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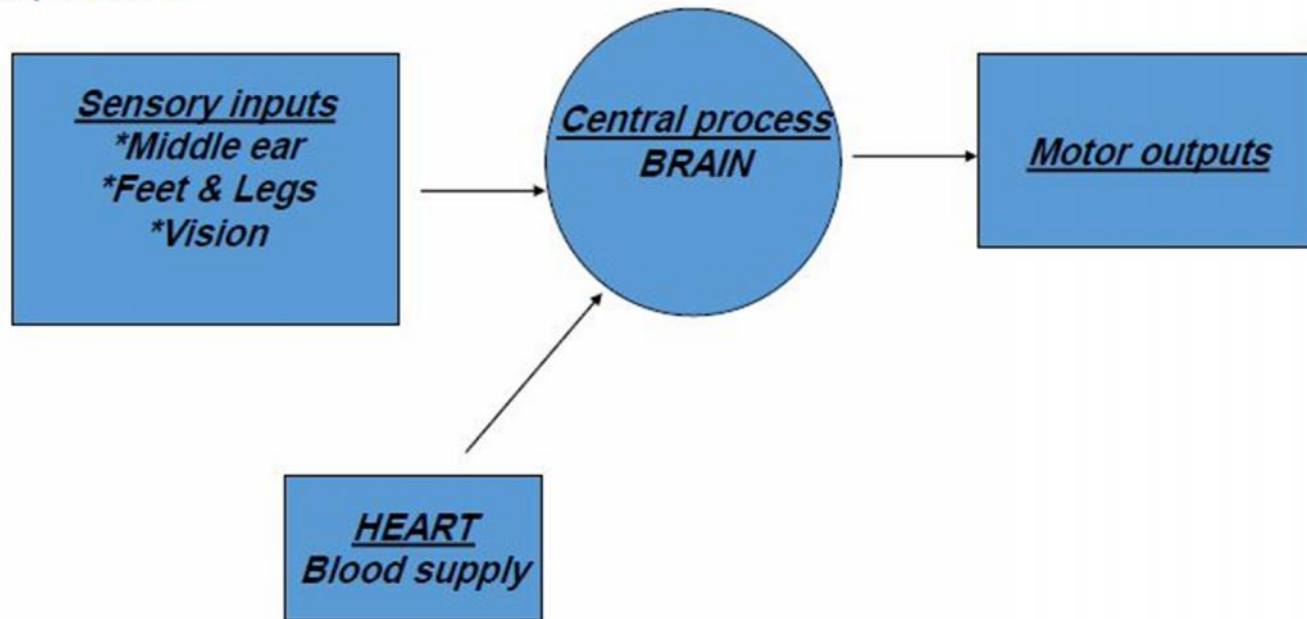
**College of Medicine
of Hammurabi**

- **Aim** :1-How to build conceptual structures which help you to diagnose and manage complex multi-factorial conditions like falls 2-why people more likely to fall 3-why fractures are more likely if they fall

Session 7

Falls

Staying upright posture:



Falls

elderly people are more likely to fall, but also because injuries from falls, especially fractures, are much more likely. Everyone falls at some stage. It is impossible to avoid occasional trips even when sober and in many sports falls are common. Individuals who are elderly or who suffer disability may well fall when other people would not

Most falls in young fit people do not lead to serious injury.

Staying upright requires considerable **motor control** **informed by sensory input** from a variety of sources. **Impairment of any part** of this process leads to an **unexpected fall**. Falls may occur if the sensory inputs are disrupted. Damage to the **bMohammadce organs** in the **middle ear** can lead to dizziness and instability. Impaired sensation from the feet and legs may compromise bMohammadce, as may **impaired vision**, as humans use a wide variety of sensory inputs to stay upright and to detect trip hazards whilst walking.

Information from sensory organs must be centrally processed by the brain. **Many falls** follow from **poor central processing**, either because of long term **neurological problems**, or short term shortage of oxygen if blood flow to the brain is compromised. Many falls in the **elderly** are attributable to **cardiovascular problems**, which cause a transient fall in arterial blood pressure and therefore blood flow to the brain in the upright position. The resulting **transient loss of consciousness leads to a fall**

These are commonly attributable to **disruption of the normal pattern of the heart beat – arrhythmias**, many of which can readily be treated.

Even if **sensory inputs are intact** and central processing functioning, **defects in motor outputs** can lead to stumbles and falls, such as happens in diseases like **Multiple Sclerosis**.

Most falls in the **elderly are multifactorial**.

the patient can get up unaided a fall is not too harmful, but unfortunately in the **elderly the risk** of serious injury especially fractures is very high, even in an apparently **trivial fall**. Most commonly this is because **bones weaken** – a condition known as **osteoporosis**.

Syncope-presyncope or Faint

- **Syncope** : Transient episodic loss of consciousness with loss of postural tone due to cerebral or brain stem hypo perfusion.
- **blackout**=wide term.
- **Pre syncope or faint** ? It is lightheadedness or pre monitory symptoms before syncope (patient is going to have syncope).

ORGANIZATION OF THE NERVOUS SYSTEM

2 big initial divisions:

Central Nervous System

The brain + the spinal cord

The center of integration and control

Peripheral Nervous System

The nervous system outside of the brain and spinal cord

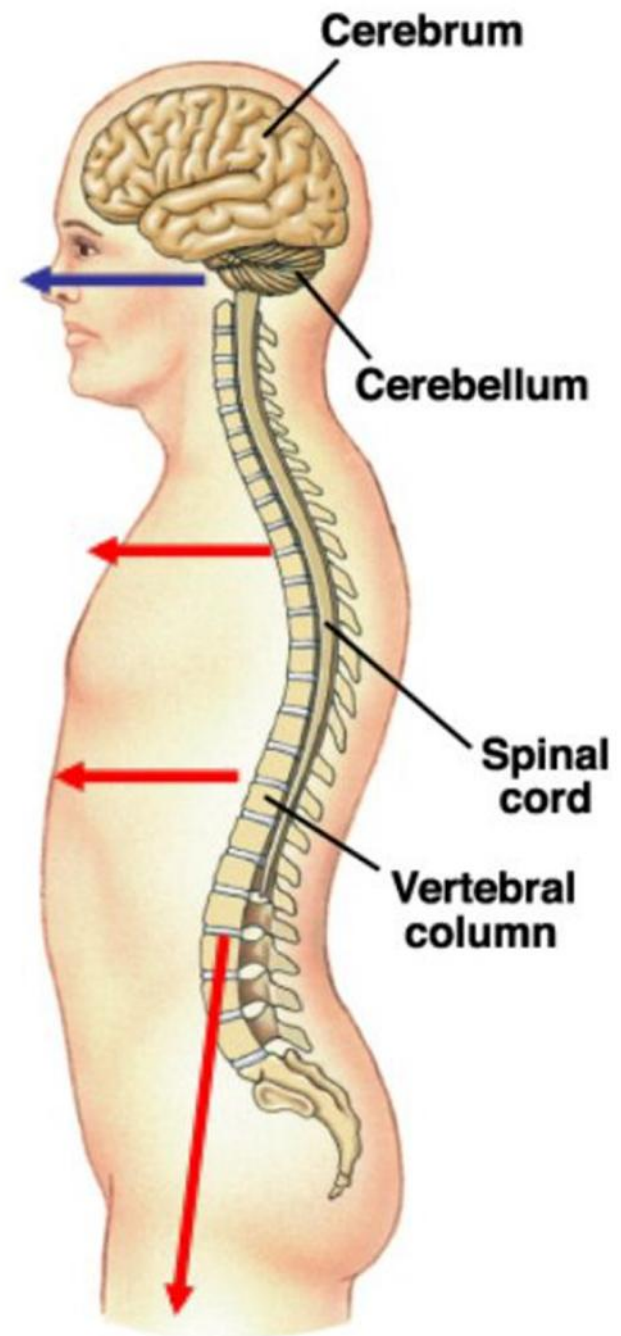
Consists of:

31 Spinal nerves

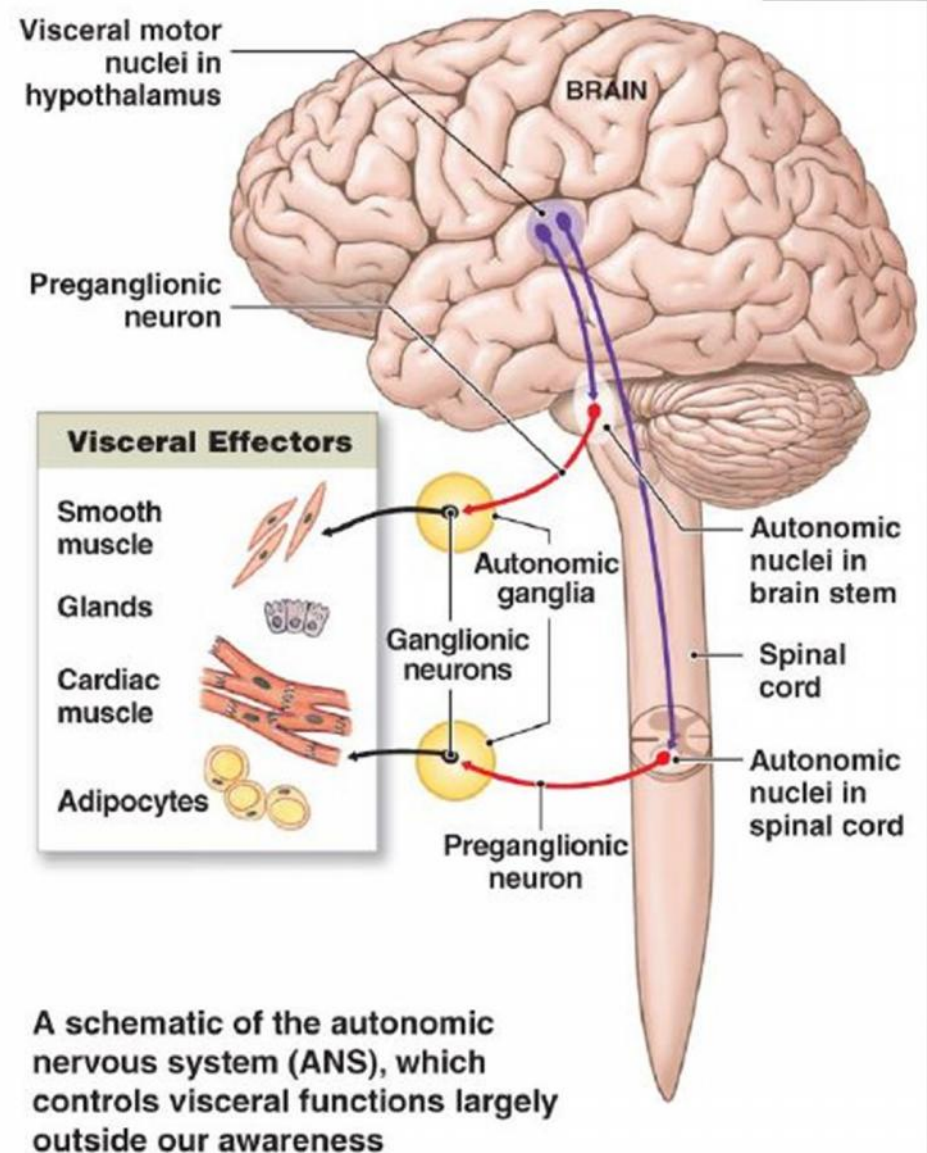
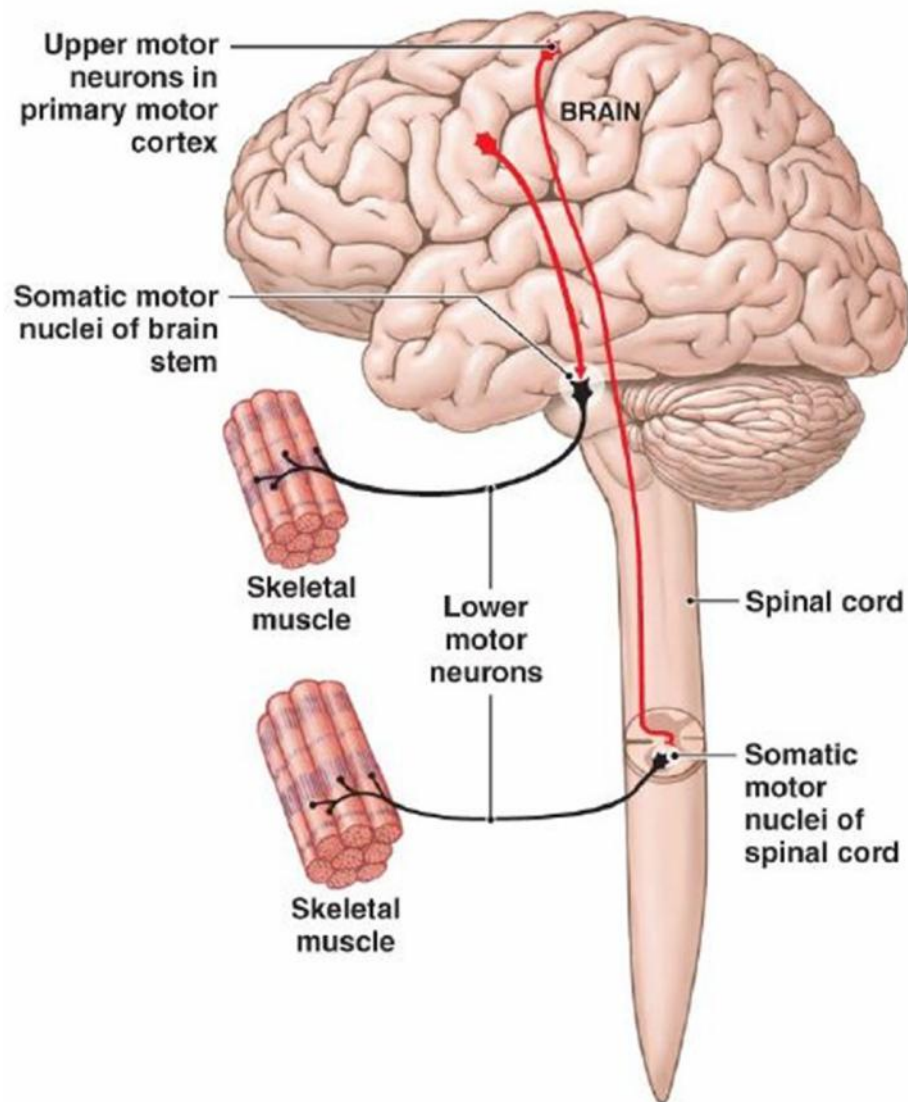
Carry info to and from the spinal cord

12 Cranial nerves

Carry info to and from the brain



A schematic of the somatic nervous system (SNS), which provides conscious and sub-conscious control over skeletal muscles



A schematic of the autonomic nervous system (ANS), which controls visceral functions largely outside our awareness

AUTONOMIC NERVOUS SYSTEM

- Can be divided into:
 - **Sympathetic Nervous System**
 - “Fight or Flight”
 - **Parasympathetic Nervous System**
 - “Rest and Digest”

These 2 systems are antagonistic.

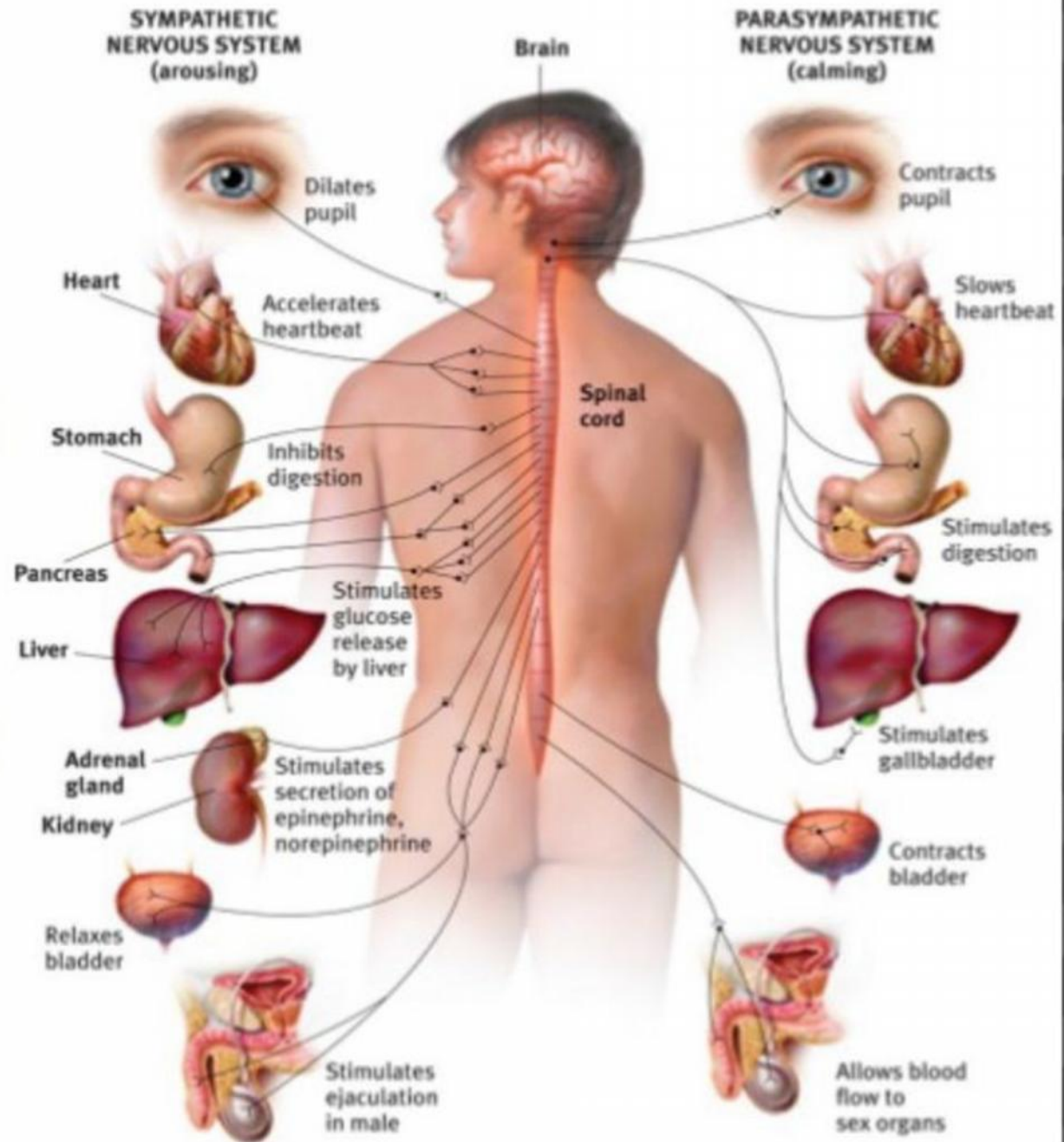
Typically, we balance these 2 to keep ourselves in a state of dynamic balance.

We'll go further into the difference between these 2 later on !

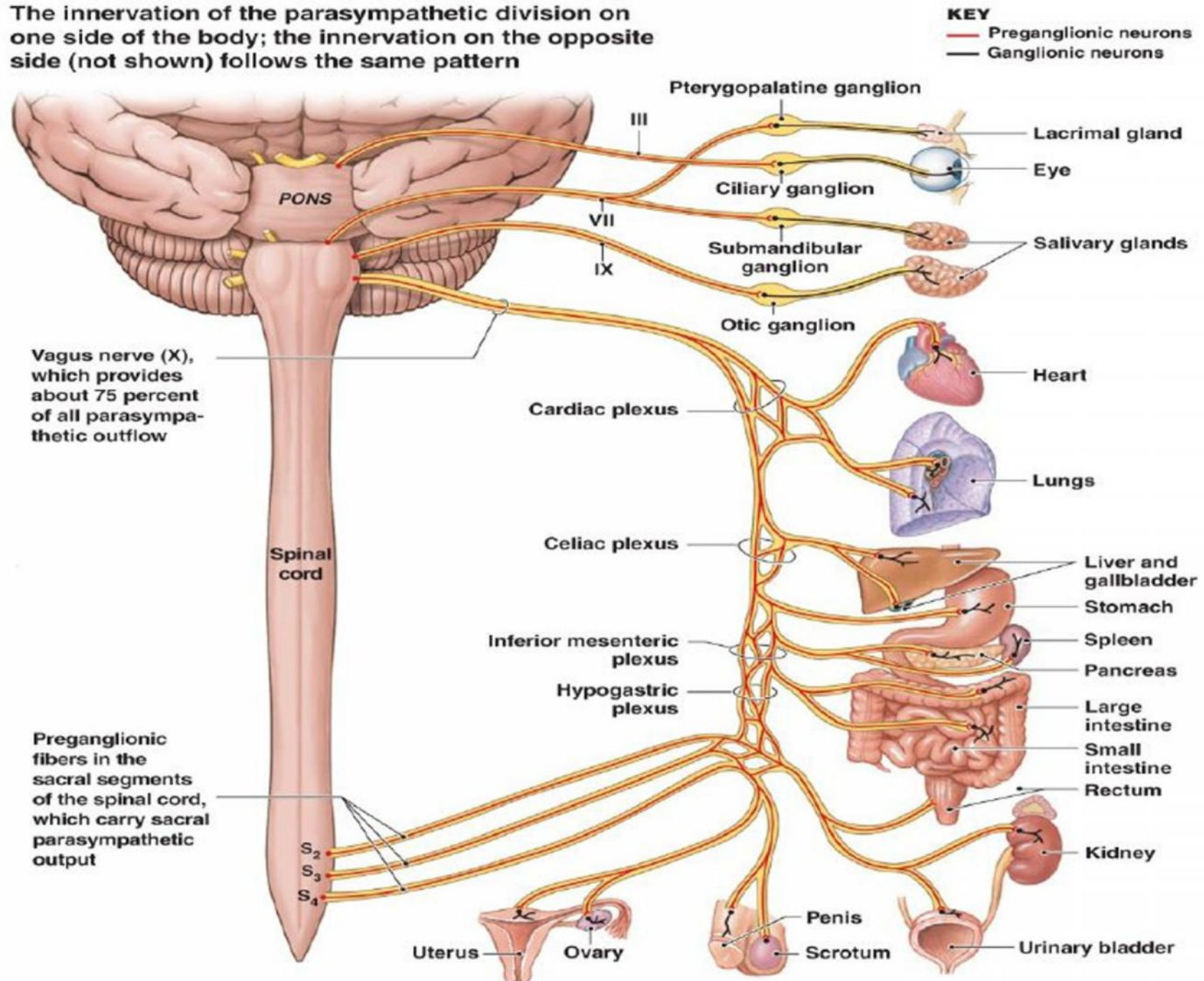
The Autonomic Nervous System:

The sympathetic NS arouses (fight-or-flight)

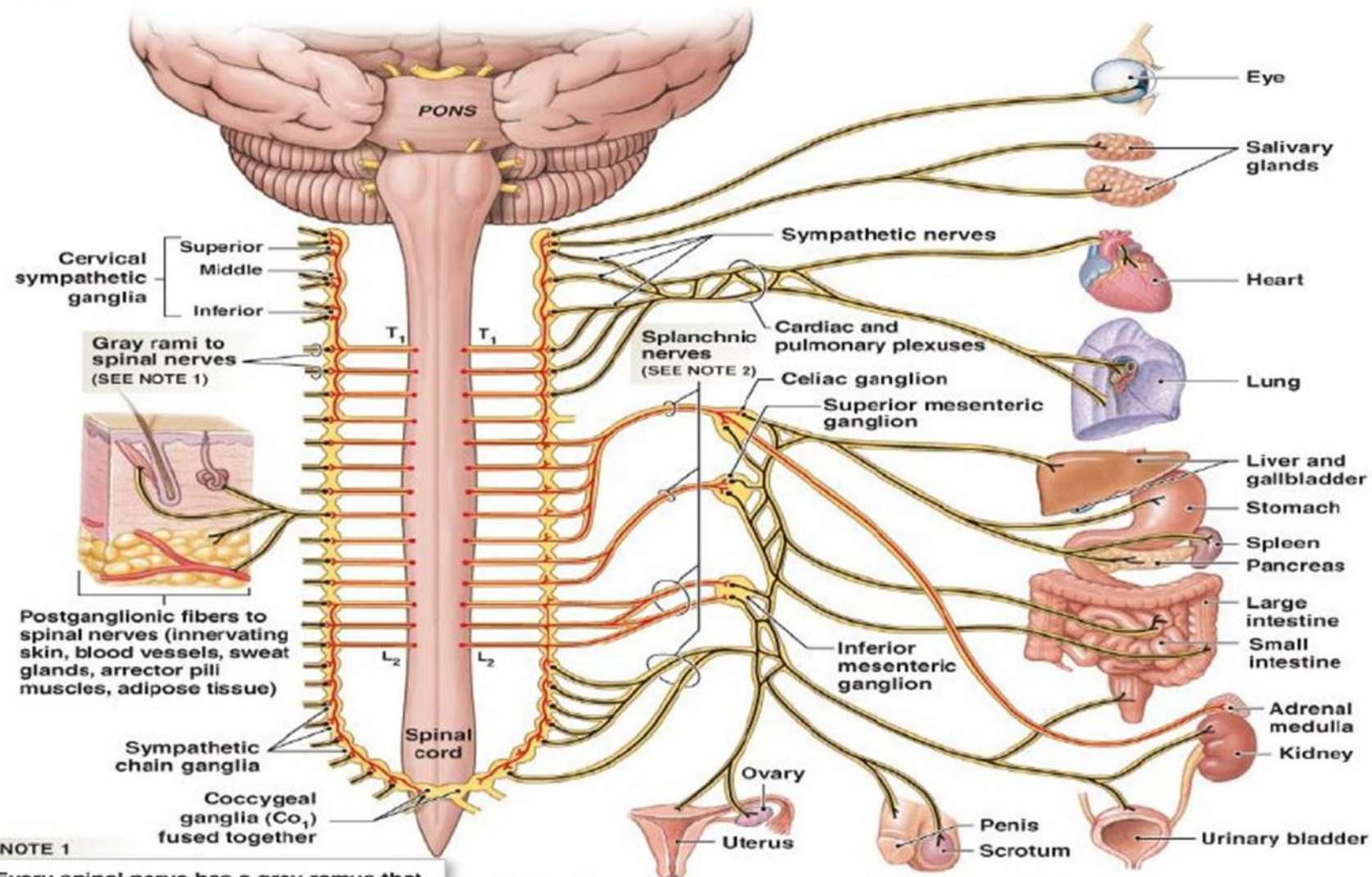
The parasympathetic NS calms (rest and digest)



The innervation of the parasympathetic division on one side of the body; the innervation on the opposite side (not shown) follows the same pattern



The innervation of the sympathetic division: at left, the distribution of nerves to the skin, skeletal muscles, and tissues of the body wall; at right, the distribution of nerves to visceral organs



NOTE 1

Every spinal nerve has a gray ramus that carries sympathetic postganglionic fibers for distribution in the body wall and limbs. In the head and neck, postganglionic sympathetic fibers leaving the superior cervical sympathetic ganglia supply the regions innervated by cranial nerves III, VII, IX, and X.

NOTE 2

Preganglionic fibers on their way to the collateral ganglia form the **splanchnic (SPLANK-nik) nerves**. Postganglionic fibers innervating structures in the thoracic cavity, such as the heart and lungs, form bundles known as **sympathetic nerves**.

KEY

— Preganglionic neurons
— Ganglionic neurons

Definitions

- **Consciousness?** Ability to maintain contact to the environment(time ,person, and place? how?

Continuous **bilateral** signals **from mid pons to both thalami**

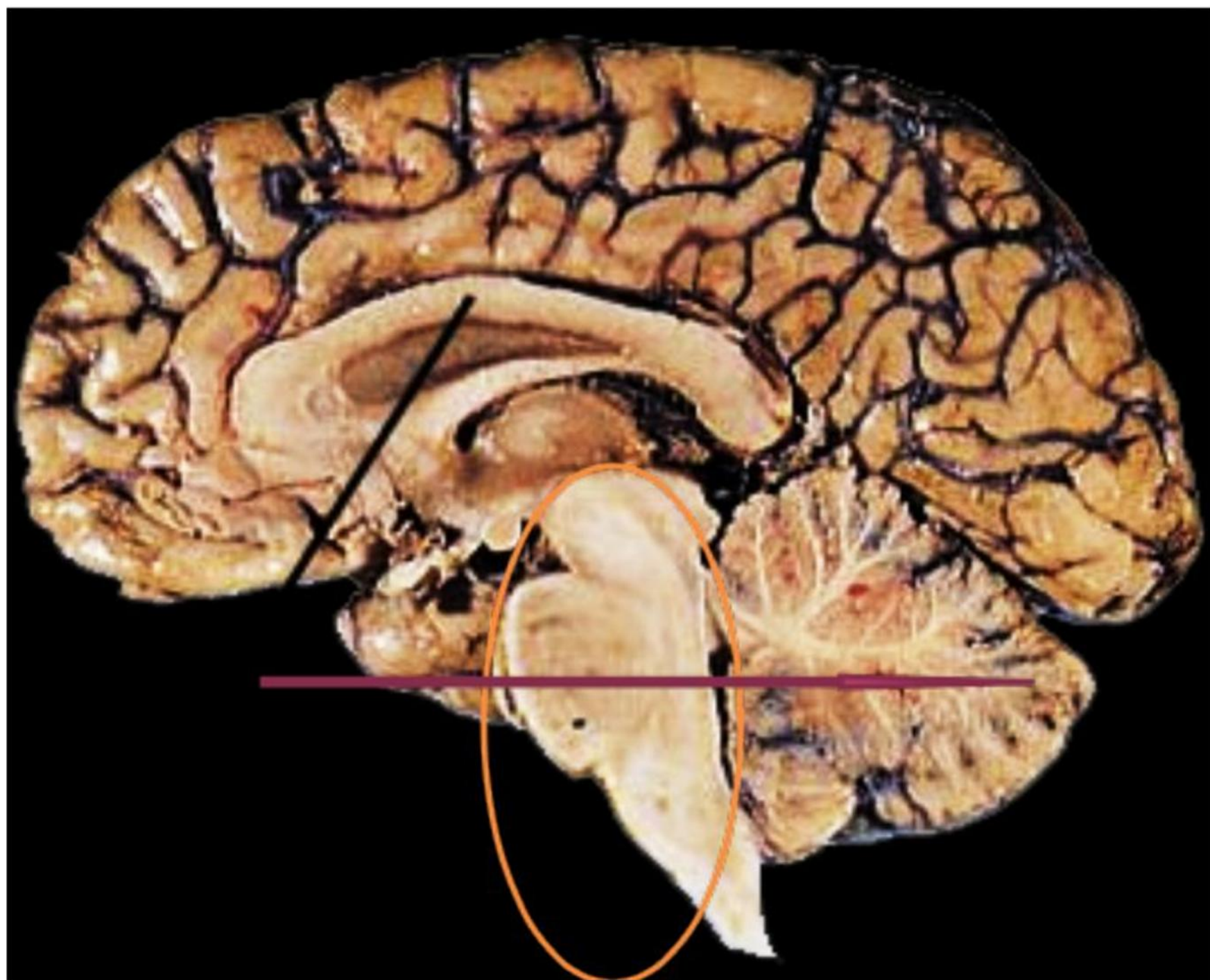
and cerebral cortices(cortex) see figure of CNS(N.S anatomy

in simple way? See figures

***(N/P unilateral lesion or below mid pons lesion----no LOC)**

- **Dizziness ?** Non specific and wide term include pre - syncope , vertigo , balance disturbance , epilepsy (you need

good history to differentiate between them).



Syncope and LOC –pathophysiology-concept

What are the elements of consciousness?

1-**Contents** ? function of cortex----lesion/disease ----
dementia

2-**Level** (wakefulness and awareness?-function of reticular activating system (RAS) in **mid pons** to the cortex ---
lesion----disturb consciousness (syncope , confusion ,
delirium , and sever one is coma).

- **Factors** we needs to maintain our consciousness?

***Blood (cardiac pump, volume, HB) , sugar ,
neural electrical signal***

- ***Can you mention some causes that lead to transient or episodic LOC due affection of these factors ?***

- If it is due to affection of cerebral perfusion CP-----
syncope

- If CP is reduced ----pre syncope symptom then syncope if

THINK LIKE A DOCTOR TO HELP OTHERS



ETIOLOGY

Syncope: Transient episodic loss of consciousness with loss of postural tone usually due to global cerebral or brain stem hypo perfusion.

1-Cardiovascular disease .

- arrhythmias (Tachy or brady as in semester 2) .
- left ventricular dysfunction .
- aortic stenosis . Murmur
- obstructive cardiomyopathy.

2-Neuro-cardiogenic causes(abnormal aut

- Vasovagal syncope (simple faint) =8-41%
- situational syncope (cough or micturitic
- carotid sinus syncope.



3-Orthostatic hypotension.=bp drop on standing from sitting or flat position

- Hypovolemia (loss of fluid or blood) .

Differential Diagnosis = Syncope Like
Hypoglycemia , Seizure , Loss Of Balance ,
Anemia (After Exertion).

Clinical types and scenarios of presentations? How we can solve the problem and reach diagnosis-group discussion.

--**History(pt. or witness)** : listen and ask about premonitory S. and triggers ,unconscious period and recovery period these will give you hint about diagnosis.

Ask about recurrence? previous health ? diet? Drugs? Any fluid loss (diarrhea) or blood loss(bleeding)? Menstruation? stress related? family history-----e ct

--**Examination** ;check the patient for relevant signs.

--**Investigate to confirm or rule out a cause.**

--**Treatment.**

- if the patient have diabetes and unconscious , he have hypoglycemia , and we should deal with hypoglycemia first before stroke (brain) and die

Clinical types of syncope

Case1 : A 32 years old Iraqi man with recurrent attacks of LOC with full recovery, not related to position; it is brief for less than one minute.

Is it syncope? Type ? Cause? Discussion---

Initial Qs and additional information? Q&A

- *Is it preceded by feeling of palpitation as pt. describes (pt.: yes) ; * any involuntary movement during falling (pt.: no).**
- *you had any history of blood loss or fluid loss(Pt.; no),***
- any drug intake or *missing meals(pt: no)**

Initial Diagnosis?

Cardiac syncope

Neural mediated –Vasovagal or hypotension syncope

Psychogenic S.

Neurological disease or seizure

It is? -----cardiac ? Then you should think about probable cardiac cause (see etiology of cardiac syncope)

- So you need Subsequent Qs to ask again to rule out or confirm certain causes, This is the aim of module(think about causes of arrhythmia)**

Ex1: If there is history of fluid loss , anorexia , thyroid problem the cause will be electrolyte disturbance most likely hypokalemia causing arrhythmia ? Stress related syncope (panic)?missing meals in hypoglycemia ? All negatives.

Ex2: Or history of deafness/ family history of Arrhythmias or sudden death(patient answer : yes yes ?Make diagnosis at this stage???)

A: congenital prolonged QT syndrome ?

Then think about causes of prolonged QT syndrome?

Questions you should ask? Same as above additional information

- acquired causes as certain drugs(antipsychotic ,anti diabetes drugs) ,or electrolytes disturbance(magnesium and K+); low K+ as in thyroid problem , diarrhea ,and anorexia**
- Inherited as in our cause ? Ask History of deafness/ family history of Arrhythmias or sudden death(patient : yes ,yes)**

How you investigate this case

***To confirm the main problem 1st ?

Ex: Cardiac syncope ?

A/ **ECG , ambulatory ECG to confirm arrhythmia**

***Then search the cause or rule out some(see etiology)

A/ **ECG to see features of prolonged QT interval & echocardiogram to exclude structural heart lesions in Ex.2. (prolonged QT syndrome) and Serum K⁺ level in Ex.1(case of fluid loss)**

In certain cases you should perform Blood sugar to rule out hypoglycemia ?? HB , blood picture to rule out anemia and EEG to rule out seizure. NEXT SLIDES.

Confirmatory test in congenital prolonged QT syndrome?

Genetic test –Autosomal or recessive Inheritance(semester 2) .

-ECG not always give the rythem , maybe the rhythm is متقطع and maybe change
So we can see the result on ECG only when attack ,
-So we use (hallter ECG) its continuos ECG paper (result)

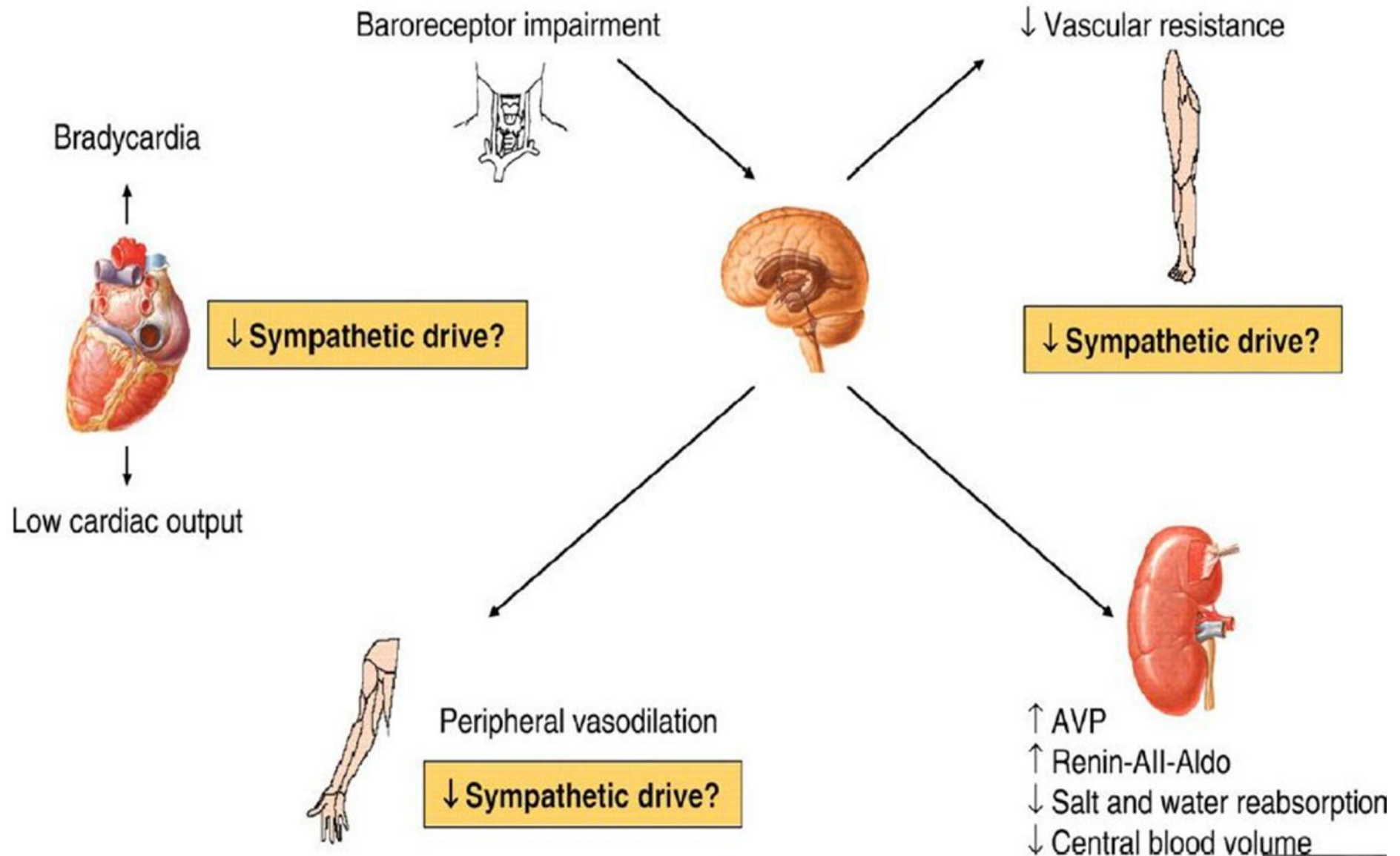
Neuro-cardiac Syncope-Vasovagal

- **Case 2** : A 20 years old medical student in his 2nd year class ;while he standing in the clinical session watching his 1st anatomy lab. , felt down on the ground suddenly ?
- Good Questions you should ask? Same in C. syncope.
- You have to ask about Premonitory symptom and triggers, blackout period , and recovery.
- Additional information were asking about out any H/O blood loss* ,drug intake* or missing meals* ,any involuntary movement* and Family history*? (Group discussion)
- A/ He was in standing for long time* , emotional factors (emotionless standing) ,then He developed nausea , pallor and sweating then fell down with slow recovery ,his pulse was slow in black out period .
- Questions ? No blood or fluid loss , no drug intake

Mechanism Bezold-jarisch Reflex (Mechanism of VVS)

- Mechanism of Vasovagal S. ? Decrease venous return to the heart(prolonged standing) -sympathetic stimulation as compensatory mechanism –abnormal contraction of under filled V. lead to tachycardia then, there is stimulation of cardiac mechanoreceptor lead to stimulation of parasympathetic mediated via Vagus nerve result in hypotension (vasodepressor response) and bradycardia (cardiac inhibitory response) making diagnosis of VVS.(in physiology)
- This is called Bezold-Jarisch reflex

Overview of the alterations in vasovagal syncope

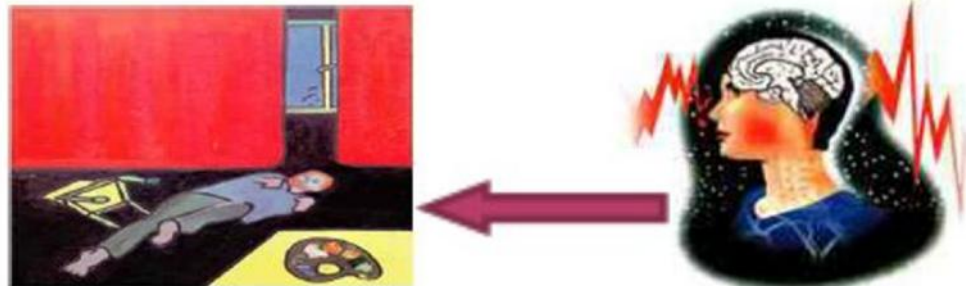


Vasovagal Syncope =VVS

- Seen in all age , commonest type of S. .
- Triggers: **prolonged standing** specially **emotionless state** , pain , sight of blood ,medical instrumentations and excess of heat exposure.
- Position ; standing .
- Premonitory S. –sweating ,pallor , dizziness , blurred vision , tachycardia (**sympathetic stim. 1st**).
- Unconscious period : **brief LOC with drop of BP** , bradycardia (parasympathetic effect).
- Recovery; rapid when assuming horizontal position with headache.
- Investigations? Head tilt test----provocative test for Vasovagal response ;pt connected to ECG and BP tool the head of table elevated 60-70 degree **for 45 min.**

DD –syncope like --important مهم

- **Anemia** ; loss of conscious seen in ^{جهد} exertion ,see pallor in examination and HB is low in blood test.
- **Hypoglycemia** : missing meal , poor diet intake , over dose of insulin in DM patient , slowly evolving (pallor, sweating , tachycardia for longer period than that in VVS. Blood sugar is low , response to sweets or hypertonic fluid infusion.
- Is it syncope? A/ We call it blackout(wide term) not syncope?
- **Seizure** ? abnormal excessive hyper neuronal discharge



Case 3

- A 34 years old man presented to emergency with **recurrent loss of consciousness at** his work and brought by his friend to hospital who mentioned that **all of sudden**, he collapsed on the ground **with spasm** all over and **abnormal movement sound and tongue bite** ;the **symptoms** subsided within **2-3 minutes** and **his cons recovered after 60 minutes** ;he was oriented but **with sever headache** and **minimal deficit on right side**.

- Questions you ask as before? blood loss ,drug intake, missing meal, stress related---**all negative**

- Is it syncope ? What is most likely diagnosis?

- Diagnosis ? Which one is true?

1-EEG, CT or/ and MRI

2-ECG , Blood sugar , blood film

Other types of syncope



- Situational(cough , micturition S.)
- Carotid Sinus Syncope
- Orthostatic Hypotension.=sudden drop of BP on standing from static posture.
(cause many like drug ,fluid or blood loss ,Varicose vein(polling of blood in legs up on standing) and autonomic dysfunction as in DM)
- Neurological Diseases Like TIA =Transient Ischemic Attack or stroke.

THANKS