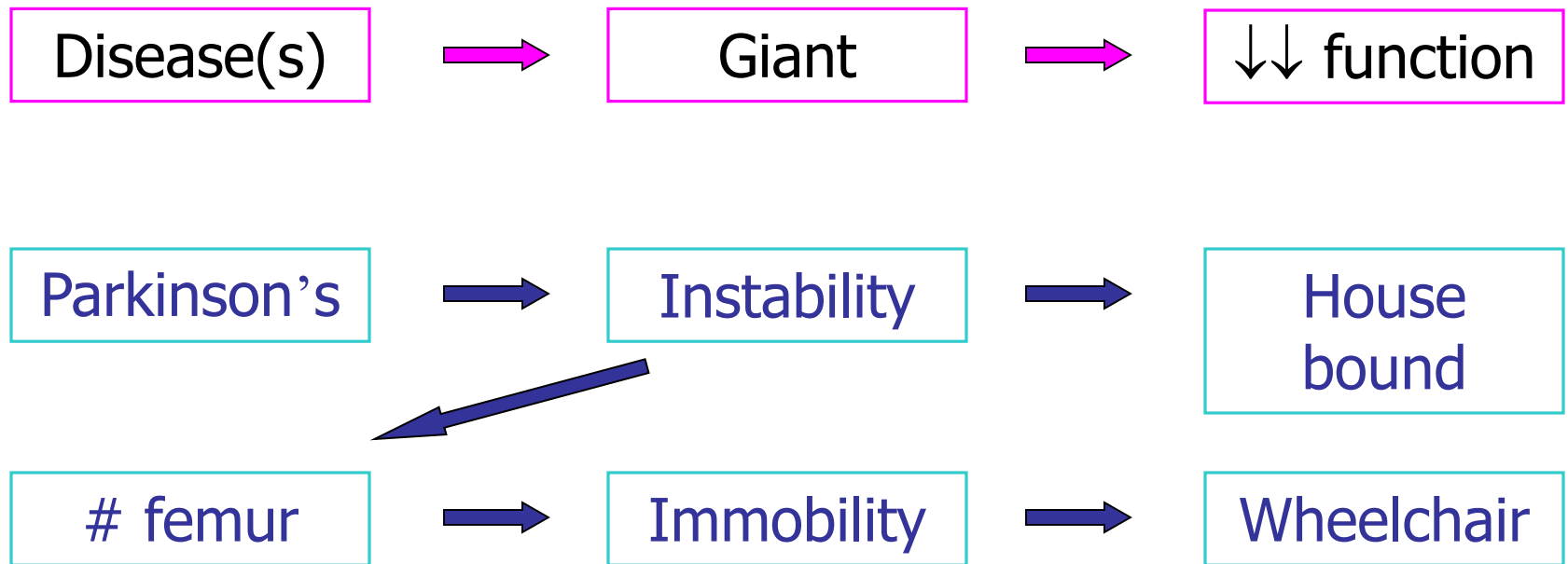


Giant

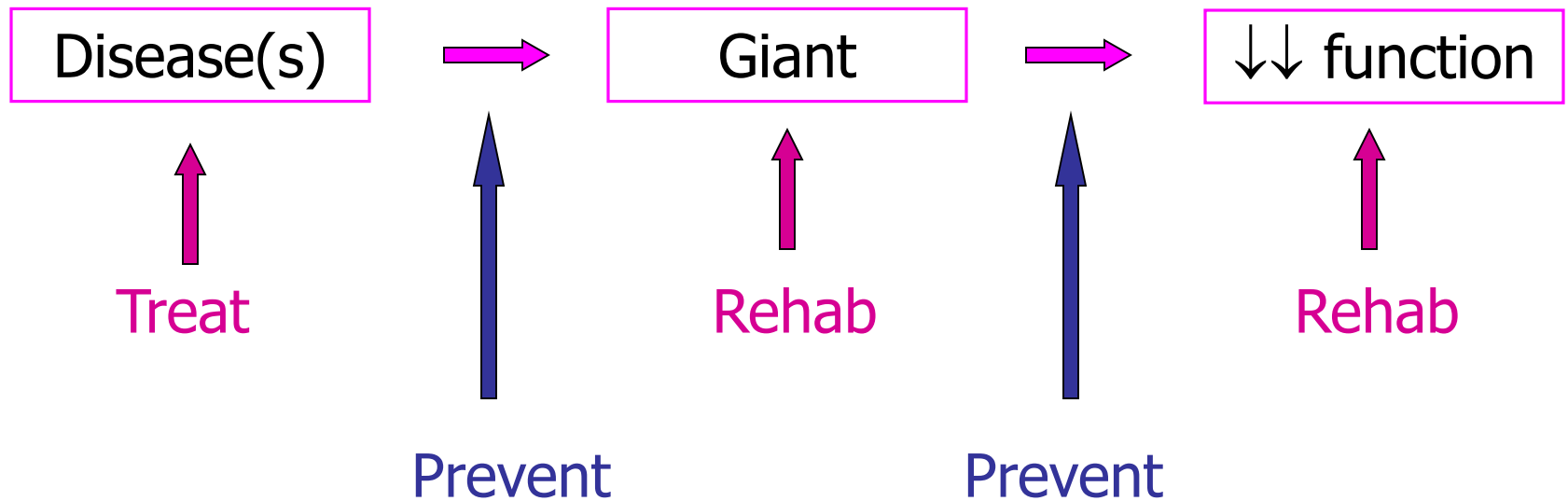


↓↓ function

# Giants – example



# Giants – management



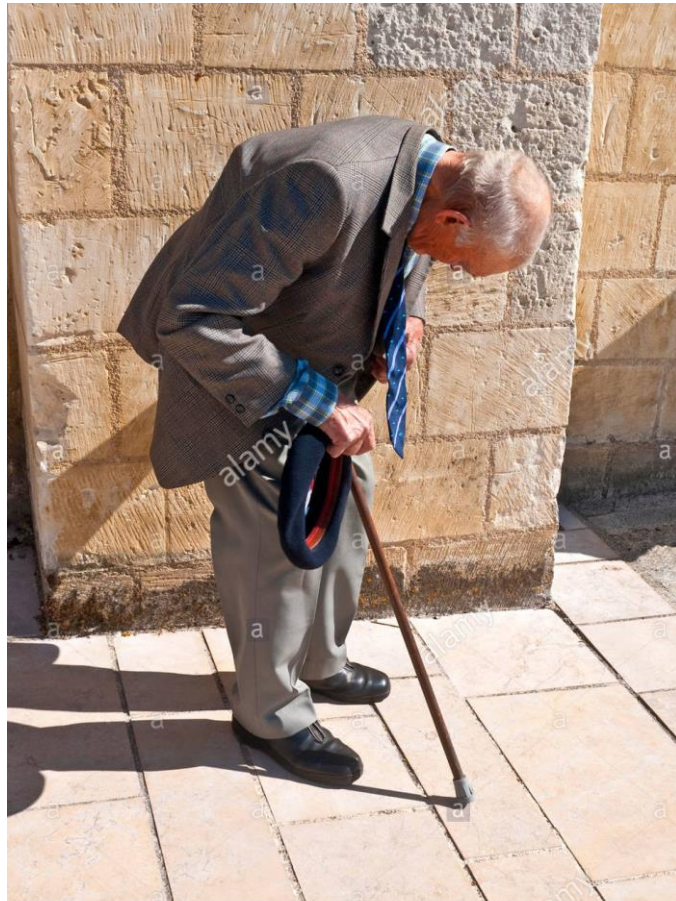


# The dark side of aging

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- Disease
- Frailty

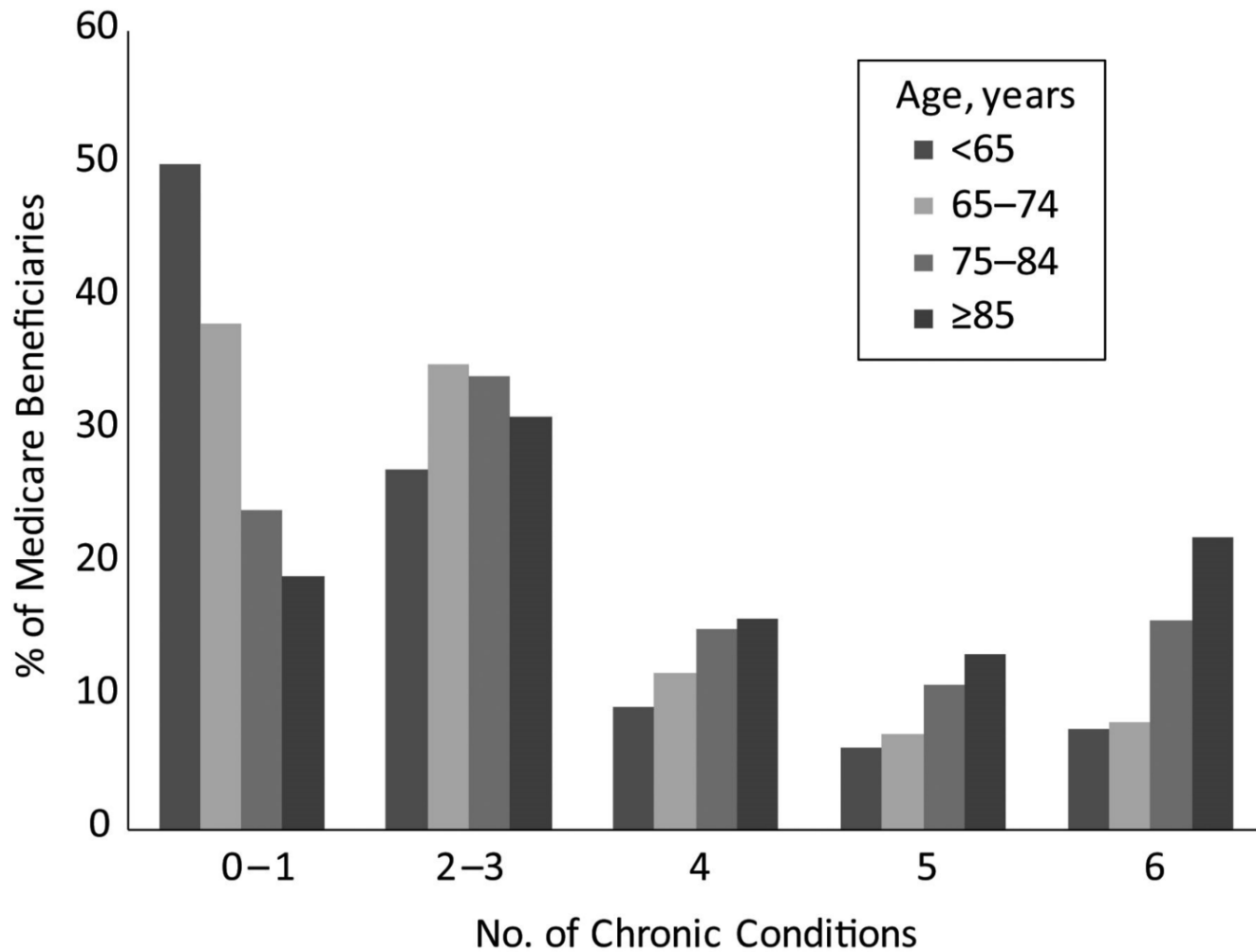
# Disease



alamy stock photo

BRBTDA  
www.alamy.com





From: Multimorbidity in Older Adults

Epidemiol Rev. 2013;35(1):75-83. doi:10.1093/epirev/mxs009

Epidemiol Rev | Published by Oxford University Press on behalf of the Johns Hopkins Bloomberg School of Public Health 2013.



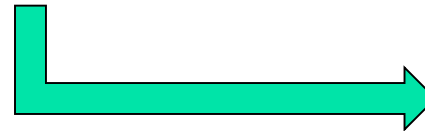
# Frailty

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- **I**mmobility
- **I**nstability
- **I**ncontinence
- **I**ntellectual **I**mpairment

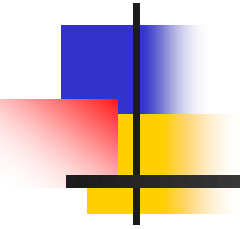


Physical frailty



Cognitive frailty

What is physical frailty?





You know it  
when you see it

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# Frailty - definition

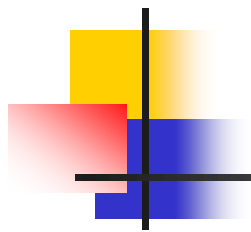
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A **multidimensional** syndrome  
characterized by  
**decreased reserve**  
and  
**diminished resistance**  
to stressors

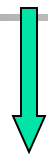
Rodriguez-Manas L. et al.

The frailty operative definition consensus conference project.

J Gerontol A Biol Sci Med Sci 2012;68:62-67



Medical



Cognitive



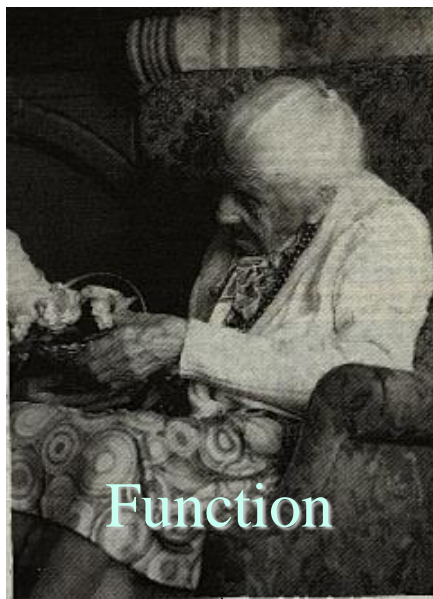
Nutritional



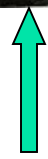
Affect



Functional

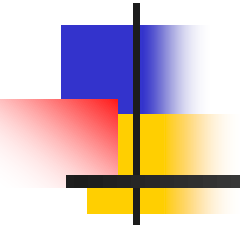


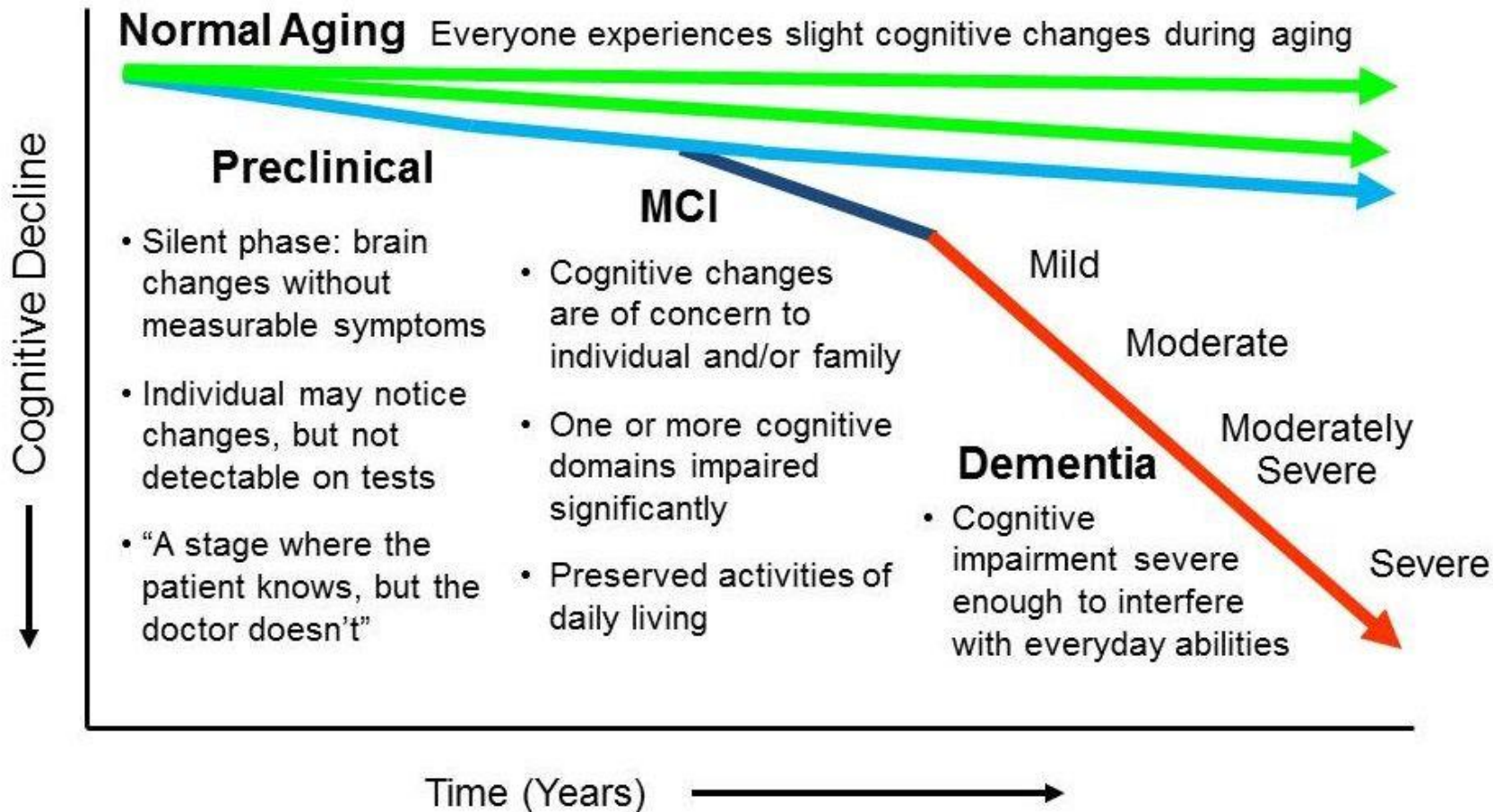
Function

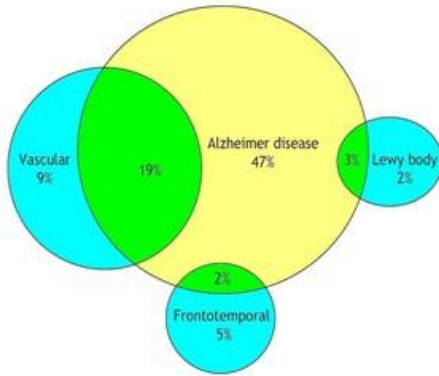


Social

# What is cognitive frailty?

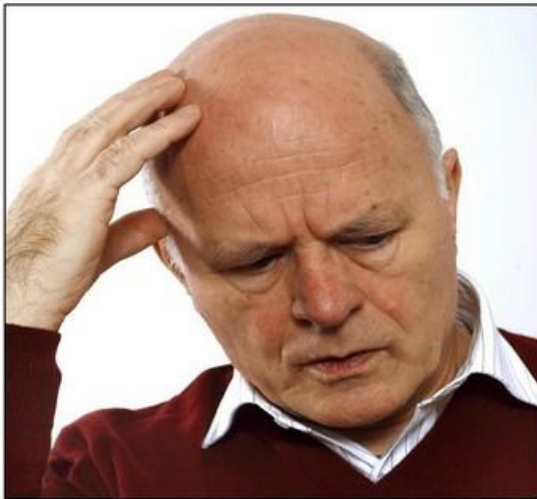
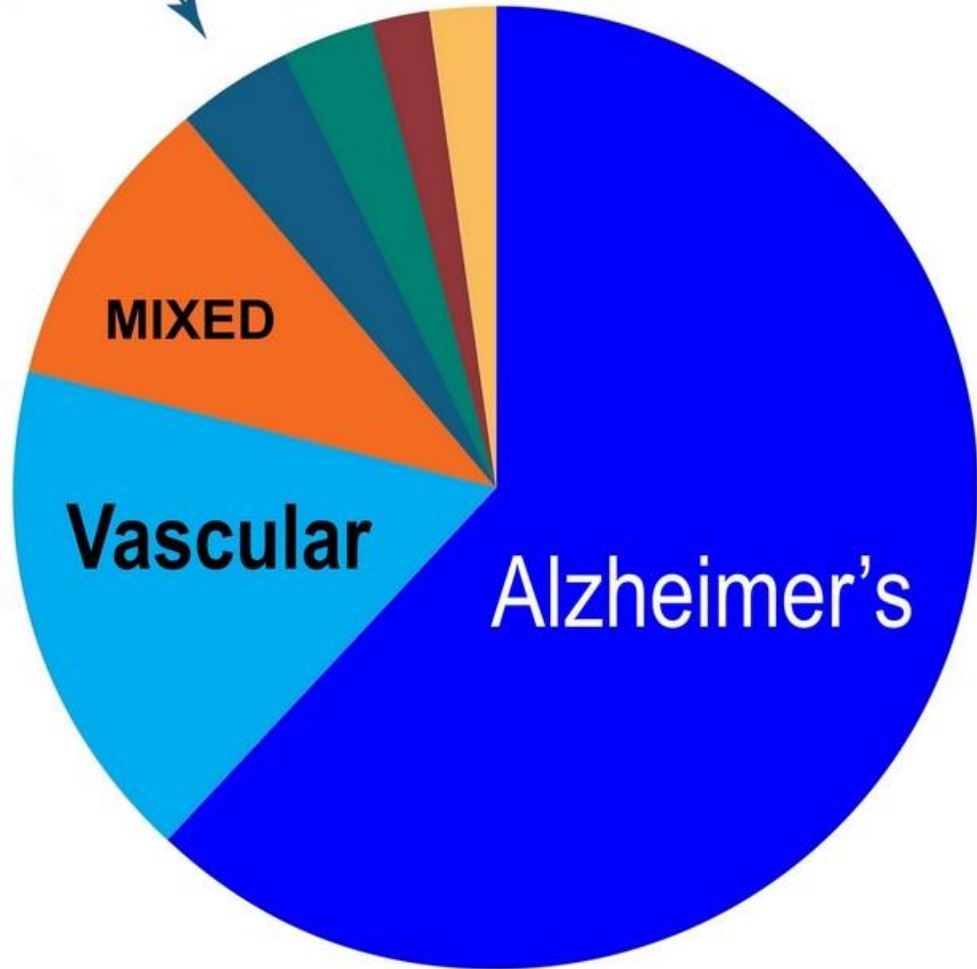






Dementia with Lewy bodies  
 Other  
 Parkinson's dementia  
 Frontotemporal dementia

# CAUSES OF DEMENTIA



JULY 24, 2000

**PUTIN STRIKES BACK**

**Birthday  
Tribute To The  
Queen Mum**



**Brain of  
Alzheimer's  
sufferer**

**Normal  
Brain**

# THE NEW SCIENCE OF **ALZHEIMER'S**

- The drugs ■ The genetics
- The latest theories ■ What you can do now





# ALZHEIMER'S DISEASE

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Alois Alzheimer

Neurologisches Centralblatt

1906:23;1129-1135

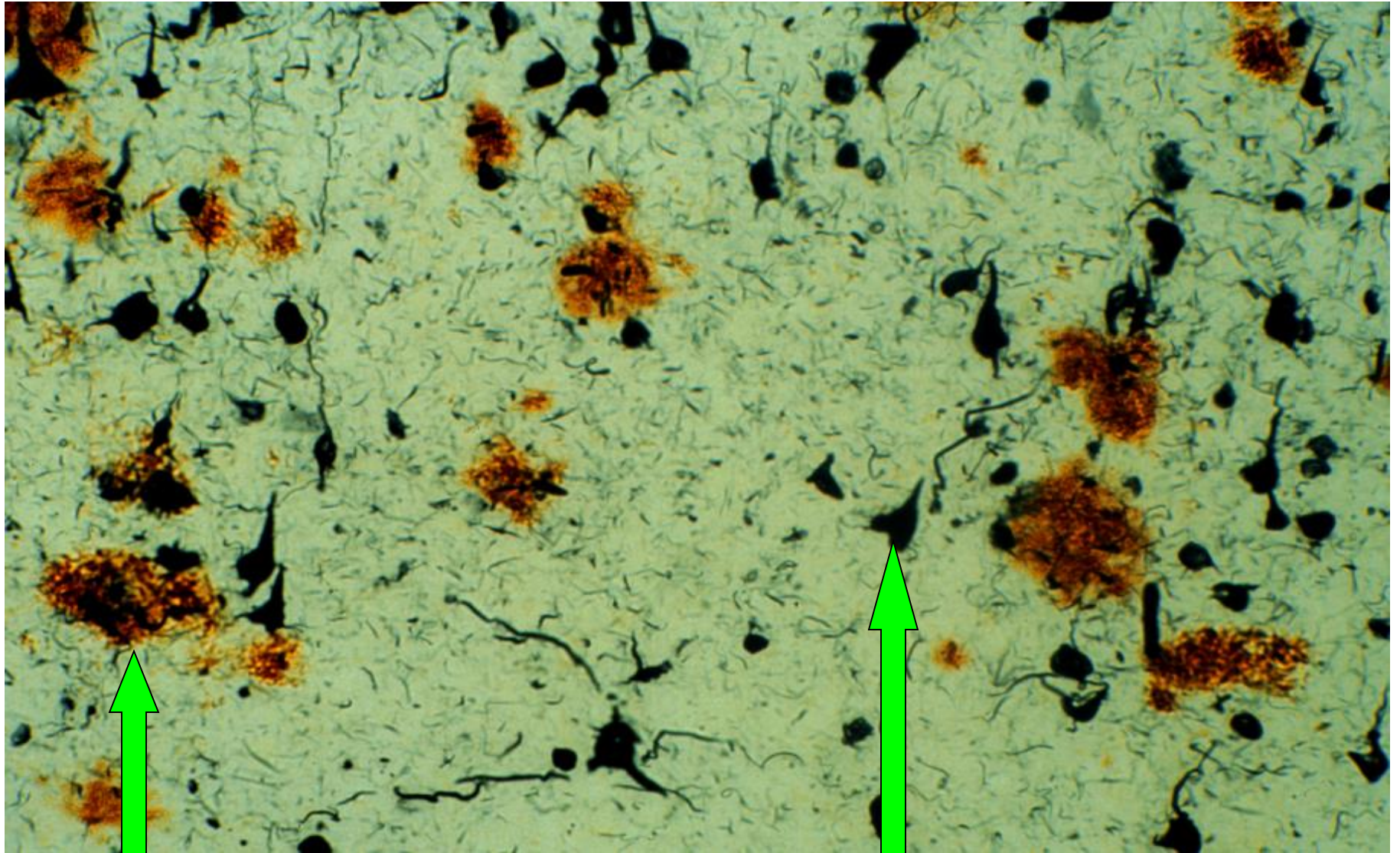




**FIG. 4.** In the laboratory of the neurology clinic, Munich: 1, F. Lotmar; 2, Frau Grombach; 3, St. Rosenthal; 4, Ugo Cerletti; 5, Allers(?); 6, F. Bonfiglio; 7, A. Alzheimer; 8, N. Achucarro; 9, G. Perusini; 10, F. H. Lewy.

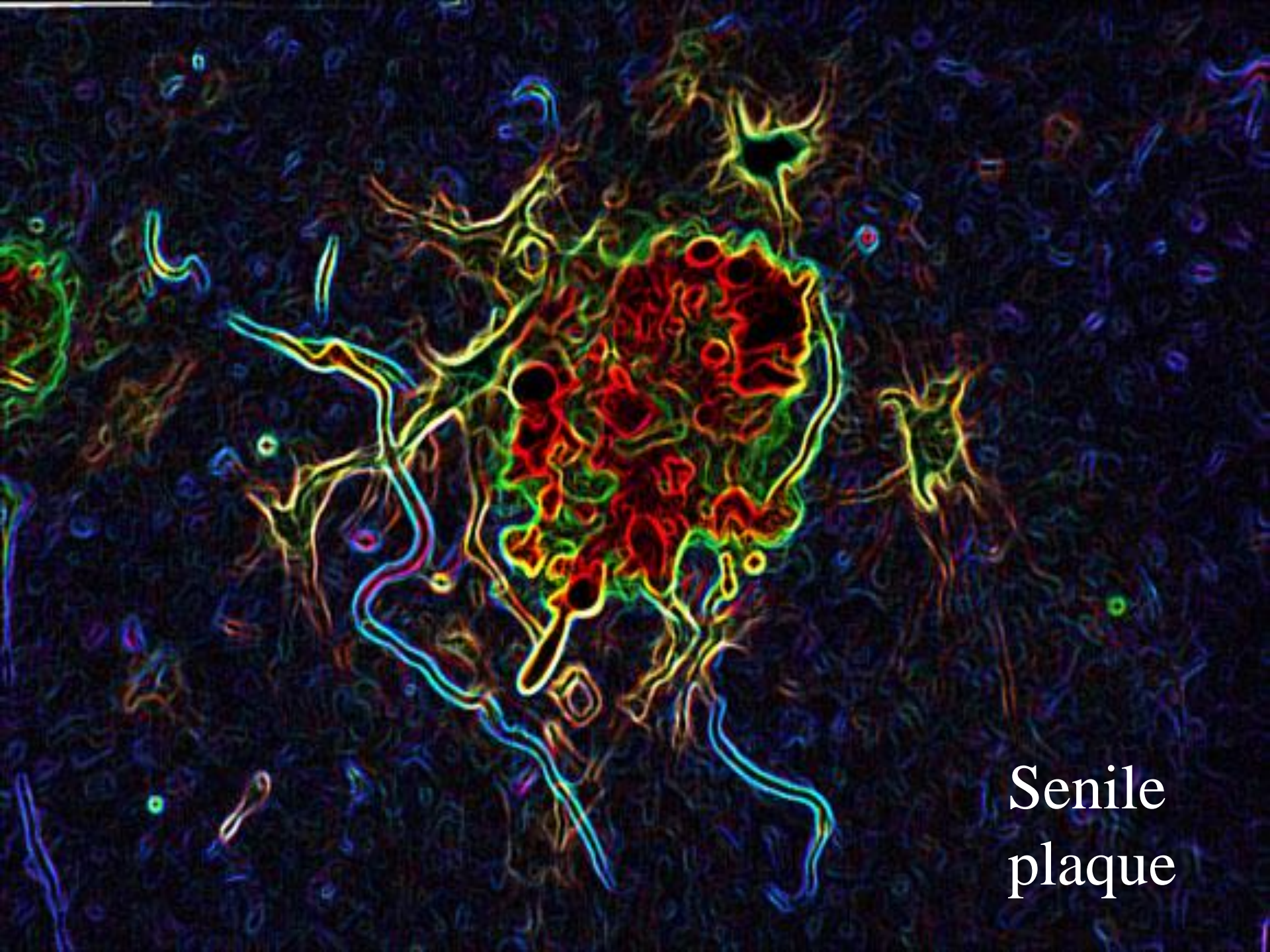


AUGUSTE D



**Senile plaque**

**Neurofibrillary tangle**



Senile  
plaque

# PATHOGENESIS OF AD

Genes

Dennis J. Selkoe Nature 1999

Beta amyloid → plaque formation

Inflammatory response

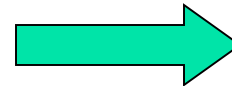
Microglial activation

Astrocytosis

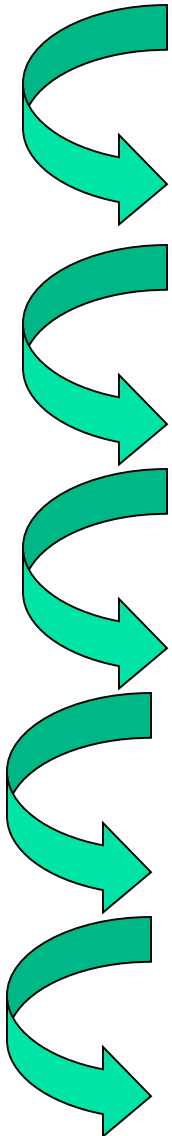
Neuritic injury

Insoluble TAU – formation PHF

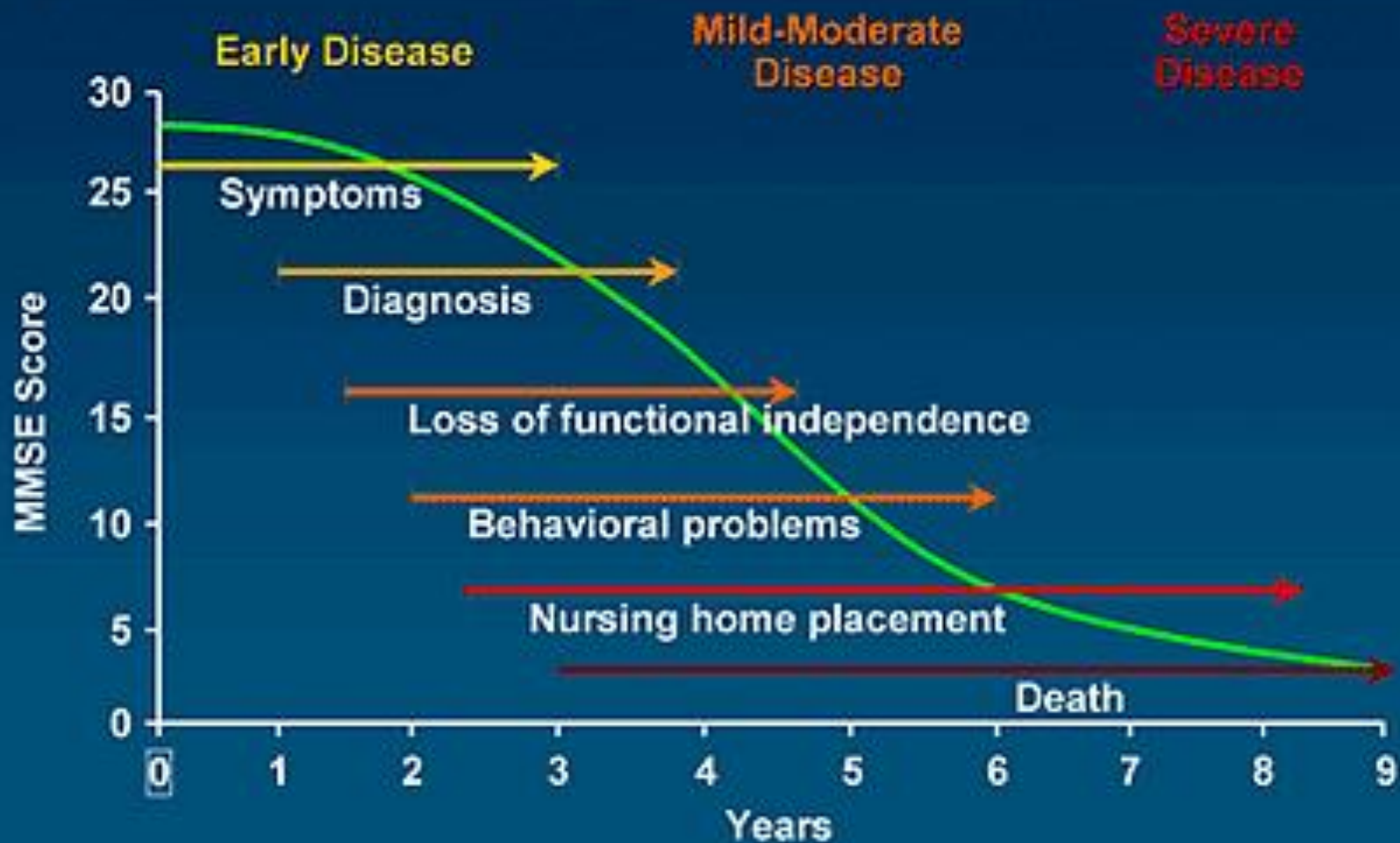
Neuronal death



DEMENTIA



# Alzheimer's Disease: Natural History



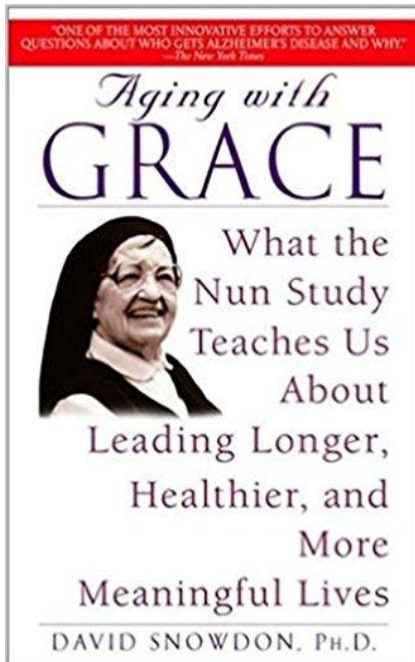


# THE NUN STUDY

**David A. Snowdon**  
Professor  
of Neurology  
at the University  
of Kentucky



Review of auto-  
biographical  
essays written  
by young nuns.



## The Nun Study

- Longitudinal study of the Teaching Sisters of Notre Dame (USA)
- 678 enrolled since 1991 aged 75-102
- Written autobiographies within 2 years of entry
- Annual cognitive testing
- Brain autopsies
- 400 deceased by 2003

Snowdon DA Ann Intern Med 2003;139: 450



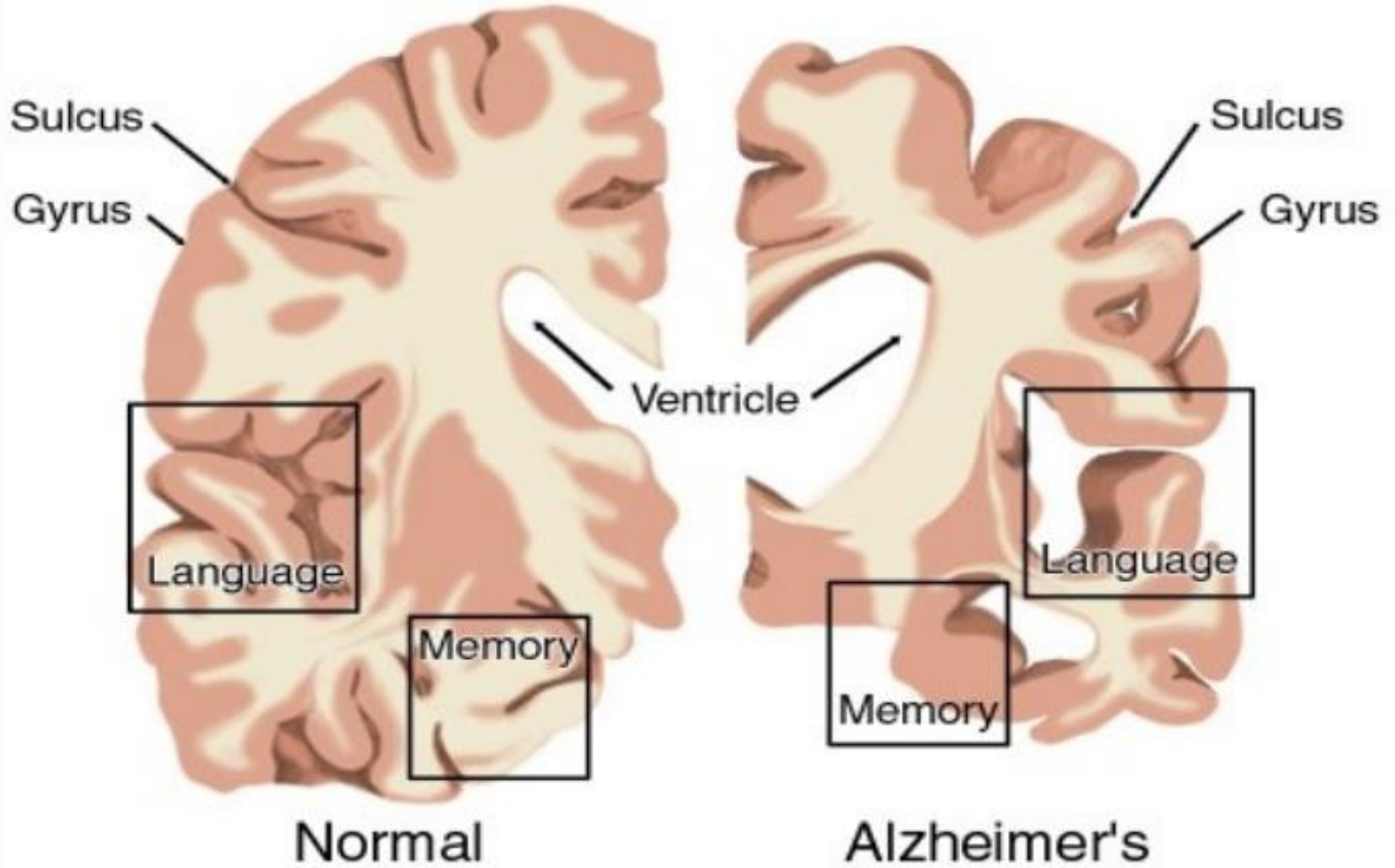
# Alzheimer's Neurofibrillary Pathology and the Spectrum of Cognitive Function: Findings from the Nun Study

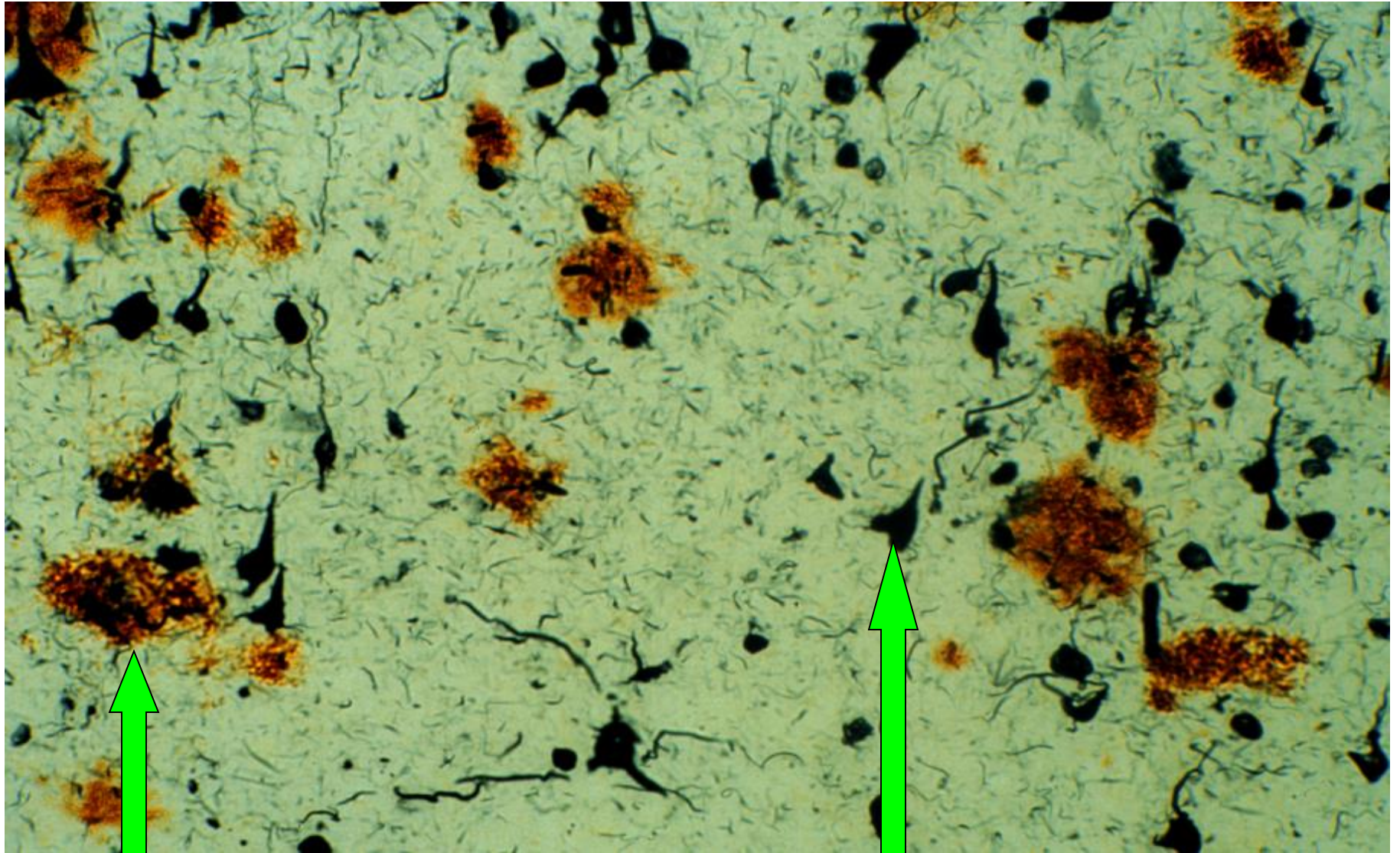
Kathryn P. Riley, PhD,<sup>1,2</sup> David A. Snowdon, PhD,<sup>1,2</sup> and William R. Markesbery, MD<sup>1,3</sup>

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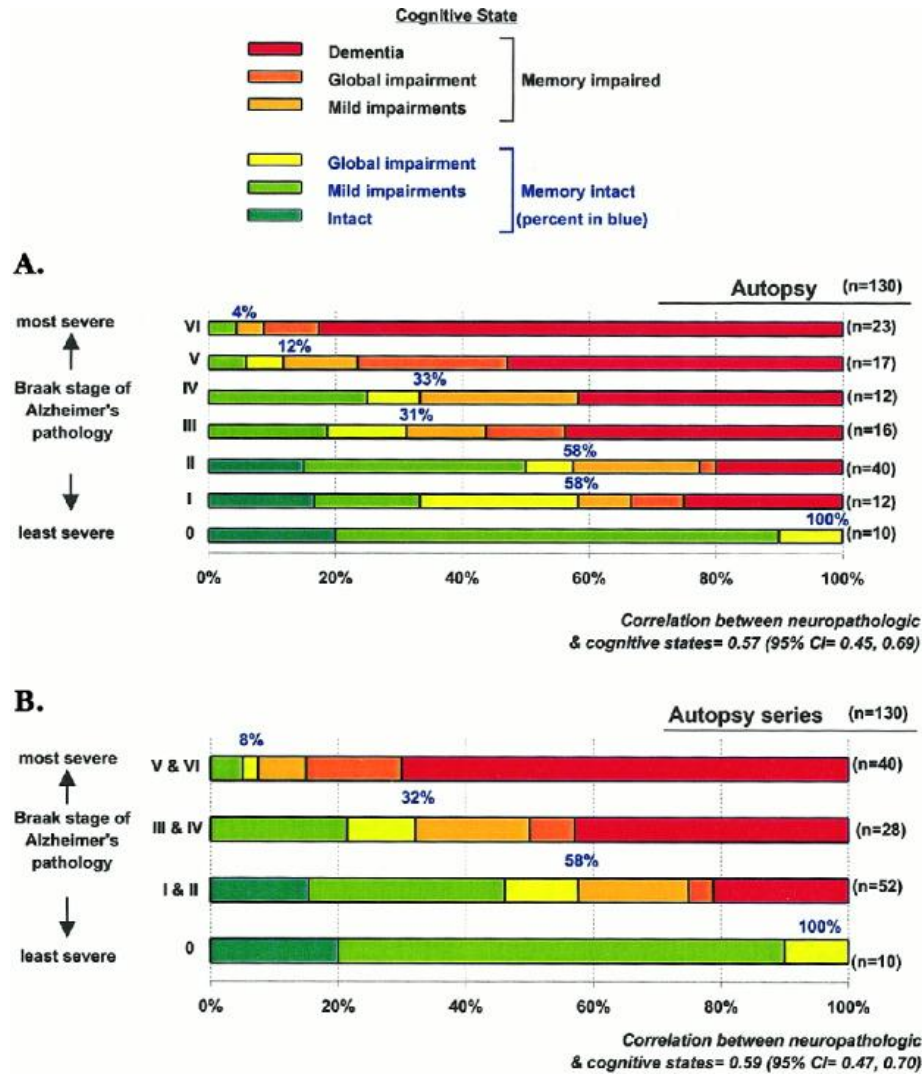
**The development of interventions designed to delay the onset of dementia highlights the need to determine the neuropathologic characteristics of individuals whose cognitive function ranges from intact to demented, including those with mild cognitive impairments. We used the Braak method of staging Alzheimer's disease pathology in 130 women ages 76–102 years who were participants in the Nun Study, a longitudinal study of aging and Alzheimer's disease. All participants had complete autopsy data and were free from neuropathologic conditions other than Alzheimer's disease lesions that could affect cognitive function. Findings showed a strong relationship between Braak stage and cognitive state. The presence of memory impairment was associated with more severe Alzheimer's disease pathology and higher incidence of conversion to dementia in the groups classified as having mild or global cognitive impairments. In addition to Braak stage, atrophy of the neocortex was significantly related to the presence of dementia. Our data indicate that Alzheimer's neurofibrillary pathology is one of the neuropathologic substrates of mild cognitive impairments. Additional studies are needed to help explain the variability in neuropathologic findings seen in individuals whose cognitive performance falls between intact function and dementia.**

# Brain Cross-Sections





# Alzheimer's neurofibrillary pathology and the spectrum of cognitive function: Findings from the Nun Study



# Learning

## Challenge Our Brain – Nun Example

**David Snowdon –  
School Sisters of Notre Dame, Mankota Hill, Minn.**

**Scientist had shown that the physical destruction wrought by Alzheimer's didn't inevitably lead to mental deterioration.**

**Theory: some folks might have an extra reserve of mental capacity that kept them functioning despite loss of brain tissue.**

**Sisters with less education had smaller brains at death.**



# Improving cognitive reserve

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# Prevent damage



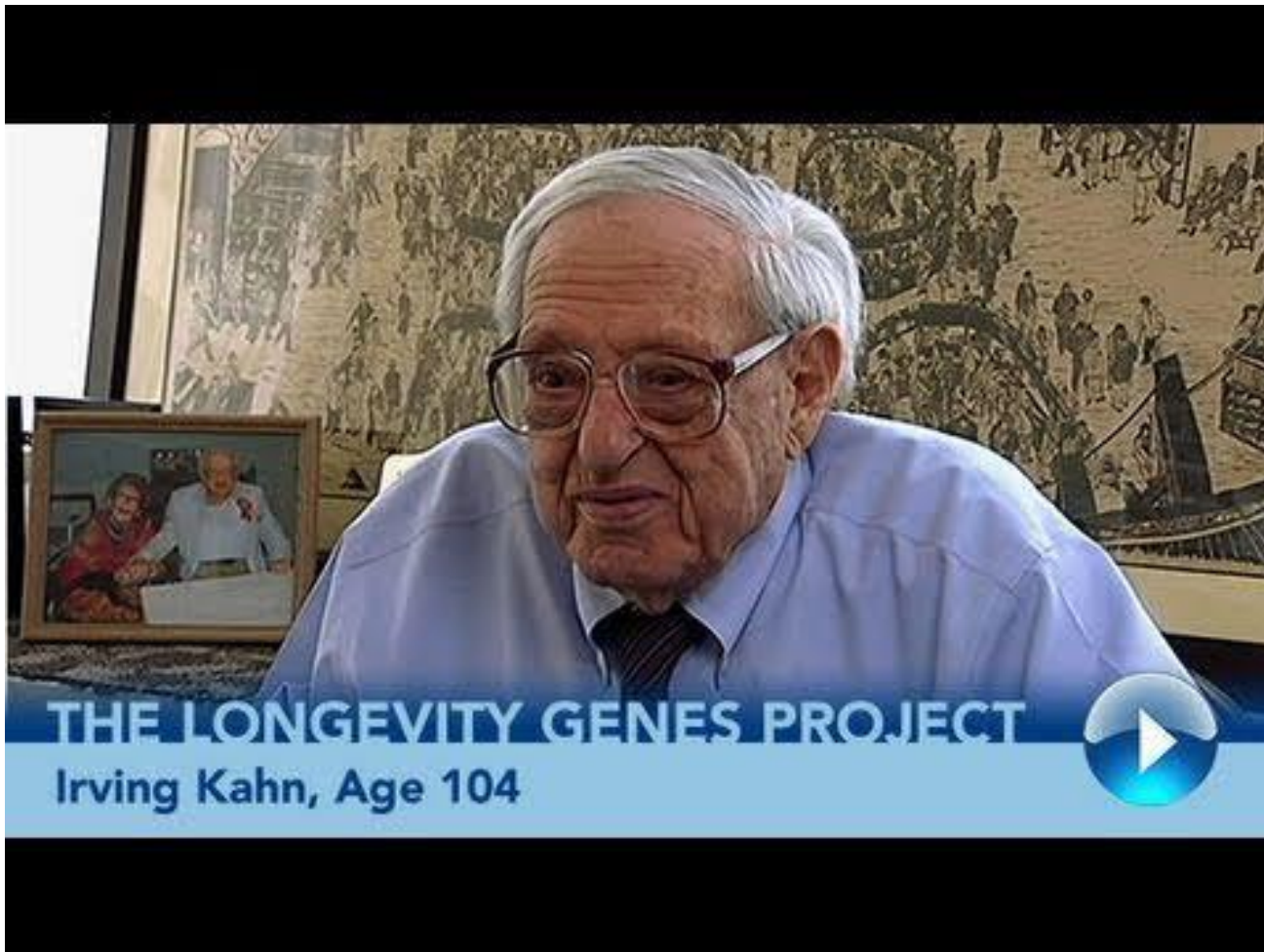
# Physical exercise







# Stimulating work



# Diet



# Cognitive stimulation



# Active social life





# Positive attitude

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