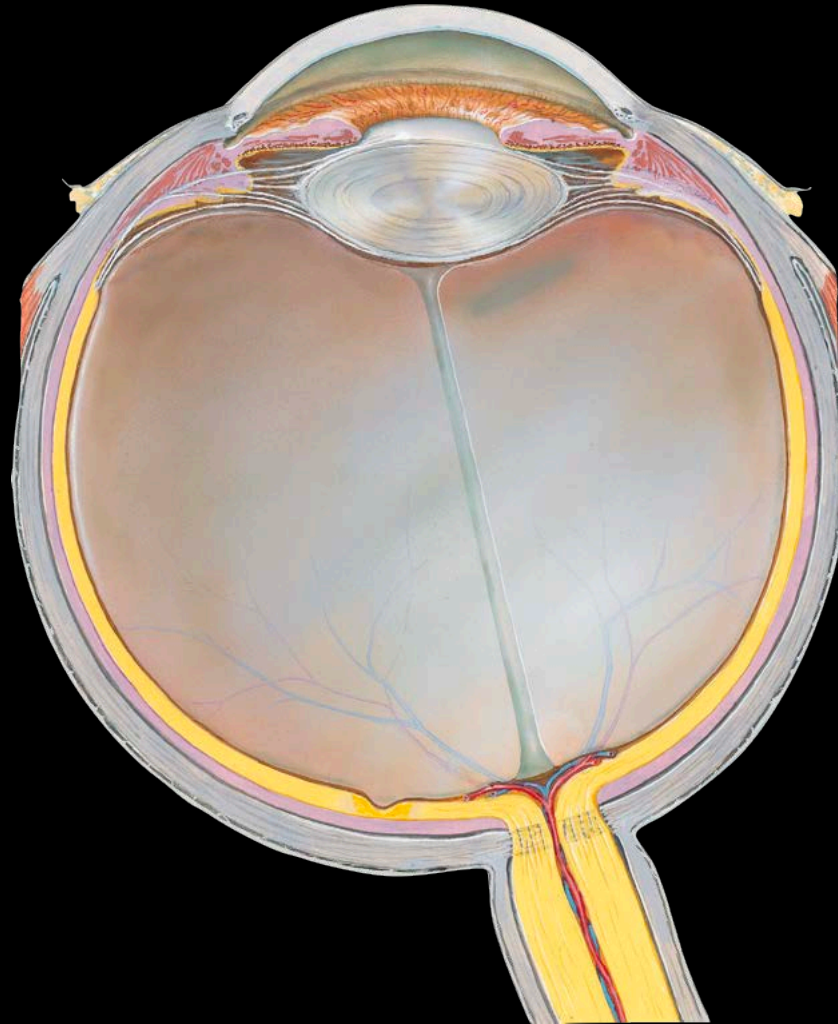


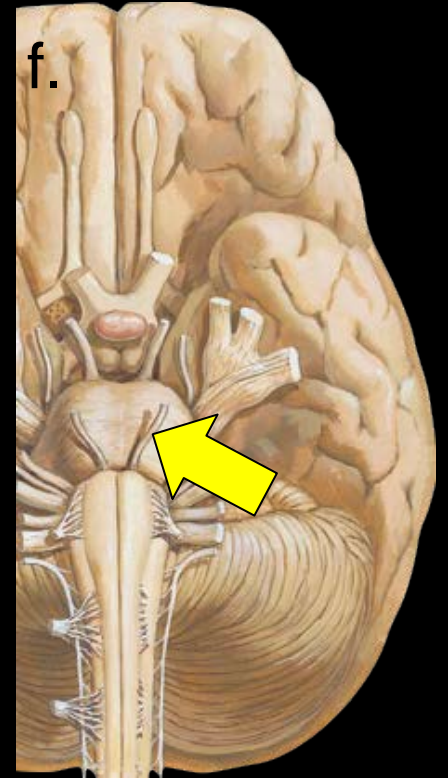
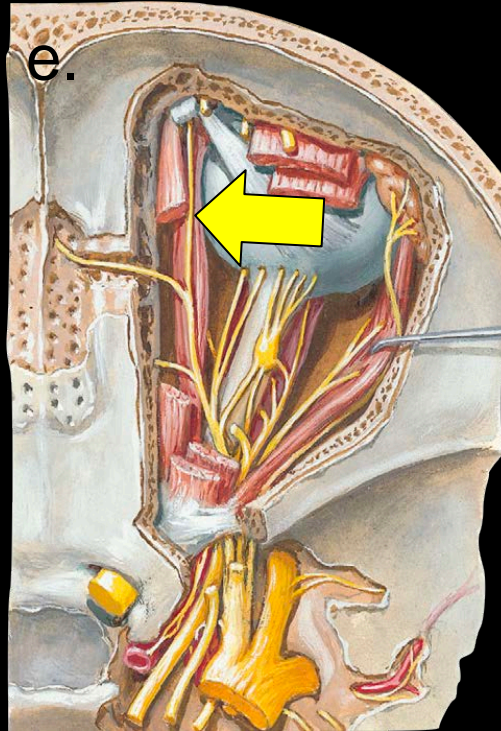
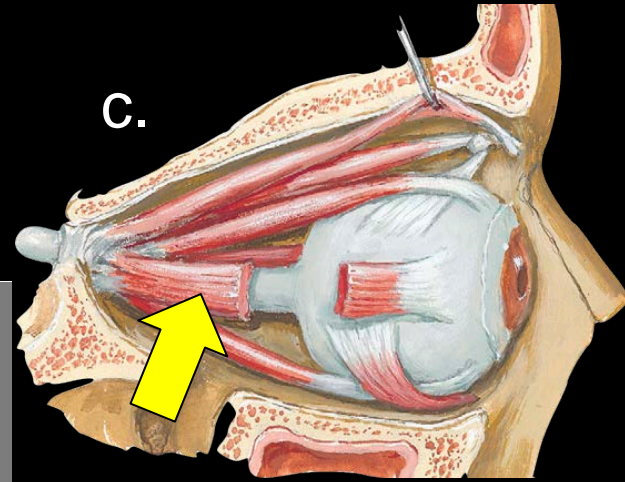
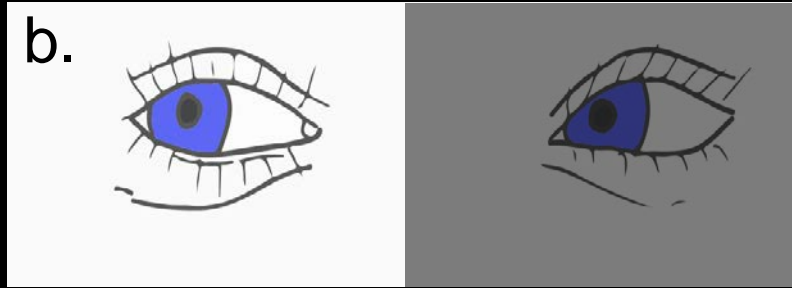
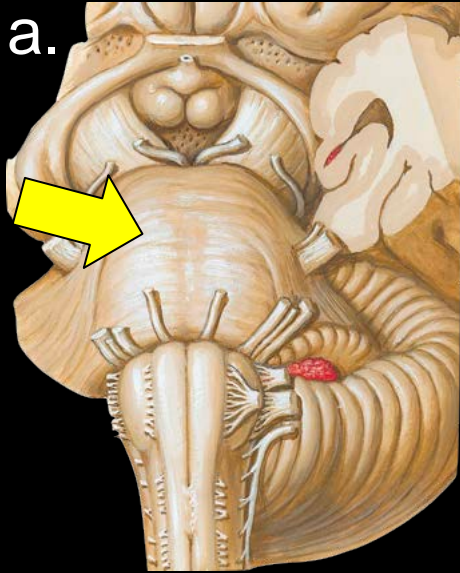
# Orbit Practice Problems



David A. Morton, Ph.D.  
Department of Neurobiology and Anatomy

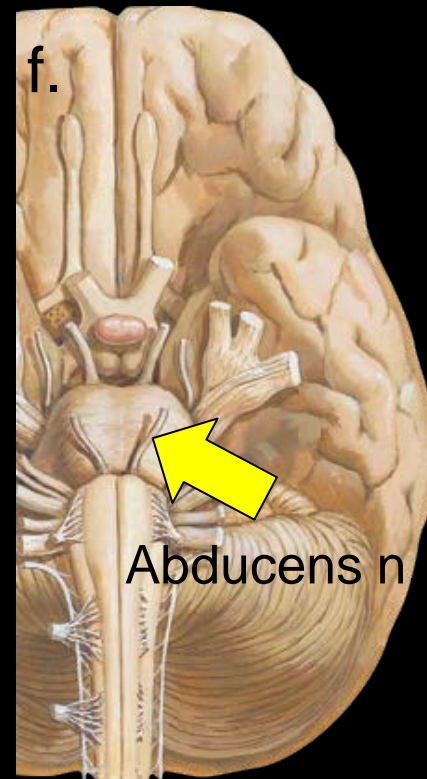
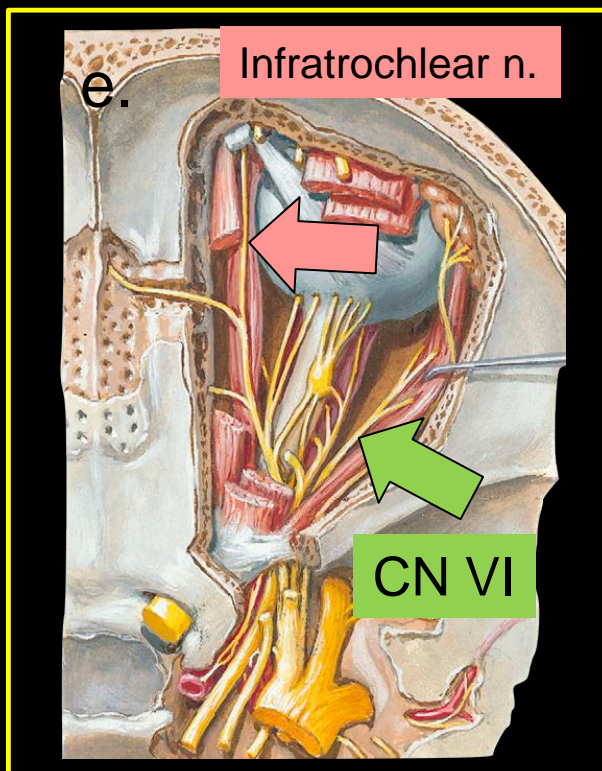
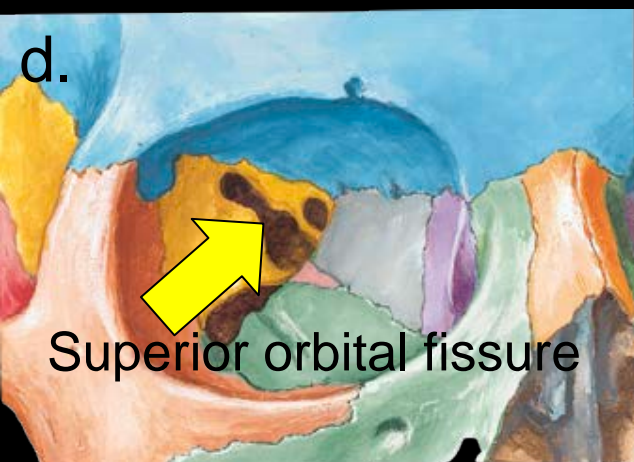
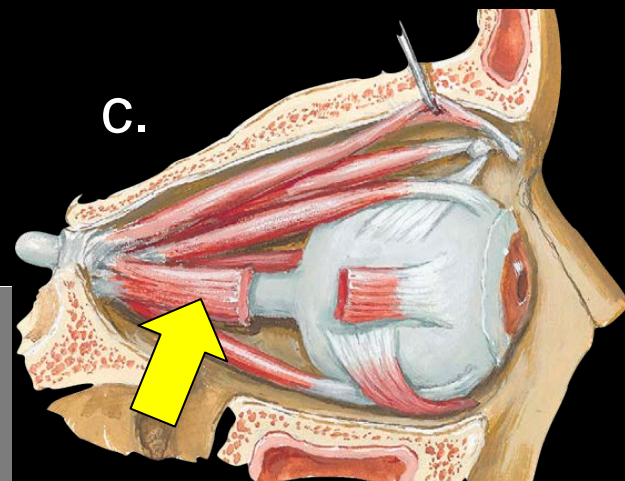
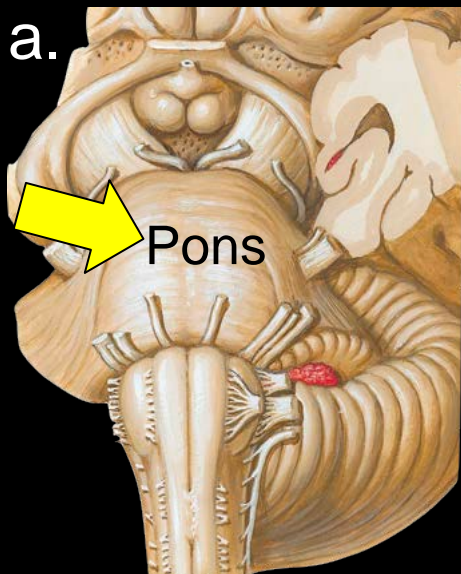


One of these things is not like the other





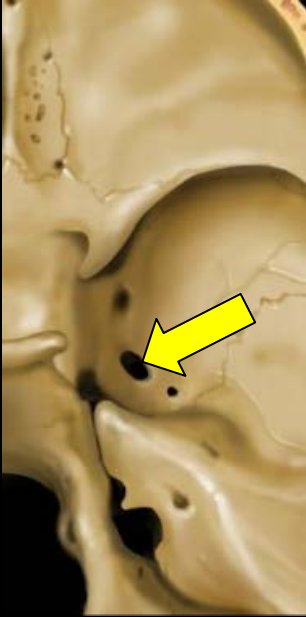
One of these things is not like the other





Match the letter with the number

a.



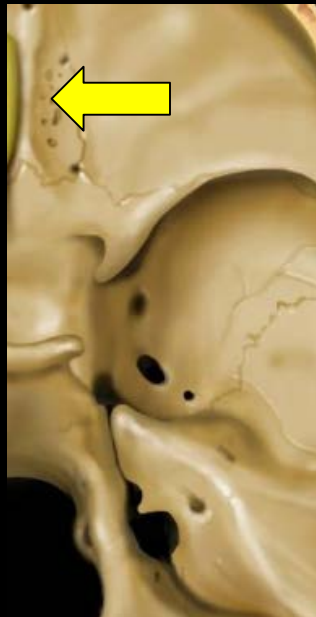
b.



c.



d.



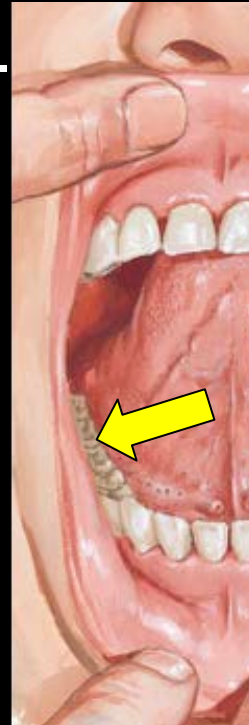
i.



ii.



iii.

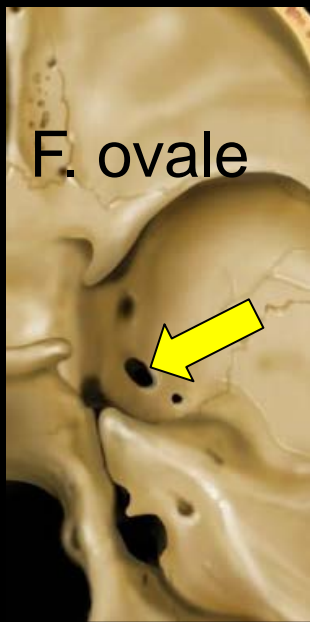


iv.

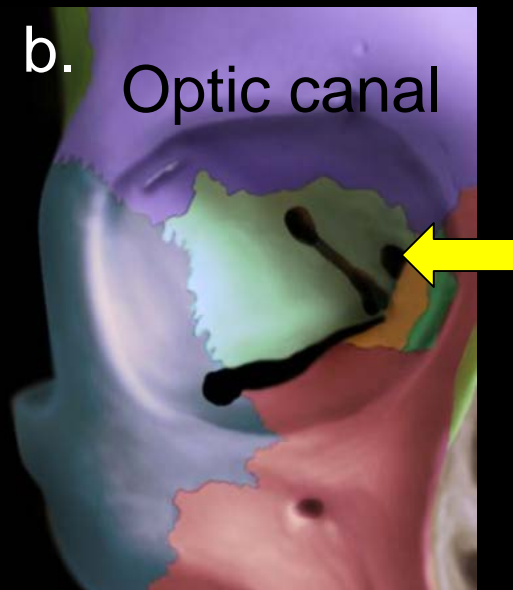




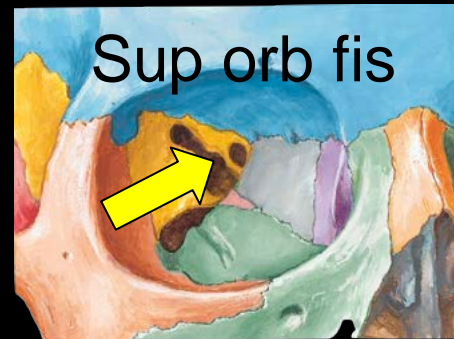
a.



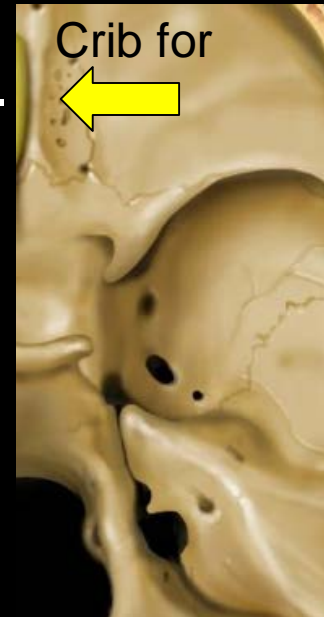
b.



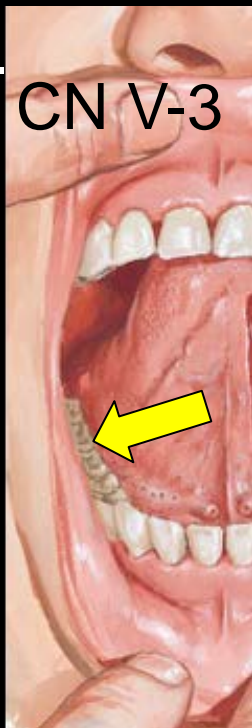
c.



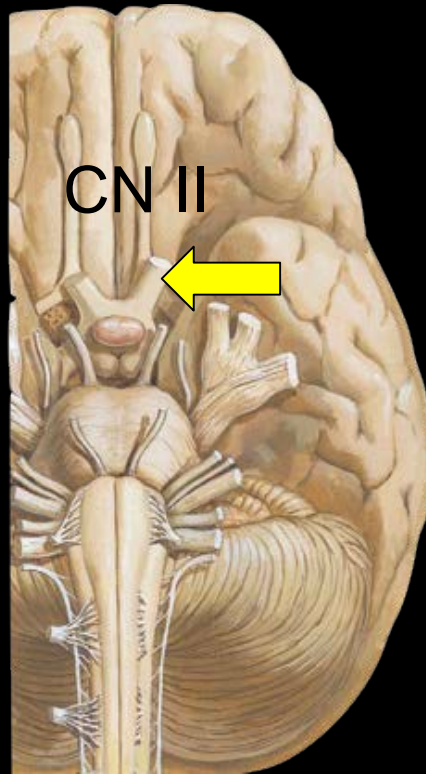
d.



iii.



iv.



i.





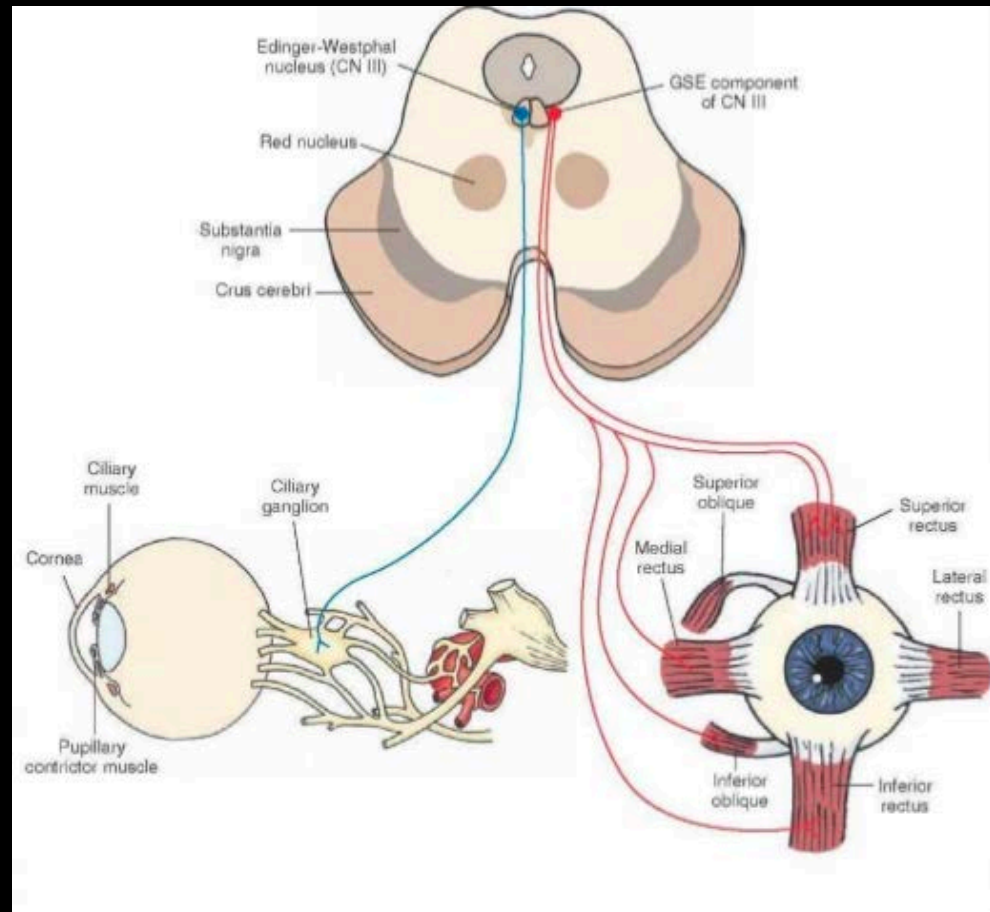


The oculomotor nerve innervates the superior rectus, levator palpebrae superioris and:

- A. Inferior rectus muscle
- B. Lateral rectus muscle
- C. Orbicularis oculi muscle
- D. Pupillary constrictor muscle
- E. Superior oblique muscle

The oculomotor nerve innervates the superior rectus, levator palpebrae superioris and:

- A. Inferior rectus muscle
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- E. Superior oblique muscle







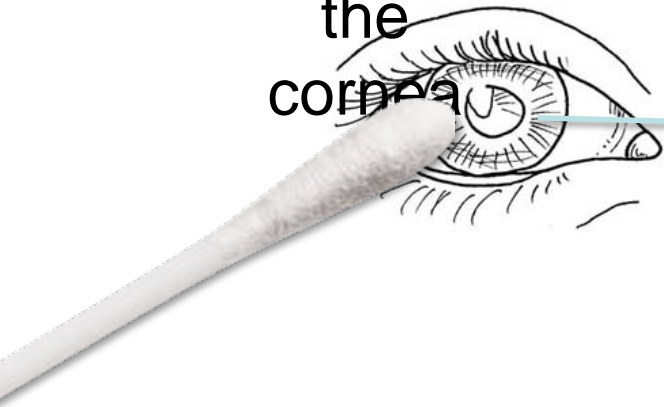
A reflex tested during a CN exam is called the corneal reflex. A patient's cornea is touched with a wisp of cotton and the patient blinks. Identify the region of the brain most likely tested by this reflex.

- A. Cerebellum
- B. Diencephalon
- C. Medulla
- D. Midbrain
- E. Pons

A reflex tested during a CN exam is called the corneal reflex. A patient's cornea is touched with a wisp of cotton and the patient blinks. Identify the region of the brain most likely tested by this reflex.

- A. Cerebellum
- B. Diencephalon
- C. Medulla
- D. Midbrain
- E. Pons

Touch  
the  
cornea

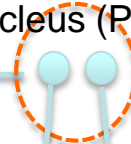


CN V-1

Semilunar  
ganglion of CN V

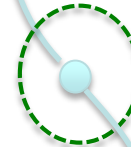


Spinal  
trigeminal  
nucleus (Pons)



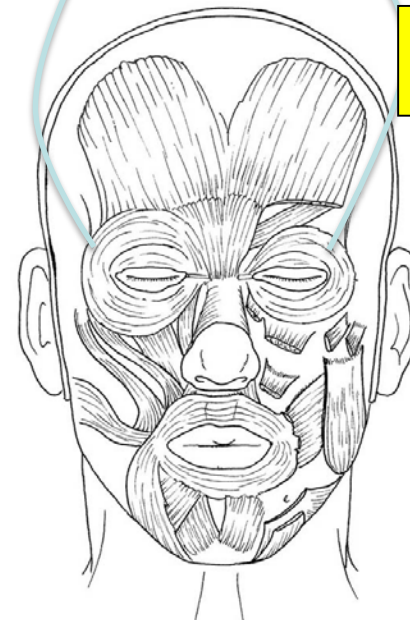
L

R



Facial motor  
nucleus

Facial nerve  
proper (CN VII)



Blink  
(Orbicularis  
occuli muscle)

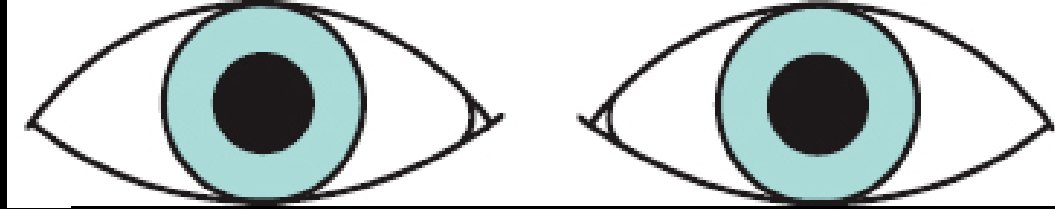
**Corneal Reflex take home  
message:**

- Sensory. CN V-1
- Brainstem level. Pons
- Motor. CN VII (facial nerve proper)
- Consensual reflex

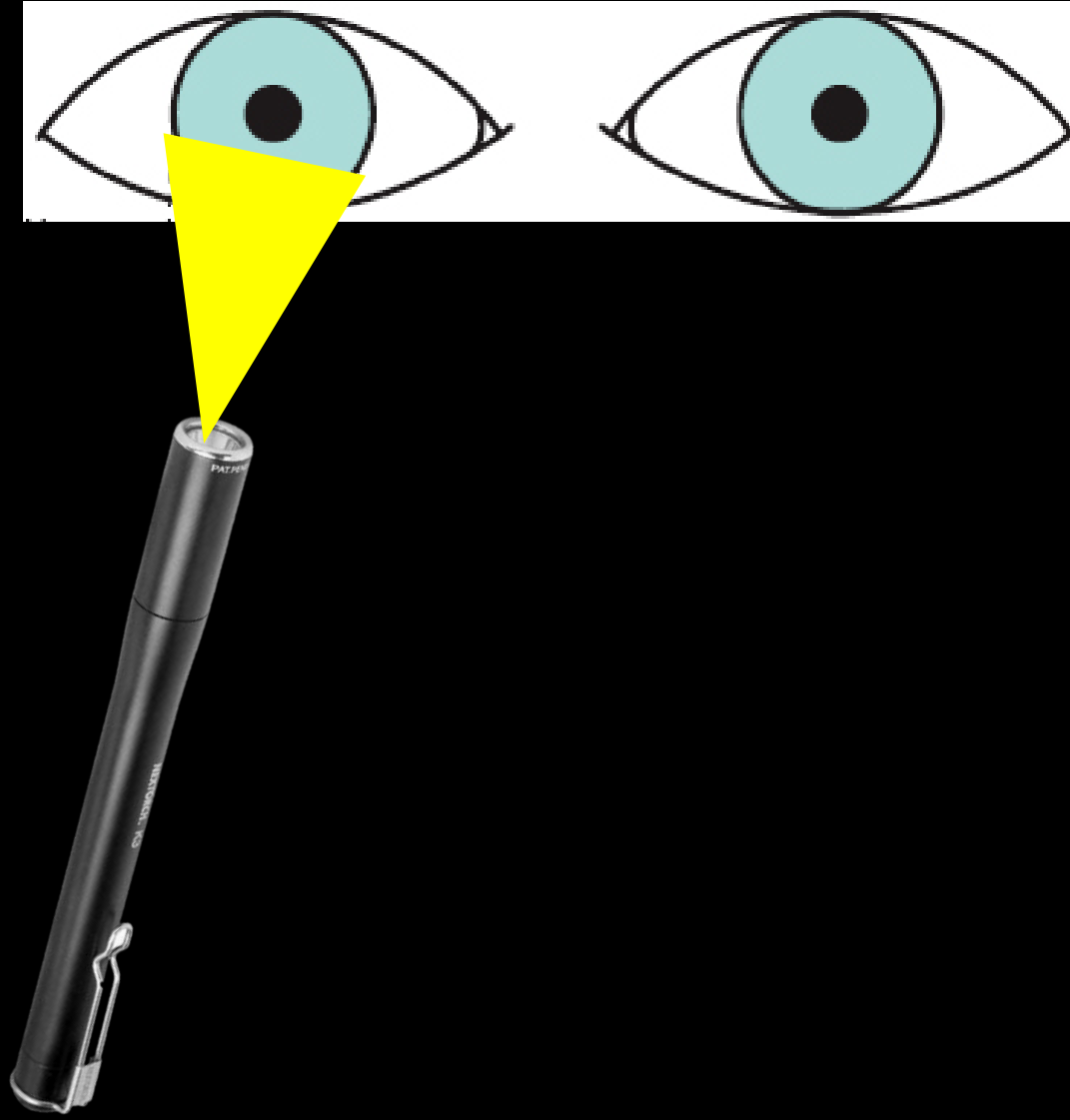




The pupillary (light) reflex is a consensual reflex because when one eye is stimulated (shine light) both pupils constrict.

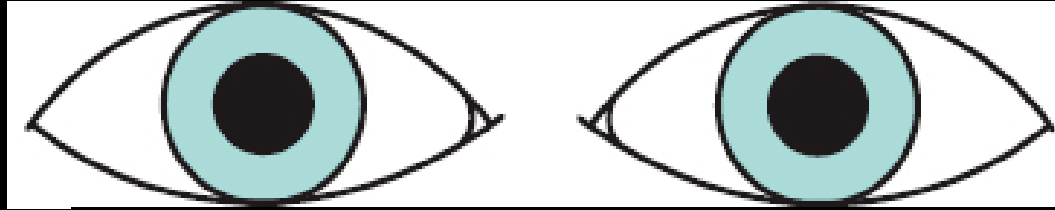


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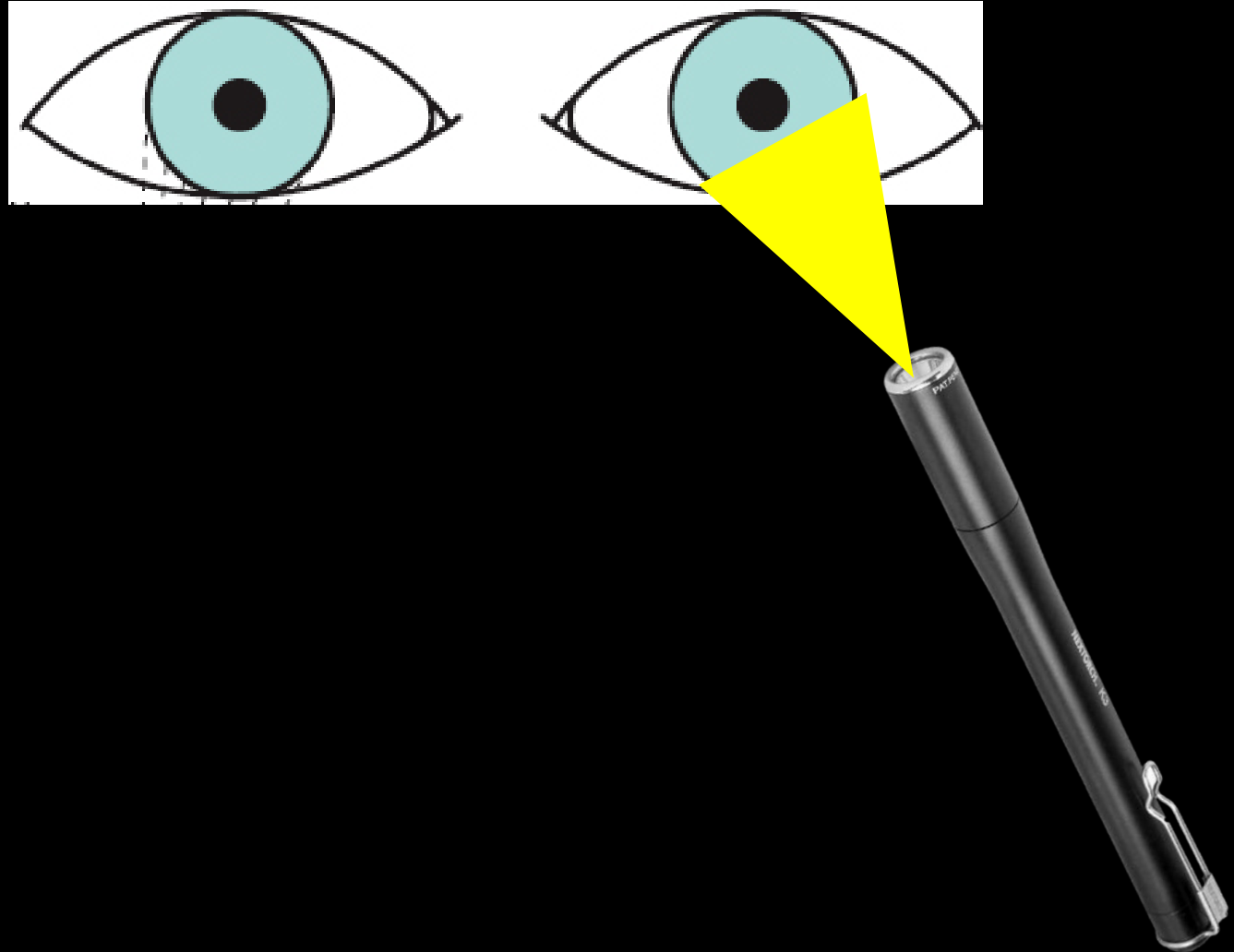




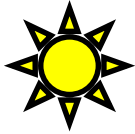
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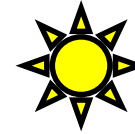
The pupillary (light) reflex is a consensual reflex because when one eye is stimulated (shine light) both pupils constrict.



Pupillary reflex on patient A reveals the following:



Left Pupil	Right Pupil
<b>Pupil constriction</b>	<b>Pupil constriction</b>

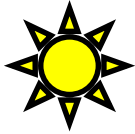


Left pupil	Right pupil
<b>No pupil constriction</b>	<b>No pupil constriction</b>

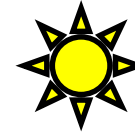
A lesion of which of the following nerves would most likely explain this pupillary finding:

- A. Left CN II
- B. Left CN III
- C. Left CN IV
- D. Right CN II
- E. Right CN III
- F. Right CN IV

# Pupillary reflex on patient A reveals the following:



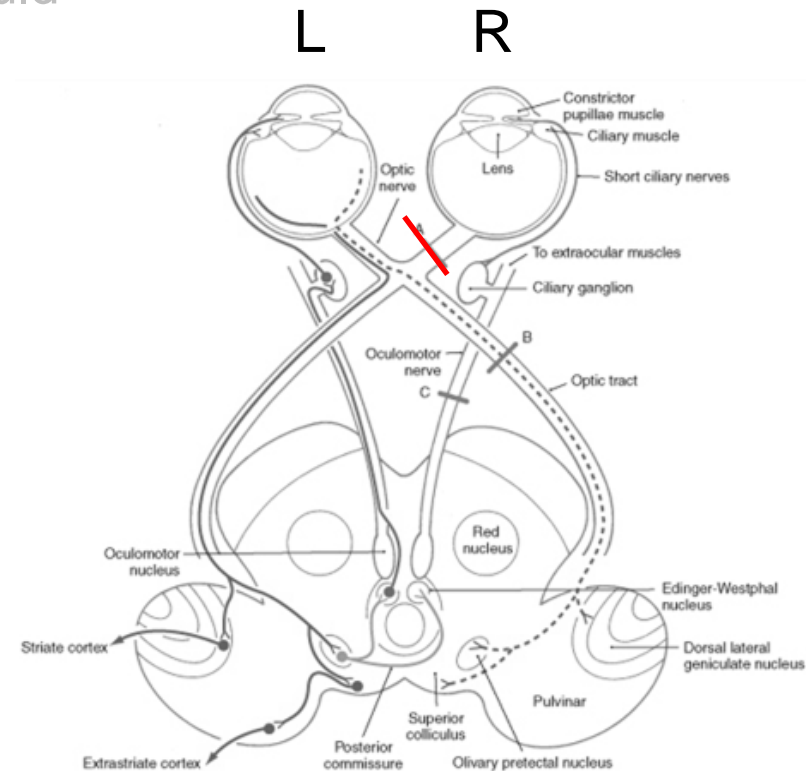
Left Pupil	Right Pupil
<b>Pupil constriction</b>	<b>Pupil constriction</b>



Left pupil	Right pupil
<b>No pupil constriction</b>	<b>No pupil constriction</b>

A lesion of which of the following nerves would most likely explain this pupillary finding:

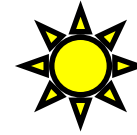
- A. Left CN II
- B. Left CN III
- C. Left CN IV
- D. Right CN II**
- E. Right CN III
- F. Right CN IV



Pupillary reflex on patient B reveals the following:



Left Pupil	Right Pupil
<b>No Pupil constriction</b>	<b>Pupil constriction</b>

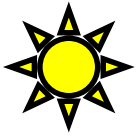


Left pupil	Right pupil
<b>No pupil constriction</b>	<b>Pupil constriction</b>

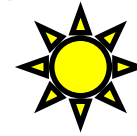
A lesion of which of the following nerves would most likely explain this pupillary finding:

- A. Left CN II
- B. Left CN III
- C. Left CN IV
- D. Right CN II
- E. Right CN III
- F. Right CN IV

# Pupillary reflex on patient B reveals the following:



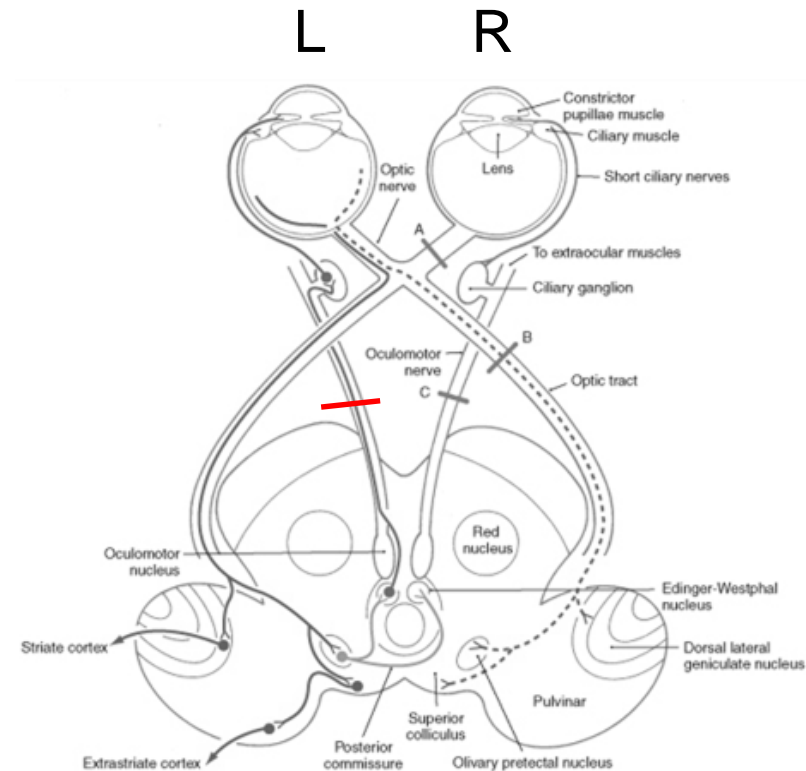
Left Pupil	Right Pupil
<b>No Pupil constriction</b>	<b>Pupil constriction</b>



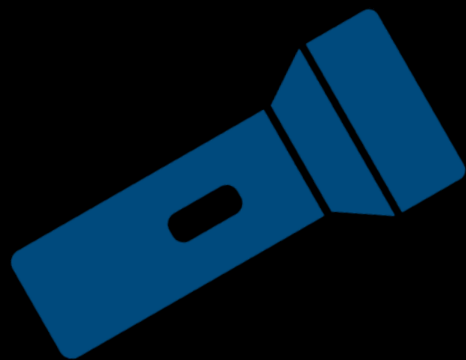
Left pupil	Right pupil
<b>No pupil constriction</b>	<b>Pupil constriction</b>

A lesion of which of the following nerves would most likely explain this pupillary finding:

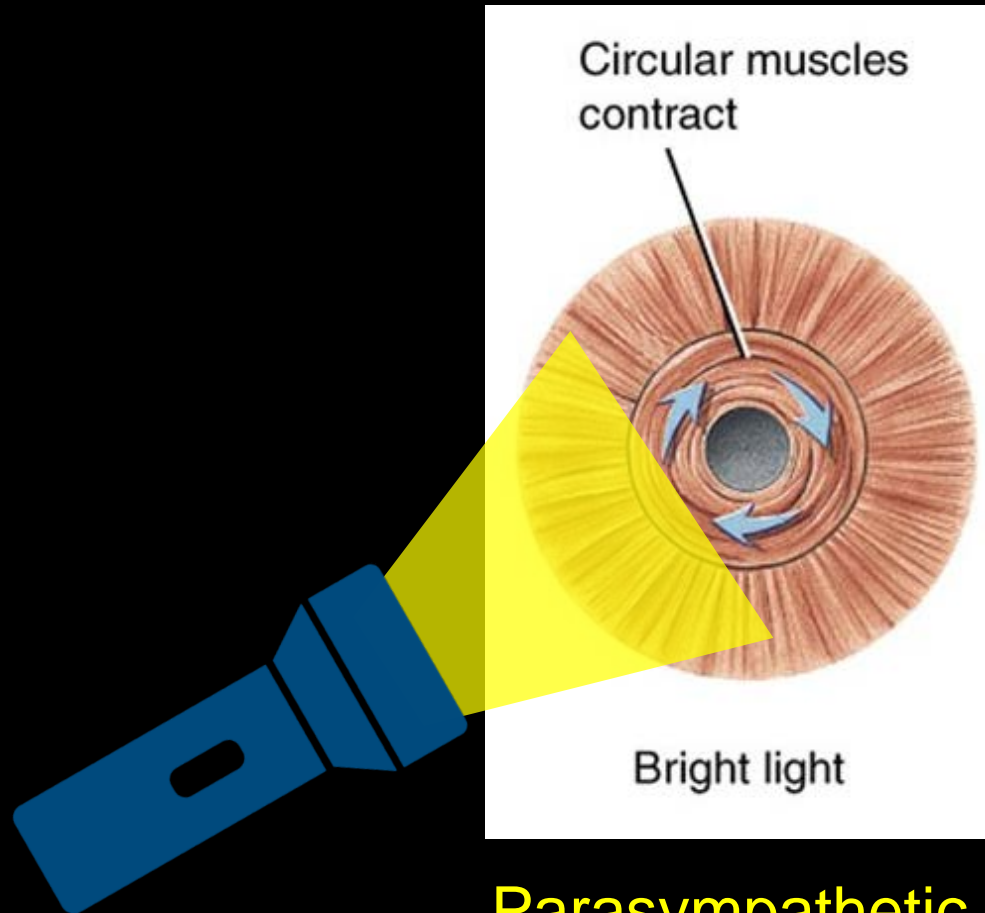
- A. Left CN II
- B. Left CN III
- C. Left CN IV
- D. Right CN II
- E. Right CN III
- F. Right CN IV







# Pupillary constrictor (sphincter) m.



Parasympathetic  
CN III





Night

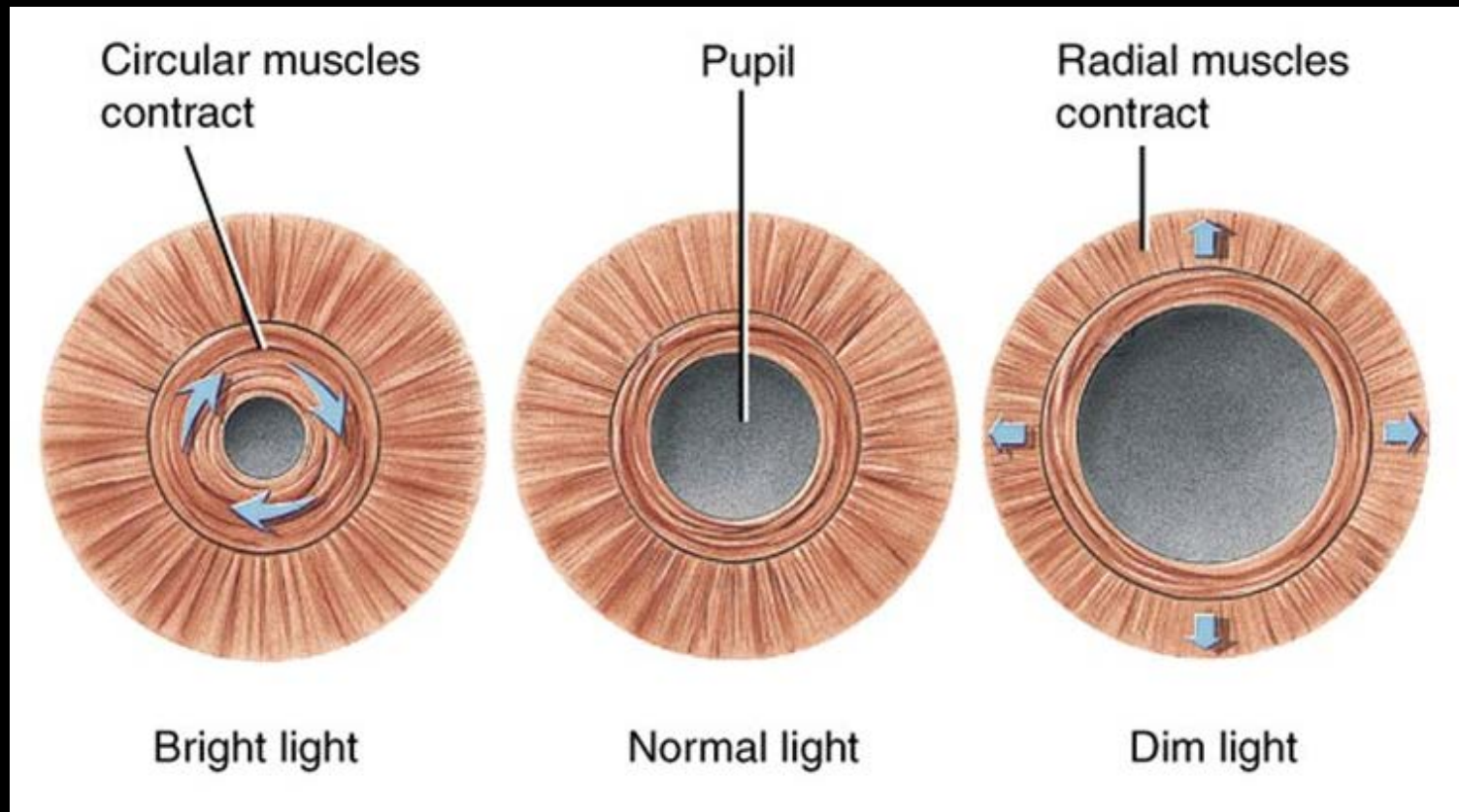
## Pupillary dilator m.



Sympathetic  
T1; sup cerv ganglion

Pupillary constrictor  
(sphincter) m.

Pupillary dilator m.



Parasympathetic  
CN III

Sympathetic  
T1; sup cerv ganglion



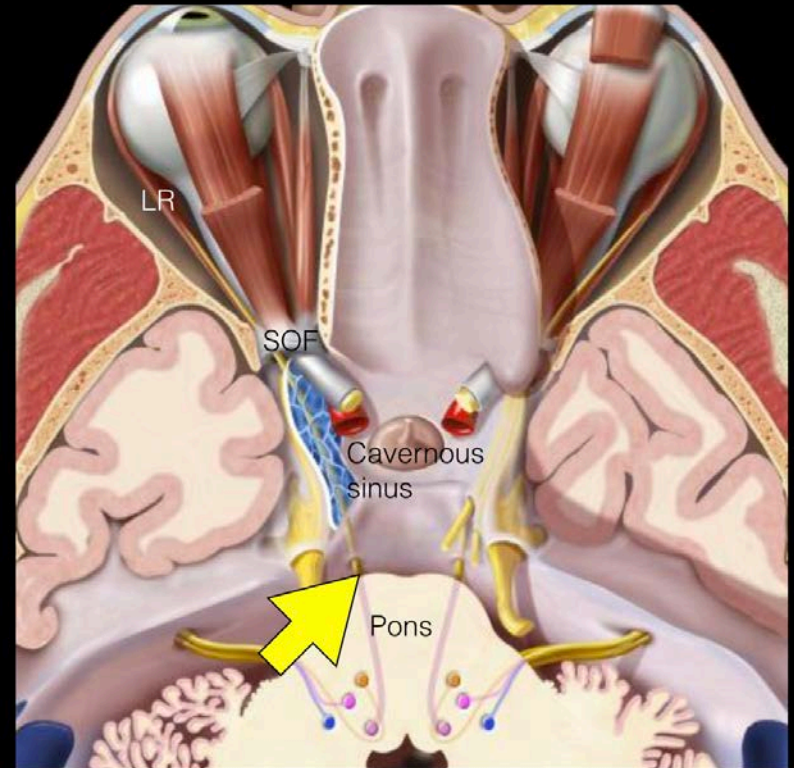


A 64-year-old man suffers a lesion to his left CN VI. Identify the symptom this patient would most likely present with.

- A. Double vision when looking left
- B. Double vision when looking right
- C. Eye is positioned down and to the right
- D. Eye is position down and to the left
- E. Miosis (pin point pupil)
- F. Mydriasis (blown/large pupil)

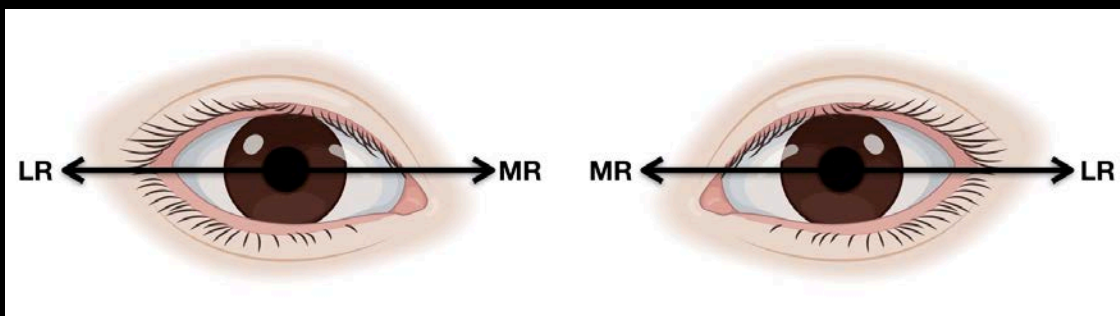
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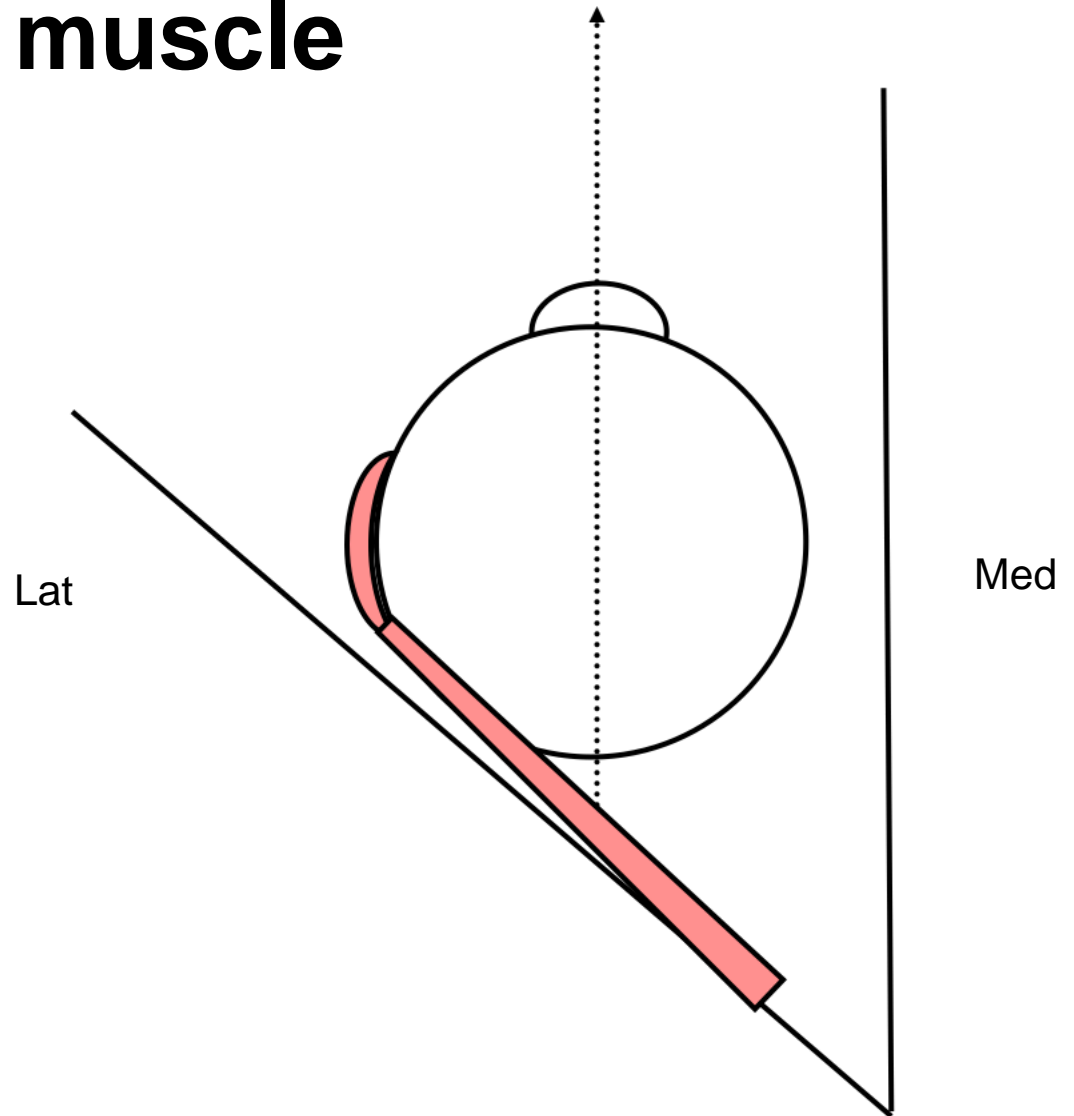


**L. Abducens n. (CN VI)**

Lateral rectus m. (LR)

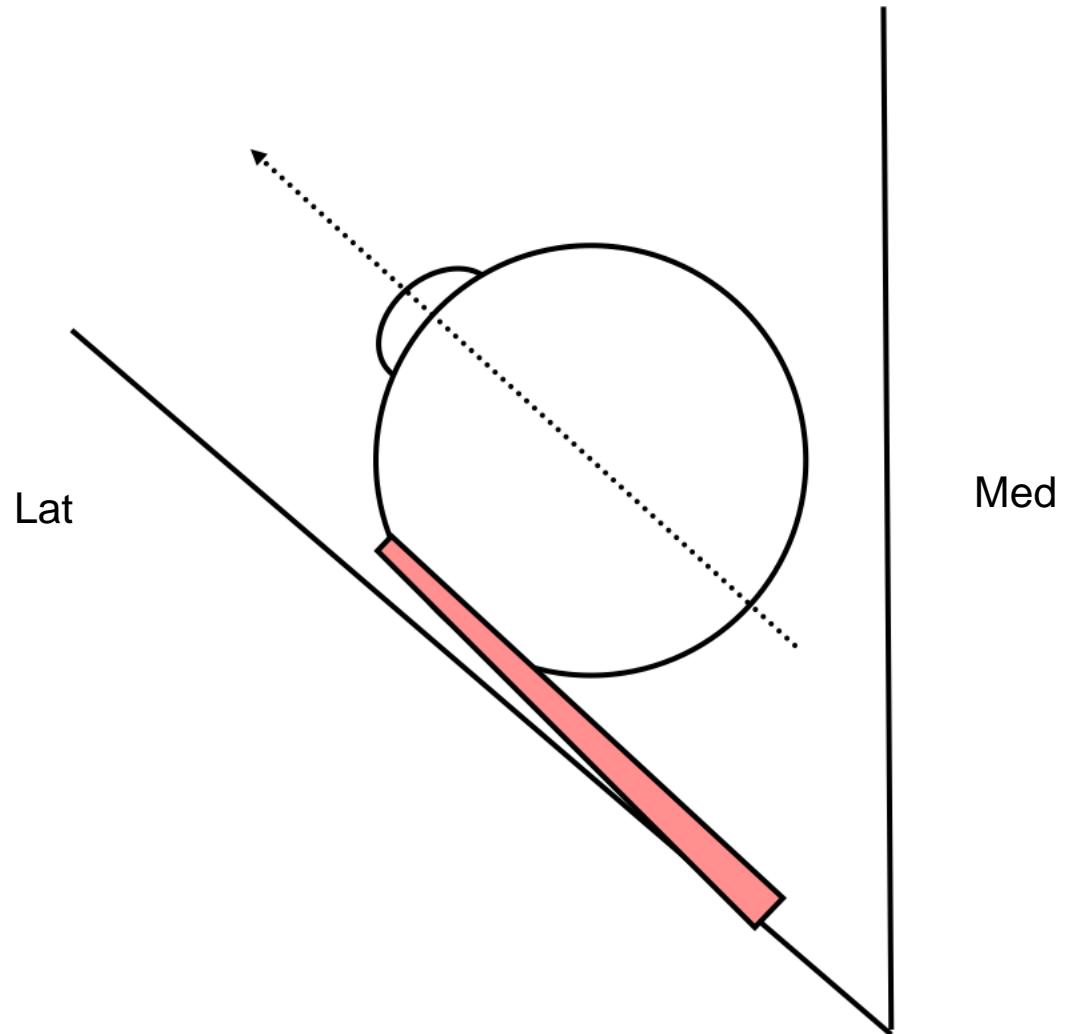


# Lateral rectus muscle



Superior view of left orbit

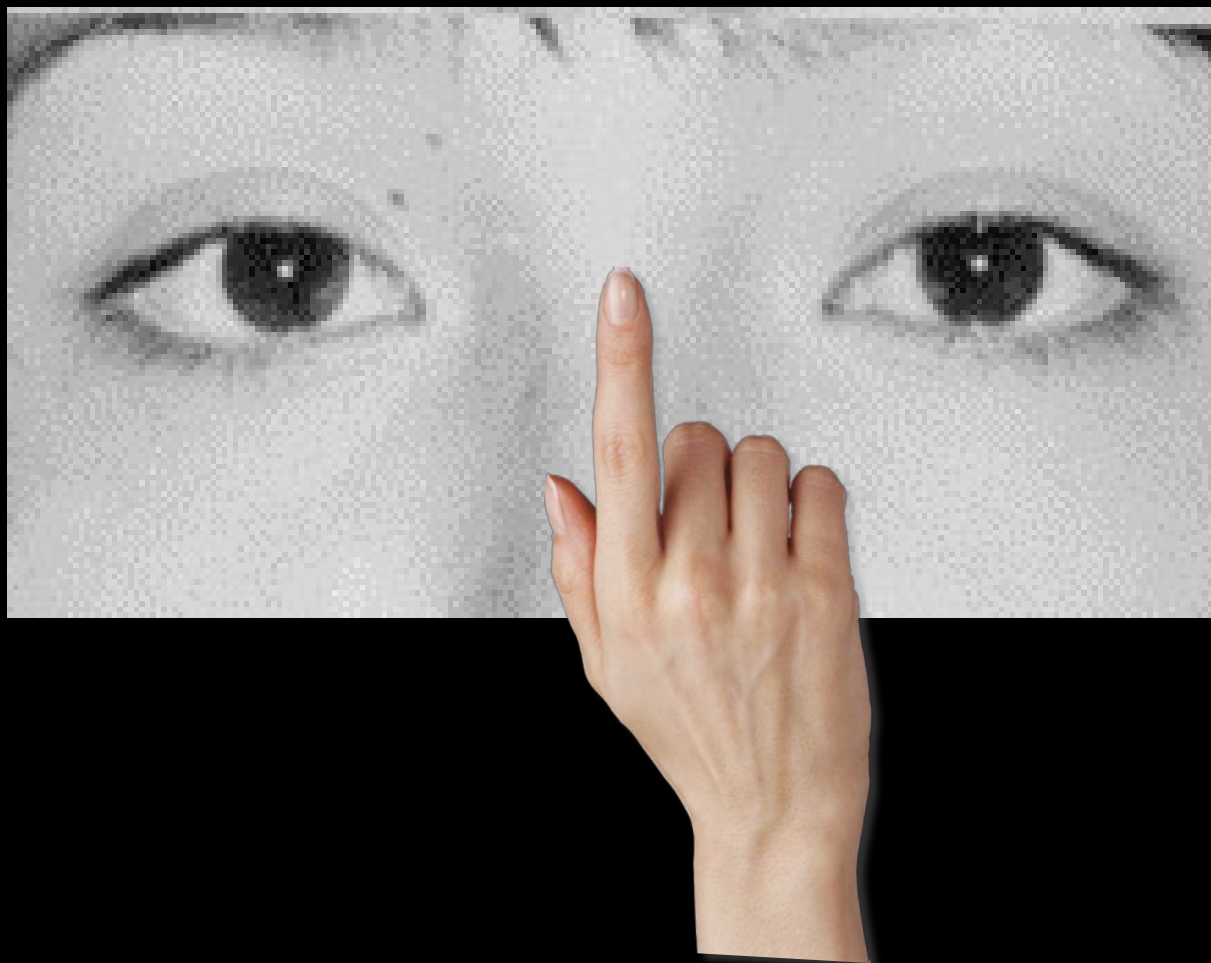
# Lateral rectus muscle



Superior view of left orbit

R

L



R

L





R

L



Double vision when  
looking laterally on side  
of the lesion

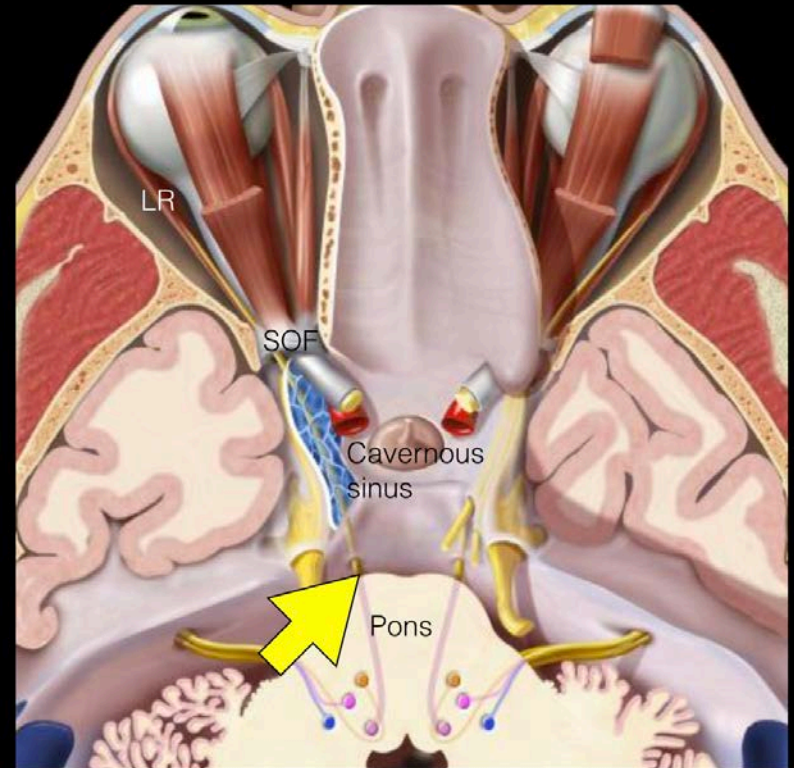
R

L



A 64-year-old man suffers a lesion to his left CN VI. Identify the symptom this patient would most likely present with.

- A. Double vision when looking left
- B. Double vision when looking right
- C. Eye is positioned down and to the right
- D. Eye is position down and to the left
- E. Miosis (pin point pupil)
- F. Mydriasis (blown/large pupil)



L. Abducens n. (CN VI)

R



L



A 71-year-old man complains of a headache, double vision and right droopy eyelid. Figure A is the man's eye at rest. Figure B shows the results of testing his extraocular muscles.

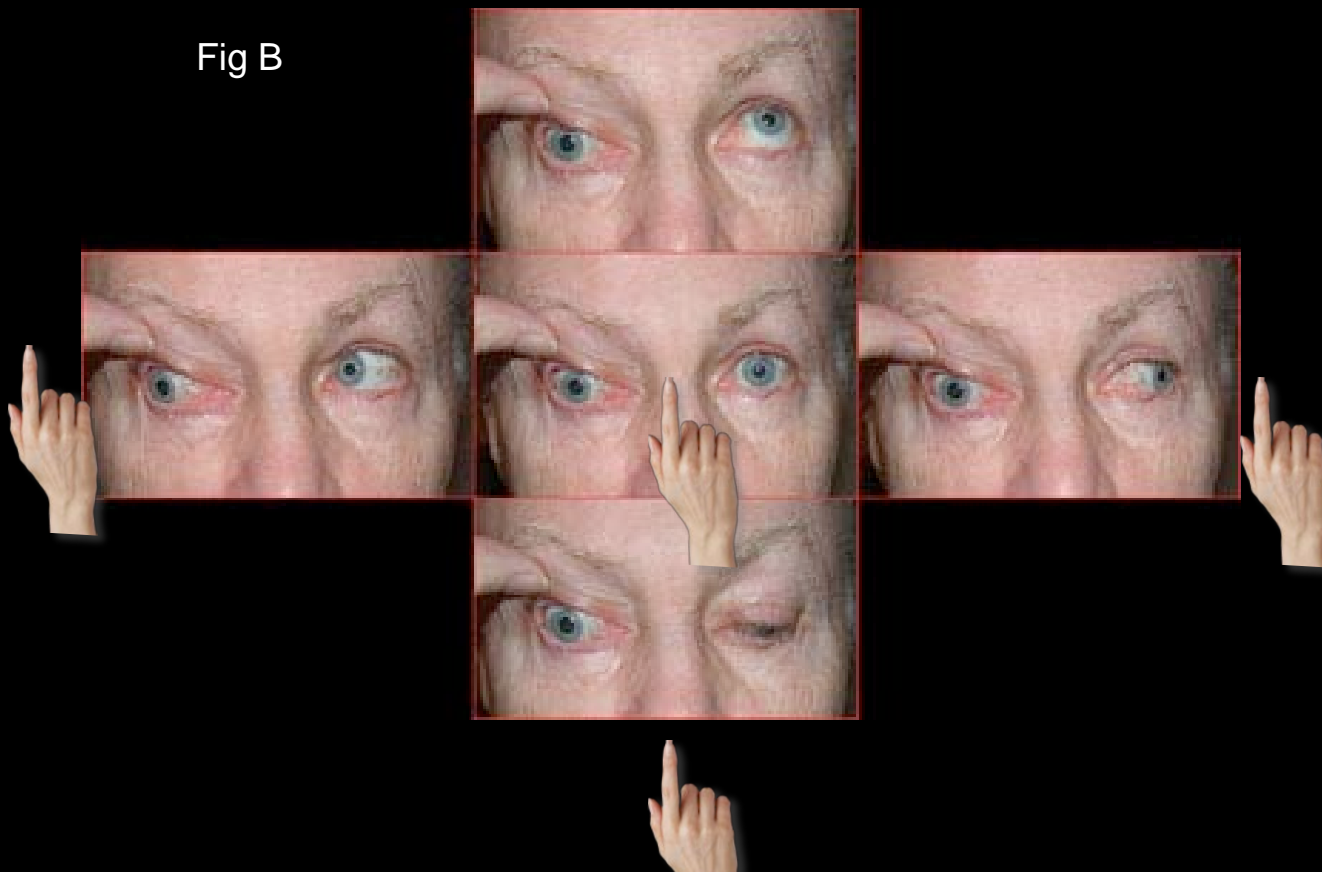
Fig A



Identify the nerve most likely injured.

- A. CN III (left)
- B. CN III (right)
- C. CN IV (left)
- D. CN IV (right)
- E. CN V (left)
- F. CN V (right)
- G. CN VI (left)
- H. CN VI (right)

Fig B



A 71-year-old man complains of a headache, double vision and right droopy eyelid. Figure A is the mans eye at rest. Figure B shows the results of testing his extraoccular muscles.

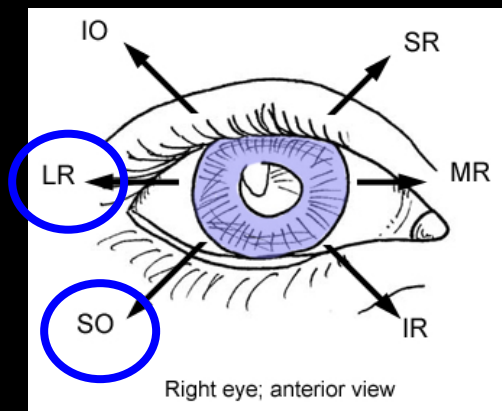
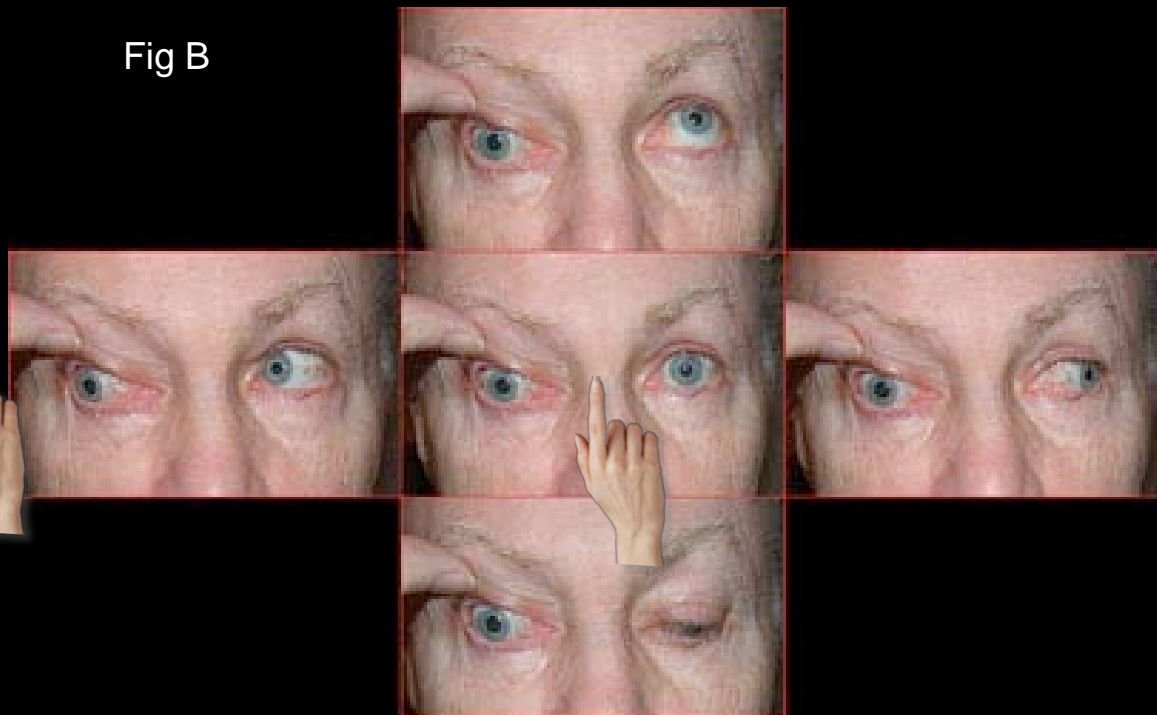
Fig A



Identify the nerve most likely injured.

- A. CN III (left)
- B. CN III (right)**
- C. CN IV (left)
- D. CN IV (right)
- E. CN V (left)
- F. CN V (right)
- G. CN VI (left)
- H. CN VI (right)

Fig B



Right eye; anterior view





Jack and Mary present with the following symptoms:

- Jack's left eye: Ptosis and a mydriasis (excessive dilation)
- Mary's left eye: Ptosis and a miosis (excessive constriction)

Explain how both patients have ptosis but Jack has a dilated pupil and Mary a constricted pupil.

Jack and Mary present with the following symptoms:

- Jack's left eye: Ptosis and a mydriasis (excessive dilation)
- Mary's left eye: Ptosis and a miosis (excessive constriction)

Explain how both patients have ptosis but Jack has a dilated pupil and Mary a constricted pupil.

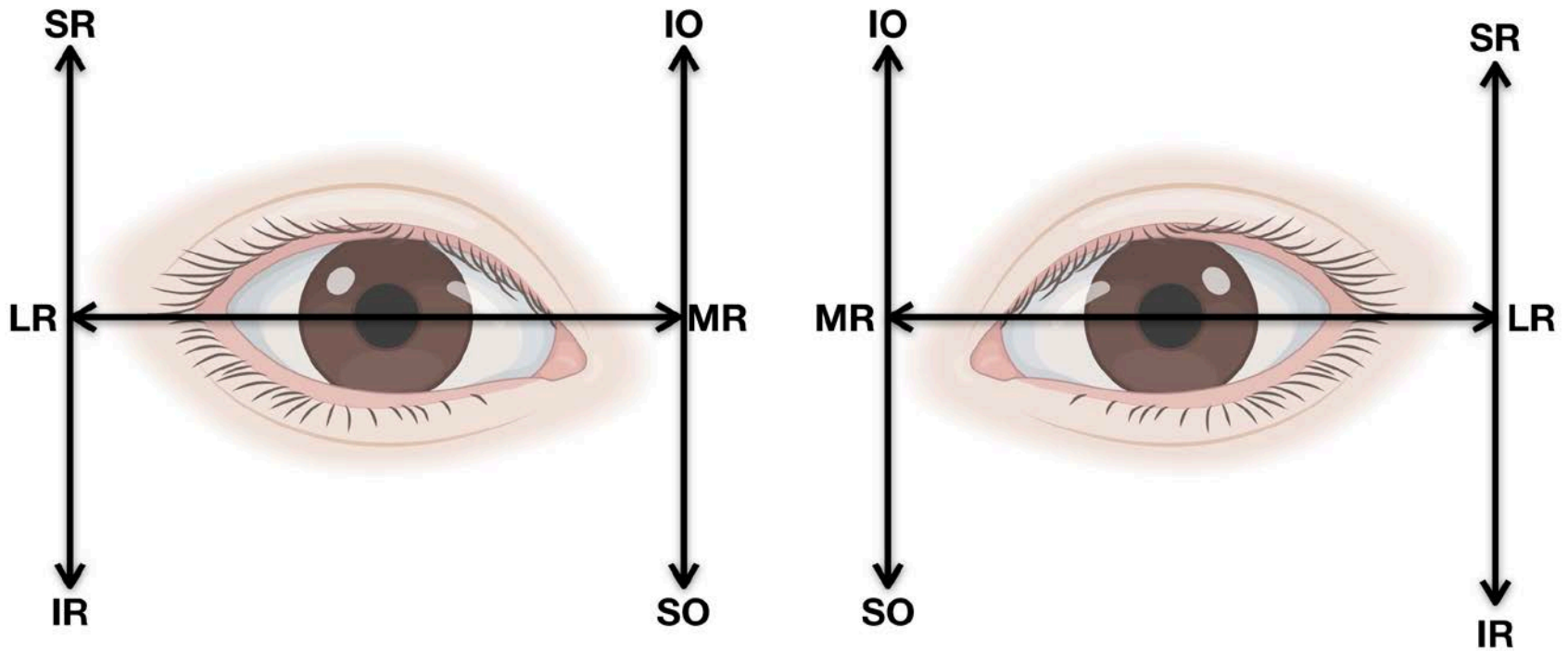
Jack has a CN III injury; CN III innervates the levator palpebrae superioris muscle and the dilator constrictor muscles. Therefore, a lesion to this nerve would result in ptosis and the pupil dilating.

Mary has sympathetic injury; the sympathetics innervate the superior tarsal muscle and dilates the pupil.



# So ...

- The “Juice-Squeeze” ration for the next concept is low .. So if you memorize the following image you don’t have to understand it in its entirety.



## Clinical Testing

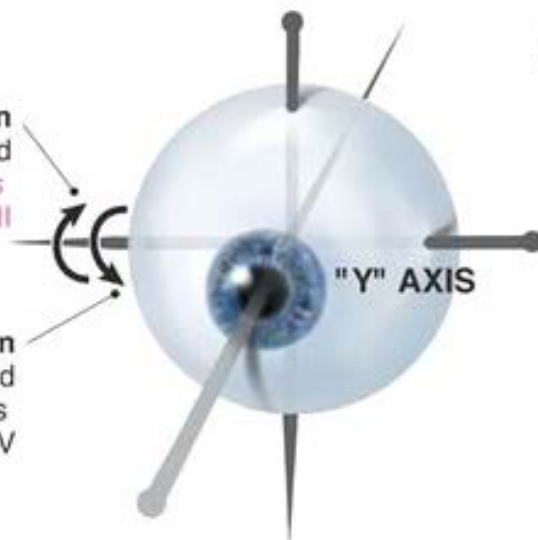
$LR_6 SO_4 R_3$

Lateral Rectus CN 6, Superior Oblique CN 4, Rest CN 3



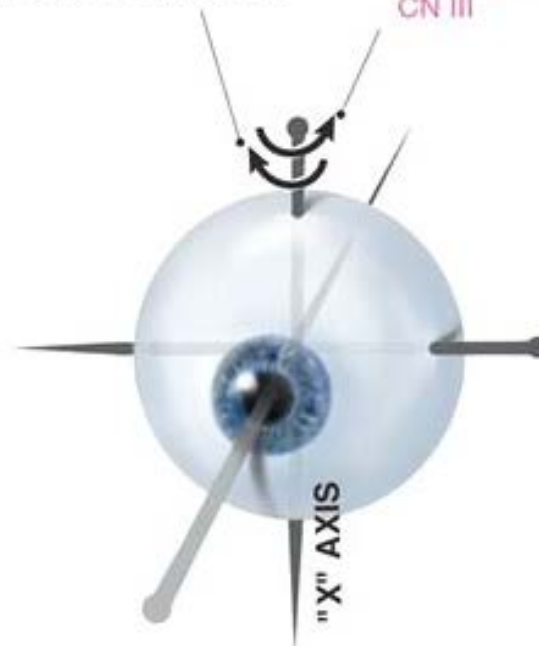
**Elevation**  
superior rectus and  
inferior oblique muscles  
CN III

**Depression**  
inferior rectus CN III and  
superior oblique muscles  
CN IV



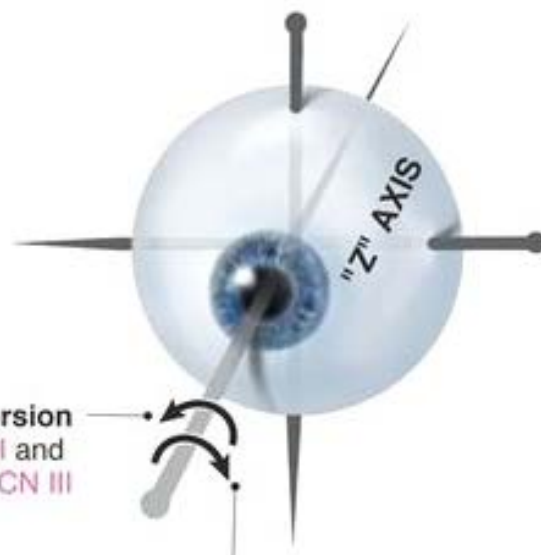
**Abduction**  
(away from nose)  
lateral rectus muscle CN VI

**Adduction**  
(toward nose)  
medial rectus muscle  
CN III



**Excyclotorsion**  
inferior rectus CN III and  
inferior oblique muscles CN III

**Incyclotorsion**  
superior rectus CN III and  
superior oblique muscles CN IV



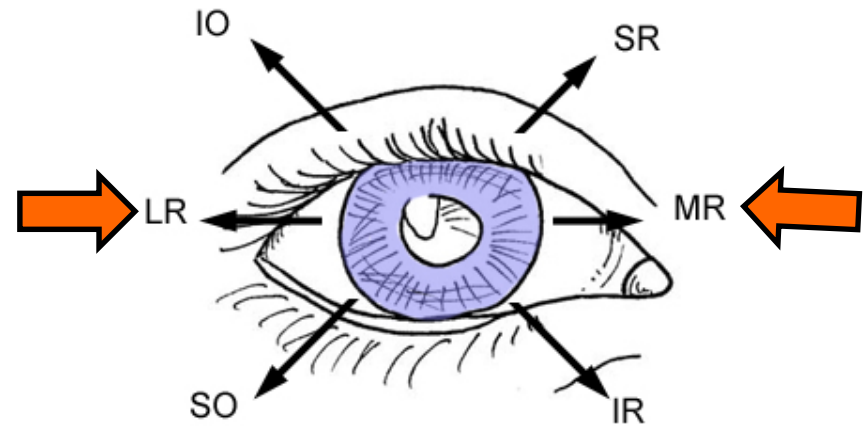
**Figure III-7** Right eye movements around the "X," "Y," and "Z" axes (movements driven by cranial nerve III are highlighted in pink).



# Clinically testing Orbital CN' s

The Medial Rectus and Lateral Rectus muscles are the only 2 extraocular muscles that act in the X-axis

How would you clinically test these 2 muscles and their CN' s?

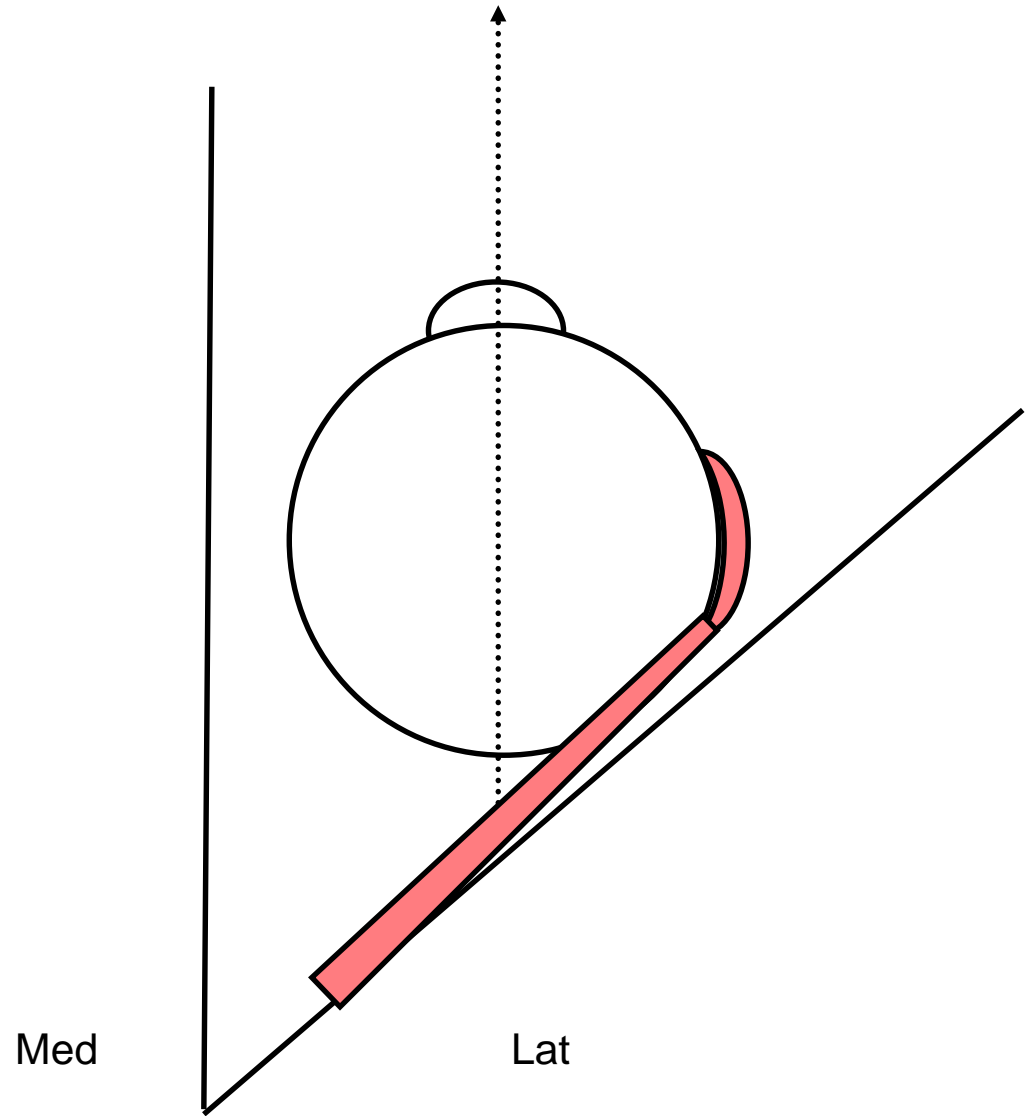


Right eye; anterior view

Anatomical Actions

# Clinically testing Orbital CN's

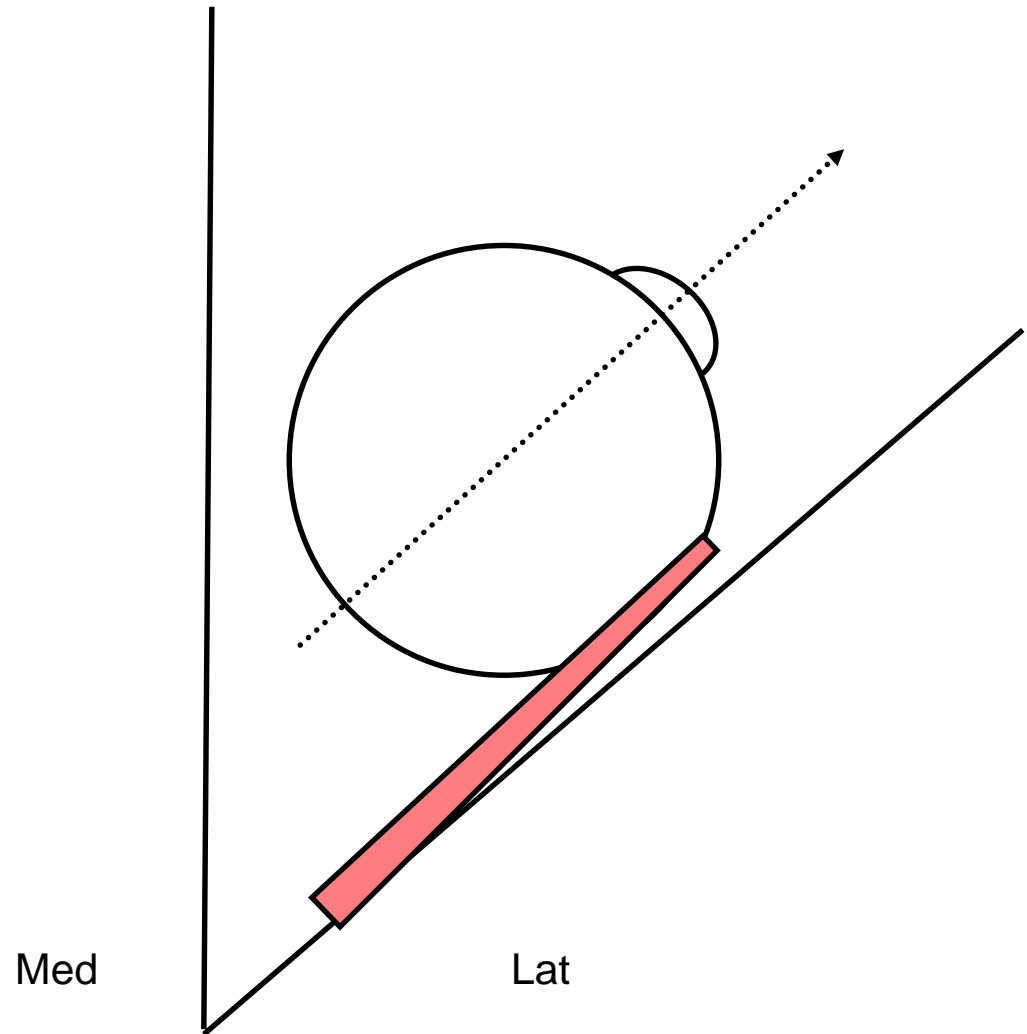
Lateral rectus muscle



Superior view of right orbit

# Clinically testing Orbital CN's

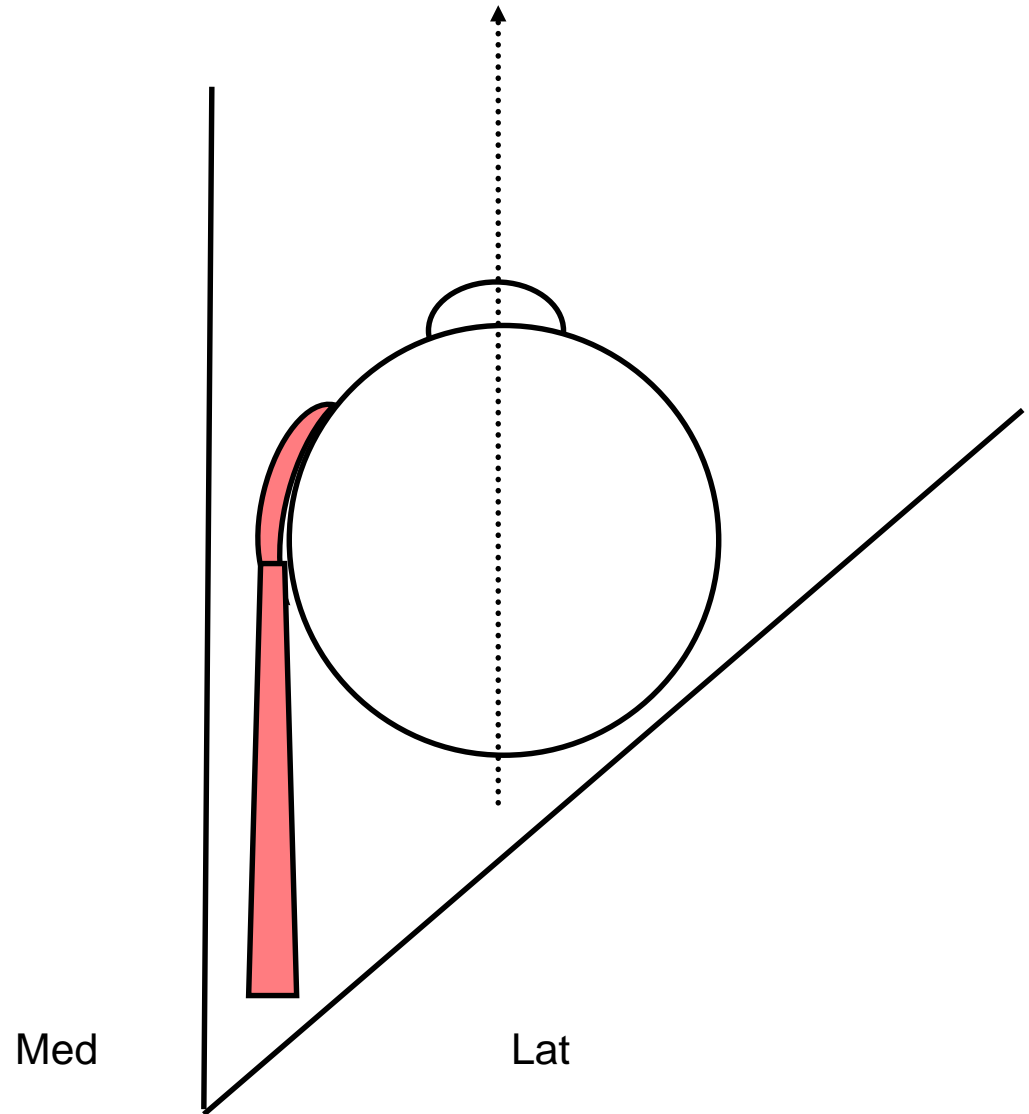
Lateral rectus muscle



Superior view of right orbit

# Clinically testing Orbital CN's

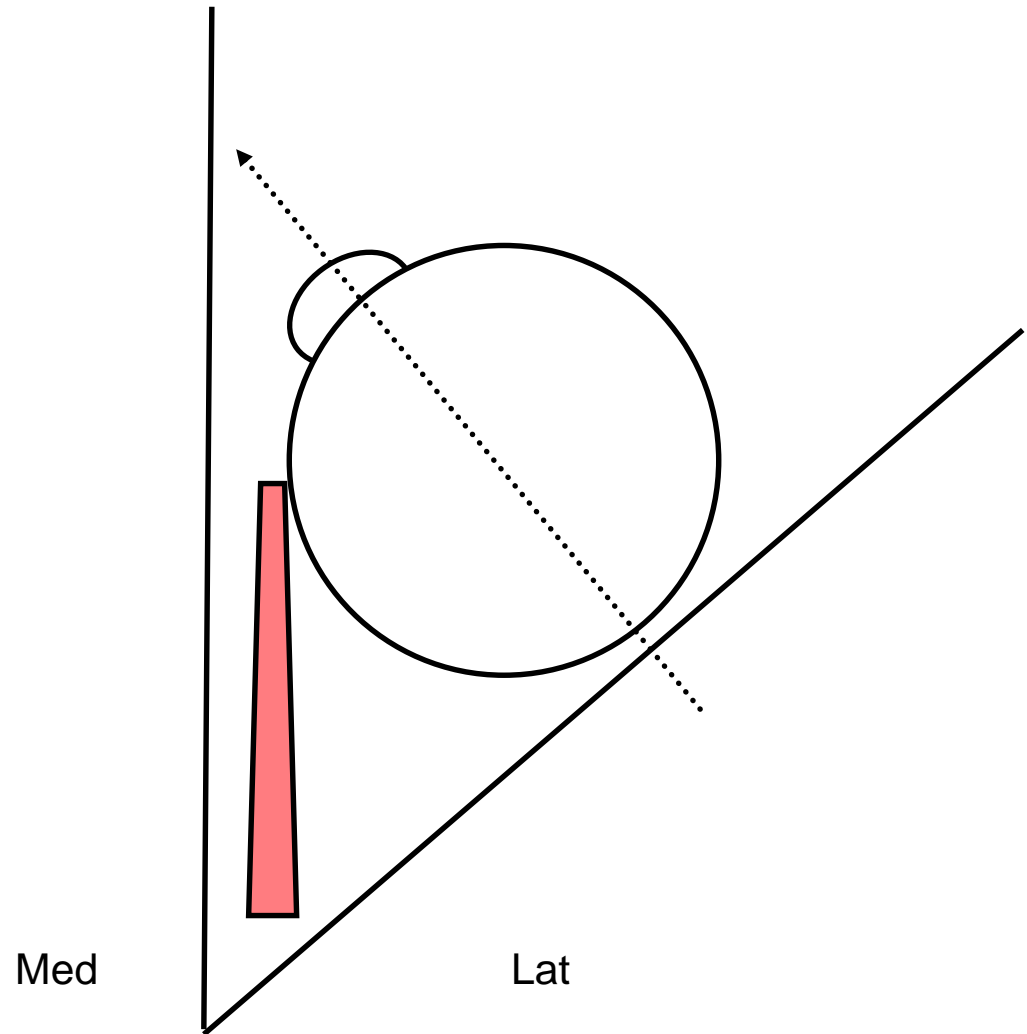
Medial rectus muscle



Superior view of right orbit

# Clinically testing Orbital CN's

Medial rectus muscle

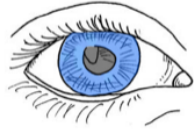


Superior view of right orbit

# Clinically testing Orbital CN's

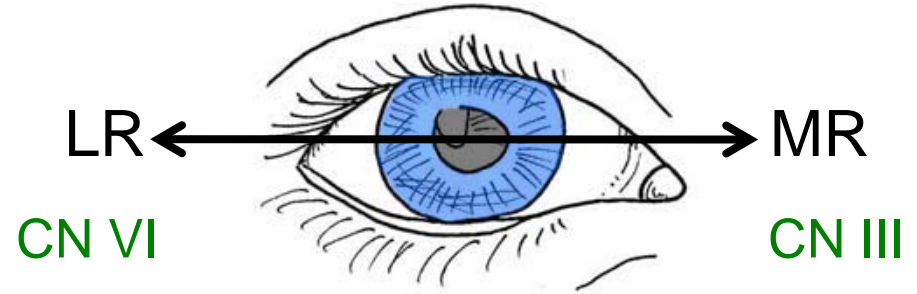
• **Clinically actions.** Movements patient is instructed to make with eyes in order to clinically test each extraocular muscle and associated CN.

- SR
- IO
- MR
- LR
- IR
- SO



Right eye; anterior view

Draw the lines on this eye to demonstrate clinical movements of eye



Right eye; anterior view

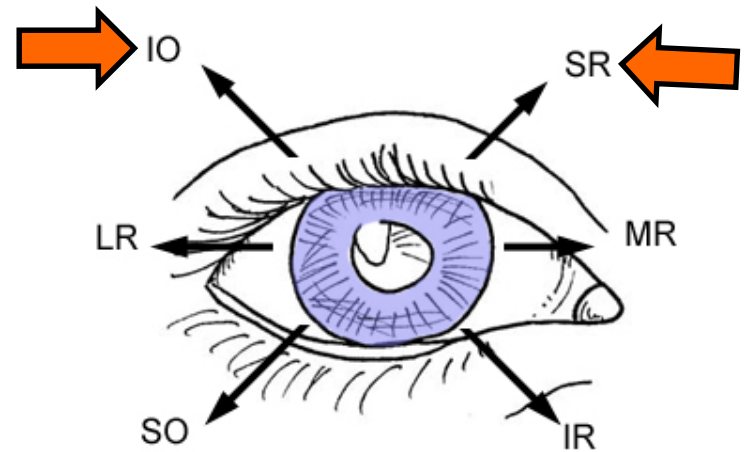
Clinical Testing

# Clinically testing Orbital CN' s

The Superior Rectus and Inferior oblique muscles are the only 2 extraocular muscles that act in the Y-axis to elevate the eye (look up).

Therefore, to test the SR muscle it must be isolated from the IO (and vice versa)

How is this done?



Right eye; anterior view

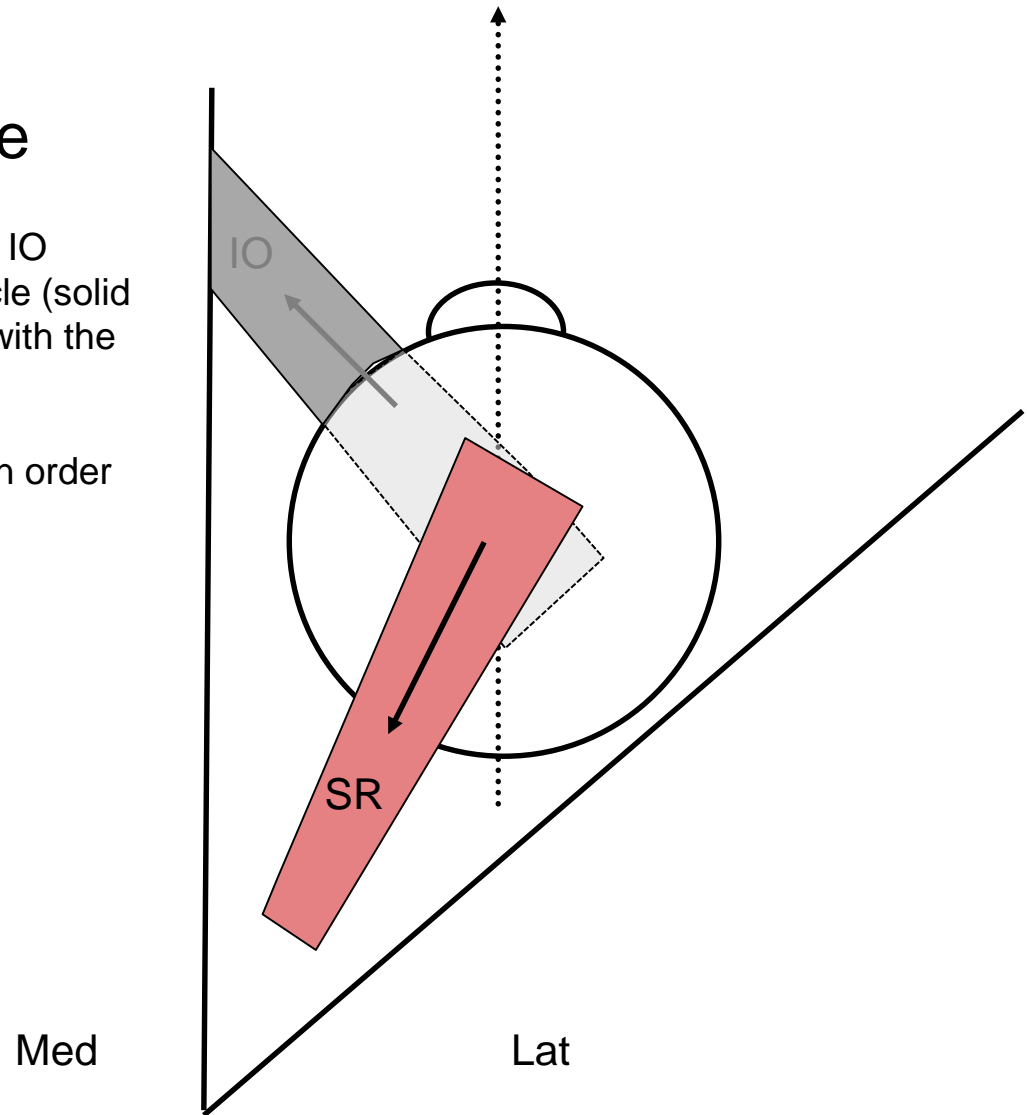
Anatomical Actions

# Clinically testing Orbital CN's

## Superior rectus muscle

In order to isolate the SR from the IO muscle the vector pull of the muscle (solid arrow) must be placed in parallel with the gaze of the orbit (dotted arrow).

What action would be necessary in order to accomplish this?



Superior view of right orbit



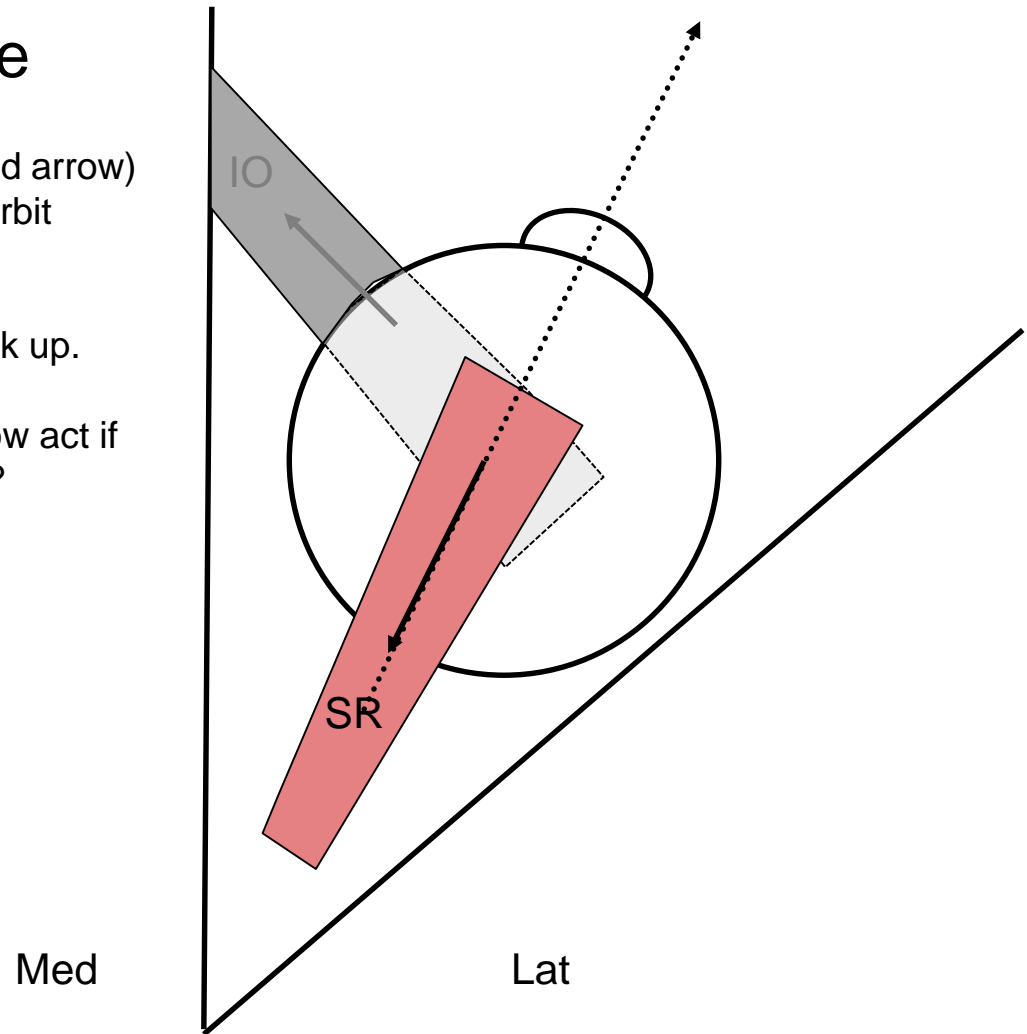
# Clinically testing Orbital CN's

## Superior rectus muscle

Now the vector pull of the SR (solid arrow) is in parallel with the gaze of the orbit (dotted arrow).

Now the patient is instructed to look up.

What axis would the IO muscle now act if contracted with the eye abducted?



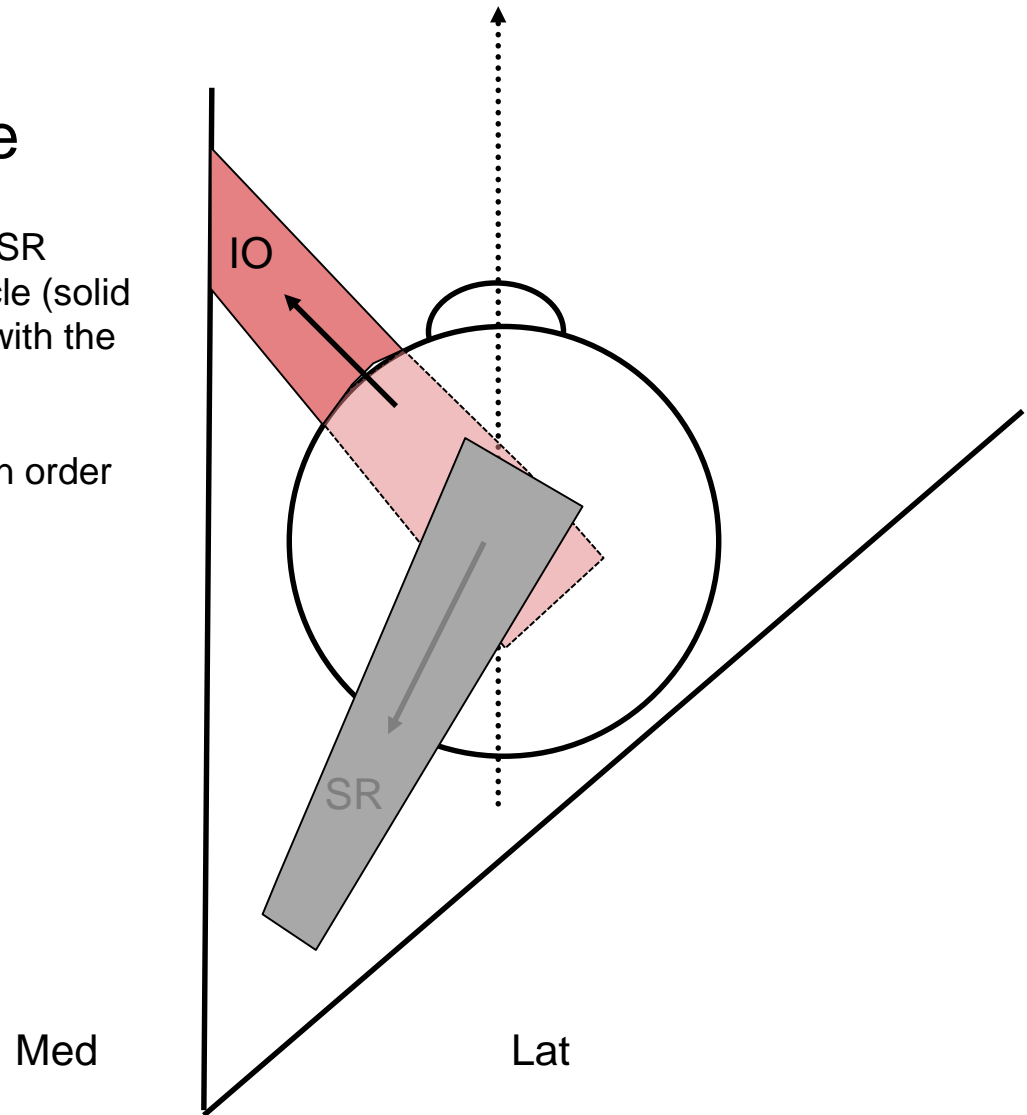
Superior view of right orbit

# Clinically testing Orbital CN's

## Inferior oblique muscle

In order to isolate the IO from the SR muscle the vector pull of the muscle (solid arrow) must be placed in parallel with the gaze of the orbit (dotted arrow).

What action would be necessary in order to accomplish this?



Superior view of right orbit

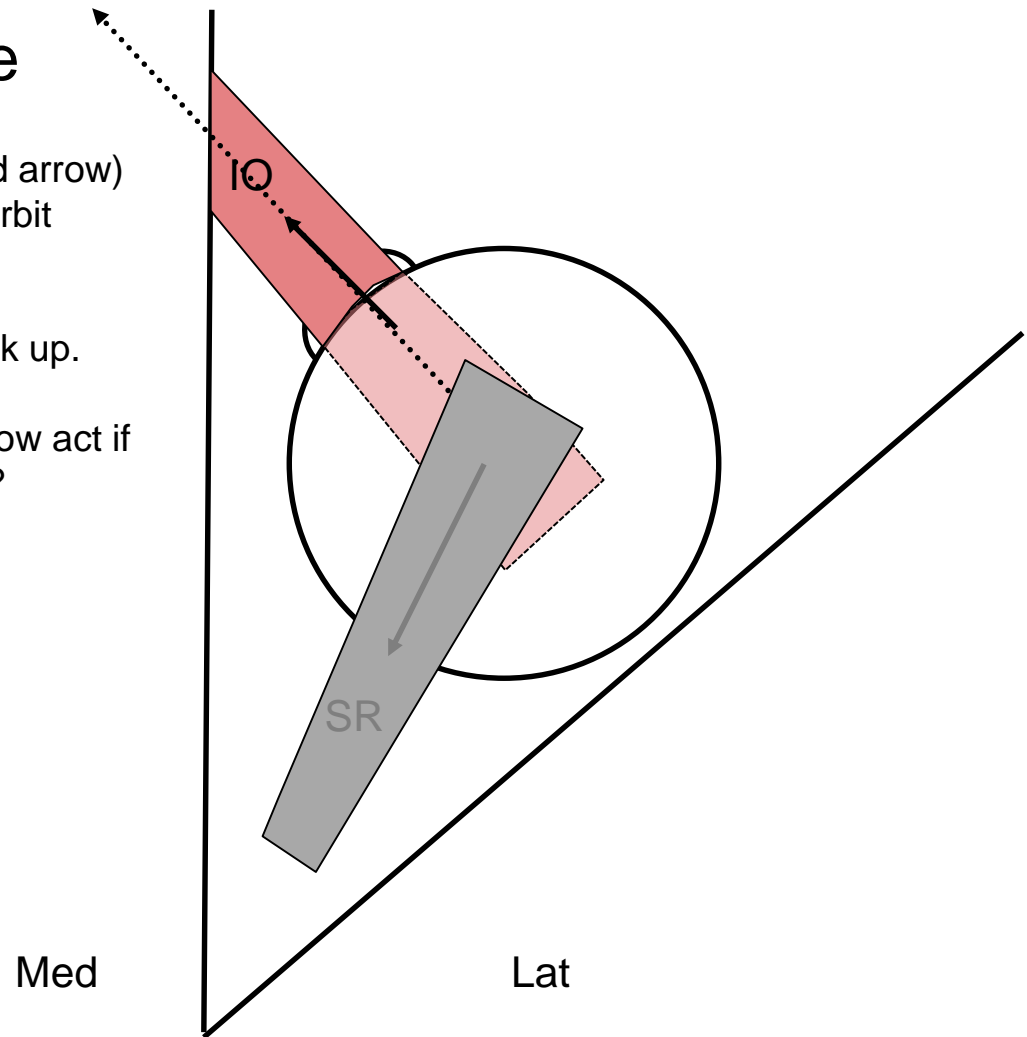
# Clinically testing Orbital CN's

## Inferior oblique muscle

Now the vector pull of the IO (solid arrow) is in parallel with the gaze of the orbit (dotted arrow).

Now the patient is instructed to look up.

What axis would the SR muscle now act if contracted with the eye abducted?

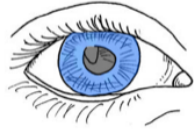


Superior view of right orbit

# Clinically testing Orbital CN's

• **Clinically actions.** Movements patient is instructed to make with eyes in order to clinically test each extraocular muscle and associated CN.

- SR
- IO
- MR
- LR
- IR
- SO



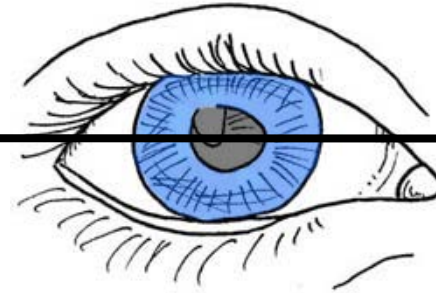
Right eye; anterior view

Draw the lines on this eye to demonstrate clinical movements of eye

CN III

SR

LR



CN III

IO

MR

Right eye; anterior view

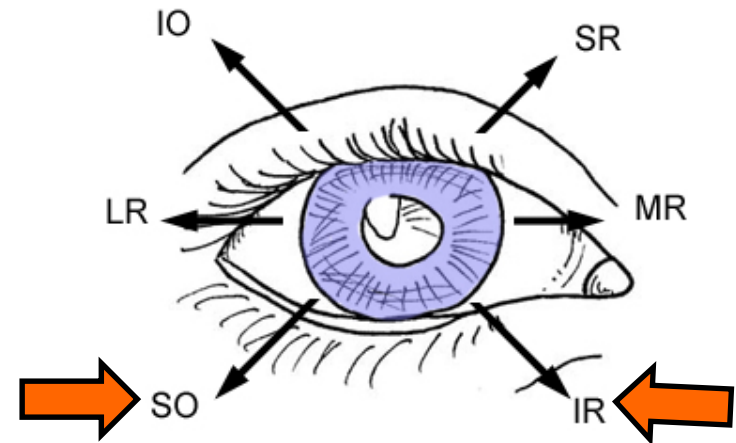
Clinical Testing

# Clinically testing Orbital CN' s

The Superior Oblique and Inferior Rectus muscles are the only 2 extraocular muscles that act in the Y-axis to depress the eye (look down).

Therefore, to test the SO muscle it must be isolated from the IR (and vice versa)

How is this done?



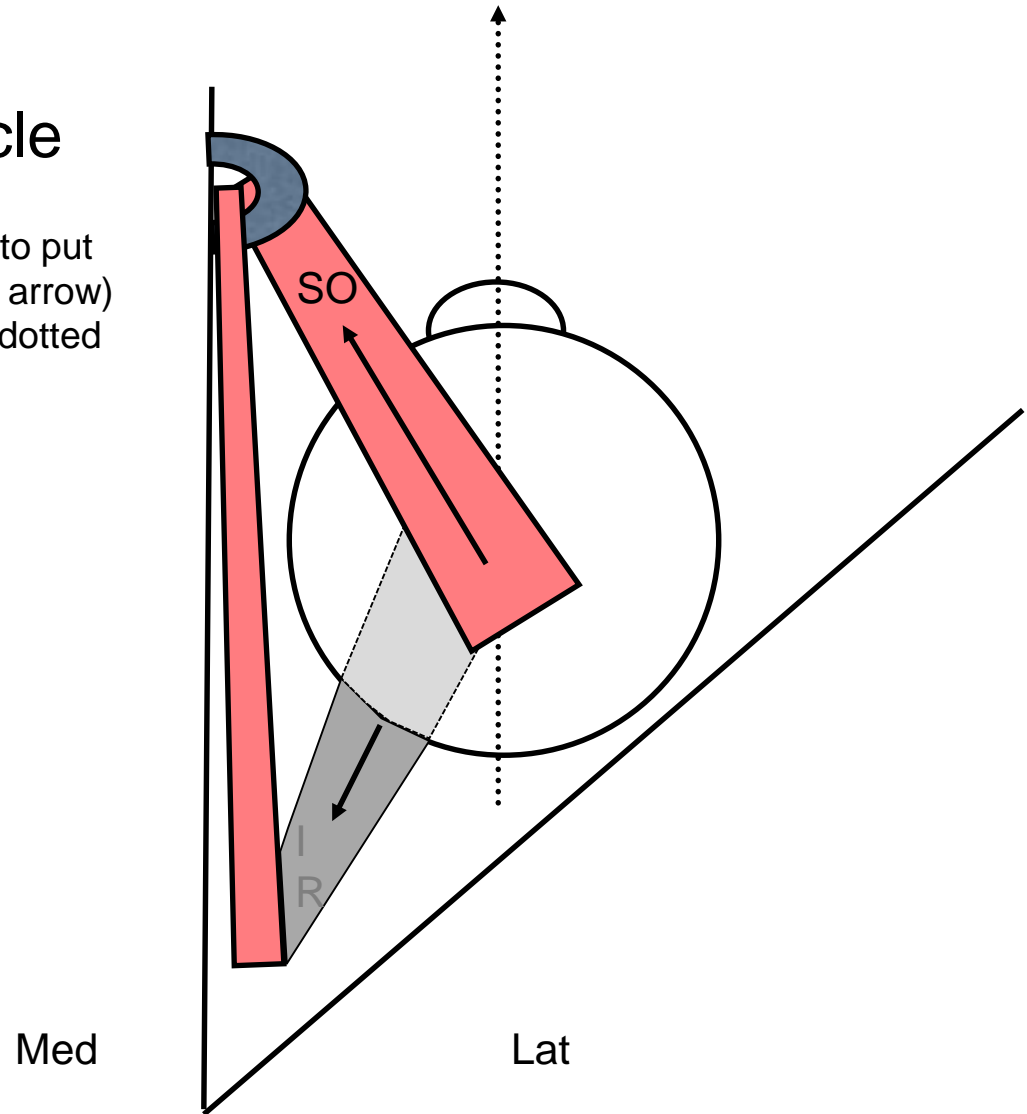
Right eye; anterior view

Anatomical Actions

# Clinically testing Orbital CN's

## Superior oblique muscle

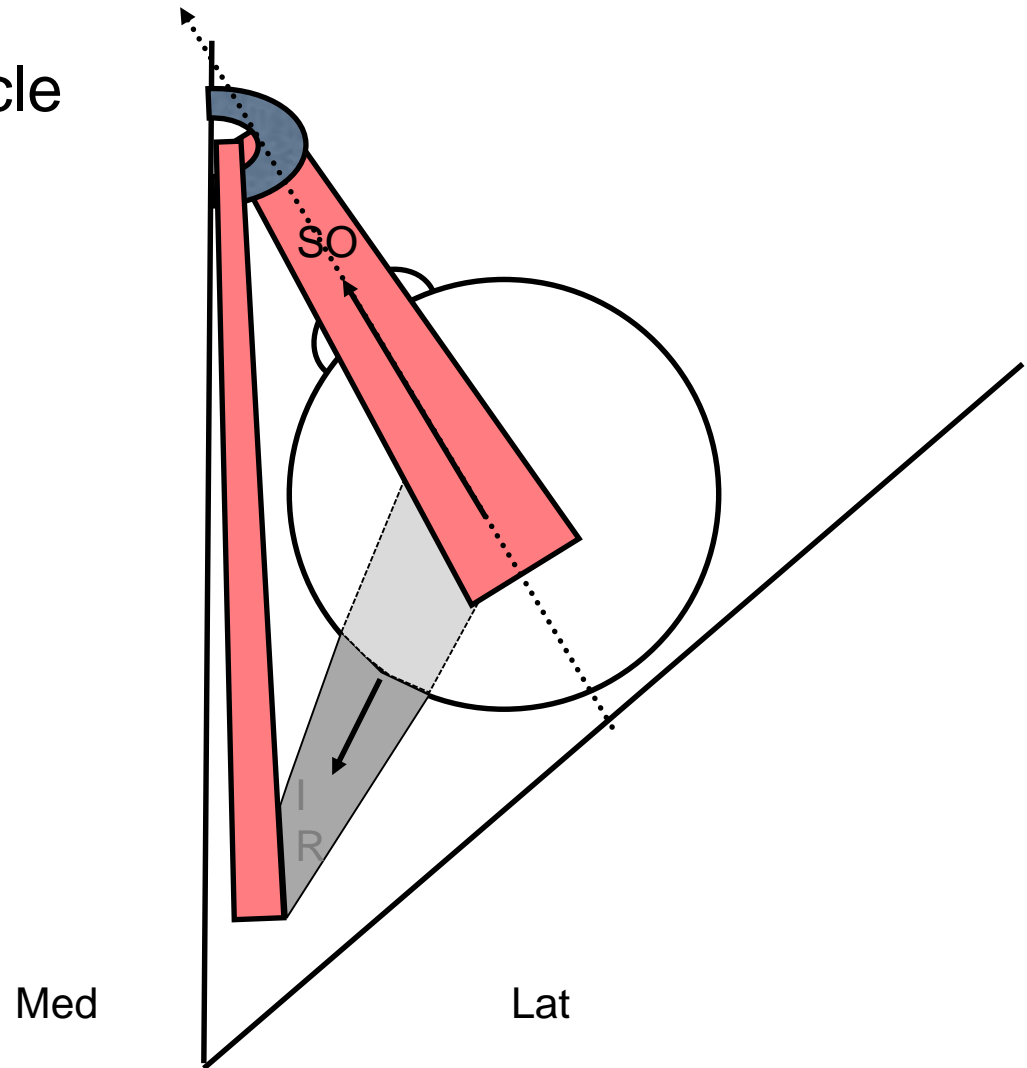
What action is necessary in order to put the vector of the SO muscle (solid arrow) parallel with the gaze of the orbit (dotted arrow)?



Superior view of right orbit

# Clinically testing Orbital CN's

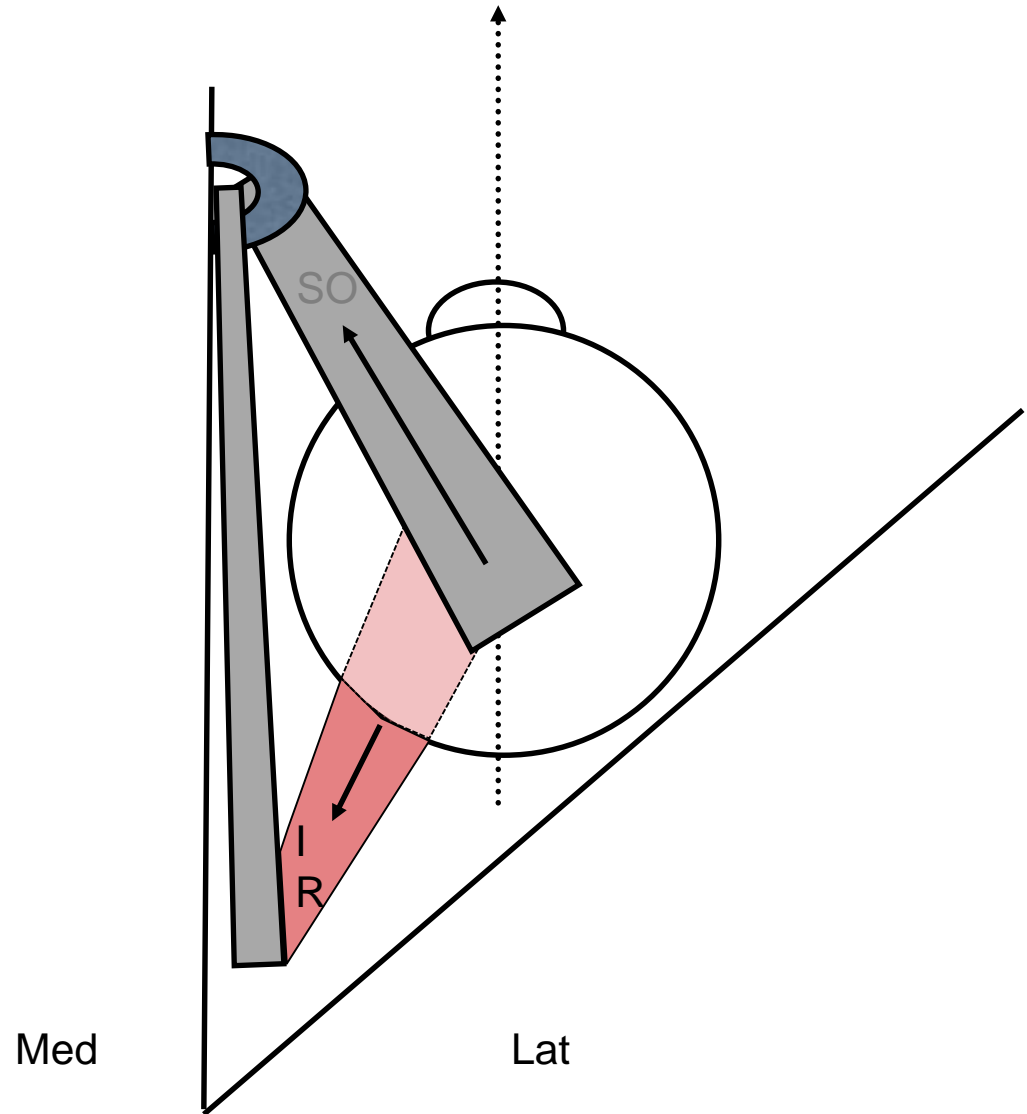
Superior oblique muscle



Superior view of right orbit

# Clinically testing Orbital CN's

Inferior rectus muscle

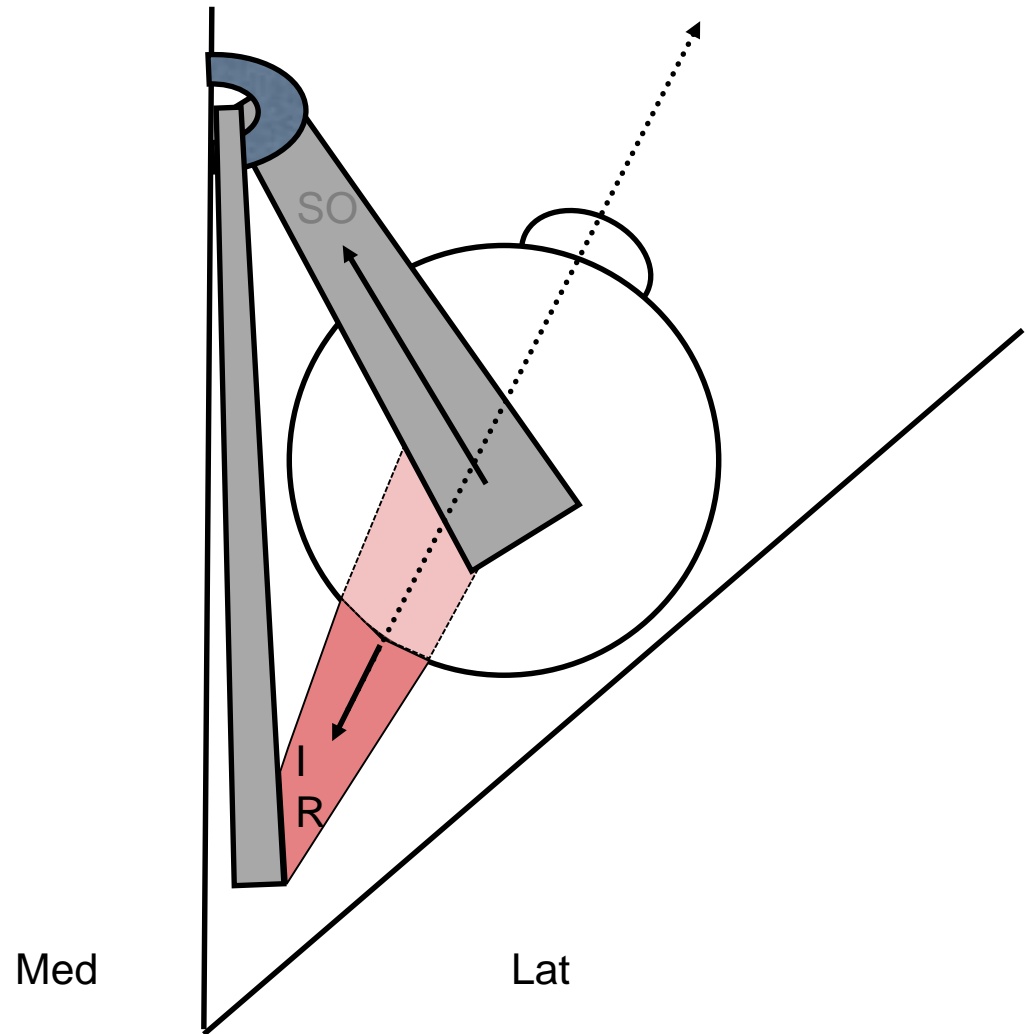


Superior view of right orbit



# Clinically testing Orbital CN' s

Inferior rectus muscle

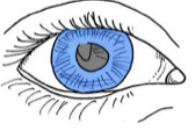


Superior view of right orbit

# Clinically testing Orbital CN's

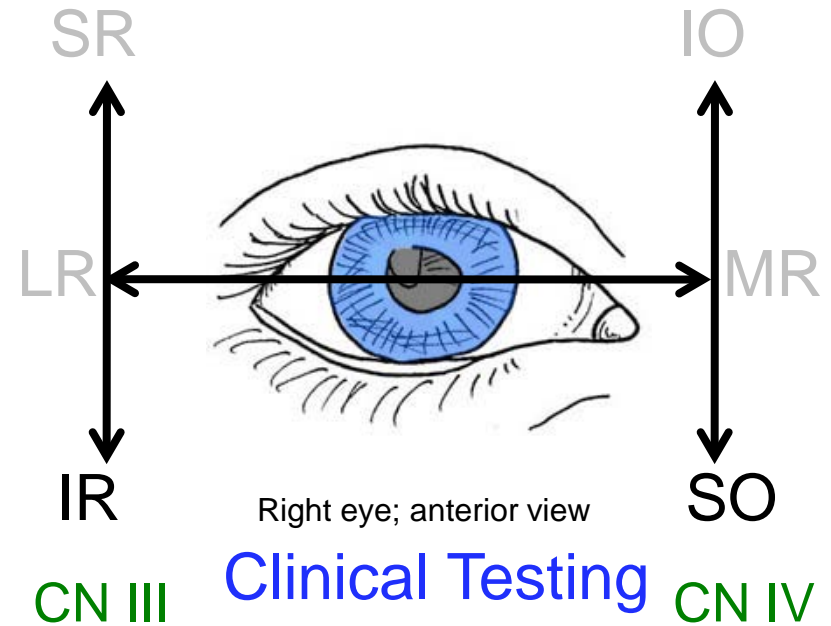
• **Clinically actions.** Movements patient is instructed to make with eyes in order to clinically test each extraocular muscle and associated CN.

- SR
- IO
- MR
- LR
- IR
- SO

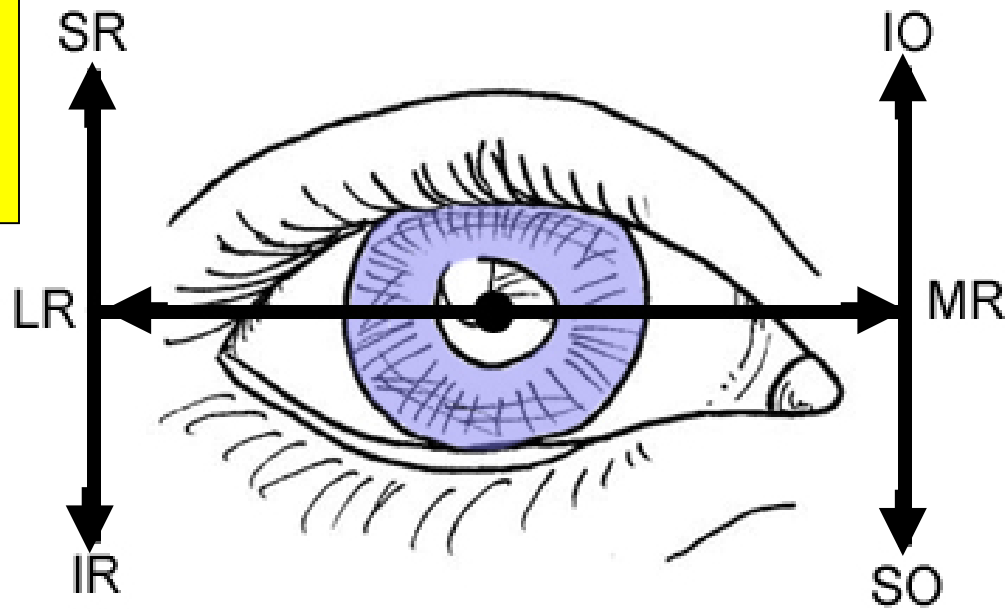


Right eye; anterior view

Draw the lines on this eye to demonstrate clinical movements of eye



This is what  
you need to  
memorize

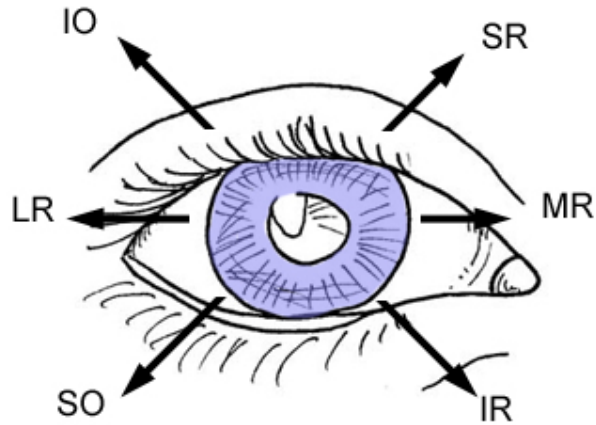


Anterior view of right eye - Clinical testing of eye muscles

## Clinical Testing

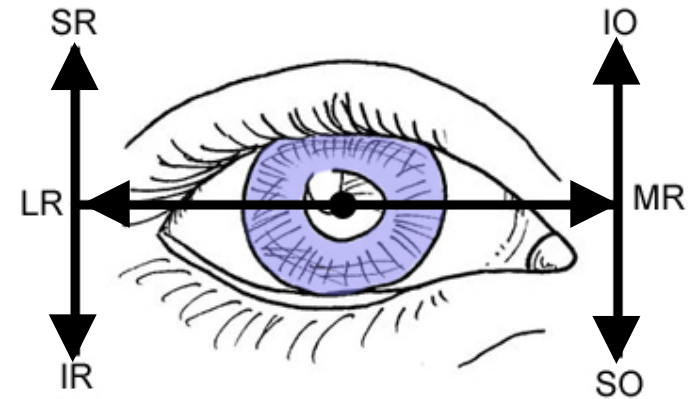
LR<sub>6</sub> SO<sub>4</sub> R<sub>3</sub>

Lateral Rectus CN 6, Superior Oblique CN 4, Rest CN 3



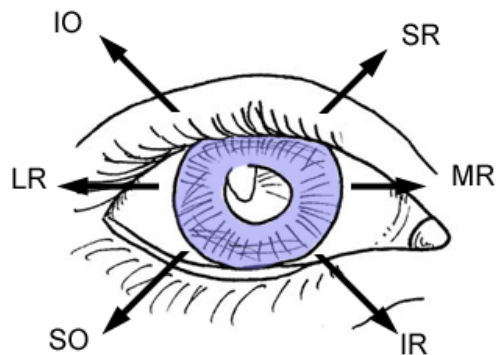
Right eye; anterior view

## Anatomical Actions

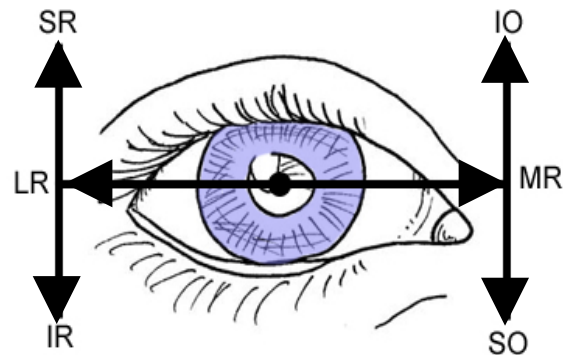


Anterior view of right eye - Clinical testing of eye muscles

## Clinical Testing

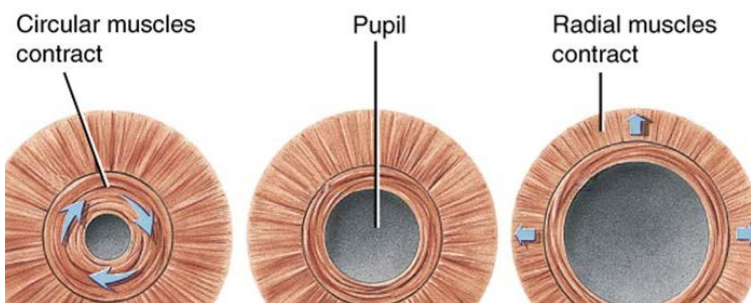


Right eye; anterior view

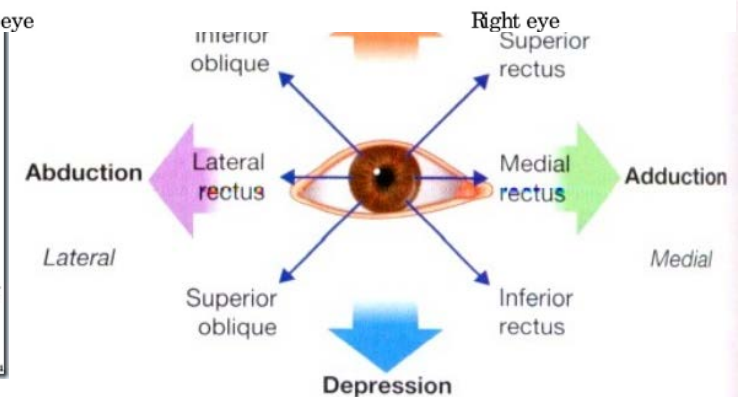
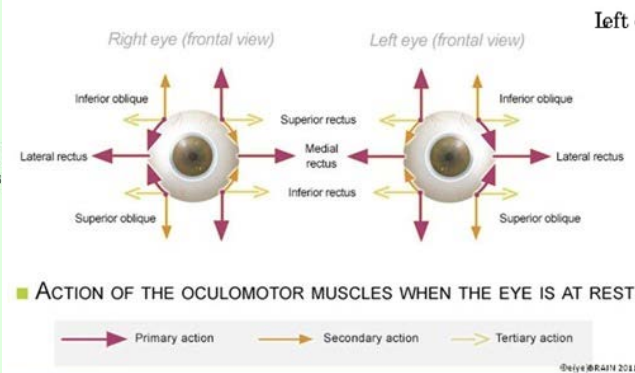
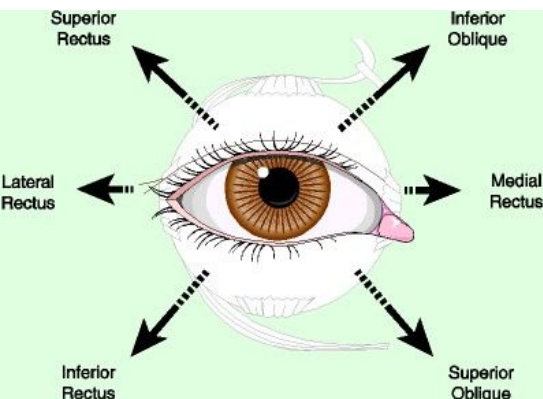
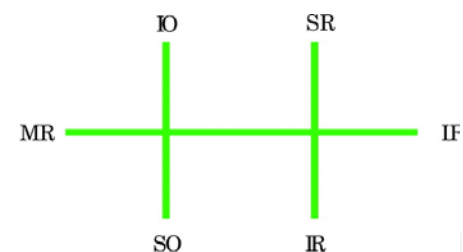
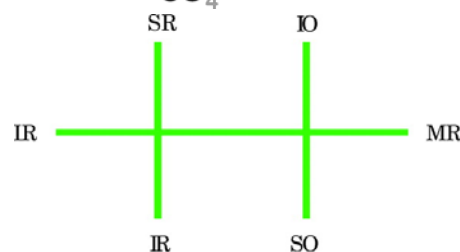
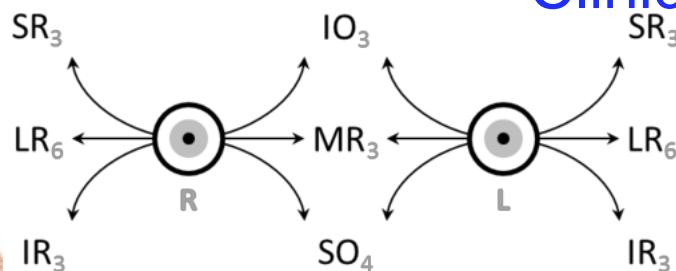


Anterior view of right eye - Clinical testing of eye muscles

## Anatomical Actions



## Clinical Testing

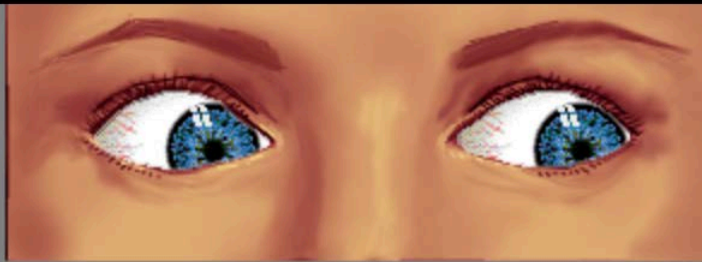


A 67-year-old woman suffers an injury to her right trochlear nerve. The movement she will most likely have difficulty doing is looking:

- A. Abduction
- B. Abduction and depression
- C. Abduction and elevation
- D. Adduction
- E. Adduction and depression
- F. Adduction and elevation

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- A. Abduction
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- C. Abduction and elevation
- D. Adduction
- E. Adduction and depression
- F. Adduction and elevation



### Muscle Settings

Right Eye

- ☒ Superior rectus
- ☒ Inferior rectus
- ☒ Medial rectus
- ☒ Lateral rectus
- ☒ Superior oblique
- ☒ Inferior oblique

Left Eye

- ☒ Superior rectus
- ☒ Inferior rectus
- ☒ Medial rectus
- ☒ Lateral rectus
- ☒ Superior oblique
- ☒ Inferior oblique

### Cranial Nerve Settings

Right Eye

- ☒ CN III
- ☒ CN IV
- ☒ CN VI

Left Eye

- ☒ CN III
- ☒ CN IV
- ☒ CN VI

☒ Enable Ptosis

*Check boxes to enable muscles and cranial nerves*

Quiz Mode

EyeTheory

Credits

<http://cim.ucdavis.edu/eyes/version15/eyesim.html>



# Some additional tutorials

A patient presents with paralysis of the extraocular eye muscles. There is an abolition of the corneal reflex but there is preservation of vision.

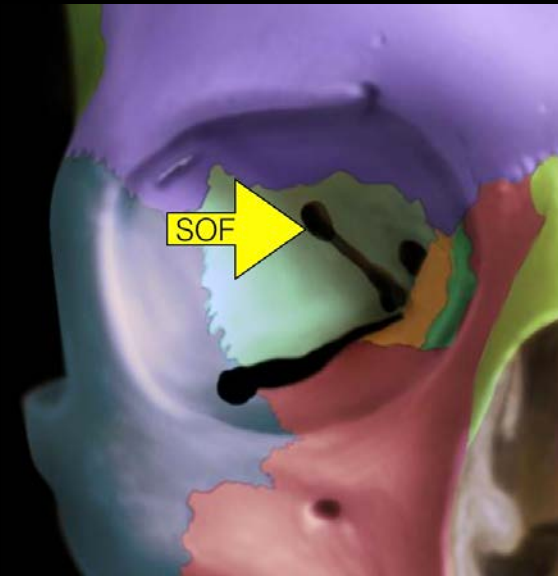
The most likely cause of this condition would be fracture of the:

- A. foramen rotundum
- B. petrous part of temporal bone (internal acoustic meatus)
- C. superior orbital fissure (Rochon-Duvigneaud's syndrome)
- D. pterygopalatine fossa (Sluder's syndrome)
- E. maxillary sinus

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The most likely cause of this condition would be fracture of the:

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- C. superior orbital fissure (Rochon-Duvigneaud's syndrome)**
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- E. maxillary sinus



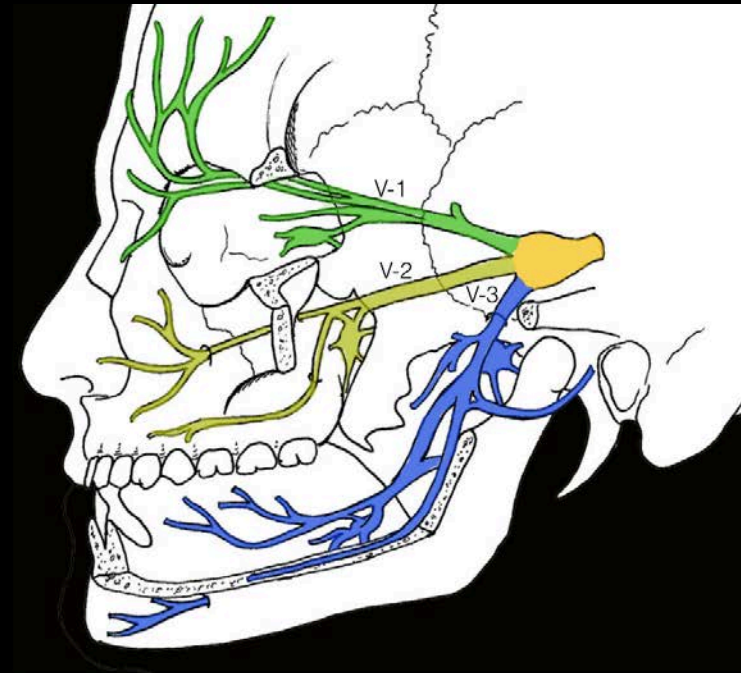
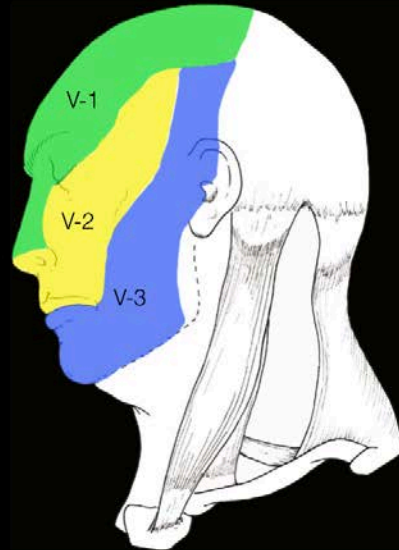
What other symptoms would this patient most likely present with?

- A. Anesthesia of the root of the nose and forehead
- B. Anesthesia of the upper lip and side of the nostrils
- C. Anesthesia of the lower lip and cheek
- D. Weakness in closing eye against resistance (facial paralysis)
- E. Weakness in clenching jaw
- F. Difficulty in saying “Ma-Ma-Ma-Ma-Ma”

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- F. Difficulty in saying “Ma-Ma-Ma-Ma-Ma”

Ophthalmic branch of  
trigeminal n. (CN V-1)



A 52-year-old woman suffers a lesion to her left oculomotor nerve. Identify symptom(s) this patient would most likely present with.

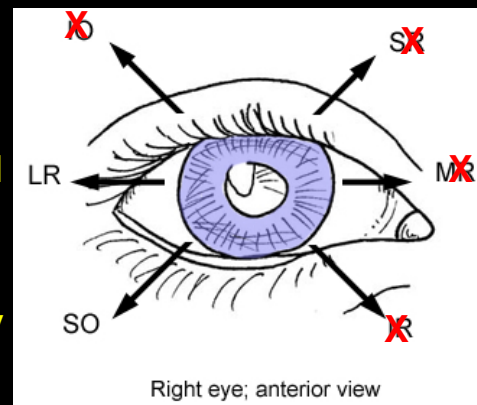
- A. Anesthesia of forehead
- B. Anesthesia of lower lip
- C. Anesthesia of mandibular teeth
- D. Anesthesia maxillary teeth
- E. Anesthesia of upper lip
- F. Anosmia
- G. Double vision when looking left
- H. Double vision when looking right
- I. Eye is positioned down and out
- J. Miosis (pin point pupil)
- K. Mydriasis (blown/large pupil)
- L. Ptosis
- M. Vision problems
- N. Weakness in clenching jaw

A 52-year-old woman suffers a lesion to her left oculomotor nerve. Identify symptom(s) this patient would most likely present with.

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- M. Vision problems
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CN VI

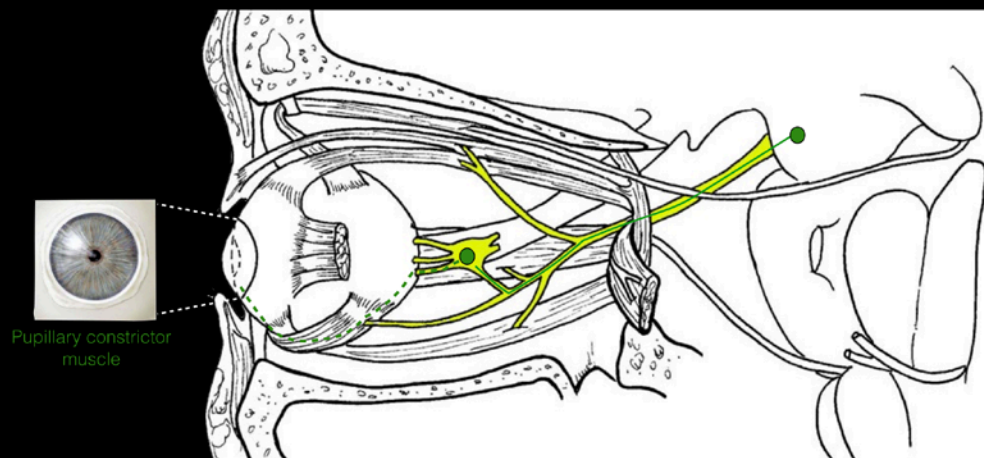
CN IV



### CN III. Oculomotor nerve

Function

Visceral motor to pupillary constrictor and ciliary muscles



A 45-year-old woman complains of double vision when looking to the right but not to the left.

Identify the side of the brainstem that is most likely injured.

- A. Medulla – left side
- B. Medulla – right side
- C. Midbrain – left side
- D. Midbrain – right side
- E. Pons – left side
- F. Pons – right side

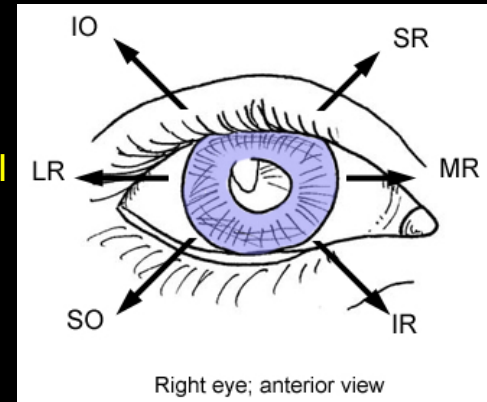


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- F. Pons – right side

CN VI

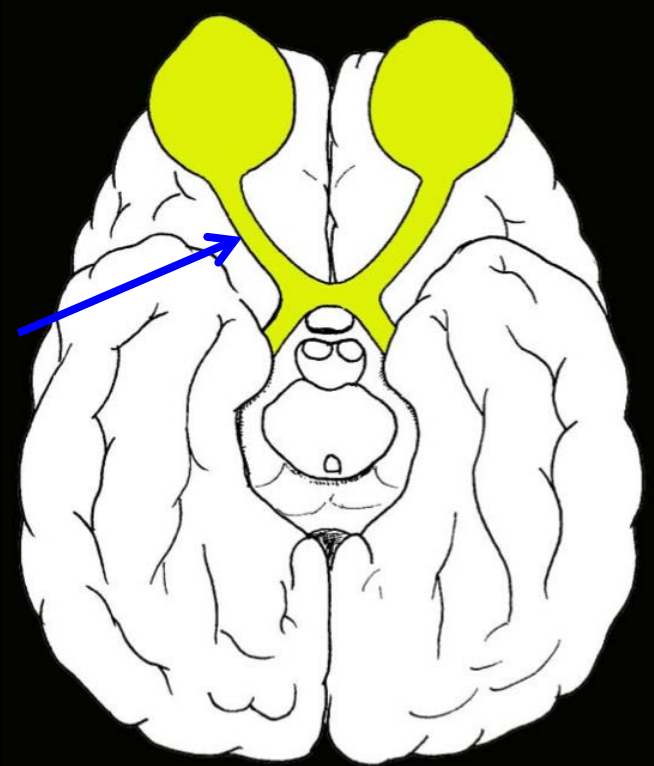


Patients with multiple sclerosis (MS) often experience numbness, tingling, pain, weakness, and balance problems. In addition, MS targets CN II up to 50% of the time. **Identify an additional symptom a patient with CN II involvement of MS would most likely experience.**

- A. Anesthesia of upper lip
- B. Anosmia
- C. Eye is positioned down and out
- D. Ptosis
- E. Vision loss
- F. Weakness in clenching jaw

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- C. Eye is positioned down and out
- D. Ptosis
- E. Vision loss
- F. Weakness in clenching jaw



The following list demonstrates symptoms associated with CN injury.  
**Identify the CN most likely associated with each injury.**

- Anesthesia of forehead
- Anesthesia of mandibular teeth and lower lip
- Anesthesia of maxillary teeth and upper lip
- Anosmia
- Mydriasis (blown/large pupil)
- Ptosis
- Vision problems
- Weakness in clenching jaw

The following list demonstrates symptoms associated with CN injury.  
**Identify the CN most likely associated with each injury.**

- Anesthesia of forehead (CN V-1)
- Anesthesia of mandibular teeth and lower lip (CN V-3)
- Anesthesia of maxillary teeth and upper lip (CN V-2)
- Anosmia (CN I)
- Mydriasis (blown/large pupil) (CN III)
- Ptosis (CN III and sympathetics)
- Vision problems (CN II)
- Weakness in clenching jaw (CN V-3)

The following list demonstrates symptoms associated with CN injury.  
**Identify the CN most likely associated with each injury.**

- Anesthesia of forehead
- Anesthesia of lower lip
- Anesthesia of mandibular teeth
- Anesthesia maxillary teeth
- Anesthesia of upper lip
- Anosmia
- Double vision when looking left
- Double vision when looking right
- Eye is positioned down and out
- Miosis (pin point pupil)
- Mydriasis (blown/large pupil)
- Ptosis
- Vision problems
- Weakness in clenching jaw

The following list demonstrates symptoms associated with CN injury.  
**Identify the CN most likely associated with each injury.**

- Anesthesia of forehead (CN V-1)
- Anesthesia of lower lip (CN V-3)
- Anesthesia of mandibular teeth (CN V-3)
- Anesthesia maxillary teeth (CN V-2)
- Anesthesia of upper lip (CN V-2)
- Anosmia (CN I)
- Double vision when looking left (left CN VI)
- Double vision when looking right (right CN VI)
- Eye is positioned down and out (CN III)
- Miosis (pin point pupil) (sympathetics)
- Mydriasis (blown/large pupil) (CN III)
- Ptosis (CN III and sympathetics)
- Vision problems (CN II)
- Weakness in clenching jaw (CN V-3)

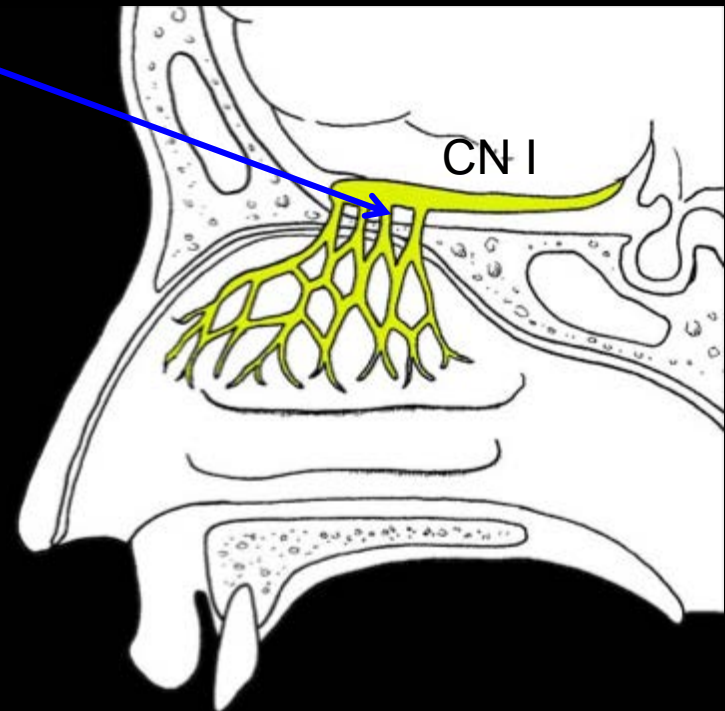
A 20-year-old man is brought to the ED following a motorcycle collision. PE shows clear fluid dripping from the nose. Radiographs confirm a fracture of the cribriform plate of the ethmoid bone. Identify symptom(s) this patient would most likely present with as a result of this fracture.

- A. Anesthesia of forehead
- B. Anesthesia of lower lip
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Tic-Douloureux is a neuropathic disorder characterized by sudden attacks of excruciating, lightening-like jabs of facial pain (paroxysm). This sudden stabbing pain is often set off by touching the face, brushing the teeth, shaving, and/or chewing.

The cause of this condition is unknown, but the nerve causing this condition is not. Identify the most likely nerve associated with this condition.

- A. Oculomotor nerve
- B. Facial nerve
- C. Glossopharyngeal nerve
- D. Trigeminal nerve
- E. Vagus nerve

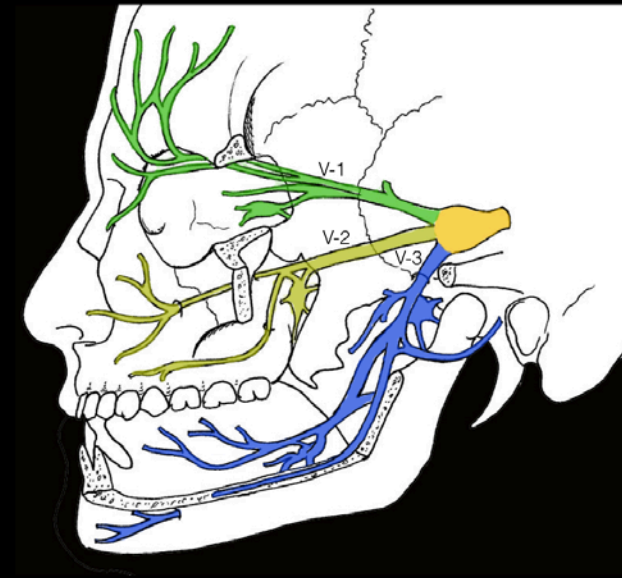
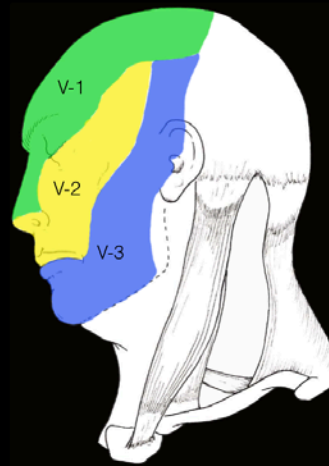
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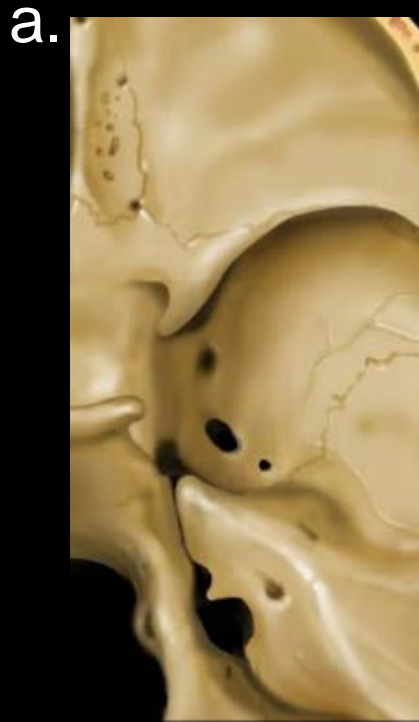
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- B. Facial nerve
- C. Glossopharyngeal nerve
- D. Trigeminal nerve
- E. Vagus nerve

CN V. Trigeminal nerve

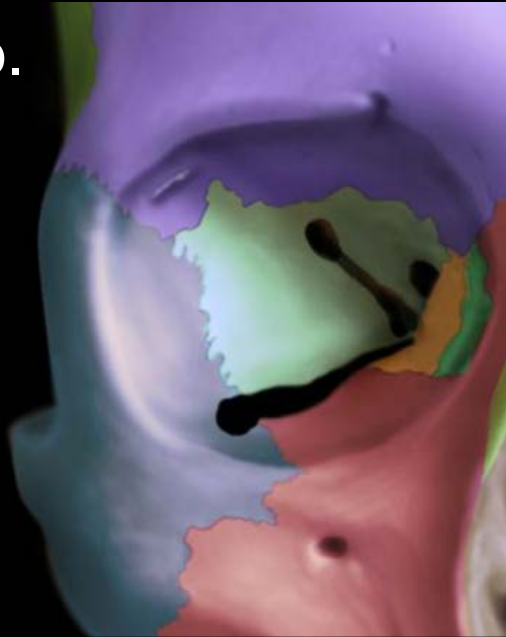
CN V. Trigeminal nerve



One of these things is not like the other



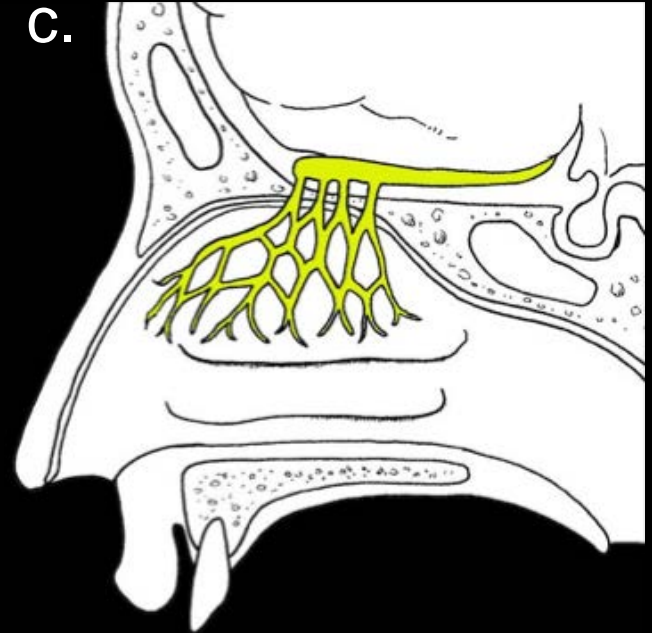
b.



d.



c.



e.



One of these things is not like the other

