

# PARA210 SUMMARY

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## 12 LEAD ECG LAYOUT:



**SEPTAL**

- V1
- V2



**ANTERIOR**

- V3
- V4



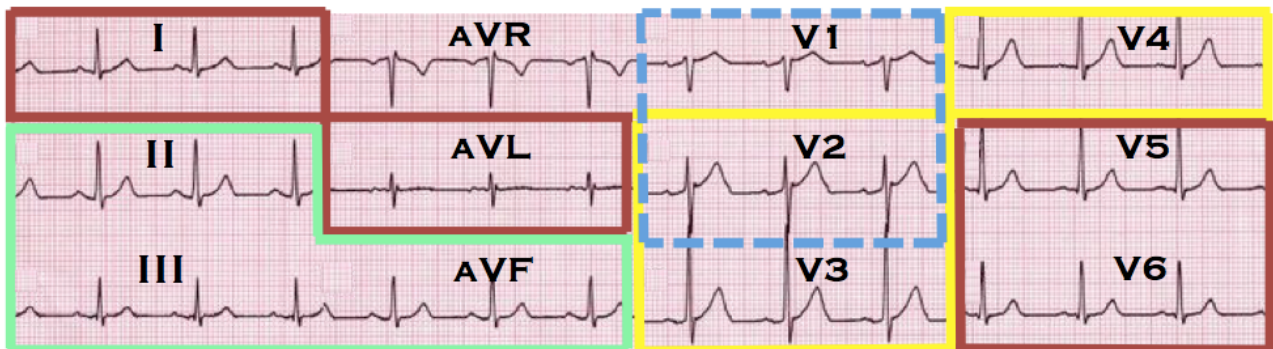
**LATERAL**

- V5 (low)
- V6 (low)
- Lead I (high)
- aVL (high)



**INFERIOR**

- Lead II
- Lead III
- aVF



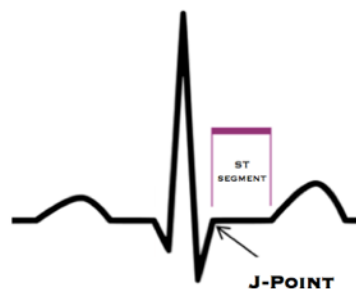
- aVR has no diagnostic value of the left ventricle, however can be used as a landmark to confirm correct lead placement (should be exact opposite of lead 2).
- Posterior view of the heart can be obtained using leads V7, V8 & V9, whereas the right ventricle can be viewed by switching V4 to the right side (V4R).

## 12 LEAD ECG PRE-ANALYSIS:

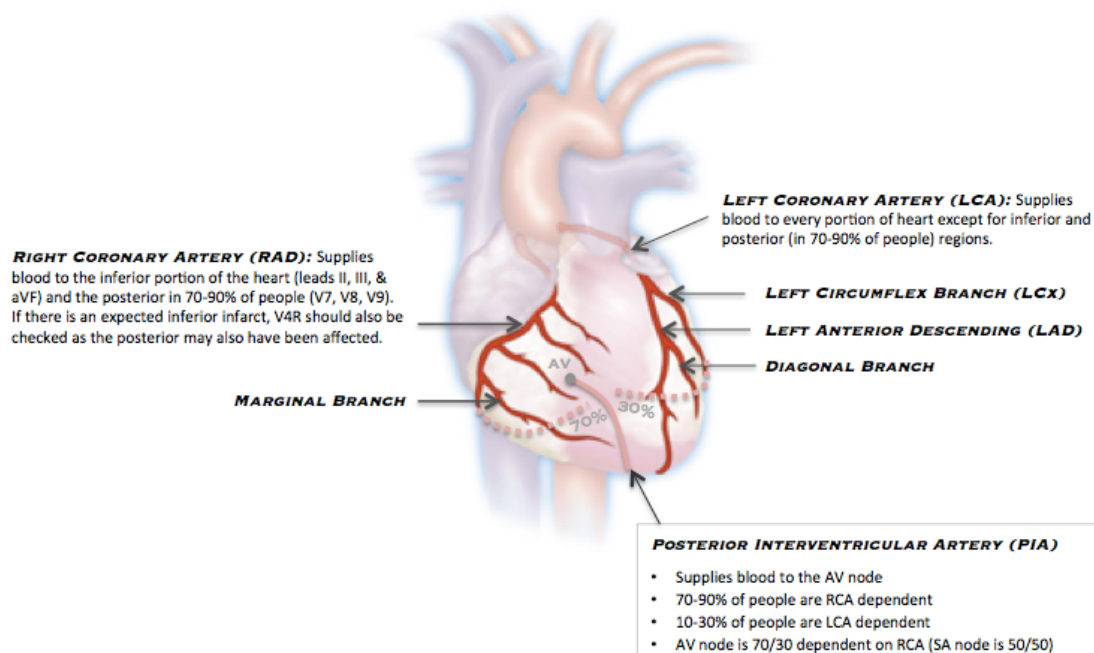
- **Tracing:** Should be clear with minimal artefact, and at least one P-QRS-T complex visible in each lead.
- **Paper Speed:** 25mm per second
- **Voltage Amplitude:** 10mm = 1mV
- **Frequency Response:** Diagnostic quality is 0.05-150 Hz (very sensitive to artefact therefore ensure no movement)
- **Lead Placement:** No leads should be isoelectric, aVR should be negative, I & V6 positive (or at least same direction)
- **R-wave Progression:** R waves should get progressively bigger, and S waves progressively smaller from V1-V6.

## ST SEGMENT & J-POINT:

- The ST segment begins at the J-point.
- The J-point is the point at which the slope of the S wave changes direction.
- The J-point is used to recognise ST elevation or depression.

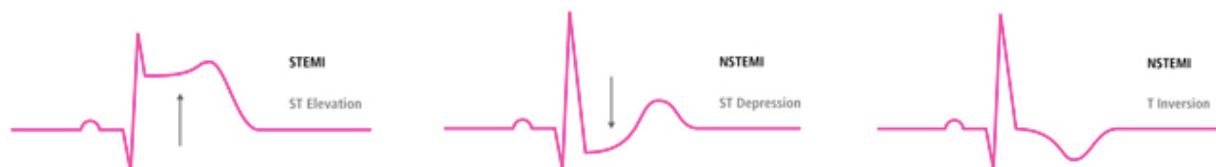


**CORONARY ARTERIES:** The arteries that supply the myocardium with blood and oxygen.



**STEACS vs NON-STEACS:** STEACS (70%) and NON-STEACS (30%) are commonly known as heart attacks.

**Pathophysiology:** STEACS occurs when a major coronary artery is completely occluded, resulting in full thickness damage to heart muscle. NON-STEACS occurs when there is a complete occlusion of a minor coronary artery, or a partial occlusion of a major coronary artery, resulting in partial thickness damage to heart muscle. STEACS is indicated by ST elevation on the ECG, whereas NON-STEACS is indicated by ST depression or T-wave inversion.



#### ANTERIOR STEACS:

- Results from LAD occlusion. Anterior MI carries worst prognosis of all infarct locations, due to larger infarct sizes.
- The more areas involved, the more proximal the obstruction is in the LCA.
- Septal Infarct: V1 & V2
- Anterior Infarct: V3 & V4
- Anteroseptal Infarct: V1-V4
- Anterolateral Infarct: V2-V6, I + aVL
- Extensive Anterior/Anterolateral Infarct: V1-V6, I & aVL ('Widowmaker MI')

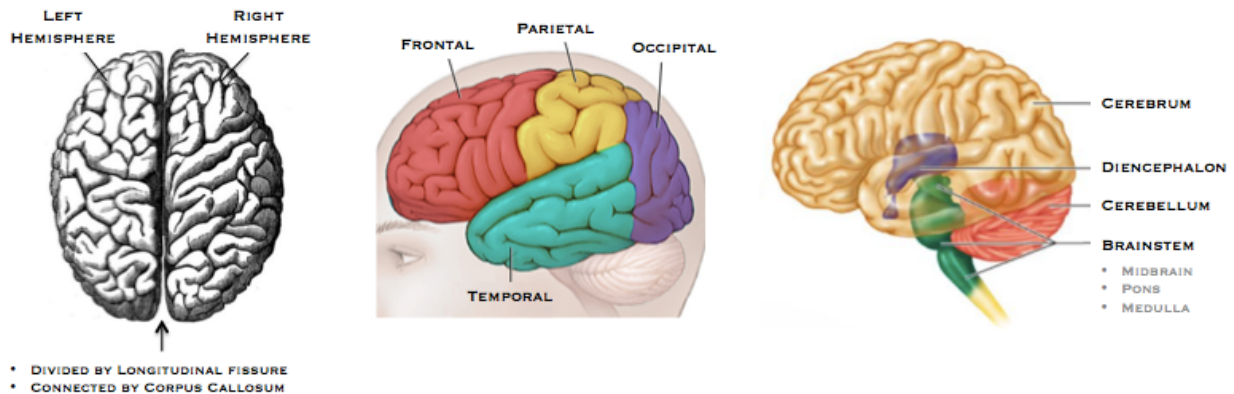
#### INFERIOR STEACS:

- Results from RCA occlusion. Accounts for 40-50% of all MIs, with more favourable outcomes than anterior MI.
- Inferior STEACS may also be associated with RV MI (40%), 2nd or 3rd degree AV block (20%), or posterior MI.
- Inferior Infarct: Leads II, III, & aVF (progressive development of Q waves in II, III, aVF, & reciprocal depression in aVL)

## BRAIN & NERVOUS SYSTEM A&P

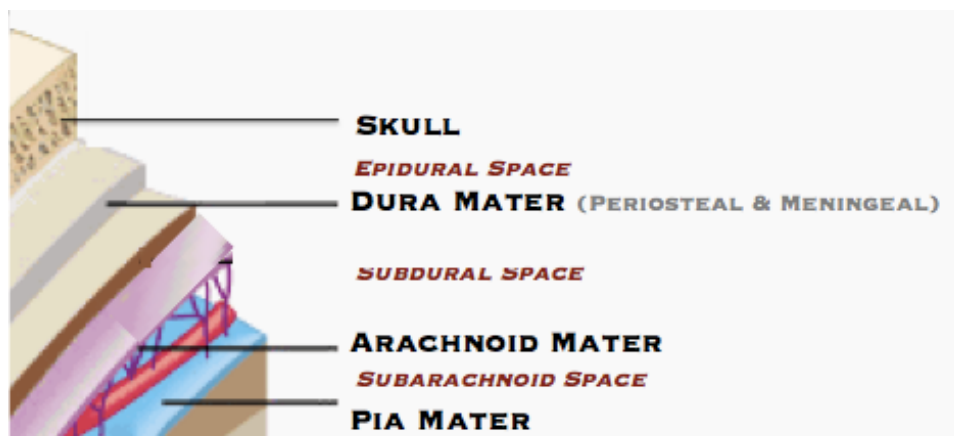
**BRAIN:** The brain weighs approx. 1500g with a volume of 1200mls. Male brains are 10% larger than females, however there is no correlation between size and intelligence. The cerebral cortex is where 'conscious mind' is found, and allows us to be aware of ourselves, sensations, communication, and initiate voluntary movement. There are 3 functional areas in each hemisphere of the brain which are motor areas, sensory areas, and association areas.

- Hemispheres: Left & right hemispheres, divided by longitudinal fissures, and connected by corpus callosum.
- Lobes: Frontal (Voluntary motor control), Parietal (Sensory control & consciousness), Temporal (Auditory & smell), Occipital (Visual)
- Components: Cerebrum, Diencephalon, Cerebellum, Brainstem (Midbrain, Pons, Medulla Oblongata)



**MENINGES:** Three protective layers that encase the brain & spinal cord.

- Dura Mater: Outermost lining of the brain & consists of 2 layers made of tough, fibrous tissue (periosteal & meningeal).
- Arachnoid Mater: Smooth epithelial membrane that contains significant amounts of CSF & largest vasculature of brain.
- Pia Mater: Innermost lining that adheres to brain's surface, & accompanies blood vessels as they enter cerebral tissue.




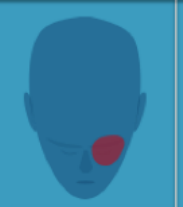
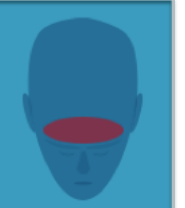


**CEREBROSPINAL FLUID (CSF):** Colourless fluid formed from blood plasma & glucose that bathes brain & spinal cord. Produced by choroid plexus in all brain ventricles, and produces 500mL per day (produced & drained every 8 hours).

- Functions: *Support* (brain floats in skull), *Transport* (nutrients, chemical messengers), & *Reduces* brain weight by 97%.
- 150mL of CSF can circulate spaces at any one time, & is in constant chemical contact with interstitial fluid.

## HEADACHES AND STROKES

**HEADACHES:** Common neurological disorders which usually are benign. There are 5 primary headache syndromes:

					
	NORMAL	MIGRAINE	CLUSTER	CHRONIC PAROXYSMAL HEMICRANIA	TENSION
DEFINITION	Develops secondary to triggers (dehydration, MSG consumption, drugs)	Episodes of severe, intermittent, and recurrent headaches	Occurs in clusters for days/weeks before a long remission period.	Variant of cluster, but more frequent, shorter duration, & shorter remissions.	Precipitated by stress and muscle tension in the face, neck, and shoulders.
PATHOPHYSIOLOGY	-	Vasoconstriction of unstable intracranial blood vessels, followed by reflex vasodilation	Release of vasoactive peptides (causes neurogenic inflammation).	Disorder of SNS	Central (hypersensitivity of pain) or Peripheral (facial and cranial muscle pain).
SIGNS & SYMPTOMS	-	<ul style="list-style-type: none"> <li>Slow to rapid onset</li> <li>Unilateral head pain</li> <li>Pulsating pain &amp; N/V</li> <li>Photophobia</li> <li>Duration = 4-72 hours</li> </ul>	<ul style="list-style-type: none"> <li>Sudden onset</li> <li>Unilateral head pain</li> <li>Orbit/temporal/teeth</li> <li>Nasal congestion</li> <li>Duration = 30-120 min</li> </ul>	<ul style="list-style-type: none"> <li>Cluster S&amp;S</li> <li>Frequent (4-12 per day)</li> <li>Duration = 20-120 min</li> </ul>	<ul style="list-style-type: none"> <li>Gradual onset</li> <li>Bilateral head pain</li> <li>Localised pressure</li> <li>"Band squeezing head"</li> </ul>
PREVALENCE	-	<ul style="list-style-type: none"> <li>Common</li> <li>Females (25-55yo)</li> </ul>	<ul style="list-style-type: none"> <li>Uncommon</li> <li>Males (20-50yo)</li> </ul>	<ul style="list-style-type: none"> <li>Uncommon</li> <li>Females (post-pregnancy)</li> </ul>	<ul style="list-style-type: none"> <li>Most common</li> <li>Young adults (10-20yo)</li> </ul>

**CEREBRAL HAEMORRHAGES:** Cerebral haemorrhages can cause herniation of brain tissue (compresses brain).

### EPIDURAL HAEMATOMA

- **Definition:** Arterial bleed between skull & dura mater.
- **Cause:** Trauma (skull fractures common)

#### Signs & Symptoms

- Initial LOC followed by lucid interval (hours-days)
- Rapid deterioration back to unconsciousness
- Increasing severity of headache & confusion
- Nausea & vomiting
- Seizures
- Ipsilateral pupil dilation & contralateral hemiparesis
- Decerebrate posturing

### SUBDURAL HAEMATOMA

- **Definition:** Venous bleed between dura mater & arachnoid.
- **Cause:** Trauma

#### Signs & Symptoms

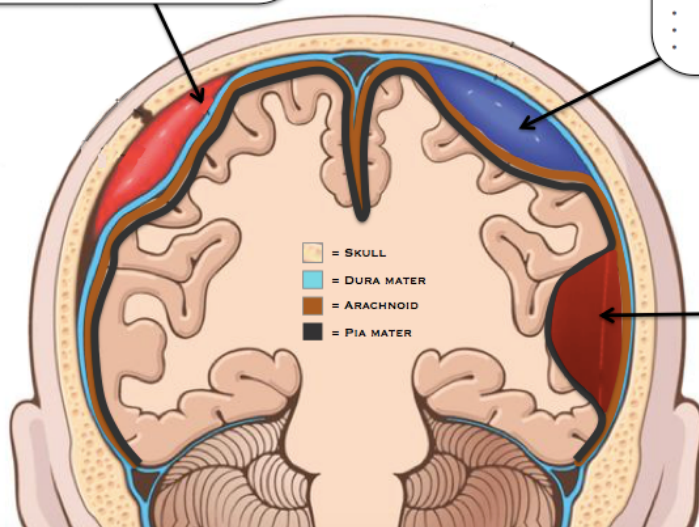
- Headache
- Drowsiness, confusion, and dizziness
- Restlessness & Agitation
- Worsening level of consciousness
- Respiratory pattern changes (due to herniation)
- Pupil dilation

### SUBARACHNOID HAEMORRHAGE (SAH)

- **Definition:** Arterial bleed between arachnoid & pia mater.
- **Cause:** Aneurysms, trauma, HTN, cocaine, family Hx

#### Signs & Symptoms

- Sudden 'thunderclap' headache with subsequent LOC
- Nausea & Vomiting
- Focal neurological defects (speech, visual, motor)
- Meningeal signs (nuchal rigidity, photophobia)
- Irritability
- Low grade fever



## FOCAL (PARTIAL/LOCALISED) SEIZURES:

### FOCAL SEIZURES (Originate in one hemisphere of brain)



#### SIMPLE

- Conscious with awareness of surroundings
- Short duration
- Slow repetitive jerking of *specific body part*
- *S&S*: Sensory, motor, psychic, or autonomic

#### COMPLEX

- Impaired or LOC with altered awareness
- Longer duration (2 minutes)
- Appear dazed and confused ('spaced out')
- *S&S*: Lip smacking, automatisms (repetitive movements)

## GENERALISED SEIZURES:

### GENERALISED SEIZURES (Originate from both cerebral hemispheres)



#### ABSENCE

- Blank staring spell
- Short duration (10 sec)
- Common in childhood
- No postictal phase

#### TONIC-CLONIC

- Prodroma/aura may precede seizure
- Long duration (1-3 minutes)
- Sudden LOC
- *Tonic Phase*: Muscle stiffness
- *Clonic Phase*: Muscle jerking
- *Postictal Phase*: Confusion & fatigue
- Cyanosis & apnoea
- Trismus +/- tongue/cheek bites
- Incontinence
- Dilated pupils (unresponsive)
- Excessive salivation
- Excessive sweating
- Contorted face
- Hyperventilation & tachycardia

#### MYOCLONIC

- Conscious
- Rapid duration (1-3 seconds)
- Sudden excessive muscle jerk
- Injuries common due to falls

#### ATONIC

- Conscious "drop attack"
- Rapid duration (1-3 seconds)
- Sudden loss of muscle tone
- Injuries common due to falls