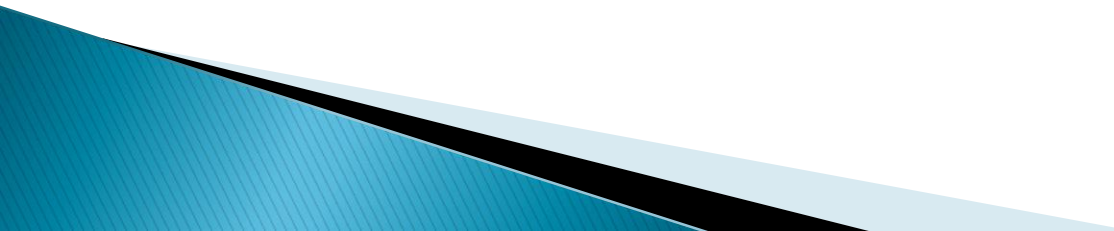


Brain and Behaviour: How does knowing about the brain help me give a bath?

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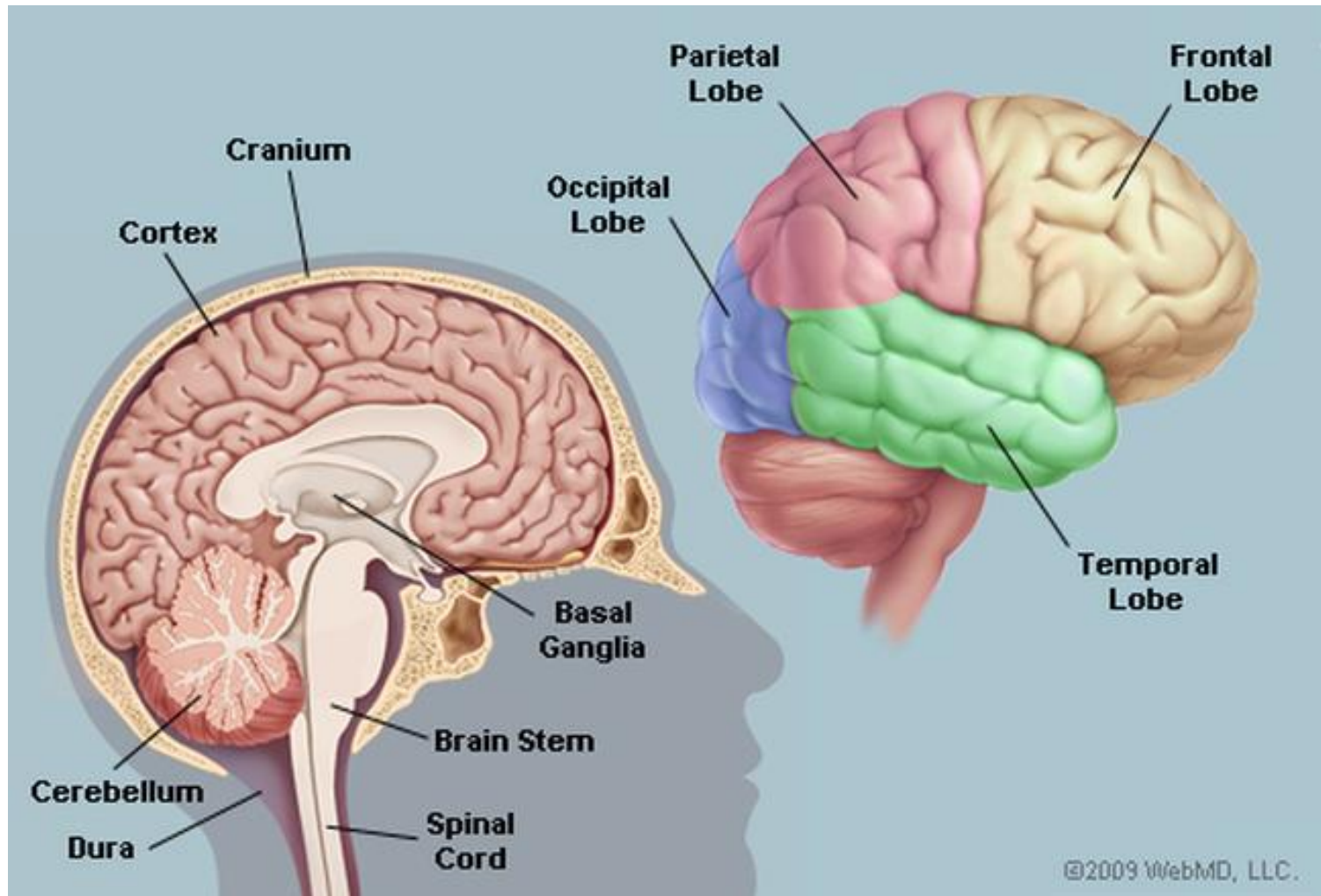
Outline

- ▶ Overview of neuroanatomy and physiology (15 mins)
 - ▶ Diagnostic criteria for Neurocognitive Disorders (15 mins)
 - ▶ Translating knowledge of the brain into every day practice with case examples (15 mins)
 - ▶ Questions (15 mins)
- 

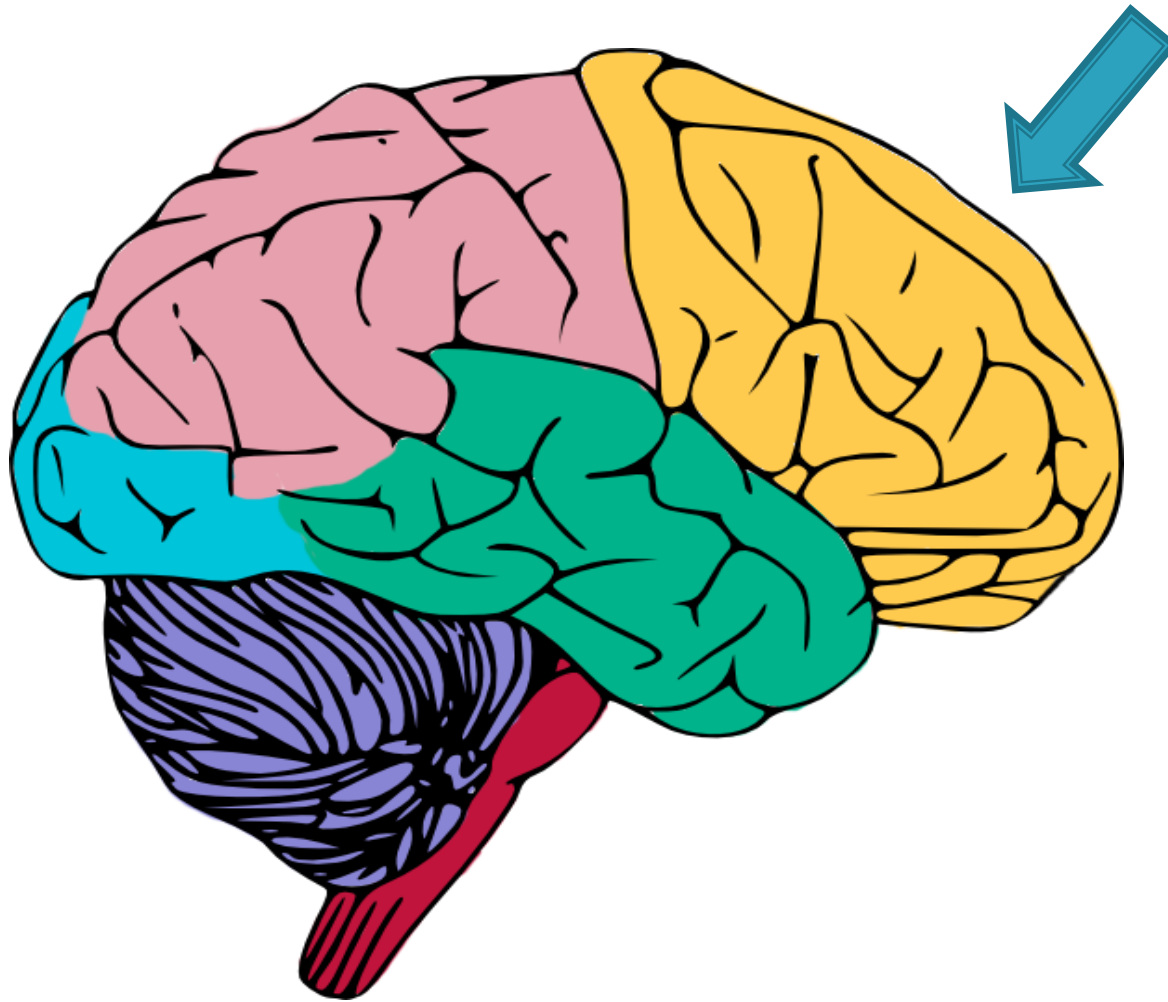
Objectives

- ▶ Participants will finish this session knowing:
 - Neuroanatomy and physiology of the cortex, cerebellum and brainstem
 - Definitions for Major and Minor Neurocognitive Disorder and their causes
 - How damage to an area of the brain can affect a person's day to day function
 - How to change our approach to reflect the abilities of the people with whom we work based on our knowledge of their diagnosis

Brain and Behaviour

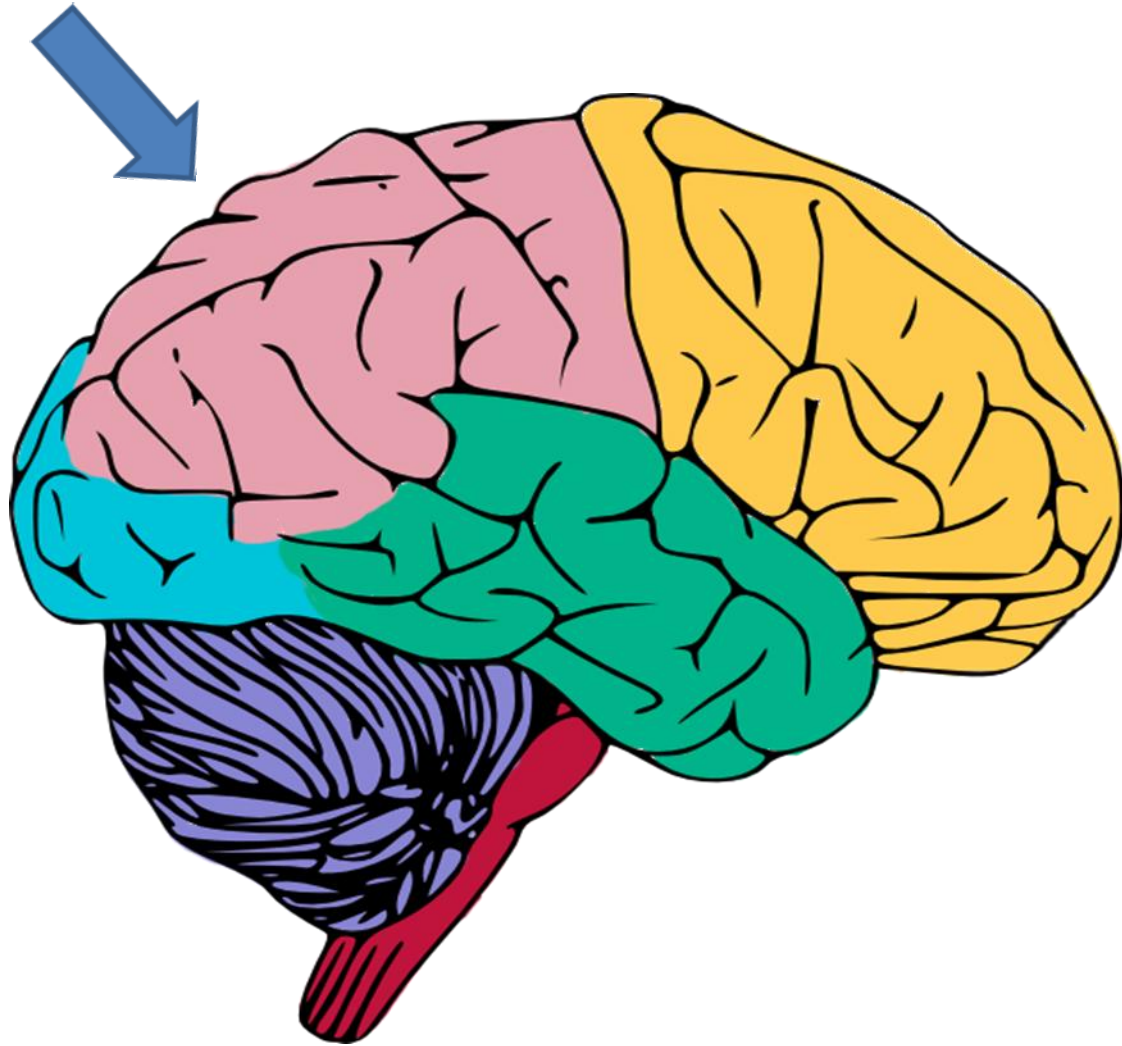


Frontal Lobe



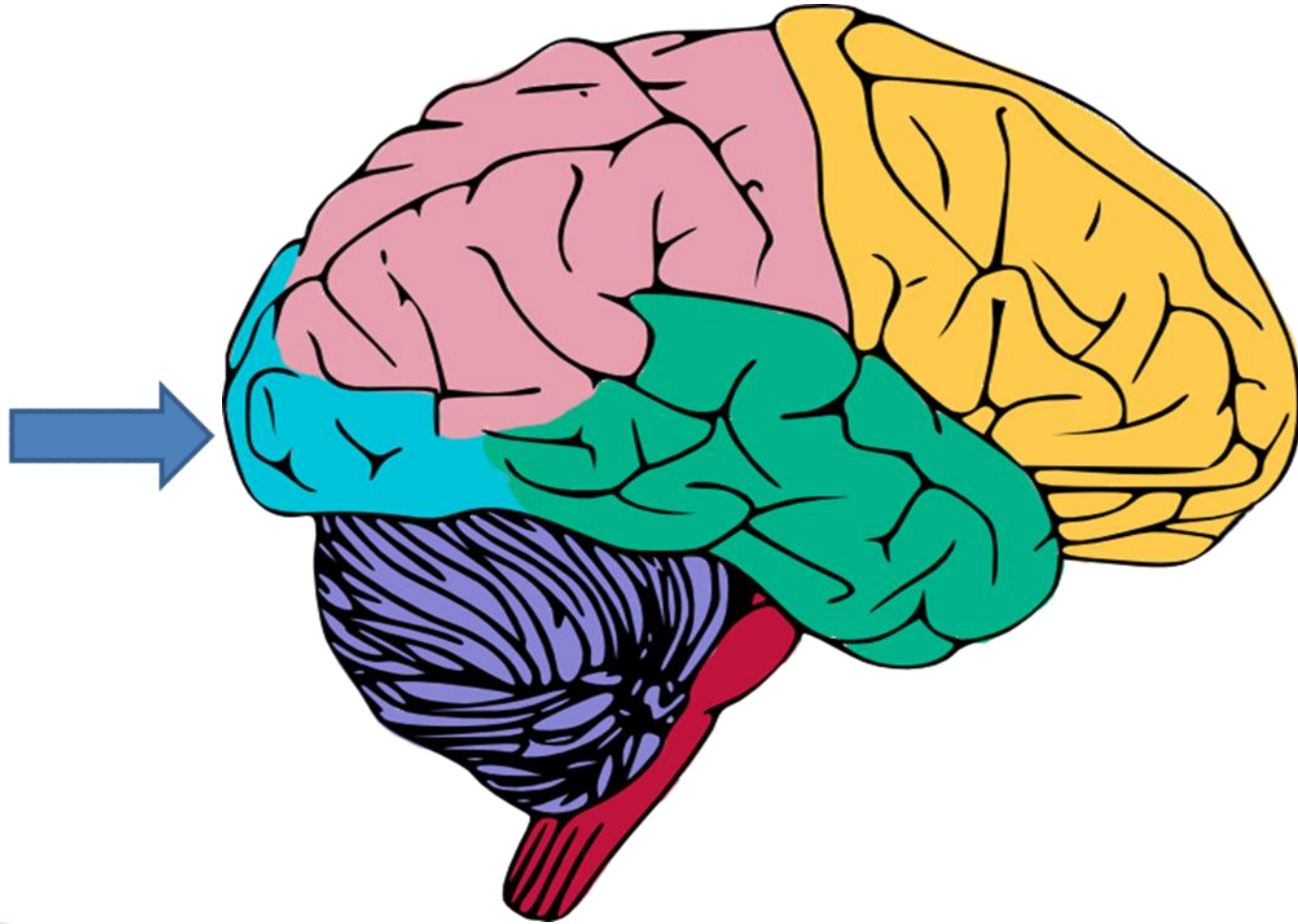
Frontal Lobe Function	Frontal Lobe Impairment
Voluntary motor function, memory for motor activities “ride a bike memory”	Paralysis/paresis of face, arm, leg, (MCA) or leg and foot (ACA)
Expressive language (Broca’s area) Assigns meaning to words we choose	Inability to express language
Controls emotional responses	Emotional lability, mood changes, impulsivity, changes in sexual and social behaviours, personality changes
Behavioural spontaneity	Lack of spontaneity interacting with others
Executive functions: Task initiation Motivation Planning Self monitoring Judgment Problem solving	Difficulty getting started “sits all day” Apathy Difficulty sequencing tasks Difficulty correcting errors Poor decisions given current abilities Difficulty identifying problems and solutions/ low flexibility in thinking
Concentration and attention	Difficulty paying attention to task or perseveration (stuck on a task)

Parietal Lobe



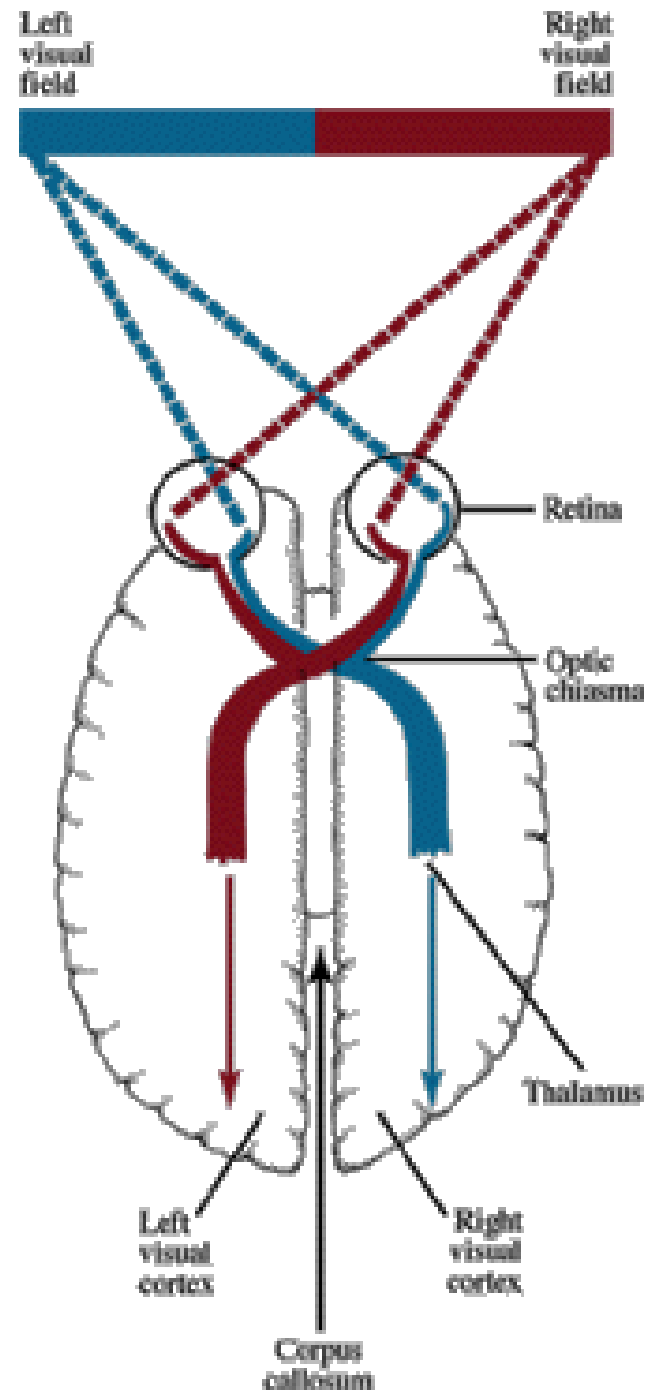
Parietal Lobe Function	Parietal Lobe Impairment
Visual attention	Difficulty focusing visual attention on more than one object at a time
Touch perception	Loss of sensation
Goal directed voluntary movements	Difficulty with hand/eye coordination, L/R
Manipulation of objects	Inability to identify objects (agnosia)
Integration of sensory input	Difficulty reading, drawing, constructing, naming objects, calculating
Proprioception – position, location, orientation and movement of body parts	Neglecting one side of the body (opposite side from affected hemisphere)

Occipital Lobe

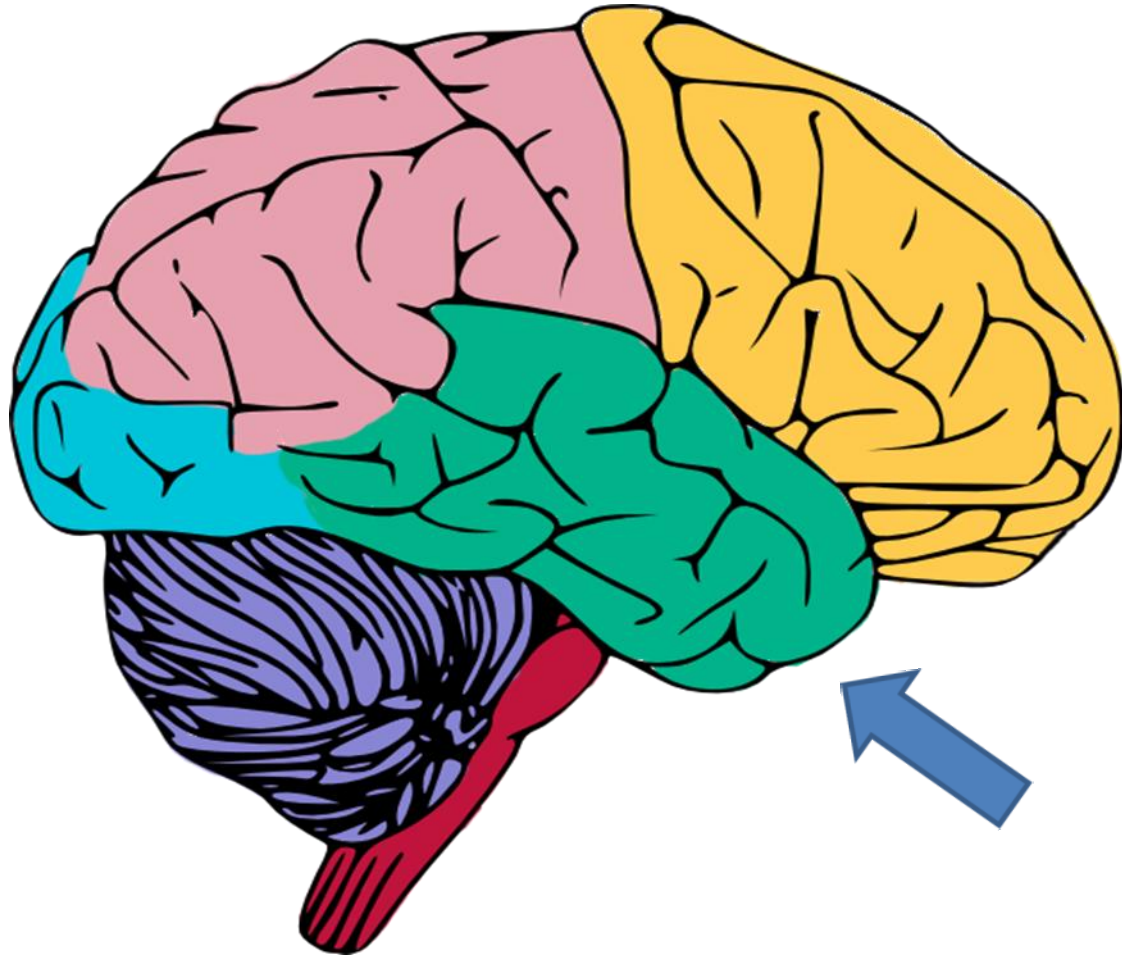


Occipital Lobe Function	Occipital Lobe Impairment
Vision	Visual field deficits – hemianopsia (lose one side of visual field), diplopia (double vision) Visual illusions (inaccurately seeing objects)
Spatial organization and interpretation of visual information	Inability to recognize familiar objects, words, colours, movement of an object (agnosia) Difficulty locating objects in environment Difficulty reading and writing – “word blindness” Difficulty recognizing drawn objects, or object in motion
Visual reflexes	Difficulty moving eyes to follow an object

Visual Field Pathways

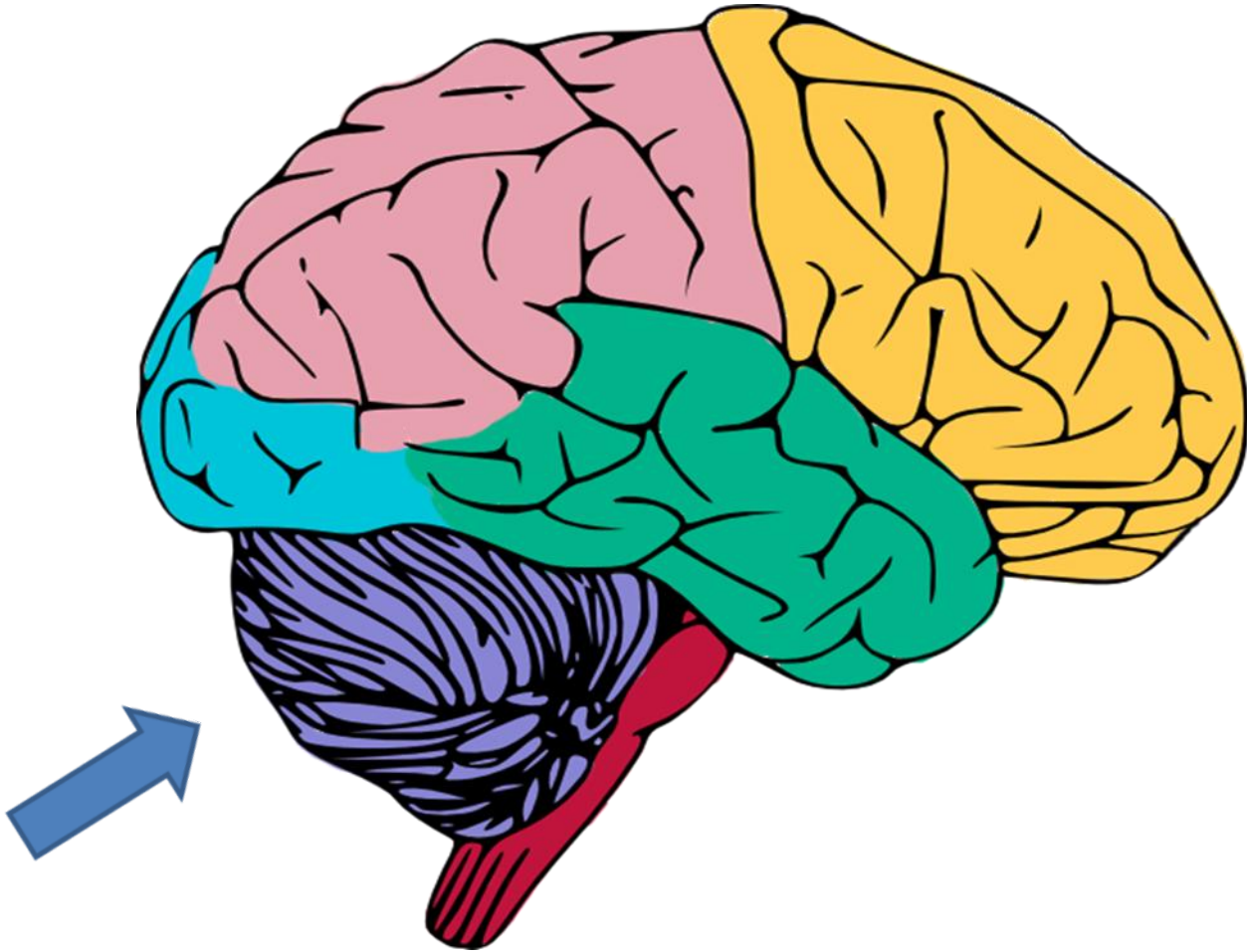


Temporal Lobe



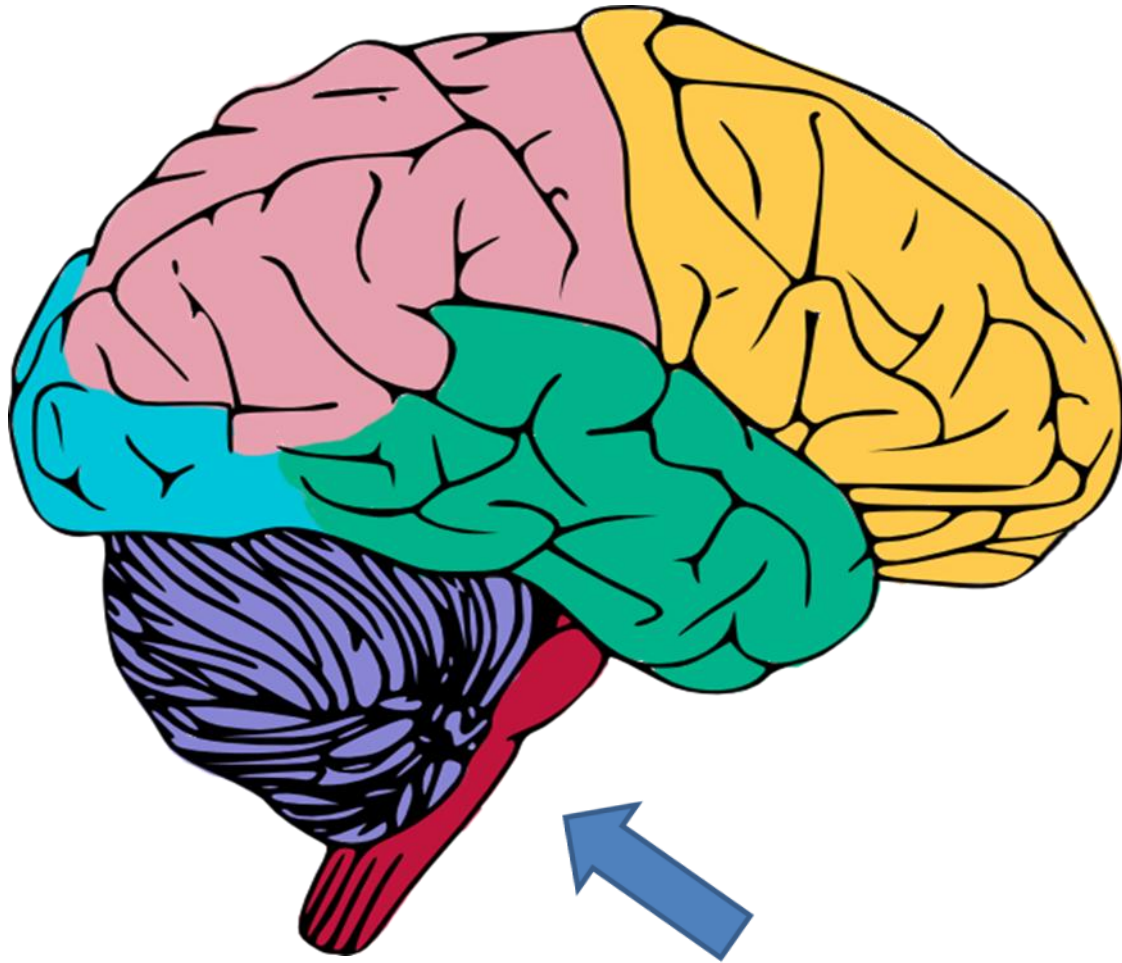
Temporal Lobe Function	Temporal Lobe Impairment
Hearing	Impaired auditory sensation and perception
Receptive Language (Wernicke's area)	Difficulty understanding language and recognizing words
Integration of visual, auditory, somatic information	Difficulty organizing verbal information Difficulty selectively attending to auditory and visual information
Memory acquisition (storage, retrieval of words, experiences)	Difficulty recognizing faces, impaired short term memory, interference with long term memory
Emotions	Impulsivity, aggressiveness, indifference, depression, altered personality, emotional behaviour, sexual behaviour

Cerebellum



Cerebellar Function	Cerebellar Impairment
Coordination of voluntary movement, balance and equilibrium	Difficulty coordinating fine motor movements Difficulty maintaining balance for walking Poor postural control Difficulty judging when to stop Inability to reach out for objects Vertigo (dizziness) Tremors Slurred Speech
Some memory for reflex motor acts	Inability to make rapid alternating motor movements

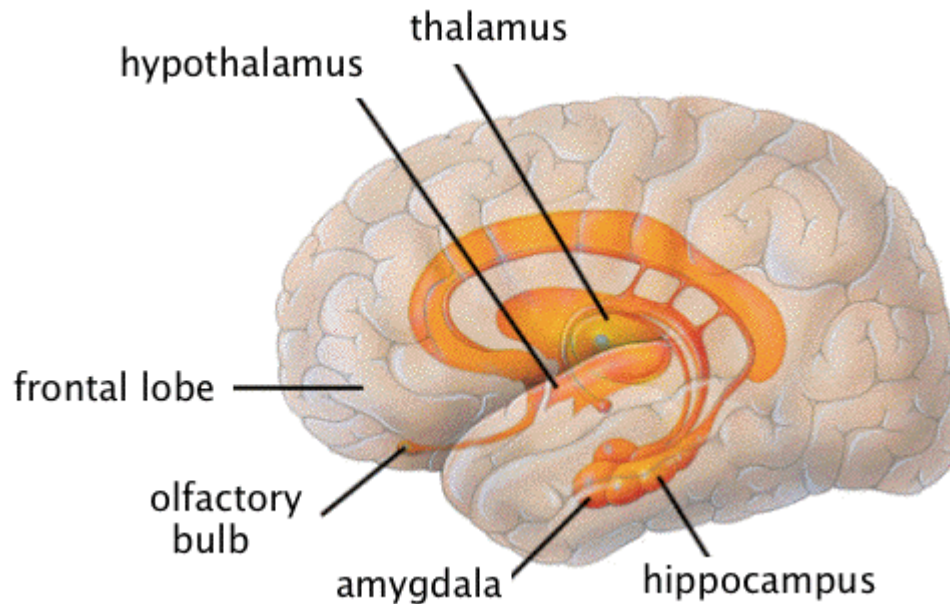
Brainstem



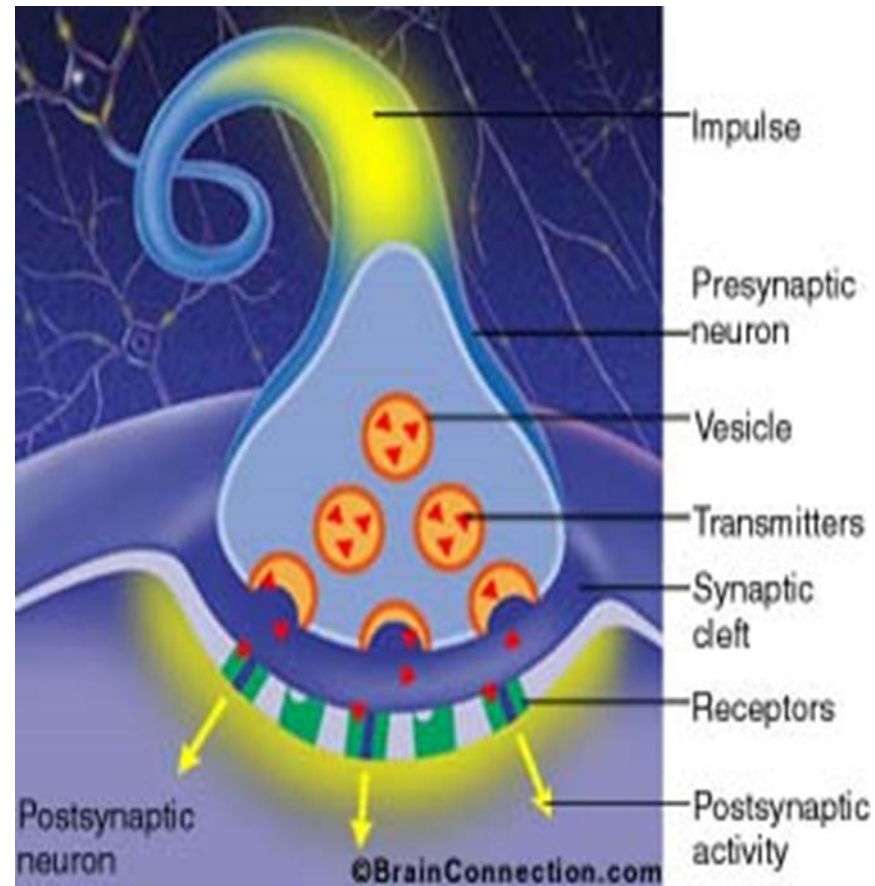
Brainstem Functions	Brainstem Impairment
Autonomic Nervous System (sweating, blood pressure, digestion, temperature)	Decreased vital capacity in breathing (also affects breathing for speech)
Level of alertness (reticular activating system)	Cortex cannot maintain consciousness without reticular activating system
Arousal and sleep regulation	Sleep difficulties (insomnia, sleep apnea)
Swallowing food and fluid	Difficulty swallowing (dysphagia) Altered taste (pons)
Balance and movement	Dizziness, nausea (vertigo), problems with balance and movement

The Limbic System

- ▶ where the subcortical structures meet the cerebral cortex



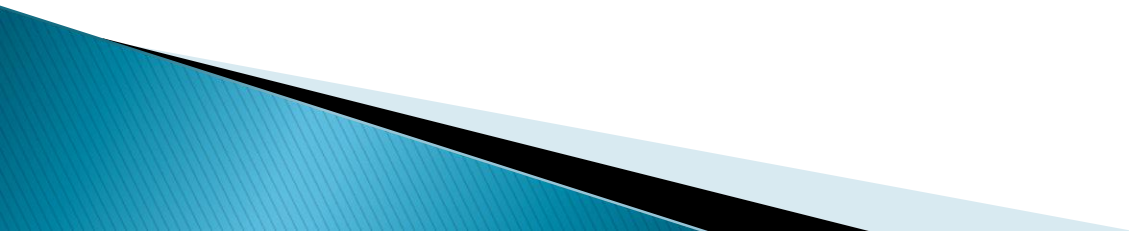
Back to those neurons...



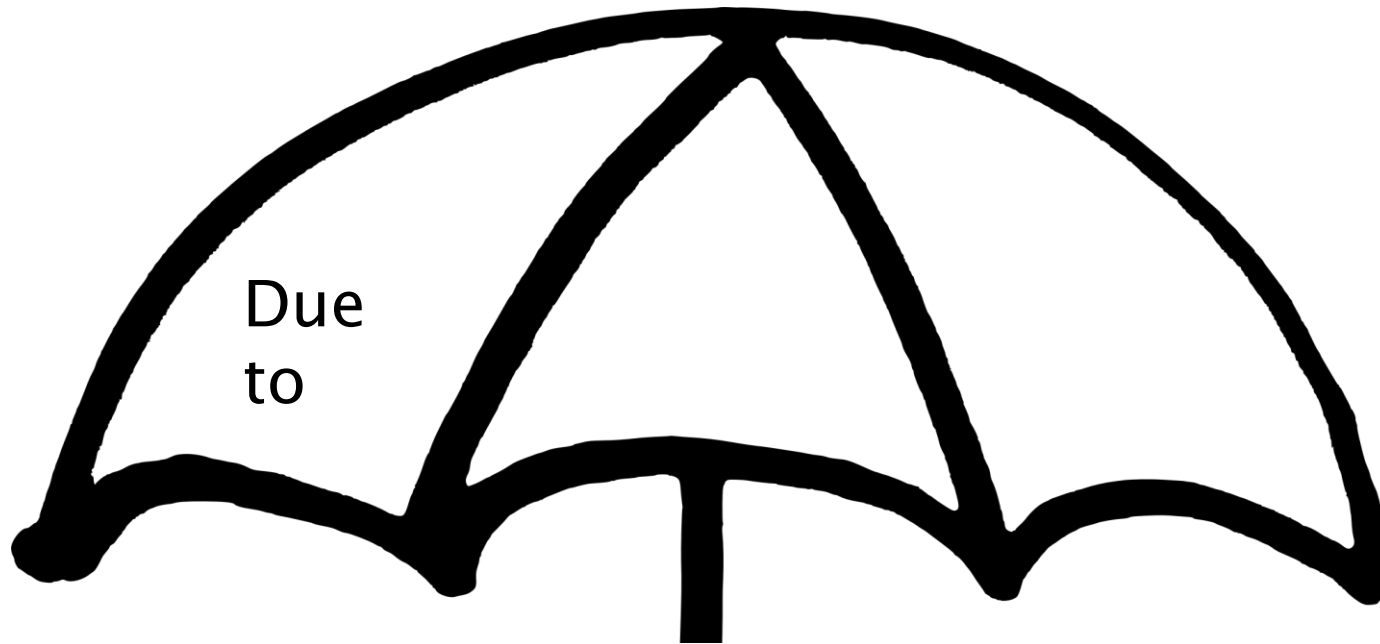
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- ▶ Snell, R. S. (1997). Clinical Neuroanatomy for medical students (4th edition). Philadelphia: Lippincott-Raven
- ▶ Mc. Nicholl, R., Bretton, J. L., Colizza, L. (2005). Functions of the Brain and their relation to stroke. Publication of the Heart and Stroke Foundation of Ontario.
- ▶ Boeree, C. G. (2009). The Emotional Nervous System. Retrieved from: <http://webspace.ship.edu/cgboer/limbicsystem.html> on December 13, 2016

Major Neurocognitive Disorder aka Dementia



Major Neurocognitive Disorder



Alzheimer's Disease

with Lewy Bodies

Another medical condition

Vascular

Substance/medication induced

Multiple Etiologies

Parkinson's Disease

HIV infection

Unspecified

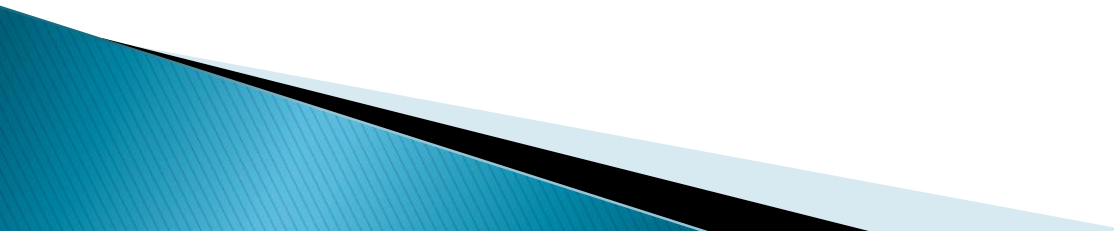
Traumatic Brain Injury

Prion Disease

Fronto-Temporal

Huntington's Disease

Cognitive Domains

- ▶ Complex attention
 - ▶ Executive function
 - ▶ Learning and memory
 - ▶ Language
 - ▶ Perceptual motor
 - ▶ Social cognition
- 

Alzheimer's Disease

- ▶ The most common type of dementia
- ▶ Caused by neurofibrillary plaques and tangles in the brain
- ▶ Early stages affect the Limbic system and temporal lobes (amygdala and hippocampus)
- ▶ Middle states affect frontal lobes, parietal lobes and Broca's area (temporal lobe)
- ▶ Late states affect motor cortex and occipital lobe
- ▶ Atypical Alzheimer Disease are Posterior Cortical Atrophy, Logopenic Aphasia and Frontal Variant AD

(Delacourte et al, 1998, UK Alzheimer Society, 2015)

AD-Symptoms

▶ Early

- memory loss
- word finding problems
- disorientation to time
- poor judgment

- lose interest in people or activities
 - problems judging distance or 3D

▶ Middle

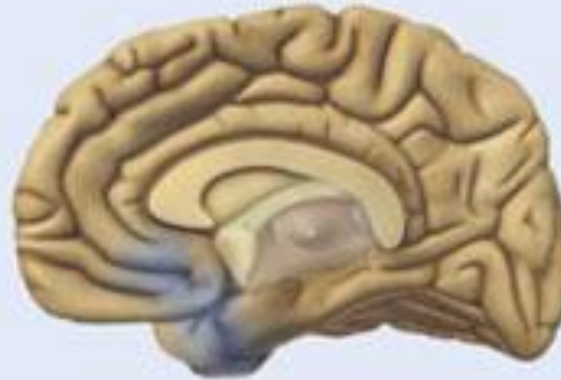
- Help with ADLs
- Increased memory loss
- Fail to recognize people

- poor insight
- increased frustration

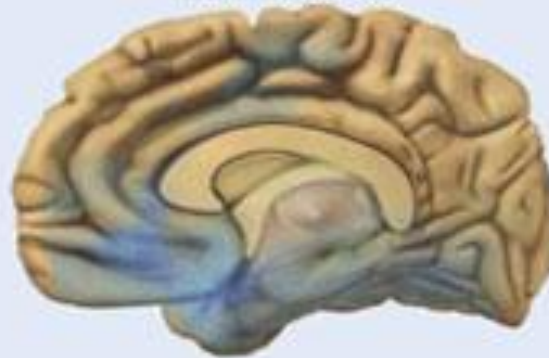
AD – Symptoms

- ▶ Late stage
 - Pronounced memory loss
 - Unable to recognize familiar objects, surroundings, family
 - Unsteady gait, walk with a shuffle
 - Difficulty eating and swallowing
 - Weight loss/gain
 - Incontinence
 - Gradual loss of speech

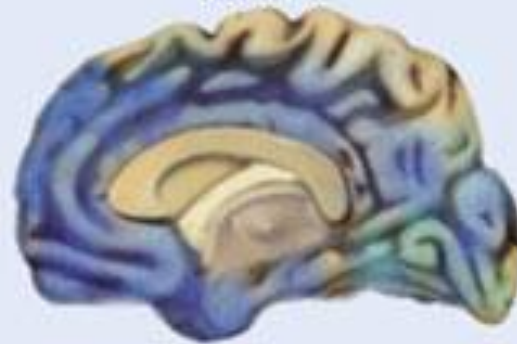
Preclinical AD



Mild to Moderate AD



Severe AD

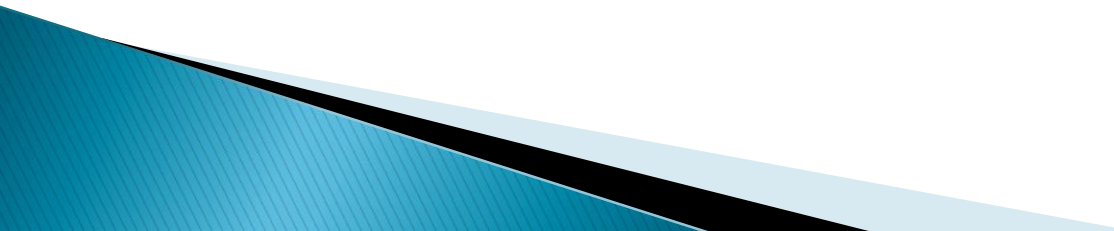


NIH, 2016

Vascular Dementia

- ▶ Brain cells die due to oxygen deprivation, either from small blood vessel disease (subcortical vascular dementia) or after a major stroke (stroke-related dementia)
- ▶ Parts of the brain affected varies
 - ▶ (Alzheimer Society of UK, 2015)

VaD – Symptoms

- ▶ Early symptoms are not forgetfulness, but difficulty planning/organizing/following steps, making decisions, slowed processing, problems concentrating.
 - ▶ Middle stages more like AD – problems with memory, confusion, disorientation, reasoning, communication
 - ▶ Late stage very similar to AD
- 

Dementia with Lewy Bodies

- ▶ Caused by abnormal protein deposits in the brain called Lewy Bodies, which damage and eventually cause neuron death
- ▶ Affects the cerebral cortex, limbic cortex, hippocampus, midbrain (including substantia nigra), brainstem and olfactory pathways
- ▶ Also affects neurotransmitters dopamine and acetylcholine

▶ (National Institute of Health, 2016)

LBD-Symptoms

- ▶ 3 features distinguish it from other forms of dementia:
 - Fluctuating effects on mental functioning, especially alertness and attention that can resemble delirium
 - Recurrent visual hallucinations
 - Parkinson-like movement symptoms, such as rigidity and lack of spontaneous movement

Memory problems occur later in the progression of the disease.

(Johns Hopkins Medicine, 2016)



FTD – Symptoms

- ▶ Early stage
 - Memory unaffected
 - Uncharacteristically selfish, unfeeling
 - Rude behaviour
 - Distracted
 - Loss of inhibition
 - Ritualized behaviours, compulsions
 - Liking of sweet foods
 - In a small number of people, difficulty recalling name of objects and understanding words (semantic dementia), or producing fluent speech (progressive non-fluent aphasia)

FTD–Symptoms

▶ Middle stage

- Differences between two types lessen – people with behavioural variant develop language problems, people with language problems develop behaviour changes

Late stage

- Memory loss
- Problems judging distance, seeing objects in 3 dimensions

References for NCD section

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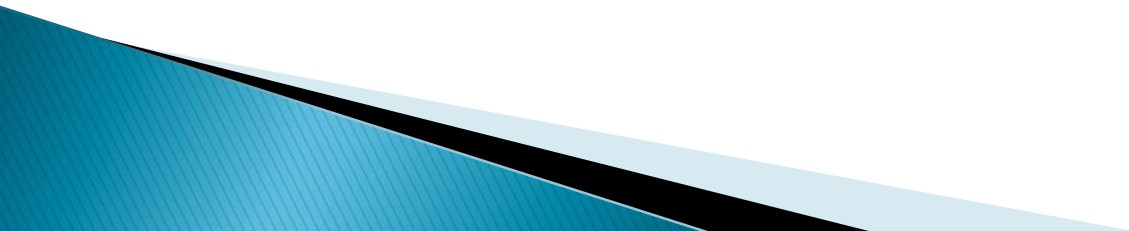
How does this all fit together???



Case Study #1

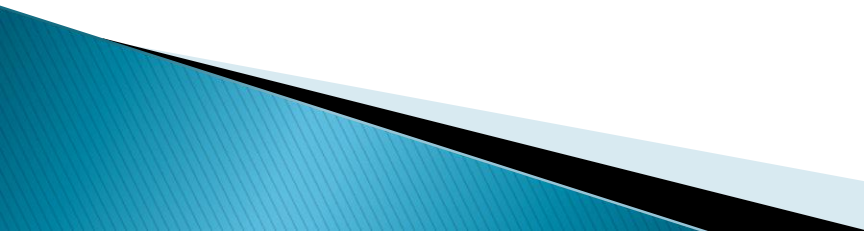
- ▶ Mrs. Brown is a 76 year old woman who recently moved into your long term care home. She has a diagnosis of Alzheimer's Disease (moderate severity). Her husband has told staff he couldn't take care of her at home anymore, he isn't visiting much because he is exhausted. Her two daughters live far away and call occasionally. She is a retired elementary school teacher and well known in the local community.
- ▶ You are asked to give Mrs. Brown a bath.

**How would you approach Mrs.
Brown?**



Responses to questions...

- ▶ Option D isn't a good option 😊
 - ▶ Option B might work, but gives her the option to say no...why is this a problem?
 - ▶ Options A and C might work best...why?

 - ▶ Remember: Moderate stage AD has impairment of frontal and parietal lobes, as well as language (Broca's area). People have poor insight and increased frustration as a result.
- 

- ▶ **You get Mrs. Brown into the tub room and help her take off her clothes. She hits you. Why?**

Response to question #2

- ▶ She isn't a nasty person!!!
- ▶ Options B, C and D are all possible.
 - How do you know which one is the underlying issue?
 - Frontal lobe impairments
 - Parietal lobe impairments
 - Limbic system impairments

- ▶ You get Mrs. Brown undressed, seated in the lift chair and lifted up over the bathtub. You took great care in getting the water the right temperature, and even turned on the jets so she could have a whirlpool bath.
- ▶ Instead, Mrs. Brown looks down and shouts “they’re trying to boil me alive! Help! Someone help me!” You notice her palms are sweaty, she’s breathing quickly and her cheeks are red.

What is affecting Mrs. Brown thinking now?

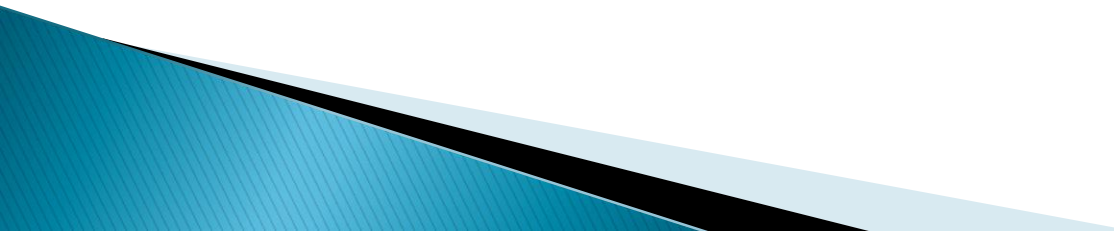
Occipital lobe – Spatial organization and interpretation of visual information


–depth perception – How deep is the bathtub? How high am I in the air right now?

–What is this thing???

Limbic system – emotional link to memories of this type of experience, as well as physiological response (increased BP, HR)

Case Study #2

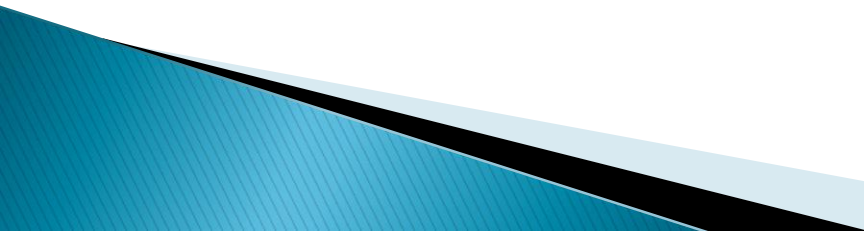
- ▶ Mr. Smith is an 83 year old man with Lewy Body Dementia. He was admitted to your home about a year ago, after his wife passed away. He is a retired custodian, working at a local factory until his retirement at age 65. He spent his spare time restoring an 1967 Shelby GT500KR, which is now with his son.
 - ▶ You've been asked to give Mr. Smith a bath.
- 

- ▶ You bring Mr. Smith into the tub room, and he asks “why are all these people here to have a bath with me?”
 - ▶ Recurrent visual hallucinations
 - ▶ You ask him to undress and sit on the chair. He takes off his shirt, then stands motionless in front of the chair.
 - ▶ Parkinson-like movement symptoms
 - ▶ He gets into the bathtub and suddenly falls asleep
 - ▶ Fluctuating alertness and attention
- 

Case Study #3

- ▶ Mrs. Murphy is a 62 year old woman with fronto-temporal dementia. She worked as a PSW in a large LTCH until 10 years ago when she was fired. She was a crisis admission from home, as her husband (who is still working) could no longer manage her care.
- ▶ You have been asked to help Mrs. Murphy have a bath.

- ▶ You look for Mrs. Murphy and find her lying on her bed, staring out the window, despite music going on in the activity room, and some knitting her husband brought from home.
- ▶ You hear another resident asking for help to go to the bathroom, so you ask Mrs. Murphy to go to the tub room and get undressed. You find her lying in her bed 10 minutes later. She remembers you asking her to go to the tub room.
- ▶ Frontal impairment – apathy, poor initiation of activities despite options being available

- ▶ You bring Mrs. Murphy into the tub room, she insists on telling you about how a bar of soap under your pillow will cure “all of your problems”. She will not stop talking about this despite your attempts to change the topic.
 - ▶ Frontal lobe impairment – insight, judgment, problem solving, perseveration.
 - ▶ You ask her to get undressed. She tells you to “expletive-off”
 - ▶ Frontal lobe impairment – impulsivity aka “no filter”, personality changes, social appropriateness of behaviour
- 

Thank you!

Questions?

