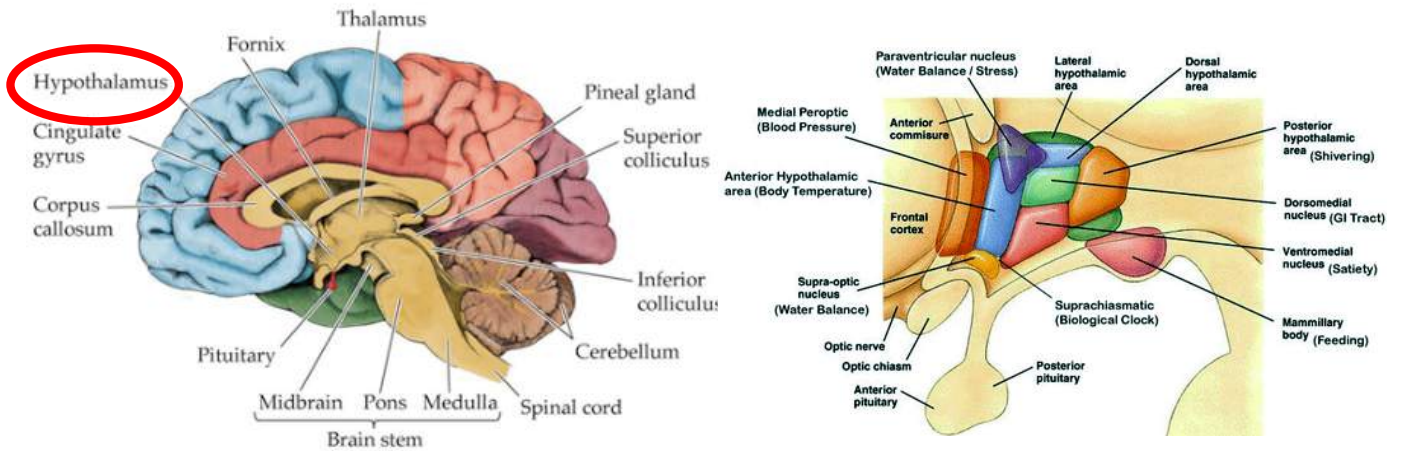


The Hypothalamus and Neuroendocrine system

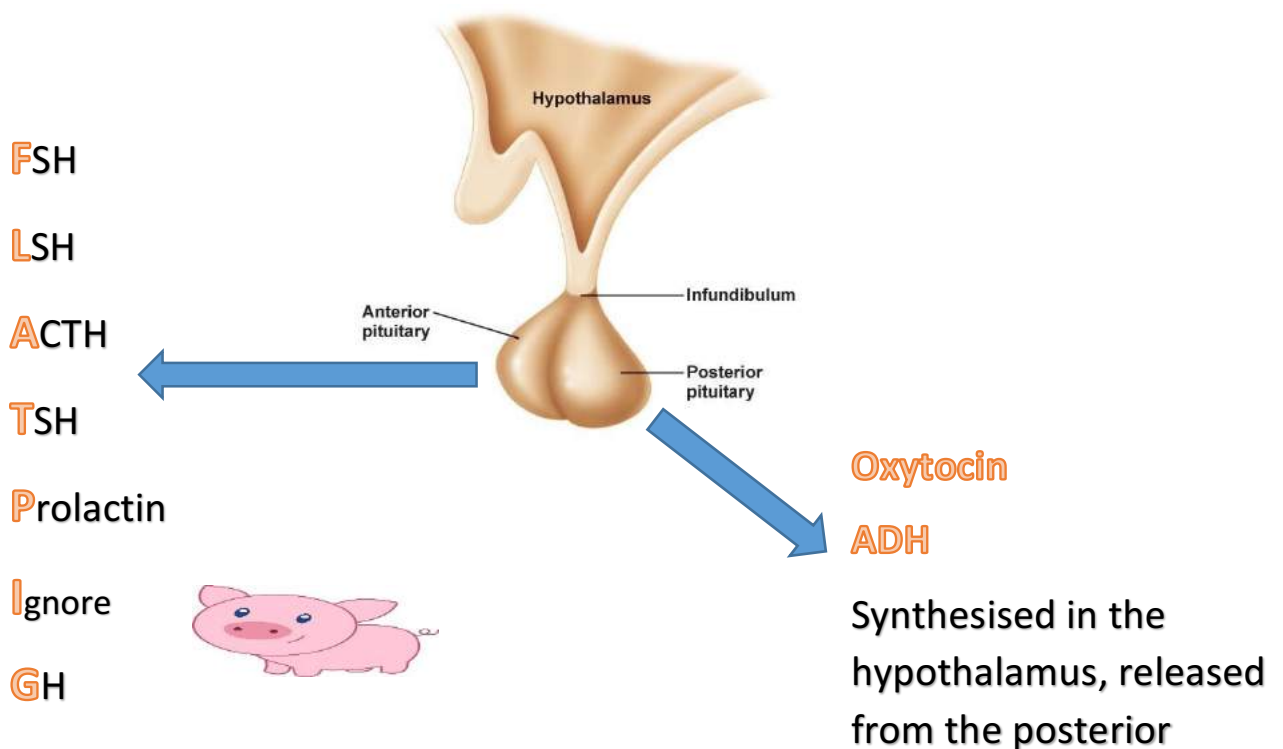


Where is the hypothalamus?

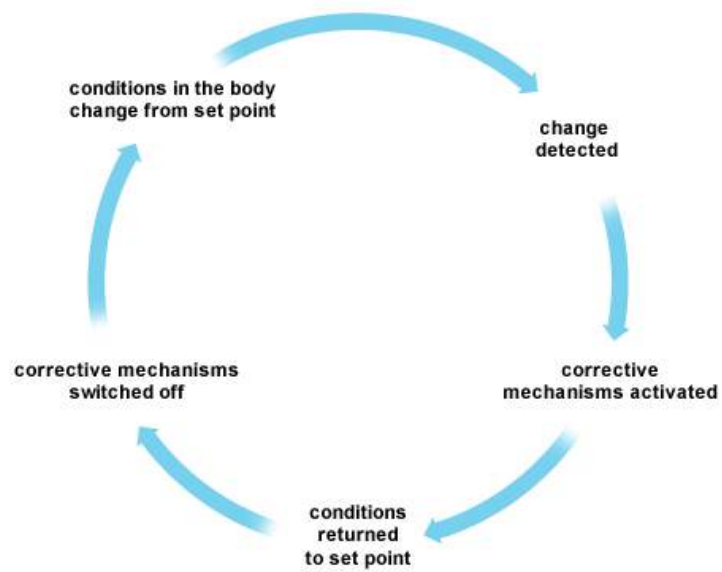
- Basal region of the _____
- Just above the _____
- Forms part of the lateral wall of the _____ -

Controls the 2 H's:

- **H** (+Rheostasis)
Maintenance of a constant internal environment
- **H**
Controlled via the _____, includes growth and reproduction

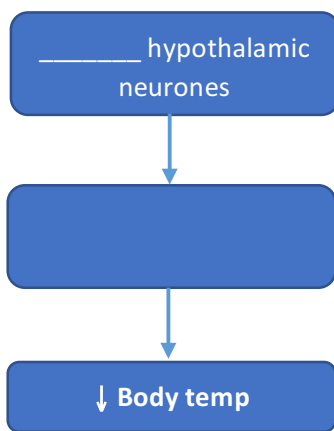


Negative Feedback



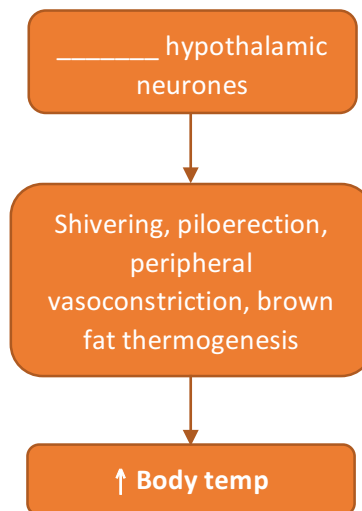
Thermoregulation

Temperature goes up:



Lesion =

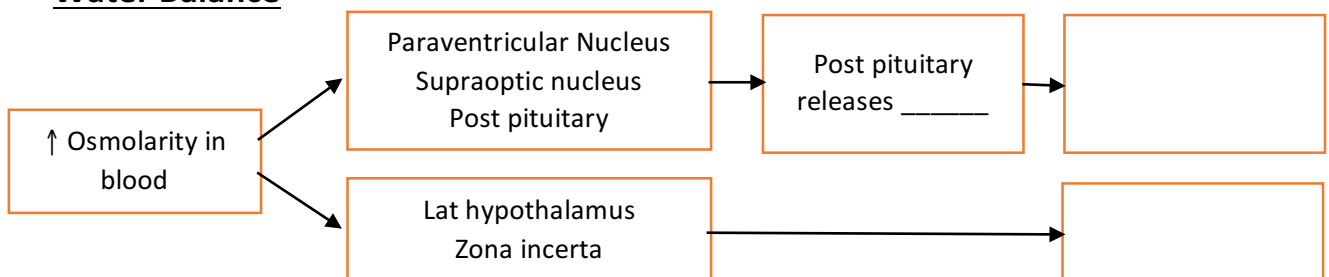
Temperature goes down:



Lesion =

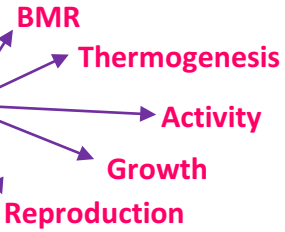


Water Balance



Energy Balance

Caloric Intake = Food Intake – Caloric Expenditure



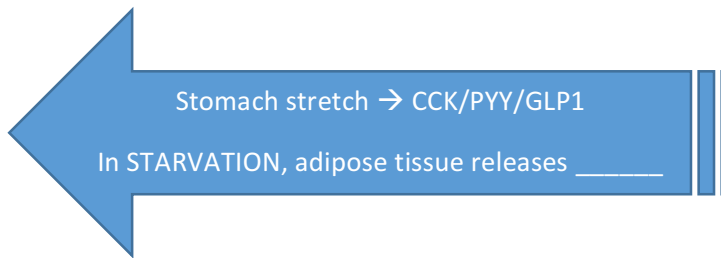
Hunger



Regulated by the _____ :

Orexigenic neurones - ↑ food intake

Anorectic neurones - ↓ food intake



Rheostasis

“Regulation within a changing environment”

Regulated by _____

1. Circadian variation = DAILY

e.g. sleep – cortisol levels vary throughout the day

body temp – falls before sleep

BP – higher in the morning (increased risk of stroke)

2. Seasonal variation

e.g. adapting to higher temperatures in summer

STROKE

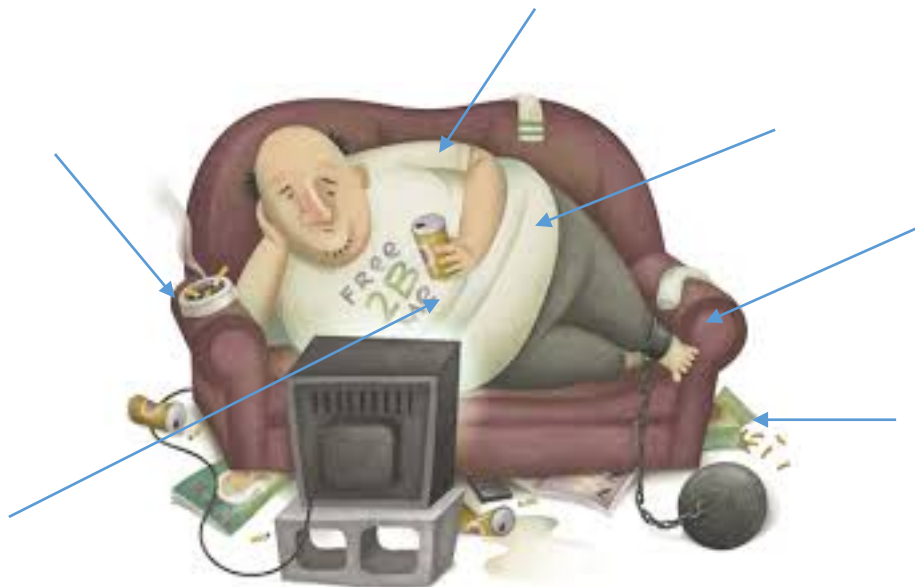
What is a stroke?

Stroke is the acute onset of neurological deficits (lasting for more than 24hrs) due to a disturbance in blood supply to the brain.

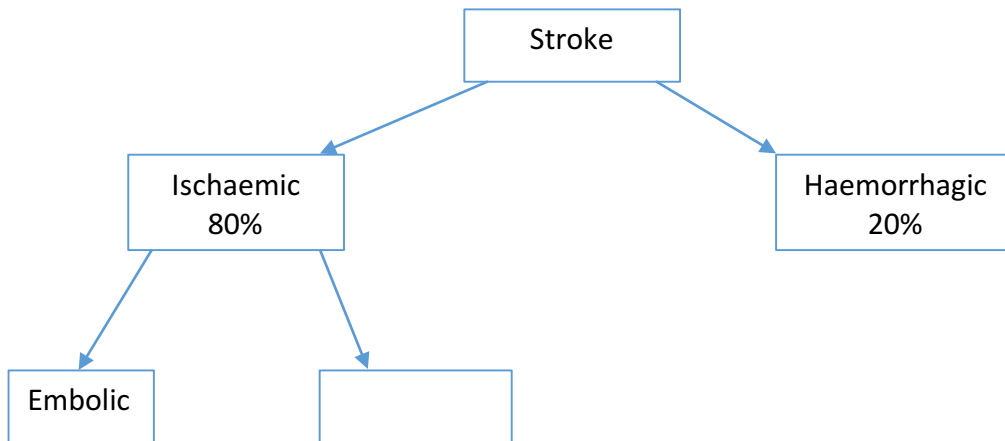
What are the symptoms of stroke?

All	
Dummies	
Are	
Happy	
Feeling	
Completely	
Thoughtless	

- F**acial weakness
- A**rm weakness
- S**peech difficulty
- T**ime to call

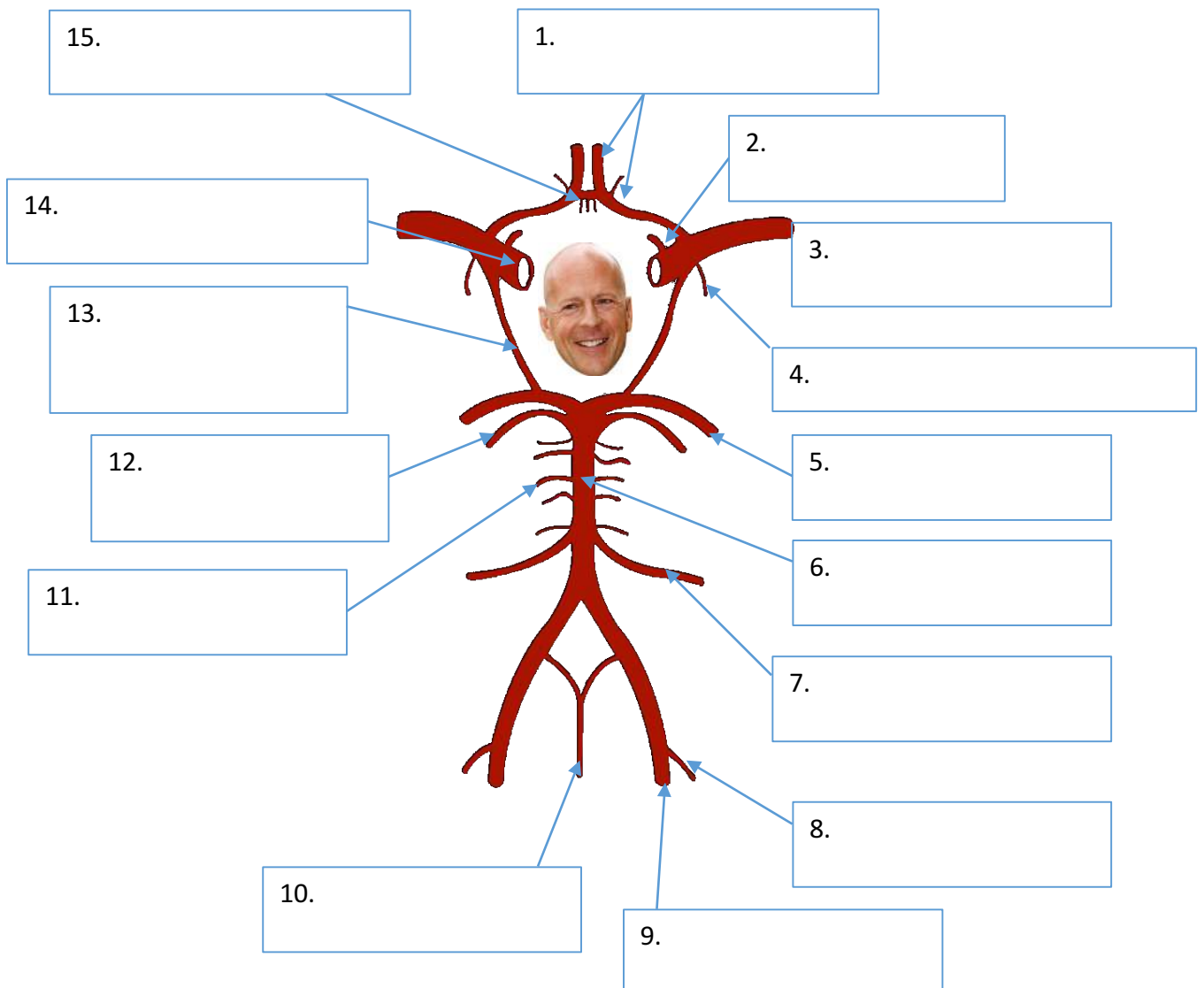


Risk factors

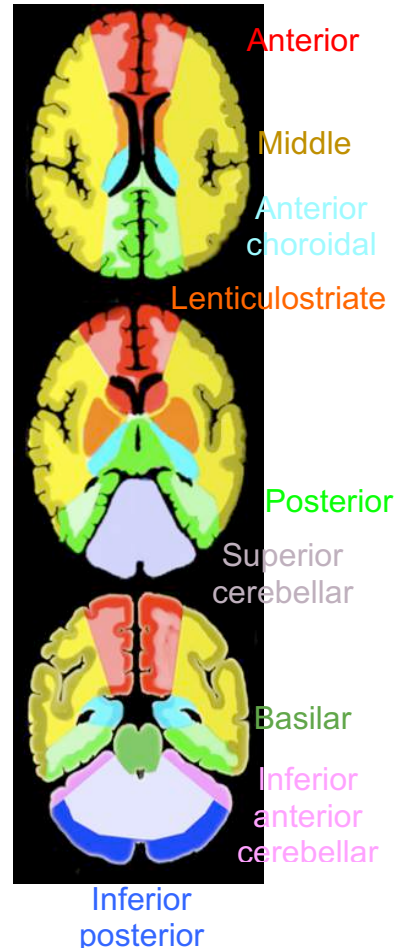


We're focusing on Ischaemic!

The Circle of (Bruce) Willis can be used to determine which parts of the brain will be affected by an embolus or a thrombus



The symptoms that appear will help you determine which arteries have been affected e.g. if the patient is experiencing personality changes we would assume that the _____ had been affected or if the patient had suffered right sided hemiplegia (paralysis on one side) we would expect there to be a clot in the _____.

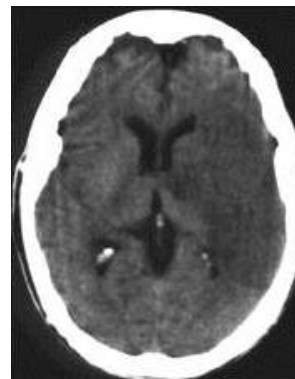


What kind of scan would we use to see the effects of stroke on the brain?

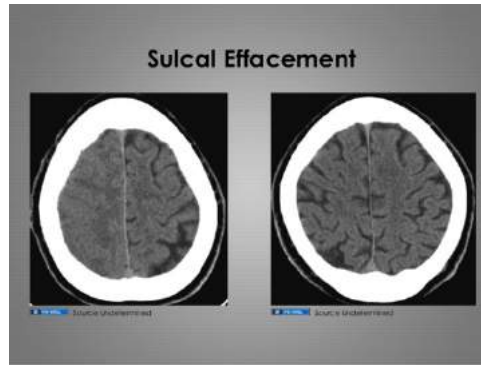
You can't see any changes in actual brain tissue until about 12-18 hours after symptoms develop. After 1 to 2 days you can see swelling in the affected brain.



This is a CT scan a **few hours after** symptoms appeared. The white line is a **MCA** _____ artery, showing a clot in the middle cerebral artery



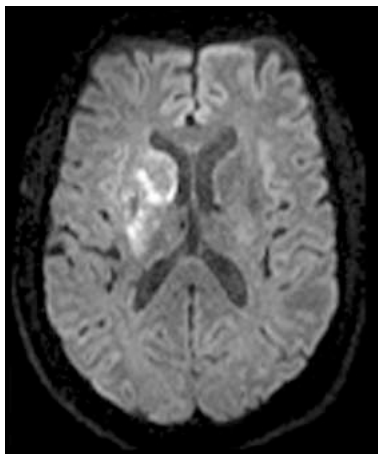
This is a scan taken **1-2 days after** the stroke. There is shading on the left side of the brain due to _____.



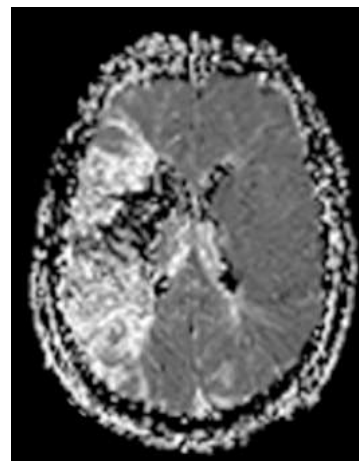
Sulcal effacement can also be used to detect ischaemic stroke. The sulci detach from the CSF (you see more gaps).

The Penumbra

- The penumbra is the tissue that surrounds the ischaemic core (the area surrounding the affected blood vessel).
- The tissue in the ischaemic core is dead within _____
- the tissue in the penumbra can survive a few hours due to blood supply from collateral vessels.



Diffusion



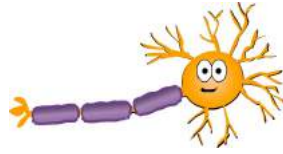
Perfusion

MRIs are 95% accurate in detecting acute ischaemic stroke

In the diffusion image, the white blob is the ischaemic core

The perfusion image highlights the penumbra that surrounds the ischaemic core that is still salvageable because it is receiving glucose and oxygen.

THE AFTERMATH!!!! i.e. the ischaemic cascade



Neurones no longer receive _____ so resort to anaerobic metabolism
this



Less energy = less ATP = less Na/K+ pump activity

Increased _____ = an osmotic gradient= movement of water into the neurone=
cytotoxic oedema

Ca²⁺ also builds up in the neurone as the Na⁺/Ca²⁺ pump is also affected.

Increased Ca²⁺ can cause increased **glutamate** (excitatory neurotransmitter)
release which goes and _____ other neurones

Increased glutamate= _____

Increased Ca²⁺= free radicals and reactive oxygen species generation

Reactive oxygen species and free radicals cause damage to the neurone,
especially the _____.

Free radicals and **Ca²⁺** cause damage to mitochondria and DNA → **APOPTOSIS**

4-6 hours after ischaemia blood- brain barrier breaks down and this is
accompanied by an **INFLAMMATORY response**.

The inflammatory response includes the recruitment of _____ (e.g.
neutrophils) which release hydrolases during liquefactive necrosis that break
down brain cells. This may not be reversible :/

Treatment

The only approved treatment for ischemic stroke is intravenous thrombolysis with recombinant tissue plasminogen activator (rt-PA)

MUST BE TREATED WITHIN _____ OF SYMPTOMS

Assessment of stroke effects

NIHSS assesses **stroke severity** and is a **good predictor of outcome**.

- A higher score indicates a worse prognosis.

The NIH Stroke Scale form includes sections for:

- Consciousness (Level of alertness, eye opening, verbal response, best motor response)
- Face (Smile, show upper and lower teeth)
- Arm (Hold arm extended, lift arm)
- Leg (Hold leg extended, lift leg)
- Speech (Say "F-A-S-T", repeat "The world is big")
- Sensorimotor (Pain, temperature, vibration, light touch)

Glasgow Coma Scale assesses the **degree of consciousness** in patients with haemorrhage.

- A higher score is better.

The Glasgow Coma Scale form includes sections for:

- Eye Opening (Spontaneous, to speech, to pain)
- Verbal Response (Oriented, confused, incomprehensible, no sound)
- Motor Response (obeys commands, localizes pain, withdraws, abnormal flexion, no response)

The **modified Rankin Scale** and the **Barthel Index** assess independence after stroke.

- The BI has 10 items, scored in intervals of 5 points, with a total possible score of 100. A higher score indicates better outcome.

Score	Description
0	No symptoms at all
1	No significant disability despite symptoms, able to carry out all usual duties and activities
2	Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance
3	Moderate disability; requiring some help, but able to walk without assistance
4	Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
5	Severe disability; bedridden, incontinent and requiring constant nursing care and attention
6	Dead

TOTAL (0-6): _____

The Barthel Index form includes the following activities and scores:

- FEEDING: 0 = cannot; 5 = needs help cutting, spreading, turning, etc., or requires modification of diet; 10 = independent
- BATHING: 0 = dependent; 5 = independent (or in shower)
- TOILETING: 0 = needs to help with personal care; 5 = independent (includes dressing, grooming, personal)
- DRESSING: 0 = dependent; 5 = needs help for one or more self-protective items; 10 = independent (including buttons, zips, laces, etc.)
- WALKING: 0 = dependent (or needs to be given assistance); 5 = ambulation; 10 = ambulation
- BLADDER: 0 = incontinent, or catheterized and unable to manage alone; 5 = incontinent; 10 = ambulation
- TOILET USE: 0 = dependent; 5 = can use toilet, but can do nothing about it; 10 = independent (on and off, dressing, wiping)
- TRANSFER (BED TO CHAIR AND BACK): 0 = needs help, or help needed; 5 = needs help once or two people; 10 = independent, one or all
- MOBILITY (ON LEVEL SURFACES): 0 = cannot; 5 = can walk or use wheelchair, > 50 yards; 10 = walks with help of one person carried or pushed > 50 yards; 15 = independent (but not on one end); 20 = walks, sticks > 50 yards
- STAIRS: 0 = cannot; 5 = needs help (stairs, platform, carrying aids); 10 = independent

TOTAL (0-100): _____

What is Schizophrenia?

Schizo = 'split' Phrenum = 'mind'

A long term mental health disorder involving the breakdown in relation between thought, emotion and behaviour leading to _____. This is a _____ of contact with _____.

Positive

1.
2.
3.



Negative

5 A's

- | |
|-------------------|
| 1. Reduced A_____ |
| 2. A_____ |
| 3. Blunted A_____ |
| 4. A_____ |
| 5. A_____ |

Cognitive

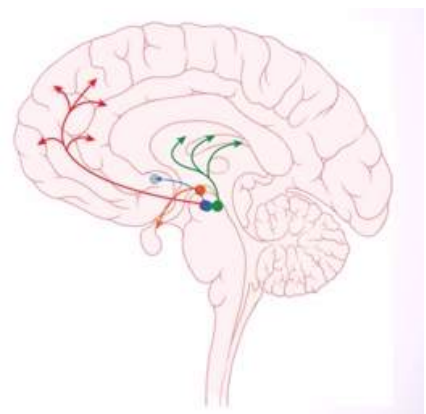
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Theories behind Schizophrenia

Dopamine hypothesis

- **INCREASED DOPAMINE** in **MESOLIMBIC PATHWAY**
- **DECREASED DOPAMINE** in **MESOCORTICAL PATHWAY**
- D2 receptors have the most crucial role in schizophrenia

(**'My Neighbours Track Me'**)

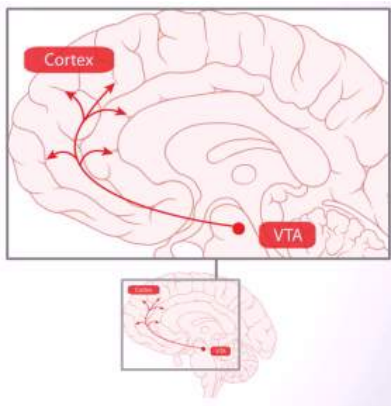
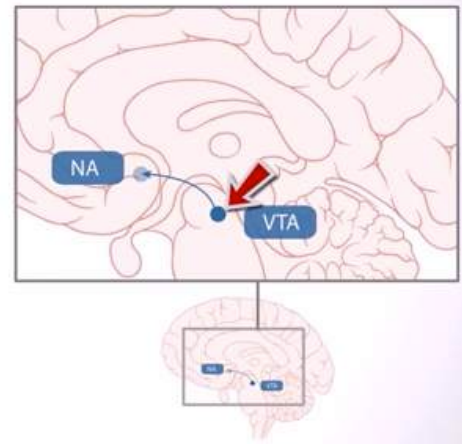


Mesolimbic pathway

V _____ T _____ A _____ to N _____ A _____

Normal functions:

Schizophrenia: _____ dopamine activity
↓
_____ symptoms of hallucinations,
delusions



Mesocortical pathway

V _____ T _____ A _____ to P _____

Normal functions:

Schizophrenia: _____ dopamine activity



_____ symptoms: social withdrawal
_____ symptoms: reduced attention, learning

Treatment????

Nigrostriatal pathway

S _____ N _____ to B _____ G _____

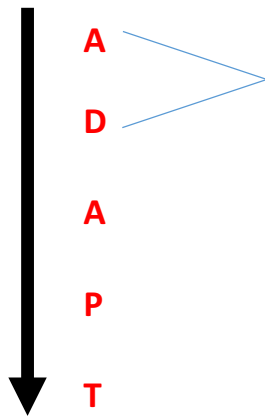
Function: Dopamine _____ movements

- _____ direct pathway (via D1 receptors)
- _____ indirect pathway (via D2 receptors)

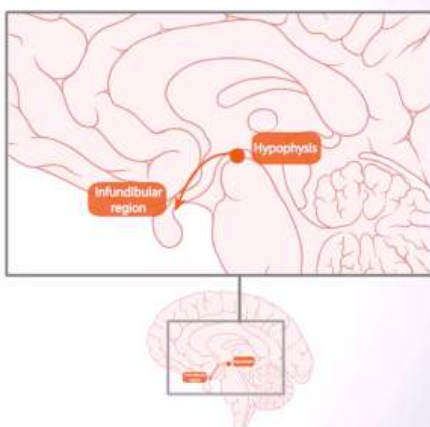
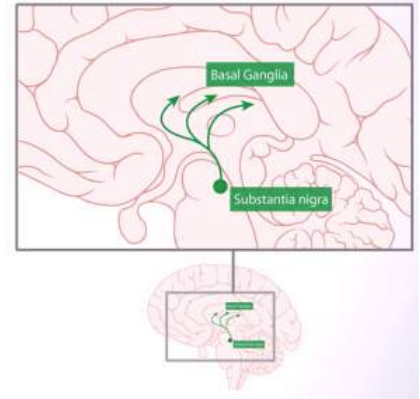
Affected by Antipsychotic drugs: D2 receptor antagonist

**BLOCKED DOPAMINE = _____ MOVEMENTS =
EXTRAPYRAMIDAL SIDE EFFECTS (EPSE)**

EPSE: 'Movement disorders caused by blockage of dopamine activity in nigrostriatal pathway'



Order of onset from early to late



Tuberoinfundibular pathway

H _____ to A _____ P _____

Function: Dopamine normally _____ prolactin release from anterior pituitary

Affected by Antipsychotic drugs: **D2 antagonists = NO inhibition of prolactin, therefore results in _____:**

Symptoms:

Treatment

1) Typical antipsychotics

e.g. _____, _____

D2 RECEPTOR ANTAGONISM

Side effects:

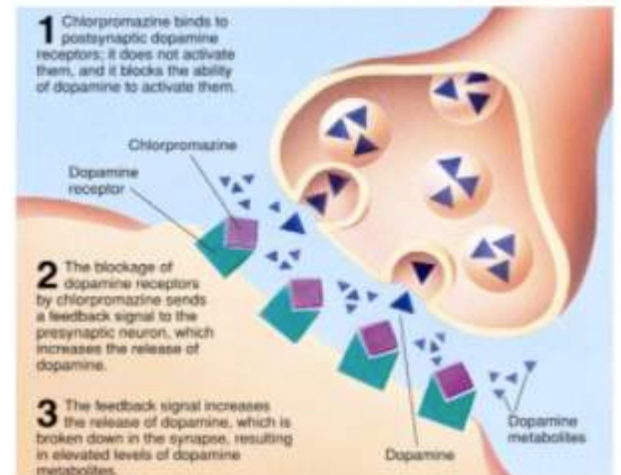
Antagonises

Dopamine:

Muscarinic receptors:

Alpha-adrenoceptors:

H1- antagonist effects:



Problem? Causes too many extra-pyramidal side effects, not selective enough for the mesolimbic pathway

2) Atypical antipsychotics (First Line, Newer generation)

e.g. _____, _____

D2 RECEPTOR ANTAGONISM + _____ ANTAGONISM

- Fewer dopaminergic side effects (_____ selectivity) decreased EPSE and hyperprolactinaemia.
- Serotonin antagonism (5HT₂) greater with atypicals- metabolic side effects (_____)

Clozapine- If patient is resistant to _____ other antipsychotics.

- effective in _____% of patients who are resistant
- affinity for D₃/D₄ and D₂
- Low EPSE's
- beware: _____ !!