

Session Objectives

- Infer what structures can be affected by blowout fractures of the orbit.
- Differentiate actions and functions of extraocular muscles.
- Describe how extraocular muscles work in pairs to induce or avoid torsion.
- Describe how the extraocular muscles work in pairs to move the eye in primary position.
- Predict lesions in nerves of the orbit based on tests of extraocular muscles.

BP:16.6
ST: 4.0
13
10:25 AM



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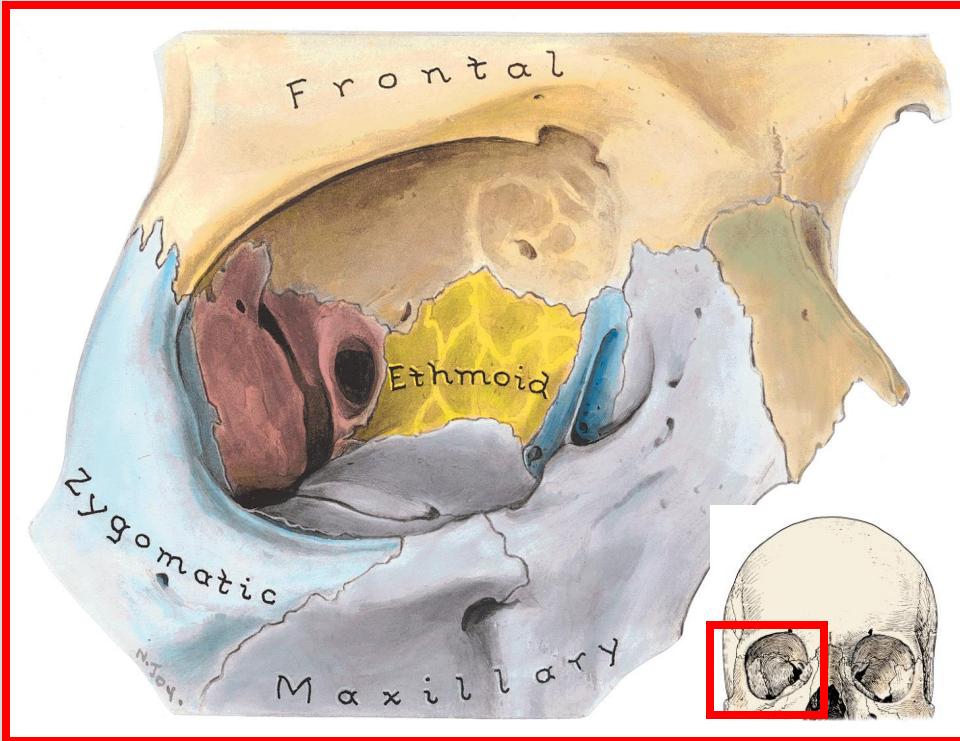
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Axial MRI of Head

- Orbit is full of adipose tissue!

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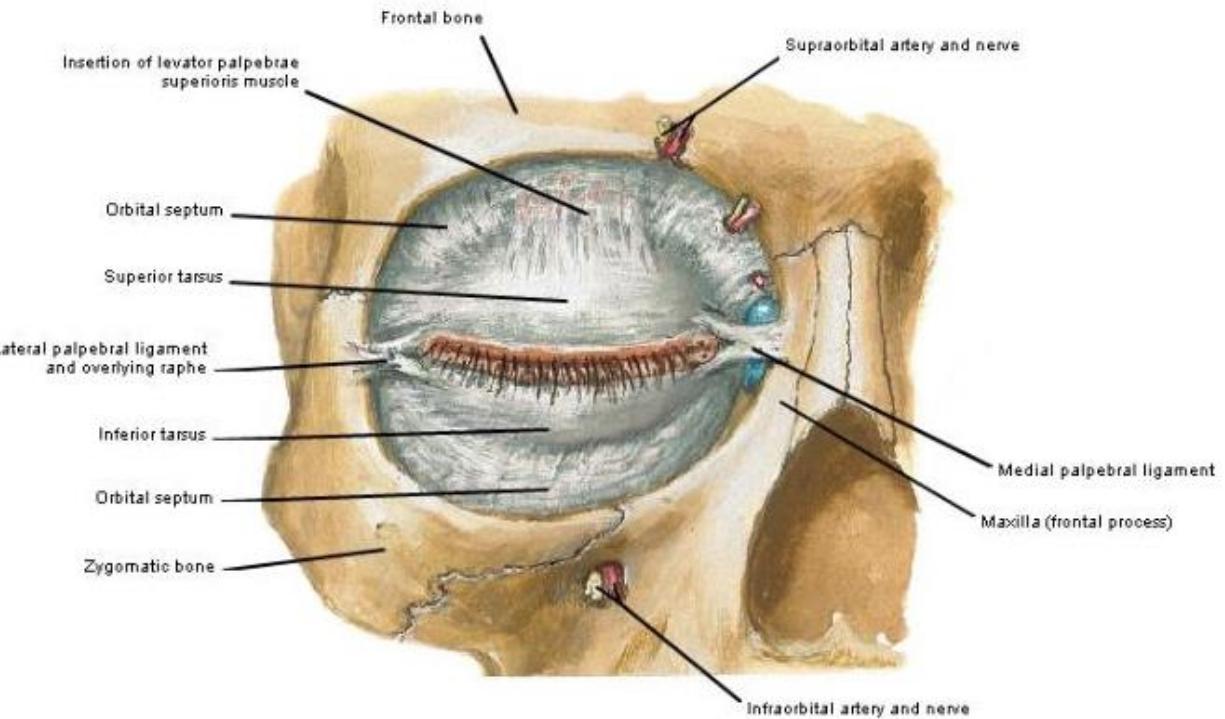
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From COA, Moore and Dalley (2006)

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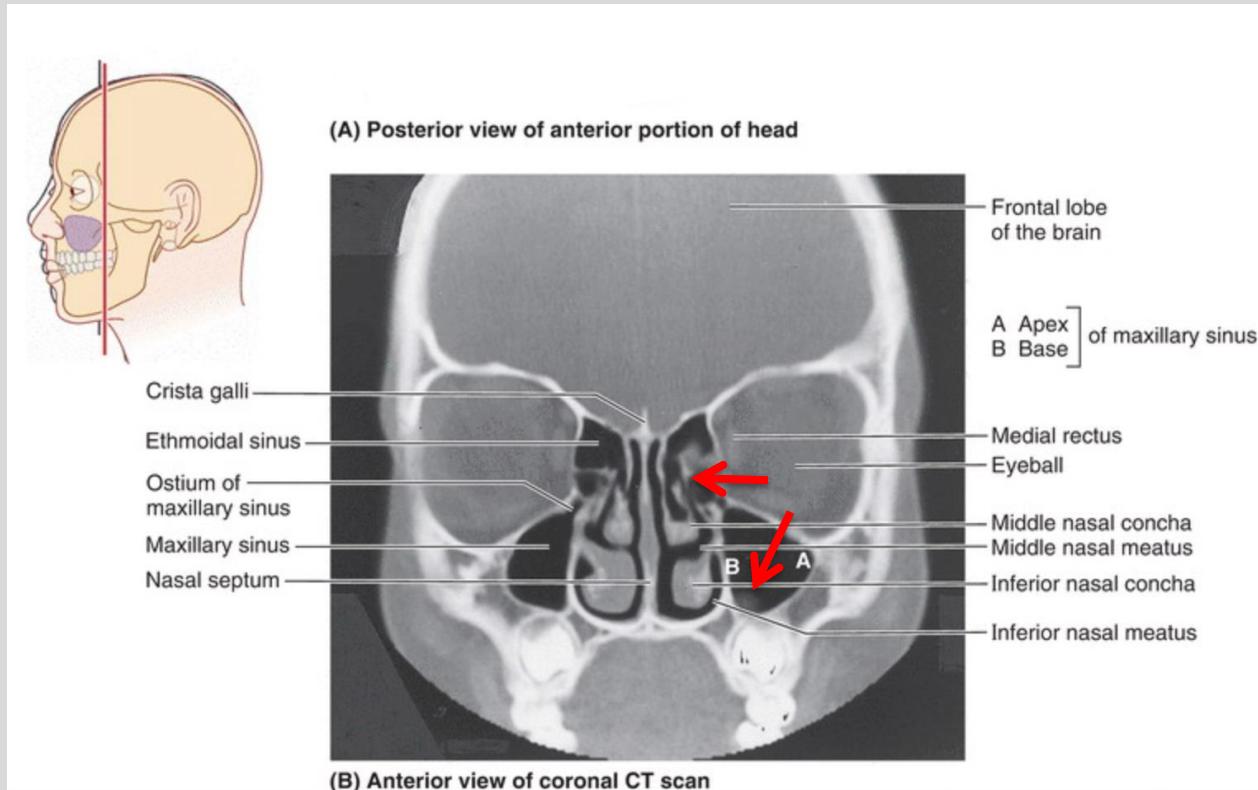


From Netter's Atlas of Anatomy

Trauma in the Orbit

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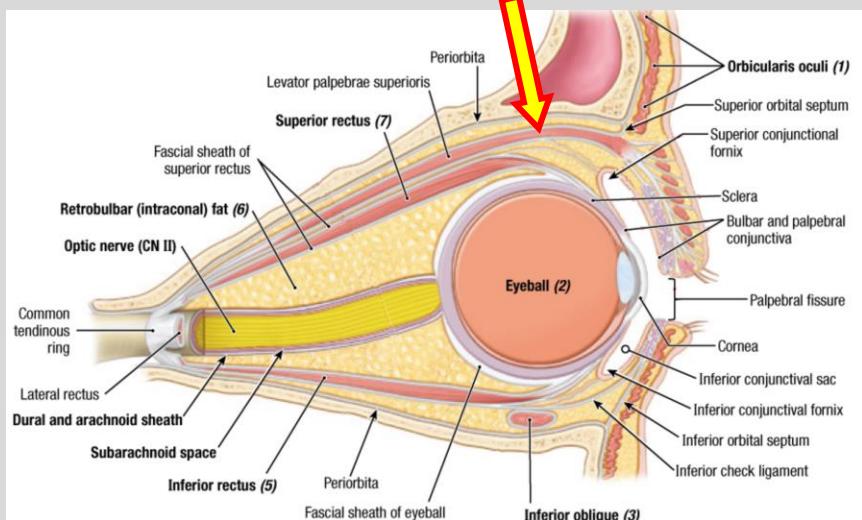


- When under pressure orbit contents can break into surrounding spaces.
- Called blowout fractures

From COA, Moore, Dalley, Agur, 2014

Levator palpebrae superioris

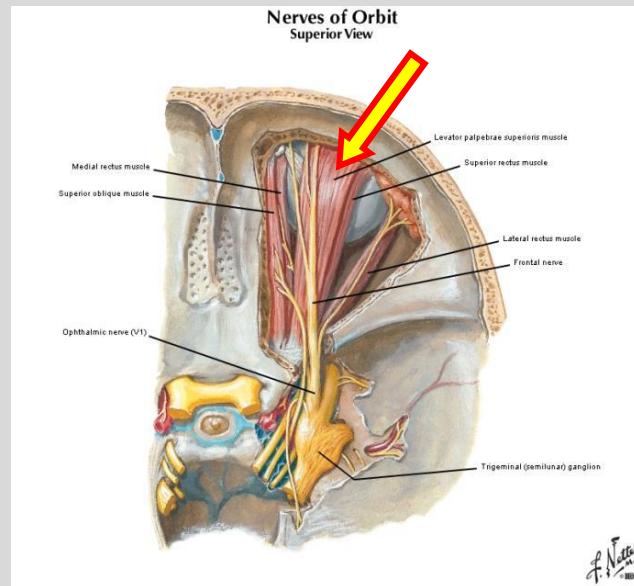
- Origin: lesser wing of sphenoid
- Insertion: superior tarsus and superficial fascia of eyelid
- Contains smooth muscle fibers (superior tarsal or Müller's muscle)



From COA, Moore, Dalley, Agur, 2014

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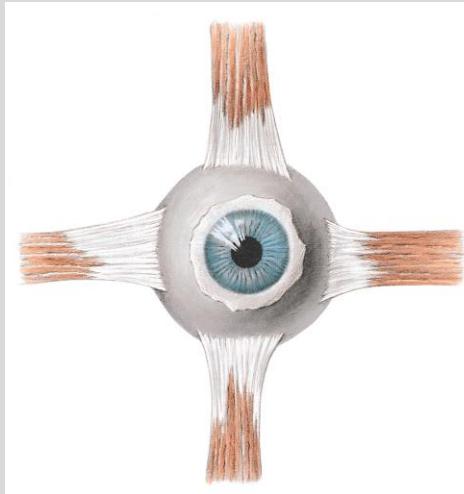
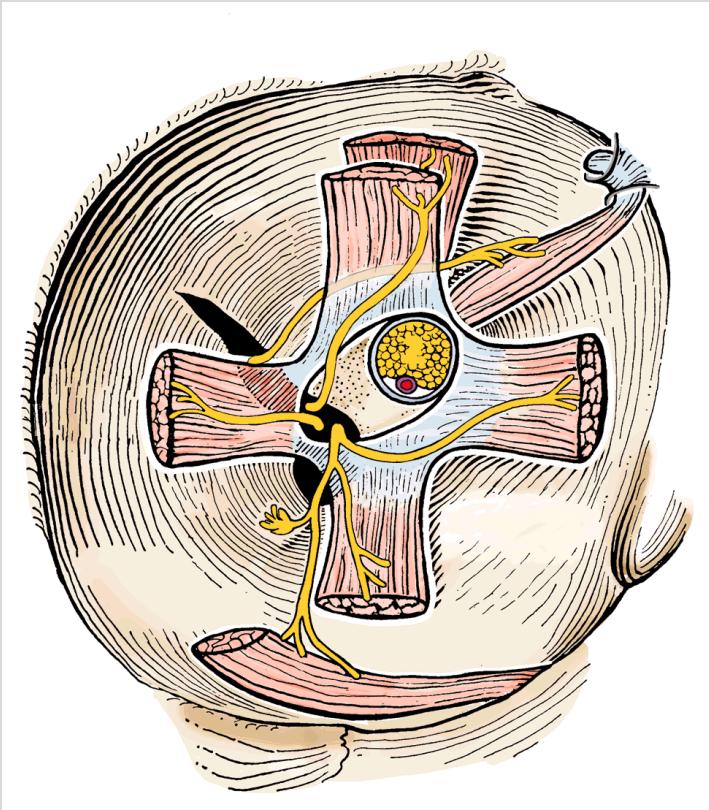


From Netter's Atlas of Anatomy

Recti Muscles

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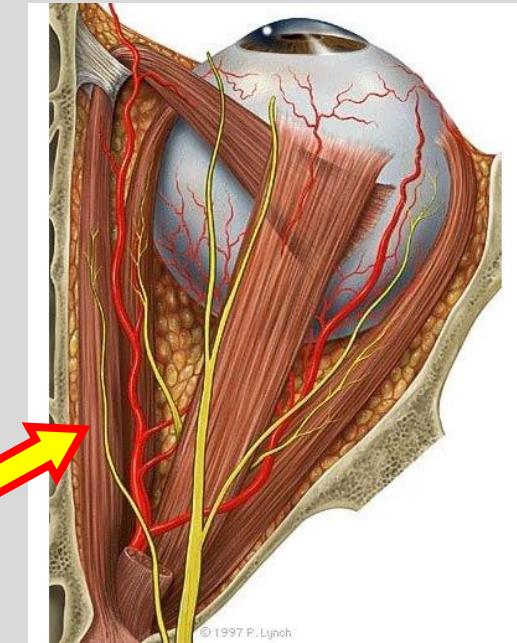


- Superior, inferior, medial, and lateral
- Originate from common tendinous ring
- Insert into sclera immediately posterior to cornea

From COA, Moore and Dalley, Agur, 2005

Superior oblique

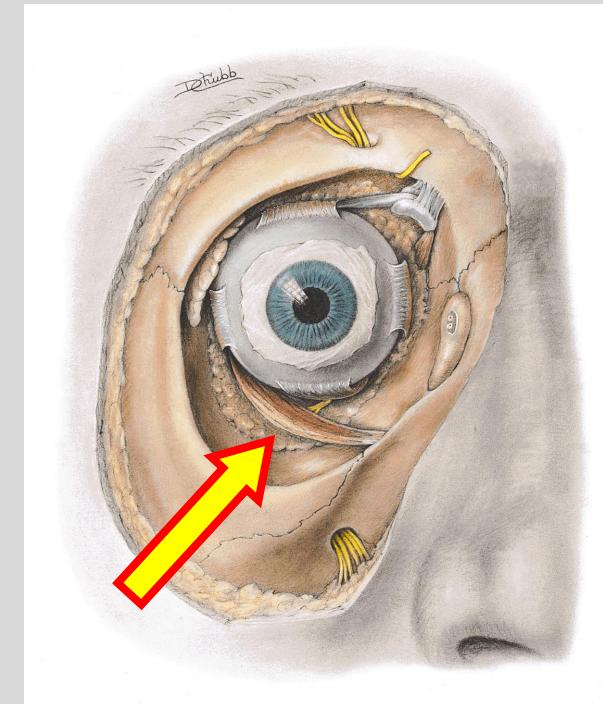
- Originates from lesser wing of sphenoid
- Passes through *trochlea*
- Inserts into sclera deep to superior rectus



Oblique Muscles

Inferior oblique

- Originates from medial orbital wall
- Passes posterolaterally beneath eyeball
- Inserts into sclera deep to lateral rectus



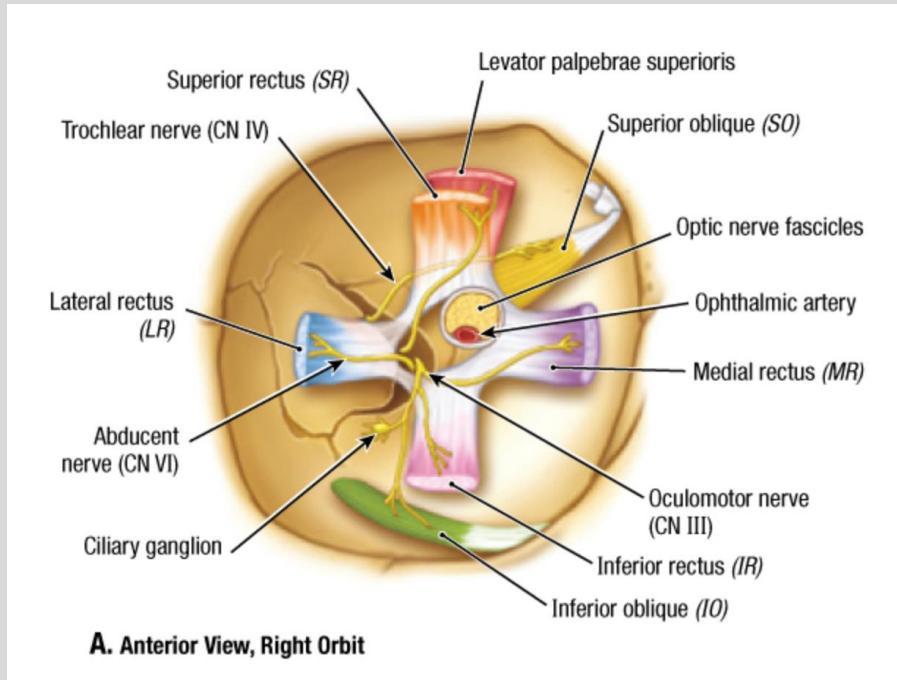
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Innervation

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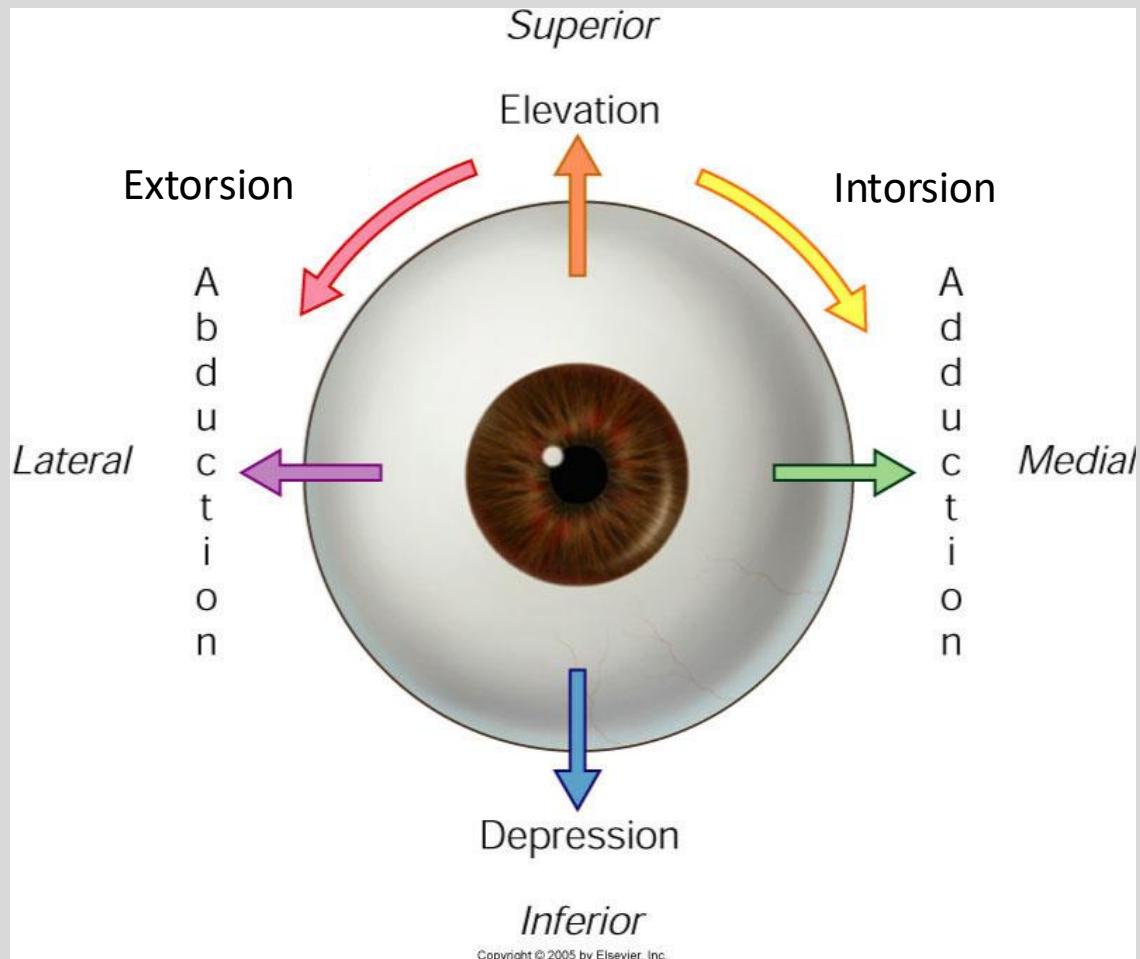
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From COA, Moore, Dalley, Agur, 2014

- Superior Tarsal (Muller's) muscle: postganglionic sympathetics from superior cervical ganglion

- $SO_4 LR_6 AO_3$
- Superior Oblique: Trochlear n. (CNIV)
- Lateral Rectus: Abducens n. (CNVI)
- All Others: Oculomotor n. (CNIII)



Actions on Eyeball

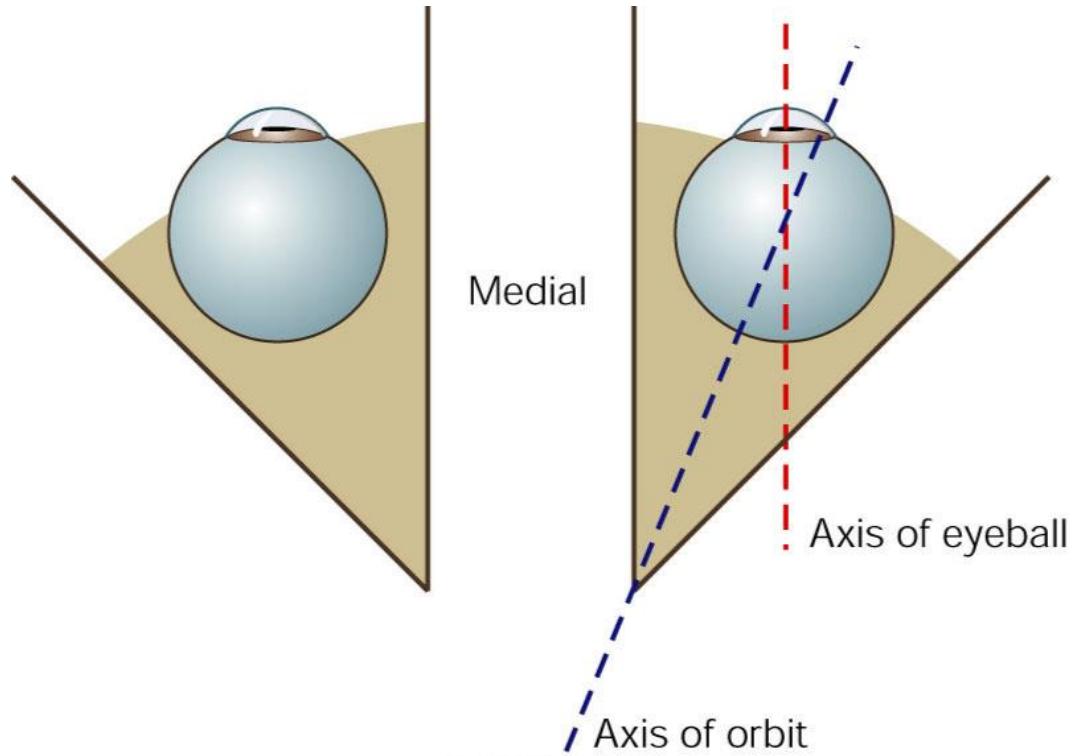
Actions vs. functions of extraocular muscles

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- *Action* is what it would do if acted in isolation
- A muscle's *function* is what it *actually* contributes to a particular motion
- Sometimes these are the same – example: Levator palpebrae superioris

*Let's start with the
simple cases ...*



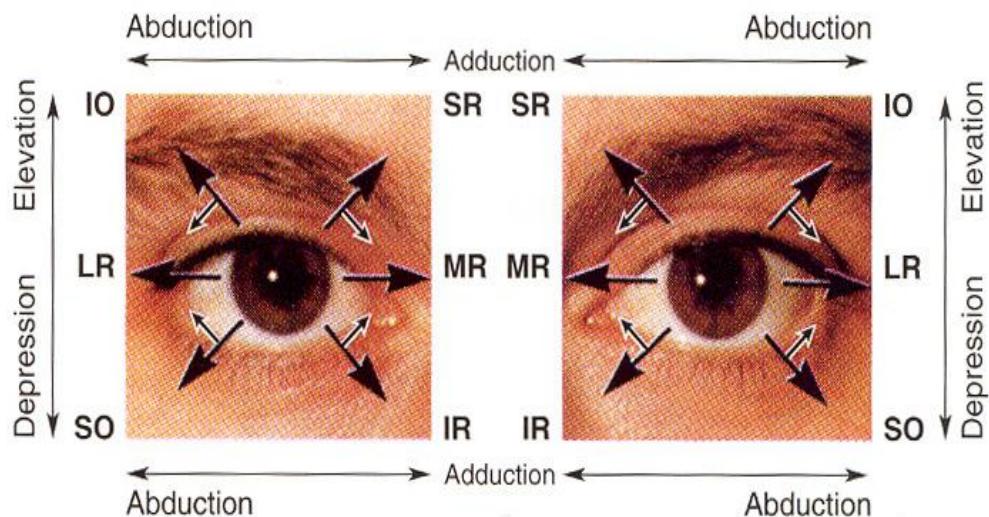
Textbook Actions of Extraocular Muscles

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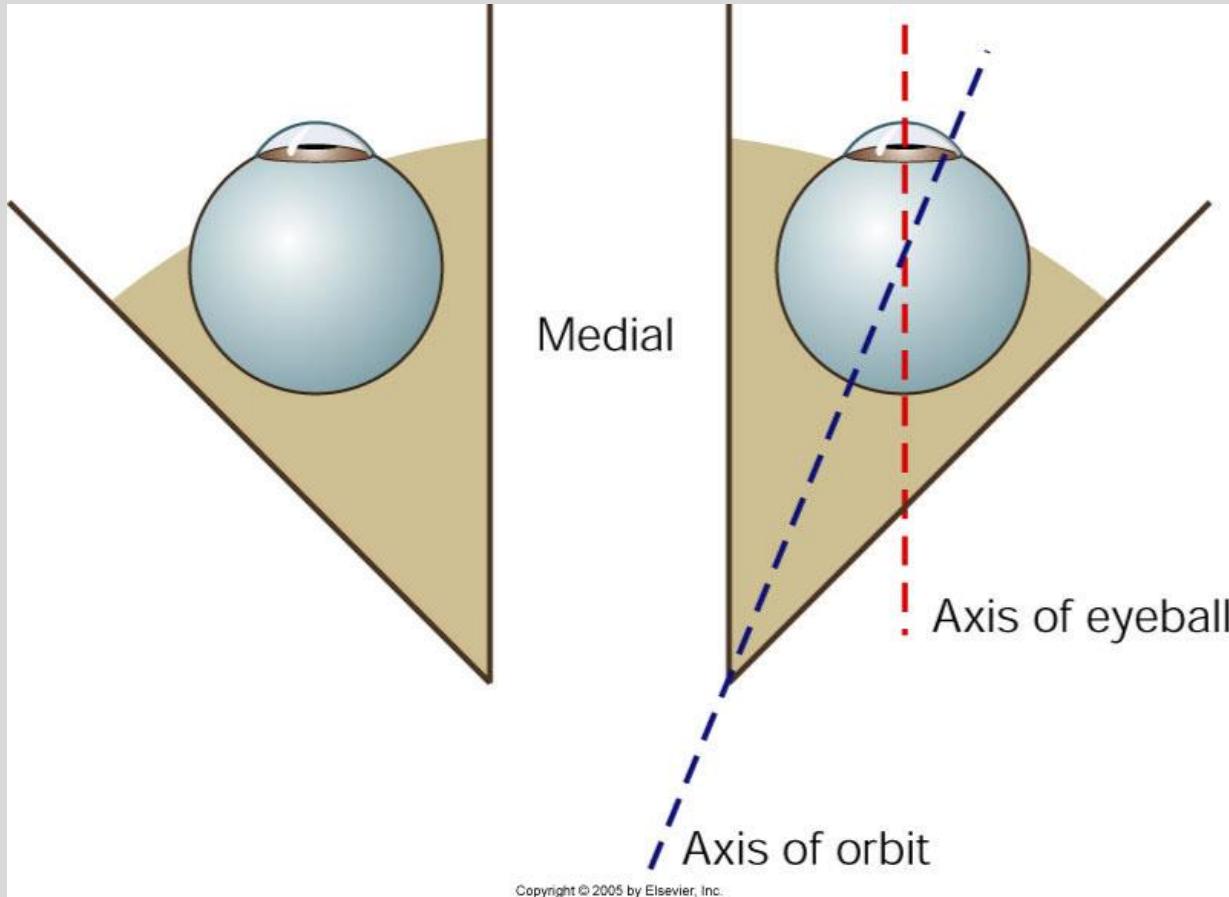
Agur & Dalley 2005

TABLE 8.5. MUSCLES OF ORBIT

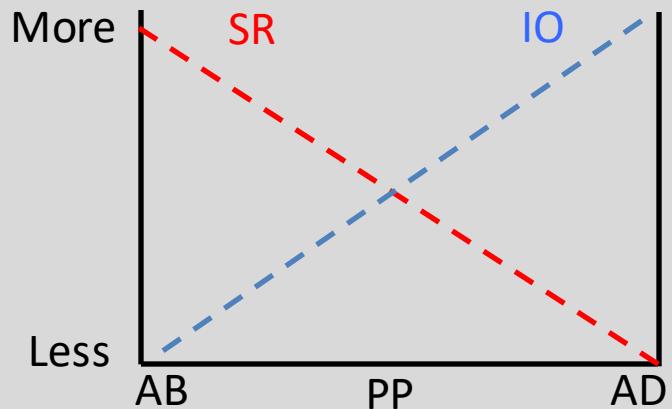


- Eye is in
PRIMARY POSITION

Torsion Often
Accompanies
Actions of
Extraocular
Muscles



Elevation (right eye)



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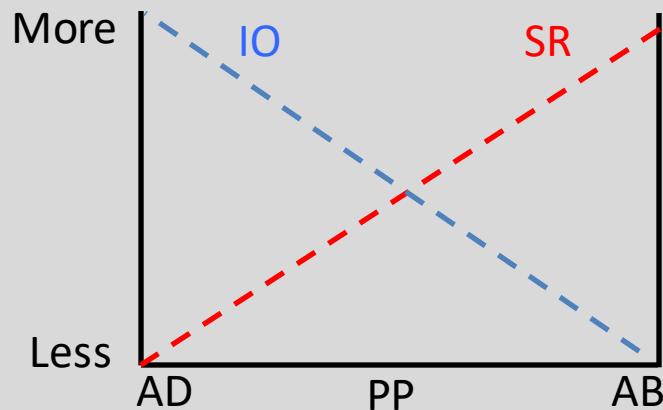
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Elevation (left eye)

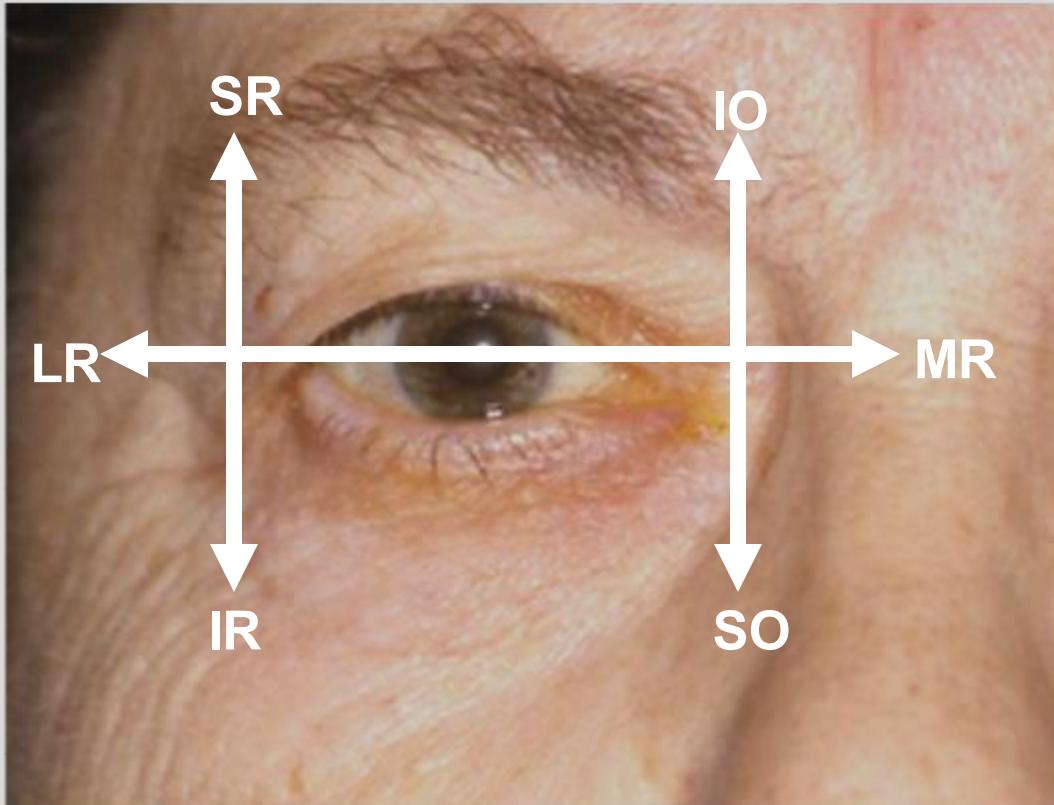


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Testing Extraocular Muscles and the Nerves that Innervate Them



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- “H” shaped pattern is used to test the extraocular muscles
- “Forcing” function = action

Patient presents
with....

“Down and out”



Patient presents
with....

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Bielschowsky's sign



Summary Slide

- Contents of the orbit are not compressible. Thus pressure requires defects in its base or walls.
- Action and Function often mean very different things for extraocular muscles.
- Torsion occurs when the optic axis is at an angle to axis of the orbit.
- Torsion is helpful when tilting the head.
- Action and Function are usually described relative to primary position. Obviously the eye can be looking elsewhere.
- Extraocular muscle function is tested by having the patient NOT in primary position.

Lecture Feedback Form:

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<https://comresearchdata.nyit.edu/redcap/surveys/?s=HRCY448FWYXREL4R>

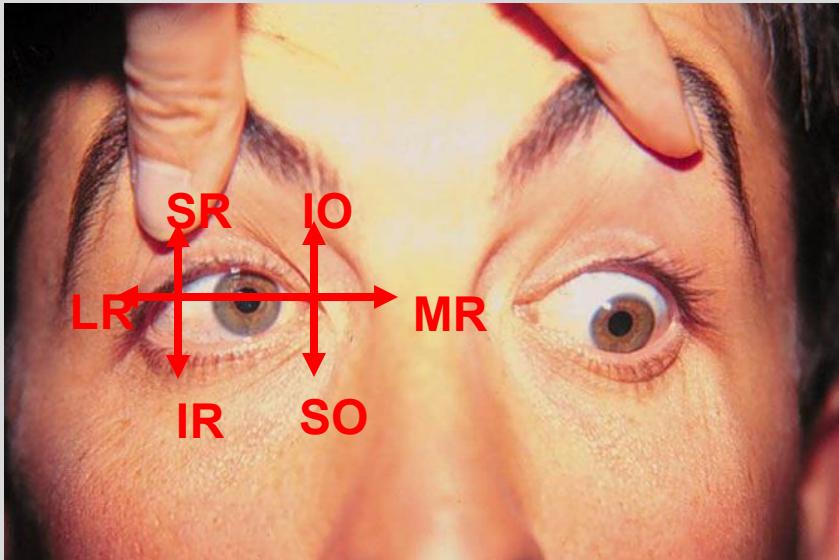
Patient presents as



What is the affected structure?

- a) left lateral rectus
- b) left medial rectus
- c) right abducens nerve
- d) right oculomotor nerve
- e) right trochlear nerve

Patient presents as



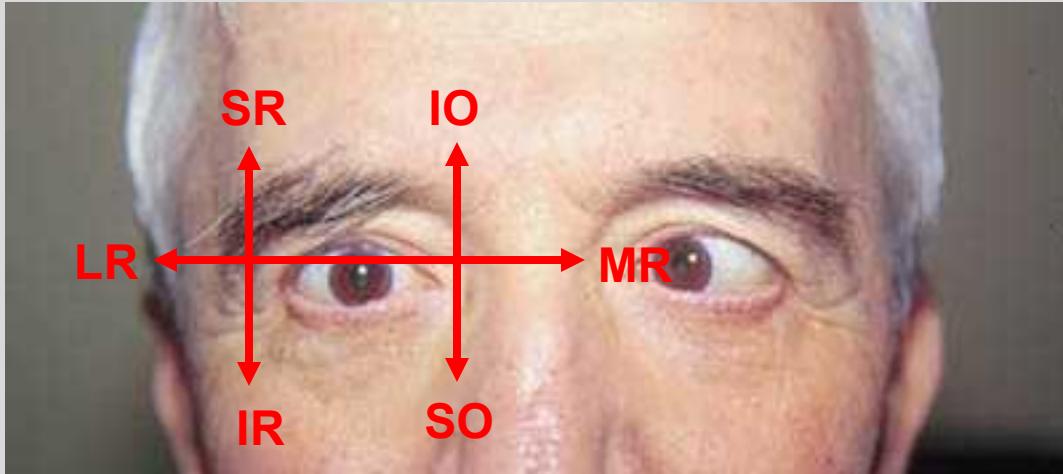
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What is the affected structure?

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- c) right abducens nerve
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Patient presents as



What is the affected structure?

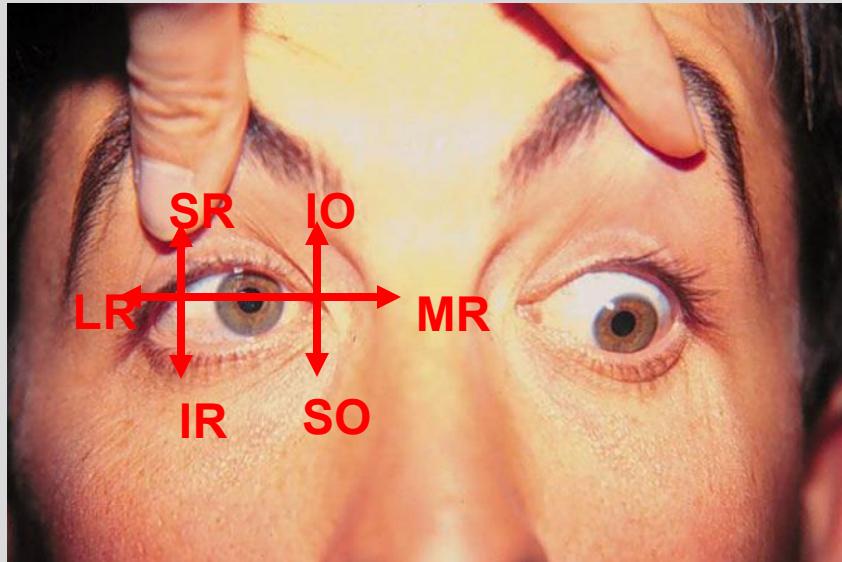
- a) left lateral rectus
- b) left medial rectus
- c) right abducens nerve
- d) right oculomotor nerve
- e) right trochlear nerve

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Rationale: You have asked the patient to follow the light. Whereas the left eye can follow the light, the right eye remains in primary position instead of abducting. Thus the right abducens nerve and/or the lateral rectus, which it innervates, are affected.

Patient presents as



Rationale: Whereas the left eye can follow the light, the right eye is elevated in the adducted position. This indicates that the right trochlear nerve and/or superior oblique, the muscle it innervates, is affected.



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What is the affected structure?

- a) left lateral rectus
- b) left medial rectus
- c) right abducens nerve
- d) right oculomotor nerve
- e) **right trochlear nerve**