

THE IMPORTANCE OF BREATHING

Why Breathing?

Breathing and Heart Rate Variability Training

Neuropeak Pro combines neurofeedback with a form of biofeedback called heart rate variability (HRV) training. Simply put, it involves combining the non-conscious retraining of the brain with the conscious effort of regulating your breathing through focused breathing techniques. So, you are simultaneously enhancing your mind and your body, individually, as well as strengthening your mind-body connection.

When we are babies, our stomachs rise and fall with each breath we take — that's good! However, with aging, most of us develop poor breathing habits and become shallow, chest breathers — rather than taking deep breaths from our abdomen, called diaphragmatic breathing. The ideal resting breath rate is six to eight breaths per minute, yet the average person breathes between 12 and 20 breaths per minute. A higher HRV score is thought to have many benefits including:

- Improve mood
- Reduced stress
- Reduced cortisol levels (which can help with weight regulation)
- Better-quality sleep
- Increased energy level
- Lower blood pressure
- Less anxiety

Breathing Practice

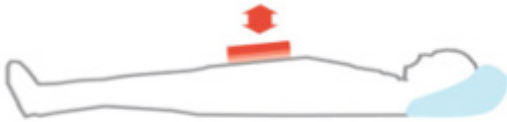
The Dos and Don'ts

There are both good and bad ways to breathe. Proper breathing will help clear your mind and focus your positive energy and thoughts on solving problems. Here are two breathing exercises you can do to relax, re-energize, restore focus, and manage stress at home.

THE IMPORTANCE OF BREATHING

Abdominal Muscle Stretching/Strengthening

- 1 Sit comfortably with your hand on your stomach.
- 2 Feel the push of your stomach outward during your inhale, and feel the pull of your stomach in during the exhale.



Back Breathing

- 1 Find a comfortable spot to lie on the floor with a pillow under your head.
- 2 Place a book or flat object on your stomach.
- 3 Place your hand on your chest.
- 4 As you inhale, force the object to move upward.
- 5 As you exhale, force the object to move downward.
- 6 Watch this up-and-down motion of the object and develop a steady rhythm of six to eight breaths per minute.
- 7 Observe your hand on your chest and try to keep your chest as still as possible.
- 8 Engage in this “back breathing” for at least 5 minutes, twice daily.

WHY YOUR LIFESTYLE MATTERS

This session is dedicated to the importance of diet, sleep, and exercise. Your day-to-day lifestyle choices and activities have a profound impact on your brain health and function, both in the short term and long term.

The Brain Benefits of Exercise



INCREASES PRODUCTION OF NEUROCHEMICALS, LIKE BDNF, THAT INCITE BRAIN CELL REPAIR



BOOSTS DECISION-MAKING SKILLS



IMPROVES MEMORY, MOOD, AND SLEEP



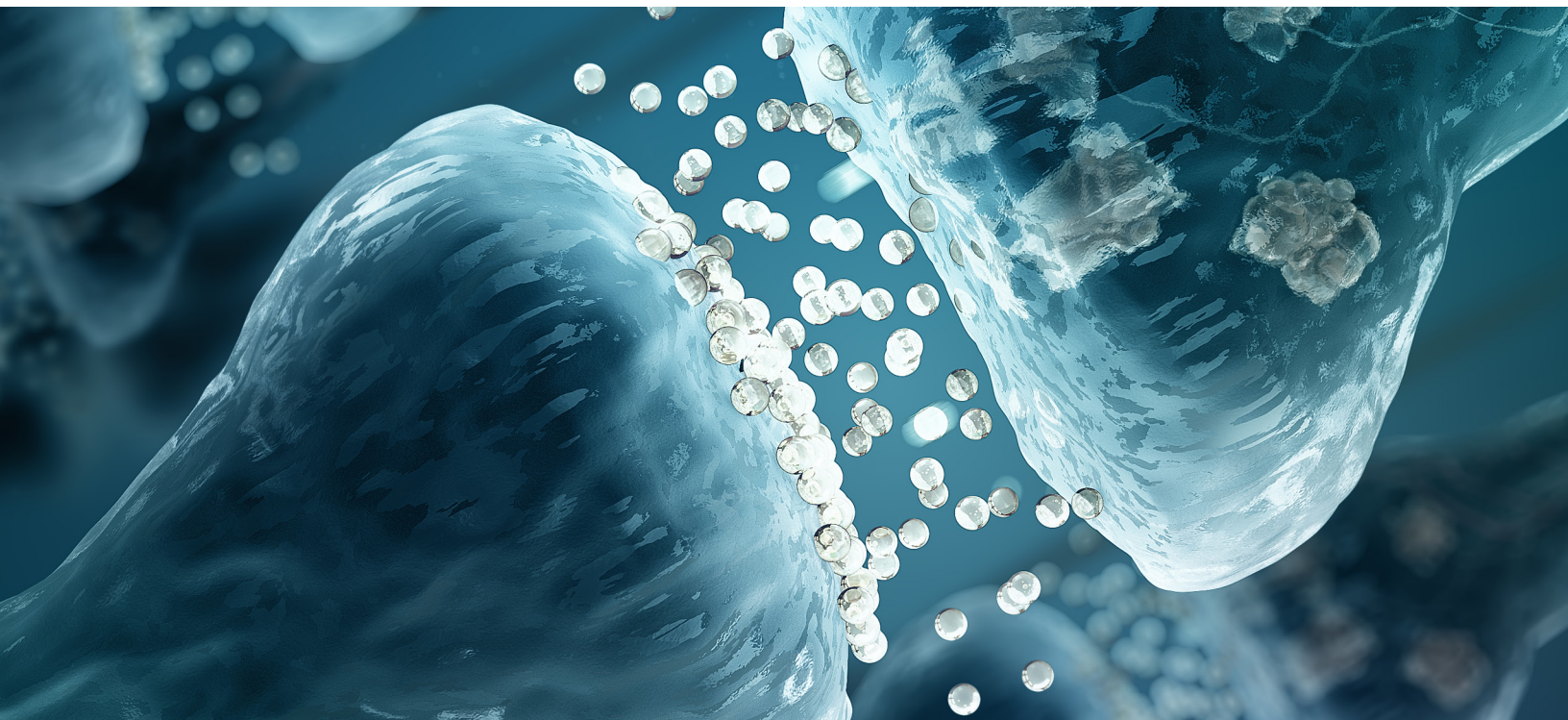
IMPROVES ORGANIZATION AND PLANNING



LENGTHENS ATTENTION SPAN



PROMPTS THE GROWTH OF NEW NERVE CELLS AND BLOOD VESSELS



WHY YOUR LIFESTYLE MATTERS

Diet & Nutrition

A healthy diet is crucial to optimizing your brain performance. A brain fueled by fruits, vegetables, protein, and healthy fats will function very differently than a brain fueled by bad carbs, sugars, and trans-fats. Food quality is important, but so is the quantity of foods you eat and when you eat throughout the day. It is best to eat smaller, more frequent meals.

Even if you are eating a healthy, balanced diet, it can be helpful to supplement your diet with a variety of brain- and heart- healthy vitamins and minerals.

Sugar and the Brain

The inflammation from junk food will interfere with the pathways we just worked on sharpening, so it's best to avoid sugar after training. Your brain just had a good workout, so you should nourish it and refuel properly. You wouldn't eat junk food after you exercise your body, so don't do it after you exercise your brain.

Inflammation

Inflammatory foods are ones that our bodies see as a threat and does not want to accept. When we inflame our bodies, our brains and our mood pay the price. One way it does so is by inhibiting the release of neurotransmitters that make us feel good, such as serotonin and dopamine. This battle in the brain weakens the once-powerful chemicals, so that by the time they're released, they don't have the full potential to impact us the way they should. To make things more complicated, an inflamed brain makes these chemicals battle each other in a good vs. evil way. The chemicals that promote a positive mood and enhanced cognition, are in a fight with the chemicals that promote low moods, stress, and brain fog. With all the struggles in today's life, you don't want to make your brain work harder than it has to. It's best to fuel it with the right nutrients that will help your brain work for you, not against you.

Fueling the Brain

Eat lots of fruits and veggies and drink plenty of water

B vitamins

- Especially B12
- Found in whole grains, meat, and eggs

D vitamins

- Found in dairy; milk, yogurt and low-fat cheeses

Omega 3 fatty acids

- Found in fatty fish like salmon, mackerel, albacore tuna, halibut, and sardines

WHY YOUR LIFESTYLE MATTERS

The Importance of Sleep

Are you sleeping well?

Poor sleep is one of the most commonly ignored and often underestimated health problems that people experience. Years and years of sleep deprivation, and of not allowing your crucial organs to recover the way they need to, can lead to some pretty serious implications for your health, including weight gain, diabetes, heart disease, heart attack, and heart failure.

Recent studies have shown insomnia can have terrible effects on your brain. People who chronically sleep fewer than six hours per night are at high risk for a stroke. The more severe your insomnia is, the more shrinkage your hippocampus can experience. In fact, the longer you suffer from insomnia (1 year vs. 20 years), the smaller your hippocampus will be. Lack of adequate sleep also increases your cortisol levels, upping your risk of heart attacks, hypertension, and blood clots.

There are many contributing factors to poor sleep quality or quantity. Our Brain Coaches will work with you to identify the factors that need attention in your life and develop a plan to correct those issues. Additionally, there are devices and apps that do a good job of tracking sleep patterns.

Improving your sleep will help in a variety of ways, including, but not limited to:

+ Improved memory

+ Increased energy level

+ Better focus

+ Elevated mood

+ Sharper mental clarity

+ Sustained attention

SLEEP

What Actually Happens When You're Sleeping?

Many people think that sleep is a passive activity, a period of rest when our bodies shut down to conserve energy or to recover from the previous day's work. For most organs in the body, that's true. But the brain is actually active when we're sleeping — and it's doing critically important work.

What your **BODY** is doing during sleep:



Your heart and lungs get a break as your breathing and heart rate slow down and your blood pressure drops.



Your muscles repair themselves and become even bigger/stronger.



Your glands pump out growth hormones to promote a healthy immune system and proper development. This is especially crucial during childhood/adolescence.



Your hunger hormones are regulated, leading to a healthier weight.

What your **BRAIN** is doing during sleep:



Forming new pathways and reinforcing connections between cells.



Cleansing away toxins that your brain cells produce as waste.



Preserving and consolidating new memories and info, including transferring your memories from short-term to long-term memory.



Learning and remembering how to perform physical tasks.

SLEEP

Don't Skimp on Your Sleep

Sleep occurs in cycles of about 90-110 minutes each. Most people usually go through 5 cycles during the night (for 7.5 to 8.5 hours of sleep).

Stages go in the following order to form a full cycle: 1-2-3-2-1-REM.

Stage 1: Drowsy Sleep

The transition period from wakefulness to sleep where you drift in and out of sleep and can be easily awakened. Your eyes move and muscle activity slows. You begin to lose conscious awareness of the external environment. You may occasionally experience a sudden jerk or twitches, as if from the sensation of falling or striking (don't worry, these are normal).

Stage 2: Light Sleep

In this stage your body is relaxed and prepares to enter deep sleep. Stage 2 typically lasts longer than the other stages — you spend 45% to 50% of your sleep in stage 2.

Stage 3: Deep Sleep

Characterized by maximum brain and muscle relaxation. Stage 3 is when you may experience night terrors, sleepwalking, and talking in your sleep. People who wake during deep sleep often feel groggy and disoriented for several minutes. In deep sleep, there is no eye movement or muscle activity and the body is still. You usually go less deep each cycle, so that most of your deep, stage 3 sleep occurs in the first half of the night.

Stage 4: REM Sleep

REM stands for Rapid Eye Movement. This stage is very different from all other stages because in REM sleep, brainwave activity is similar to an awakened state. At this stage, the body experiences periodic eyelid fluttering, muscle paralysis, and irregular breathing. Intense dreaming can occur. The end of REM stage is an ideal time for waking up.

SLEEP

Ideal Bedtime

While 8 hours of sleep is a good target number for adults (based on what needs to take place during sleep, physiologically). Infants, children, and teens need MORE sleep.

If this is your wake-up time...

	6:00AM	6:15AM	6:30AM	6:45AM	7:00AM	7:15AM	7:30AM
(Age)	Then this should be your bedtime...						
3	6:00PM	6:15PM	6:30PM	6:45PM	7:00PM	7:15PM	7:30PM
4	6:30PM	6:45PM	7:00PM	7:15PM	7:30PM	7:30PM	8:00PM
5	6:45PM	7:00PM	7:15PM	7:30PM	7:30PM	8:00PM	8:15PM
6	7:00PM	7:15PM	7:30PM	7:30PM	8:00PM	8:15PM	8:30PM
7	7:15PM	7:15PM	7:30PM	8:00PM	8:15PM	8:30PM	8:45PM
8	7:30PM	7:30PM	8:00PM	8:15PM	8:30PM	8:45PM	9:00PM
9	7:30PM	8:00PM	8:15PM	8:30PM	8:45PM	9:00PM	9:15PM
10	8:00PM	8:15PM	8:30PM	8:45PM	9:00PM	9:15PM	9:30PM
11	8:15PM	8:30PM	8:45PM	9:00PM	9:15PM	9:30PM	9:45PM
12-15	8:15PM	8:30PM	8:45PM	9:00PM	9:15PM	9:30PM	9:45PM
16-18	9:00PM	9:15PM	9:30PM	9:45PM	10:00PM	10:15PM	10:30PM
Adults	10:00PM	10:15PM	10:30PM	10:45PM	11:00PM	11:15PM	11:30PM

SLEEP

The Importance of Sleep

Sleep Habits: Out with the Old...

Light at night can negatively impact the body's natural circadian rhythm. Blue light wavelengths, which positively impact attention, reaction time, and mood during the day, are disruptive at night.

Research shows exposure to blue-light wavelengths in the evening suppresses your body's melatonin production. Melatonin is the sleepy-time hormone that indicates to your brain and body that it's bedtime. When you use electronics with back-lit screens, like your phone, tablet, TV, or computer, you are exposed to blue light.

Suggestions:

- Dim your lights in the evening hours.
- Red-light wavelengths have the least impact on your circadian rhythm, so try adjusting your phone to night mode (which uses red light instead of blue) in the evening.
- Avoid bright screens/electronics at least 2 hours before to bed.

The Biggest Sleep No-Nos

It's important to identify habits that could be compromising your ability to rest well. If you don't make an effort to eliminate the sleep-robbing practices in your daily routine, whatever new and better habits you introduce to your daytime and nighttime rituals won't be as effective. So really, the first tip for a better night's sleep is to kick your bad sleep habits to the curb.

Most Common Habits That Sabotage Sleep:

1. Eating too late or too large of a meal.

Ideally, your last meal of the day should be 3-4 hours before you plan to sleep.

2. Short-selling your caffeine intake.

Caffeine can linger in your system for up to 12 hours, so caffeine should be avoided after lunch.

3. Frequent social media use.

Spending more than 1 hour per day on social media can lead to a high level of sleep disturbance.

4. Engaging in "screen time" less than 2 hours before bed.

The blue light emitted by laptops, TVs, cell phones, and tablets has been proven to suppress your body's melatonin production.

5. Checking the clock frequently while you are lying awake.

If you can't sleep, one of the worst things you can do is continue to check your alarm clock to see how many hours remain until you have to wake up.

SLEEP

The Importance of Sleep

Sleep Habits: In with the New!

In addition to cutting out bad habits that could sabotage your sleep hygiene — like “screen time” 2 hours before bed, frequent social media use, eating too late or too large of a meal and lots of caffeine — there are several simple, proactive steps you can take to improve your sleep hygiene and get a better night’s rest.

Exercise

Exercising for a minimum of 150 minutes a week may help you sleep better and feel more alert during the day.

Avoid Long Naps

If you have insomnia, avoid naps. Daytime sleeping will make it more difficult to fall asleep/stay asleep at night.

Limit Use of Electronics for at Least 2 Hours Before Bed

The blue light emitted from these devices can reduce your production of melatonin, a hormone needed for sleep.

Use the Bedroom for Sleep

Make it your sleep sanctuary. That means removing the TV and avoiding eating, exercising, or working in your bedroom.

Keep the Same Sleep Routine

Going to bed and waking up at the same time every day is important — this includes the weekend.

Monitor Your Diet

Too much caffeine during the day, eating spicy foods, or having a large meal right before bedtime are diet-related habits that could negatively impact sleep. Some medications also can cause insomnia.

Don’t Toss and Turn

If you’re having trouble falling asleep, don’t lie in bed watching the clock. Instead, get up and engage in a quiet activity like reading. Then go back to bed when you feel sleepy.

Sleep Until Sunlight

If you can, wake up with the sun or use a biolight in the morning to help reset your body’s internal clock.

SLEEP

Sleep Progress

Foods for Better Sleep

Eating too late or too heavy of a meal can contribute to poor sleep. However, food doesn't have to be part of the problem. There are a number of foods shown to help naturally increase your body's melatonin production.

Melatonin is a hormone that is key to your body's ability to prepare for and, ultimately, to sleep. As the day wanes, your body naturally should begin to ramp up melatonin production. Healthy levels of melatonin are necessary for inducing sleep onset, improving sleep quality, and increasing sleep quantity.

Top Foods Thought to Increase Melatonin and Improve Sleep:

Bananas	Barley	Mustard Seed
Oranges	Peanuts	Honey
Pineapple	Oats	Ginger Root
Tart Cherries	Rice	Walnuts
Sweet Corn	Tomatoes	Asparagus



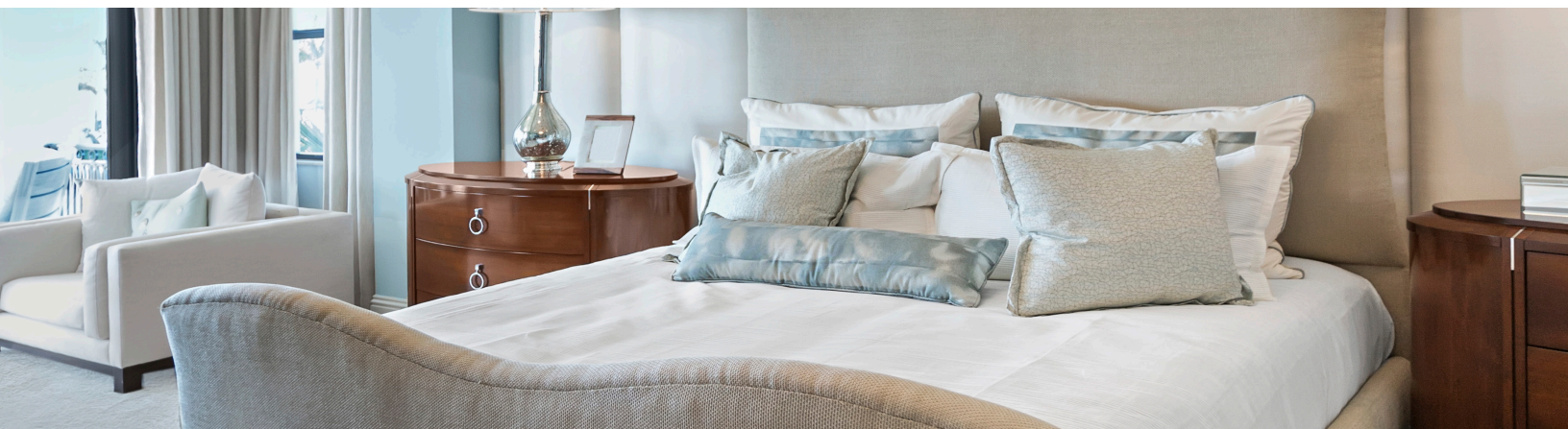
SLEEP

Sleep Progress

What Your Bedroom Says About Your Brain

Most of us underestimate the importance of our bedroom's design and atmosphere. Your bedroom is the place in which you spend the least amount of **conscious time**, but your brain is spending the greatest amount of its most active time there. So really, **we should reframe how we think about our bedrooms**. Stop thinking of it as the room you just sleep in, and start thinking of it as the room in which you recover, detox, store long-term memories, and solidify newly-learned tasks.

- Stick to a cool color palette for bedding and walls. Warm colors affect you physically by increasing your heart rate, blood pressure, and body temperature.
- Set your thermostat closer to 65 degrees. Cool temperatures are best for melatonin production.
- Keep your bedroom dark with room-darkening blinds or drapes and minimize the light given off by your alarm clock. Light is a major cue to your brain to wake up, so the darker, the better.
- Make sure you have a good, quality mattress. The typical maximum life expectancy for a mattress is 9-10 years. At this point, the mattress may not necessarily feel uncomfortable, but a natural breakdown of materials occurs. It could be filled with allergens or sleep-disruptive chemicals from years of wear and sweat.
- Don't make a habit out of doing awake-time activities in your bedroom, such as watching TV, reading, or working. If you aren't tired, go to another room to do these things.
- If you are the type of person who thinks too much before sleep, keep a pad of paper on a bedside table. The act of writing down your worries or thoughts as soon as you get in bed can help program your brain to put your troubles aside before slumber, and drift away more easily over time.
- Keep it quiet. Avoid music or leaving the TV on to fall asleep. If you must have noise to sleep or to drown out traffic and other street sounds, use a white noise machine, or consider a dehumidifier or a bedroom fan.



SLEEP

Sleep Progress

The Risks of Not Sleeping Enough

Your Bedtime Supports Long-Term Health

It's not uncommon in our culture to feel the need to squeeze every last bit of life from each day. We live in a world that values performance, experiences, and constant connection to work and technology, but sacrificing precious ZZZs for a few more hours of productivity can be costly.

Years and years of sleep deprivation, and of not allowing your crucial organs to recover the way they need to, can lead to some pretty serious implications for your health.

High Health Risks

Frequent sleep deprivation has been linked to a high risk of:

- Stroke
- Depression
- Diabetes
- Weight gain
- Heart disease, heart attack, and heart failure
- Dementia and Alzheimer's Disease

MYTH: Repaying Sleep Debt on the Weekend

The idea that you can “catch up on sleep during the weekend” is a common myth. It might be possible if your accumulated sleep debt is just a couple of hours — say, for example, you get 7 hours of sleep instead of 8 two nights a week. Then sleeping for an extra hour on Saturday and Sunday isn't inconceivable.

But if you get just 5 hours of sleep two or more days a week, you're looking at a minimum sleep debt of 6 hours. Making that up on the weekend would bring your sleep total for both Saturday and Sunday to 11 hours. More than 9 hours of sleep per night has recently been reported to have its own set of negative health effects — not to mention, the detriment to your heart, lungs, and brain have already been done after multiple nights of fewer than 6 hours of sleep.



Restructure your brain with food

Every cell in your brain will be affected by what is on the end of your fork. Nutrients (or lack thereof) cause reactions in the brain that release hormones. These hormones can have positive impacts such as enhanced mood, memory, mental clarity, or they can work against us by producing low moods, brain fog, stress, etc. Each time you're putting food in your body, you're altering the chemistry of your brain in either a beneficial or hindering way.

Food	Good source of:
Apples	Choline, L-theanine, quercetin, vitamins A & C
Beets	Fiber, folate, nitrates, potassium, vitamin C
Blueberries	Antioxidant, beta carotene, folate, vitamins A, C, & K
Carrots	Antioxidant, beta carotene, folate, vitamins A & B6
Elderberry	Antioxidant, quercetin, vitamin C
Leafy greens	Beta carotene, calcium, folate, lutein, vitamins A, C, & K
Oranges	Folate, thiamine, vitamins A & C
Pomegranates	Antioxidant, folate, vitamins C & K
Red grapes	Calcium, resveratrol, vitamin C
Spinach	Antioxidant, choline, folate, protein, vitamins A, B6, and K
Sweet potatoes	Antioxidant, beta carotene, folate, vitamins A, B6, & C
Tomatoes	Beta carotene, folate, lutein, lycopene, vitamins A, B6, & C
Dairy products	Calcium, riboflavin, vitamins B12 & D
Eggs	Folate, protein, riboflavin, vitamin B12
Poultry	Iron, niacin, vitamins B6 and B12, zinc
Fish	DHA, protein, vitamins B12 and D
Clams	Iron, potassium, vitamin B12, & zinc
Oysters	Iron, vitamins B12 & D, zinc
Dry beans and peas	Fiber, folate, protein, vitamin K, zinc
Chickpeas	Fiber, folate, protein, vitamin B6
Soybeans	Fiber, folate, iron, protein, vitamin C
Quinoa	Copper, iron, vitamins, zinc
Fortified cereal	Folate, iron, all the B vitamins, zinc
Whole-grain products	Folate, iron, niacin vitamins B6 & E
Flaxseed	Folate, omega-3, thiamine, vitamin B6
Canola oil	Omega-3, vitamins E & K
Vegetable oil	Iron, vitamins E & K
Pecans	Choline, copper, thiamine, zinc
Pistachios	Antioxidant, choline, omega-3, vitamin E
Walnuts	Folate, omega-3, vitamin B6
Tea	EGCG, L-theanine, quercetin, vitamins A & D

Brain-Building Nutrients

Nutrient	Supports:
Antioxidant	Heart health, may lower risk of infections
Beta Carotene	Growth and development, source of Vitamin A
Calcium	Bone health, heart and muscle function
Choline	Essential nutrient needed for metabolism
Copper	Immune system health, blood cell production, energy
EGCG	Prevents cell damage, natural antioxidant
Fiber	Regulates blood sugar levels and balances hunger
Folate	Blood cell formation, treats anemia
Iron	Oxygen, muscle and brain function, fights anemia
L-theanine	Promotes relaxation, used to decrease stress
Lutein	Eye health
Lycopene	Skin and heart health, may lower cancer risk
Niacin	Cholesterol, heart disease, brain function
Nitrates	Reduces blood pressure
Omega-3	Prevents heart disease, improves brain function
Potassium	Cardiovascular health
Protein	Builds and repairs tissues (bones, muscles, etc.)
Quercetin	Reduces fatigue and increases endurance
Resveratrol	Fights against heart disease and cancer
Riboflavin	Energy, growth, and overall health
Thiamine	Energy production
Vitamin A	Strengthens immune system, vision
Vitamin B12	Improves mood, bone health, and mental function
Vitamin B6	Brain function and heart health
Vitamin C	Important for heart and bone health
Vitamin D	Immune function, promotes bone growth
Vitamin E	Skin, heart, and brain health
Vitamin K	Fights blood clots, promotes bone health
Zinc	Immune function, testosterone production

EXERCISE

Exercise and the Brain

There is a scientific reason as to why our bodies feel so good when we exercise. When we move our bodies, our brain releases a hormone called dopamine, or the “feel-good” hormone.

Our brains work just as our muscles do: growing with use and withering with inactivity. The brain has the capacity to regenerate and grow throughout our entire lifespan. With exercise and neurofeedback, you create the most compelling way to ensure your brain’s continued growth and rejuvenation.

Children and adolescents need at least:

- 1 hour or more of moderate to vigorous physical activity on most or all days.
- Participate in several bouts of physical activity of 15 minutes or more each day.
- Avoid periods of inactivity of 2 hours or more unless sleeping.

Adults need at least:

- 2.5 hours of moderate-intensity aerobic activity (i.e., brisk walking) every week

OR

- 1 hour and 15 minutes of vigorous-intensity aerobic activity (e.g. jogging or running) every week.

AND

- Muscle-strengthening activities on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms).



EXERCISE

Exercise and the Brain

Exercise can provide immediate relief for symptoms associated with stress – most notably, the physical and emotional symptoms. Exercise increases oxygen to the brain and has been shown to promote a healthy blood pressure. Aerobic exercise has been shown to contribute to lowering anxiety and promoting growth of the hippocampus.

How different exercises impact the brain and performance.

Sports Drills

Prefrontal Cortex & Basal Ganglia

Attention, switching between tasks, inhibition

Parietal Lobe

Visual-spatial processing

Cerebellum

Attention

High Intensity Intervals

Hypothalamus

Appetite regulation, cravings and addiction

Lifting Weights

Prefrontal cortex

Complex thinking, reasoning, problem solving

Aerobic Exercise

Hippocampus

Memory and learning

Yoga

Frontal Lobe & Insula

Integrates thoughts and emotions

Amygdala

Regulates fear and anxiety

EXERCISE

Workout: Anytime, Anywhere

Below are some examples of bodyweight exercises that don't require any equipment. If you're not sure what they are, examples of all of these movements can be found on YouTube. Try to include one or two movements from each category and create a workout. Feel free to get creative and challenge yourself!

Full Body:

Inchworm
Inchworm Push-Ups
Tuck Jumps
Bear Crawl
Mountain Climbers
Prone Walkout
Burpees
Planks
Plank to Push-Up

Core:

Flutter Kicks
Side Plank
Russian Twists
Bicycle Crunches
Sit-Ups
Shoulder Bridge

Legs:

Wall Sit
Lunges
Lunge Jumps
Pistol Squats
Squats
Single-Leg Deadlift
Frog Jumps
Step-Up
Calf Raises
Supermans

Shoulders/Arms:

Tricep Dips
Push-Ups
Diamond Push-Ups
Arm Circles

Workout Example 1:

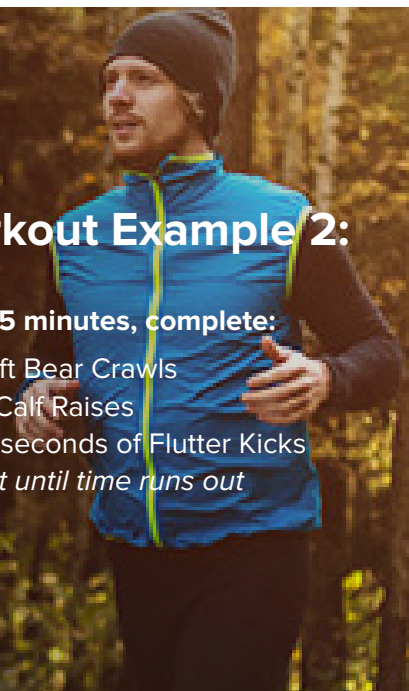
3 Rounds

8-12 Mountain Climbers (both sides)
8-12 Step-Ups
8-12 Tricep Dips
8-12 Flutter Kicks (both sides)

Workout Example 2:

In 10-15 minutes, complete:

2-4 40ft Bear Crawls
15-20 Calf Raises
20-30 seconds of Flutter Kicks
Repeat until time runs out



WHAT HAPPENS WHEN YOU EXERCISE...



Norepinephrine is released, improving attention, perception, and motivation

Brain-derived neurotrophic factor (BDNF) is released, protecting and repairing neurons from injury and degeneration

Hormones combine with BDNF to grow brain cells, regulate mood, and provide mental clarity

The hippocampus, a part of the brain concerned with learning and memory, grows in size with regular exercise over time



Endorphins are released, dulling the sensation of pain

Serotonin is released, enhancing mood and sleep

Blood flow to the brain increases, delivering more oxygen and nutrients and improving waste removal

Dopamine is released, improving motivation, focus, and happiness



EFFECTS OF STRESS ON THE BRAIN/ NERVOUS SYSTEM

STRESS

MINDFULNESS

PREFRONTAL CORTEX

The prefrontal cortex is the brain's executive control center. Short-term and chronic stress weaken the brain's ability to self-regulate emotions, make decisions, respond flexibly, organize thoughts, and engage social skills.

Thinking/observing brain can re-engage and calm down emotional brain regions by bringing mindful awareness to bodily sensations and emotions.

AMYGDALA "ALARM SIGNAL"

The amygdala becomes active when danger is present. Danger can be an external situation, thought, memory, or body sensation. Unmanaged stress can cause the amygdala to become over-active.

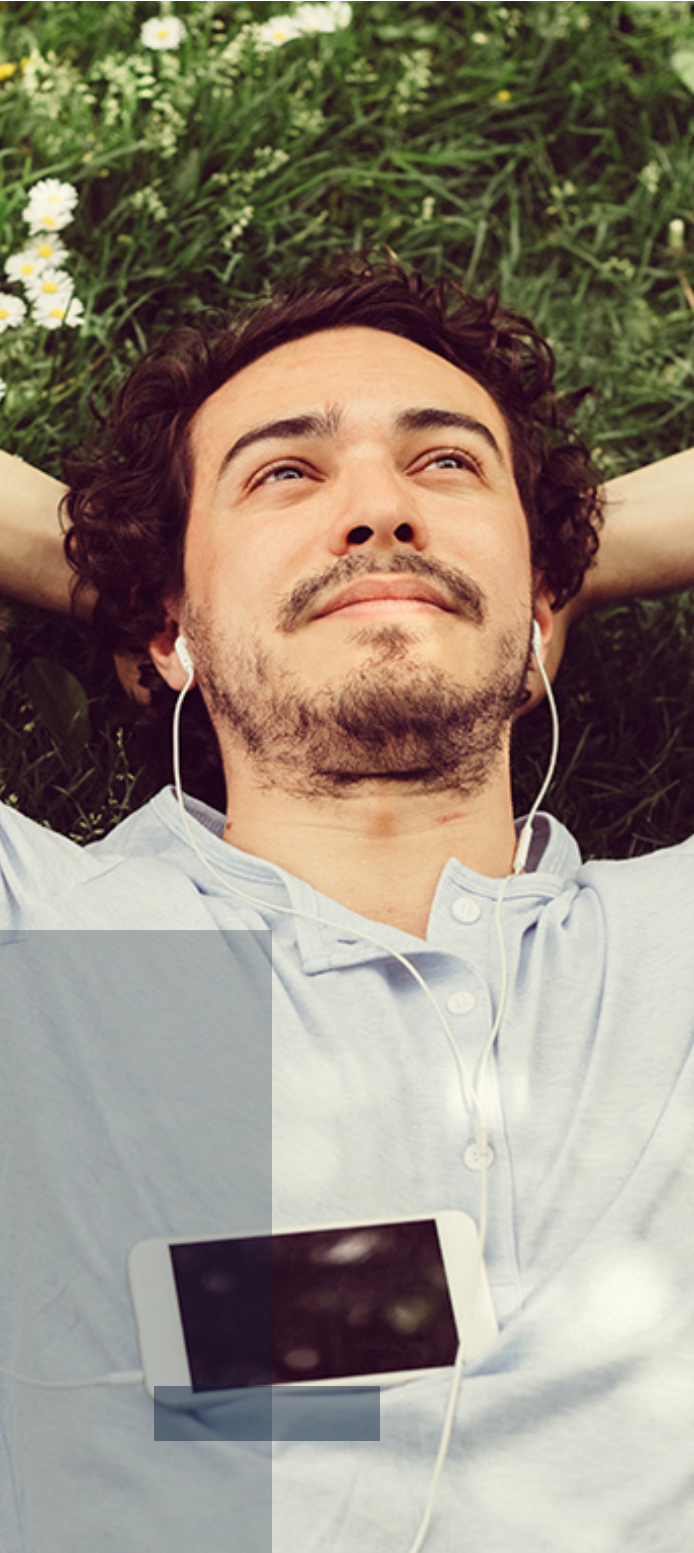
Amygdala calms down, stressful implicit memories lose strength, positive/adaptive memories are formed and strengthened through neuroplastic changes in the brain.

BASIC SURVIVAL MECHANISMS "FIGHT OR FLIGHT"

The amygdala triggers activation of the sympathetic nervous system's "fight or flight" response: stress compounds are released, muscles tense, breathing & heart rate increase. Excessive activation of this response weakens the prefrontal cortex's ability to calm the amygdala causing a downward spiral of stress over-activation.

Survival defense mechanisms disengages and the parasympathetic nervous system's "rest and digest" response is strengthened. A stronger parasympathetic nervous system buffers against future over activation of the sympathetic fight or flight" response, strengthening the ability of the prefrontal cortex to maintain self-regulation.

EFFECTS OF STRESS ON THE BRAIN/ NERVOUS SYSTEM



Effects of Excess Cortisol on the Body

- Decreased Metabolism
- Hunger
- Fatigue
- Sleep Deprivation
- Migraines
- Tunnel Vision
- Acid Reflux Disease
- Decreased Immune System
- Hostility
- Hypertension
- Arthritis
- Shorter Lifespan

STRESS MANAGEMENT

Simple Ways to De-Stress

Visualization

Try this visualization exercise when you feel stressed or anxious. Think of a place. Then notice the sensations of being there.

- 1 Pick your favorite place
- 2 Describe what you see
- 3 Describe what you hear
- 4 Describe what you feel
- 5 Describe what you taste
- 6 Describe what you smell

Take A Breath:

Deep breathing is not only a great intervention strategy during times of high stress, but also a great preventative strategy to work into your daily routine. A breathing pacer app can be especially helpful in finding a healthy pattern on the go.

Turn Up The Tunes:

Consider listening to a new genre of music. Want to calm down? Try classical or acoustic music with a relaxing, slow rhythm.

Unplug:

Step away from the noise of your tablet, phone, or gaming system. The lights and sounds that come from these devices are designed to capture our attention and activate our brains. Consider limiting your time on these devices, especially before bed.

Try a New Hobby:

Trying something new can be particularly rewarding, especially if you involve a partner or friend. Make time for things that you enjoy and keep an open mind.

Journal:

Writing down your thoughts and feelings can be a powerful practice. Some journals offer structured prompts each day or a quote to inspire you. Get creative!

STRESS REDUCTION TIPS

Mindfulness Meditation

Below is a great meditation exercise to practice at home.

- 1 Sit upright, take your shoes off and begin breathing in and out slowly (belly breathing) for about 2 minutes. Let your muscles relax and feel yourself become more calm.
- 2 Now close your eyes and focus your attention on your feet while breathing in and out very slowly for about 2 minutes. Let your thoughts cease and just “think” about your toes. If new thoughts arrive, push them gently aside. Feel the tingling in your toes as more blood rushes to your feet.
- 3 Now focus your attention on your knees; deep breath in, deep breath out for 2 minutes.
- 4 Focus on your hips, shoulders, hands, neck, mouth, and then eyes — breathing deeply as you focus on each for 2 minutes.
- 5 Repeat a calming mantra with your eyes closed (e.g. ocean, ocean, ocean, ocean, ocean) for 5 minutes; deep breath in, deep breath out.
- 6 Now bring your focus back to your eyes and just concentrate on your eyes; deep breath in, deep breath out for 2 minutes.
- 7 Then focus on your mouth, then neck, hands, shoulders, hips, and knees – breathing deeply as you focus on each for 2 minutes.
- 8 Lastly, refocus on your feet and toes, again for 2 minutes, always taking deep, from your belly, breaths in and out.
- 9 Open your eyes and sit for a few minutes while you return to your environment, then put your shoes back on.



STRESS REDUCTION TIPS

Walking Meditation

Walking meditation involves combining mindfulness and physical activity. Here is an example of a walking meditation practice you can try.



- 1 Begin walking at a normal pace, preferably in a quiet environment.
- 2 Then start to observe your breath, appreciating how air enters in through your nostrils, fills your lungs, and comes back out from your throat and mouth.
- 3 Gradually refine your breathing to take deep, diaphragmatic breaths.
- 4 Now coordinate your breath with your stride, inhaling for four steps and exhaling for four steps.
- 5 Once this becomes comfortable and automatic, take four, short, staccato breaths of air through your nostrils — one puff for each step.
- 6 Focus on the audible sound of your breath, then exhale in the same fashion, contracting your abdominal muscles and pushing your belly button into your spine for four steps.
- 7 Continue this pattern for 5 minutes, then walk and breathe normally for 3 minutes.
- 8 Repeat as many times as you can during the course of your walk.

STRESS REDUCTION TIPS

Progressive Muscle Relaxation:

Progressive muscle relaxation is best done in a quiet space, free from distractions. We recommend you practice the following 10-minute exercise at least twice per day.

Sit in a comfortable chair with good back support and place your feet flat on the floor. Slowly work through the following muscle groups by tightening the muscles for five seconds and releasing the muscles for 10 seconds. Be aware of the pressure as you tighten, compared to the calming sense as you relax.

- 1 Close eyes tightly for five seconds. Relax for 10 seconds.
- 2 Clench jaw — not so tightly that your teeth hurt — for five seconds. Relax your jaw for 10 seconds.
- 3 Slowly rotate your head in a circle to the left for three rotations. Rotate to the right for three rotations.
- 4 Pull your shoulders up toward your ears and hold for five seconds. Relax your shoulders for 10 seconds.
- 5 Pull your chin to your chest for five seconds. Relax for 10 seconds.
- 6 Hold your arms out like you are pushing against a wall for five seconds. Then drop your arms for 10 seconds.
- 7 Tighten your fists for five seconds. Relax them for 10 seconds.
- 8 Tighten your stomach muscles for five seconds. Relax your muscles for 10 seconds.
- 9 Tighten your thighs for five seconds. Relax your thighs for 10 seconds.
- 10 Tighten your calves for five seconds. Relax them for 10 seconds.
- 11 Curl toes to tighten for five seconds. Relax your toes for 10 seconds.
- 12 Finish your muscle relaxation exercises with 60 seconds of focusing on all muscle groups and being aware of a calm, relaxed feeling within them.

As you learn this relaxation technique, you'll become more familiar with the physical sensations of stress. Once you know what the stress response feels like, you can make a conscious effort to practice progressive muscle relaxation, breathing, or other techniques at the onset of stress symptoms. This can keep stress at bay.

STRESS REDUCTION TIPS

Plan Ahead

Invest in a good phone app — or an old-fashioned paper planner — and schedule your days and weeks in advance. Set time aside and set ten goals to achieve within the year. On the first Sunday of each month, set goals to accomplish that month. Each Sunday, spend 15 minutes jotting down goals for the upcoming week. Every morning spend 5 minutes writing down tasks to complete that day, which will help to move towards the weekly, monthly, and annual goals. Knowing what to expect can greatly reduce your level of stress and help you avoid overscheduling.

Just Say “No”

It's hard, especially if you've gotten yourself into the habit of helping out whenever asked, but learning how to say no to requests for your time or energy is key to reducing your stress.

Limit Yourself

While your Stress Chart will help, ultimately, you have to make a commitment to avoid some people or situations that cause you stress.

Change Your Attitude

When stressful situations present themselves, try to put them in perspective in the grand scheme of things. Accept that some things in your life are beyond your control. Also, practice being upbeat and positive.

Do Something

If you're concerned about something, do something about it. It might be as simple as writing a letter or voicing your opinion, but taking action can help break the pattern of anxious thinking. This can give you the pleasure of being proactive, as opposed to the agony of rehashing the same negative thoughts.

Practice Introspection

It's easy to get caught up in our hectic lives, running from one commitment to the next without giving much thought as to why. Take some time every few weeks for a little introspection. Ask yourself, *What am I doing in life? Where am I going? What's working for me and what's not working? What is important to me and how can I achieve it?*

THE POWER OF THOUGHTS



Current Circumstances

Looking at the way things actually are can help us understand that our thoughts may not be totally realistic or helpful.

Past Experiences

Consider past situations/experiences that do not fit with your automatic thought.

Future Possibilities

Is there a chance of things being different in the future?

Behavioral Tests

Try something outside of your comfort zone and see if the outcome is better than you had expected.

COMMON THOUGHT PATTERNS

Mind Reading/Fortune Telling

The tendency to assume people are reacting negatively to you, or that an activity will turn out negative, without evidence.

“He didn’t say hi to me; he must not like me.” vs. “It is possible he was thinking about something else. In fact, we chatted at lunch last week.”

“I’d better not ask for a raise because my boss will say ‘no.’” vs. “True, my boss may say no, but she may say ‘yes.’ I won’t know unless I try.”

All-or-Nothing Thinking

Looking at events in absolute, black or white categories with no middle ground. Using words such as “always,” “never,” “no one,” and “everyone.”

“I never do anything right as a parent.” vs. “There have been plenty of times in the past that I have helped my kids and there are areas I’d like to do better.”

Overgeneralizing

Viewing a negative event or setback as a never-ending pattern of defeat.

“I have only lost 5 pounds when I wanted to lose 10. Eating healthy and exercising will never work for me.” vs. “I have been successful at losing 5 pounds. I will keep doing my best.”

Discounting Positives

Believing the positive things you do or your accomplishments don’t count. You tell yourself it wasn’t good enough or anyone could have done just as well.

Someone gives you a compliment on a drawing you made and you think, “It’s not that good; anyone could have drawn it.” vs. “I did my best and others have given me nice compliments on my drawing.”

COMMON THOUGHT PATTERNS

Labeling

Applying negative terms to describe yourself instead of the behavior.

“I am stupid.” vs. “I made a mistake at work today.”

Mental Filter

You pick out a single negative detail and dwell on it exclusively, ignoring the positives. For example, you receive 10 positive comments and a mildly critical one at your work review, yet you obsess over the one critical remark and ignore the positive feedback.

“My boss critiqued my time management, she must think I’m bad at my job.” vs. “My review was mostly positive and now I know where I can improve and impress my boss for my next review.”

Should Statements

You criticize yourself or others with “should,” “shouldn’t,” “must,” “ought,” or “have to.” When you do this against yourself, it leads to guilt and frustration. When you do this against other people, it leads to anger and frustration.

“I should have worked out every day this week.” vs. “I worked out this week, which is better than not working out at all.”

Catastrophizing

Blowing negative events out of proportion.

Asking someone out on a date. “If she says no it will be awful/the worst thing ever!” vs. “Sure it would hurt, but not forever. I have gotten over rejections in the past.”

Blaming

Blaming yourself for an event that isn’t entirely under your control.

“If I had been a better parent, my daughter would have a better marriage.” vs. “While there are some things I may have done differently, I am not directly responsible for my daughter’s decisions.”

Emotional Reasoning

You assume your negative emotions reflect the way things really are.

“I feel terrified about going on airplanes; it must be very dangerous to fly.” vs. “Flying is proven to be the safest way to travel and people do it everyday. I will be okay.”

HELPFUL HINTS FOR FOCUS

Break it Down

Provide one direction at a time.

Multiple requests (brush your teeth, make your bed, get dressed) at the same time will be difficult for someone with attention/focus concerns to remember.

Repeat Directions

Request that the person with focus challenges repeats the direction provided.

Repeating the direction will allow for better recollection of the direction.

Make Eye Contact

Proximity is key when providing directions.

Eye contact and one-on-one direction can positively impact attention and task completion.

Consider Your Voice

The use of a very quiet to moderately loud voice will yield more attention from your audience than yelling.

Look for Visual Opportunities

Using visual cues when providing directions/instructions will help those who respond positively to visual stimuli. A picture to depict a responsibility (brush teeth, make bed, etc.) can be beneficial.



HOW THE BRAIN FOCUSES

Responses to Emotion

Emotionally-charged events are remembered better than “neutral” events. The brain remembers emotional components of events more so than specific details of events.

“Gist” Before Details

The brain is more capable of remembering and focusing on the “gist” of an experience, rather than a step-by-step recollection of details.

The brain functions best when it is able to code or associate information in a logical and organized manner.

Teaching/learning tip: Start with the key ideas, presenting them in order of importance. Once you’re through the key concepts, then add a layer of information to each key point.

Myth of Multi-tasking

The brain naturally focuses on tasks in a sequential order, one at a time.

The brain’s ability to multi-task while paying attention is a myth. “We are biologically incapable of processing attention-rich inputs simultaneously.”

Example of multi-tasking: “Paying attention” to an email or paper while listening to music, text messaging, and searching the Internet.

Mental Break

The brain requires mental breaks, especially when being presented with a lot of information or material at once, like in a lecture, seminar, sermon, meeting, etc.

Providing large amounts of material in a short amount of time does not allow the brain to “connect the dots,” meaning no time for processing or recollection.

Distraction Busters

1 Organize It

- Color code by importance
 - Red - Do now
 - Yellow - In progress
 - Green - Coming soon
- Use visual tools like a whiteboard for mapping
- Use due dates to create order
- Use folders for assignments

2 Break it Down

- Choose a deadline
- Split task into small pieces
- Take a brain break

3 Be Prepared

- Keep backpack in same spot
- De-clutter one day a week
- Breathe deeply before a task

4 Celebrate!

- Give yourself a reward for a job well done!

MINDFULNESS

Benefits of Meditation

Mindfulness training and meditation promote healthy brainwave activity in the short and long term. It increases alpha activity, which is associated with calmness, alertness, focus, and attention.

Meditation refers to the practice of deliberate techniques aimed at inducing a state of relaxation, attentional focus, or contemplation.

Meditation can involve:

- Repeating certain words or phrases
- Regulating breathing
- Clearing thoughts
- Directing thoughts in a particular way

GOAL

To train the mind so you can bring yourself into a state of consciousness that benefits you in some way — be it relaxation, heightened awareness, enhanced concentration, etc.

Walking Meditation

Walking meditation also involves the element of mindfulness, as well as adds in the element of activity. Here is an example of a walking meditation practice you could try.

- 1 Begin walking at a normal pace, preferably in a quiet environment.
- 2 Then start to observe your breath, appreciating how air enters in through your nostrils, fills your lungs, and comes back out from your throat and mouth.
- 3 Gradually refine your breathing to take deep, diaphragmatic breaths.
- 4 Now coordinate your breath with your stride, inhaling for four steps and exhaling for four steps.
- 5 Once this becomes comfortable and automatic, take four, short, staccato breaths of air through your nostrils — one puff for each step.
- 6 Focus on the audible sound of your breath, then exhale in the same fashion, contracting your abdominal muscles and pushing your belly button into your spine for four steps.
- 7 Continue this pattern for 5 minutes, then walk and breathe normally for 3 minutes.
- 8 Repeat as many times as you can during the course of your walk.

MINDFULNESS

Specific Exercises

Mindfulness Meditation

Here's one mindfulness meditation exercise our Brain Coaches can assist you with while you're in our center. Once mastered, you can try it on your own.

- 1 Sit upright, take your shoes off and begin breathing in and out slowly (belly breathing) for about 2 minutes. Let your muscles relax and feel yourself become more calm.
- 2 Now close your eyes and focus your attention on your feet while breathing in and out very slowly for about 2 minutes. Let your thoughts cease and just “think” about your toes. If new thoughts arrive, push them gently aside. Feel the tingling in your toes as more blood rushes to your feet.
- 3 Now focus your attention on your knees; deep breath in, deep breath out for 2 minutes.
- 4 Focus on your hips, shoulders, hands, neck, mouth, and then eyes — breathing deeply as you focus on each for 2 minutes.
- 5 Repeat a calming mantra with your eyes closed (e.g. ocean, ocean, ocean, ocean, ocean) for 5 minutes; deep breath in, deep breath out.
- 6 Now bring your focus back to your eyes and just concentrate on your eyes; deep breath in, deep breath out for 2 minutes.
- 7 Then focus on your mouth, then neck, hands, shoulders, hips, and knees – breathing deeply as you focus on each for 2 minutes.
- 8 Lastly, refocus on your feet and toes, again for 2 minutes, always taking deep, from your belly, breaths in and out.
- 9 Open your eyes and sit for a few minutes while you return to your environment, then put your shoes back on.

GROW YOUR BRAIN

BDNF

What is BDNF?

BDNF stands for brain-derived neurotrophic factors. BDNF plays a key role in maintaining the brain's neuroplasticity and in determining how effectively your brain can adapt and learn, in order to conquer new challenges. BDNF is like a fertilizer for the brain's neurons, making them grow more quickly and develop stronger connections. Essentially, BDNF is the "Miracle Grow" of the brain. Just like putting Miracle Grow on your plants or flowers can cause them to shoot up in size or to have more blooms, BDNF can help create more neurons, more connections and ultimately, a bigger brain. BDNF levels primarily rise with vigorous exercise, and to a lesser degree, with consuming coffee, blueberries, and taking omega-3 fatty acid supplements.

Track your exercise, diet, and sleep progress below:

Make it a goal to do something active **5 out of 7 days** of the week.

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____

BDNF



GROW YOUR BRAIN

4 Ways Our Brains Can Grow

New Synapses

Building new synapses is one way the brain can grow in size. Synapses are the trillions of contact points between the more than 100 billion **NEURONS** in our brains. Synapses direct the intricate communication network in your central nervous system and transfer information between cells. The brain can build new synapses when we challenge it to go outside of its comfort zone — for example, by learning new information or a hobby, as well as when we provide the brain with essential nutrients, like omega-3 fatty acids.

New Highways

Fiber bundles are the super highways of the brain, connecting the different regions of the brain — from front to back, side to side, or top to bottom. Fiber bundles can either blossom or wither away, depending on our lifestyle choices. Some ways we can expand the volume of this intricate communication network include: increasing blood circulation to the brain, reducing stress, using neurofeedback to harmonize the brainwave patterns or electrical activity in the different regions of the brain, and consuming a diet that stimulates the production of a healing brain protein called brain-derived neurotrophic factor or BDNF.

New Neurons

The hippocampus is among the few areas of the brain where brand-new neurons can grow. In fact, scientists have discovered that, on average, 400 to 700 new neurons are born in the hippocampus daily. These “stem cell,” premature neurons get incorporated into the hippocampal circuitry only if they’ve been nourished and matured. The best way for us to boost this **NEUROGENESIS** is through vigorous exercise. How do you know if you are engaging in vigorous exercise? The activity should increase your heart, breathing, and perspiration rates. Other ways for us to mature and nourish newborn neurons are to increase blood circulation to the brain, reduce stress, and eat a diet that lowers inflammation, increases omega-3 fatty acids, and stimulates levels of the protein BDNF.

New Blood Vessels

The capillaries and various other components of the blood circulation system in the brain can become larger in size within weeks. Like a tree that can create new branches, the blood vessel branches in our brains can grow and become more elaborate. The best ways to increase the production of new blood vessels in the brain is to exercise.

BRAIN BASICS

We've talked about how you are your own best brain-fitness advocate. But in order for you to take on this role with gusto, and to best understand how the work you are doing in this program is changing your brain, there are some “brain basics” you first should grasp:

- Your cortex
- Your hippocampus
- Your brain's blood supply
- Neuroplasticity
- Cognitive reserve
- Your brainwaves

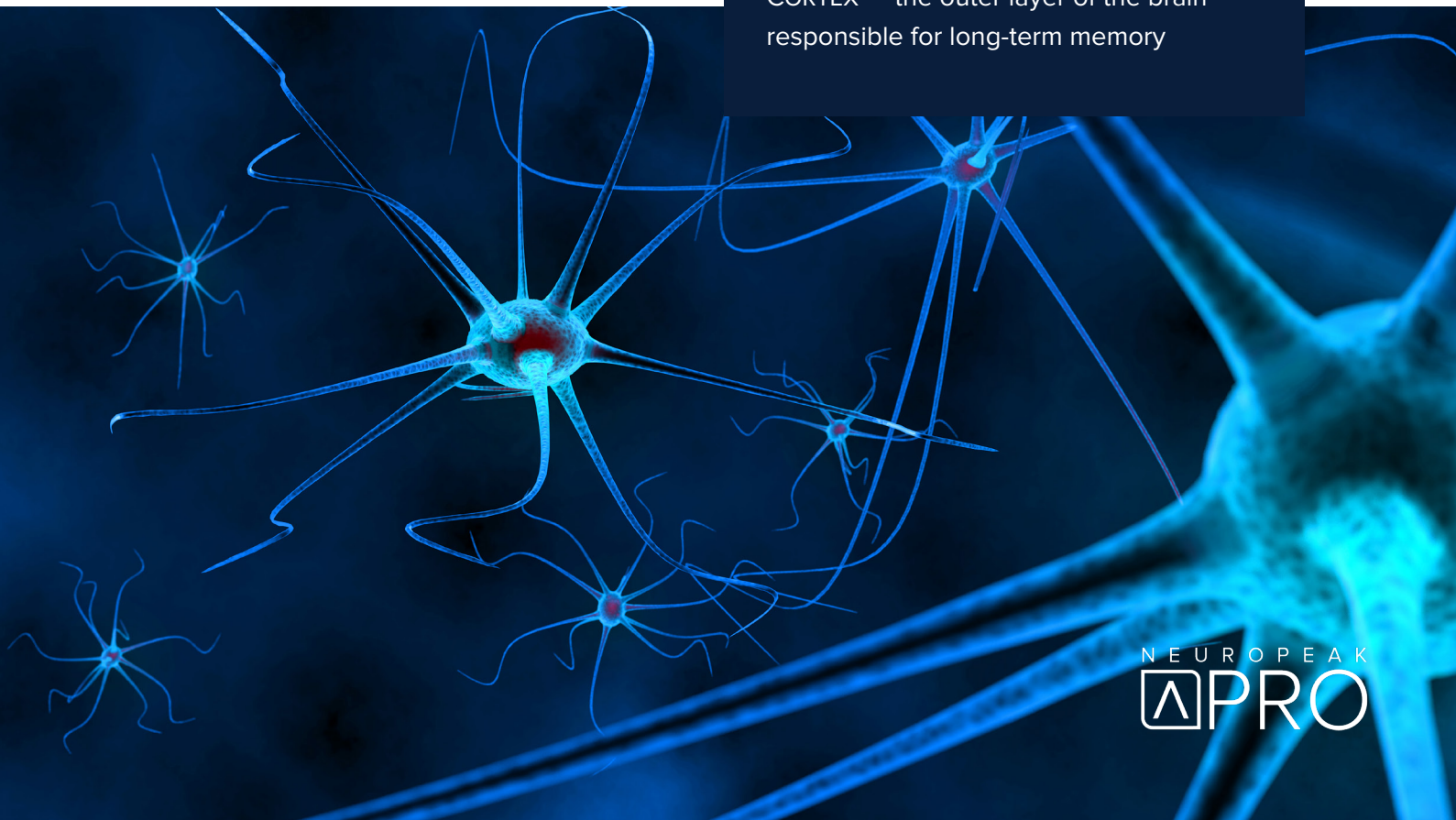
BRAIN 101 - Glossary

HIPPOCAMPUS — a pair of thumb-sized brain structures that help you form new memories and consolidate them for long-term storage.

SYNAPSES — tiny gaps between brain cells where signals travel from one cell to another

FIBER BUNDLES — super highways of the brain that connect the different regions of the brain

CORTEX — the outer layer of the brain responsible for long-term memory



BRAIN BASICS

Your Cortex and Hippocampus

Your **HIPPOCAMPUS** is roughly the size of your thumb, and there is one on each side of your brain, near your ear. This pair of deep-brain structures is critical for short-term memory — like remembering names, dates and conversations. When you learn something for the first time, new tiny **SYNAPSES** are formed in your hippocampus. The more you practice your new skill, the more synapses your brain cells make and the stronger they get. When you learn many new things, millions and millions of synapses are born. At some point, they — along with new **FIBER BUNDLES** that connect the hippocampus to other areas of the brain and new blood vessels that form to support those fiber bundles' expansion — actually grow the size of your hippocampus.

Being able to grow your hippocampus is groundbreaking because science has shown, on average, the hippocampus and cortex shrink by about 0.5% per year after age 40.

The hippocampus works closely with the rest of your brain, and especially with the cortex. The **CORTEX** is the outermost layer of your brain. It's essentially, a thick blanket of cells that covers the entire brain. The cortex is responsible for many higher cognitive functions, such as long-term memory, language making decisions, understanding abstract information, performing mathematical calculations and navigating your way when you drive. You can think of your cortex and hippocampus as operating a two-man assembly line for your memories. The hippocampus first helps you to acquire the new information and “learn” it. Then, it consolidates the information and passes it along to the cortex for long-term storage.

Understanding this connection, it should now make sense why someone may have a difficult time memorizing new names and phone numbers, but can still recall old memories, like their childhood home or something that happened in elementary school. This is the result of a breakdown in the “assembly line” between the cortex and hippocampus; memories are not making it to long-term storage due to the hippocampus shrinking at a faster rate than the cortex.



BRAIN BASICS

Your Brain's Blood Supply

About one-third of your brain is comprised of blood vessels — from tiny, microscopic capillaries to large, pencil-sized pipes. If you could use an imaging technique to show only the blood vessels in your brain, this is what you would see.

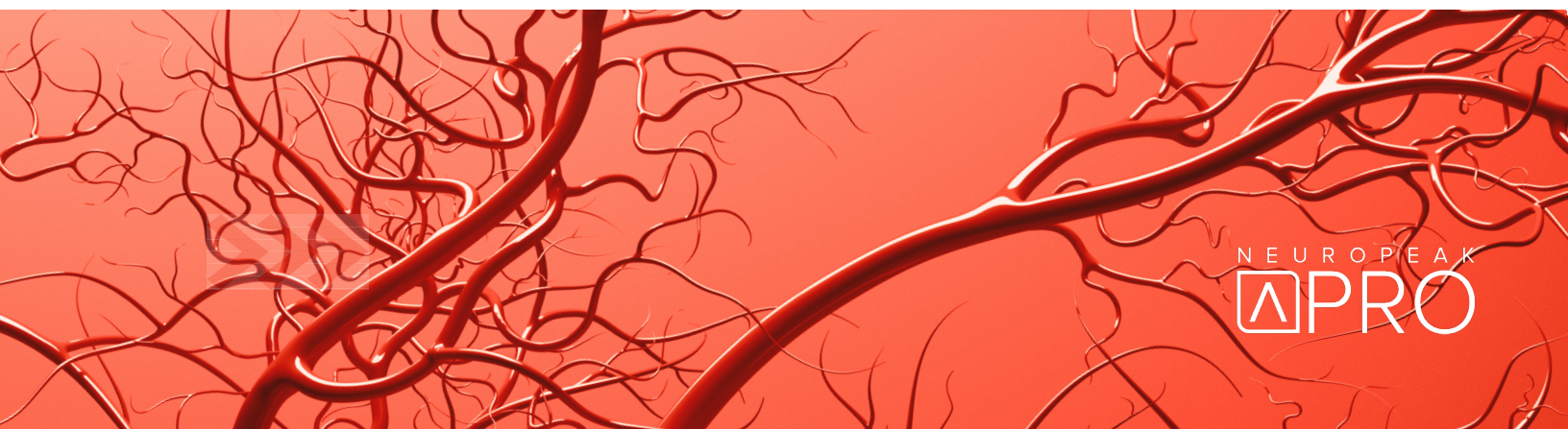
Given that so much of your brain is composed of blood vessels, it's no wonder that lifestyle choices — like adopting a proper diet that isn't artery-clogging and staying active to increase blood flow to the brain — are so important!



Some interesting facts:

- Your brain contains 100 billion neurons and trillions of synapses; they all need an adequate source of oxygen and nutrients from your blood.
- Your brain has an elaborate network of small and large blood vessels.
- Without enough blood, your whole brain (and especially your hippocampus) cannot function well.
- Up to 80% of strokes are preventable.
- Strokes more commonly happen in people who have vascular risk factors, such as obesity, hypertension, high cholesterol, diabetes and sleep apnea.
- Many of the medical conditions that can increase your risk of stroke (and heart attacks) — such as high blood pressure, diabetes, heart disease and a sedentary lifestyle — also can damage your hippocampus and cause memory loss with aging.

Blood supply is essential to having an agile and sharp brain. So it should be no surprise that lifestyle choices and vascular risk factors that impact blood flow and circulation can have a huge impact on whether your brain remains healthy and strong, or becomes weak and frail with age. People with multiple vascular risk factors experience significant brain shrinkage. This is a great motivator to talk to your doctor about treating or preventing vascular medical conditions.



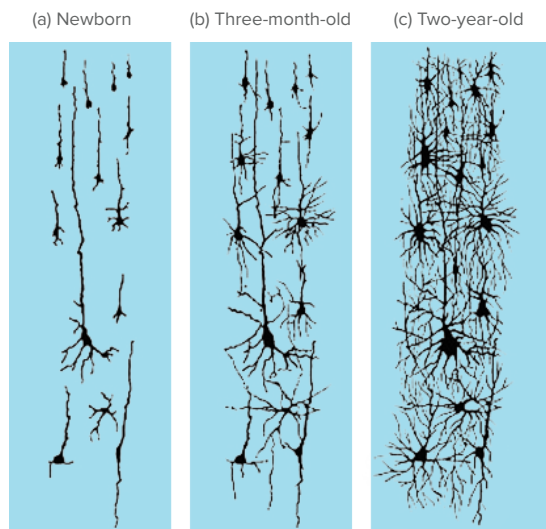
BRAIN BASICS

The Role of Neuroplasticity and Cognitive Reserve

There are two qualities of your brain that can play an important role in how well your brain ages: neuroplasticity and cognitive reserve.

Neuroplasticity

This term refers to the brain's ability to change, adapt and learn new things. Our brains are changing throughout our lives — for better or worse. They are constantly reorganizing their **NEURONAL PATHWAYS** and even creating new neurons in response to the circumstances we subject them to. Neuroplasticity is the reason we can learn new skills. It helps the brain recover from injury (such as from concussion or stroke), disease and environmental changes. But it's also the reason the brain can develop bad habits from the lifestyle choices we make, such as years of unmanaged stress and poor sleep.



Source: Frontiers in Integrative Neuroscience, 27 June 2012

The brain is its most “plastic” during early childhood. Just take a look at this image to the right to see how many more synapses and fiber bundle connections are formed from birth to three months old, and from three months to two years old.

We used to think the older brain had less “plastic” capabilities. However, evidence continues to mount that the aging brain actually may be just as plastic as the younger brain. It's just that we're likely not giving our brain's access to the same types of stimuli and learning opportunities that we did when it was young.

Neuronal Pathways

Another term for fiber bundles, the highways of the brain.

Cognitive Reserve

Cognitive reserve refers to the amount of damage due to aging and diseases that the brain can sustain before a person's cognitive abilities are negatively impacted and noticeable. The larger your cognitive reserve, the more able your brain is to operate well, even if some damage has occurred. Individuals who continue to learn new things, exercise regularly, enjoy different leisure activities, have a challenging occupation and take care of their health issues will continue to increase the number of synapses, neuronal connections, blood vessel branches and even new neurons throughout their lives. These individuals can usually stay sharp into their 80s and beyond, even if some footprints of Alzheimer's disease, a small stroke or concussion cause injury to some parts of their brains. They also are more resilient to the effects of aging.

Genetics, as well as education and other life experiences, all factor into a person's cognitive reserve. The “right” combination of genetics plus life experiences could tip the scale in favor of a person developing a serious memory condition or not. This is similar to the fact that a fit and strong person is more likely to resist and recover from pneumonia.

BRAIN BASICS

Your Brainwaves

When you are resting, your brainwave activity should be slow. For example, if you are at your desk working on a deadline and find you are zoning out, that could indicate your brain is running slowly when it shouldn't be.

When you're being chased by a lion, for example, you want your brain activity to be fast and for your body's fight-or-flight response to kick in. However, again, if you're at your desk trying to finish a project but find your palms getting sweaty, your mind unable to think clearly and your heart beating quickly — it could be that your brain is running too fast when it shouldn't be.

Correcting Your Brain's Speed

The brain needs a healthy balance of fast- and slow-moving brainwave activity to function at its best. With balanced electrical activity, the brain is able to operate in a calm, focused state and is better able to “get in the zone” and be productive. A brain that is consistently running too fast or too slowly is likely to result in a host of negative symptoms.



BRAIN BASICS

Brain Regions

Frontal Lobes

The frontal lobes can be roughly divided between the motor areas on the top of the head, responsible for planning and directing motor movements, and the “prefrontal” areas that sit in front of the motor areas. Certain prefrontal areas are responsible for cognitive functions like paying attention, planning, problem solving, and decision making. Other prefrontal areas are responsible for regulating emotional reactions, controlling impulses, and moderating social behavior. Dysregulation of the frontal lobes may lead to issues with any of the above functions.

Temporal Lobes

The temporal lobes are responsible for auditory perception, speech comprehension, and certain aspects of visual processing (e.g. face and object recognition). Deeper regions within the temporal lobe play an important role in forming and storing new memories (e.g. hippocampus) and integrating sensory information with emotional perception and experience (e.g. amygdala). Dysregulation of the temporal lobes may lead to issues with any of the above functions.

Parietal Lobes

The parietal lobes receive information from the body on touch, temperature, and pain and integrates these with visual, auditory, and motor inputs. This produces spatial awareness and coordination of movement in space (e.g., hand-eye coordination). As a hub of multi-sensory integration, the parietal lobes play a key role in reading, writing, and performing math calculations. Dysregulation of the parietal lobes may lead to issues with any of the above functions.

Occipital Lobes

The primary function of the occipital lobes is related to visual processing. This region of the brain works to receive and process visual input and send signals to other regions to aid in understanding colors, shapes, and movement, among other visual processes. Tasks such as reading, writing, and spelling rely heavily on having accurate visual processing. Dysregulation of the occipital lobes may lead to issues with any of the above functions.

Brain Frequencies

Delta (1 – 4 Hz)

Delta waves predominate in the deepest stages of non-REM sleep. Widespread appearance of delta during wakefulness may indicate a sleepy or drowsy state. Delta dysregulation may be associated with symptoms related to energy, sleep and cognitive function.

Theta (4 – 8 Hz)

Theta waves predominate in the state just before the onset of sleep. An abundance of theta during wakefulness may produce states of drowsiness or daydreaming. Theta dysregulation may be associated with symptoms related to inattention, impulsivity and mood.

Alpha (8 – 12 Hz)

Alpha waves predominate when the brain is in an idling state and may be associated with rest, creativity and meditation. Alpha dysregulation may be associated with symptoms of inattention, anxiety, depression and exhaustion.

Beta (12 – 30 Hz)

Beta waves predominate when awake and alert. They are associated with thinking, planning and problem solving. Dysregulation in beta brainwaves may be associated with symptoms of anxiety, rumination, inattention and hyperactivity. Beta waves may be divided into several subgroups (see below).

- **Beta 1 (12 – 15 Hz)**

Beta 1 brainwaves produce a calm, focused state of mind and are responsible for one's ability to sustain that state. These brainwaves are associated with being "in the zone." They also contribute to physical balance and coordination (when over the sensorimotor strip).

- **Beta 2 (15 – 18 Hz)**

Beta 2 predominates when actively involved in problem solving.

- **Beta 3 (18 – 25 Hz)**

Beta 3 also predominates during cognitive tasks, but may indicate too much intensity.

- **High Beta (25 – 30 Hz)**

High beta brainwaves may be associated with hypervigilance and activation. They may indicate that the body is more likely to be triggered by sympathetic "fight or flight" reactions, which may lead the body to respond negatively to stress. This response is adaptive in times of panic or fear; however, an overabundance in day-to-day life may produce symptoms of inattention, anxiety, rumination or poor sleep.

BRAIN BASICS

Figure:

This graph depicts the brainwave activity of an optimized brain. Amplitude is a measure of the strength of the electrical activity. The higher the amplitude, the stronger/more dominant the activity. A balanced, optimized brain has the slowest brainwave activity (delta) at the highest amplitude, with the other brainwave frequencies decreasing in strength from there. The fastest activity (high beta) should be at the lowest amplitude, indicating stress is not an over-dominant force in the brain.

