

SUPER HUMAN BRAIN AND **NEUROLOGY 101**



THE BUSY
SUPERHUMAN

**BRAIN, VISION, BALANCE AND NERVOUS
SYSTEM TRAINING**

Dr Sara Pugh PhD

WWW.BUSYSUPERHUMAN.COM

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Hello and Welcome

Thank you for downloading eBook and video. My name is Sara and I will be guiding you through Neuro 101 by explaining the 'Why, What and How' of a very exciting field called functional neurology.



Why train the nervous system?

Do you have or know someone who has aches and pains that won't go away?

Do you feel like you could be more flexible or stronger?

Do you have or know anyone with balance issues?

Do you have issues with visual skills and coordination?

Do you feel that you could think more clearly?

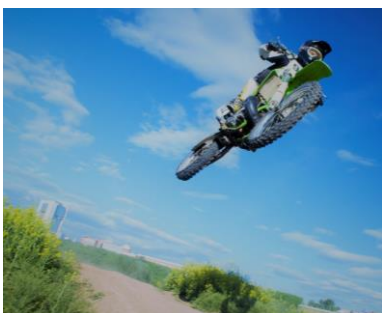
These are all problems that can be aided or fixed by working with the nervous system.

What can be expected from training the nervous system?

Nervous system based training allows greater force, production, skilled manoeuvring, jumping and landing and of course faster reflexes. Decision making processes will be more effective as well as increased stamina and decreased overall tiredness due to a more efficient nervous system. In terms of sport, players who train their nervous systems will see more options more quickly. 'See it first, be first'.

Improving the parts of the brain involved in vision, spatial awareness, balance and coordination allows people to see more of what's coming at them and be aware of what's around them. This is key in sport not only for preventing concussions and being 'hit', but also for preventing accidents in general.

One key aspect which separates us from animals, and is key to our survival, is our ability to predict. Your brain can imagine many possible scenarios so you can then make the best decision. The better your brain the faster it can predict and take action. With a better brain, information is stored, organised and applied effectively; this is relevant for productivity, driving, competitive sports or passing exams.



What is the Nervous System?

The nervous system is a complicated system of different types of nerves and cells that carry messages to and from the brain and spinal cord to and from different parts of the body. In a nutshell, the purpose of the nervous system is to sense what is happening inside and outside the body and to react appropriately so that you survive. The nervous system is the fastest system in the body and controls pretty much every bodily function; the brain is the gaffer or the big boss. This is why it is useful to learn about the nervous system.

The nature of your brain both determines who you have been and more importantly, who you will become. Everything you have ever felt or done in your life was due to brain function. The brain's primary objective is survival - it wants to keep you safe and alive today. The brain's top questions are "Is this safe?" "Am I in danger?". Your brain essentially lives in a cave and relies on information from different systems in the body. Your eyes and tongue are bits of your brain poking out into the world so they provide valuable input and output for the brain.

Performance and pleasure are secondary, as we are wired for survival rather than performance. One of the best ways to get the most out of your brain is to make it feel as safe as possible so that you don't live in 'high alert' or 'high stress mode' 24/7. This frees up brain power and space for performance and pleasure. Making the communication system between the brain and the body as smooth and easy as possible will help reduce stress and increase performance. If you have a stiff spine, bad eye sight, bad balance or a trapped nerve, this will stress out the brain and make it feel threatened as it is stuck in a body that isn't working properly. Would you feel safe driving a car on a road trip with a flat tyre, one headlight, a horn that didn't work, brakes that did work reliably and faulty fuel gauge?

To function well your brain needs

1. Fuel. Which means glucose, ketones and oxygen
2. Good communication with the 'body'
3. **Activation. Which means stimulation and this is what we will be focusing on**



What happens when we stimulate the brain? This is called the 1-2-3-4 of brain function. The brain receives an **input**, **processes** the input makes a **decision** and **produces** an output.

In the video you are going to learn how to stimulate different parts of the brain using a variety of different '**inputs**'.

How Does the Nervous System Work?

Input. This comes from eyes, ears, skin, joints and receptors in the body. The quality and quantity of the input or signals matters. Am I getting good signals? Am I getting enough of them? Think of a drunk person texting, making a phone call or emailing you; there is lots of input but does your brain understand? Can it interpret the messages? Can you decide what to do with the drunk messages intelligently? No.

Training input systems like the eyes and inner ear (balance / vestibular system) are important and are often neglected. If your eyes or inner ear give your brain poor or inaccurate information then you are going to have trouble hitting a ball or balancing on a skateboard, or even just walking.



Processing and Decision. This is the brain attaching meaning to the incoming input, comparing it to all other past experiences and then making a decision. This is where the speed at which you process the information comes into play. Ideally, we want to make the most intelligent decision in the fastest possible time. This can be on the sports field, in an exam or on a date.

Output. This can be movement, organ response or something like blood pressure changes. Most commonly it is movement of the eyes, mouth or joints. For the output to be successful the target organ, e.g. your muscles, ligaments and joints need to be healthy and working effectively.

If you are struggling with a knee or shoulder pain you can't get rid of or have flexibility or strength issues which don't improve then somewhere in the input, processing, decision and output loop lies the solution. Finding and fixing the problem is what functional neurology is all about. The brain runs the show and contained in the following pages are some brain basics. The brain and functional neurology are very complicated topics with intricate details. This report is by no means a complete comprehensive guide; there is more, a lot more, but this is a start.

*"The goal of any rehabilitation intervention is to re-engage those neural systems rendered dysfunctional from injury and disuse."
-Jeffrey Kleim, PhD "*

Vision and Balance

Your brain always has to know:
Where you are in space
Where your head is in relation to your body
Which way is up



If your balance system (inner ear/vestibular system) and eyes are giving bad input, your brain doesn't know where you are. This is not safe.

The visual system is top of the neuronal hierarchy and feeds into many other neurological pathways which means it is viewed as very important by the brain. Eyesight is simply the ability to see something clearly. Vision goes beyond eyesight and can best be defined as the understanding of what is seen. About 50% of the brain is for processing 'vision'.



Eye movements. Can you visually follow a moving object, and shift between targets, while still seeing clearly?

Visual clarity. Can you see it clearly?

Depth of vision. Can you precisely identify where an object is in relation to everything around it?

Peripheral vision. How much and how well can you see what you are not looking at?

Vision involves the ability to take incoming visual information, process that information and obtain meaning from it.

The vestibular system or the inner ear is second on the neural hierarchy and is a very important part of how well you keep your balance in all situations; however it does much more than that. The inner ear helps to tell your brain where you are in space, how fast, what direction you are moving and when you will arrive at your destination-this can be bending over to put washing in the dryer, or running up the stairs or doing a double back flip with a half twist. The vestibular system is the fastest system in the body.



The vestibular system has a control over muscle tone in legs and spine and neck, which means back problems and back pain can come from the vestibular system being weak or imbalanced. It tells your postural muscles what to do reflexively, so it works by a method that is not under your control. The vestibular system inputs into or 'talks to' the cerebellum and medulla.

To move efficiently, powerfully and gracefully through the world, you need great signal quality from your inner ear, joints and eyes and great signal integration in your brain

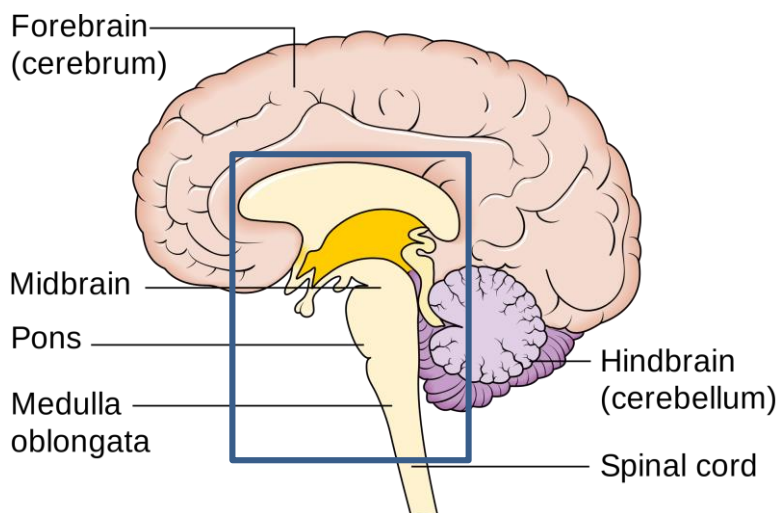
Brain Basics

The brain receives input, processes it, makes a decision and produces an output. Now we will dive into some basic brain anatomy and find out a bit more about what makes up a brain. The old parts of brain or 1st brain are survival orientated. They are sometimes called the mammalian and reptilian brain. In the book *The Chimp Paradox*, Dr Steve Peters talks about the chimp brain, the human brain and the computer. To build rapport with another person you need to please their 1st brain or chimp brain, so that you are not perceived as a threat.

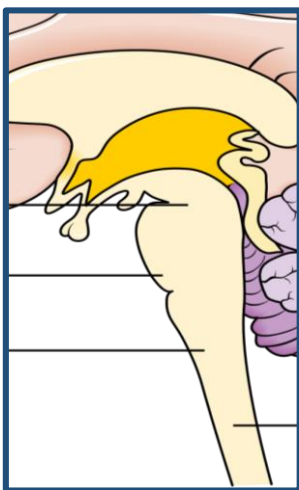
The 2nd brain, forebrain, neo cortex or new brain is you and where creativity, logic and personality reside.

The new brain inhibits the **old brain**.

The **cerebellum** is part of both new and old brain.



There are many more parts to the brain. These are the parts you will learn the basics on in this report - the **frontal lobe** and **parietal lobe** which are in the **2nd brain** or **forebrain**, the **pons** and **medulla**, the **midbrain** or **mesencephalon** and the **cerebellum** which are the **1st brain**.



Reflexes come from the 1st brain. These are not just ninja-like responses, but reflexive eye and head movement in response to light or loud noises, how your balance system reacts in different situations, autonomics and basal function (heart rate, breathing, blood pressure) and many aspects of posture or just standing up. Many problems are 1st brain issues, as reflexes just happen and you cannot control them. For example if someone shines a light in your eye, your pupil will constrict in less than a second and there is nothing you can do to stop that, you cannot consciously control all reflexes.



Cross section of the spinal cord

The brain connects to the spinal cord by special tracts, ascending tract (coming to the brain) and descending tracts (going out of the brain). These tracts are like a one way traffic system in a city, or electrical wires in your home. It would be pandemonium if all the nerve impulses just went up the spinal cord at once. The spinal cord is actually lots of separate cords, wrapped up in myelin (a special biological insulating material made from fat) and stored together. All of the messages to and from the brain have specific 'routes' they are allowed to use.

Pain and the Brain

It is important to mention that pain is not made at the “tissue level,” such as the elbow, knee or shoulder, even though that’s where you feel it. Pain comes from the brain, as your brain has a whole virtual map of your body so it can make pain, rather like the concept of having a voodoo doll in your head and the brain poking it with a pin. ‘If you have a brain you will feel pain’.

Pain, when it is created, is simply a signal that tells us our brain would like us to take action. It is called a first order signal, which is very hard to ignore. In other words, pain is your brain’s way of saying, “Stop doing what you’re doing, or do something different”.

There are situations when you have a stressed out or neurologically unbalanced brain, and it over-reacts to ordinary stimulation and produces pain.



The brain is supposed to make you feel pain when there is a real threat, for example when you stand on broken glass. It is sharp enough to cut the feet so you need to step off the glass ASAP. The brain is very protective of your feet as it still thinks there are sabre toothed tigers from which you need to run away. There are situations when the brain over-reacts, particularly when stressed or tired, like worn out parents. For example, being rubbed by a towel and feeling pain. The brain decides the stimulation, in this case the towel, is dangerous or a threat and creates some pain to make you move away from the perceived threat. This is part of how chronic pain syndromes manifest themselves, but there are other factors which play a role.

There is more to pain than simply an over-sensitive brain but a stressed out brain is more likely to feel pain. If your brain doesn’t receive good input from your senses or from your eyes or balance system then this will stress it out as it doesn’t know what's going on.

Make sure your brain is getting the best possible input so it can produce the best possible output

To be healthy and be able to interact with the world you need to see well, balance well, move well and breathe well



The Parietal Lobe

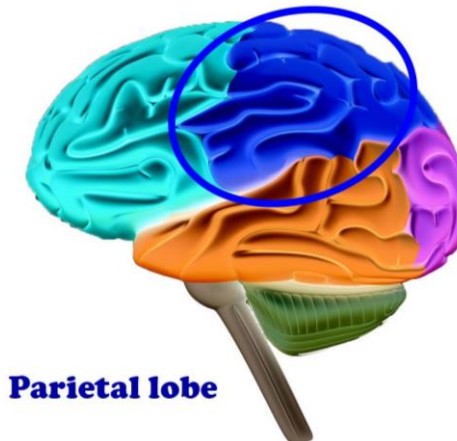
A tremendous amount of your brain space and your body design is oriented toward helping you understand your environment through what you feel and what you sense. This is called sensory information. If you reach out and touch something you need to know if it's a hot oven or a cat. Your brain always needs to know exactly where your joints are in space all the time so it can move them with the correct force and speed, in the right direction at the right time. This is called proprioception or body awareness. If your brain and joints don't communicate properly, your brain won't allow you to move as well as you could. This means you will be weaker, stiffer, slower and more likely to get an injury.

'Sensory before motor' - you need to be able to feel it before you can move it.

The part of the brain which receives incoming sensory information is the parietal lobe, there are two, left and right side. This input can be hot, cold, rough, smooth, sharp dull, vibration, light touch / fine touch or about your location. The parietal lobe decodes the information and then works out what it means.

The parietal lobe processes spatial sense of self, body image and navigation, but it also deals with information from the eyes. The parietal lobe attaches meaning to incoming sensory inputs, for example is this a fist or a ball coming towards my face or a person trying to kiss me. If you put something in your hand and then try and guess what it is with your eyes closed, your parietal lobe works out what it is. The parietal lobe allows you to guess the weight of something you are holding.

- Integrates sensory information
- Spatial representation of the world
- Interprets language and words
- Interprets signals from vision, hearing, motor, sensory and memory
- Non-verbal memory



The parietal lobe is key for certain visual skills-these are 'smooth pursuits' which are eye tracking movements e.g. following a target such as ball or reading are coordinated by the same side parietal lobe. The parietal lobe also recognises letters and numbers even if they are upside down or backwards, if it is working well it should be able to deal with that. Without diving into too much detail the parietal lobe's 'domain' when it comes to vision is seeing slow moving, low contrast objects that are low down. So in the context of daily life this means seeing and registering something like a hedgehog or a snake on the ground. If you are driving at dusk or in fog then it would be seeing and registering cyclists or pedestrians. This means the parietal lobe helps you to avoid stepping on snakes or hedgehogs and accidentally running over pedestrians.

The Parietal Lobe

People with parietal lobe problems tend to knock things over often, bump into people or furniture, so have trouble with body awareness and often have a history of injuries on one side of the body. Other signs of a malfunctioning parietal lobe include difficulty with mental focus, understanding language, reading and remembering where things are. The left and right parietal lobes are slightly different in what they do and how they function. That is covered in Brain and Neurology 102.

Sensations on **Left** side of body are processed in **Right** parietal lobe.

A sign the right parietal lobe is not working well is poor navigational skills.

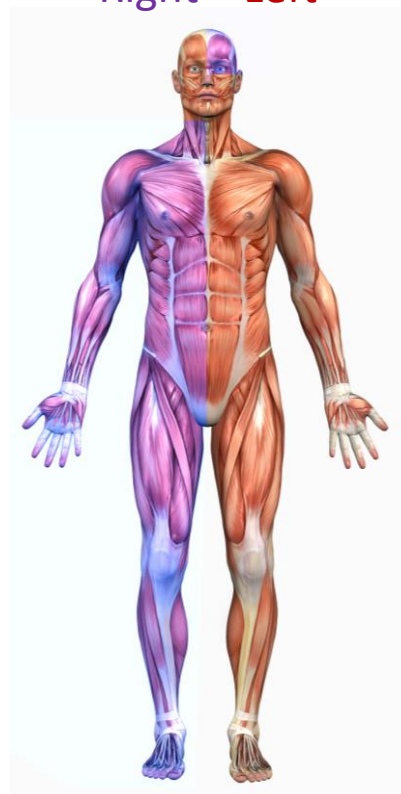
Sensations on **Right** side of body are processed in **Left** parietal lobe.

A sign the left parietal lobe is not working well could be reading difficulty or eye strain when reading.

Right **Left**



Right **Left**

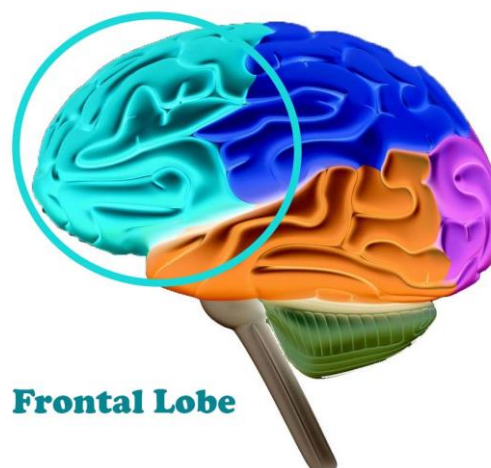


The Frontal Lobe

The frontal lobe or neo cortex is where your personality and consciousness resides, and is the 'King' or 'CEO' of the brain. The frontal lobe has eight primary functional areas. The motor cortex is an area of the frontal lobe and its job is planning, initiating and performing voluntary movement. The motor cortex uses the corticospinal tract to send the messages to the muscles to tell them when and how to move. Some of the cognitive functions the frontal lobe performs include planning, logic, attention, choosing, comparing, reward, motivation, predicting, problem solving, decisions, social behaviour and other executive functions.

The frontal lobe is heavily involved in inhibition and modulation of other parts of the brain and the sympathetic nervous system via the brain stem. The frontal lobe modulates emotions and inhibits unwanted, inappropriate or compulsive behaviours. The pre-frontal cortex, a sub set of the frontal lobe is most involved in will power or compulsion, but has other biological roles.

- Focus
- Moral choices
- Abstract thought
- Personality insight
- Language processing
- Regulation of movement
- Higher order sensory processing
- Prediction of future consequences
- Long term non-task based memories



An area in the frontal lobe called Broca's area is key for fluent articulate speech. There are other areas in the frontal lobe involved in vision and fast eye movements to targets, called saccades. In the exercise video there is a variety of activities involving saccades to stimulate your frontal lobe.

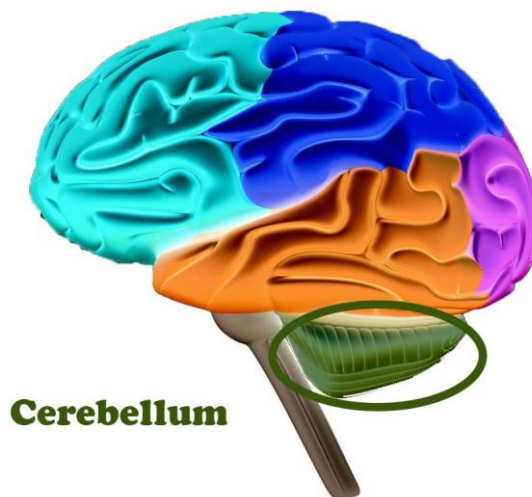


As far as movement goes, for simplicity the right cortex controls voluntary movement on the left side of the body via the motor cortex. The left cortex controls voluntary movement on the right side of the body via the motor cortex. Only 10% of the output goes towards actually performing the movement you planned to do such as kick a football or reach for a cup of tea. The other 90% goes to the brain stem and acts 'reflexively' or 'unconsciously' like stabilising the body and integrating with other systems like the balance system, blood flow and postural muscles. Therefore, you are only consciously in control of 1/10th of your 'physical actions'.

The Cerebellum

The cerebellum is the little brain behind the brain and there are two, left and right. The cerebellum is very metabolically active which means it gets hit first by drugs, chemotherapy and heavy metals. Although it is $1/10^{\text{th}}$ the size of the brain, it contains over 50% of the total number of nerve cells in the brain.

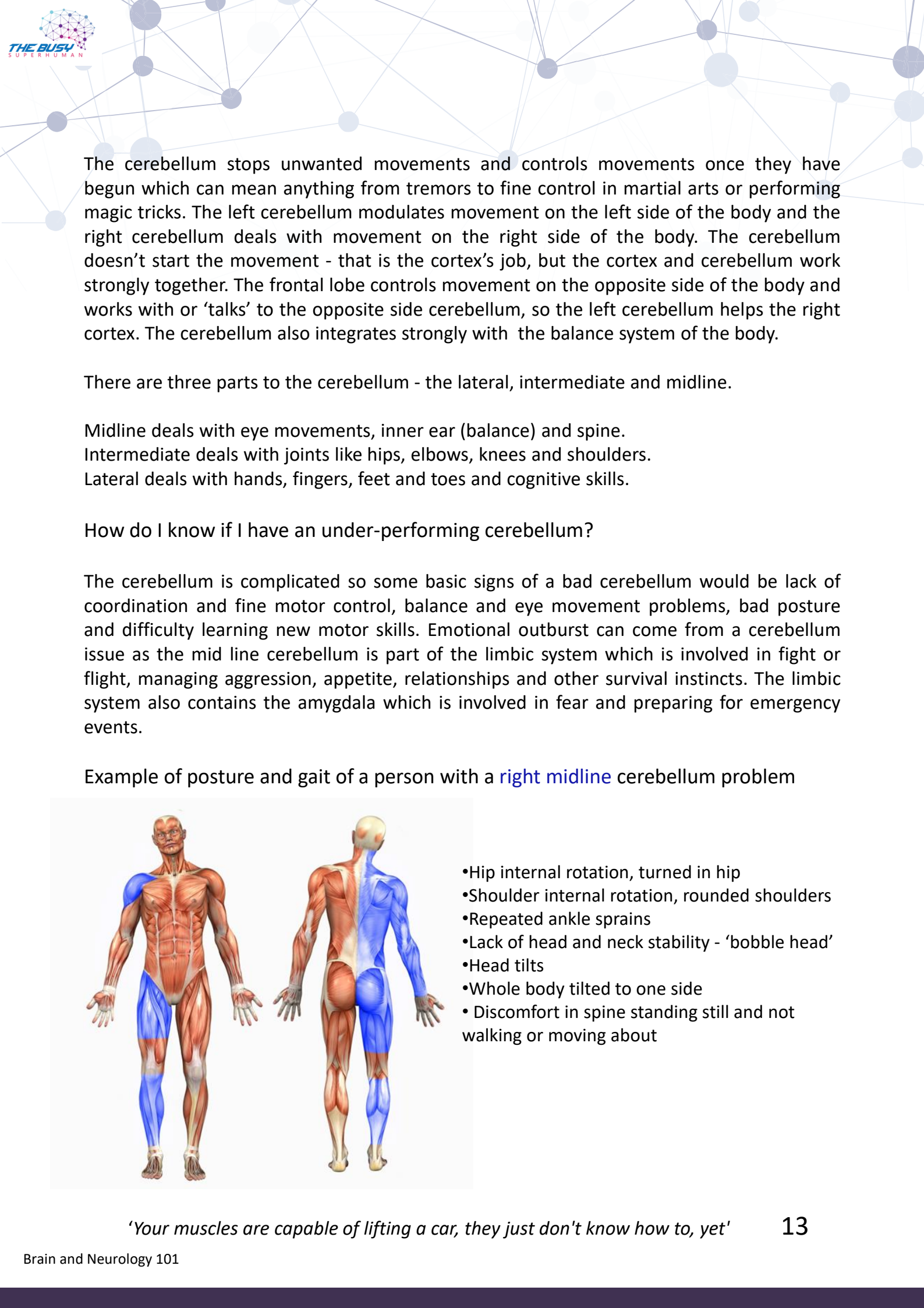
The cerebellum is involved in the **ABC of movement**, which is **accuracy, balance and coordination**. This ABC of movement is everything, arms, legs, spine, eyes and tongue. It is involved in everything from eye movements and speech to playing sports and musical instruments.



The cerebellum is an integration centre or a switchboard. It takes in lot of information, ignores the irrelevant input, simplifies the useful information and passes it on to other parts of the brain. The cerebellum plays a key role in good posture and gait, both walking and running.



The cerebellum is important for learning how to do a skill, movement or task as it compares desired movement with actual movement. For example, if you are learning golf your cerebellum will constantly be trying get you to be able to hit the ball where you desire, as this is not always where the ball actually lands when you first start out. No matter what movement you do, the cerebellum will ask 'How did we do?', then set about perfecting or learning the movement, depending on the answer.



The cerebellum stops unwanted movements and controls movements once they have begun which can mean anything from tremors to fine control in martial arts or performing magic tricks. The left cerebellum modulates movement on the left side of the body and the right cerebellum deals with movement on the right side of the body. The cerebellum doesn't start the movement - that is the cortex's job, but the cortex and cerebellum work strongly together. The frontal lobe controls movement on the opposite side of the body and works with or 'talks' to the opposite side cerebellum, so the left cerebellum helps the right cortex. The cerebellum also integrates strongly with the balance system of the body.

There are three parts to the cerebellum - the lateral, intermediate and midline.

Midline deals with eye movements, inner ear (balance) and spine.

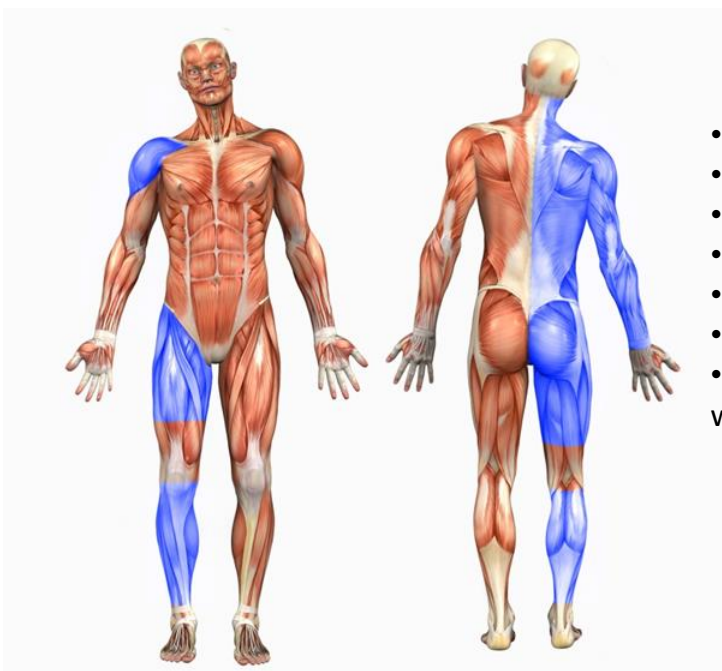
Intermediate deals with joints like hips, elbows, knees and shoulders.

Lateral deals with hands, fingers, feet and toes and cognitive skills.

How do I know if I have an under-performing cerebellum?

The cerebellum is complicated so some basic signs of a bad cerebellum would be lack of coordination and fine motor control, balance and eye movement problems, bad posture and difficulty learning new motor skills. Emotional outburst can come from a cerebellum issue as the mid line cerebellum is part of the limbic system which is involved in fight or flight, managing aggression, appetite, relationships and other survival instincts. The limbic system also contains the amygdala which is involved in fear and preparing for emergency events.

Example of posture and gait of a person with a **right midline** cerebellum problem



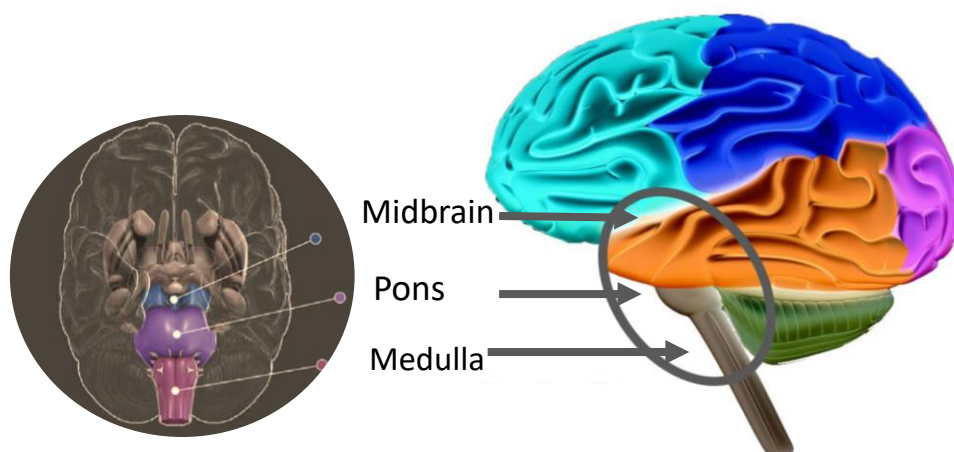
- Hip internal rotation, turned in hip
- Shoulder internal rotation, rounded shoulders
- Repeated ankle sprains
- Lack of head and neck stability - 'bobble head'
- Head tilts
- Whole body tilted to one side
- Discomfort in spine standing still and not walking or moving about

'Your muscles are capable of lifting a car, they just don't know how to, yet'

The Pons and Medulla

The pons and medulla, along with the midbrain are part of the brain stem and they control basal functions such as breathing, standing up, blood pressure and more. Because of the incredible density of cranial nerves and ascending and descending fibres from spinal tracts contained in the brainstem, it has an enormous influence on virtually all body systems. There are two midbrains, pons and medulla - a right and left and it's common for one to be overactive and the other underactive, but both sides can malfunction.

There is a part of the brain called the ponto-medullary reticular formation (PMRF) which is the part we are going to focus on as it is involved in posture, balance, muscle tone, respiratory and cardiovascular control, sleeping, arousal and pain control. Ninety percent of the output of the cortex goes to the PMRF and the cortex 'fires' to the same side PMRF. This means a lot of brain power is sent to the PMRF so it must be important. The brain is a glucose hog and the PMRF is a brain power hog.



The PMRF is important in sensation as it inhibits pain on the ipsilateral (same) side of the body, as it is a pain gate, so when it is not working properly ordinary sensation can be perceived as 'painful'. Children or adults who get very irritated by clothes often have a PMRF that has not developed properly yet, so they are over-sensitive to the feeling of the fabric.

The brain stem can be damaged by head injuries, cancer, strokes, surgery and anything else which damages nerves. Some signs the PMFR or pons/medulla are under performing are cold hands and feet, Raynaud's syndrome, joint dysfunction on one side of the body, lack of stability or tone on one side of the body, high blood pressure and decreased gut motility or function.

The PMRF also does something else which is very important, it inhibits the intermediolateral nucleus (IML) which is the beginning of the sympathetic nervous system. This means if you have a weak PMRF then your fight or flight system can run out of control 'sympathetic escape', which then results in the well know effects of stress such as inflammation, high blood pressure, sleep problems, mood issues, anxiety and burn outs. This is an example of neurologically induced stress, as lots of other factors can create stress such as hormones, food intolerances, environment and other people.

The PMRF

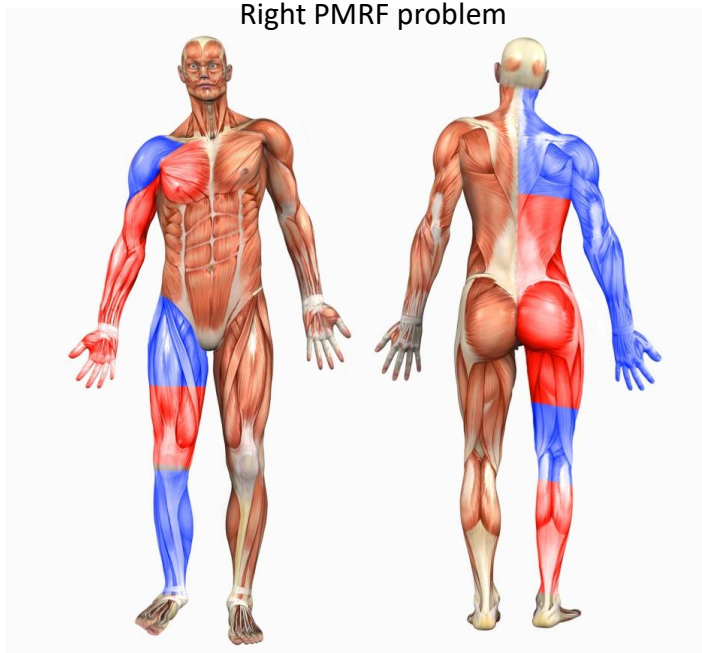
The IML, PMRF and the rest of the brain are supposed to work together to relax and constrict blood vessels at the right time to send the blood to where it is needed. For example if you want to move your right leg there is no point sending blood to the gut or the left arm. Therefore the PMRF is important in endurance and supplying fuel to muscles, so is of interest to 'movers' or athletes.

It is only when the IML and the sympathetic nervous system 'escape' and try to squeeze all the blood vessels at once does it become a problem. Interestingly, as there are two IMLs and two PMRF which control vessels on their own side, most people have different blood pressure readings left and right. It is only medical convention which measures the left. This is medically relevant as you can have a normal brain stem on one side and a malfunctioning one on the other. If you had a bad right PMRF then you could go all your life with high blood pressure on the right side and not know. Until it was too late. Always measure blood pressure on both sides. If in doubt go and read a neurology book.

The PMRF plays a key role in good posture and gait, both walking and running. There are specific muscle imbalances that are associated with an underperforming PMRF. The PMRF uses the reticulospinal tract to communicate with the muscles.

The PMRF inhibits flexors muscles on the same side above T6 (mid back) and extensors below T6. The PMRF also works with the cerebellum on the same side to create global tone or stability on that side of the body. Remember 90% of the output of the cortex goes to the PMRF/pons/medulla, so a proportion of your brain's output is used to just stabilise the body unconsciously.

Right PMRF problem



Red= hypertonic (too tight)
Blue = hypotonic (too weak)

- Weak muscles at the back of shoulder, triceps and upper back (rounded shoulders)
- Tight pectorals and biceps
- Tight lower back
- Tight external rotators of the hip (turned out hip)
- Imbalances around the knees (hyperextended)
- Tight calves
- Weak ankle stabilisers

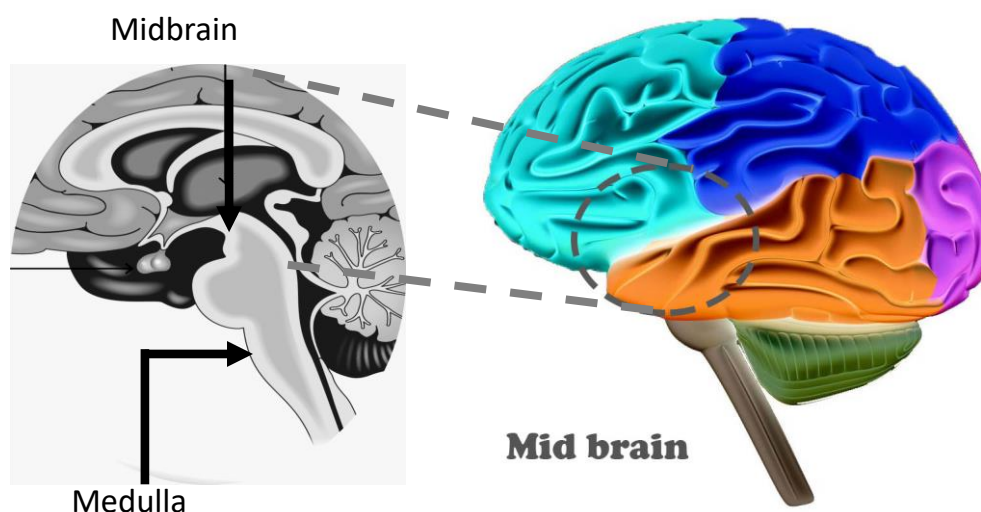
These postural problems from a weak PMRF can give rise to rotator cuff and shoulder impingements, thoracic outlet syndrome, piriformis syndrome and nerve impingements. Another symptom would be general lack of tone, stability or floppiness all over the body.

The Midbrain (Mesencephalon)

The midbrain or mesencephalon is located behind the eyes, and it is part of the brain stem and is in part under control of the cortex. In terms of movement the midbrain plays a role in eye and eyelid movement, pupil constriction and walking, particularly arm swing via the red nucleus and the rubrospinal tract. The mid brain partially controls some flexor muscles, such as shoulder flexors and hip flexors.

The Inferior and superior colliculi which detect sound and light are in the mid brain and are key parts of mapping so that you can know where noise and action are coming from and react appropriately. The tectum and the tectospinal tract are in the midbrain and this is responsible for reflexive head and neck response to sound / visuals - like someone popping a balloon near you and you whip your head round to see where it came from.

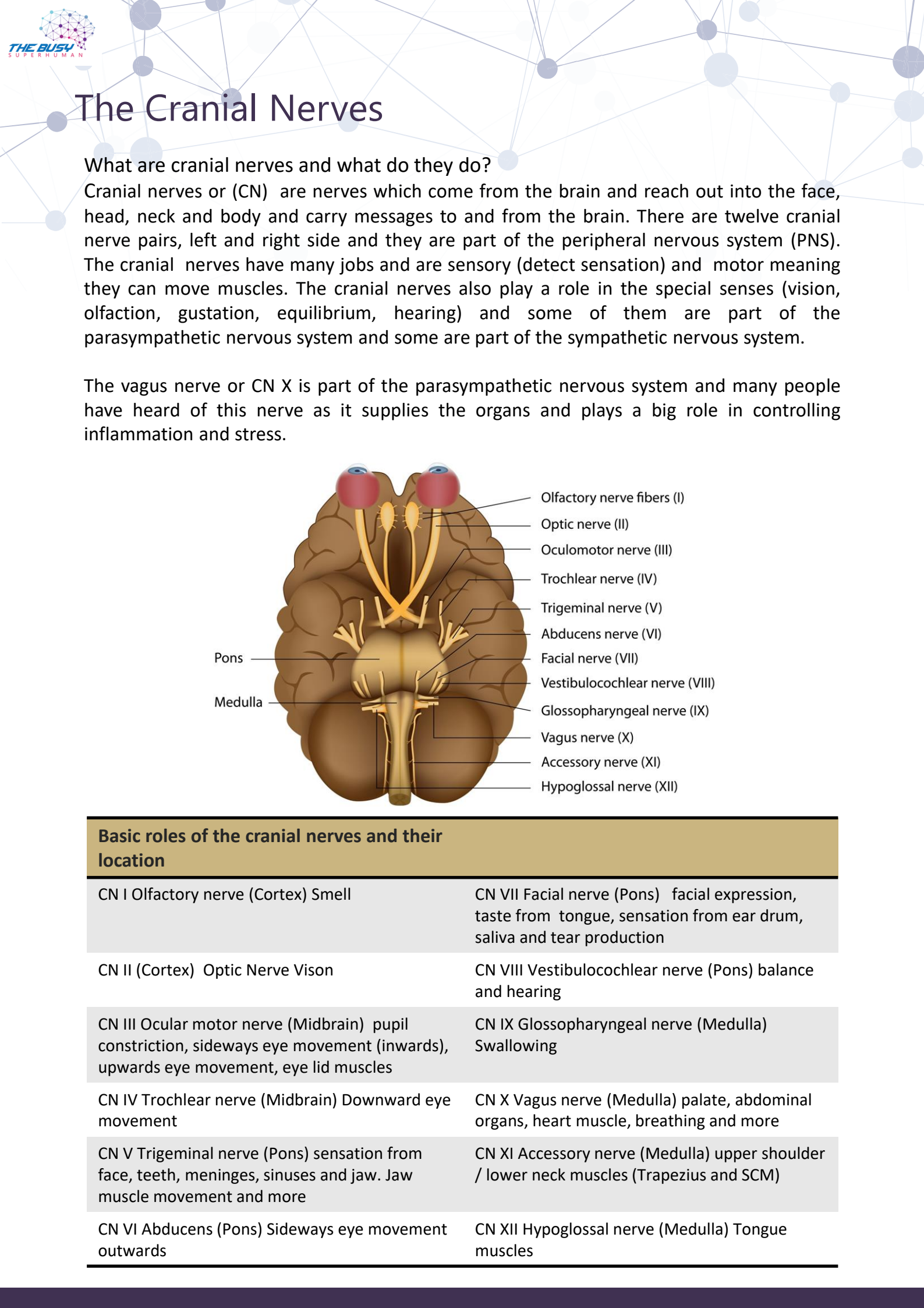
In terms of mood, the midbrain plays a role in wakefulness and sleep, as well as stress, anger and OCD. The substantia nigra which are a special kind of dopamine-producing cell are in the midbrain.



From its location, actions and the type of muscles it controls, the midbrain resembles a sentry or a guard as it can sense danger and react. Flexor muscles are turned on in the startle reflex to curl the body up to protect the vulnerable bits and prepare for battle, like hunching over like a boxer ready to punch. The midbrain can also fire to and excite the IML (the start of the sympathetic nervous system), so activates the physiological fight or flight response.

Midbrains get damaged by blows to the eyes and nose, but they also malfunction if there is something wrong with the cortex and it is not firing to the midbrain properly. Inflammation, viruses and toxins in the brain will also affect the midbrain.

Midbrains can be weak so that would mean tiredness, weak arm swing, and a pupil which doesn't constrict properly. Midbrains can be over-active which would mean insomnia, hyperactivity, irritability, OCD and tight flexor muscles, so basically living in 'high alert mode'

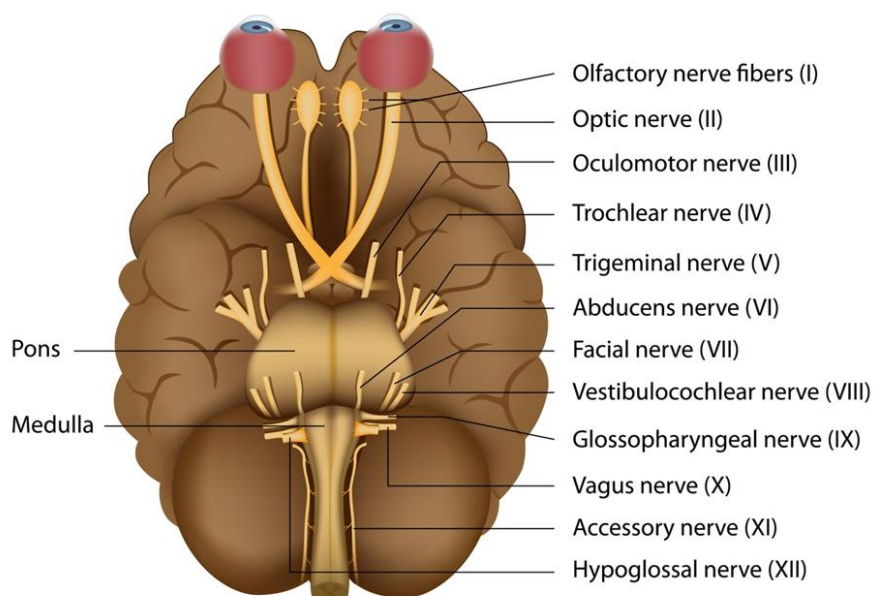


The Cranial Nerves

What are cranial nerves and what do they do?

Cranial nerves or (CN) are nerves which come from the brain and reach out into the face, head, neck and body and carry messages to and from the brain. There are twelve cranial nerve pairs, left and right side and they are part of the peripheral nervous system (PNS). The cranial nerves have many jobs and are sensory (detect sensation) and motor meaning they can move muscles. The cranial nerves also play a role in the special senses (vision, olfaction, gustation, equilibrium, hearing) and some of them are part of the parasympathetic nervous system and some are part of the sympathetic nervous system.

The vagus nerve or CN X is part of the parasympathetic nervous system and many people have heard of this nerve as it supplies the organs and plays a big role in controlling inflammation and stress.



Basic roles of the cranial nerves and their location

CN I Olfactory nerve (Cortex) Smell

CN VII Facial nerve (Pons) facial expression, taste from tongue, sensation from ear drum, saliva and tear production

CN II (Cortex) Optic Nerve Vision

CN VIII Vestibulocochlear nerve (Pons) balance and hearing

CN III Ocular motor nerve (Midbrain) pupil constriction, sideways eye movement (inwards), upwards eye movement, eye lid muscles

CN IX Glossopharyngeal nerve (Medulla) Swallowing

CN IV Trochlear nerve (Midbrain) Downward eye movement

CN X Vagus nerve (Medulla) palate, abdominal organs, heart muscle, breathing and more

CN V Trigeminal nerve (Pons) sensation from face, teeth, meninges, sinuses and jaw. Jaw muscle movement and more

CN XI Accessory nerve (Medulla) upper shoulder / lower neck muscles (Trapezius and SCM)

CN VI Abducens (Pons) Sideways eye movement outwards

CN XII Hypoglossal nerve (Medulla) Tongue muscles

The Cranial Nerves

How do cranial nerves get damaged or malfunction?

Cranial nerves get damaged in head injuries, dental or face surgery, by viruses or certain strong drugs. They can be rehabilitated as long as the nerve isn't severely damaged or broken in half.

Lack of stimulation will result in a decrease in function. Use it or lose it. After the age of 40 the senses start to degrade (particularly balance and vision) if they aren't trained, so all the more reason to do exercises to stimulate the cranial nerves,



How do I train or stimulate cranial nerves?

In the exercise video, most of the cranial nerves are going to get stimulated either directly or indirectly. 'Nerves which wire together, fire together', which means stimulating cranial nerve 11 will also stimulate 12 and 10 to some extent. Where ever the nucleus of the nerve is so the nerve HQ stimulating that nerve will also stimulate that part of the brain, for example;

Cranial nerves 3 and 4 are in the midbrain and they are involved in vertical eye movements and convergence, so vision exercises that include these types of movements will stimulate the mid brain and cranial nerves 3 and 4.

Cranial nerves 5, 6, 7 and 8 are in the pons so exercises involving the jaw, sound, face exercises and the inner ear will stimulate these nerves and the pons.

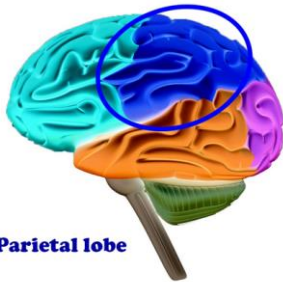
Cranial nerves 9, 10, 11 and 12 are in the medulla so breathing, gargling, swallowing, humming, singing, tongue exercise will stimulate these nerves and the medulla.



Singing stimulates multiple cranial nerves and parts of the brain, and its benefits are often overlooked and under rated.

Brain Training Exercises

You have completed your introduction to the brain and functional neurology, and taken your first steps to understanding to the complex inner working of your brain. Now it's time to start to do some brain stimulation. Below is a summary of the brain lobes and brief outline of the exercises you will be doing in the video.

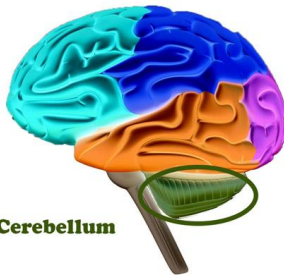


Parietal lobe

Sensory, what is it and where am I

Sensory warm up exercise

Vision exercises, smooth pursuits and contrast training



Cerebellum

Little brain behind the brain, the ABC of movement

Coordinated movement of hands and feet

Coordinated movement of hips and shoulders

Vision and balance exercises, VOR and diagonal eye movements .

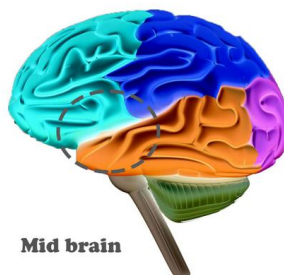


Frontal Lobe

The king or CEO of the brain

Smell – Cranial Nerve 1 and cortex on the same side

Fast eye movements anti - saccades for pre-frontal cortex

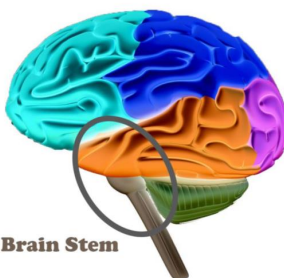


Mid brain

The sentry of the brain

Vertical eye movements - Cranial Nerves 3 & 4

Convergence (going cross eyed) - Cranial Nerve 3



Brain Stem

House keeper and pain gate of the brain

Tongue/Jaw - Cranial Nerve 12 & 5

Horizontal eye movements with sound - Cranial nerve 6, 7& 8

Nerve glide for - Cranial Nerve 11

Integrated eye movements optokinetic reflex (OPK)

Breathing - Cranial Nerve 10

Brain Training Exercises

The exercises in the video are designed to stimulate five different lobes of the brain, but some of the stimulation will 'bleed' through into neighbouring areas and stimulate other parts of the brain at the same time. This why neurology can be complicated as you cannot isolate one part of the brain as everything is intertwined. This is an introduction to how brain based training is done.

"No cortical area is an isolated entity in which a single function is represented. No area is without feedback connections and no area is without re-entrant connections from the thalamus." - E.G. Jones (2008)

This means that even though the lobes of the brain are separate the functions are not isolated and everything works together. The thalamus is like the switchboard in the brain which every thing passes through.

You are here to learn the nervous system basics and take your first steps in training your brain. This is Ivaylo and he will be showing you how to do the follow along nervous system exercises in the video. More from Ivaylo on Instagram @ivaylo_stoychev



References and Further Reading

<http://zhealtheducation.com/>

<https://carrickinstitute.com/>

Brain Training Supplements

When you add brain exercises to your regime, it's useful to consider some brain and mitochondria-boosting vitamins and supplements, particularly if you have a TBI, or kind of head injury. It is the inflammation from the TBI or inflammation in general which is a major cause of brain fog and other cognitive issues. There are also things which you can avoid which will help reduce inflammation and improve mental clarity, if you prefer not to use supplements. The mitochondria, also called the 'powerhouse of the cell' are a special organelle in the cell that produce energy in the form of adenosine tri phosphate (ATP) from your food. ATP is the universal energy currency of the cell. The brain and the eyes require lots of energy and contain large numbers of mitochondria. Poorly functioning mitochondria contribute to more inflammation and more free radicals, which is why keeping them healthy is key for overall health in addition to brain health. Here is a brief list of suggested supplements and why they can help your brain, this is for information and is not medical advice.

Essentials	Reason
Magnesium Vitamin D3 Omega-3 fatty acid (DHA, EPA) Zinc	Most people are deficient in these nutrients and they are key for brain health. Low zinc cause the body to accumulate aluminium which is linked to Alzheimer's and cognitive issues.
Detoxification	Reason
N-acetyl cysteine Glutathione Activated charcoal powder Choline Selenium	Glutathione is the body's No.1 detox molecule and the body uses N-acetyl cysteine to make glutathione. Activated charcoal binds to and helps excrete heavy metals and other toxins which harm the brain and body. The liver uses choline and selenium as back ups for some detox processes. Selenium is need for making T3, the active thyroid hormone. Low thyroid plays a big role in fatigue and brain fog.
Mitochondria Support	Reason
Co-enzyme Q10 L-Carnitine PQQ Polyphenols	Many people have mitochondrial dysfunction. Co-enzyme Q10 is key for people over 40 as levels begin to decline Polyphenols are found in dark chocolate, coffee, green tea, grape seed, pomegranates and other natural sources.

Brain Training Supplements

Useful natural products	Reason
Ashwagandha Astaxanthin Berberine	<p>Ashwagandha is a plant which can lower cortisol, which in excess or under times of prolonged stress is harmful to the body. Cortisol can affect blood sugar on contribute to insulin resistance.</p> <p>Berberine can stabilise blood sugar and increases insulin sensitivity as insulin resistance can lead to type 2 diabetes. Unregulated blood sugar can lead to mental crashes and brain fog.</p> <p>Astaxanthin is a very powerful anti-oxidant for mopping up free radicals.</p>

Avoid	Reason
Cheap vegetable oils	Soya oil, corn oil, canola oil, peanut oil, sunflower oil are unstable poly-unsaturated fats which produce free radicals and are inflammatory. Do not cook with these oils as it makes them even more inflammatory.
Dairy, Fructose Syrup, Gluten and Mould toxin	These are all anti-brain nutrients and inflammatory, so is excess sugar. Grass-fed butter, despite being a dairy product is well tolerated by most people and contains omega-3 fatty acids, vitamin K2 and other fats which feed the good gut bacteria.

This is only a short list of things to avoid as there are other culprits which are 'brain drainers', this is enough to consider for now. The biochemistry and uses of many more supplements are covered extensively in the Super Human Structures eBook

Thank you once again for choosing to download this product to begin your brain and nervous system training. More training and tips in Brain and Nervous System 102.

Consult your doctor before commencing any exercise regime or trying supplements if you have any underlying health conditions or concerns. The closer the exercise is to the brain the greater its neural impact so avoid fatigue while doing the exercises.