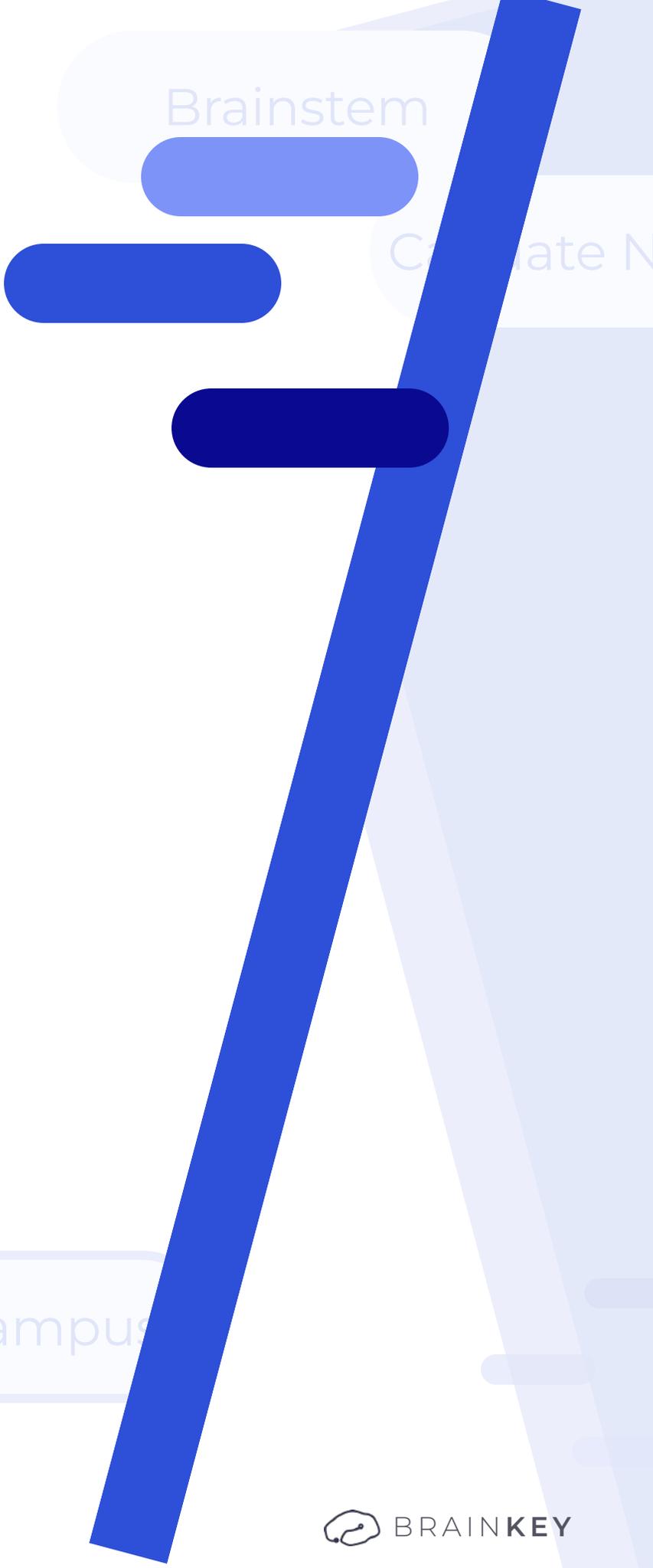


Your Personal

BrainKey Report



gdala

Hippocampus

Frontal Lobe

Your BrainKey Report



Patient: PHIL NEWMAN (55, M)

Date of scan: Sep 9 2022

Physician: Gary Savin

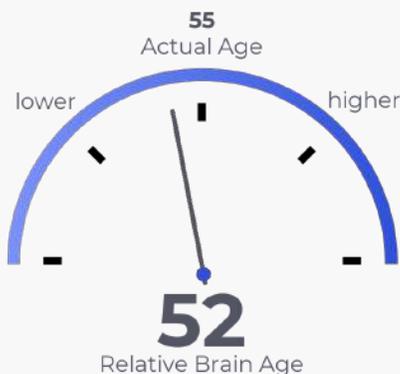
www.brainkey.ai

Summary

PHIL NEWMAN, your BrainKey Report includes your brain statistics extracted from your MRI scan data as well as recommendations to maintain brain health. Your brain statistics include the summary score, **“BrainAge”, as well as brain volume and cortical thickness statistics for 25 regions.** You’ll also find information on how your results compare to the average population and what brain function is related to each region.

Summary Score: BrainAge

Our bodies change as we age, and therefore also our brains. Your BrainAge Summary Score is a measure of the biological age of your brain, i.e. how young or old your brain is relative to other people your age and gender. BrainKey calculates your score (at the time your scan was done) from your MRI based on a statistical analysis of your brain regions.



Chronological Age: 55
BrainAge: 52
BrainAge - Chronological Age: 3

PHIL NEWMAN, your computed BrainAge of 52 year(s) is currently lower than your chronological age of 55 year(s) by 3 year(s).

A BrainAge within ± 7 years of Chronological age is normal. A BrainAge that is close to or less than Chronological Age is optimal.

An advanced BrainAge compared to your chronological age is associated with a higher risk to develop neurodegenerative disease. Your BrainAge indicates that your Neurodegenerative Risk is relatively low.

Your Optimal Brain Regions:

The top three brain regions which contributed to a younger BrainAge:



Cerebellar gray matter



Brainstem

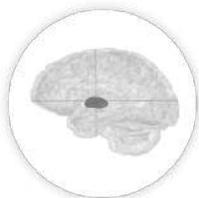


White matter

Find more information about these regions in the section **Brain Volume Results by Region**, below.

Your Target Brain Regions:

The three brain regions that contributed to an older BrainAge:



Globus pallidus



Amygdala



Cerebellar white matter

Below are your personalized, research-based* recommendations to help you improve your brain health and increase brain longevity.

*See relevant peer-reviewed scientific publications at the end of the report

Personalized Recommendations to Improve Your Brain Health & Longevity

Research suggests that certain types of exercise and physical activity affect different brain regions positively. Nutrition, diet, lifestyle, and stress can also have a major impact on brain health and longevity.

The following recommendations can help you optimize your BrainAge (currently, 52) as well as improve your target areas where you were statistically lower: Globus pallidus, Amygdala, Cerebellar white matter, compared to the other regions in your brain.

Physical Exercise

- Alternate moderate-to-intense aerobic exercise and resistance training 3-5x per week for 20-30 minutes
- Yoga: practice for 10-15 minutes per day or 20 minutes 3x per week

Nutrition

- Anti-inflammatory diet: vegetables, fruit, whole grains, nuts and legumes, omega-3 fats, and polyunsaturated fatty acids
- Supplements: 250-500mg of Vitamin C; 10-15mg Vitamin E, 10-20mg Selenium, 15mg Leptin or Beta-carotene
Supplements should be taken ~3 hours apart from medications to avoid interactions. If you start to feel ill, you should discontinue use immediately.

Lifestyle/Stress Reduction

- Meditation: 5-10 minutes per day or 30 minutes per week
- Practice memory games and engage in new activities that are stimulating

Your Brain Volume Results by Region

Hippocampus:

in the typical range for men your age



Hippocampal volume measurement is an important biomarker in tracking the progression of your brain health and is associated with susceptibility to age-related neurodegenerative disorders, such as dementia and Alzheimer's disease. The hippocampus is a structure located deep inside the brain and is highly involved with memory and learning. This brain area is one of the first structures to show atrophy in common memory-related neurodegenerative diseases as we age, such as Alzheimer's disease.

Amygdala:

in the low range for men your age



Your amygdala is highly involved in processing our emotions (e.g. fear, anger, excitement) and motivations, particularly those that are related to survival, such as changes in our environment, reacting to threat or stress.

Brainstem:

in the high range for men your age



Your brainstem regulates autonomic and fundamental functions such as heart rate and breathing. The brain controls the flow of messages between the brain and the rest of the body. Its main function is to regulate the autonomic, most fundamental functions of the brain: regulating heart rate, controlling reflexes, breathing, and consciousness, and whether one is awake or asleep.

Caudate Nucleus:
in the typical range for men your age



Your caudate nucleus plays an important role in learning, specifically storing and processing of memories. The caudate nucleus plays a vital role in how the brain learns, specifically the storing and processing of memories. It works as a feedback processor, which means it uses information from past experiences to influence future actions and decisions.



Cerebellar Gray Matter:
in the high range for men your age



Your cerebellum means literally 'little brain'. It has two hemispheres that control the opposite side of the body and are covered by gray matter and surface folds. The cerebellum functions closely with the cerebral cortex and the brain stem. Automatic regulation of movement and posture and learning of new motor patterns are coordinated by the cerebellum.



Cerebellar White Matter:
in the typical range for men your age



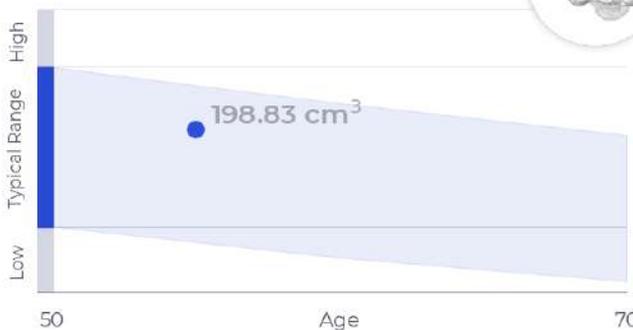
The cerebellum functions closely with the cerebral cortex and the brain stem. Automatic regulation of movement and posture and learning of new motor patterns are coordinated by the cerebellum.



Frontal Gray Matter:
in the typical range for men your age



Your frontal lobe is essentially the human 'control panel'. It plays a vital role in memory, attention, motivation, decision-making and how we conduct our daily tasks. The frontal lobe controls important cognitive skills in humans, such as emotional expression, problem solving, memory, and language.

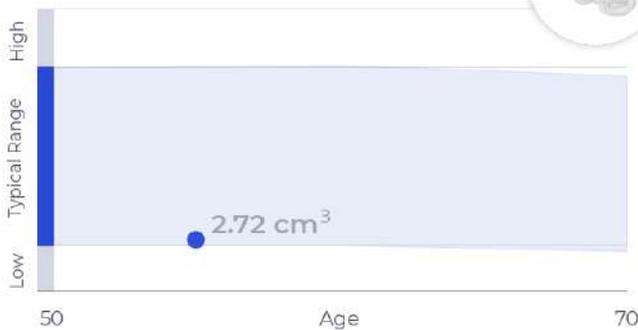


Globus Pallidus:

in the typical range for men your age



Your globus pallidus is involved in the regulation of voluntary movement. It is part of the basal ganglia, which regulate movements that occur on a subconscious level, for example petting a dog. The globus pallidus helps to respond to sensory feedback and to regulate such movements and make it as smooth as possible.



Occipital Gray Matter:

in the typical range for men your age



Your occipital lobe is located at the back of the brain and is responsible for visual perception, allowing you to see and process stimuli from the external world, and to assign meaning to and remember visual perception. It is the center of our visual perception system.



Parietal Gray Matter:

in the typical range for men your age



Your parietal lobe integrates sensory information among various modalities, including spatial sense and navigation. The somatosensory cortex is found within the parietal lobe and is essential for processing touch sensations and helps to discriminate between sensations such as temperature and pain. It is also involved in interpreting visual information as well as processing language and maths.

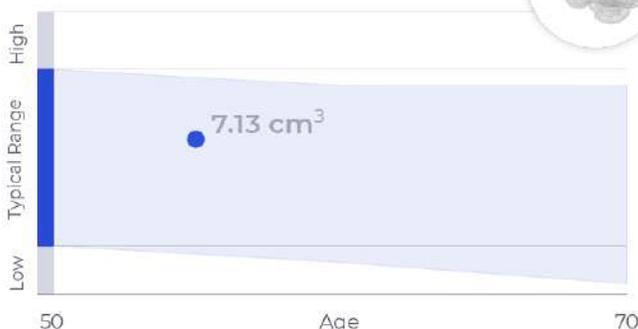


Putamen:

in the typical range for men your age



Your putamen is involved in a very complex feedback loop that prepares and aids in movement of the limbs. There are two putamina, one in each brain hemisphere. The primary function of the putamen is to regulate movements at various stages (e.g. preparation and execution). Signals are transmitted through the putamen that help the body with all aspects of physical movement.



Temporal Gray Matter:

in the typical range for men your age



Your temporal lobe is involved in vision, memory, sensory input, language, emotion, and comprehension, and holds the primary auditory cortex. The primary auditory cortex receives sensory information from the ears and secondary areas process the information into meaningful units such as speech and words.



White Matter:

in the high range for men your age

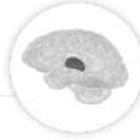


About 60% of the human brain is made up of white matter. White matter is the connecting wires of the brain. White matter is made up of axons of neurons, the connecting wires of the brain. White matter gets its name from myelin, the fatty coating that insulates the wires to speed up the transmission of electrical signals, much like the rubber coating on electronic cables.



Thalamus:

in the typical range for men your age



Your thalamus relays motor and sensory signals, and is involved in the regulation of consciousness, alertness and sleep. The main function of the thalamus is to relay sensory impulses from receptors in various parts of the body to the cerebral cortex, including motor signals to the cerebral cortex.

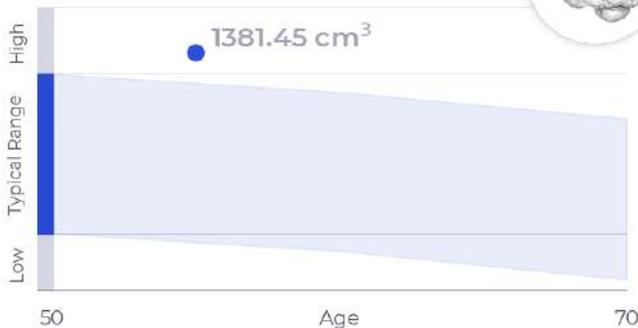


Whole Brain:

in the high range for men your age



The brain is one of the largest and most complex organs in the human body and weighs about 1.5 kg. Brain volume is an important measure because brain size accounts for between 9 and 16 percent of the overall variability in general intelligence. Intelligence can be defined as a general mental ability for reasoning, problem-solving, and learning.



Additional Exercise and Lifestyle Recommendations to Improve Brain Health

Physical exercise

An increasing number of neuroscientific studies suggest that the brain is highly responsive to consistent physical activity, specifically aerobic exercise and high-resistance training. Regular exercise strengthens connections between nerve cells, improves blood vessel volume in the brain, increases cognitive functioning, and can reverse age-related loss in volume over time, particularly in areas of interest such as the hippocampus.

The function and structure of the brain may be modified by not only aerobic exercise, but other types of activities. For example, neuromotor exercises activate many areas of the brain, and can improve overall brain connectivity, volume, and functionality. Neuromotor exercises include activities that require balance and proprioception (e.g. yoga, pilates), agility (e.g. tai ji), coordination (e.g. shooting basketballs or dance) and visual coordination (e.g. catching a ball, balance exercises).

- Incorporate moderate-intense aerobic/ cardiorespiratory exercise at least 3x per week for 6 months; this has been shown to significantly improve brain health and has a positive effect in key brain areas, including the hippocampus, amygdala, occipital cortex, and many other regions.
- Research suggests High-Intensity Interval Training (HIIT), e.g. sprinting upstairs followed by a period of rest; running in place for 60 secs followed by a 15 second pause, performed at least 3x per week is associated with brain volume increases.
- Yoga: 10-20 minutes 3-5x per week may reduce stress and increase volume in many regions of the brain over time.
- Diversify your fitness routine: alternate aerobic exercise (running/walking) and anaerobic exercise (weight training, stretching) on different days at least 3x per week.

Nutrition

Research indicates that adherence to a diet rich in antioxidants and anti-inflammatory foods is associated with larger hippocampal volume.

- Consider a Mediterranean diet: Vegetables, fruit, whole grains, nuts and legumes, omega-3 fats (e.g. fatty fishes such as salmon, anchovies, codfish, etc.), and polyunsaturated fatty acids (e.g. olive oil, sunflower oil, walnuts). Making these foods a staple of your diet can be beneficial to increase brain volume in many regions across the brain and improve overall brain connectivity and functioning.
- Dietary supplements with antioxidants: vitamin C and E, selenium, and carotenoids, such as beta-carotene, lycopene, lutein, and zeaxanthin, combined with routine exercise may increase brain volume in key areas..
- Avoid four key food groups: highly processed foods (e.g. red and processed meats); processed sugar (e.g. sodas, fruit juices, sweeteners), foods with trans fats (e.g. fried foods, fast food, snacks including chips, crackers, and cookies), and foods high in sodium. Indulging in these foods regularly can be detrimental to brain volume over time, including brain regions associated with memory-related functions.
- Considerably reduce alcohol intake. Consume less than 2 drinks per day for men and one or less drinks per day for women. Drinking high to moderate amounts of alcohol is correlated with significant decreases in hippocampal volume and other associated brain regions in healthy adults.

Lifestyle

Studies indicate stress levels may significantly affect brain volume. Prolonged periods of stress are associated with lower brain volume in many areas of the brain, including the hippocampus, in healthy adults.

- Routine meditation: 5-10 minutes daily or 20 minutes 3x per week is correlated with larger brain volume in areas of the brain like the amygdala, cerebellum, and hippocampus, as well as many other areas.
- Learn new activities and skills: engage in social activities with friends, take on new projects, develop new skills, commute to work differently. Research suggests new activities have a significant positive impact on the hippocampus and associated regions of the brain.

Genetic data

Summary:

Recommendation:

Your Genotype	Effect Allele*	SNP ID	Scientific Rigor	Studies
<p>Genetic data is not available. You can upload genetic data and learn more at brainkey.ai/dashboard/genetics</p>				

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