

# An Introduction to Traumatic Brain Injury



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# Epidemiology

- 171,600 admissions/year in UK
- 70% are male
- Over 1/3 are under 16
- Around 1/3 are over 75!

# Severe Traumatic Brain Injury (GCS<9)

- 11,000/year in UK
- Most common in ages 15-25 and 65-75
- High mortality

# Epidemiology

- Falls, Assaults and RTAs make up the majority of TBIs in general
- RTAs most common cause of severe TBI

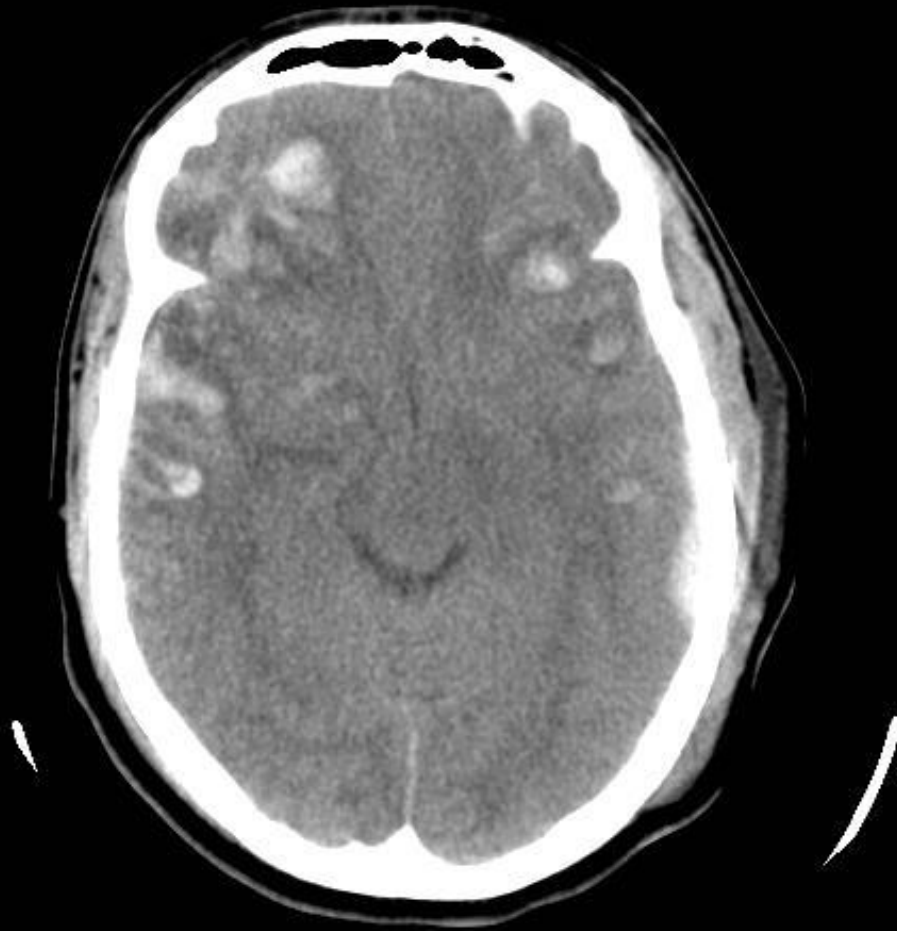
# Mechanisms and Effects of Traumatic Brain Injury

# Mechanisms and Effects of Traumatic Brain Injury

- **Primary Brain Injury**
  - Contusions/Lacerations
  - Axonal Injury
- **Secondary Brain Injury**
  - Compression (bleeding/swelling)
  - Toxic (cell breakdown products)
  - Metabolic (hypoxia/blood loss/sepsis/drugs)

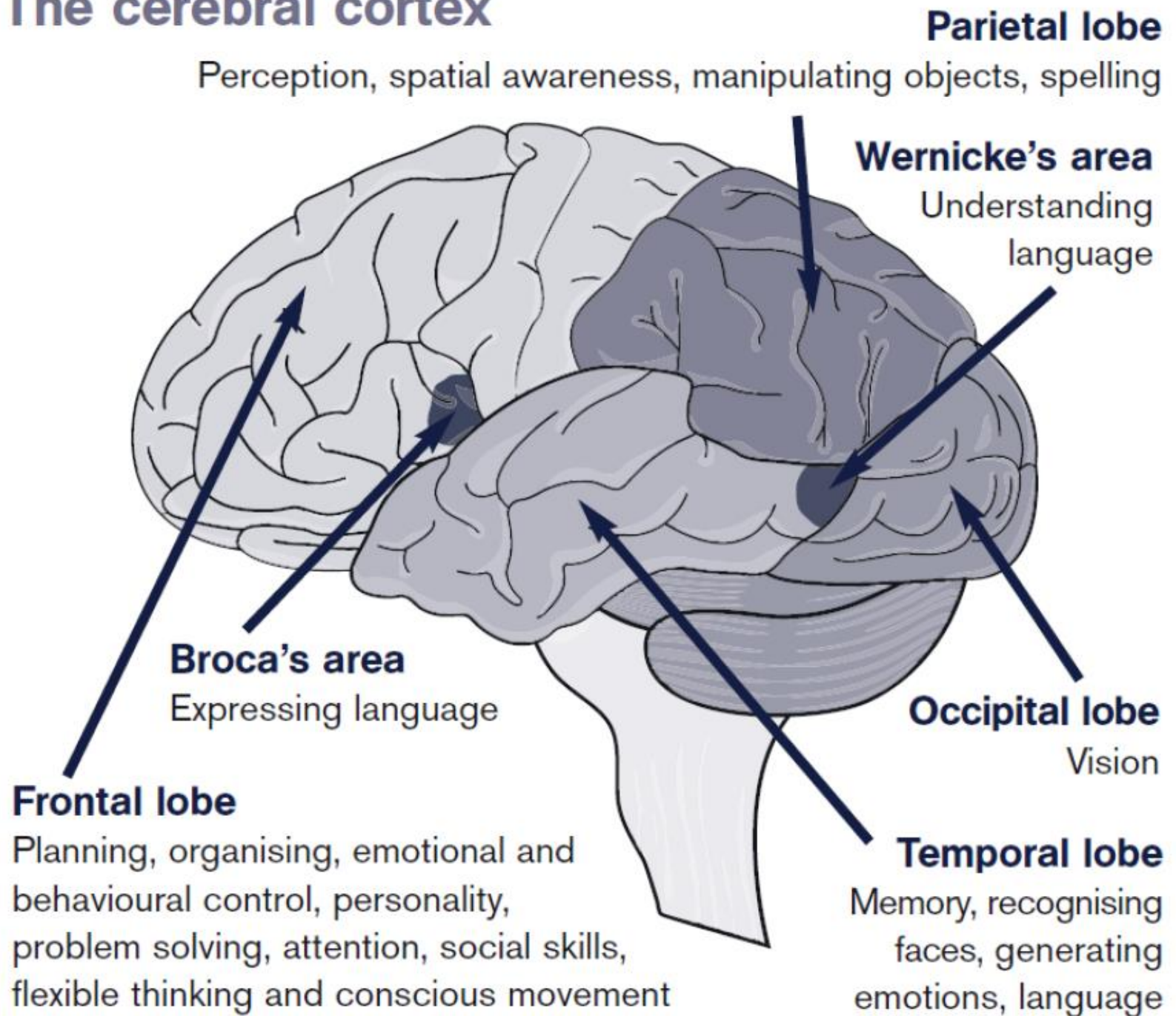
# Contusions

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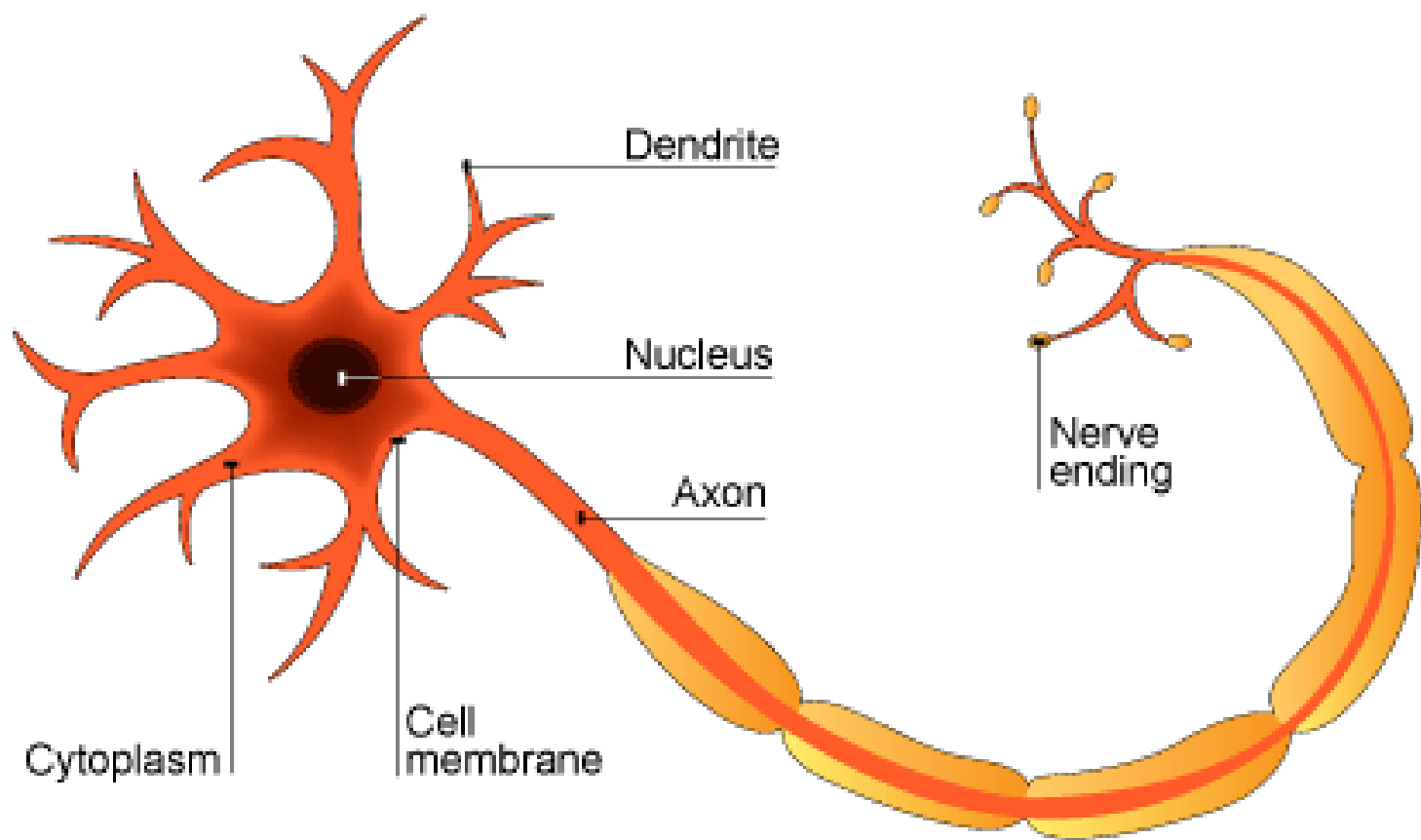




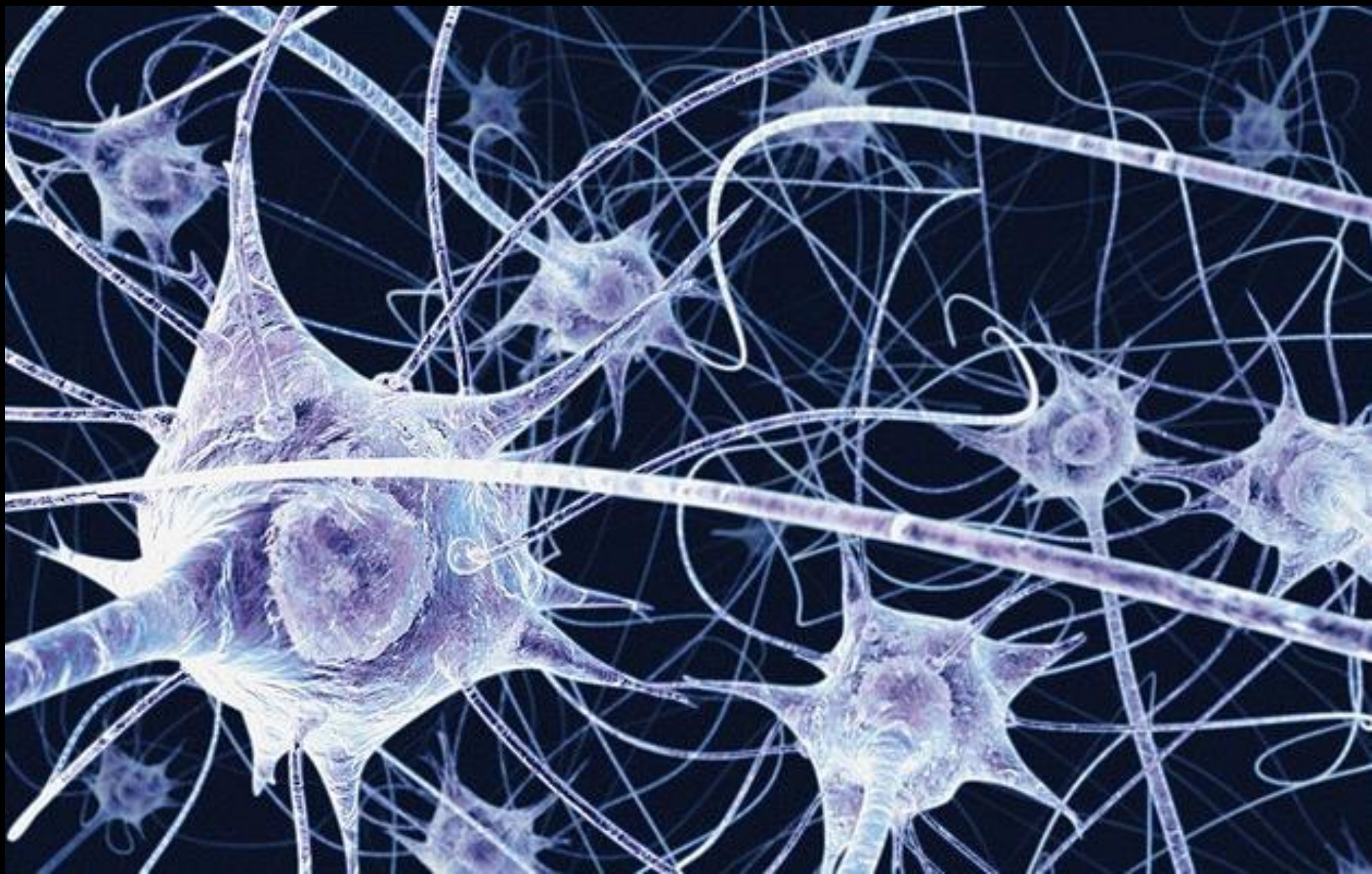
# The cerebral cortex



# (Diffuse) Axonal Injury





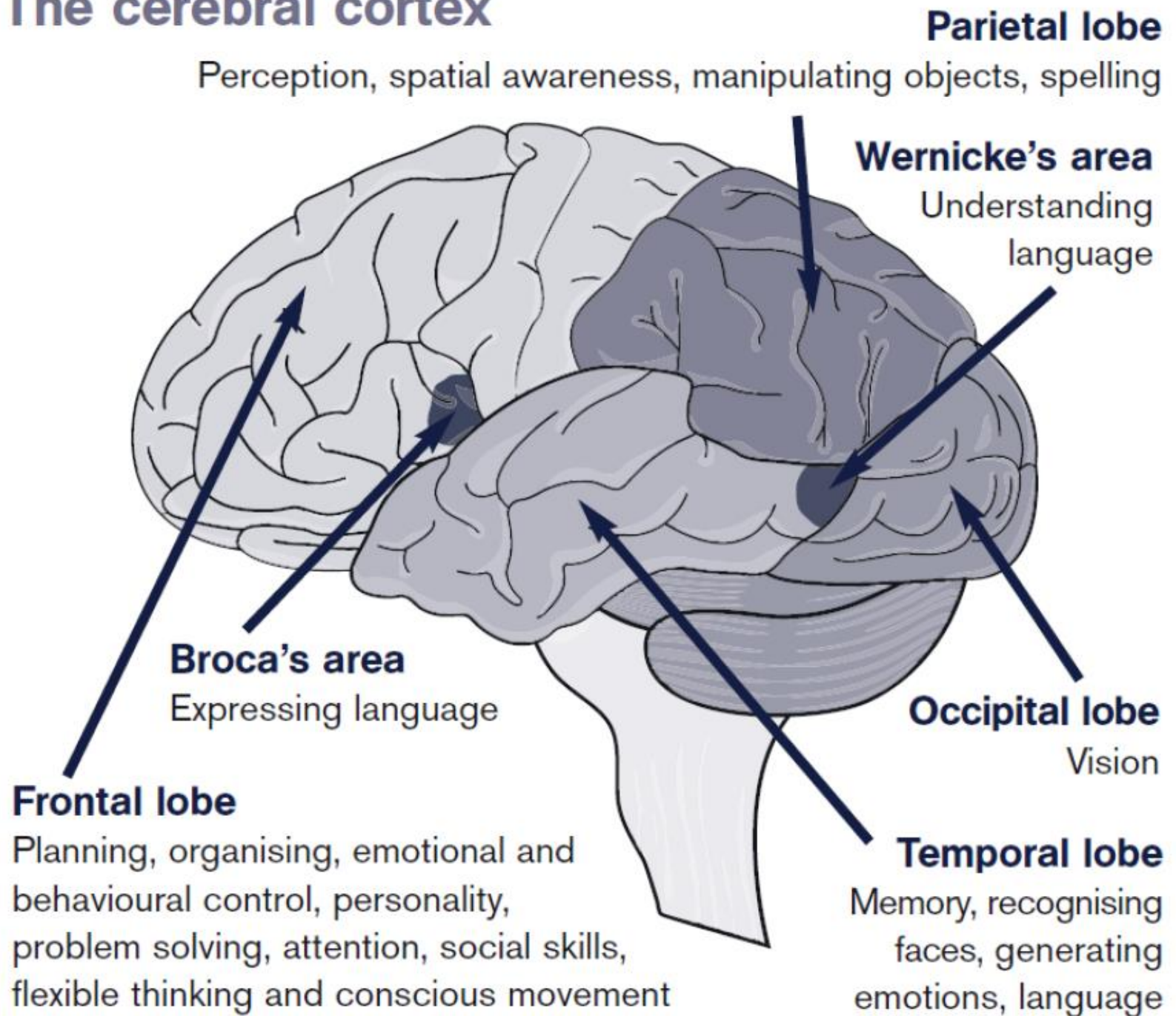


# Diffuse Axonal Injury

- Caused by shaking/shearing type forces
- Disrupts connections between cells
- Commonly trauma CT will be normal (or very minimal change)



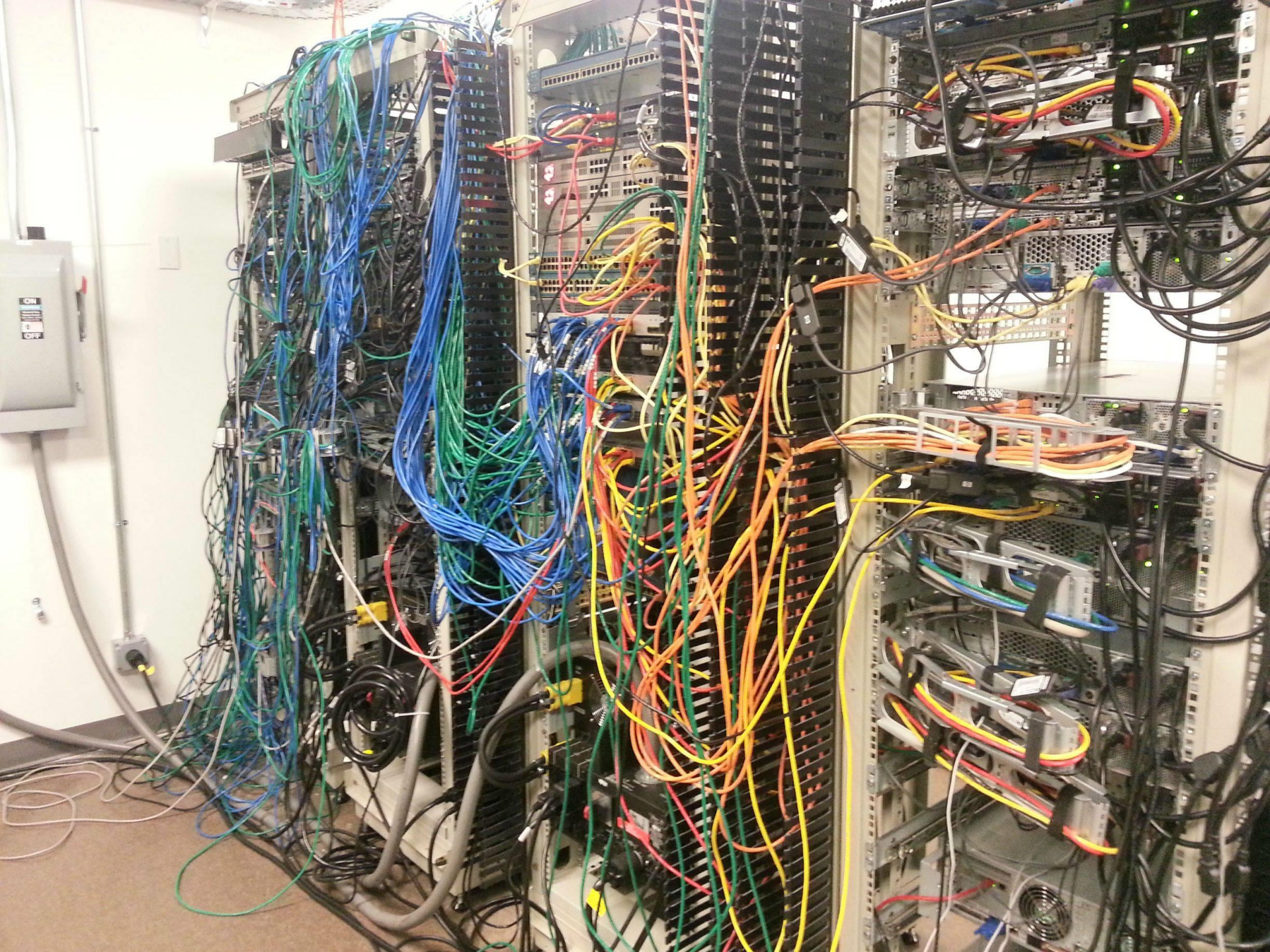
# The cerebral cortex



# Diffuse Axonal Injury

- The brain is an integrated network
- Virtually every action we make in the world relies on many areas of the brain acting simultaneously in a highly co-ordinated way.







# Diffuse Brain Injury – patterns of clinical presentation

- 1. Coma
- 2. Post Traumatic Amnesia
- 3. Patterns of specific deficits

# Secondary Brain Injury

# Secondary Brain Injury

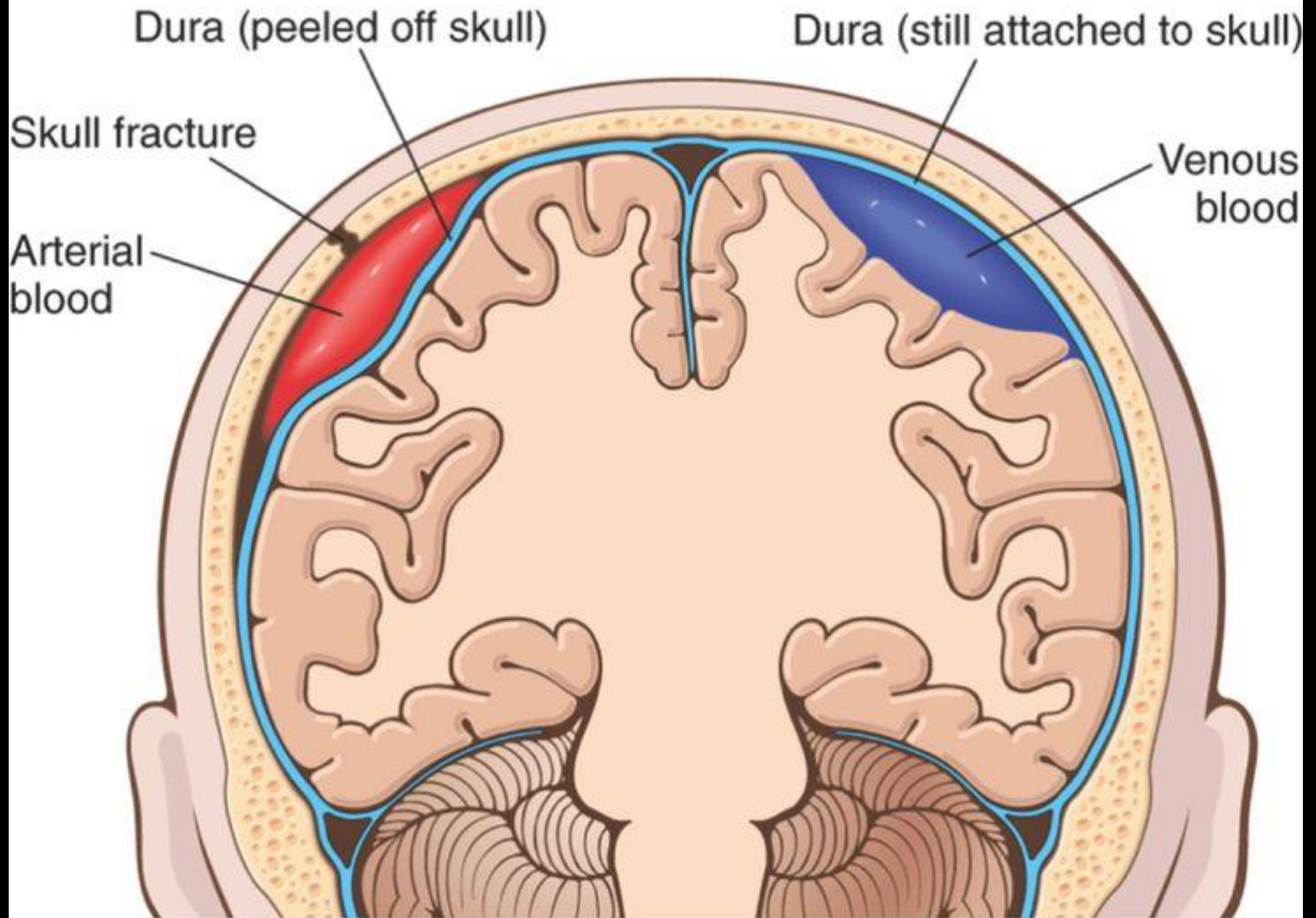
- In Hospital Care is geared towards reducing secondary brain injury.
- Direct toxic damage from cell breakdown products may be unavoidable.
- Optimising physiology and relieving pressure are the cornerstones of intensive care treatment

# Causes of increased pressure

- Direct from space occupying lesions i.e. Subdural haemorrhage or intracerebral haemorrhage
- Oedema
- Hydrocephalus

## EPIDURAL HEMATOMA

## SUBDURAL HEMATOMA





Study Date:09.1  
Study Time:1

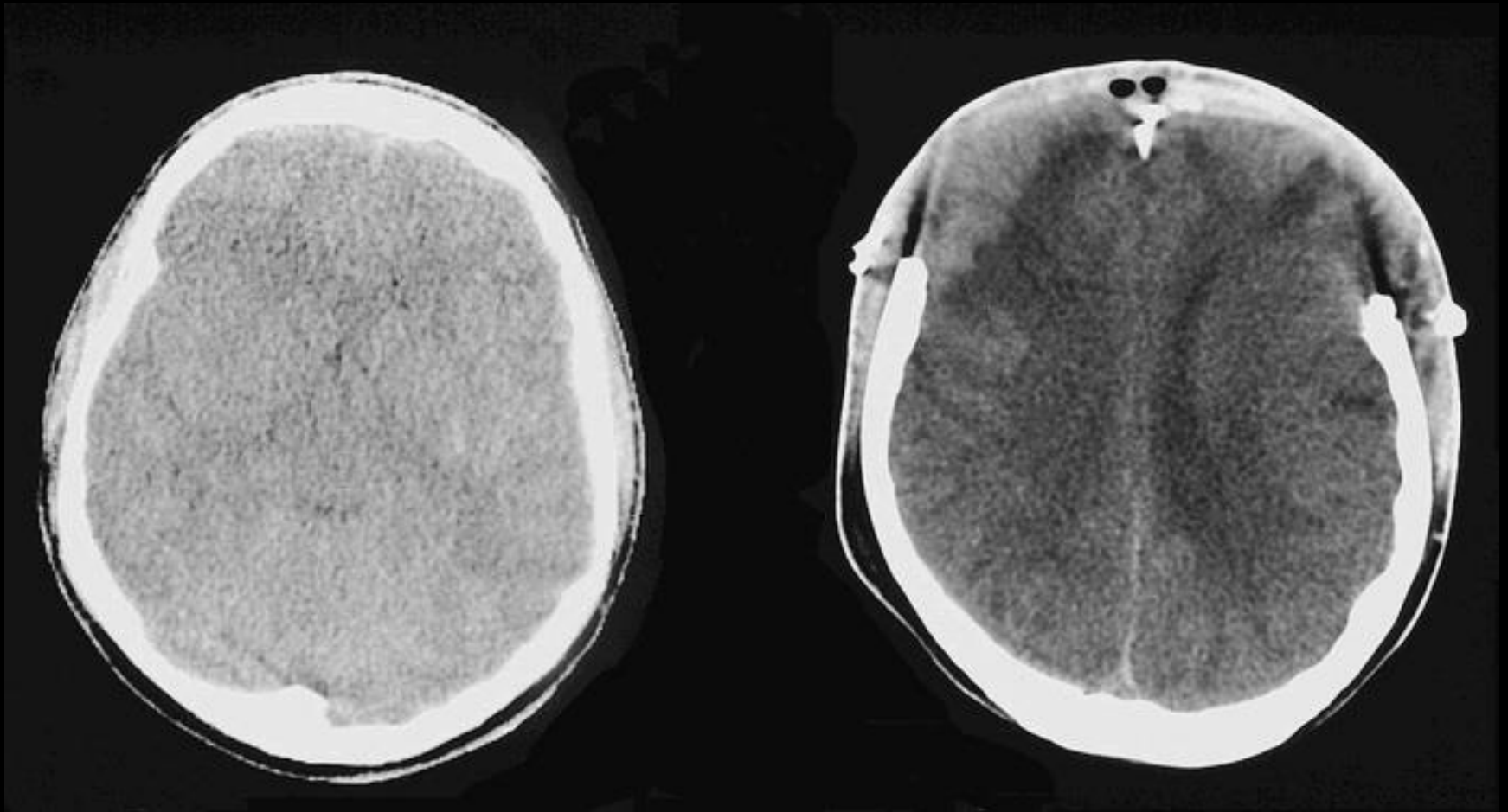




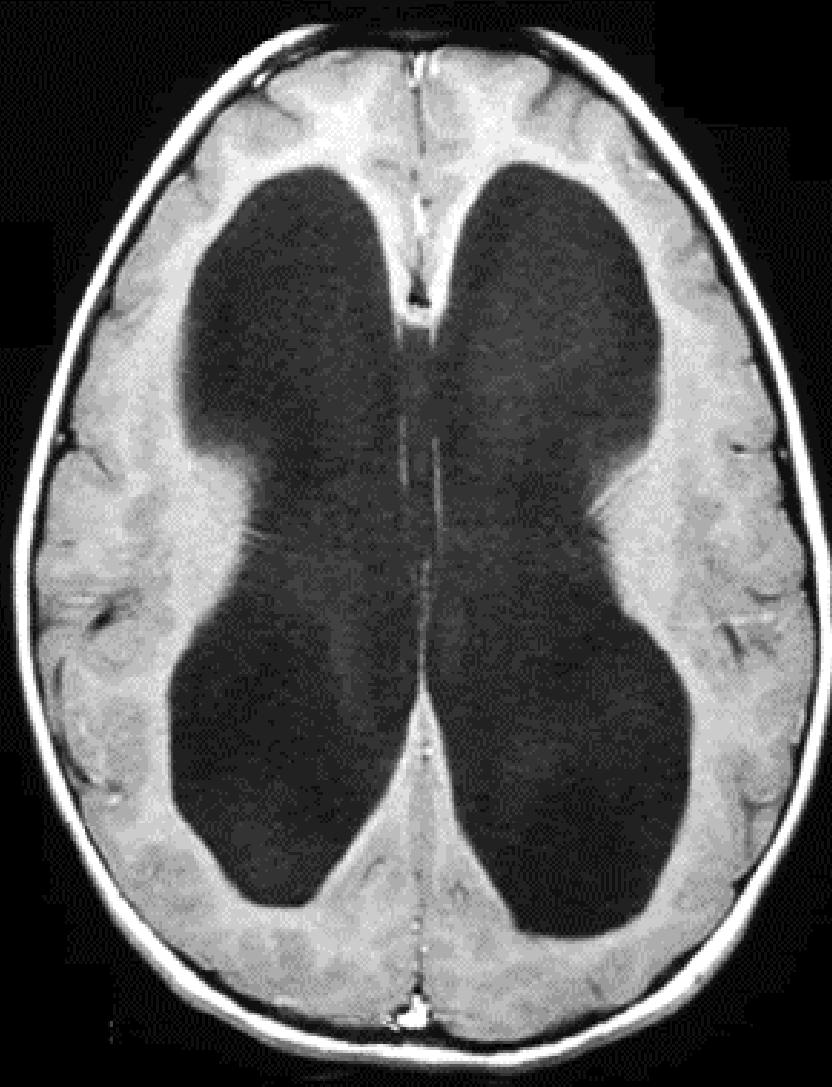
NCCT : Left frontal bleed with focal vasogenic odema which is confined to white matter.  
© Balaji Anvekar's Radiology Cases



# Decompressive Craniectomy



# Hydrocephalus



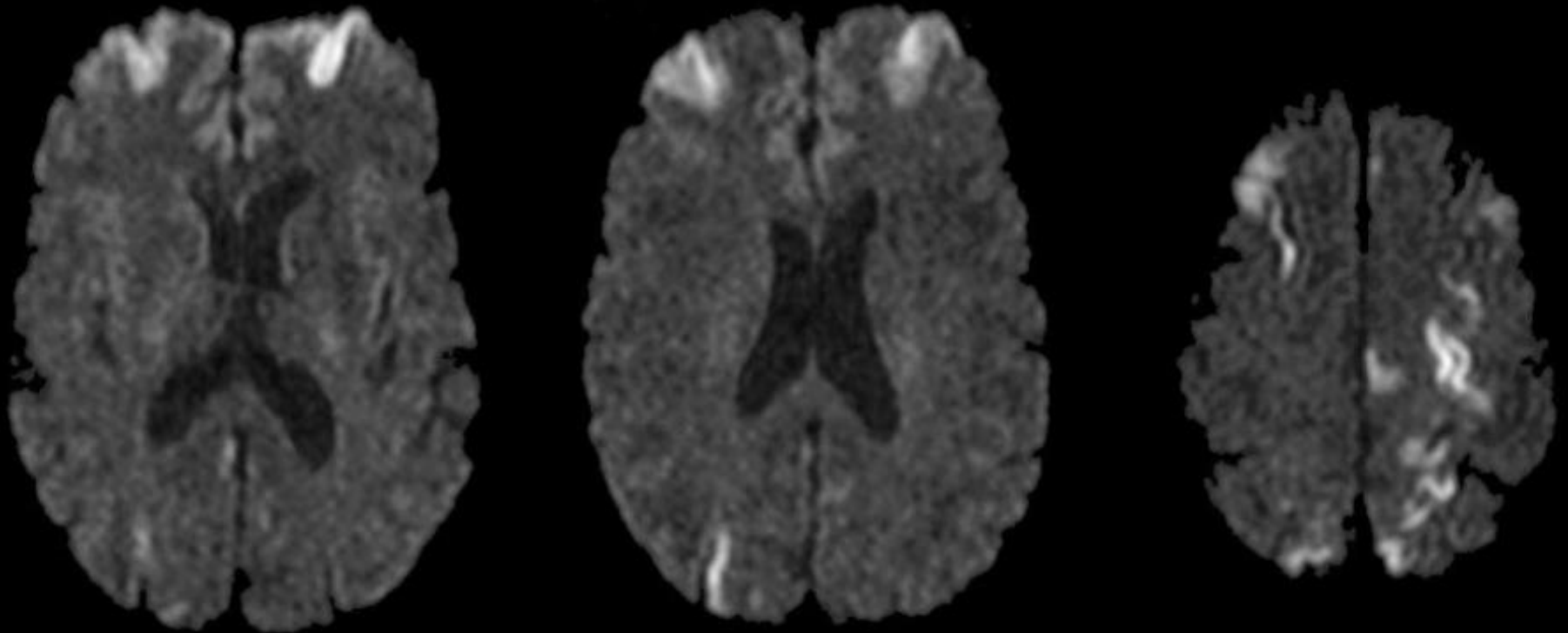
# Hypoxic Brain Injury

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W 70 : L 40

# Hypoperfused Injury



# Some Clinical Presentations

# 1. Post Traumatic Amnesia

# 1. Post Traumatic Amnesia

- A state of confusion that occurs following a traumatic brain injury
- The cardinal deficit is that the person is unable to lay down new memories and is therefore profoundly disorientated (and difficult to rehabilitate!!)
- Other deficits i.e. emotional regulation, attention, may exacerbate the situation

# Post Traumatic Amnesia

- May persist for hours, days, weeks or more!
- The patient may well walk, talk, perform simple tasks (i.e. Washing and dressing), but will be profoundly disorientated in time and place. They may be wandersome and even aggressive and may not respond to reassurance and advice (as they can't remember it!)



# Managing PTA

- PTA responds best to behavioural intervention
- Low stimulation environment – few visitors, TVs/radio off/lower light levels/side room
- Monitoring of orientation (WHIM/GOAT/PTA scale etc) to look for emergence.

# Managing behavioural disturbance after traumatic brain injury

- The cornerstones are consistency and structure
- Document behaviour on an ABC chart
- ABC chart tries to determine patterns in triggers for disturbed behaviour and which techniques work or don't work

# ABC chart

Behavior	Example: Yelling/screaming (be as specific as possible)
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BEFORE Date/Time/Location Who was there? What was happening?	BEHAVIOR What did my loved one do?	AFTER What did I do/say? What did my loved one do/say? What did others do/say?

# Managing Behavioural Disturbance

- Use orientation prompts, diaries, wall charts
- Careful thought to balance stimulation vs safety
- Co-ordinated and planned interventions ie. Distraction, containment
- Make interventions patient centered
- Medications may have a role (anticonvulsants, sedatives and olanzapine but NOT neuroleptic)

# Frontal Lobe Injury (dysexecutive syndrome)

# Frontal Lobe Injury

- The front of the brain is the most commonly affected area following TBI
- It is often thought of as the executive centre of the brain (the CEO of the company!) where all the big and important decisions are made

# Functions of the Frontal Lobe

- Generating goals/initiating actions
- Synthesising sensory information and memory
- Sustaining and dividing attention
- Decision making/planning
- Problem solving/flexible thinking
- Monitoring actions and changing plans
- Emotional regulation
- Acting in social and situational context

# Dysexecutive Syndrome

- Patient may be very passive
- Or may be disinhibited and impulsive
- Distractibility
- Poor planning/organisation
- Concrete thinking
- Emotional outbursts
- Low social awareness



# Why is this important?

- Deficits are often not immediately obvious.
- Without appropriate support, patients commonly run into problems post discharge:

# Why is this important?

- Marriage / Family breakdown
- Unemployment
- Involvement of police
- Accidents and premature death
- Depression and suicide

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- Marriage / Family breakdown
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- BUT!!

# Why is this important?

- With correct support, education and rehabilitation these outcomes can be avoided!!

Any questions?