

# The Best Food and Nutrients for Building a Fit and Strong Brain

Majid Fotuhi, MD PhD  
NeuroGrow Brain Fitness Center  
Johns Hopkins Medicine



# Memory lapses or Alzheimer's?

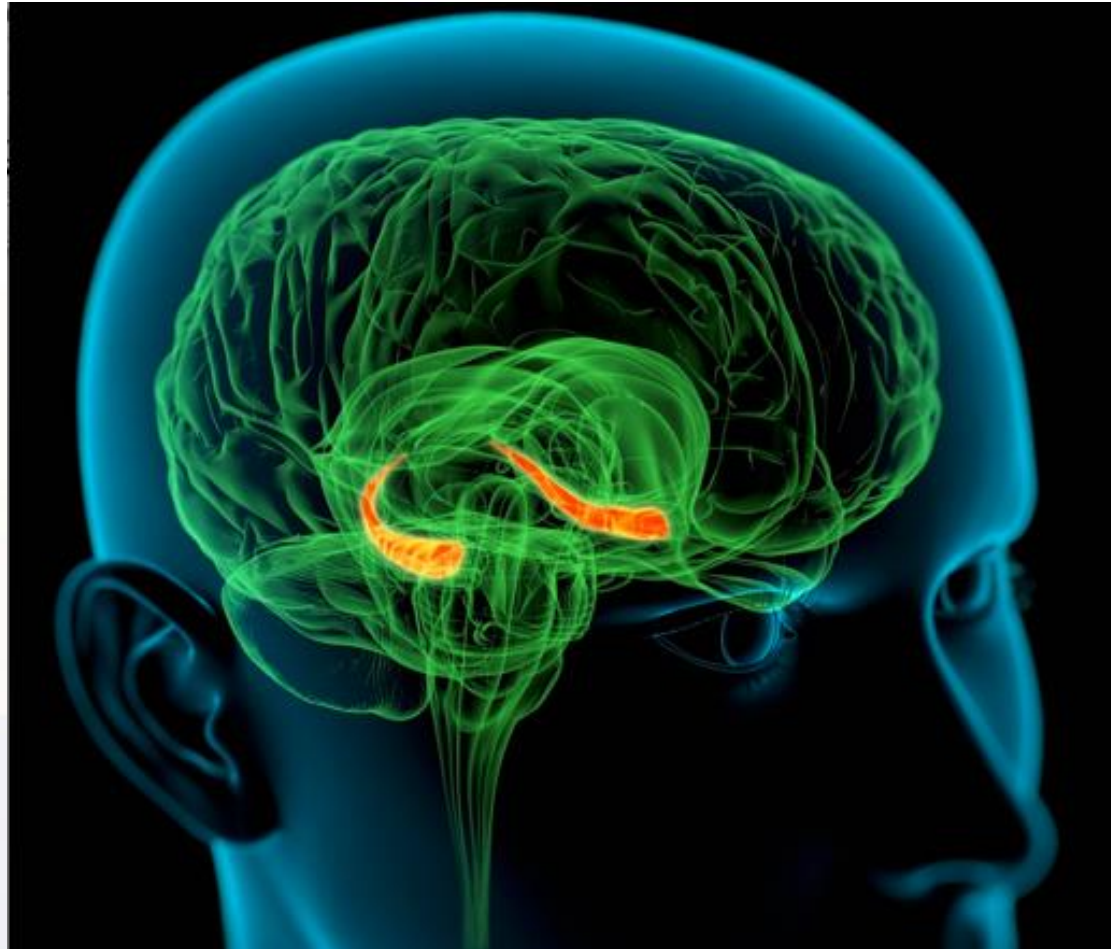
Memory Lapses

Age-Associated  
Memory  
Impairment

MCI

Alzheimer's

# Cortex and Hippocampus



# What Causes Atrophy in Hippocampus?

**Insomnia**  
**Sleep Apnea**

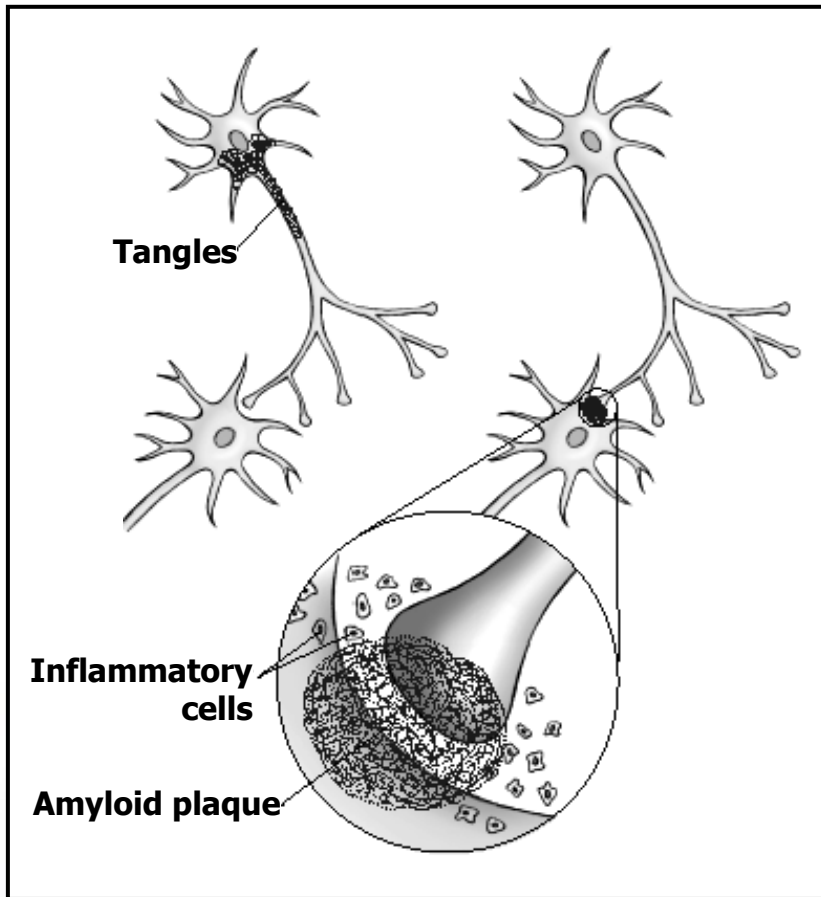
**Obesity**  
**Smoking**  
**Diabetes**

**Concussion**

**Stress**  
**Depression**

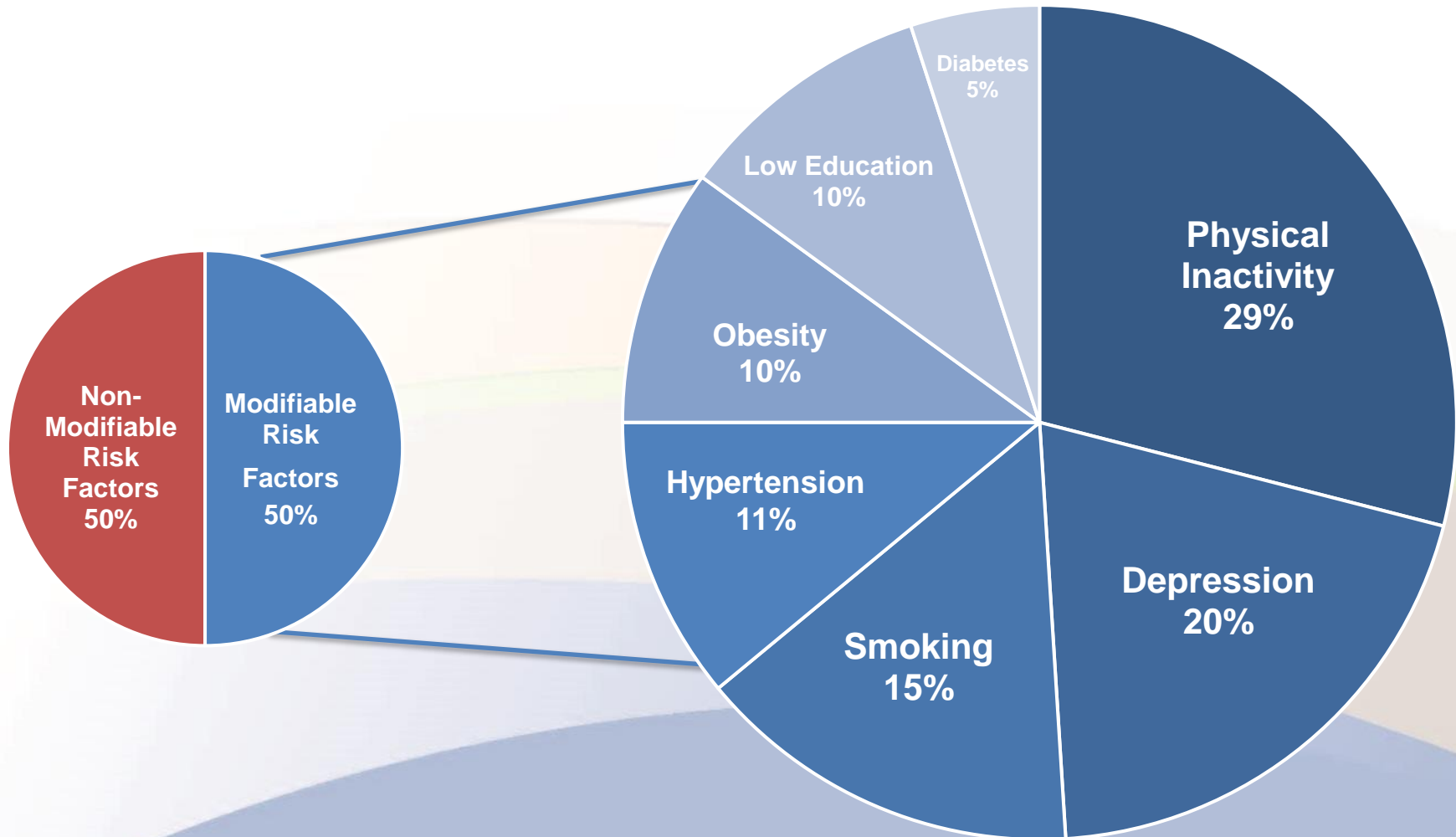
**Alzheimer's**

# Plaques and Tangles of Alzheimer's Disease (AD)



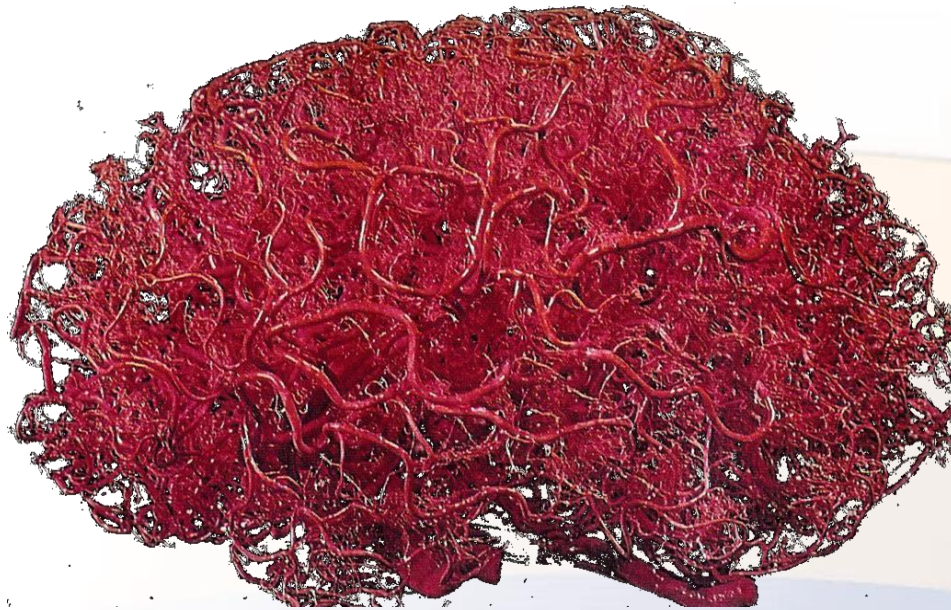
- Plaques — abnormal aggregation of *amyloid*
- Tangles — abnormal aggregation of *tau*
- Inflammation
- Brain Atrophy

# Half of the Alzheimer's Cases in the United States are Due to Seven Modifiable Risk Factors

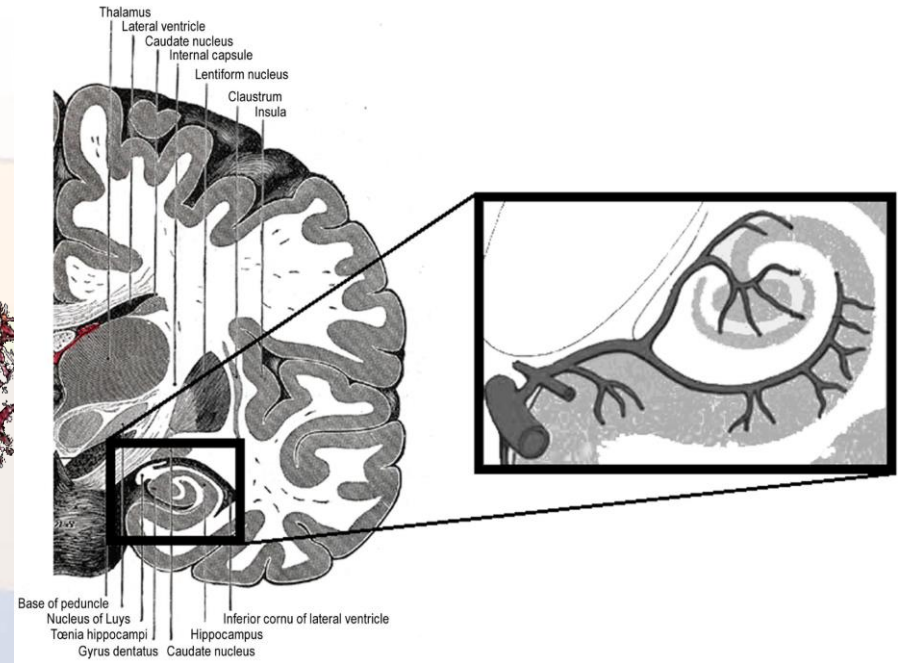




# The Brain is a Highly Vascular Organ

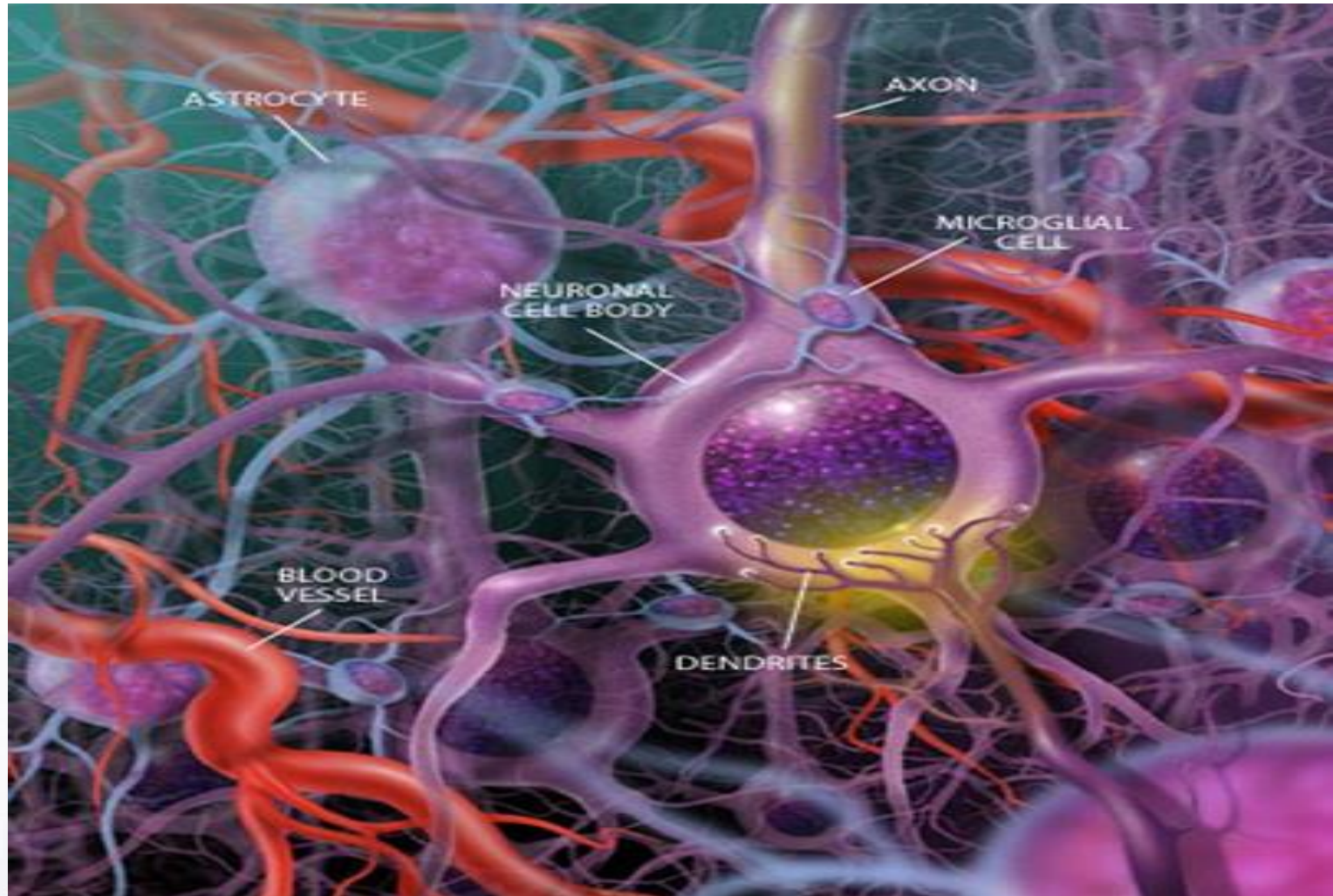


Zlokovic et al. Neurosurgery 43(4), 877-78, 1998



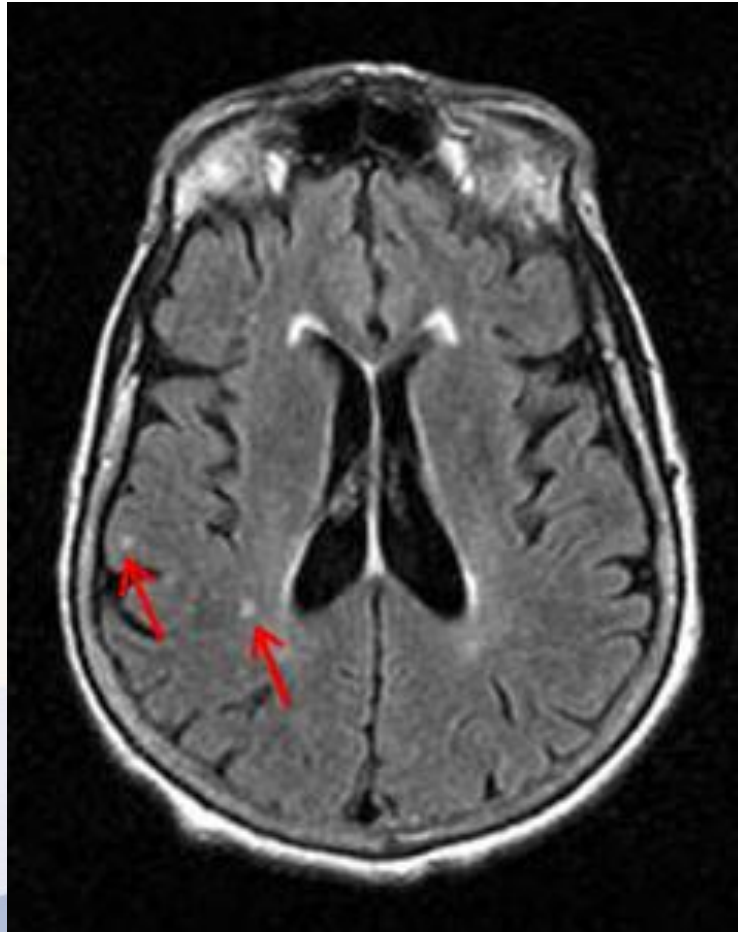
<http://www.aasmnet.org/jcsm/ArticleImages/jcsm.9.9.921a.jpg>

# Blood Vessels



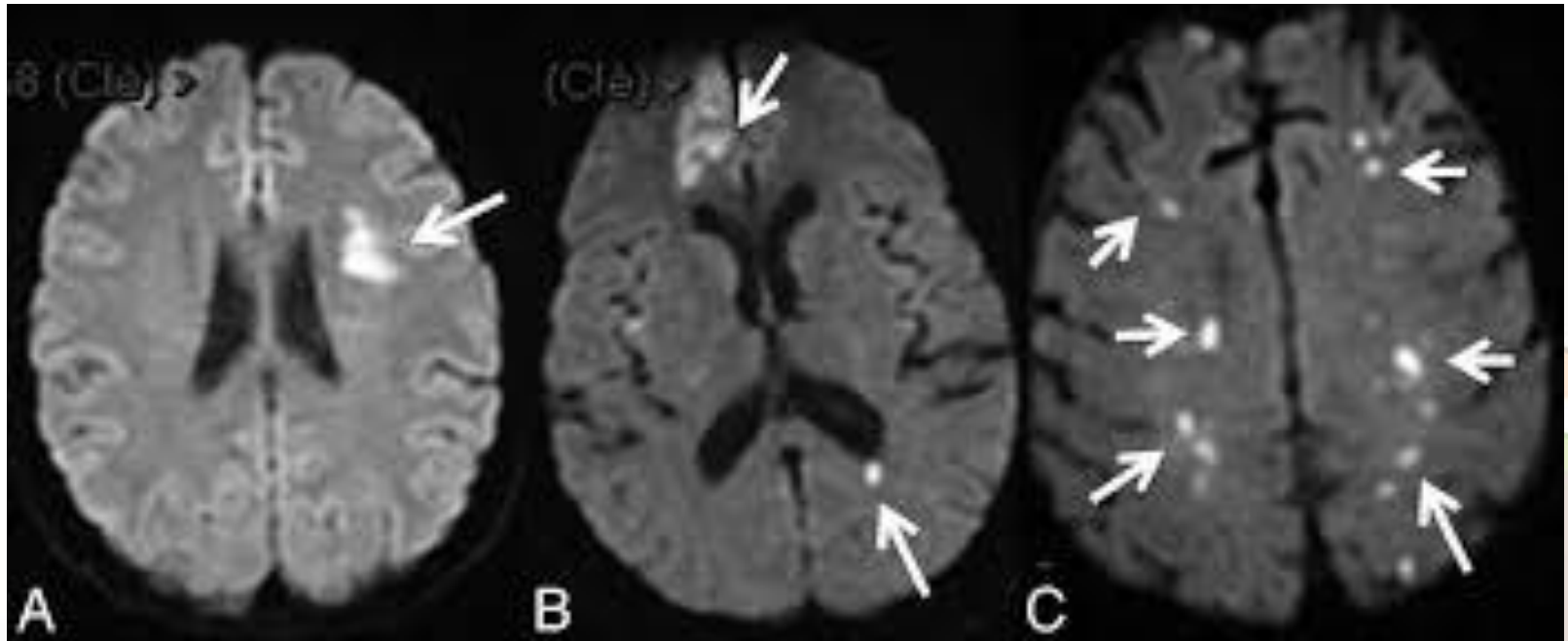


# Silent Strokes



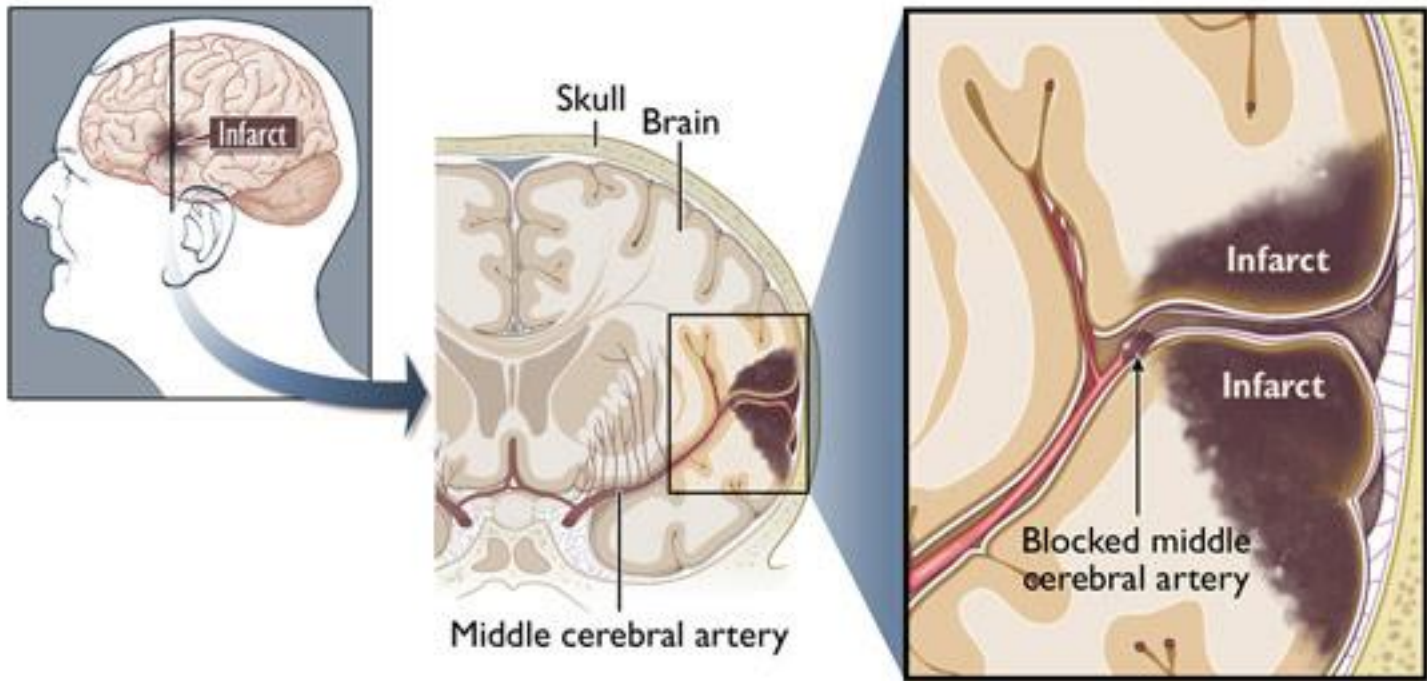
<https://blog.ninds.nih.gov/2015/04/24>

# Small to Medium Strokes



# Large Strokes

Large ischemic stroke in the brain



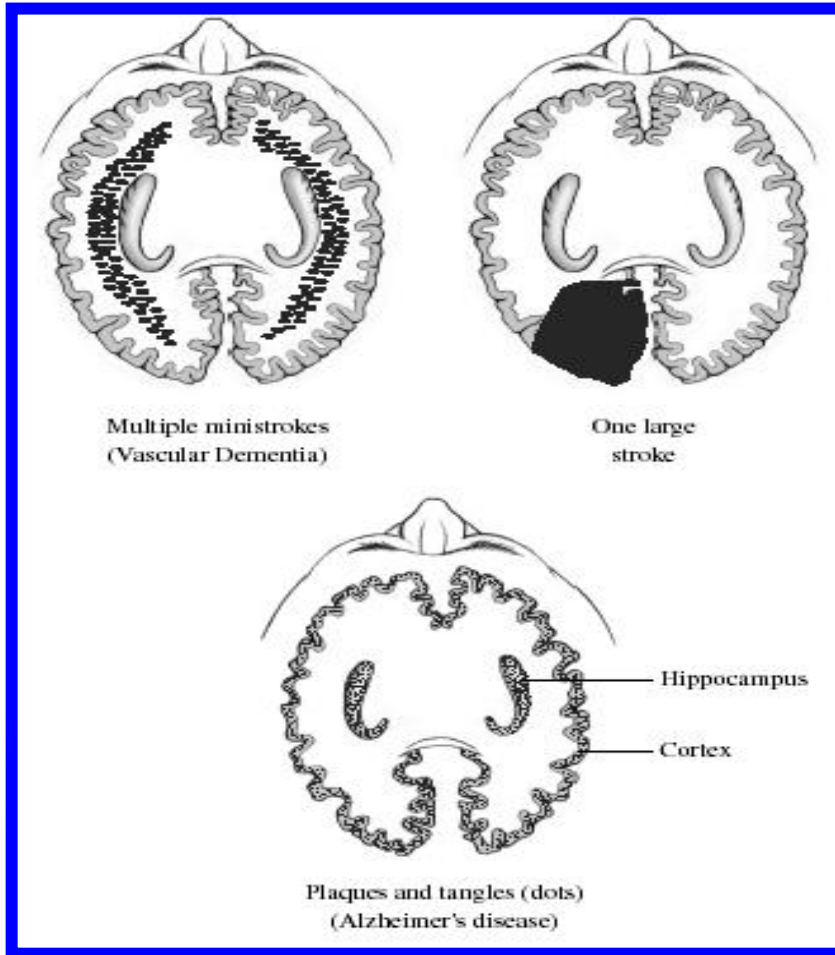
<http://www.uwmedicine.org/health-library/Pages/large-artery-stroke.aspx>

# Large Strokes



<http://neuropathology-web.org/chapter2/chapter2bCerebralinfarcts.html>

# Alzheimer's Disease (AD) vs Strokes

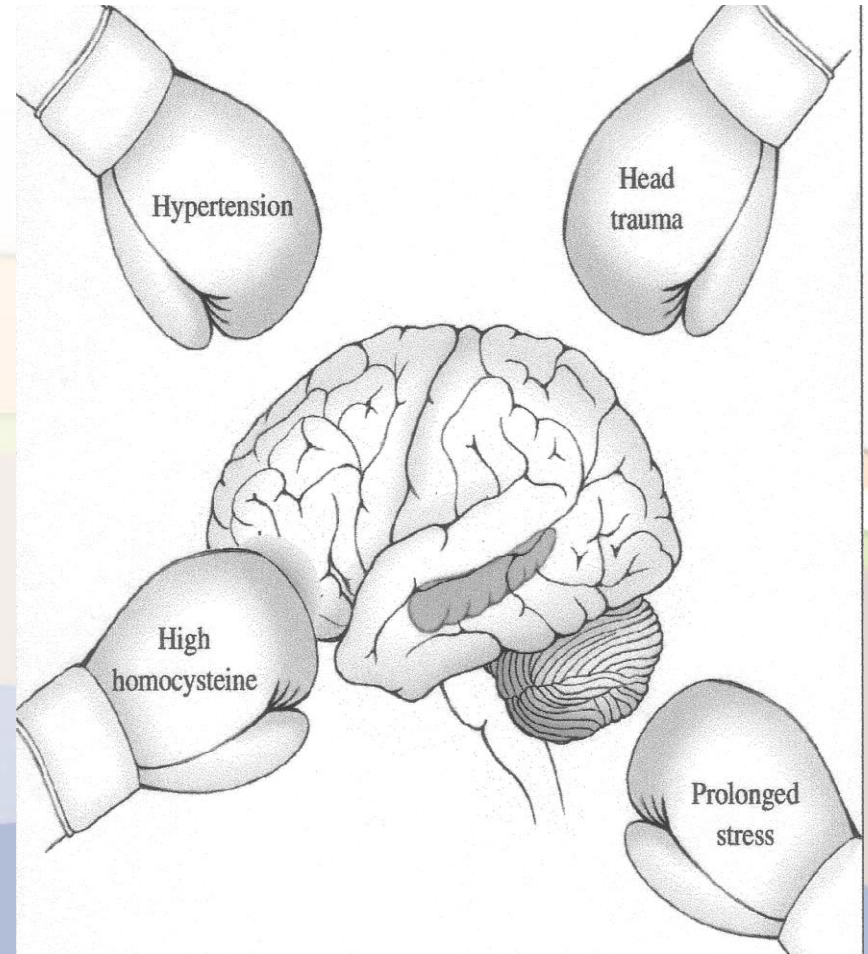


- AD pathology causes atrophy in the hippocampus and cortical areas
- Small or large strokes cause atrophy in cortical and white matter areas
- Worse outcome with both AD and strokes



# Resisting the effects of Alzheimer's Disease: Nuns

- Each negative risk factor lowers the brain's threshold to withstand the effects of plaques and tangles
- Nuns who had a healthy brain (no strokes) did not become demented, even when they had lots of Alzheimer's in their brain



# Essential Features of an Ideal Brain Diet

- Avoid factors that lead to brain shrinkage  
(Brain Shrinkers)
- Increase factors that grow and heal the brain  
(Brain Healers)



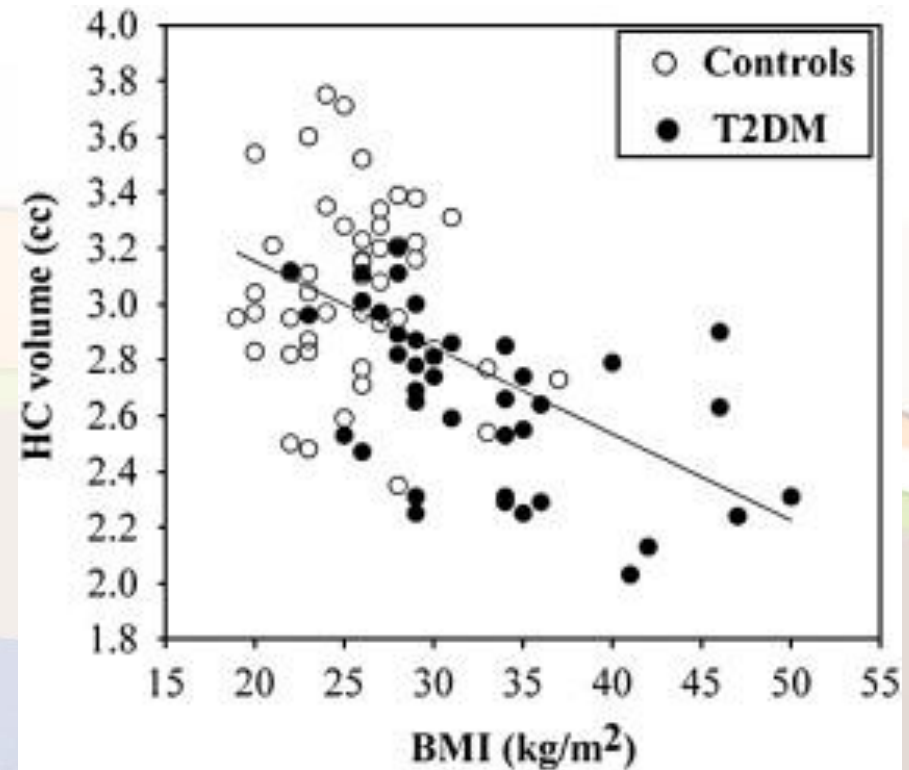
# Brain Shrinkers: Obesity (Diabetes)

- Increases risk of Alzheimer's by 360%

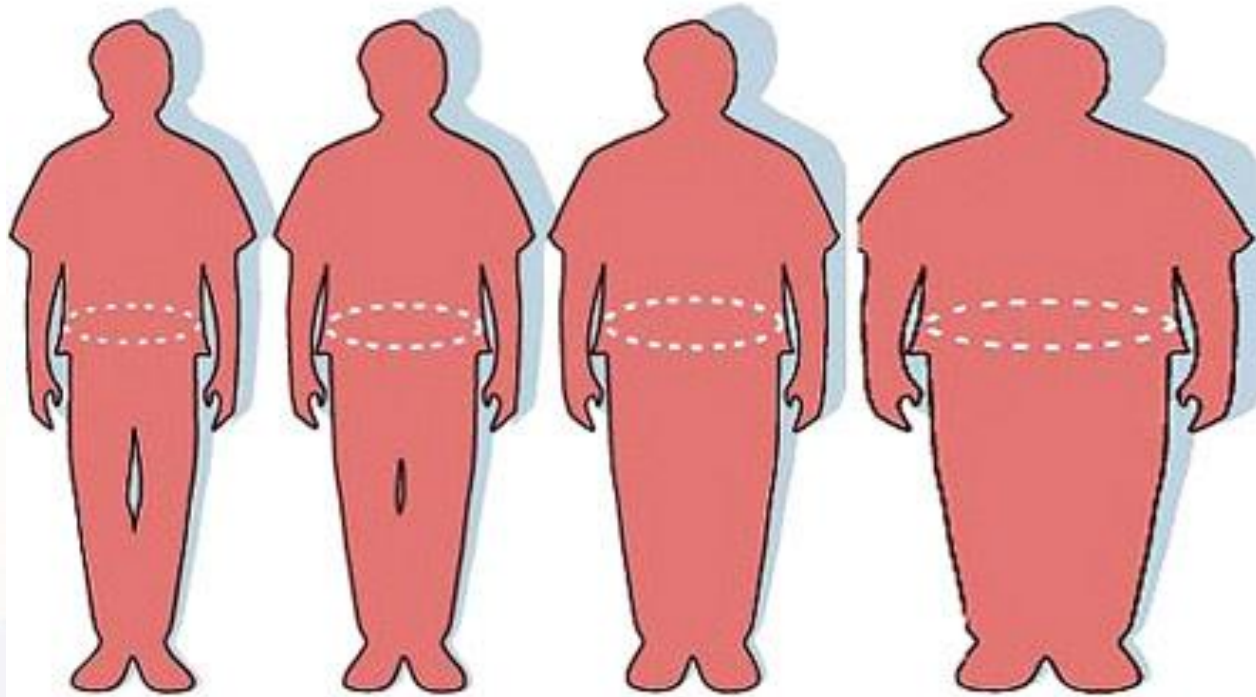
Whitmer et al, 2008

- Brains of overweight and obese individuals appeared **8 and 16 years older**, respectively

Raji, et al., 2010



# Central Abdominal Obesity

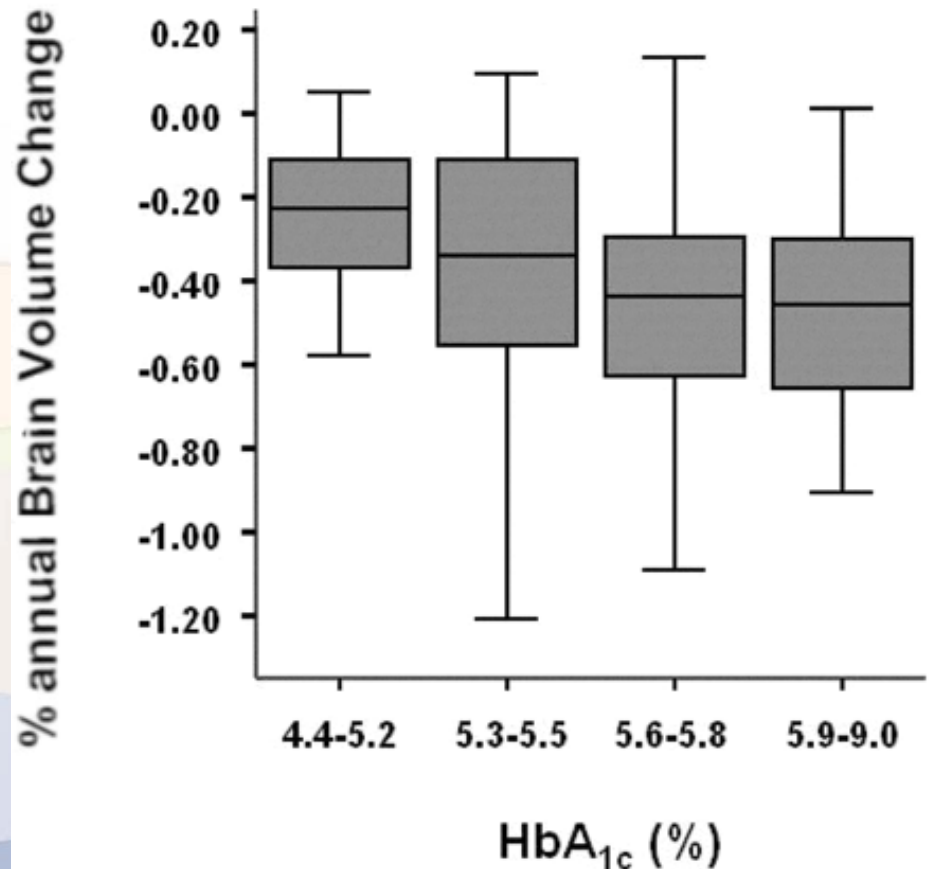


# Brain Shrinkers: Sugar (Diabetes)



- Increases insulin resistance
- Slows cognitive performance
- Reduces hippocampal BDNF levels

*Agrawal & Gomez-Pinilla, 2012.*



*Neurology. 2005 May 24;64(10):1704-11.*



# Brain Shrinkers: Trans Fats

- Found in foods such as:
  - Cookies, crackers, muffins, donuts
  - Fried foods like French fries, chicken nuggets
  - Chips and other snack foods
- Increase the risk of heart attacks
  - Increases LDL (bad cholesterol)
  - Decreases HDL (good cholesterol)
- Linked with brain shrinkage

*Agrawal & Gomez-Pinilla, 2012*

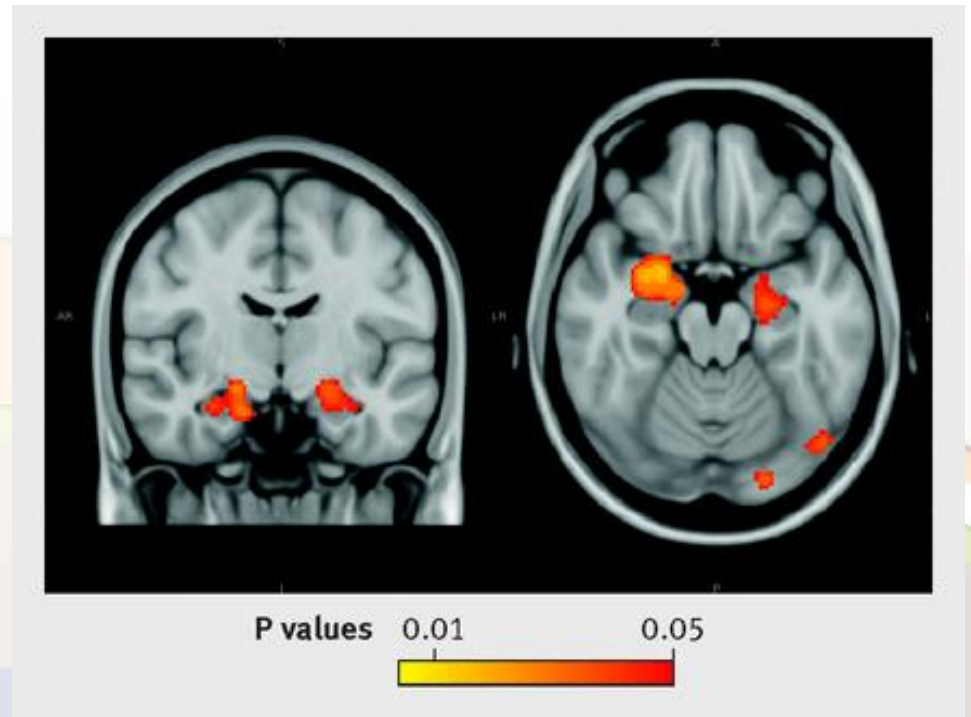


Image source: Bantransfats.com

# Brain Shrinkers: Too Much Alcohol



<https://www.verywellmind.com/cause-of-brain-shrinkage-in-alcoholics-studied-66615>



<https://www.bmj.com/content/357/bmj.i2353>

# Brain Shrinkers: Cause too Much Inflammation



<https://www.amenclinics.com/blog/inflammation-killing-brain/>

# Brain Healers

- Increase BDNF
- Increase blood flow
- Reduce amyloid build-up in the brain
- Reduce inflammation



# Brain Healers: BDNF

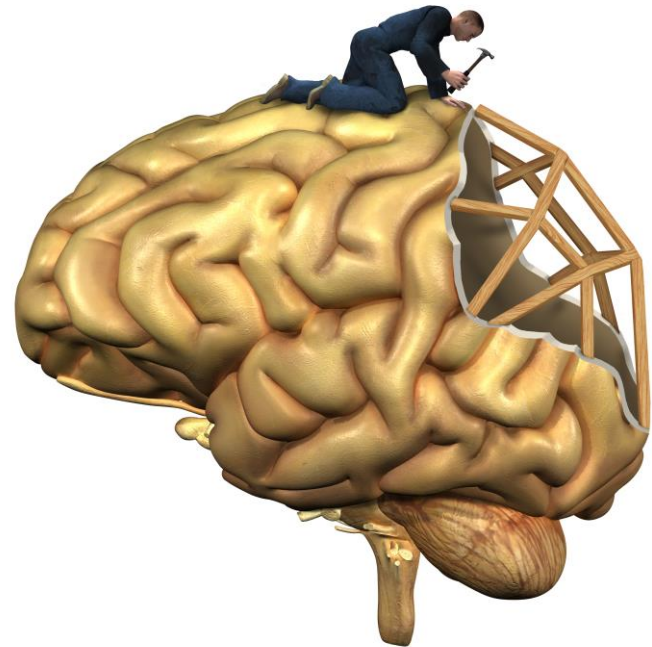


**B**rain-  
**D**erived  
**N**eurotrophic  
**F**actor



# Brain Benefits of BDNF

- Improve the healing and repair mechanisms in the brain
  - Better recovery after stroke, concussion, or other forms of damage to the brain
- Help the process of growth and maturation of new neurons
  - Better memory
  - Better sleep
  - Better mood
  - Less aging in the brain



# Food That Increase BDNF Levels

- Omega-3 Fatty Acids: DHA and EPA
- Blueberries
- Cocoa
- Grapes
- Caffeine

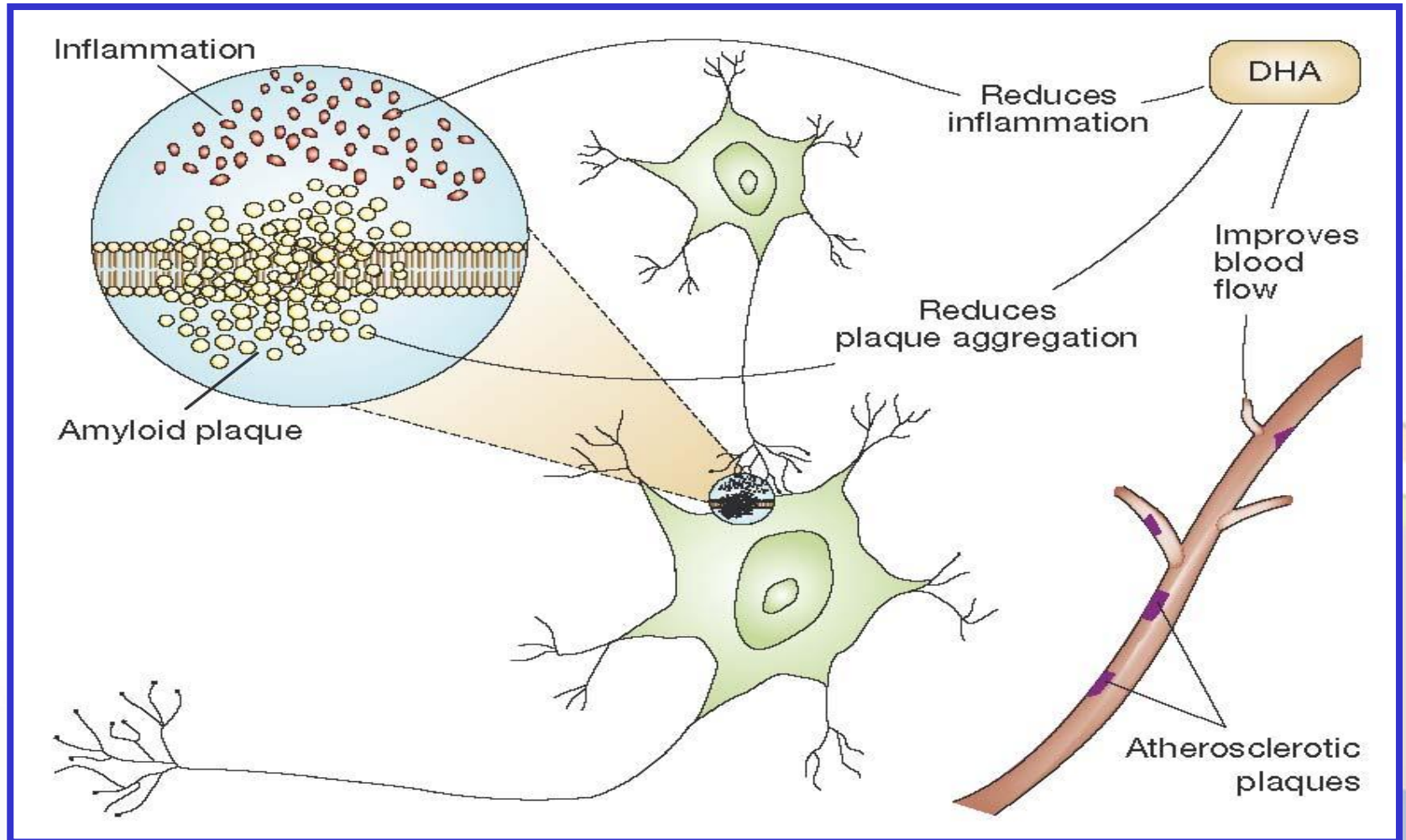


# Best Brain Foods: #1 Salmon

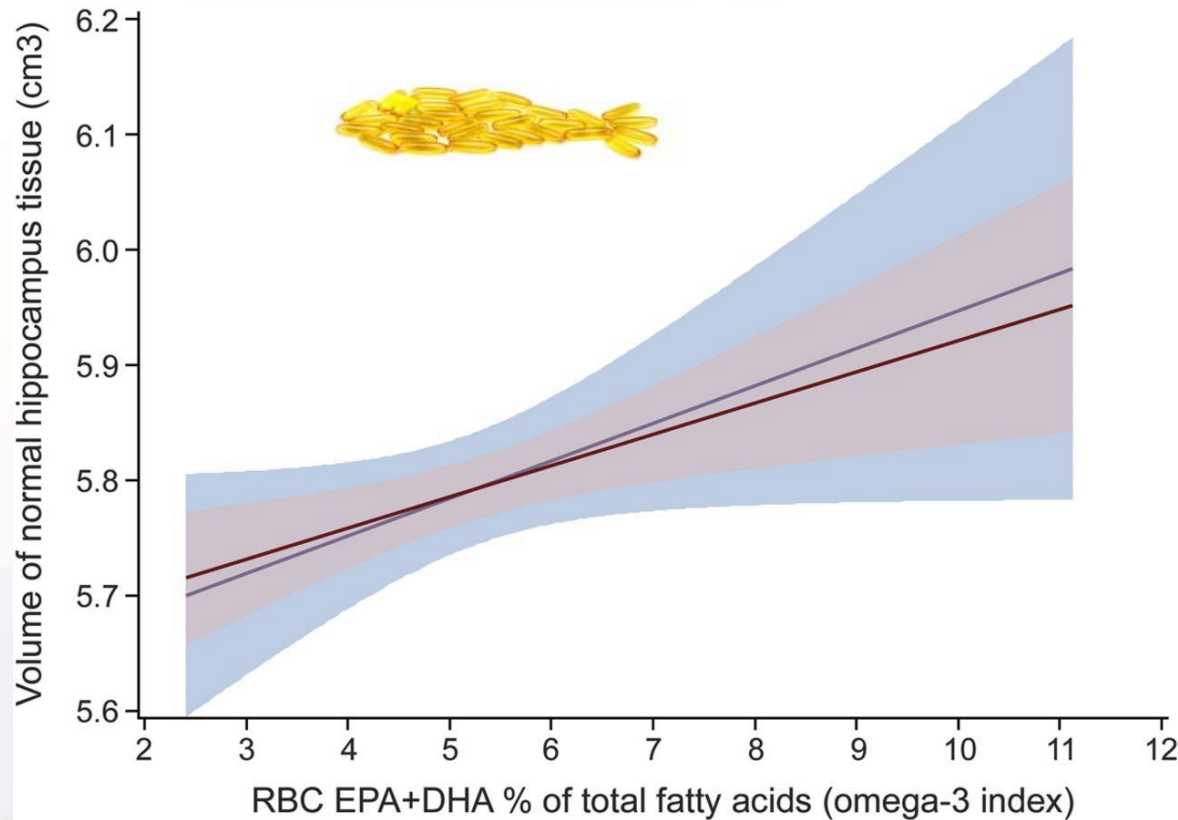
- High in Omega-3 fatty acids, which increases BDNF and improves healing in the brain
- High in levels of vitamin B12



# Omega-3 Fatty Acids: DHA-EPA



# More Omega-3 Fatty Acids: Bigger Hippocampus





# Best Brain Foods: #2 Blueberries

- Increase BDNF in the hippocampus
- Increase levels of vitamins A, C, K
- Increases levels of flavonoids



# Best Brain Foods: #3 Tomatoes

- Contains lycopene which increases blood flow and reduces risk of stroke
- Also contains vitamin C and biotin, which are good for nails, skin, and hair



<https://www.bbcgoodfood.com/howto/guide/10-foods-boost-your-brainpower>

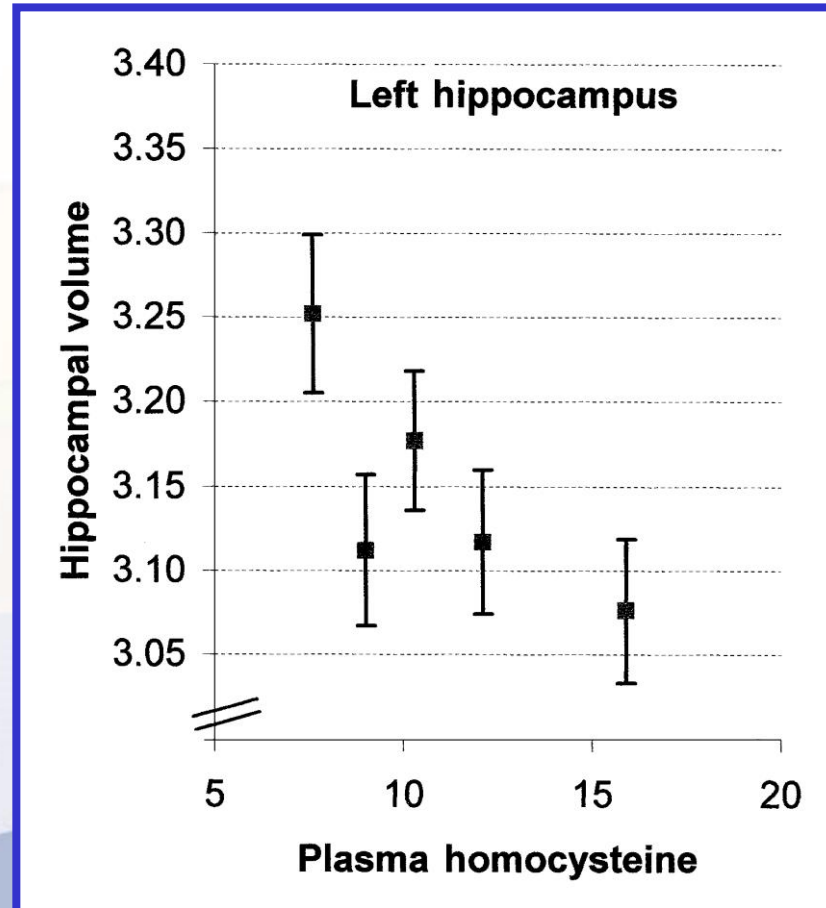
# Best Brain Food: #4 eggs

- Contains high levels of vitamin B12 and B6



# Low B12 (causes high levels of homocysteine):

## Smaller Hippocampus



*Den Heijer et al., Brain 126:170-5, 2003*

# Vitamin B12

- Improves blood flow to the brain
- Increases cognitive function and processing speed
- Reduces risk of inflammation, stroke, heart attack, and Alzheimer's disease

*Ho, et al., 2011.;*  
*den Heijer, et al., 2003.;*  
*Firbank, et al., 2010.*





# Best Brain Foods: #4 Dark chocolate

- High in Cocoa, which increases BDNF
- Improves blood flow to the brain
- Improves mood and memory



<https://www.health.harvard.edu/blog/your-brain-on-chocolate-2017081612179>

# Best Brain Foods: #5 Spinach

- High in vitamins A, B6 and K (not iron)
- High in fiber and protein



<https://www.bbcgoodfood.com/howto/guide/ingredient-focus-spinach>

# Best Brain Foods: #6 Coffee

- Increases levels of BDNF
- Reduces risk of cognitive decline with aging
- Improves attention and focus



# Best Brain Foods: #7 Grapes

- Increases levels of BDNF and resveratrol
- Reduces inflammation and improves blood flow to the brain
- Lowers the risk of heart attacks, diabetes, and cancer



<https://www.alzdiscovery.org/cognitive-vitality/ratings/resveratrol>



# Best Brain Foods: #8 Oatmeal

- High in iron, magnesium, fiber, and protein
- Lowers cholesterol and improves blood flow



<https://www.well-beingsecrets.com/health-benefits-of-oatmeal/>



# Best Brain Foods: #9 Curcumin

- Increases levels of BDNF
- Has strong anti-inflammatory effects, has been used for treatment of arthritis and cancer
- Lowers levels of amyloid plaques, and reduces risk of Alzheimer's disease



<https://www.healthline.com/nutrition/turmeric-vs-curcumin>

# Best Brain Food: #10 Walnuts

- High in vitamin E and omega-3 fatty acids
- Reduces inflammation and improves blood flow to the brain



<https://www.bbcgoodfood.com/howto/guide/health-benefits-nuts>

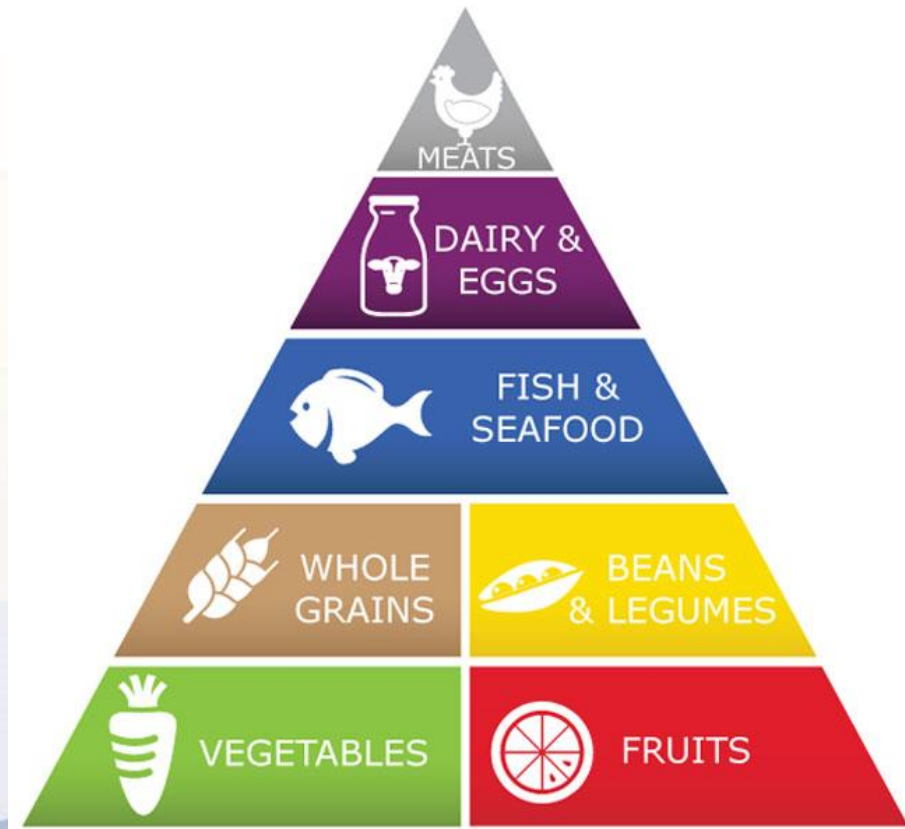
# Certain Foods Can Grow Your Brain by:

- Increasing levels of a healing protein: BDNF
  - BDNF helps with growth of new brain cells
- Reducing levels of toxic amyloid in the brain
  - Too much amyloid kills brain cells
- Increasing blood flow in the brain
  - Reducing risk of stroke is the best way to keep your brain young and strong



# Mediterranean Diet

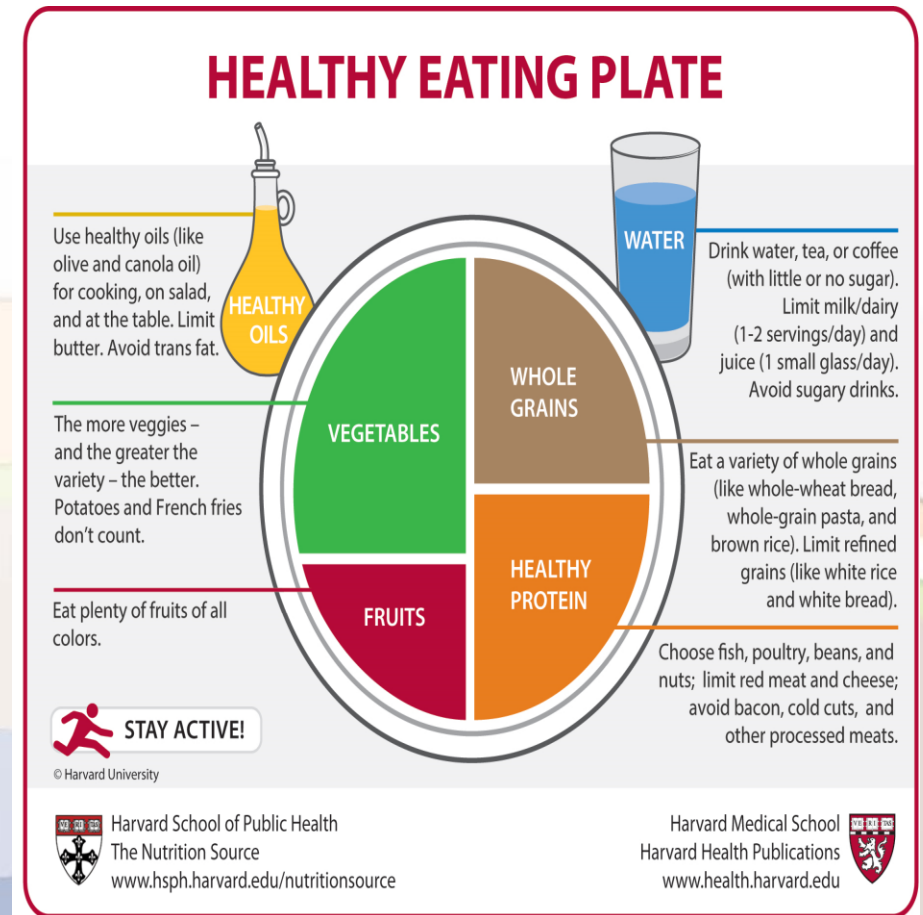
## Mediterranean Diet Pyramid



<http://www.beautyglimpse.com/wp-content/uploads/2014/08/Mediterranean-Diet-1.jpg>

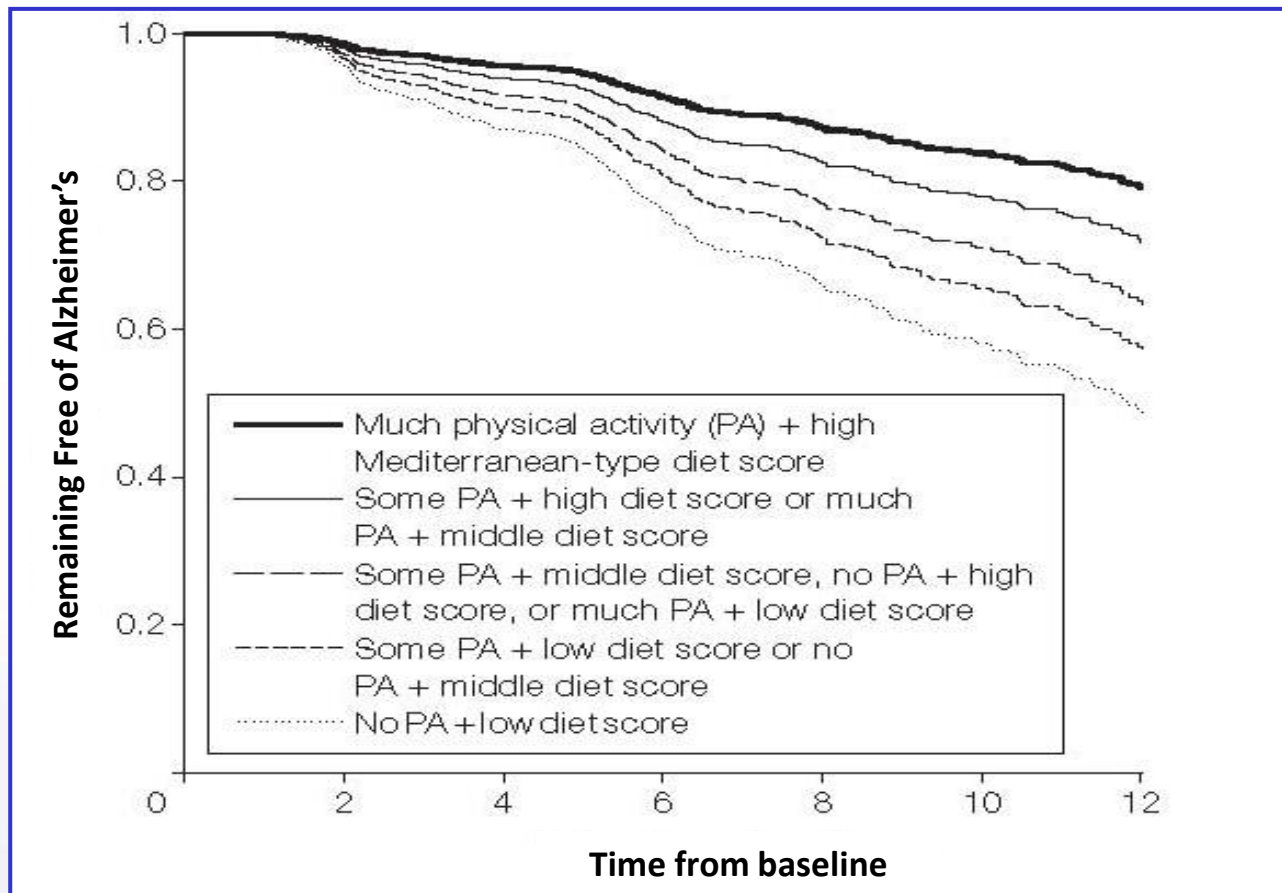
# Best Brain Diet

- Low Carb
  - No white rice
  - No white bread
- High protein
  - 1-2 lean meats/week
  - 1-2 salmon a week
- Lots of fruits and vegetables
- Plenty of water
- DHA-EPA supplements
- Vitamin B12 and D





# Mediterranean Diet and Physical Activity (PA), More Effective Together



# Brain-Mind-Body Connection



# Why do we forget names?

- Hypertension
- Diabetes
- Alcoholism
- Depression
- Heart failure
- Obesity
- Vitamin deficiency
- Sleep apnea
- Poor sleep
- Too much work
- Information overload
- Too many responsibilities
- High expectations
- Poor attention
- Poor diet
- “Can’t do it” mentality

# MAJID FOTUHI, MD, PHD

Mobile: 1.443.722.0888

[mfotuhi@neurogrow.com](mailto:mfotuhi@neurogrow.com)

