

# It's in the Eyes: Understanding Gaze and Visual Field Disorders

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# Disclosures

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None

# Objectives

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1. Distinguish gaze disorder findings in the anterior vs. posterior circulation.
2. Describe visual field disorder findings associated with anterior and posterior circulation stroke.
3. Correctly score the NIHSS to reflect deficits in gaze and visual field disorders.

# It's in the eyes: I hate the eyes!

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- Homonymous Hemianopia
- Visual field cut
- Gaze preference
- Nystagmus
- INO
- Diplopia



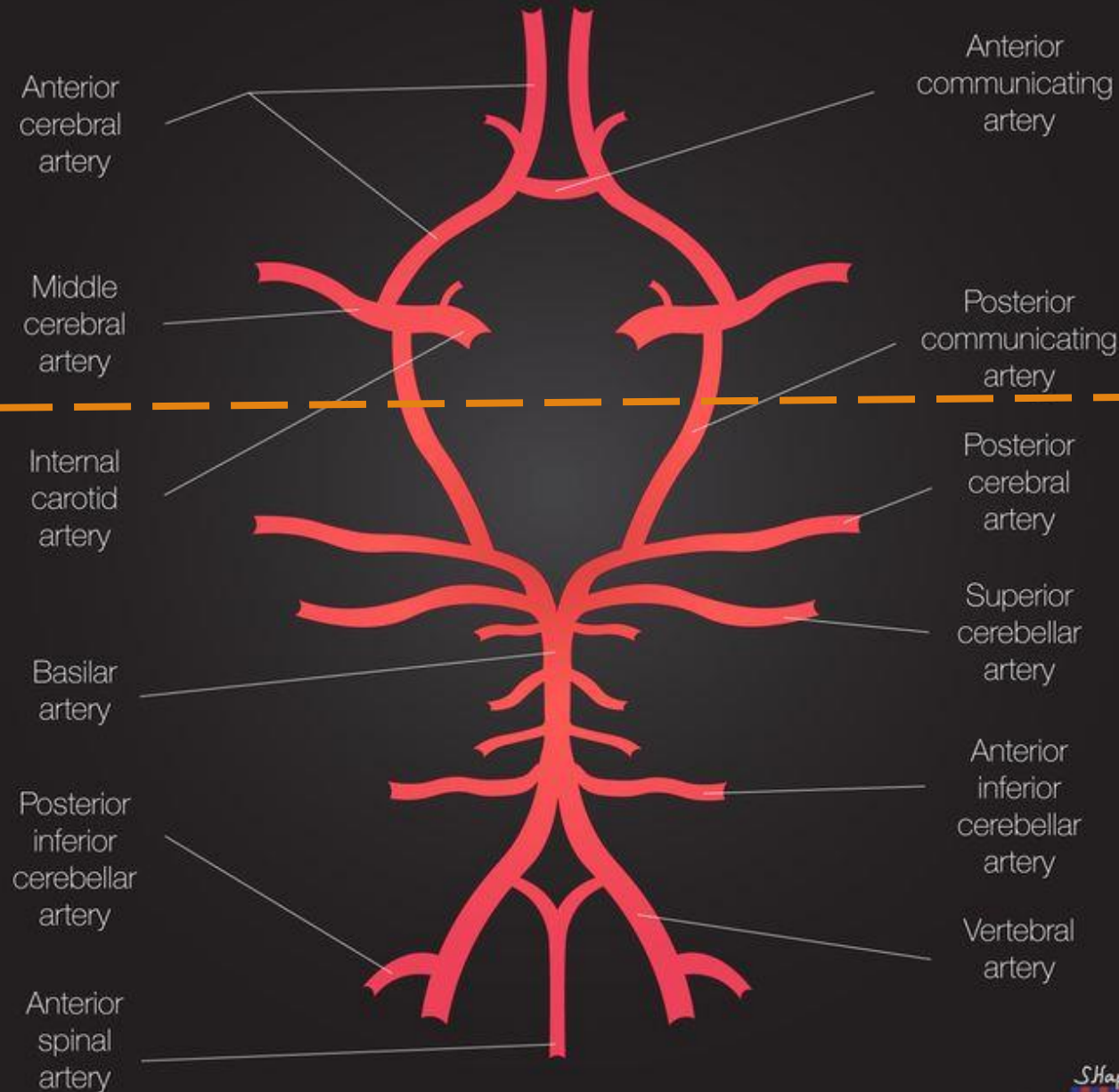
PCA, MCA, vertebrobasilar?!



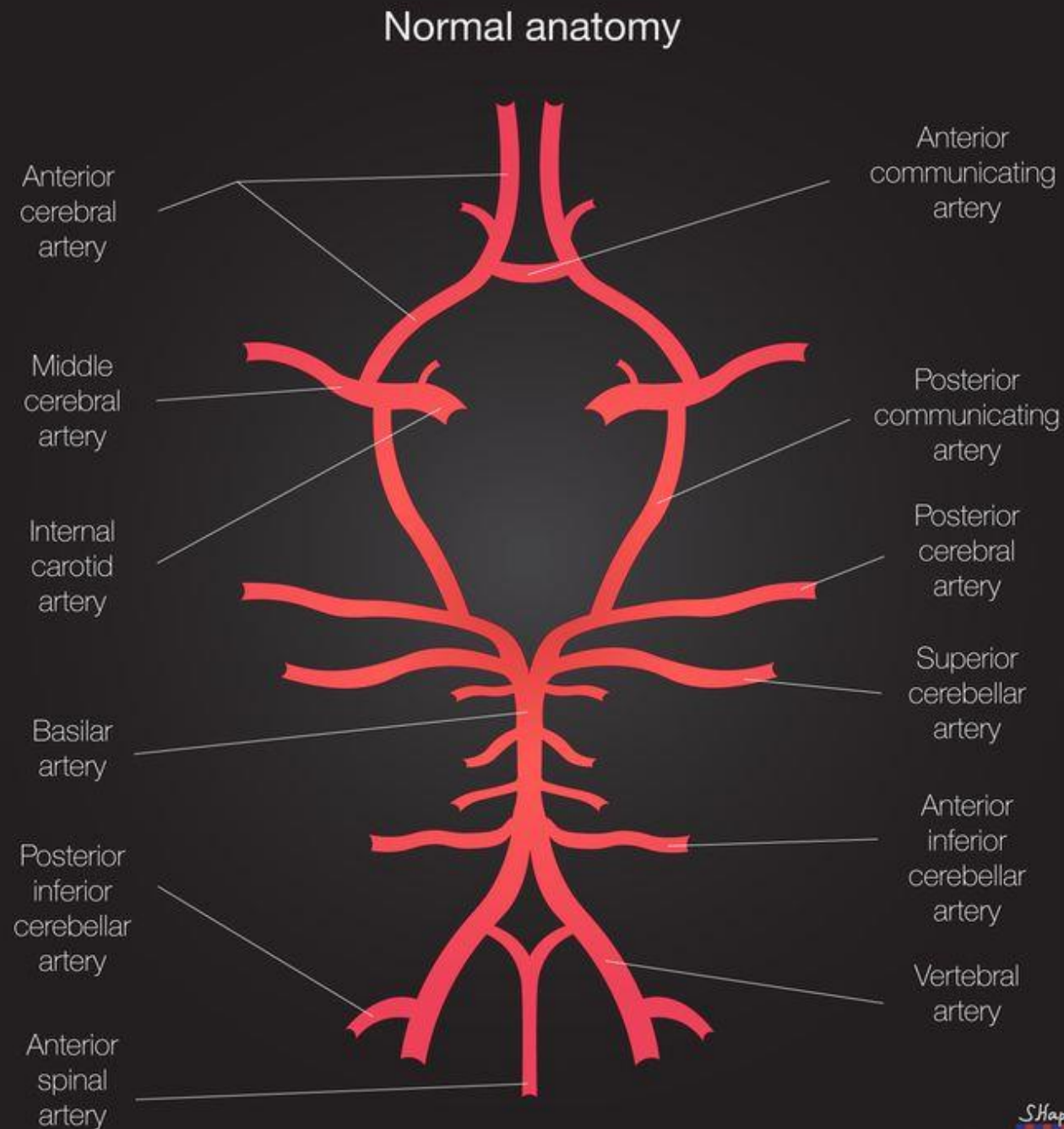
Anterior

Posterior

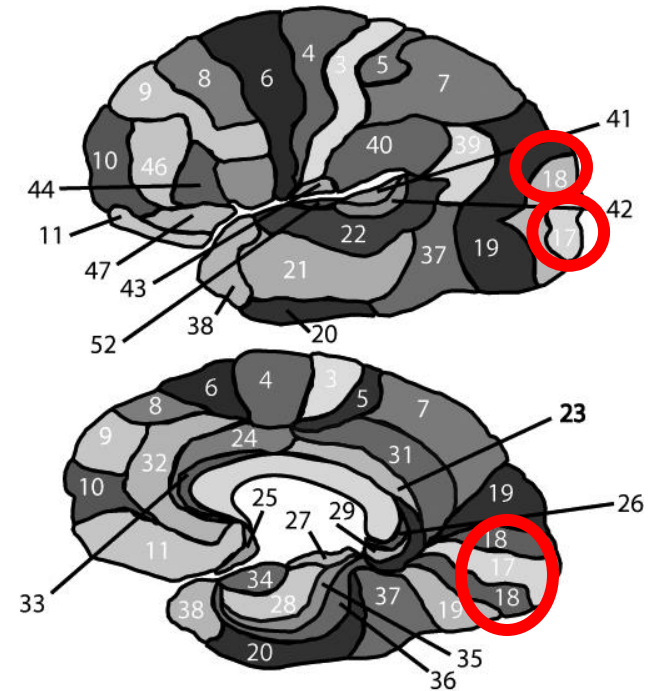
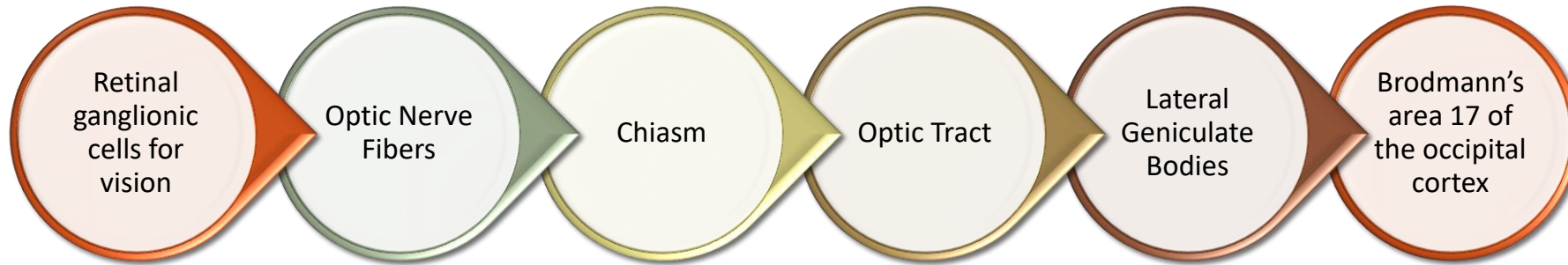
### Normal anatomy



# “PCA eyes”



# The Course of Visual Stimuli

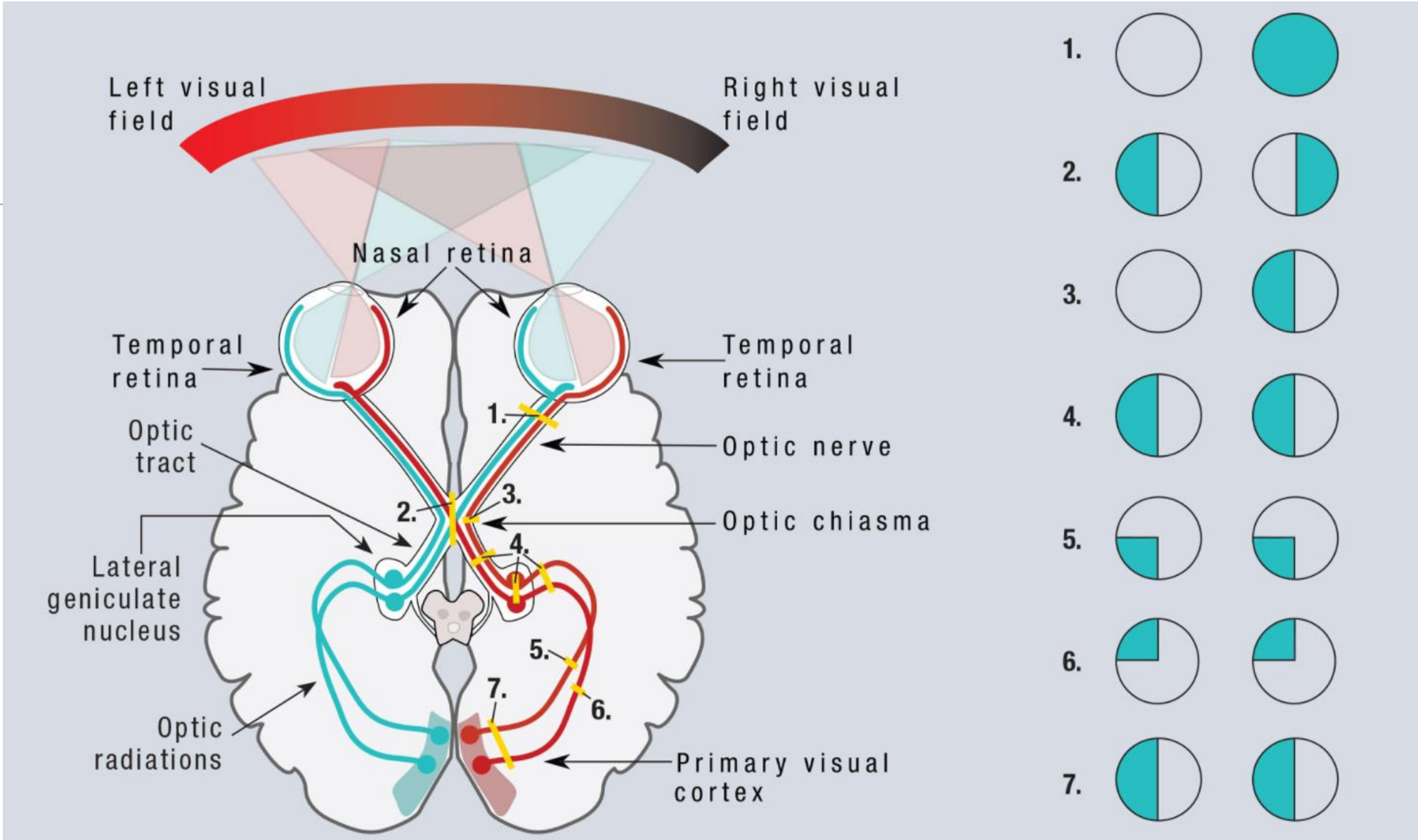


Area 17:

- Primary visual cortex

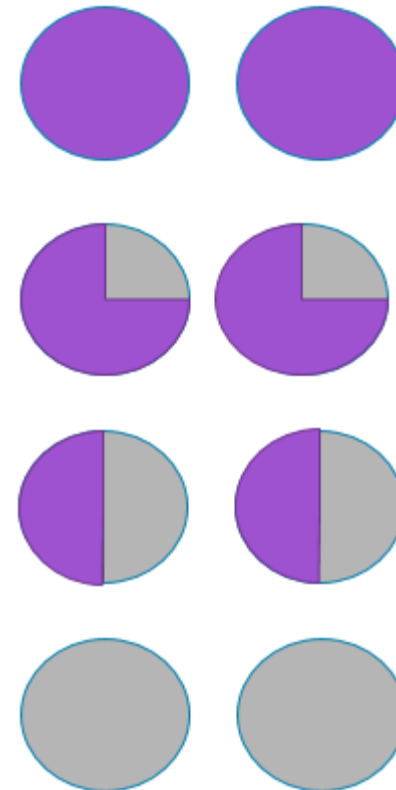
Areas 18:

- Visual association cortex



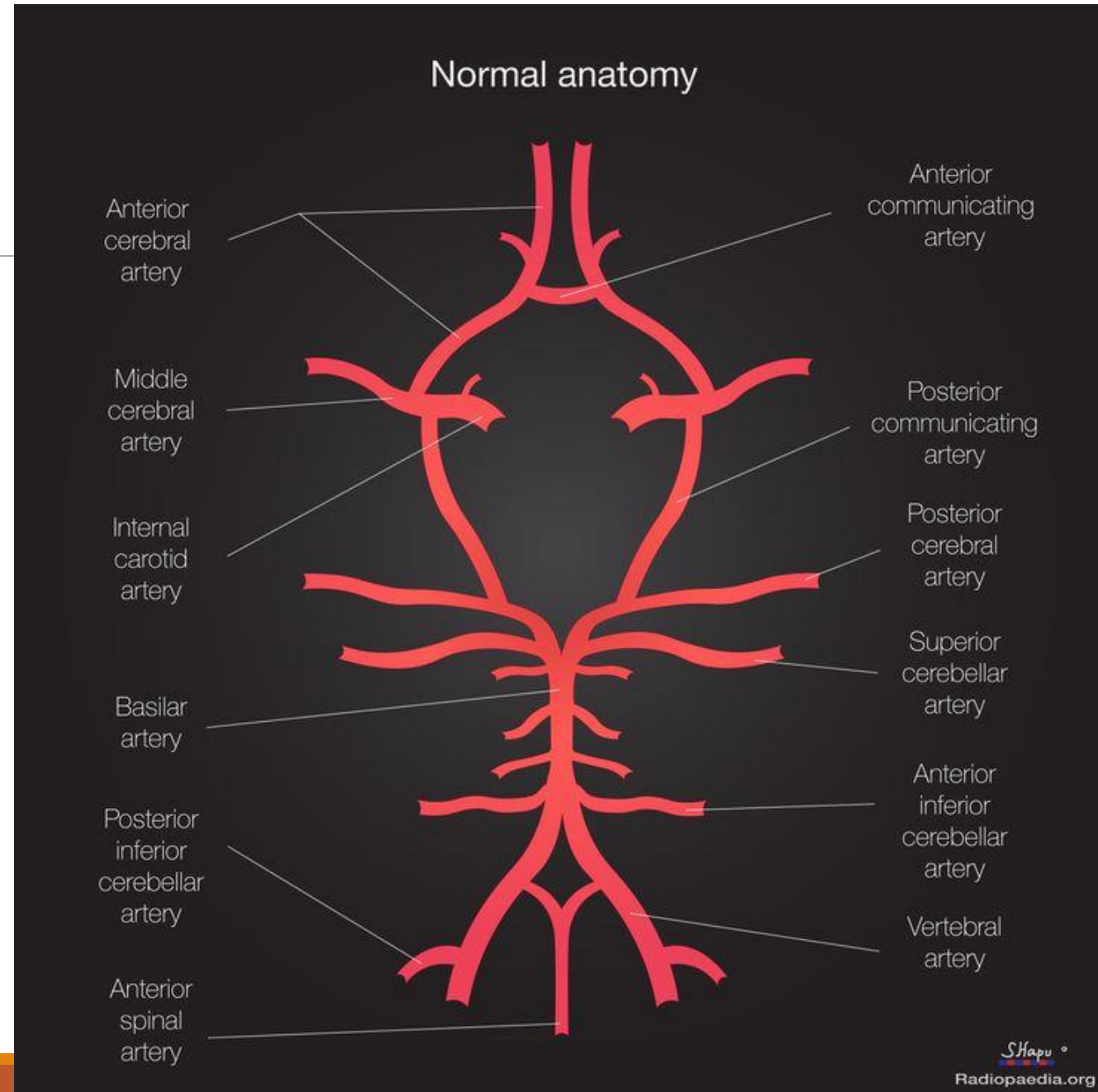
# NIHSS: Visual Fields; CN II

Item 3: Visual Fields		
No vision loss	0	No vision loss
Partial hemianopia	1	Missing a quadrant of vision in each eye
Complete hemianopia	2	Missing half of the vision in each eye
Bilateral hemianopia	3	Cannot see- blindness



# Cortical Blindness

- May result from a single or consecutive events
- Most often the result of simultaneous or successive PCA occlusions –
  - Top of the basilar occlusion



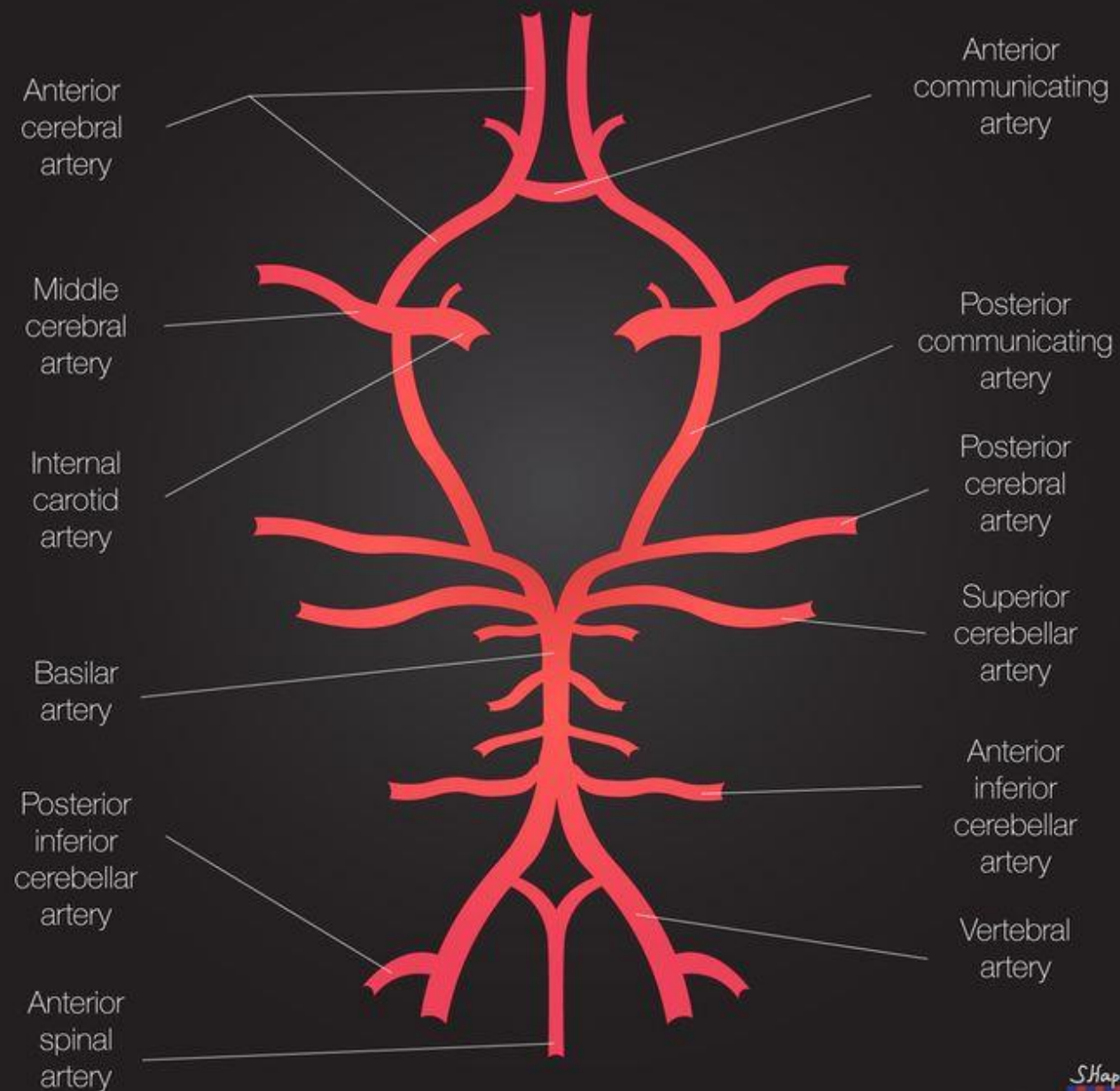
# Visual Field Localization Rules

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- Confrontation must be used in patients with poor attention, cognitive limitations that affect cooperation, or in cases of altered consciousness
- Defects of one eye (monocular) = retina or optic nerve
- Defects of both eyes (binocular) = chiasm or beyond
- Homonymous hemianopias are always beyond the chiasm

# “MCA eyes”

## Normal anatomy



# NIHSS: Best Gaze; CN III, CN VI

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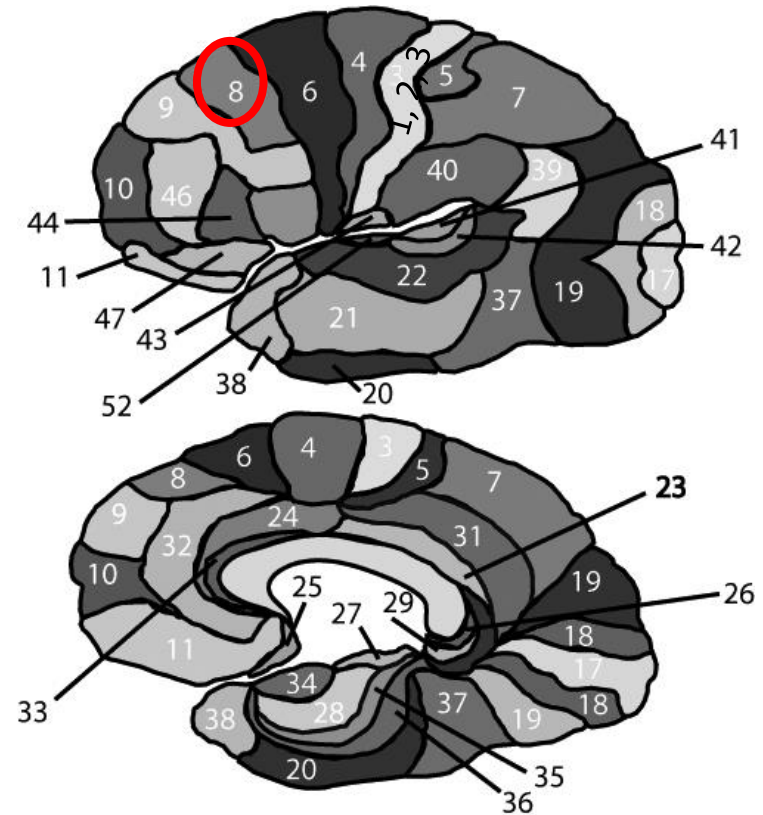
Item 2: Best gaze		
Normal	0	Normal side to side eye movement
Partial gaze palsy	1	Partial side to side eye movement
Forced deviation	2	No side to side eye movement

# Brodmann Area 8: Frontal Eye Fields

The frontal eye fields are responsible for saccadic eye movements

- Allows the eyes to rapidly move together to surveil visual content

Interruption of this area of the brain causes conjugate eye deviation toward the affected MCA territory



# Right way eyes vs. Wrong way eyes

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## RIGHT WAY

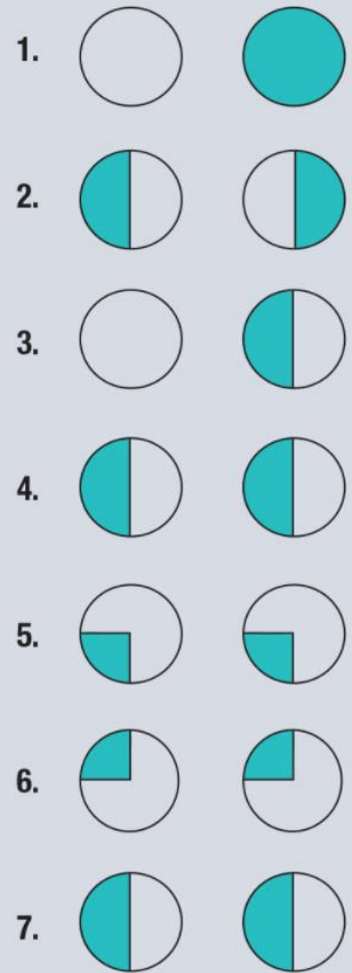
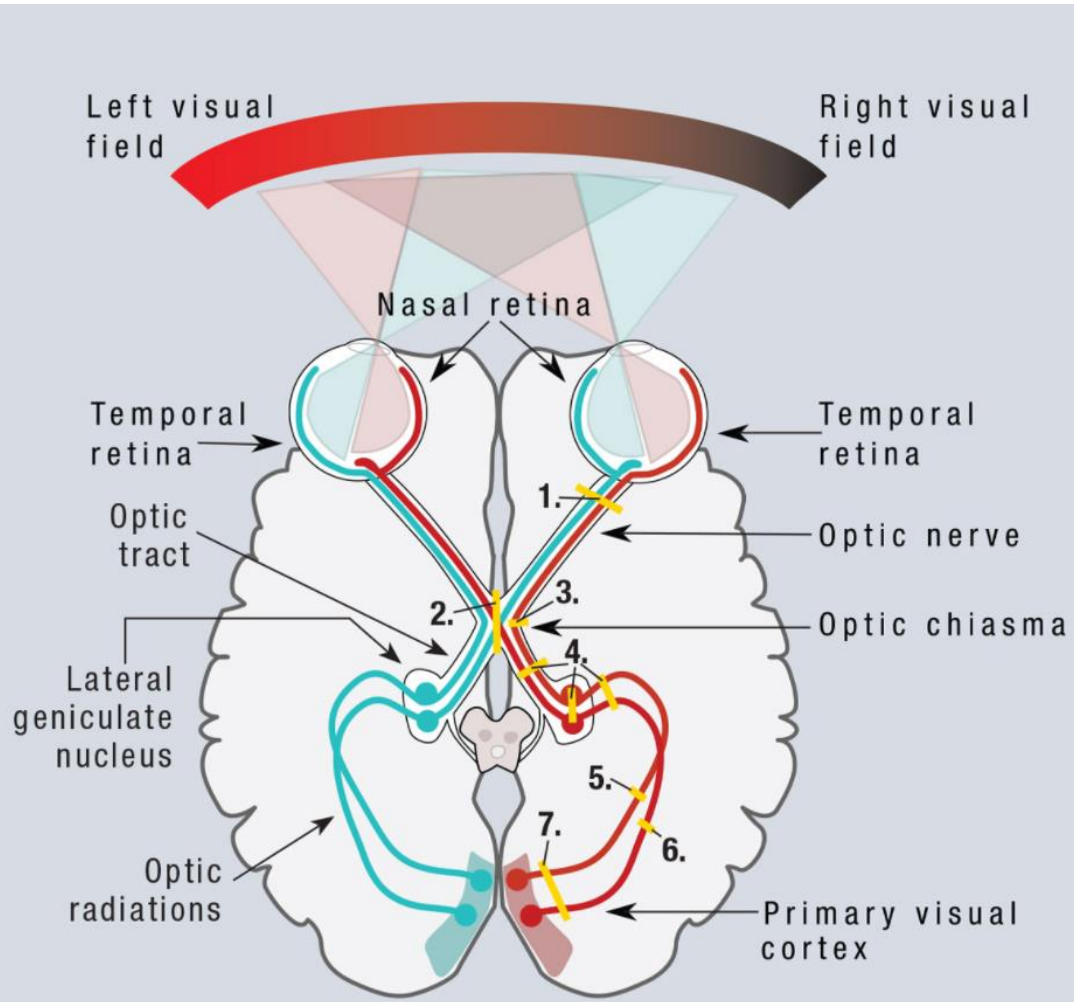
Forced gaze TOWARD the side of the lesion-  
away from the side with weakness

STROKE= MCA territory

## WRONG WAY

Forced gaze AWAY from the side of the lesion –  
look toward the side of the weakness

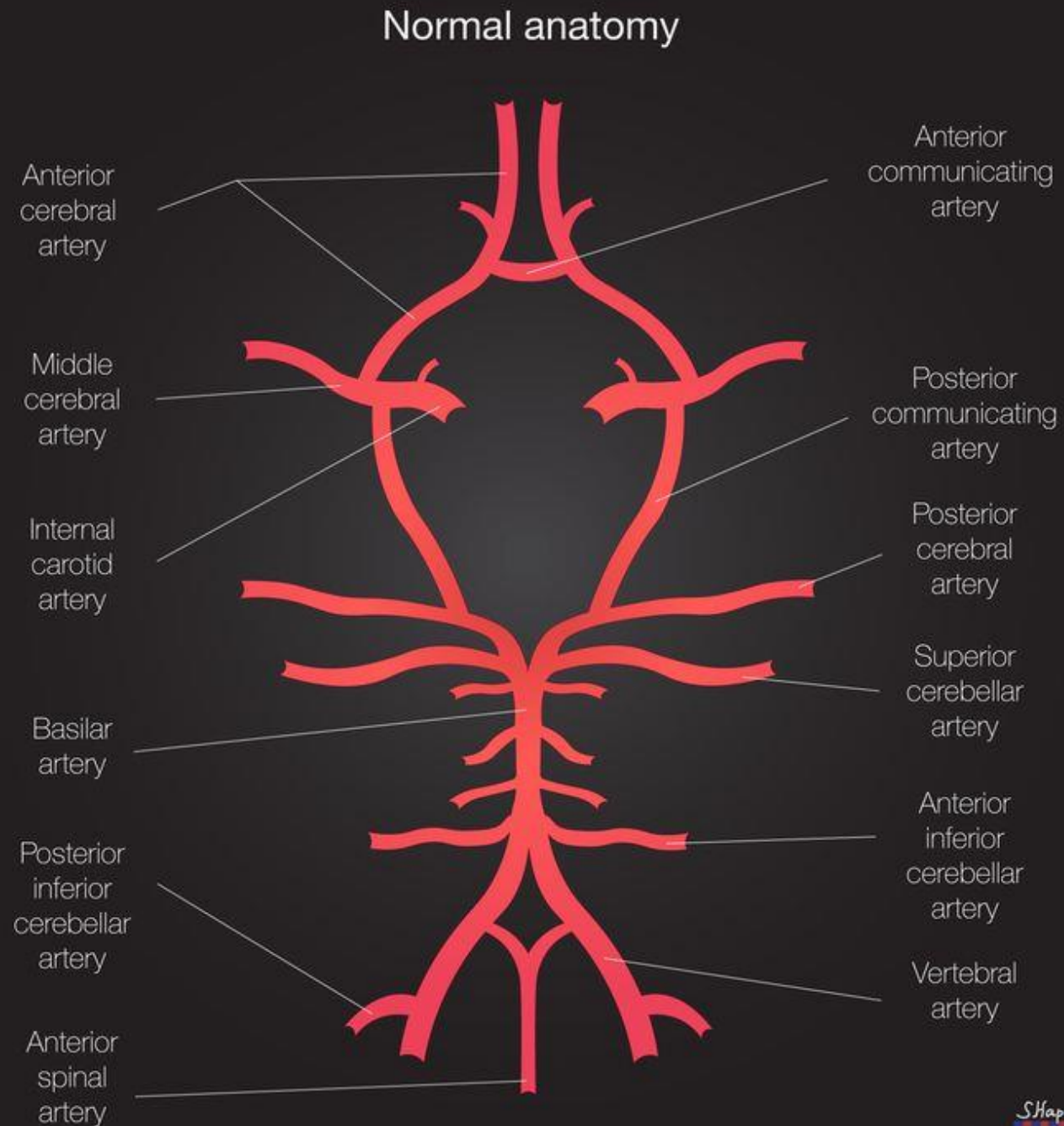
SEIZURE (may be non-convulsive)

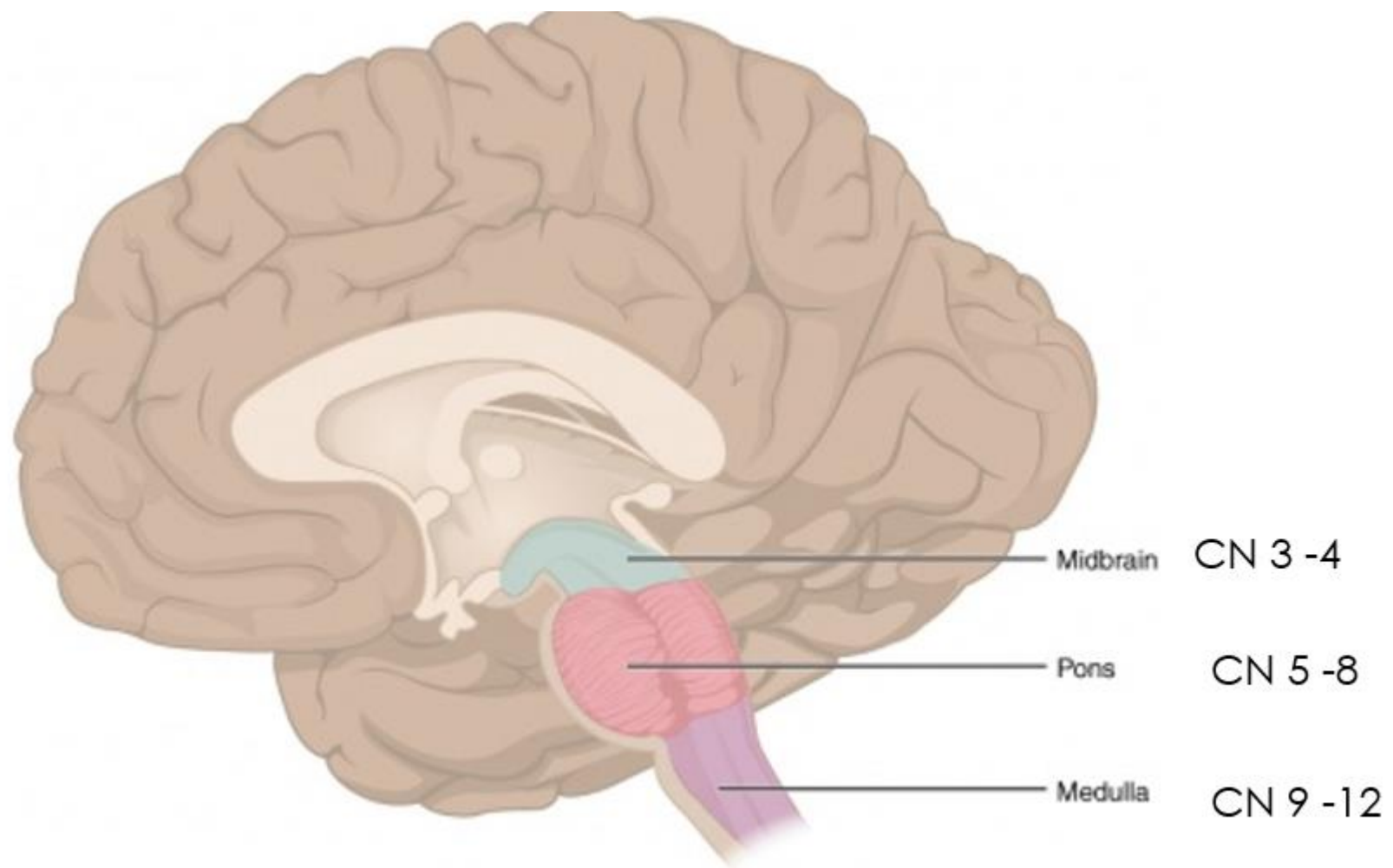


Lesions of the **parietal lobe** can interrupt the lower optic radiations (Meyer's loop) and cause a contralateral inferior quadrantanopia **"Pie on the floor"**

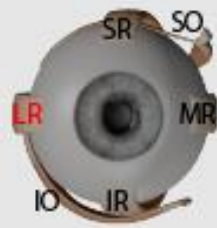
radiation (Meyer's loop), can cause a contralateral **homonymous hemianopia**

# “Brainstem eyes”

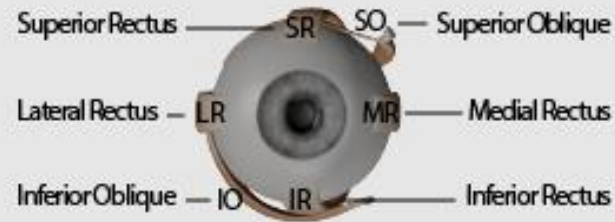




# Extraocular Movement



← Look Right



Look Straight



Look Left →

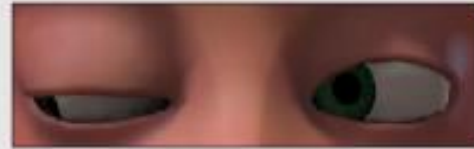
Normal



*For deficit affecting the RIGHT eye:*

CN III Palsy

Lateral deviation  
Downward deviation  
Ptosis



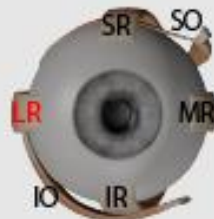
CN IV Palsy

Upward deviation



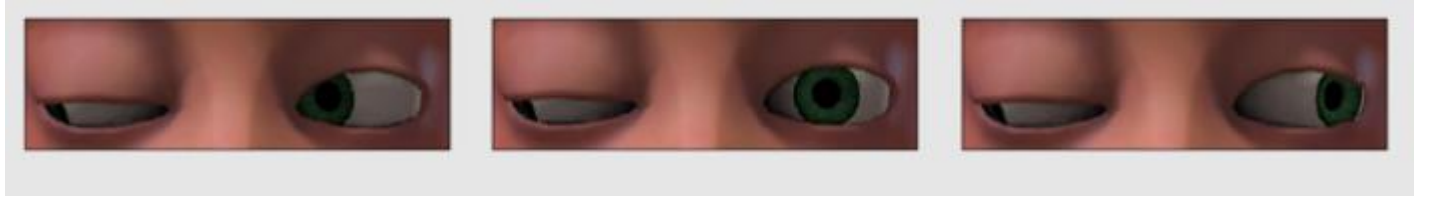
CN VI Palsy

Medial deviation



# 3<sup>rd</sup> Nerve Palsy

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- Eye deviates laterally and down
- Pupil exam:
  - If dilated/nonreactive likely secondary to space occupying lesion
  - If pupil is spared likely ischemic etiology
- Loss of accommodation
- Ptosis

**Localization:** Basilar artery thrombosis, SAH-PCoM A aneurysm

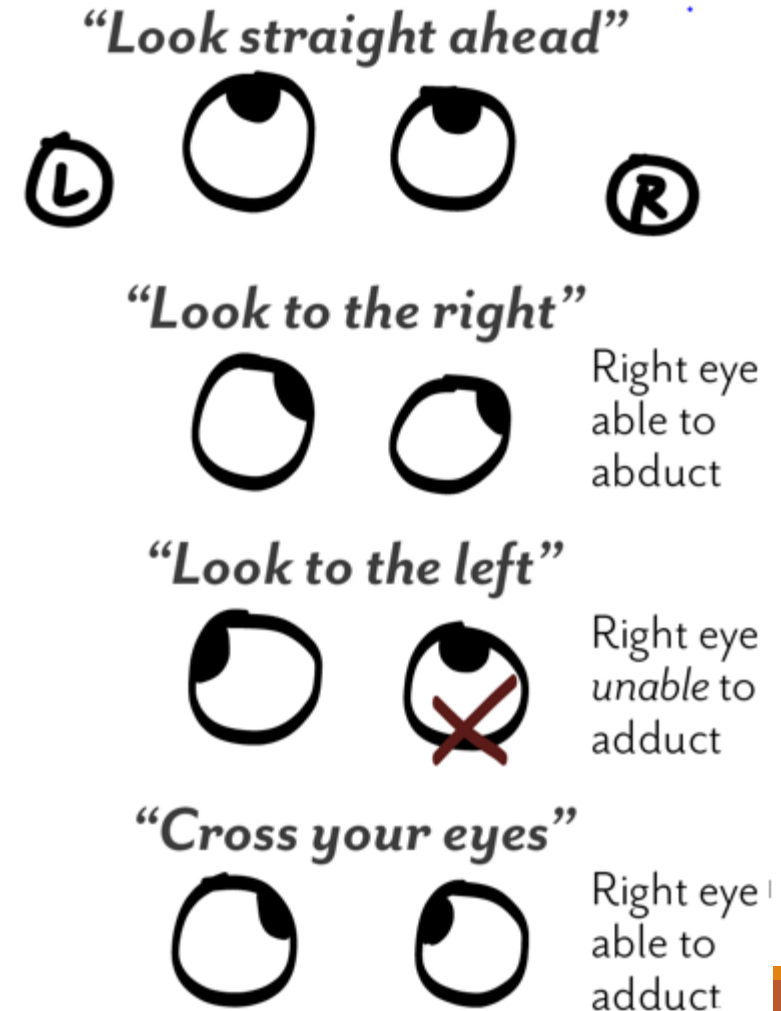
# Internuclear Ophthalmoplegia (INO)

Dysconjugate gaze palsy also called, medial longitudinal fasciculus (MLF) syndrome

Usually monocular in ischemic stroke; binocular presentation is most common in MS but can also happen after an ischemic stroke

## Presentation:

- Ipsilateral adduction weakness due to MLF lesion; may have transient clockwise nystagmus
- Monocular nystagmus is present in the normal/leading eye when abducting and is likely reflexive in nature
- May have no symptoms; others may have diplopia with or without oscillopsia



# Diplopia

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Diplopia is almost always caused by lesions affecting the ocular movement system in the brainstem (CN III, IV, VI), NOT the occipital lobe

- Occurs most frequently with lesions of the extraocular muscles or ocular motor nerves



Questions?

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