Healthy Aging and dementia

Knoebel Institute for Healthy Aging
Quality in Life, Wellness and Community

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Outline

- The Aged Brain
- How can we study aging?
  - Animal/cell studies
  - Biomarkers
  - Clinical outcome studies
- What is dementia?
- Different forms of dementia
- Pathological changes
- Protein aggregation (amyloid/tau)

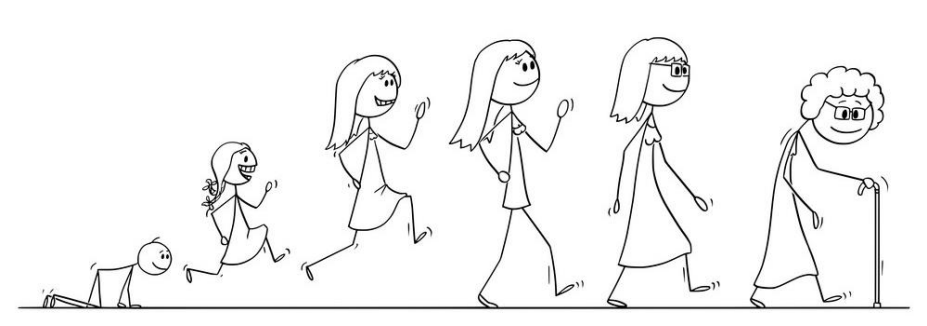
  Neuronal loss

  Inflammation

http://selfhealthguide.blogspot.com/2012/10/the-blue-zones.html

What is Aging?

1) Increase in mortality with age
2) Physiological changes/functional decline
3) Increased disease
4) **Aging is a progressive deterioration of physiological function, an intrinsic age-related process of loss of viability and increase in vulnerability**
5) **… but aging is also hope, wisdom**



10 Common Chronic Conditions for Adults 65+

Quick Facts

80% have have at least 1 chronic condition

68% have 2 or more chronic conditions

Hypertension (High Blood Pressure)
58%

High Cholesterol
47%

Arthritis
31%

Ischemic Heart Disease (or Coronary Heart Disease)
29%

Diabetes
27%

Chronic Kidney Disease
18%

Heart Failure
14%

Depression
14%

Alzheimer's Disease and Dementia
11%

Chronic Obstructive Pulmonary Disease
11%

Source: Centers for Medicare & Medicaid Services, Chronic Conditions Prevalence State/County Table: All Fee-for-Service Beneficiaries, 2015

ncoa
National Council on Aging

ncoa.org

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Centenarians

- Jean Calment
- Oldest recorded
- 1875–1997

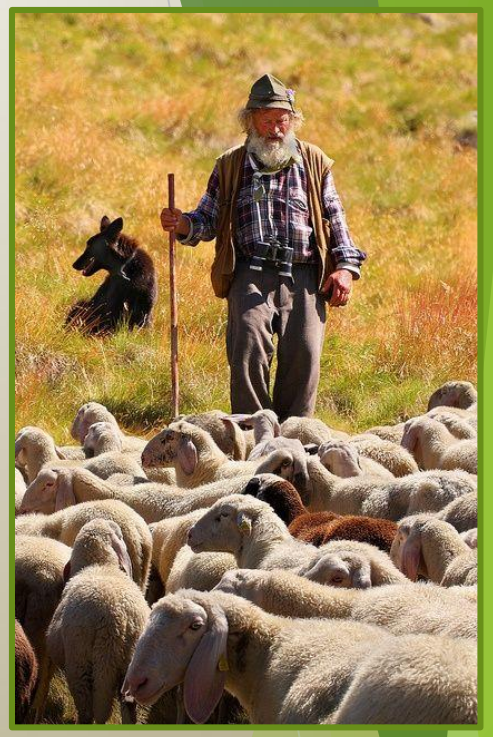
Jeanne at 121 years old

Jeanne at 60 years old

Jeanne Louise Calment was a French supercentenarian who had the longest confirmed human lifespan on record, living to the age of 122 years, 164 days.

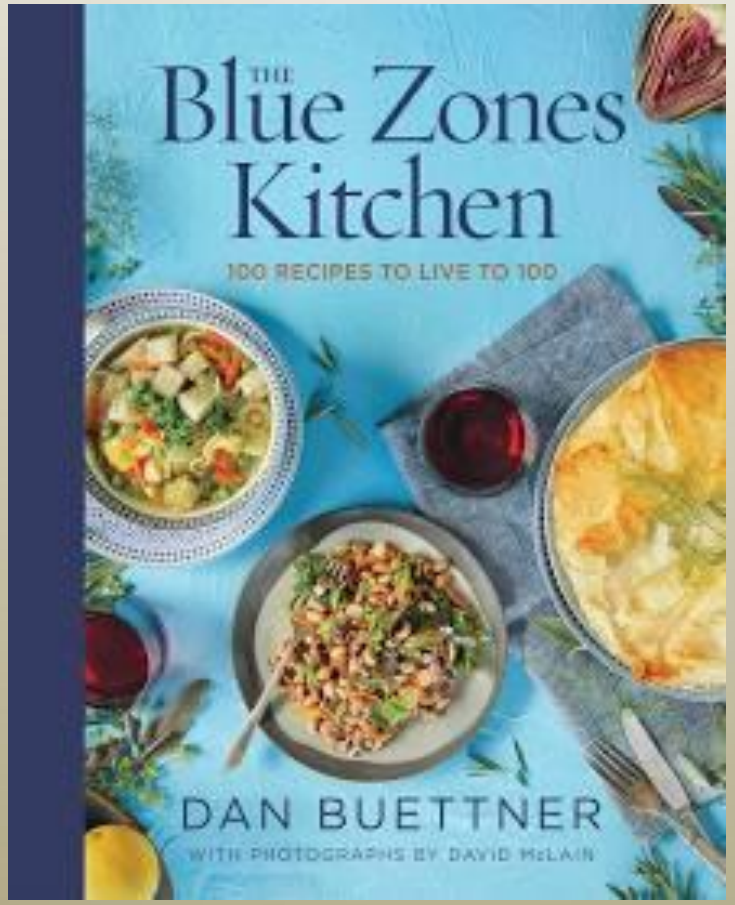
Blue zones Centenarian Lifestyle

- Geographic properties
- Philosophical outlook – jovial -purpose
- Eat until 80% full
- Move naturally, no stress
- Fish, vegetables, legumes, barley, goat milk
- Red wine in moderation



A respectful life.com

The Blue zone kitchen

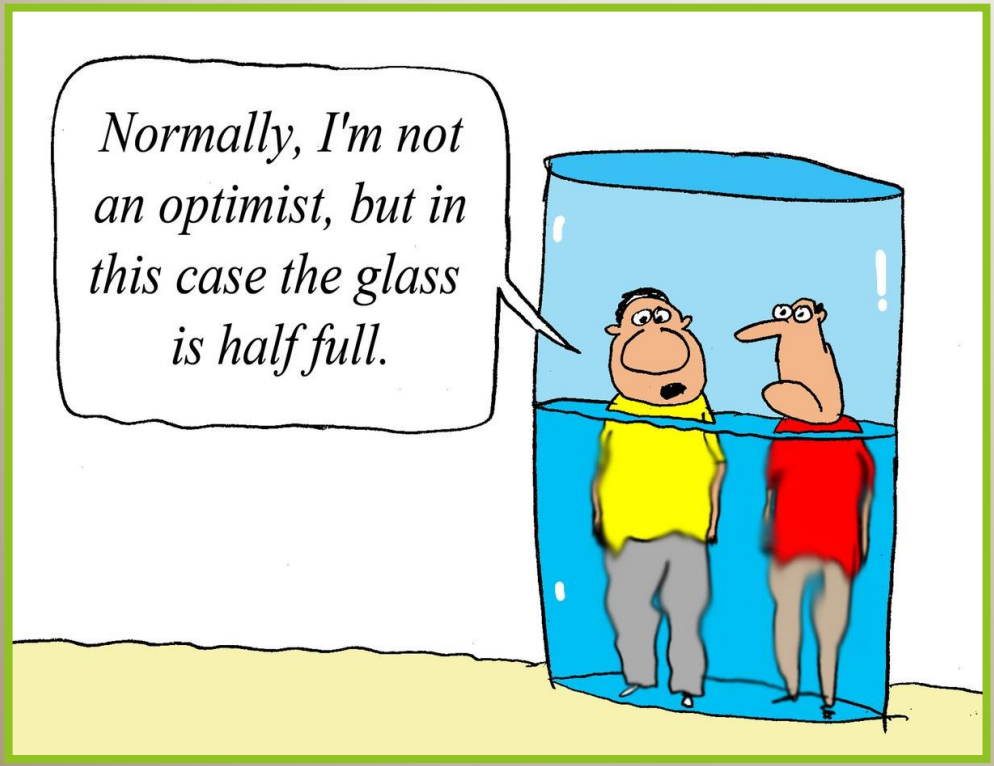


Studies on Okinawa centenarians

- High in grains, fish, and vegetables and light on meat, eggs, and dairy
- Low-stress lifestyle
- A caring community
- Work until an older age walking and gardening
- Spirituality
- “Eat until you are 80% full”

Dr. Makoto Suzuki and Dr. Bradley Willcox, Longevity study

Most important trait:



Comic written by Larry Lambert; illustrated by Jerry King.

Is the glass half full or half empty?

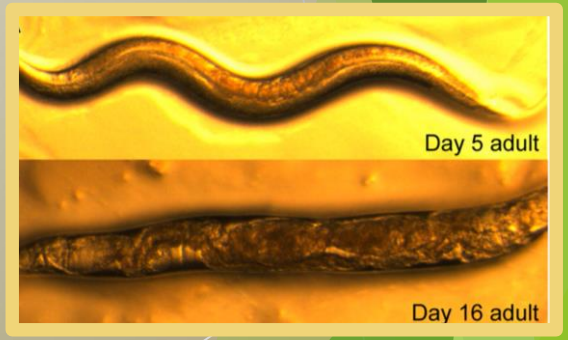
- Physical activity
- Plant-based diet
- Family
- Social network
- Gardening
- No smoking

How can we study aging?

- Animal/cell studies
- Biomarkers
- Clinical outcome studies

Animal studies of aging

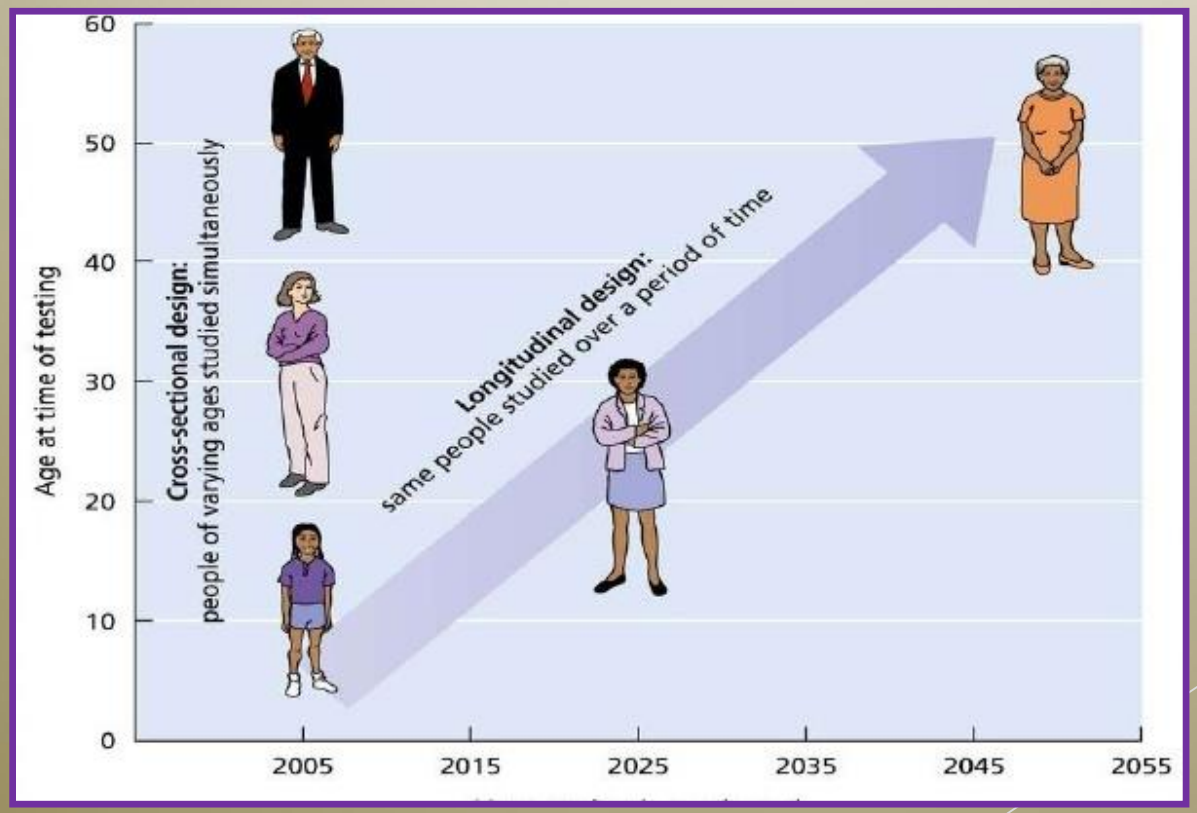
- Human long lifespan makes aging studies difficult
- **Yeast** - days
- **Fruit flies** (Drosophila) – 50-60 day lifespan
- **Worms** (*C. Elegans*) - 20 day lifespan
- **Rodents** – 2 to 3 year lifespan
- **Non-Human primates** – 30 year lifespan



https://www.deviantart.com/nunt/art/drosophila-160708584

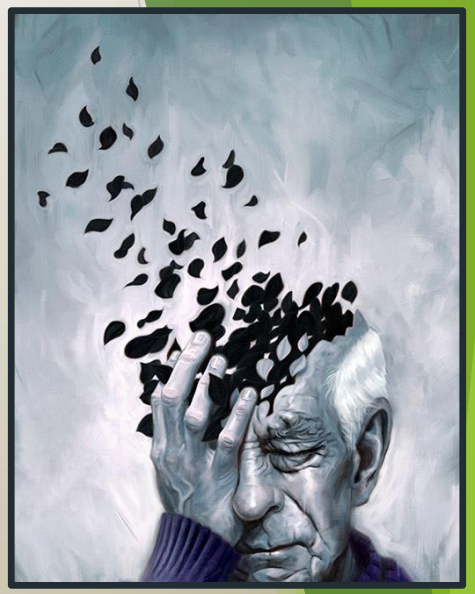
Human Aging studies

- Cross sectional
- Longitudinal
- Cross-sequential



https://www.slideshare.net/guest1d8cad/research-3042787

The Aged Brain



1. **Dementia:**

risk double every 5 years;

> 40% in people over 85 years of age

2. **Motor dysfunction:**

Prevalence of extrapyramidal symptoms:

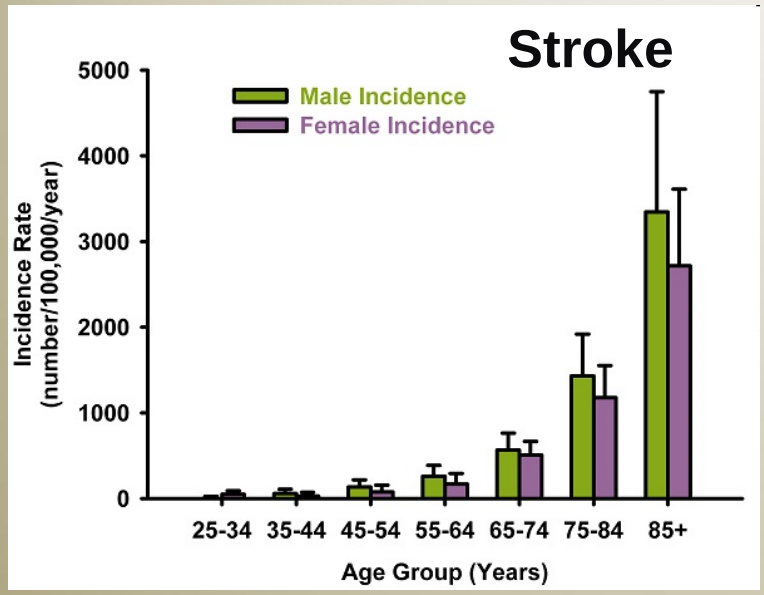
15% in 65-74 years of age

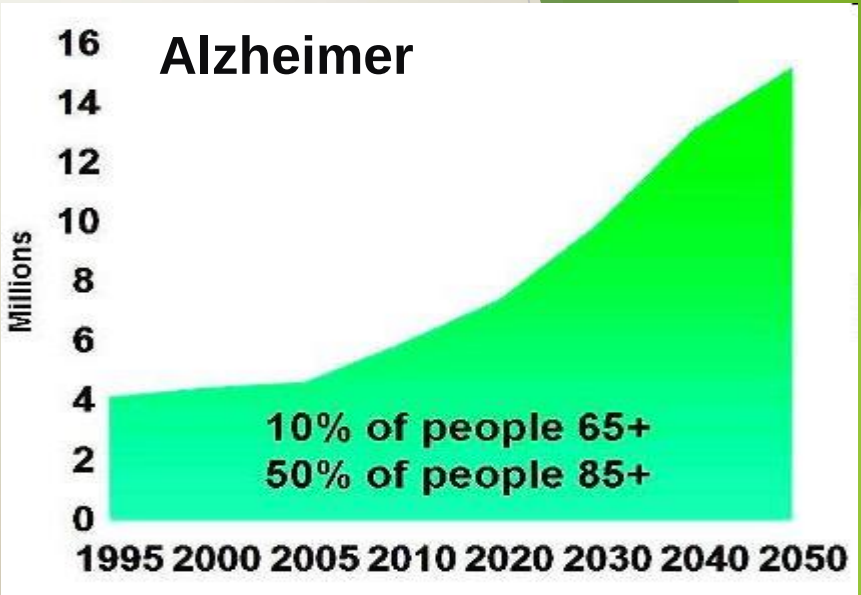
30% in 75-84 years of age

>50% in > 85 year olds

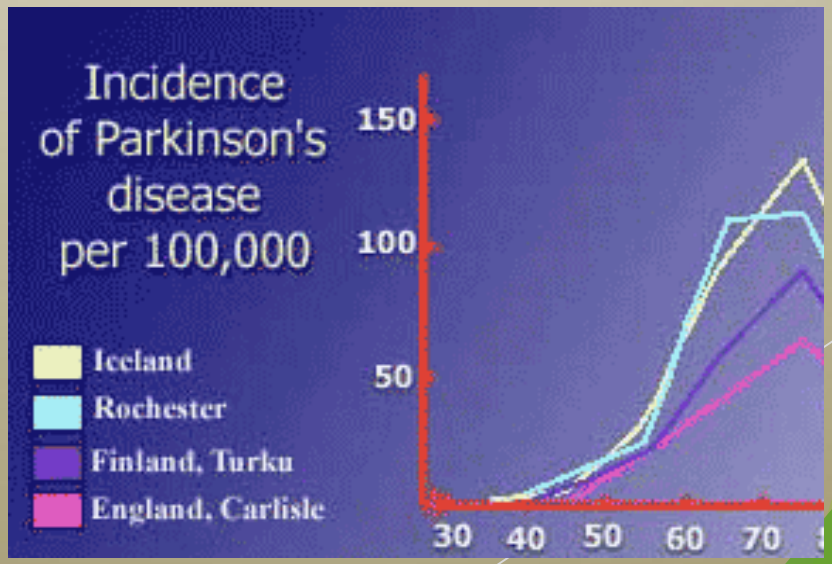
www.livestrong.com

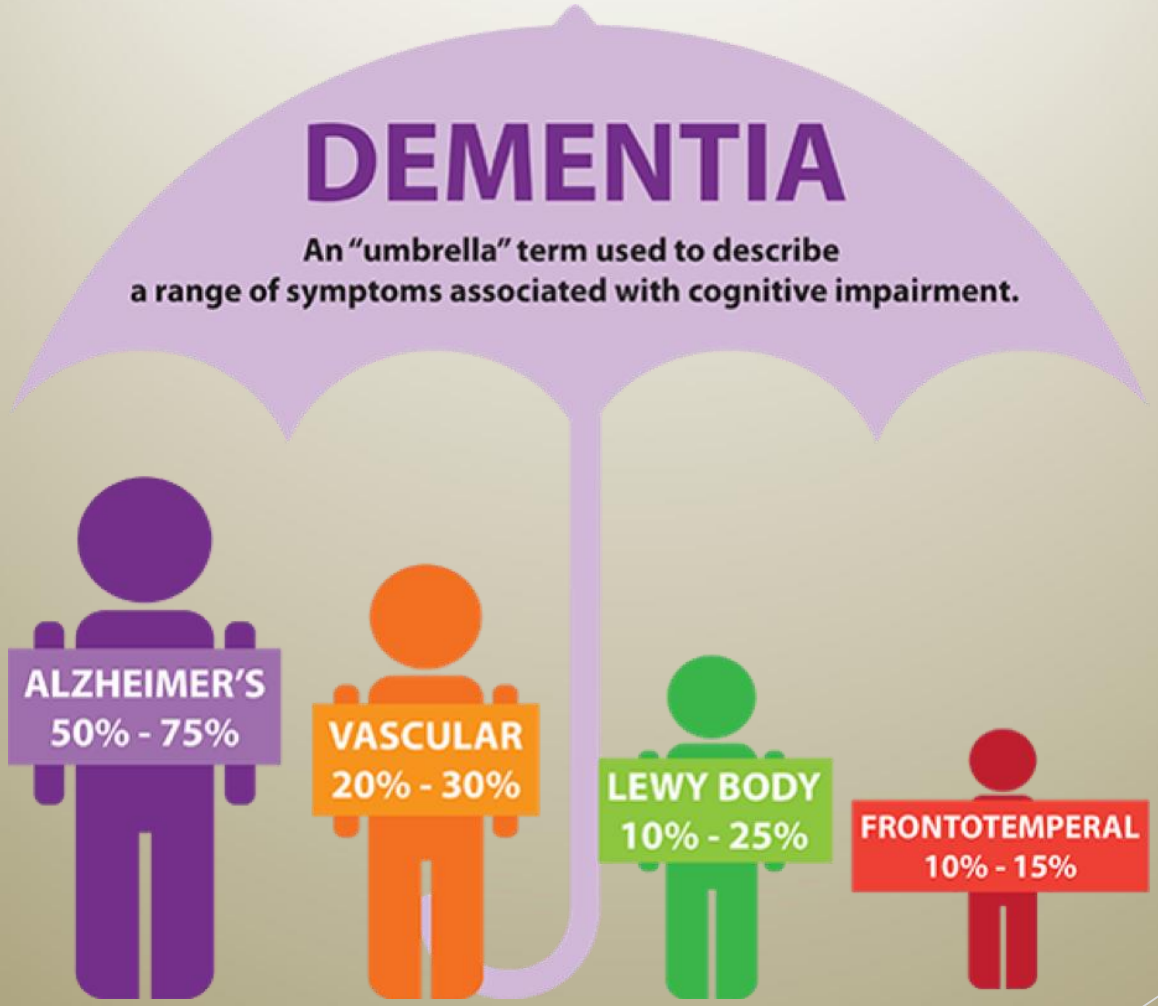
Neurological disorders





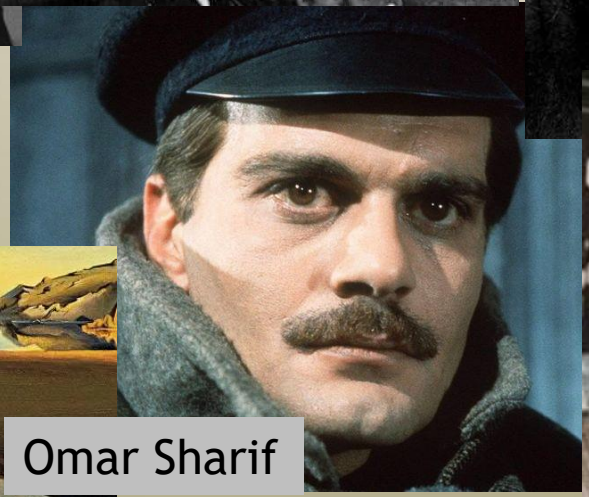
Parkinson's disease

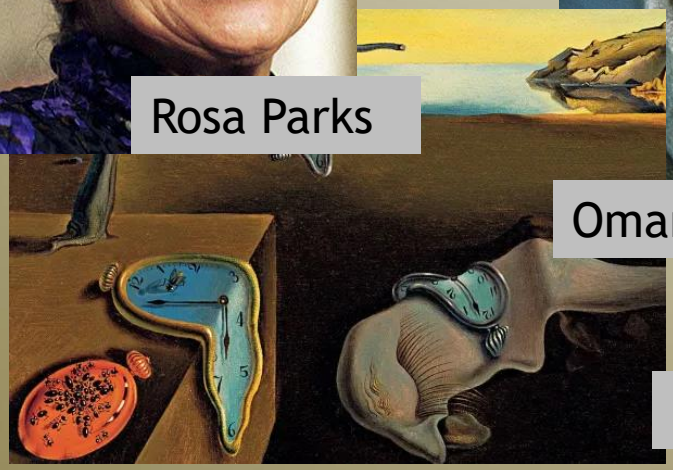


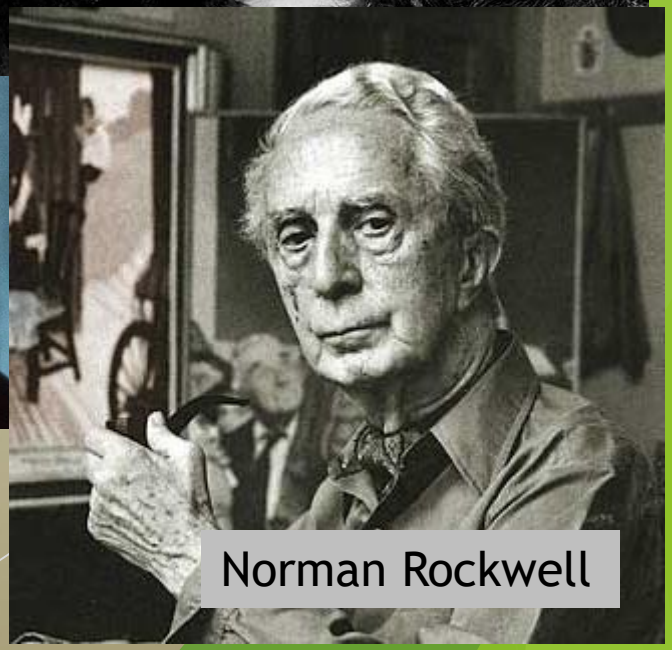


http://www.dfwsheridan.org/types-dementia

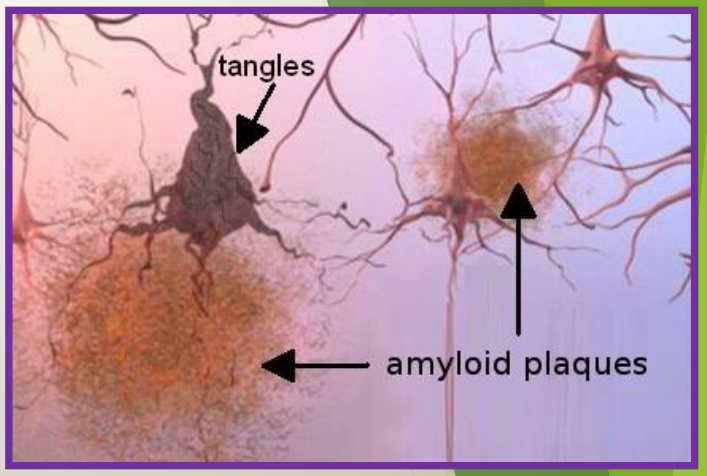
The many faces of dementia







Alzheimer's Disease

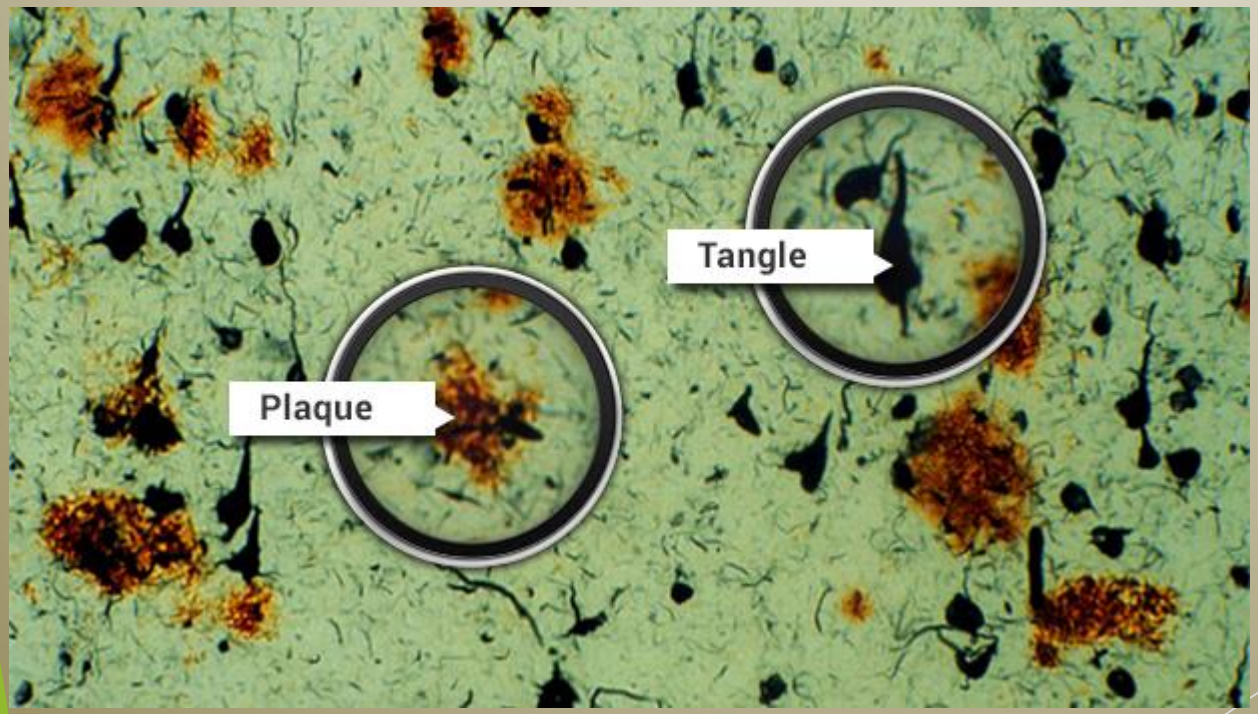


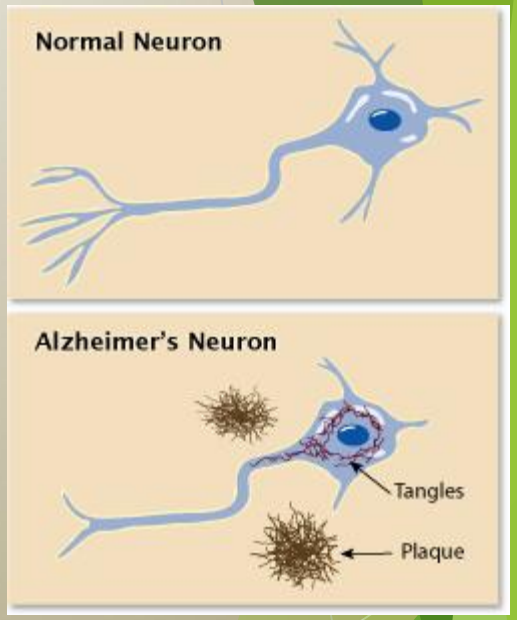
- Most common form of dementia
- Incidence will double next 15 years
- Pathology includes amyloid and tau accumulation

wwww.alz.org

Protein aggregation

- Amyloid: aggregates and forms plaques
- Tau: aggregates and forms tangles

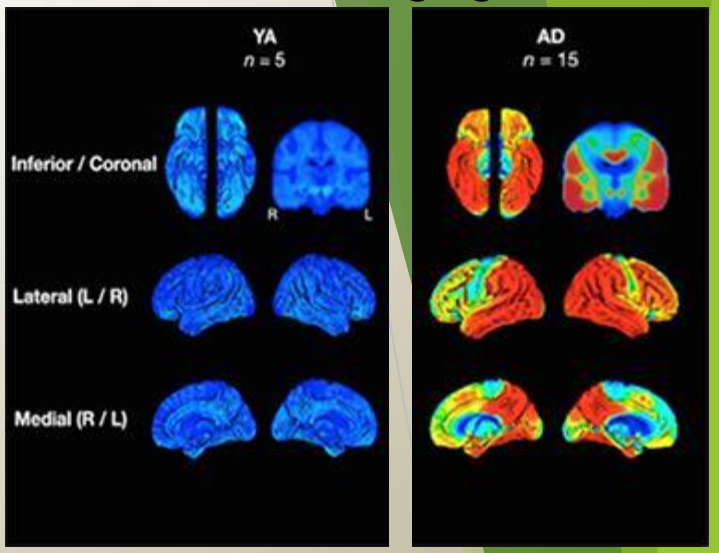




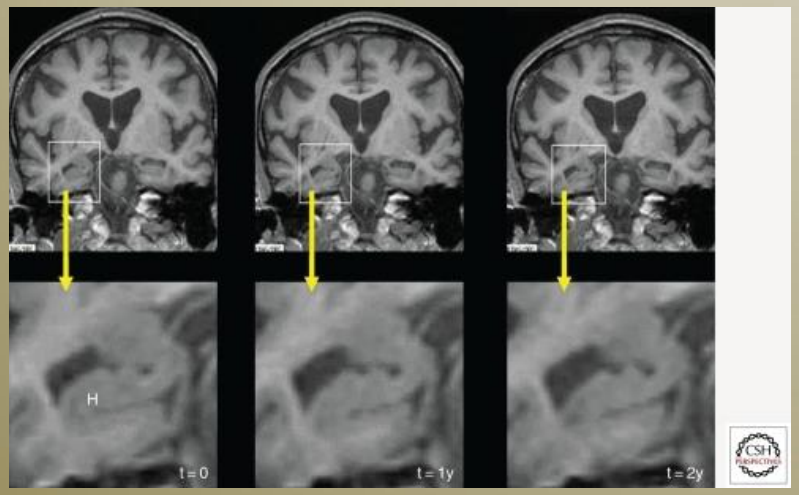
Diagnosis

- MRI or PET imaging
- Biomarkers in blood or CSF
- Determine progression and treatment effects
- Neuropathology staging

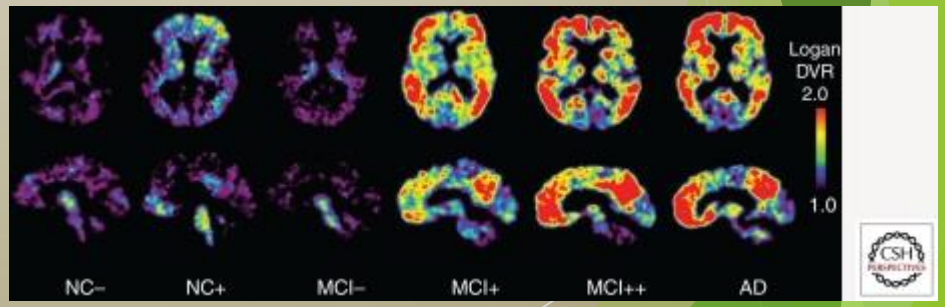
Tau imaging



MRI of hippocampal shrinkage

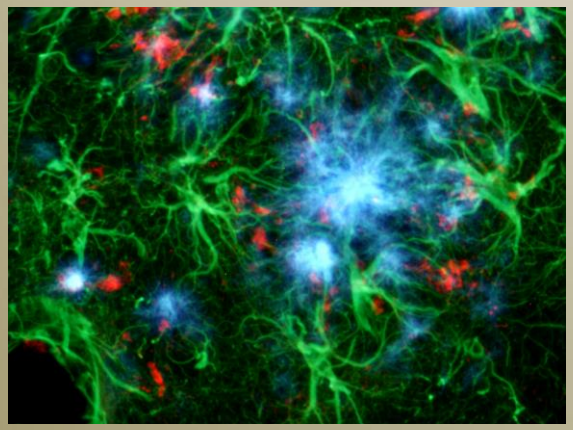


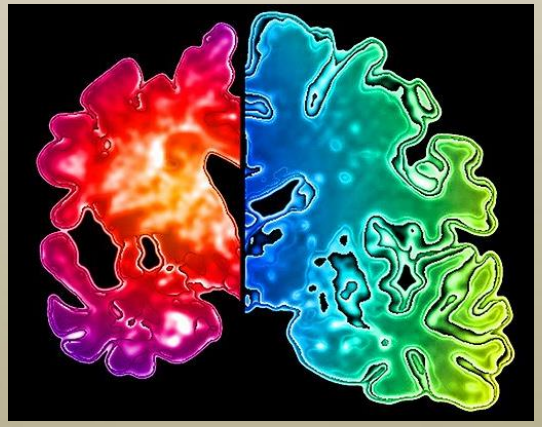
PET imaging of amyloid plaques

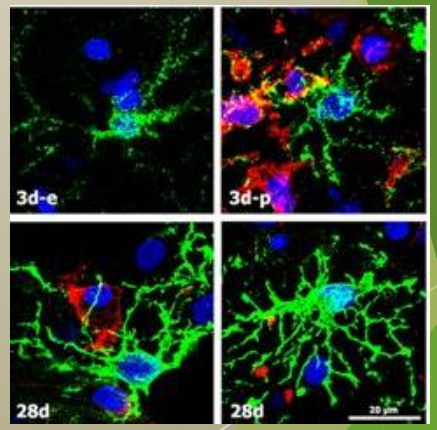


Biological correlates of dementia

- Protein aggregation - Amyloid and Tau
- Nerve cell (neuronal) Loss
- Inflammation
- Oxidative stress







Risk versus protection

Modifiable risk factors for Alzheimer's

Risk Factors

- Stroke
- High Blood Pressure
- High Blood Cholesterol
- Obesity
- Diabetes mellitus
- Smoking
- Depression/stress
- Head trauma
- ?

Protective Factors

- High education
- Physical activity
- Active lifestyle
- Antioxidants
- Fish oils
- Coffee
- Antihypertensives
- Statins

Karolinska Institutet

Miia Kivipelto, MD, PhD, Professor

Monday, September 16, 13

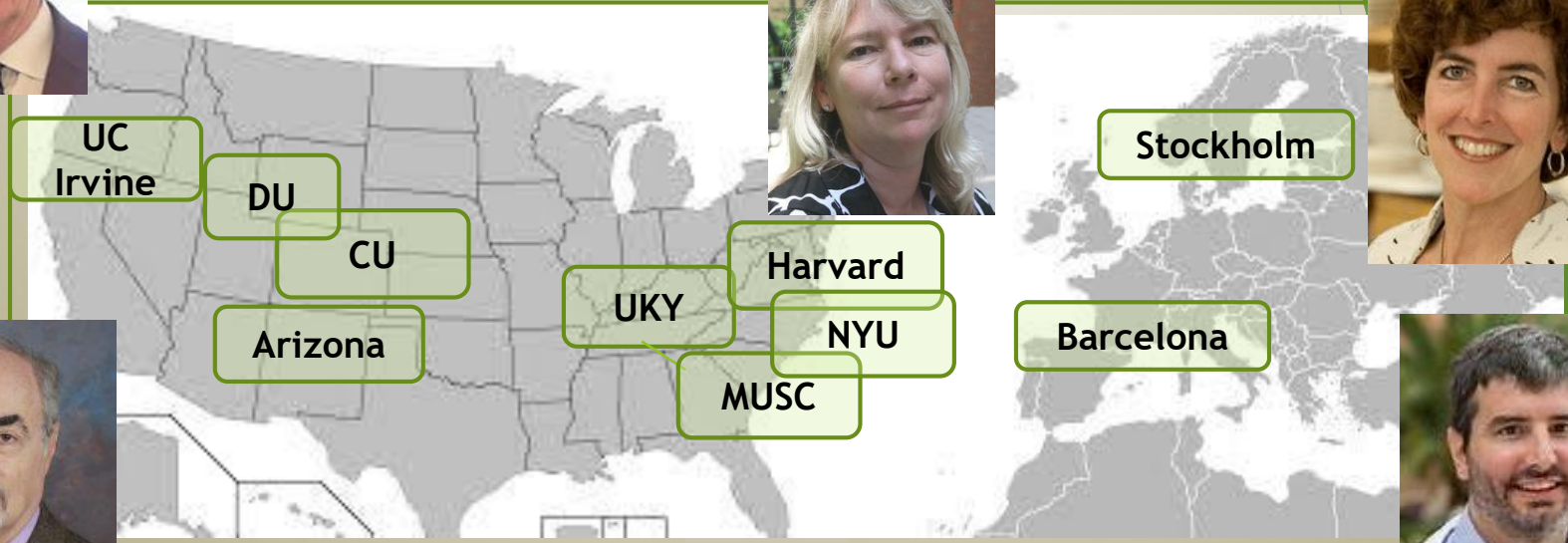
Treatment

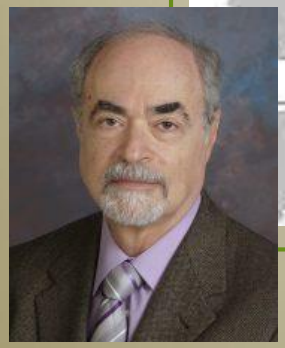
- Some drugs available to slow progression
- 90 experimental treatments being tested
- Take care of your cardiac disease
- Exercise
- Diet
- Train the brain

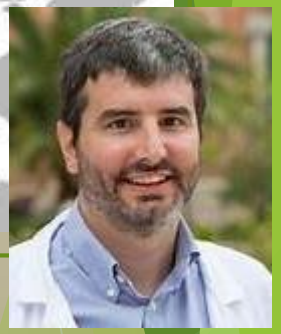
Our collaborators

BrightFocus™ Foundation
Cure in Mind. Cure in Sight.

Sites involved in the DS Biobank Consortium



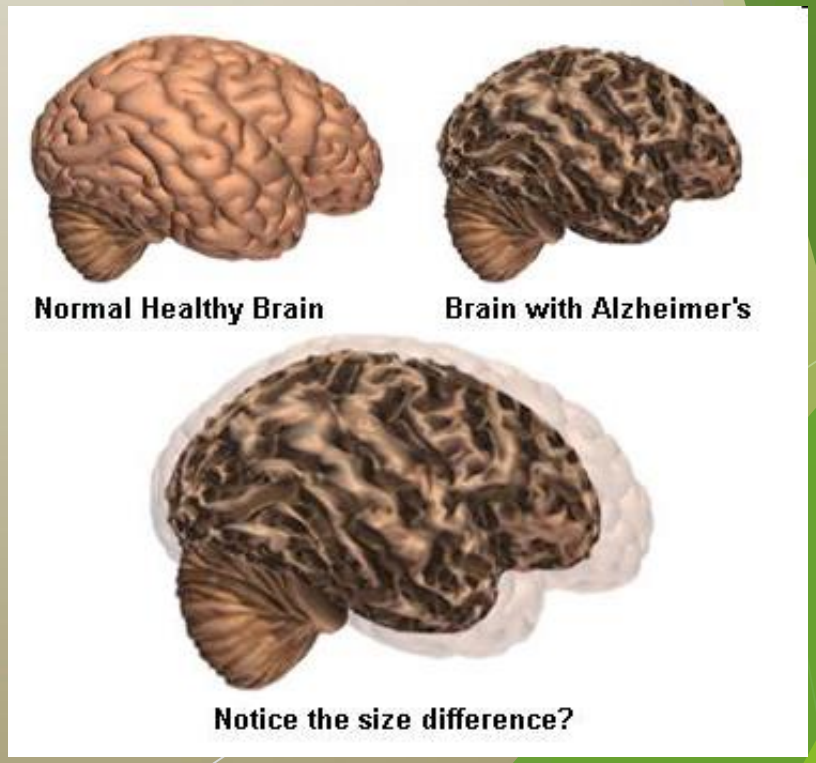




- Train graduate students and physicians
- Provide tissues and biofluids to other researchers
- Standard neuropathology staging
- Advocate for brain donation

Size of brain and exercise

- Physically fit had larger brains than those with Alzheimer and less physically fit
  (Jeffrey Burns, Neurology 2008)
- **“Cognitive reserve” is an important factor**



Vitamin D and COVID-19

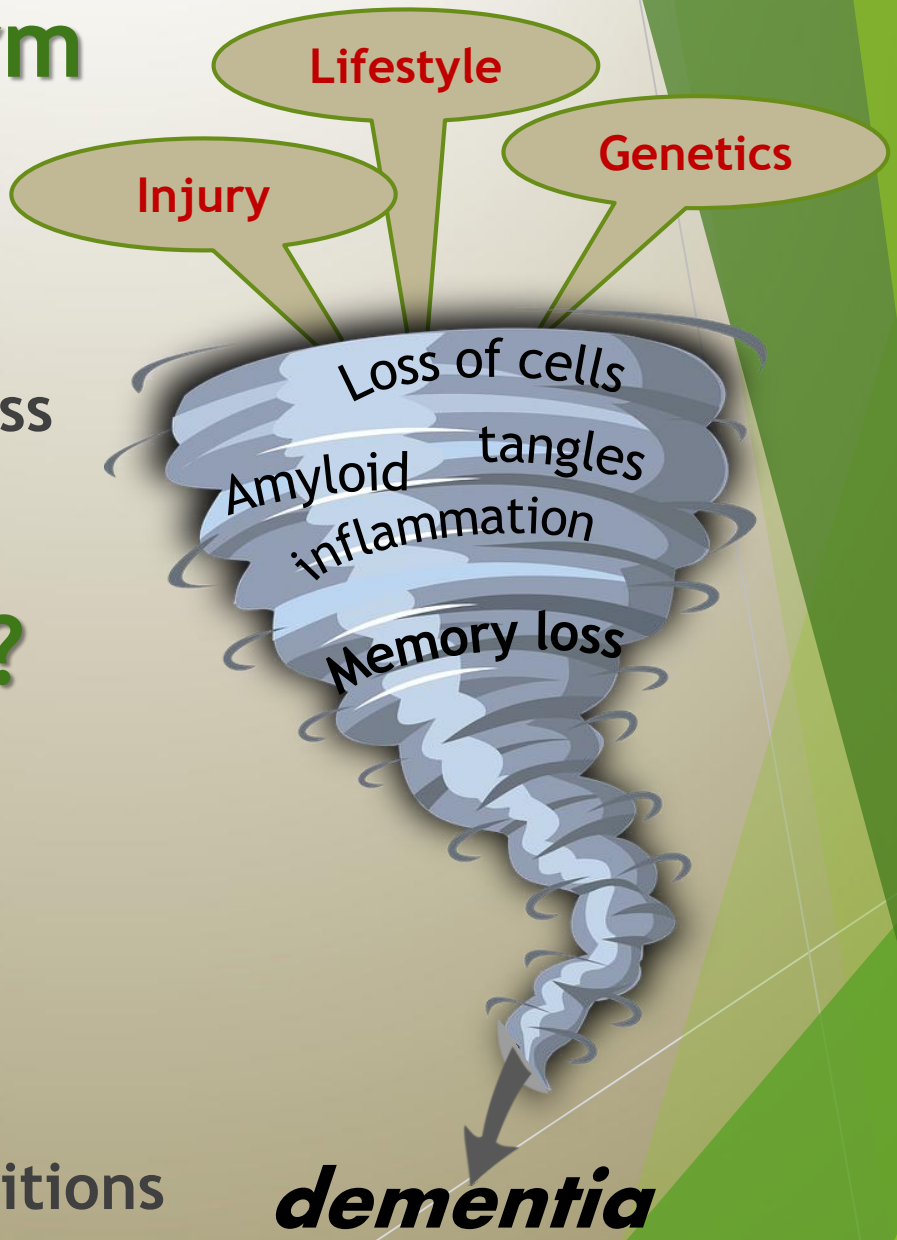
We are all wondering how to protect ourselves against the coronavirus. ***Vitamin D*** plays an important role for the body's immune system, the ability to ramp up a defense against diseases. Low levels of vitamin D are associated with an increased susceptibility to infections. Older adults often have lower Vitamin D levels. This could at least partially explain why so many are more susceptible to COVID-19. **Vitamin D deficiency is linked to lower lung function**.

Vitamin D supplements can therefore reduce the risk of having infections in general and can improve lung function, if a person has a vitamin D deficiency. Vitamin D supplements reduce mortality in older adults. Keeping in mind that ***no research has shown that vitamin D can protect against COVID-19***, supplementing with 1,000–4,000 IU of vitamin D per day is typically sufficient for most people. Those with low blood levels may require higher doses to reach optimal range. In addition, the sun's ultraviolet B (UVB) rays hit cholesterol in the skin cells, providing energy for vitamin D synthesis to occur when you are exposed to sunlight. **Therefore, go out and enjoy the spring sun!**

References:https://www.healthline.com/nutrition/vitamin-d-coronavirus; https://www.measureup.com.au

The perfect storm

- Memory loss
- Protein aggregation
- Nerve cell (neuronal) Loss
- Inflammation



What can we do?

- Early detection
- Exercise/diet
- Reduce stress
- Battle inflammation
- Reduce systemic conditions

Clinical treatment for Alzheimer's disease

- More than 100 drugs are currently in trials for Alzheimer's disease
- It is easy to get access to this information via the Alzheimer Association
- TrialMatch is a free matching tool for research studies and treatment

alzheimer's association®

Trial Match® Alz Association

Resources

- **Alumia Institute:** https://alumiainstitute.com/
- **Rocky Mountain Alzheimer's Disease Center:** http://www.ucdenver.edu/academics/colleges/medicalschool/departments/neurology/clinical/rmadc/Pages/default.aspx
- **Alzheimer Association**
  - Support groups
  - Call in 24/7
  - Education
  - Trial Match is a free clinical studies matching service that connects individuals with Alzheimer's, caregivers and healthy volunteers to current studies.

Together we can stop Alzheimer's

Thank you for your Attention