

Brain Health

The brain

- The main switchboard composed of grey matter – nerve cells or neurons, and white matter – the nerve fibers that communicate impulses
- Voluntary function: daily physical and mental activities
- Involuntary functions: Internal organ function, immune response, and stress response

The Hippocampus:

- Center for learning, short term memory, long term memory storage, and emotions
- Brain cell death, chronic inflammation, and plaque formation of the Hippocampus can cause decreased cognitive functions and increased risk of dementia and depression
- 700 new brain cells are grown each day
- Enhancing brain cell growth will improve and restore function and also help treat and prevent Alzheimer's disease

The Brain-gut connection

- The brain and the gut are connected by and communicate through the Vagus nerve. This nerve also plays a large role in the stress response
- The brain has approx 100 billion neurons
- The gut has approx. 500 billion neurons
- The brain responds to any change in the gut such as inflammation, stress, antibiotics, high carbohydrate diet, high sugar diet, and environmental toxins
- Information between the brain and the gut is accomplished with neurotransmitter, many of which are produced and stored in your gut. Serotonin (the happiness hormone), Gamma-Alpha Butyric Acid (reduces anxiety), and many Short Chain Fatty acids
- Healthy intestinal flora is essential to brain function

Brain health:

- Level of fitness and physical activity
- Nutrition and intestinal health
- Sleep, stress management, relationships, daily routines, and recreation

Physical Activities that enhance brain health

- Active people enjoy better cognitive function
- Sustained aerobic exercise: 30 min of moderate intensity exercise increases the rate of new brain cell growth
- Strength training stimulates growth of new brain cells
- Exercising to music improves verbal fluency. Used in stroke rehabilitation
- Dancing improves coordination, balance, memory, planning and organizational skills. May protect against cognitive decline
- Playing golf enhances sensory-motor control (changes brain structure)
- Yoga improves concentration, balance, cognitive performance and mood. Prevents cognitive decline in older adults

Nutrition and the brain

General nutrition and brain health

- Balanced meals help maintain alertness and focus throughout the day
- Variety: the brain depends on a multitude of nutrients, vitamins, and minerals. This is best provided through a wide variety of different foods
- Omega-3 and other fats are essential to nerve cell integrity and conductivity. Also plays a role in long term memory formation. “good” fats are found in fish, nuts, seeds, olives and avocado
- Hydration is essential for brain function. Especially important in the clearing of toxins during sleep.
- Vitamin D3, commonly deficient in older adults

Food choices that help fight cognitive decline and dementia

- The Mediterranean diet significantly reduces the risk of Alzheimer’s (40%) Diet is rich in fruits, vegetables, legumes, whole grains, fish, and olives. Even partial adherence improve the risk factor.
- Omega-3 fatty acids found in fish (salmon), nuts (walnuts), and flax seed
- Fruit and vegetable juices help protect against Alzheimer’s
- Pumpkin seeds (zinc, copper, and magnesium)
- Dark, leafy greens and broccoli
- Quercetin, a flavinoid the protects against dementia is found in apple skins, citrus fruits, onions, parsley, sage, tea, and red wine
- Dark chocolate (cocoa) helps prevent age related cognitive impairment

Food choices that boost memory and learning

- Foods containing choline: eggs, chicken, milk legumes, fish, and liver
- Grape juice and wine (polyphenols boost memory and learning)
- Sage, cumin, turmeric, and cilantro

Sleep

- Your brain does important work while you sleep
- Sorting information gathered during the day, deciding what to store and what to discard
- Clearing our toxins with increased lymphatic flow. Inadequate clearing of Beta-Amyloid can lead to Alzheimer's
- Most require 7-9 hours of sleep. Quality sleep includes several stages of non-REM sleep as well as REM sleep
- Older adults tend to have more disrupted sleep patterns and less time in the deeper levels of sleep
- Good quality sleep improves learning, concentration, and memory

Getting a good night's sleep

- Regular habits: going to bed and getting up at the same time each night
- Sleep in a darkened room. The circadian rhythm depends on daylight and dark
- Sleep in a cool room. This makes it easier to fall asleep
- Use your bed for sleeping. The brain learns association: do your reading and TV watching somewhere else
- Keep lights low before bedtime. Bright lights destroy the Melatonin in the brain
- Things to avoid before bedtime:
- Caffeine, large meals, high sugar snacks, and alcohol
- Limit mental and emotional stimulation such as high-tension movies or TV programs, even TV news casts

Stress and brain function

- Stress inhibits nerve signal transmission through the Vagus
- Chronic stress causes inflammation of the brain and depletes serotonin. This can lead to dementia and depression
- Chronic stress blocks the formation of new brain cells
- Long term stress leads to depression which doubles the risk of developing Alzheimer's

Interrupting the stress response (stimulating the Vagus nerve)

- Deep breathing
- Singing out loud
- Gargling for at least one minute Shaking your body 2-3 minutes
- Eye exercise: look right, keep gaze there until you sigh or swallow, return gaze to center, repeat on the left
- Shaking your body 2-3 minutes
- Yoga balancing poses (not proven)

Stress management techniques

- Meditation or bio-feedback changes the brain waves
 - Brain bonus: it improves memory, decision making, and attention
 - Smart phone apps
- Deep breathing: 15 min daily reduces stress and improves well-being
- Practice mindfulness: Live in the moment and pay positive attention to surroundings. Practice gratitude
- Doing for others. Practice random acts of kindness: Smile and make eye contact. Compliment someone. Notice people who are otherwise ignored
- Volunteering
- Exercise
- Dog therapy
- Laughter: Have fun! Find Joy!
- Probiotics have been found to reduce stress hormone levels

Learning challenge your brain and create new cells and neural pathways

- Increases blood flow to the brain
- Thickens gray matter: increase number of cells
- Improves white matter conductivity: speeds up the brain
- Increases functional flexibility
- Improves executive function: higher level thought process enabling us to organize, plan, and carry out tasks. Includes self-monitoring and behavioral control

Activities that challenging your brain

- Music training: Enhances the ability to simultaneously use right brain creativity and left brain logic
 - Learning a new language develops new nerve pathways and connections, hence adding flexibility to the brain

- Do something different: Listen to a different kind of music. Read something you may not think you are interested in. Use a map instead of your GPS. Brush your teeth with the other hand. Tackle a different varieties of puzzles

Relationships

- Positive relationships and an active social life protects against dementia, improves memory, and cognitive skills
- Conversation strengthens memory and the ability to block out distractions
- Laughter boosts creativity
- Sex improves logical decision making and boosts creativity
- Volunteering can reverse loss of brain volume
- Companion animals. Petting your non-human companion increases oxytocin, serotonin, and dopamine in the brain while lowering levels of hormones linked to stress, anger, and weight gain

Life style choices

- Listening to music increases activities in the areas of the brain involved in movement, attention, planning, and memory. It improves memory, mood, alertness, and sleep quality
- Getting organized, sharpens cognitive skills and memory
- The great outdoors: people who walk in nature vs. city streets score better on IQ tests. Soil contains microbes that, when inhaled, increases serotonin levels in the brain

Miscellaneous brain boosters and “not-so-bad” habits

- Writing things by hand improves learning and memory
- Flossing your teeth: plaque can trigger an immune response that keep nutrients from getting to your brain
- Doodling while you think improves memory
- Letting your mind wander increases creativity and problem solving
- Verbalize your thought out loud strengthens your memory
- Lawn mowing relieves stress and boosts memory
- Power naps help improve alertness and memory
- Chewing gum improves mood and alertness
- Playing 3-dimensional video games improves cognitive skills like multi-tasking and spatial cognition

Summary

- Eat the right foods
- Exercise regularly
- Get enough sleep
- Alleviate stress
- Be social
- Keep learning
- Manage chronic illness

Brain food shopping list

- **Vegetables:** Spinach, kale, romaine, collard green, swiss chard, broccoli, red onion, peppers, pumpkin, asparagus
- **Fruit:** Apples, strawberries, lemons, blueberries, grapes. Cherries, cranberries
- **Nuts and seeds:** Sunflower seeds, hazelnuts, almonds, cashews, walnuts, pistachios, peanuts
- **Fish and other proteins:** Eggs, salmon, trout, shrimp oysters, herring, mackerel
- **Grains:** Buckwheat
- **Fats and oils:** Safflower, soybean, sunflower, coconut, flax seed, olive, sesame, peanut, canola
- **Other:** Cocoa powder (dark chocolate), red wine