

UNIVERSITY *of* WASHINGTON

Aging and the Brain

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Overview

- Important statistics on aging
- Brain anatomy and physiology review
- Brain aging
- Life's simple 7 + 1



Statistics on Aging

- Life Expectancy and Life Span
 - The average life expectancy of individuals born today in the US is 78.7
 - Sixty-five years olds in US can expect to live an average of 18.6 more years
 - ...19.9 for females
 - ...17.2 for males



Statistics on Aging

- Life Expectancy

- In Virtually all species, females outlive males
- Women have more resistance to infections and degenerative

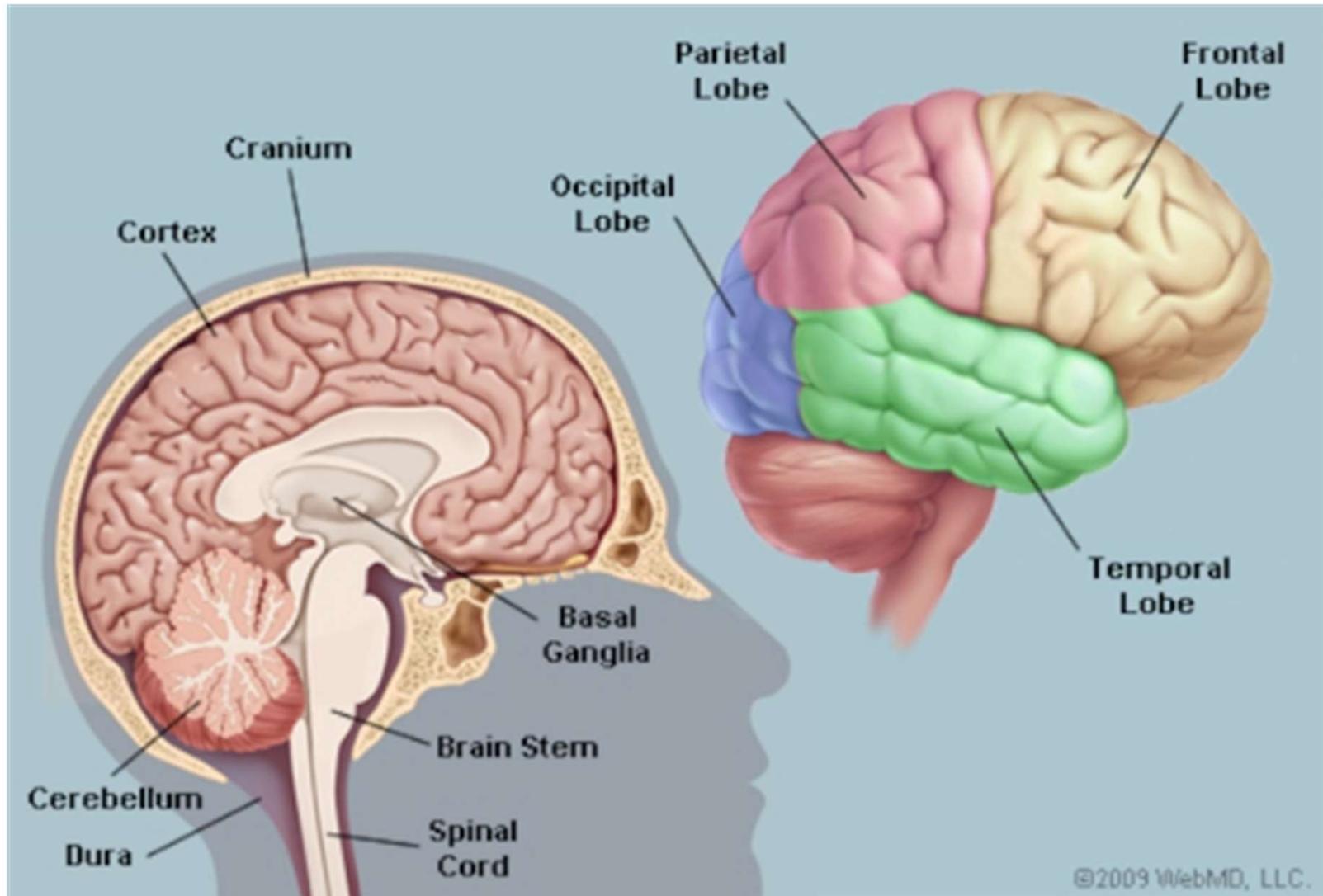
- Centenarians

(individuals 100 years and older)

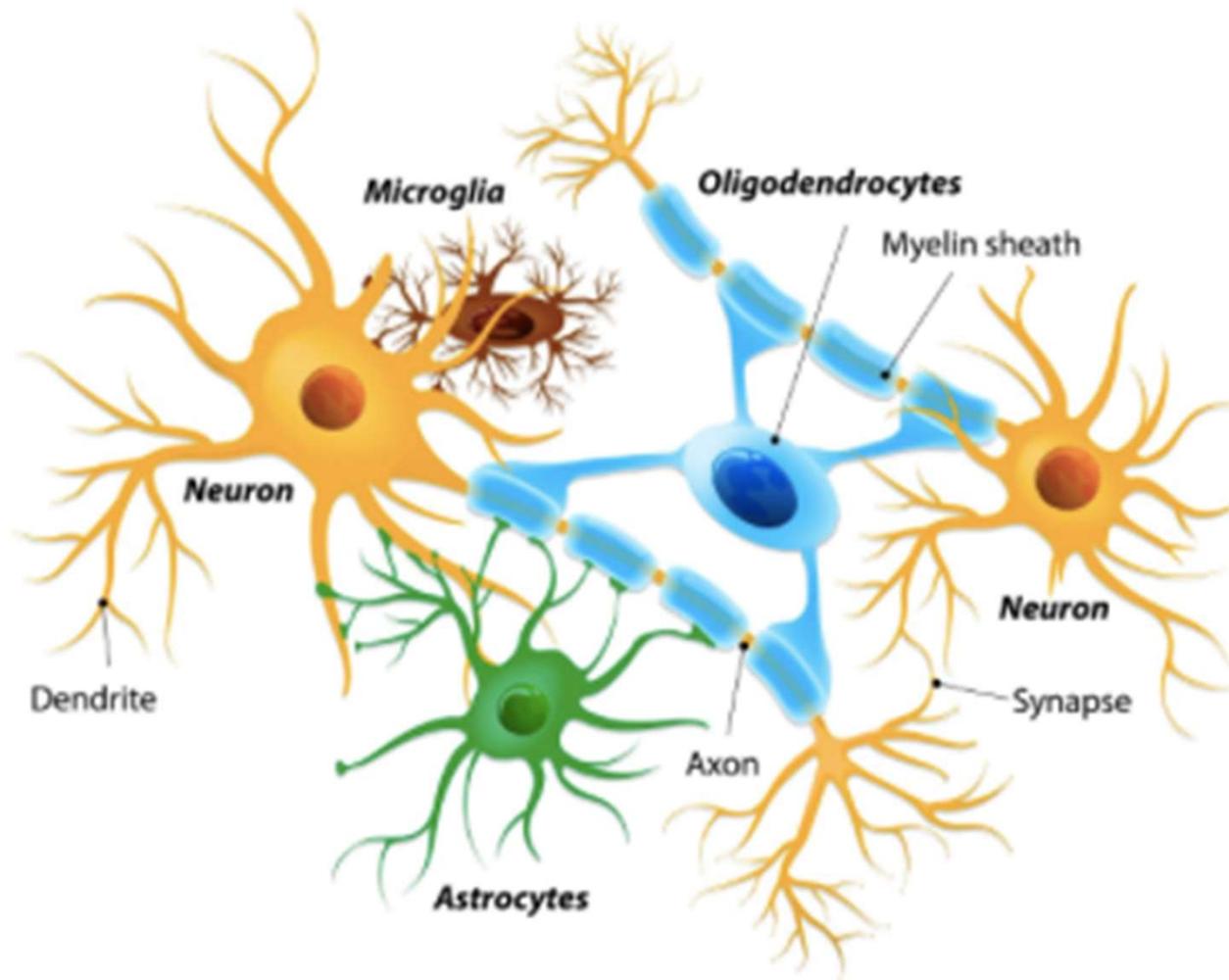
- Increasing at a rate of approximately 7 percent each year

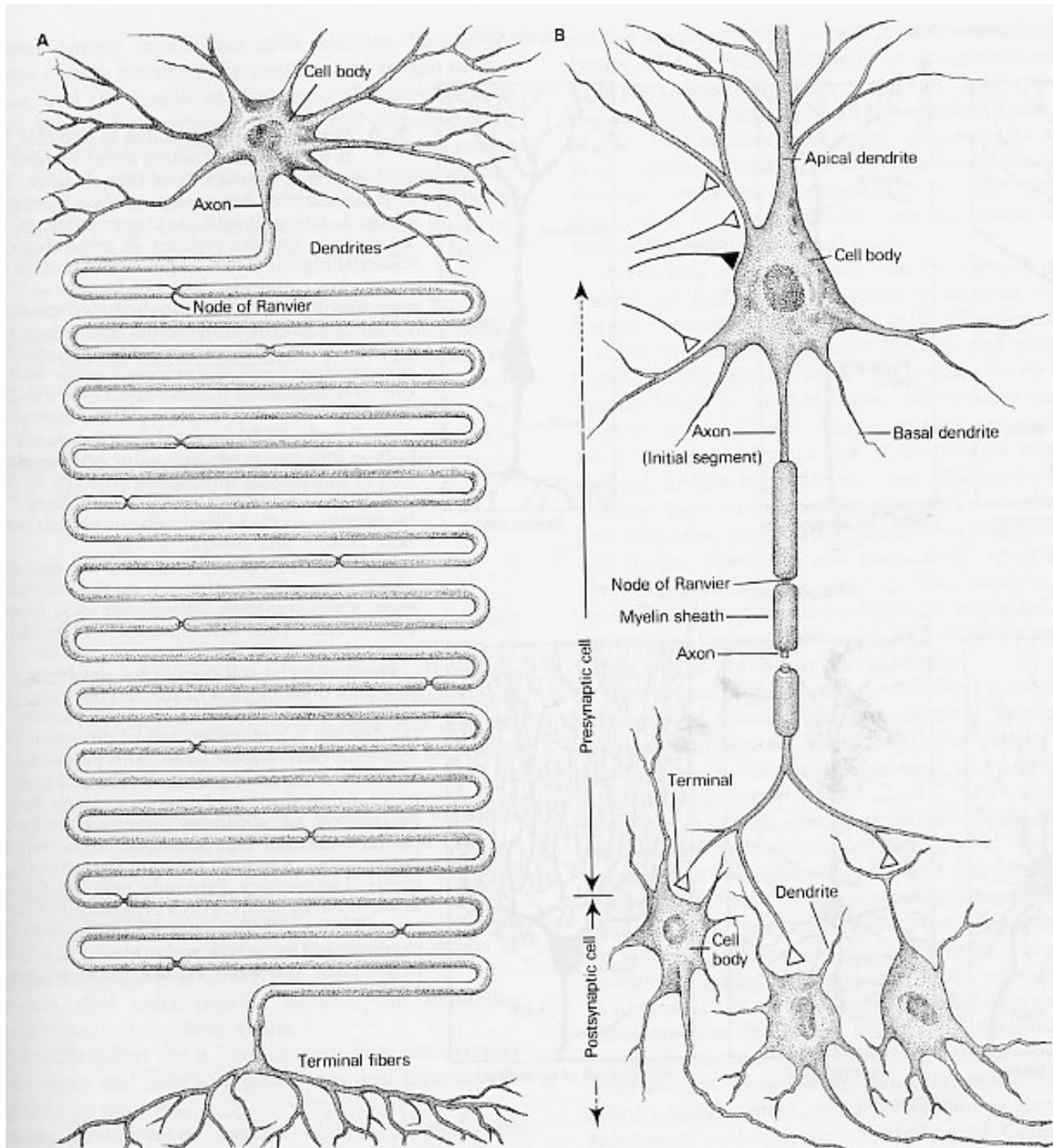


Get to Know Your Brain



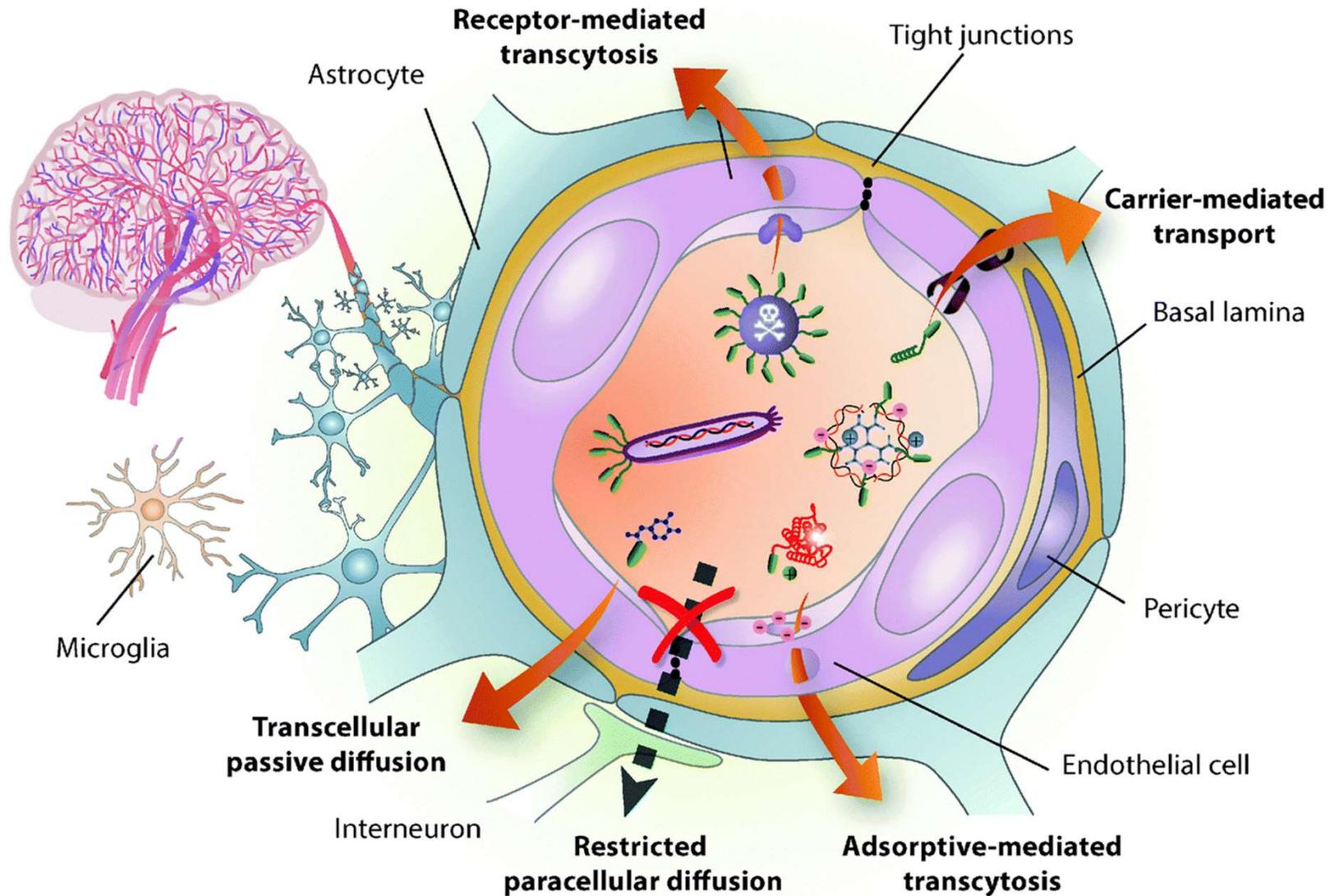
Get to Know Your Brain – Brain Cells





EACH NEURON HAS,
ON AVERAGE,
10,000
CONNECTIONS
RANGING FROM A
FEW THOUSAND TO
OVER 100,000.

Get to Know Your Brain – Blood Brain Barrier



Get to Know Your Brain

- The brain is constantly changing
- Unused connections get pruned; used connections get strengthened
- This process continues throughout our life



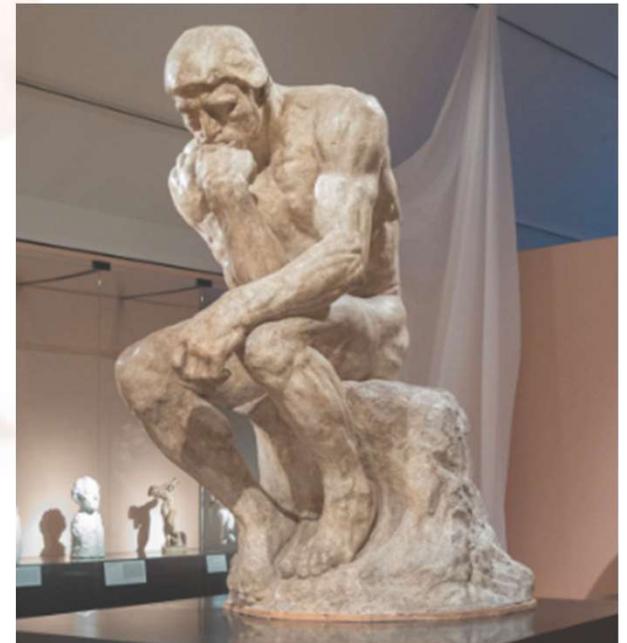
Definition of Cognition

“Everything that is related to knowledge”

- In other words, **knowledge acquired through experience**, and our subjective characteristics that allow us to integrate all of this information to evaluate and interpret our world.
- In other words, **cognition is the ability that we have to process the information** that we receive from different sources to convert them into knowledge.

Cognition includes different processes, like **learning, attention, memory, language, reasoning, decision making**, etc., which form part of our intellectual development and experience.

Latin root *cognoscere*, which means “to know”.

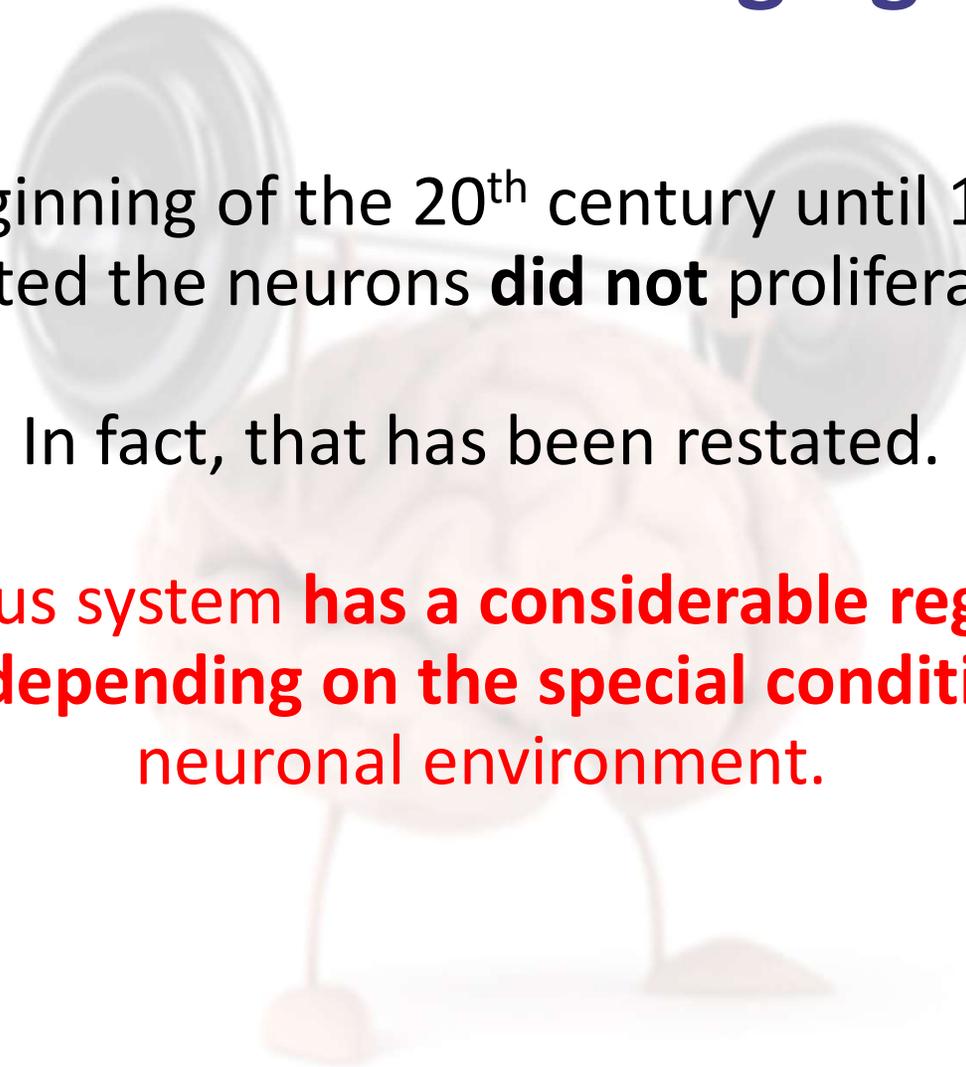


The Brain and Aging

From the beginning of the 20th century until 1990's, it was stated the neurons **did not** proliferate.

In fact, that has been restated.

The nervous system **has a considerable regenerative potential depending on the special conditions of the neuronal environment.**



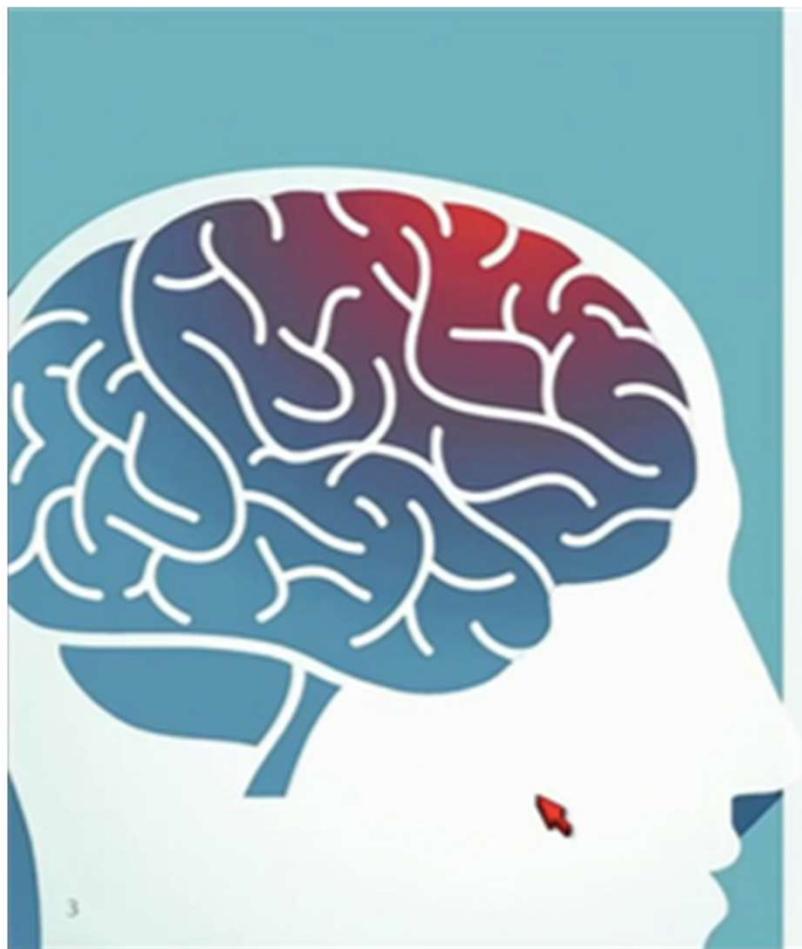
Healthy Brain Aging

Erton-Lyons D et al. Neurology 2009; 72(4) 354-60

Row JW et al. Gerontologist 1997; 37(4) 433-440

- **Defined healthy brain aging as:**
 - Maintenance or improvement in cognitive function
 - Ability to make appropriate decisions and remain independent
 - Avoidance of disease and disability by maintenance of physical, cognitive and sustained social engagement
- **Larger brain and hippocampal volumes are associated with preserved cognitive function**

The Brain and Aging



The brain can begin showing signs of **Structural Injury** as a person enters their 20-30s

3 out of 5 Americans will develop a brain disease



including Alzheimer's, dementia, stroke and vascular dementia.

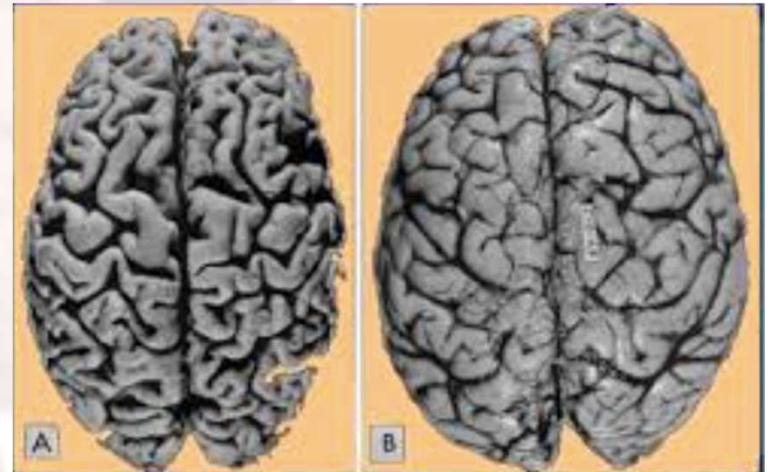
By 2030, the total cost of Alzheimer's, dementia and stroke is expected to exceed

\$1 TRILLION

The Brain and Aging

The brain loses 5-10 percent of its weight between the ages of 20 to 90

- **Characteristics of brain aging is:**
 - Brain volume loss, especially in hippocampus and frontal lobes
 - Myelin loss
 - Loss of synapsis and dendrites
 - Cytoskeleton changes
- **Progressive loss of function across multiple systems:**
 - Sensation, cognition, memory, motor control, and emotions



Age-Related Changes in and Learning

Memory

- You may find:
 - Increased difficulty finding words
 - More problems in multi-tasking
 - Mild decreases in ability to pay attention



You can still:

- Learn new things
- Create new memories
- Improve vocabulary and language

Barriers to Healthy Aging

Modifiable Risk Factors

- Unhealthy Diet
- Physical Inactivity
- Tobacco Use
- Alcohol Use
- Drug use
- Polypharmacy
- Stress/Sleep

Intermediate Risk factors

- Raised blood pressure
- Raised Blood glucose
- Abnormal lipids
- Over weight /obesity
- Heart disease
- Pulmonary disease
- Mental Illness
- Arthritis
- Osteoporosis
- Dental care

Brain Health

- **Poor brain health may eventually result in cognitive impairment** or dementia via underlying disorders that include but are not limited to:
 - Alzheimer disease (AD)
 - Stroke and vessel impairment
 - Brain trauma
 - Other neurodegenerative disorders



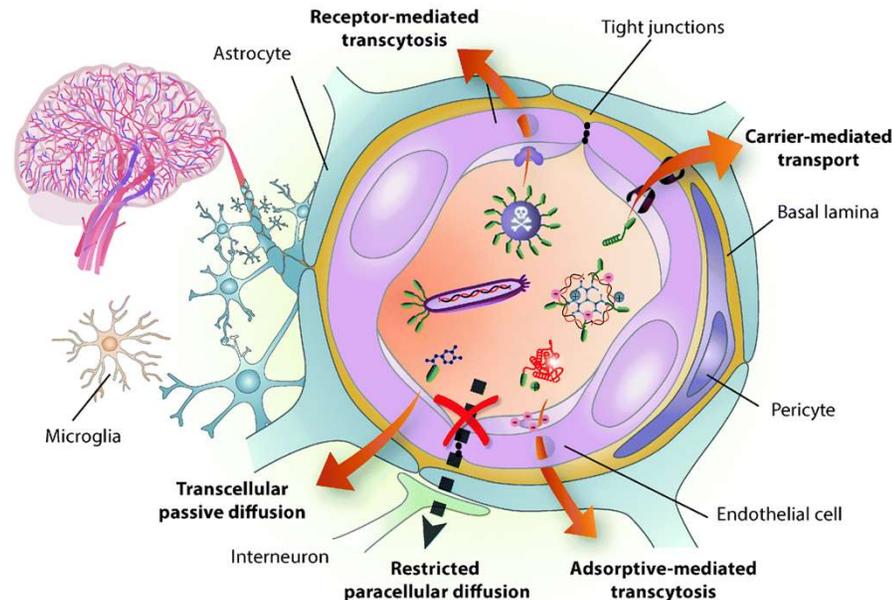
Brain Health Requires Consideration of the Life Continuum

- **Many brain disorders manifest later in life but, in fact, are life-course illnesses.**
- It has been shown that even during the period of brain development, subtle injury can begin to accumulate.
 - Risk of stroke in age 50's and 60's depends not only on the BP at the time that risk is being assessed, but also on BP patterns experienced in the preceding 1 or 2 decades.

Brain Health

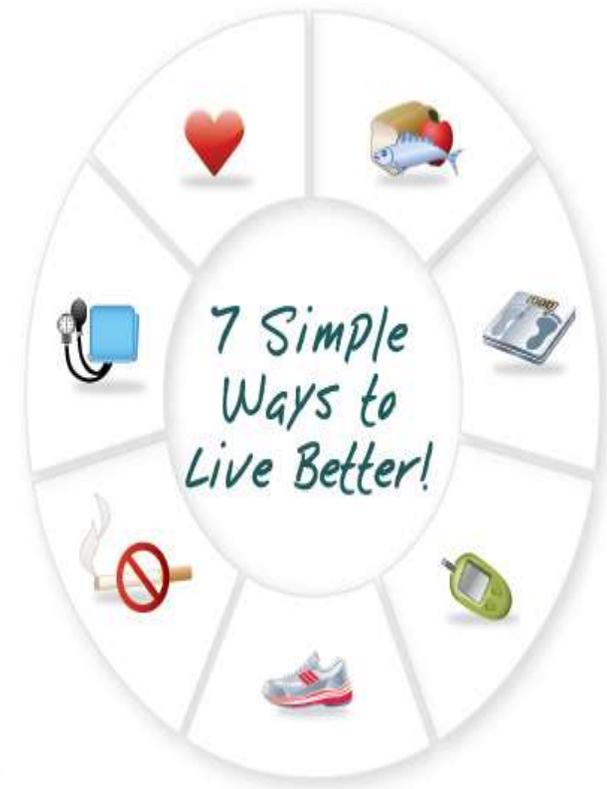
Research is establishing the connection between cardiovascular health and brain health

- Factors that increase the risk of **cardiovascular disease** are now recognized as factors that **increase the risk of developing brain disease.**



Life's Simple 7 + 1

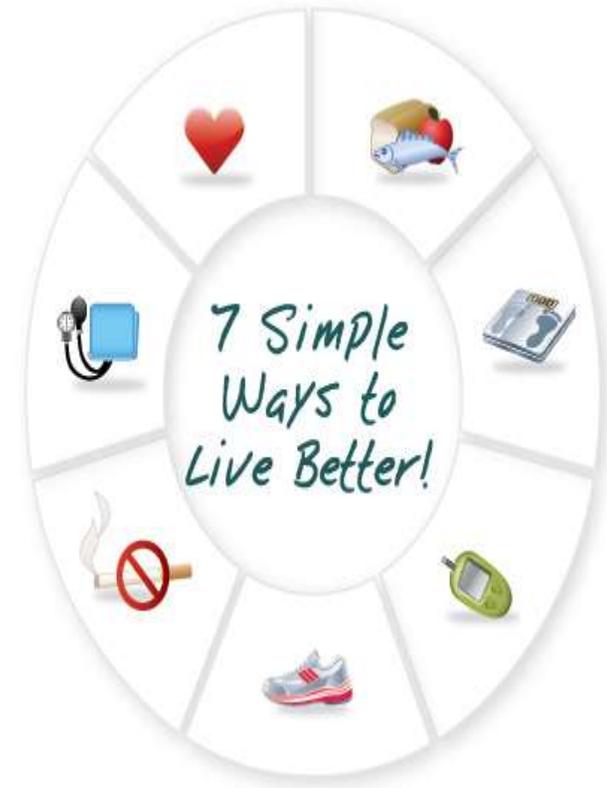
- Manage Blood Pressure
- Get Active
- Control Cholesterol
- Eat Better
- Lose Weight
- Don't Smoke
- Reduce Blood Sugar
- Active Brain



To find out where you stand with the Life's Simple <http://mylifecheck.heart.org/> and take the assessment.

Let's Get Started With Life's Simple 7 + 1

- You make many choices every day, like what color socks to wear or how to fix your hair.
- When it comes to **making decisions that keep you healthy**, it may seem difficult to choose better options when so many things seem easier or just more fun.
- Knowing the healthy choices to make will help you take small steps in a healthy direction! Before you know it, it will be easier to make choices every day that help keep you healthy.



1. Don't Smoke or Use Smokeless Tobacco



- Smoking cigarettes, e-cigarettes, vapes or using smokeless tobacco (also called dip, snuff or chew) are some of the worst things you can do to your body.
- Using **ANY** tobacco product damages nearly **EVERY** organ in your body and can cause heart disease and cancer.
- Using smokeless tobacco is **NOT a safe alternative** to smoking!

Harmful Chemicals that can be found in Smoke or Smokeless Tobacco



- There are thousands of chemicals found in cigarette smoke and smokeless tobacco that also found in other things:
 - **Acetone** — nail polish remover
 - Hydrogen cyanide — insecticide
 - **Methanol** — antifreeze
 - Cadmium — batteries
 - **Hydrazine** — rocket fuel
 - Toluene — paint thinner
 - **Polonium 210** — toxic radioactive chemical
 - Formaldehyde — embalming fluid
 - **Lead** — once used in paint
 - Nitrosamines — cancer-causing substances
 - **Arsenic**— once used in rat poison
 - Propylene glycol – automobile anti-freeze

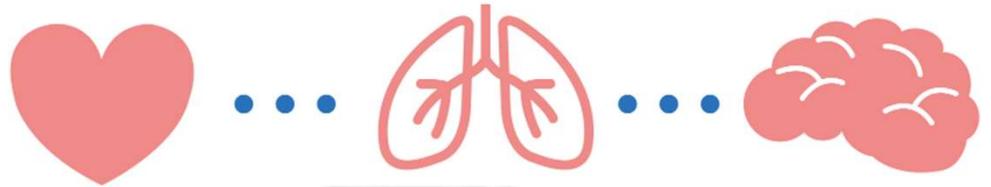
2. Be Physically Active



- Regular physical activity helps keep your heart, muscles, bones, and joints healthy and strong.
- Physical activity can also raise self esteem, **improve your mood, help you sleep better** and give you more energy.
- The American Heart Association recommends that children and teenagers get **at least 60 minutes** of moderate to vigorous physical activity every day.

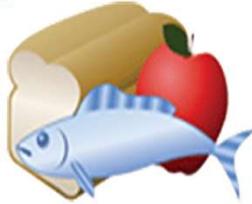
Be Physically Active

TIPS

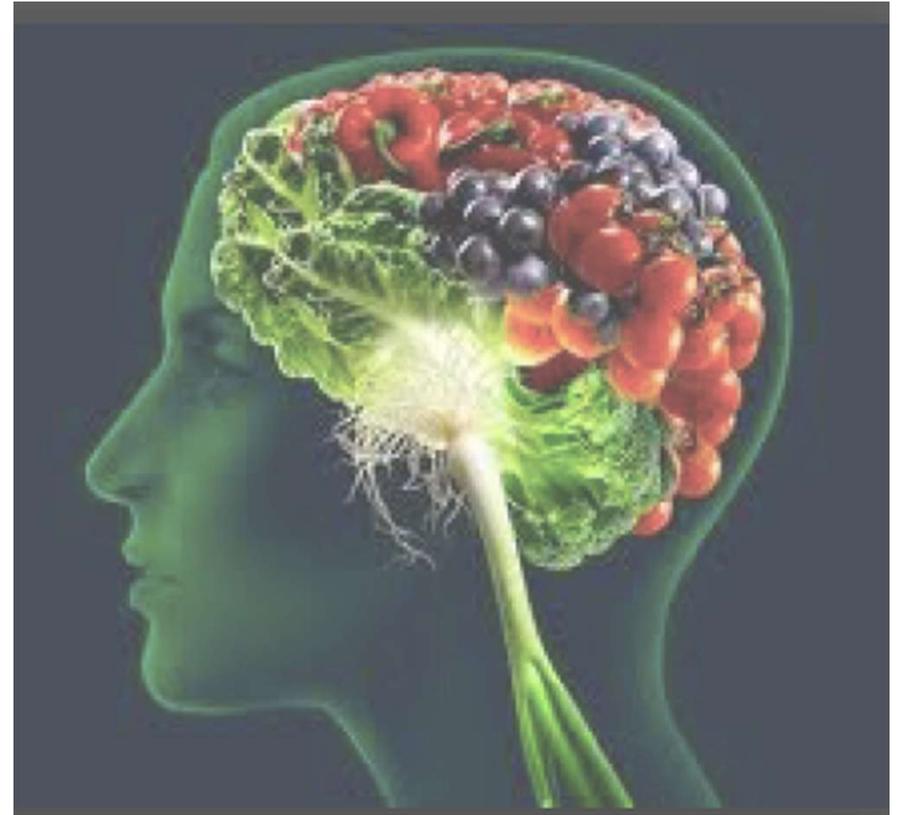


- **Start slow and build up to a total of 30 to 60 minutes on most or all days of the week.**
- Look for chances to be more active. Take 10 or 15-minute walking breaks during the day, instead of a coffee break or after meals.
- **Find a routine and make it a habit.**
- Find an exercise partner or exercise class to help you stay interested and hold you accountable.

3. Eat a Heart-Healthy Diet



- Eating healthy foods is one of the most important ways to keep your heart and body working at its best.



- Try to eat a diet that includes **whole grains, fruits, vegetables, low-fat dairy products, poultry, fish, and nuts** while limiting sodium, sugary foods and beverages, and red meat.

Mediterranean Diet (Mostly Plants)

NEJM June 26, 2003



High Consumption of:

Fruits (4-6 servings daily)

Berries (flavanoids, phytochemicals)

Vegetables (4-6 servings daily)

Beans (3-6 servings daily)

Nuts (3-5 pieces)

Whole grains (3-6 servings daily)

Olive oil (monounsaturated fatty acids)

Fish – broiled not fried!

Alcohol – red

Spices (turmeric, ginger, garlic)

Low Consumption of:

Saturated fat

Dairy products

Red meat and poultry

4. Keep a Healthy Weight



- Gaining too much weight at any point in your life can be dangerous to your health.
- A person is considered overweight or obese when they have more body fat than is considered healthy.
- Being overweight **can increase your risk of serious health problems like diabetes, heart disease, high blood pressure, or other breathing problems and even some types of cancer.**

5. Keep Your Blood Pressure Healthy



- When your heart and blood vessels are healthy, the vessels are flexible enough to expand and contract, which produces normal blood pressure.
- When blood vessels become less flexible or narrowed, the heart has to pump harder to get the blood to go through the vessels. This causes an increase in pressure in the vessels or **high blood pressure**.
- For optimal brain health, keep blood pressure less than 120/80

6. Keep Your Total Cholesterol Under Control



- Some cholesterol is important for good health, but too much cholesterol in your blood is not good for your body.

Cholesterol combines with other substances in your blood to form “plaque,” which is a thick, hard deposit that can narrow the arteries and make them less flexible, and put you at major risk for heart disease and stroke.



- About **25% of cholesterol** comes directly from what you eat, so we have a lot of control of those numbers. Choose foods low in saturated fat and *trans* fats and high in whole grains.

Keep Your Total Cholesterol Under Control



- Total Cholesterol - less than 200 mg/dL
- LDL (“Bad”) Cholesterol – *LDL Cholesterol goals vary*
 - Less than 75-100 mg/dL Optimal
 - 100 to 129 mg/dL Near Optimal/Above Optimal
 - 130 to 159 mg/dL Borderline High
 - 160 to 189 mg/dL High
 - 190 mg/dL and above Very High
- HDL (“Good”) Cholesterol 50 mg/dL of higher

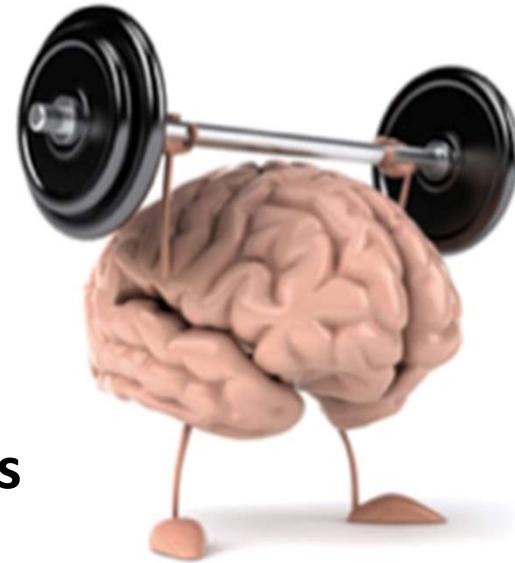
7. Keep Your Blood Sugar Healthy



- When you consume foods and beverages that contain carbohydrates, the digestive system breaks down the carbohydrates into sugar for energy.
 - Foods like **whole grains and vegetables** and other high-fiber foods, can take longer to digest.
 - Foods like refined grains and foods high in added sugar are digested very quickly and are quickly delivered into the bloodstream as sugar.
- **If your blood sugar goes high too often, it can overwork the body's ability to keep your blood sugar in healthy ranges. If this happens, you become more likely to develop diabetes.**

8. Active Brain

- Keep Your Mind Alive
 - Do mentally stimulating activities
 - Read books and magazines
 - Play games or puzzles
 - Learn new things
 - Take or teach a class



Active Brain

- Be Social

- People who have meaningful activities, like volunteering, feel happier and healthier
- **Social activities are linked to reduced risk for health problems, including dementia and effects of aging**

Join in social and other programs through your Area Agency on Aging, Senior Center, or other community organizations



Know Your Numbers



- **Total cholesterol** <200 mg/dL
- **Blood Pressure** <120/80 mmHg
- **Fasting Glucose** <100 mg/dL
- **Body Mass Index (BMI)** <25 Lg/m²
- **Exercise** minimum of 30 minutes
most if not all days
- **Stay involved socially** once a day

THANK YOU !

