Maintaining Optimal Brain Health

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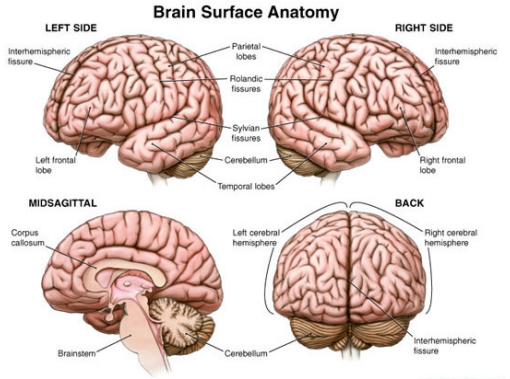
1

Fun Facts!

- **3 lbs** is the weight of and average human brain
- The brain is **2%** of your body weight but uses **20%** of your blood supply
- The human brain has **86 billion nerve cells**
- The surface of the brain is about 2.5 ft^2
- We pass out after **10 seconds** of loosing blood supply to the brain
- The size of your brain and your intelligence level are NOT related

2

Brain Anatomy



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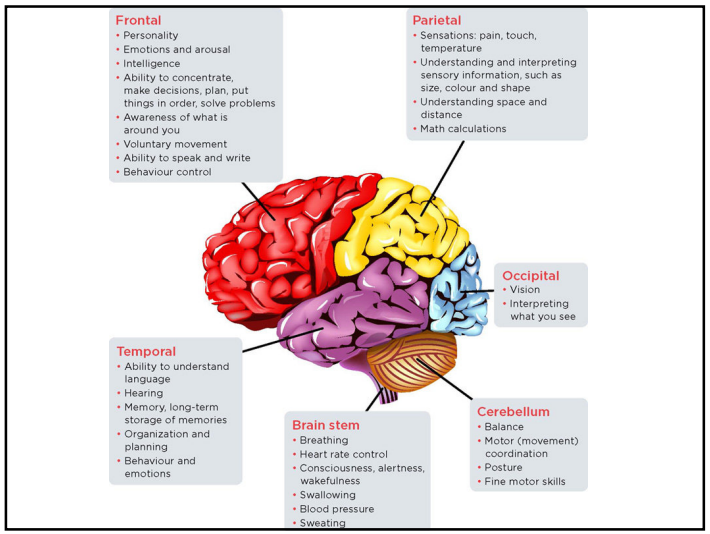
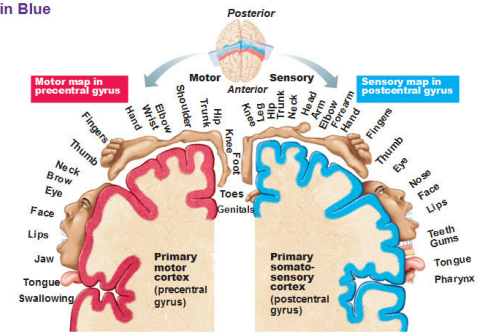


4

Homunculus of Primary Somatosensory Cortex in Blue

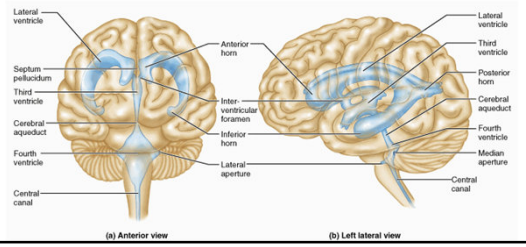
Note that each hemisphere receives info from the opposite side of the body



5

CSF spaces…

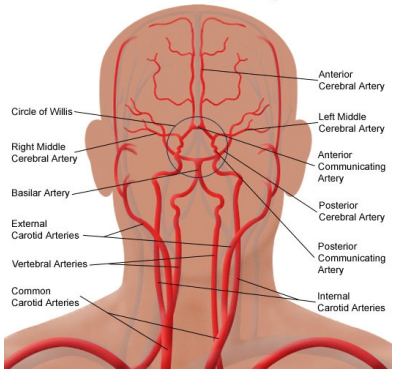
- **150cc of CSF aka spinal fluid in the body**
- CSF is recycled 3x per day, so we make about 0.5 liters per day.
- HYDROCEPHALUS: results from decreased absorption or blockage in drainage system.



6

Arteries of the Brain…

Arterial Circulation of the Brain, Including Carotid Arteries



7

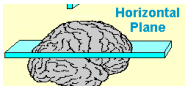
How do we study the brain?

- **ANATOMICAL**
  - **CT scan**
  - **MRI**
  - **Brain biopsy**
  - **Brain dissection / Autopsy**
- **FUNCTIONAL**
  - **EEG**
  - **fMRI**
  - **PET**
  - **Brain function tests**

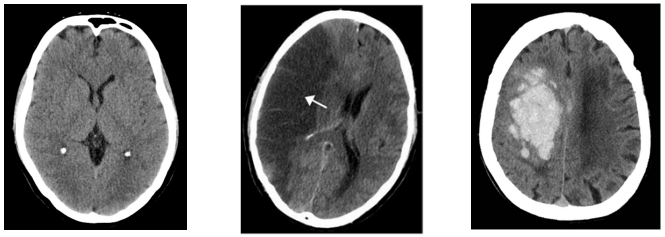
A brain lesion does NOT always translate in a brain malfunction.
A brain malfunction can occur WITHOUT a lesion.

8

CT Scan

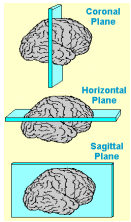


- Screening/Diagnostic tool
- Radiation exposure
- Images are grainy shades of grey

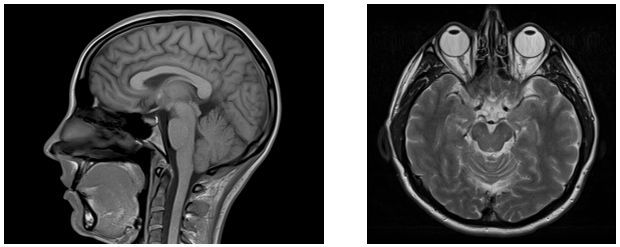


9

MRI Scan

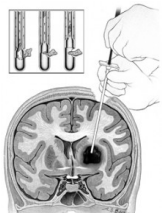


- More definitive diagnostic tool
- NO RADIATION exposure
- Images are very detailed

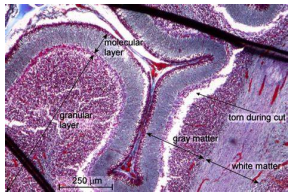


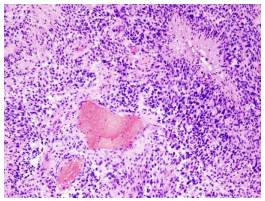
10

Brain Biopsy



- Surgery under general anesthesia
- Very small samples of brain tissue is removed
- Only performed when absolutely necessary (e.g. brain tumor)

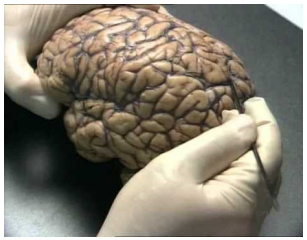




11

Brain Dissection

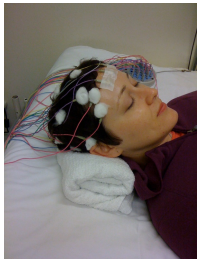
- Postmortem

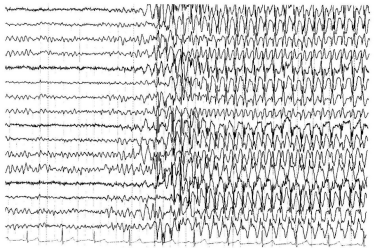


12

EEG

- Measures the electrical activity of your brain; same as EKG measures the activity of your hearth.
- Important in diagnosis of seizures and evaluate coma states.

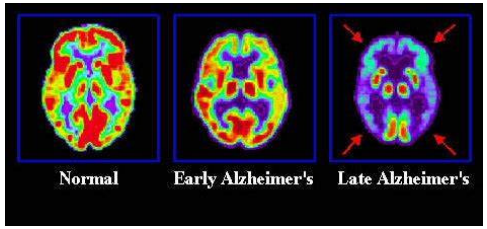




13

PET

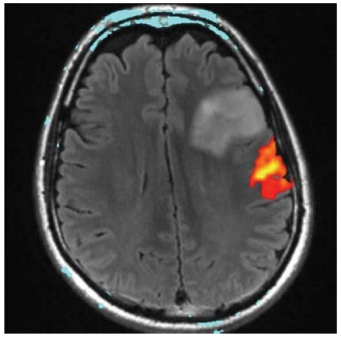
- Measure brain activity by tracking radioactive glucose (sugar) use by the brain
- Hyperactivity (Tumor, Seizure) vs. Hypoactivity (Stroke, Dementia)



14

Functional MRI

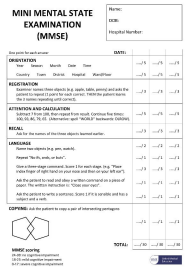
- MRI is performed while you are doing a specific task
- The part of your brain that is involves lights up

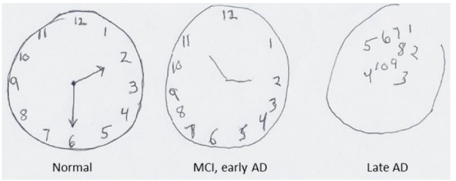


15

Brain Function Test

- **Administered by professional**
- **Can be used to diagnose and track disease progression**





16

The Problem:
Aging negatively affects the brain

17

The Solution:
Lifestyle Changes to Improve Brain Fitness

18

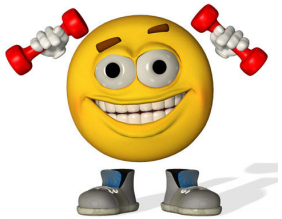
O.P.T.I.M.A.L.
M.E.M.O.R.Y.

19

Obtain regular exercise
Put out the cigarettes
Take vitamins
Involve yourself with others
Maintain Healthful Nutrition
Aim for a goodnight's sleep
Learn something new
Moderate alcohol intake
Engage in life
Manage stress
Organize your thinking/life
Routinely protect your brain
Yes you can attitude

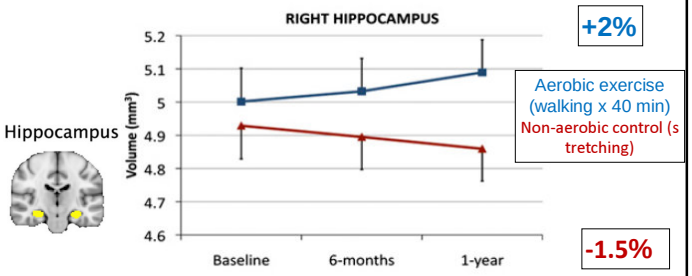
20

Obtain Regular Exercise



21

Take a walk!

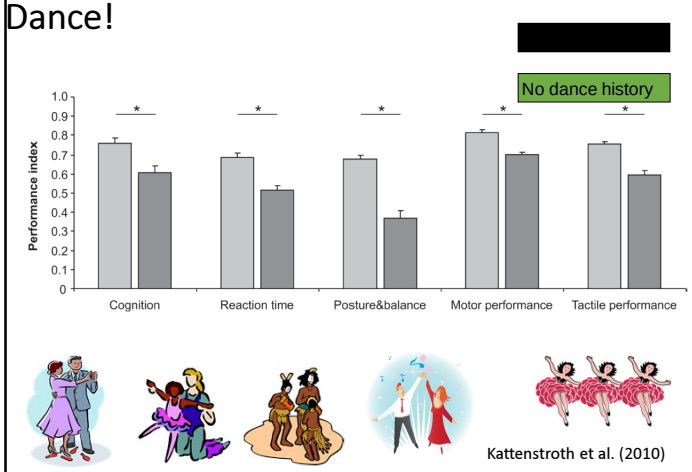


120 65+ yo cognitively healthy
randomly assigned to 12 month program

Erickson et al (2011)

22

Dance!



Kattenstroth et al. (2010)

23

- Exercise:
  - Increases neurotransmitters necessary for good neuron function
  - Supports good blood vessels
  - Reduces risk of other medical risk factors
  - Reduces brain inflammation

24

Put out the cigarettes

Take Vitamins

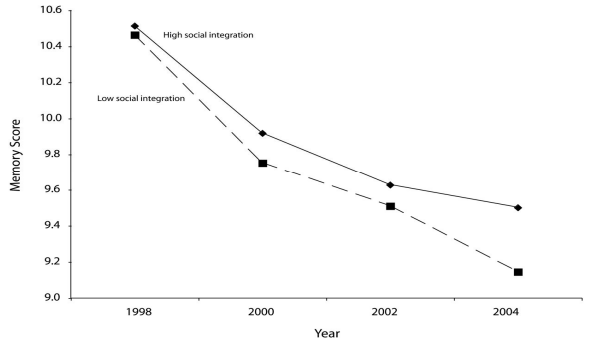
25

Involve yourself with others

26

Make some friends

social activity: marital status, volunteer activities, and contact with parents, children, and neighbors



N = 11000, 50+ years old, living in community

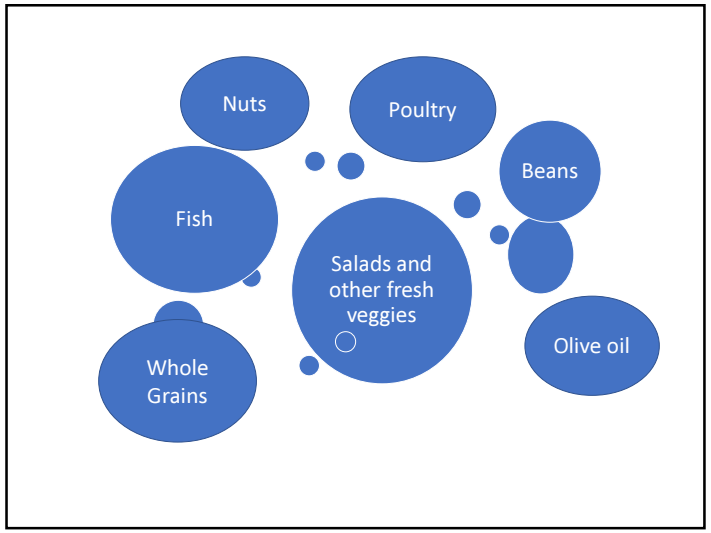
Ertel, K. A. et al. Am J Public Health (2008)

27

Maintain Healthful Nutrition

MIND Diet:
Mediterranean Intervention for Neurodegenerative Delay

28



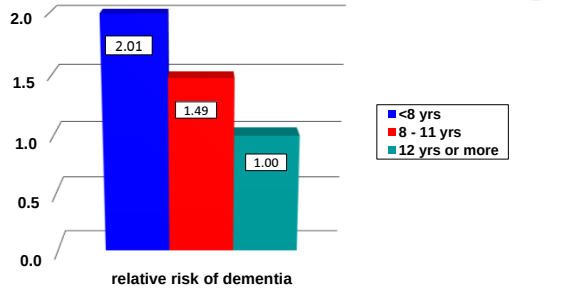
29

Aim for a good night's sleep

Learn something new

30

Go back to school



Launer et al. (1999)

31

Cognitive Reserve

Reading especially important

Beware brain training programs

32

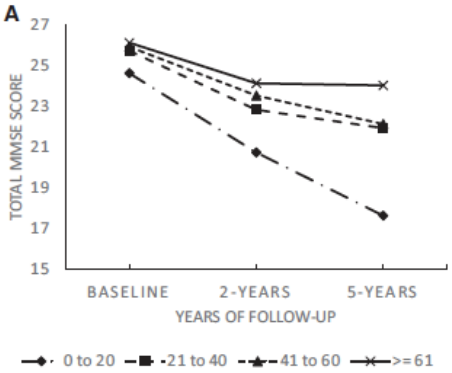
Presenters: Sonia Geschwindt, MD; Amanda Johnson, PhD from UP Health System Brain and Spine. Reproduced in abbreviated format by permission

Moderate alcohol intake

Engage in life!

33

Get out of the house

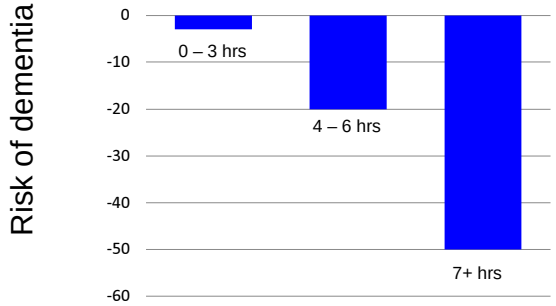


Life Space Mobility

Silberschmidt et al. (2017)

34

Get a hobby



Hughes et al. (2010)

35

Manage stress

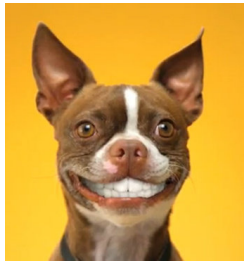
36

Organize your thinking, organize your life

Routinely take precautions to protect your brain

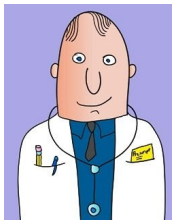
37

Yes you can! Maintain a positive attitude



38

Visit your doctor



Cardiac health=brain health

39

Lose that spare tire

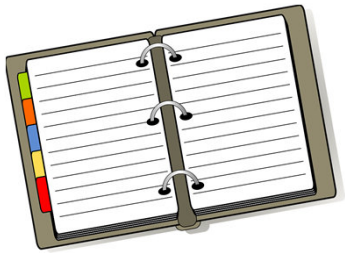
Manage chronic medical conditions

40

Practical Strategies to Enhance Memory

41

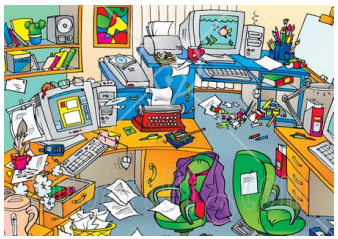
Use a Planner



A place for everything and everything in its place.

42

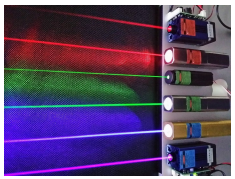
Remove Clutter



Checklists for Infrequent Activities

43

Actively listen and read- laser focus



Remembering Names

44

Attention and Memory Techniques

- Internal vs. External

45

Talk yourself through tasks

Mnemonic techniques

Don't Multitask: Unitask

46

Alarms

Distraction notepad

47

Be Patient with Yourself

48

Beware Snake Oil Solutions

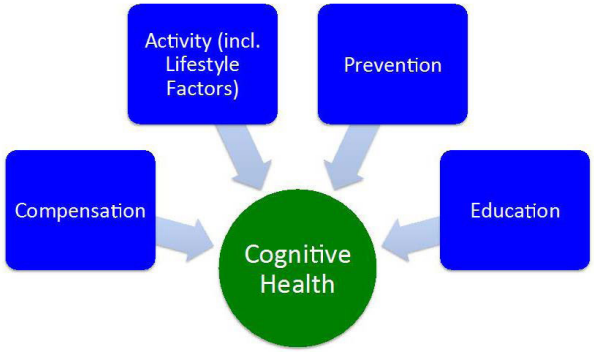
49

Conclusion

- Aging affects the brain in a number of adverse ways
- There are things you can do to improve brain fitness
  - Physical
  - Cognitive
  - Social

50

C.A.P.E. Model



51

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52