AN APPROACH TO DIFFERENT OCULAR MOTILITY DISORDERS

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Hôpitaux de Lyon

Lyon 1

Disclosure

- None related to the teaching course

Need for eye movements

- Eye movements serve to compensate for constraints of organisation of the visual system
  - 1rst constraint: binocular frontal vision ⇒ need to align the eye axis and move the eye together
  - 2nd constraint: development of foveal vision (tubular) ⇒ need to make rapid eye movements for multiple fixation
    - Saccades, vergence
  - 3rd constraint: need for retinal stability during period of fixations ⇒ (slow) stabilisation eye movements
    - Fixation
    - Smooth pursuit (SP)
    - Vestibulo-ocular reflex (VOR)

Ocular motor disorders

- Peripheral ocular motor palsy and *diplopia*
- Central ocular motor palsy and *gaze palsy*
- Deficit of ocular stability: nystagmus, saccadic intrusions and *oscillopsia*
- Deficit in slow eye movements (asymptomatic)

Learning objectives

- Revisit the peripheral and central organisation of eye movements
- Steps of ocular motor examination in case of diplopia
- How to examine central ocular motor deficit
- Which type of different ocular motor instability can be observed
- How to examine asymptomatic slow eye movements

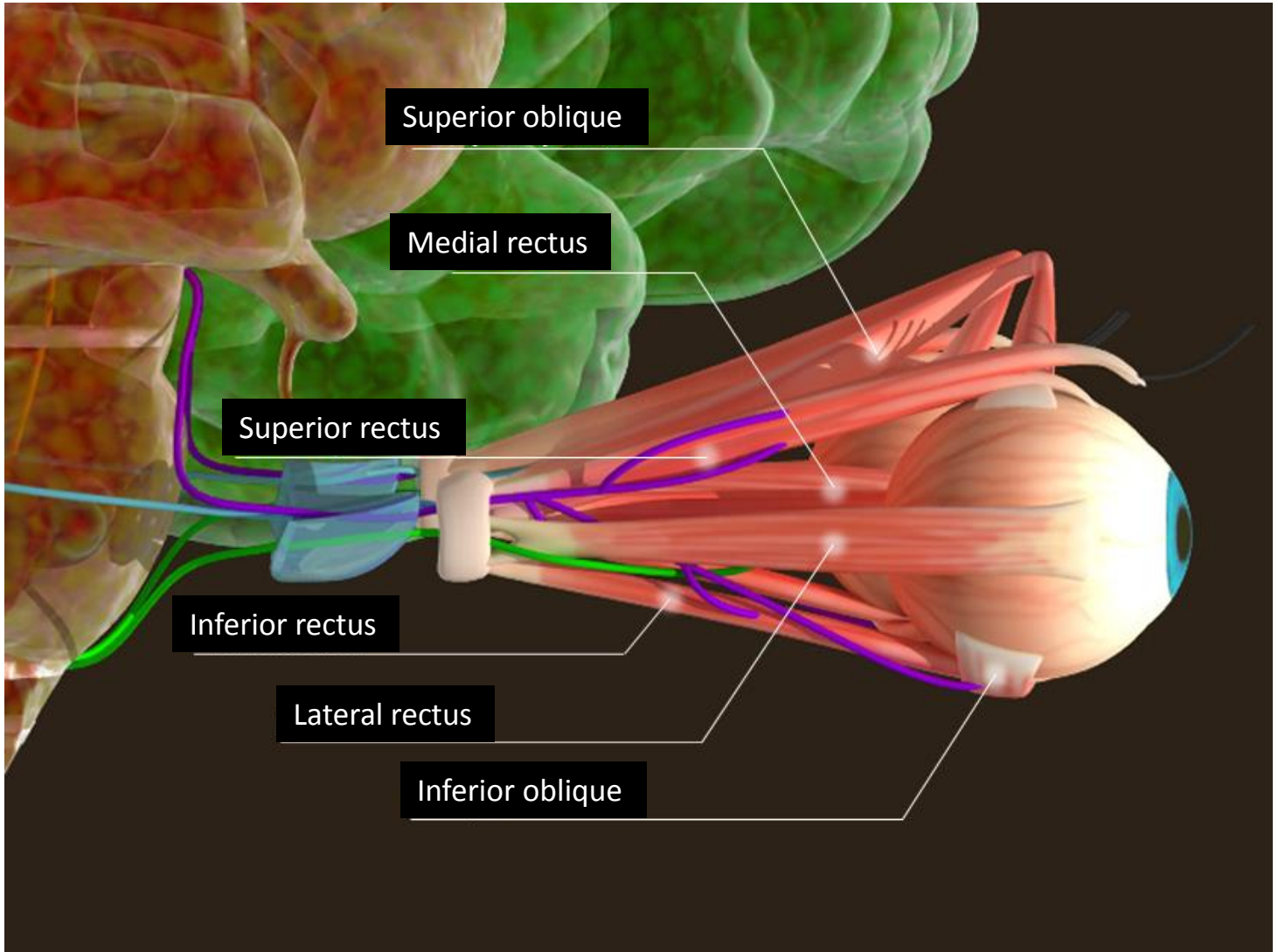
Key messages

- In case of diplopia
  - Search for the involved muscle
  - Test version and vergence in case of adduction palsy
- In case of gaze palsy
  - Check rapid (saccades) and slow (Smooth Pursuit, Oculocephalic reflex) eye movements
- In case of oscillopsia
  - Check ocular fixation and head impulse test
- Don’t forget Oculocephalic reflex inhibition
  - in systematic examination of slow eye movements

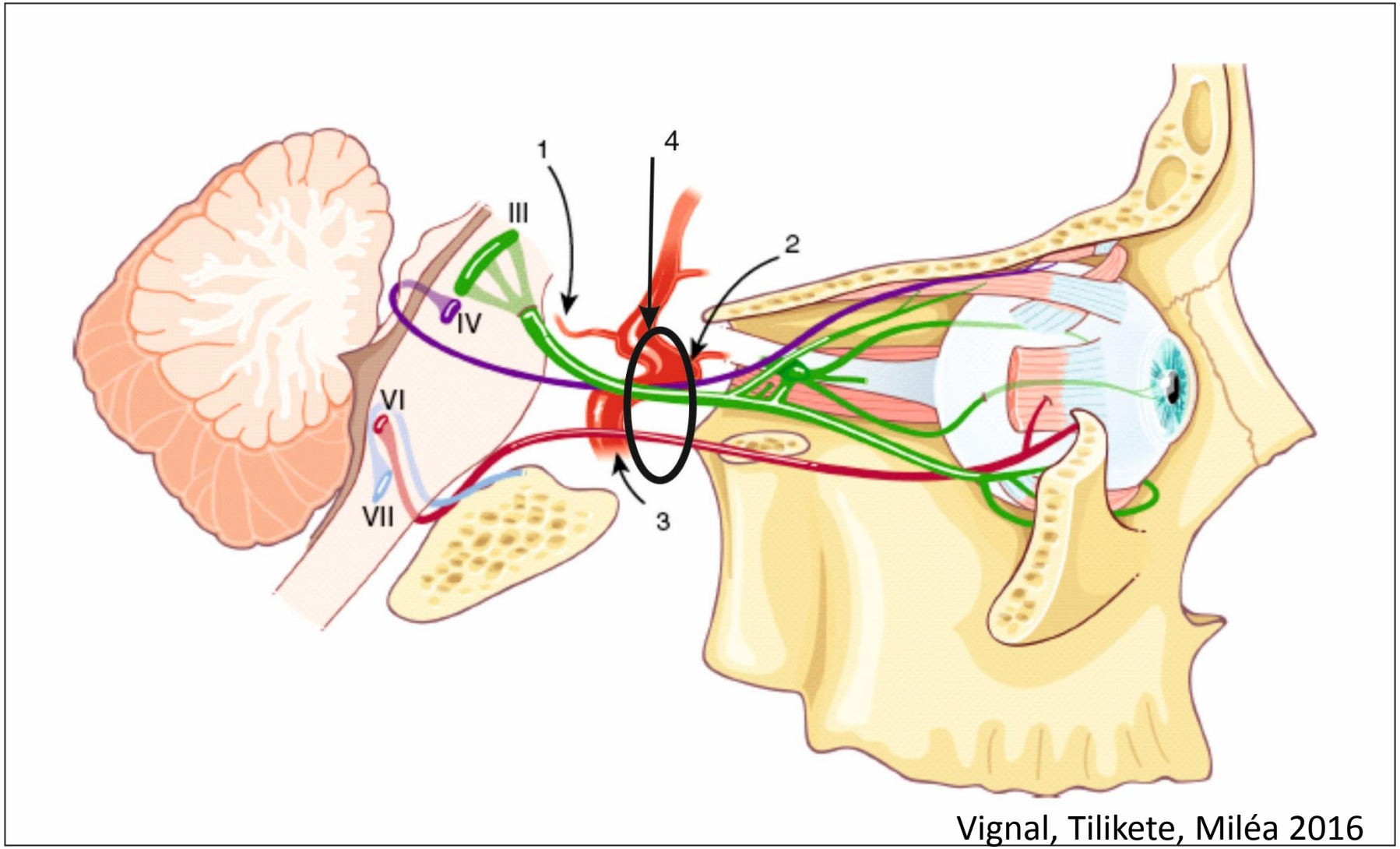
Plan

- Some basic knowledge
- Diplopia and peripheral ocular motor deficit
- Gaze palsy and central ocular motor deficit
- Oscillopsia and nystagmus / other abnormal eye movements

Ocular muscles



Ocular motor nerves



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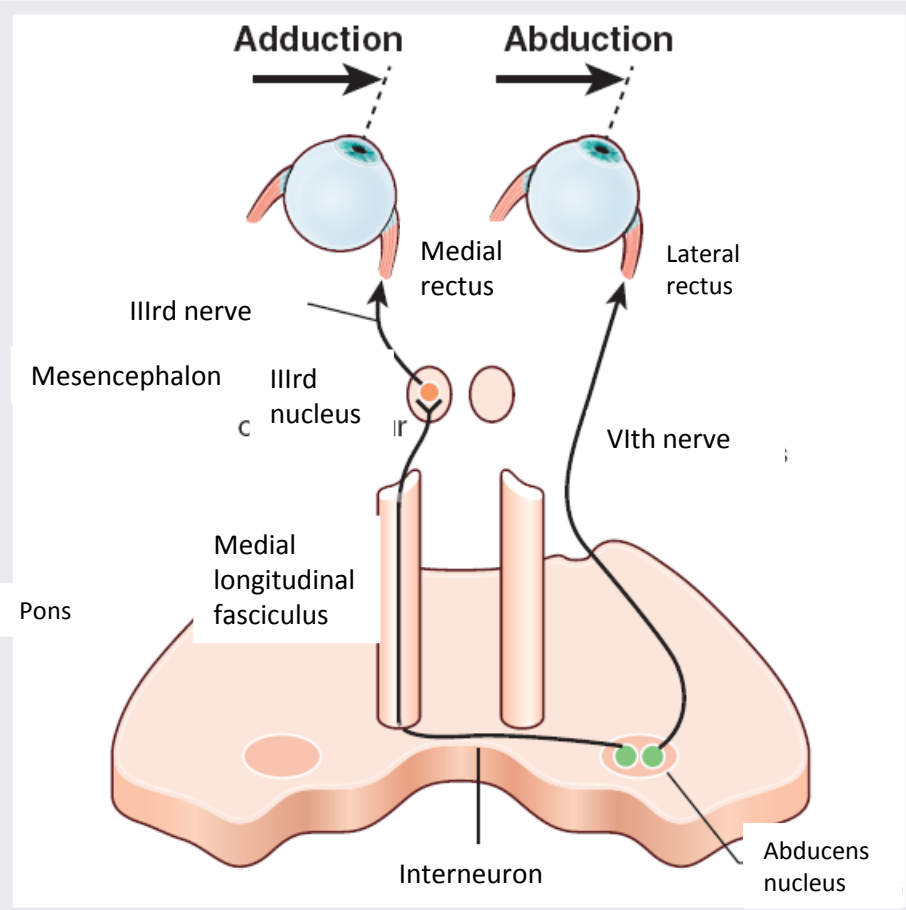
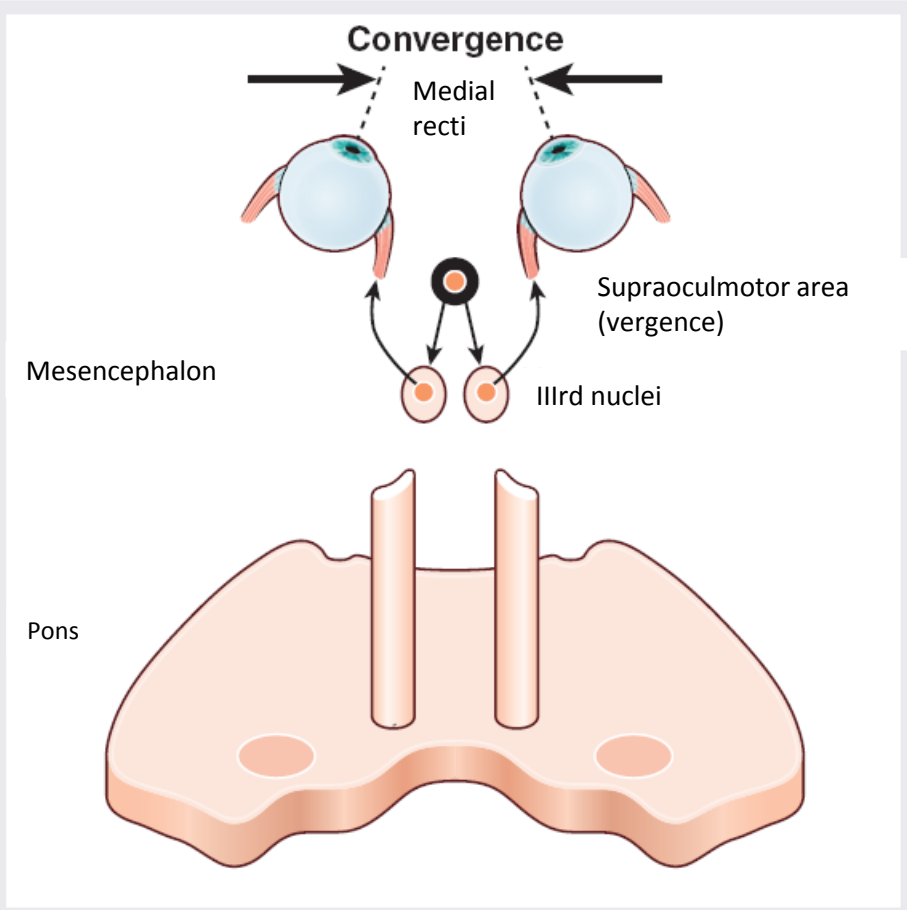
Central pathways



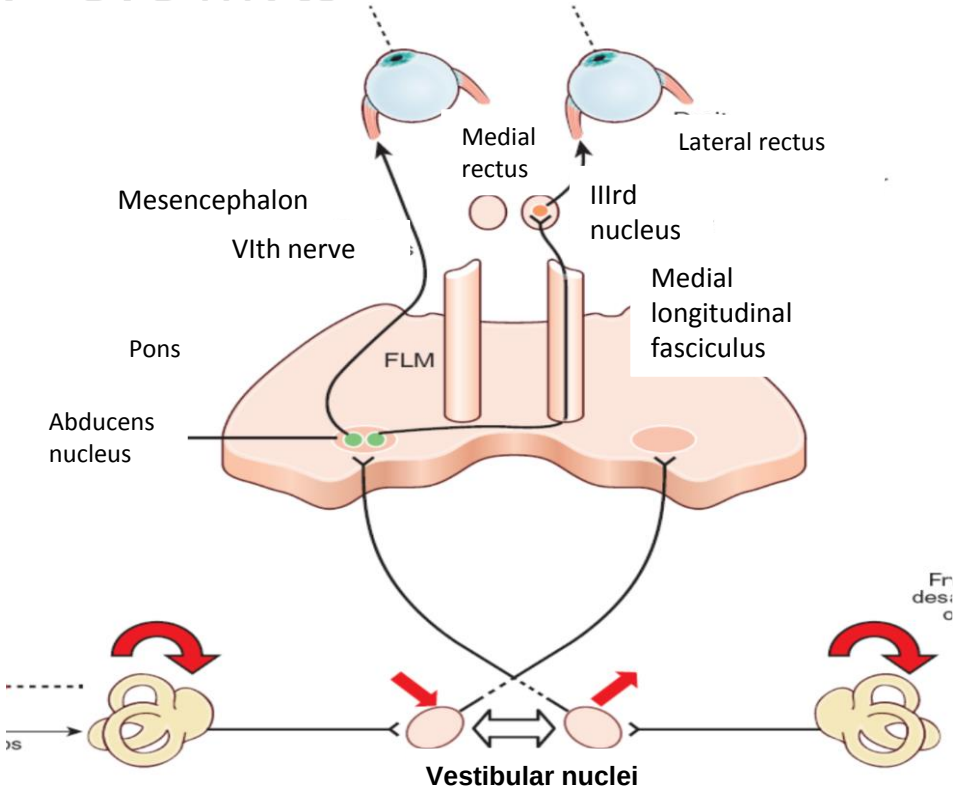
VERSION



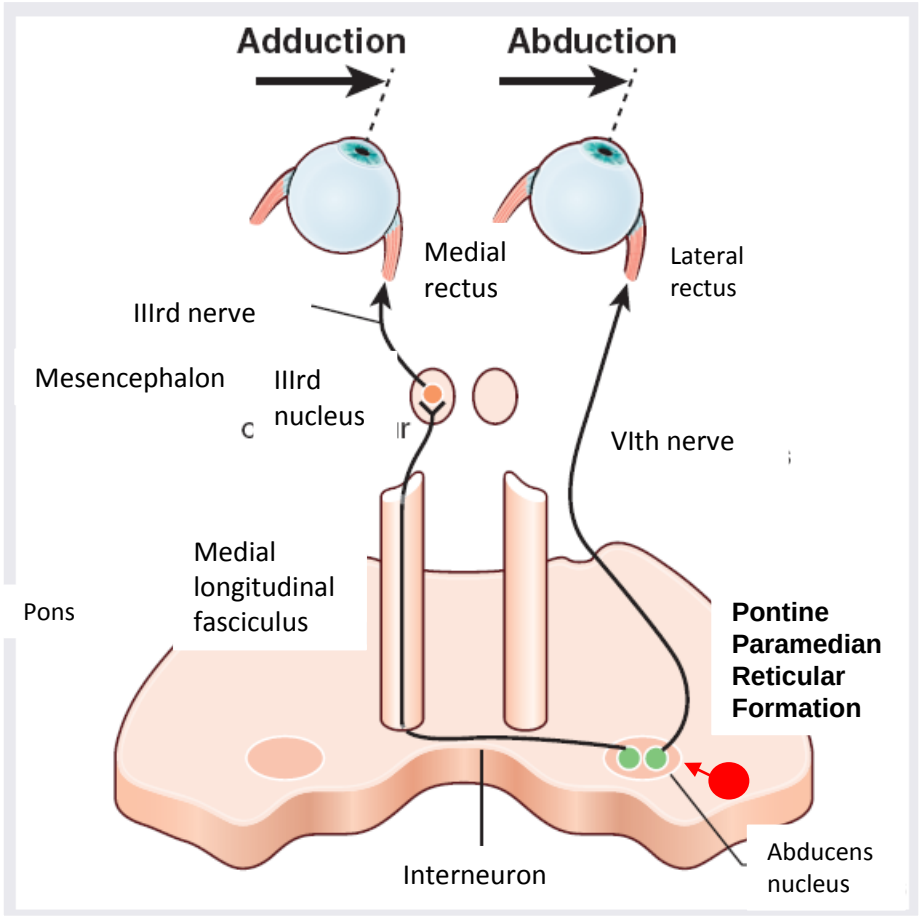
VERGENCE

Central pathways

Slow eye mvts



Saccades



1. Diplopia: which involved muscle(s)?

- 1st step:
  - observation of manifest ocular deviation (or strabismus) in primary position of gaze
  - assessing the amplitude of ductions and versions

Stop here if obvious strabismus and limitation
If important limitation: forced duction test (mechanical restriction)

1. Diplopia: which involved muscle(s)

Next steps detect relative ocular deviations
(but not the paretic eye)

2nd step: test heterotropia by using the cover-uncover test (manifest ocular deviation)

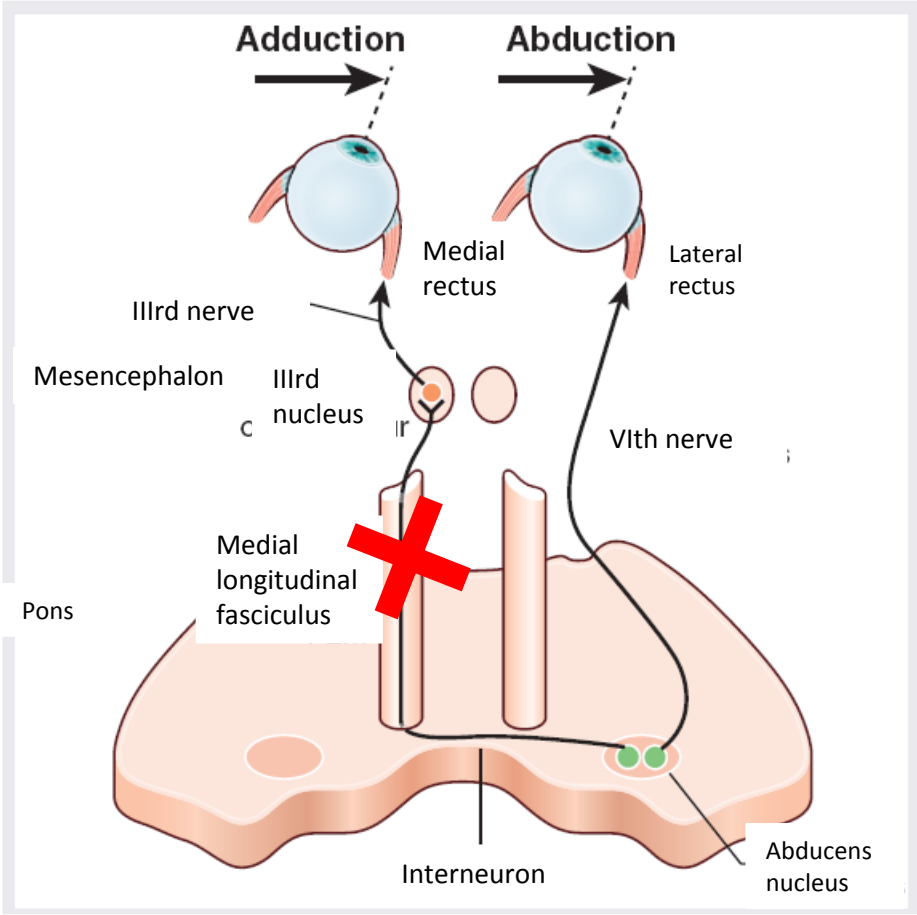
Stop here if obvious heterotropia

1. Diplopia: which involved muscle(s)

3rd step: in case of orthotropia, test heterophoria by using the cross cover test (latent ocular deviation)

1. Diplopia:
Adduction palsy: peripheral or central (INO)?

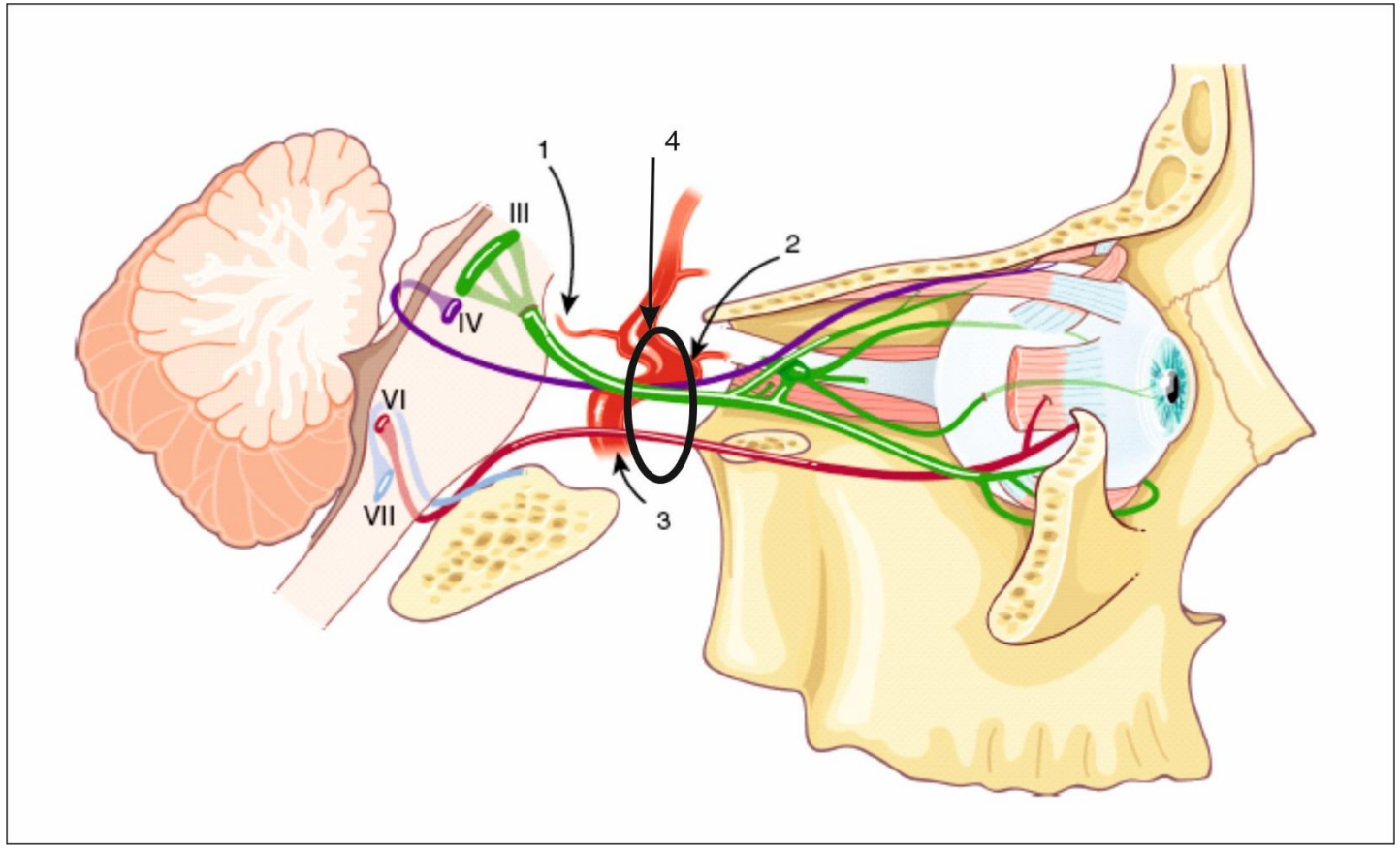
- test adduction in version and vergence
- test slow and rapid eye movements



1. Diplopia: Localize the lesion

- Muscle
- Neuro-muscular junction
- Nerve
- Central

- Congenital
- Functional



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2. Gaze palsy: peripheral or central?

Test slow and rapid eye movements

Saccades

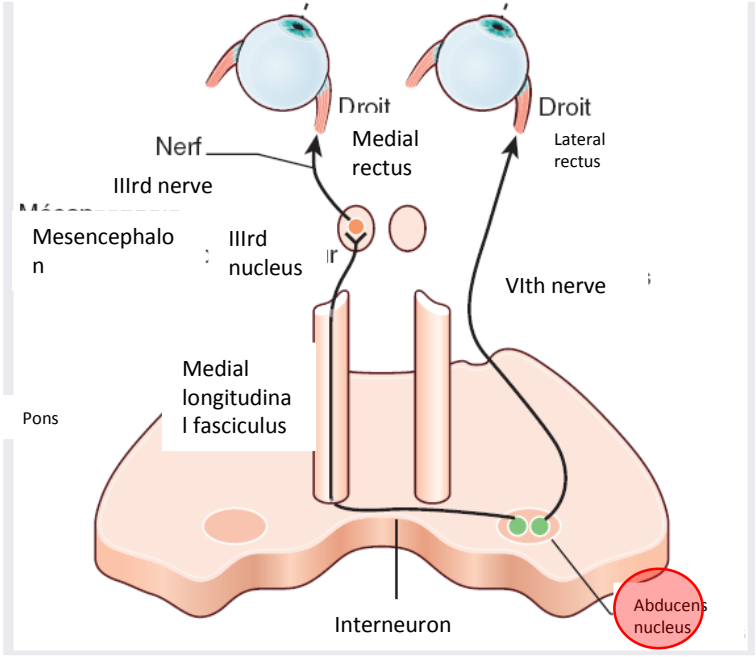
Smooth Pursuit

Oculo-cephalic reflex

Convergence

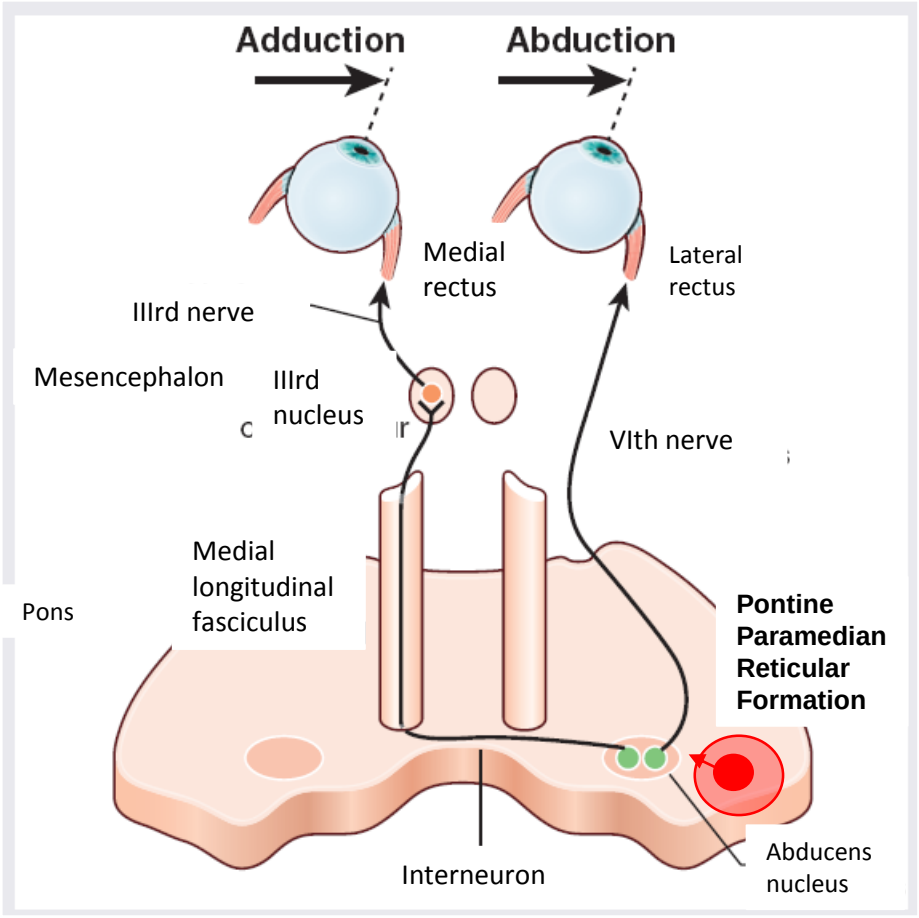
2. Gaze palsy: peripheral or central?

Abducens nucleus syndrome



2. Gaze palsy: peripheral or central?

Supranuclear horizontal palsy



2. Gaze palsy: peripheral or central?

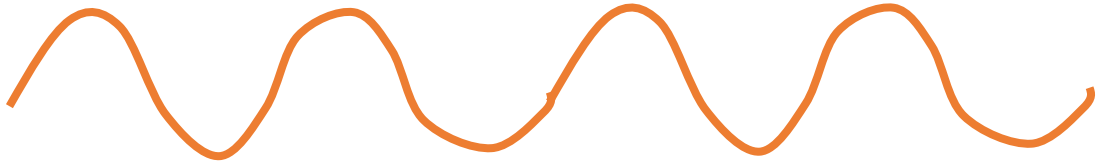
- Supranuclear vertical palsy

3. Spontaneous oscillopsia: ocular instability?

NYSTAGMUS

- Regular to and fro movement of the eye, initiated by a slow phase

Jerk nystagmus



Pendular nystagmus

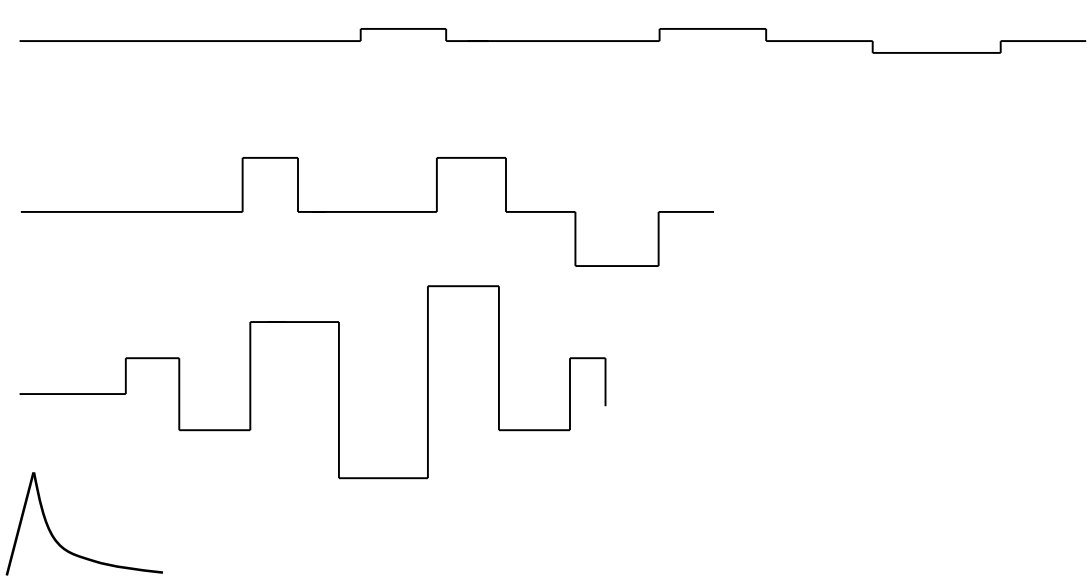
3. Spontaneous oscillopsia: ocular instability?

Jerk or pendular nystagmus?

3. Spontaneous oscillopsia: ocular instability?

SACCADIC INTRUSION

- With intersaccadic latency (200 msec)
  - Square waves
  - Macro square waves
  - Macrosaccadic oscillations
  - Saccadic pulse



3. Spontaneous oscillopsia: ocular instability?

SACCADIC INTRUSION

- With intersaccadic latency (200 msec)
  - Square waves
  - Macro square waves
  - Macrosaccadic oscillations

3. Spontaneous oscillopsia: ocular instability?

SACCADIC INTRUSION

- Without intersaccadic latency
    - Flutter
    - Opsoclonus

3. Oscillopsia during head movements: VOR deficit?

test VOR during head impulse test

4. Systematic slow eye movement examination

test oculocephalic reflex, smooth pursuit, and OCR inhibition

References

- Leigh & Zee. The neurology of Eye Movement. 5ed. New Yord: Oxford University Press. 2015
- Lemos J, Eggenberger E. Saccadic intrusions: review and update. Current opinion in neurology (2013) 26(1):59-66.
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