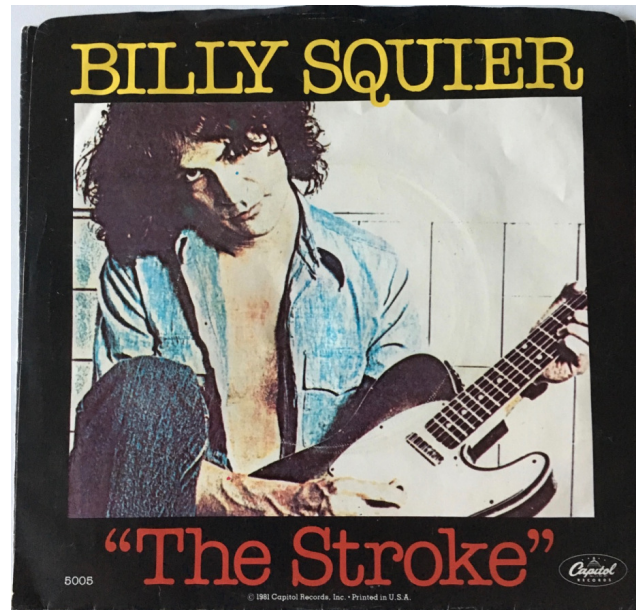


# Stroke Localization (Part 1)

*for USMLE Step One*



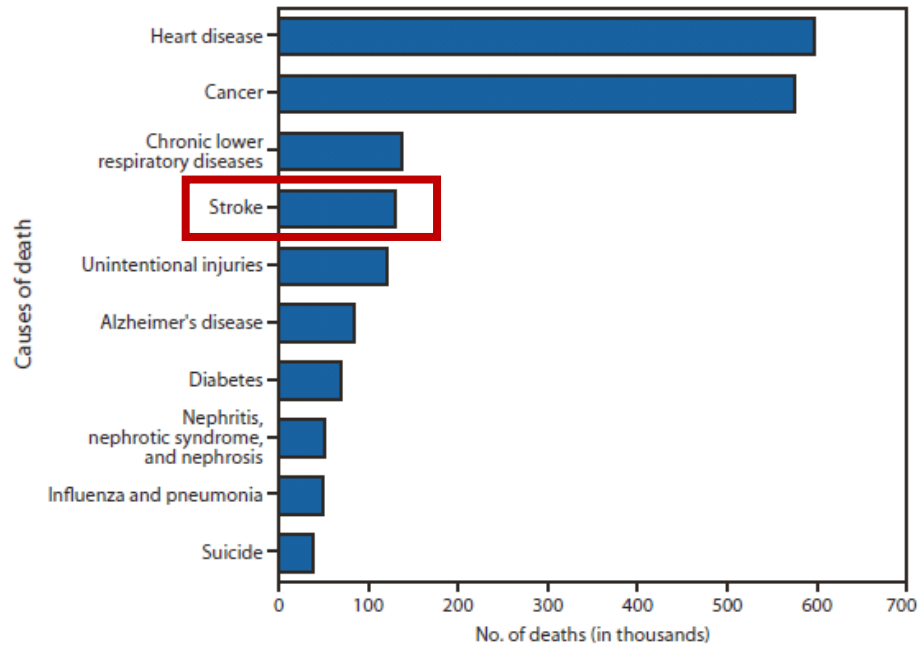
Benjamin Tanenbaum  
UMass Class of 2021

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*email: Howard@12daysinmarch.com*

# Stroke Basics

## Epidemiology

- 4<sup>th</sup> leading cause of death in US
- Major cause of disability



# Stroke Basics

## Epidemiology

- 4<sup>th</sup> leading cause of death in US
- Major cause of disability

## Heart Parallel

Angina



Heart Attack  
(Myocardial  
Infarction)



Transient  
Ischemic  
Attack (TIA)

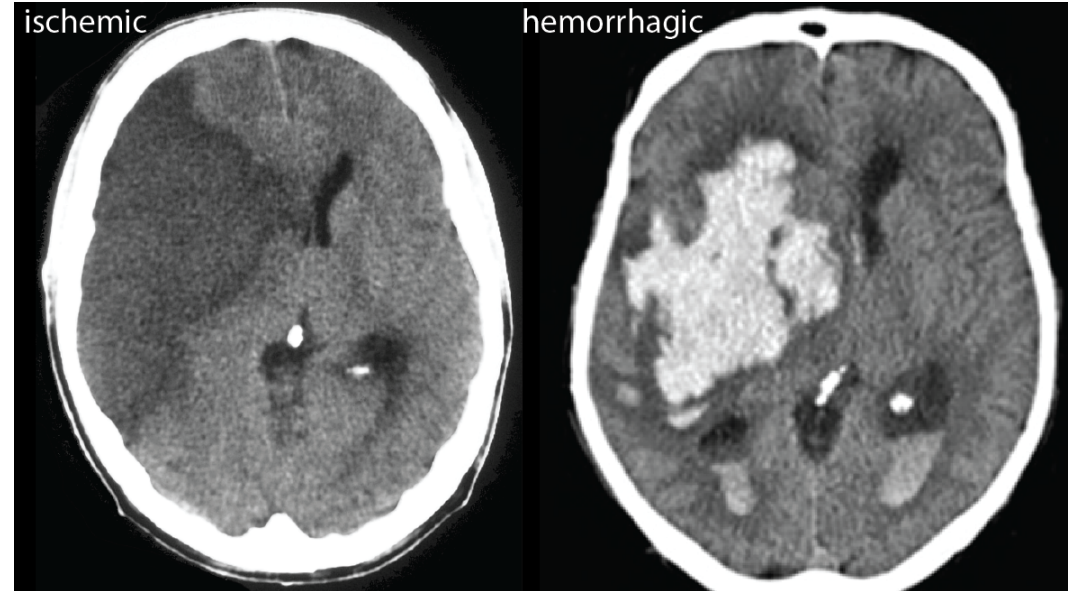


Brain Attack  
(Stroke)

# Stroke Basics

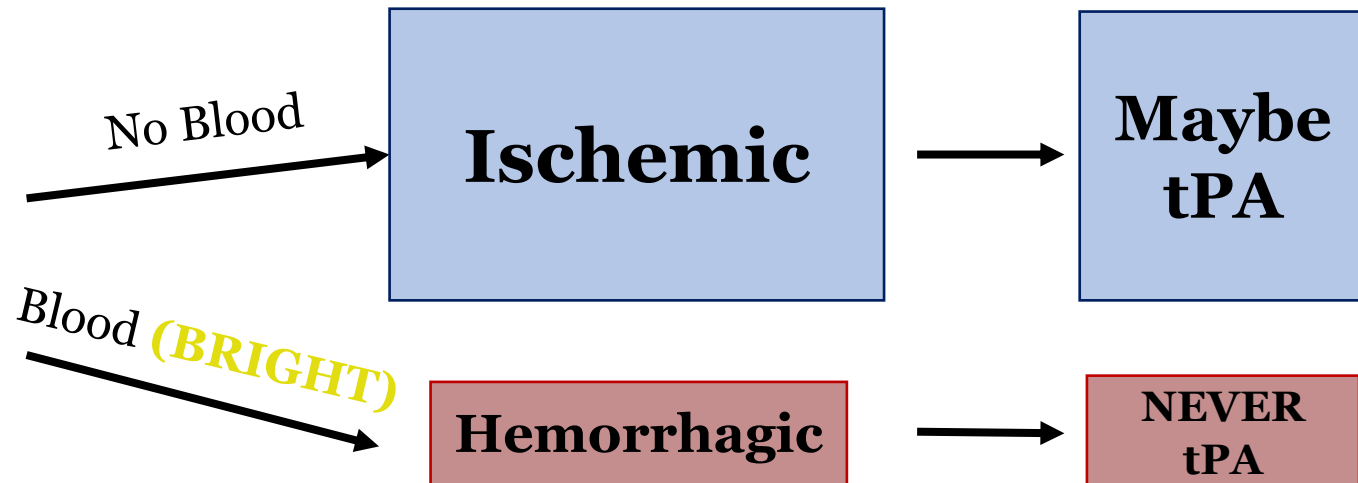
## Epidemiology

- 4<sup>th</sup> leading cause of death in US
- Major cause of disability



## Non Contrast Head CT

(blood vs no blood)



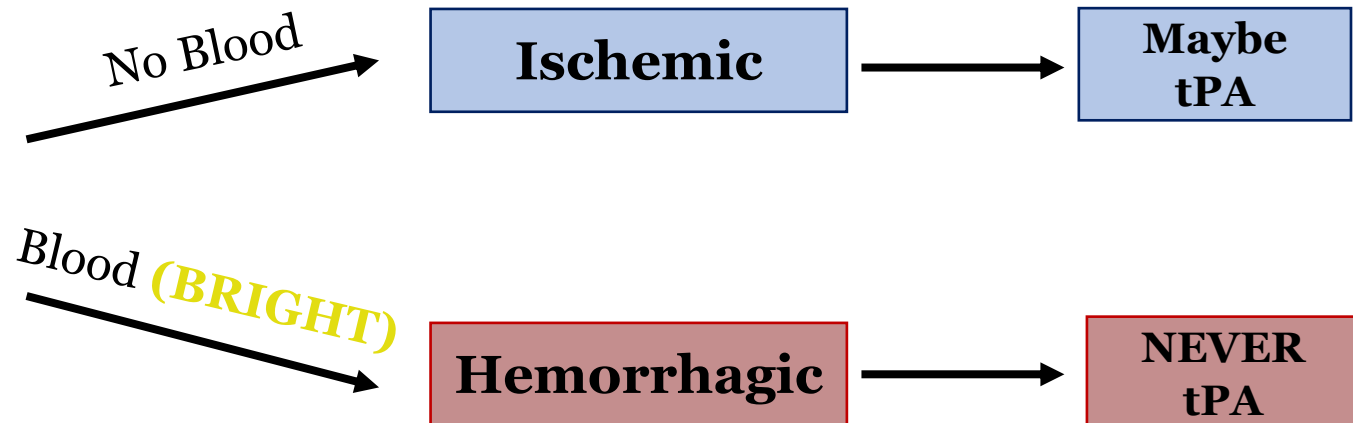
# Stroke Basics

## Epidemiology

- 4<sup>th</sup> leading cause of death in US
- Major cause of disability

## Non Contrast Head CT

(blood vs no blood)



# Roadmap

*(Strokes for the Boards)*

Circle of Willis

Lacunar

Brainstem

Spinal Cord

- 1) ACA
- 2) MCA
- 3) PCA
- 4) Watershed

- 1) Internal Capsule
- 2) Thalamus
- 3) Subthalamic nucleus (STN)
- 4) Thalamus + STN

- 1) AICA
- 2) PICA
- 3) Basilar

Artery of Adamkiewicz

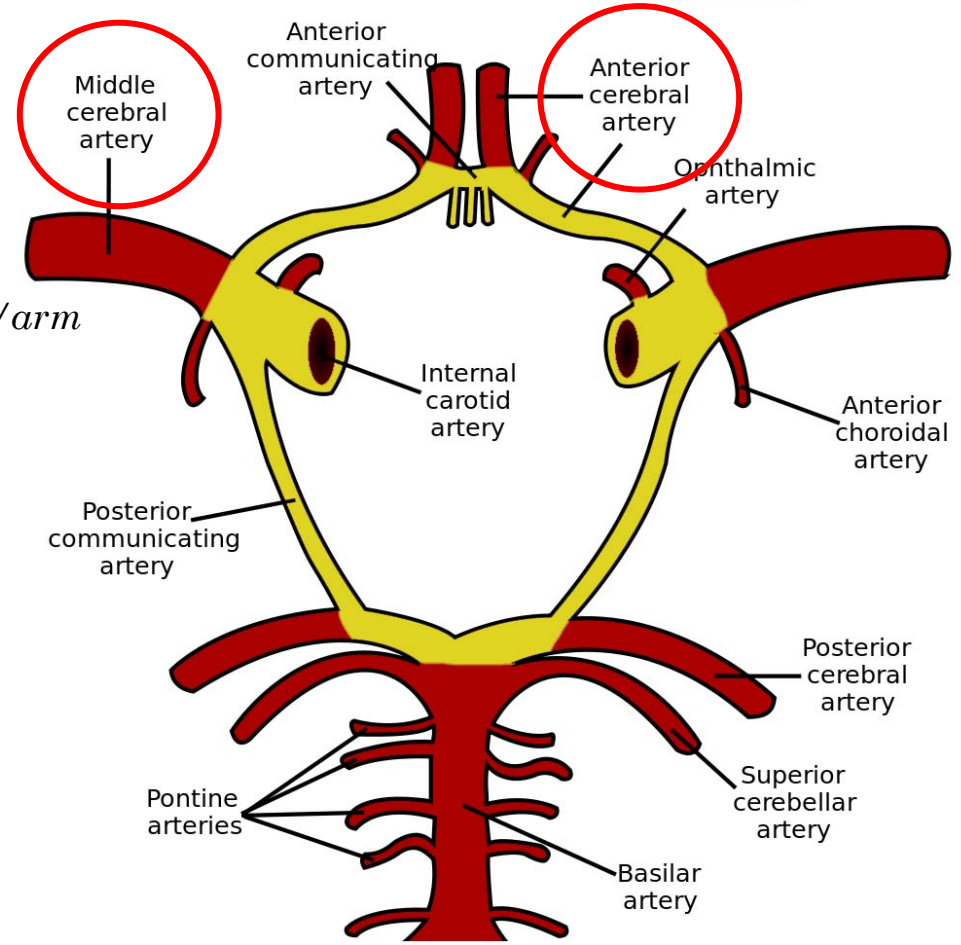
# Roadmap

(Strokes for the Boards)



## Circle of Willis

- ACA
- MCA
- PCA
- Watershed



Affected



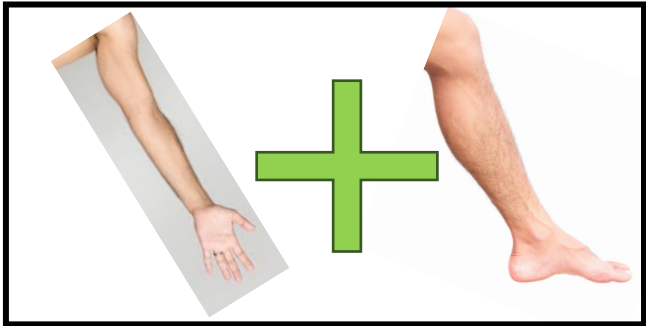
Spared



# Roadmap

*(Strokes for the Boards)*

Lacunar



Subthalamic Nucleus (STN)



Hemiballismus

Internal Capsule

Thalamus

Pure Motor

Pure Sensory

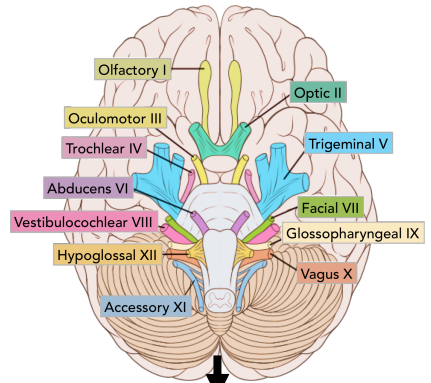
Capsule + Thalamus  
=  
Sensory + Motor



# Roadmap

*(Strokes for the Boards)*

Brainstem

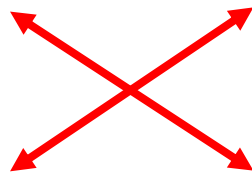


AICA



PICA

Basilar



Crossed Pain + Temp Loss



Locked-In

# Roadmap

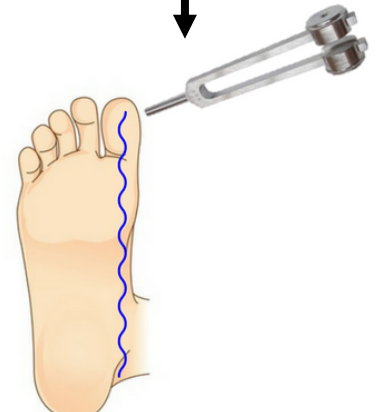
*(Strokes for the Boards)*

Circle of Willis

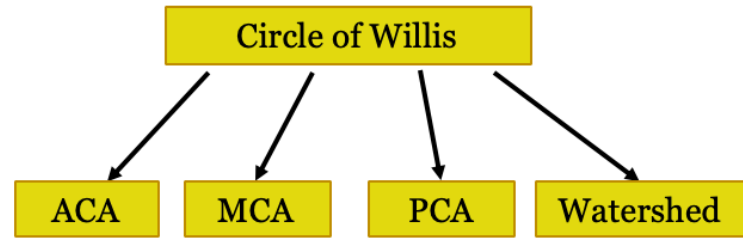
Lacunar

Brainstem

Spinal Cord

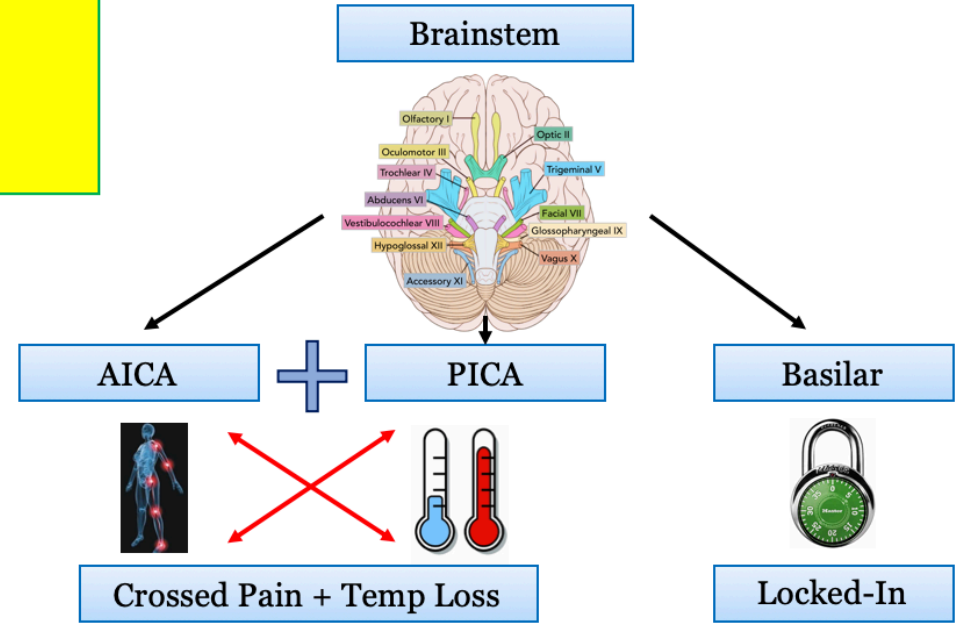


Only vibration spared in legs

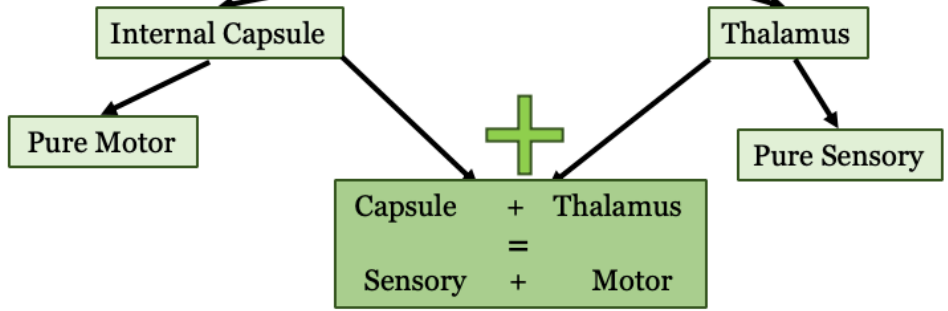
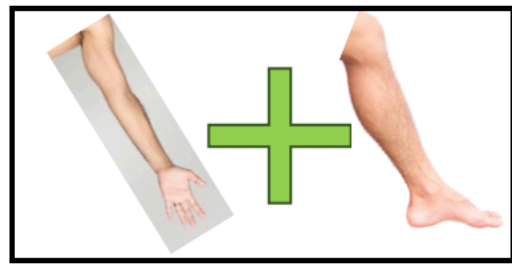


# Roadmap

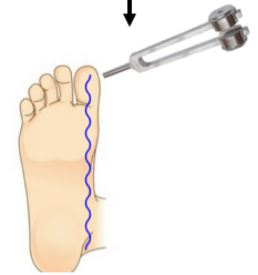
(Strokes for the Boards)



**Lacunar**

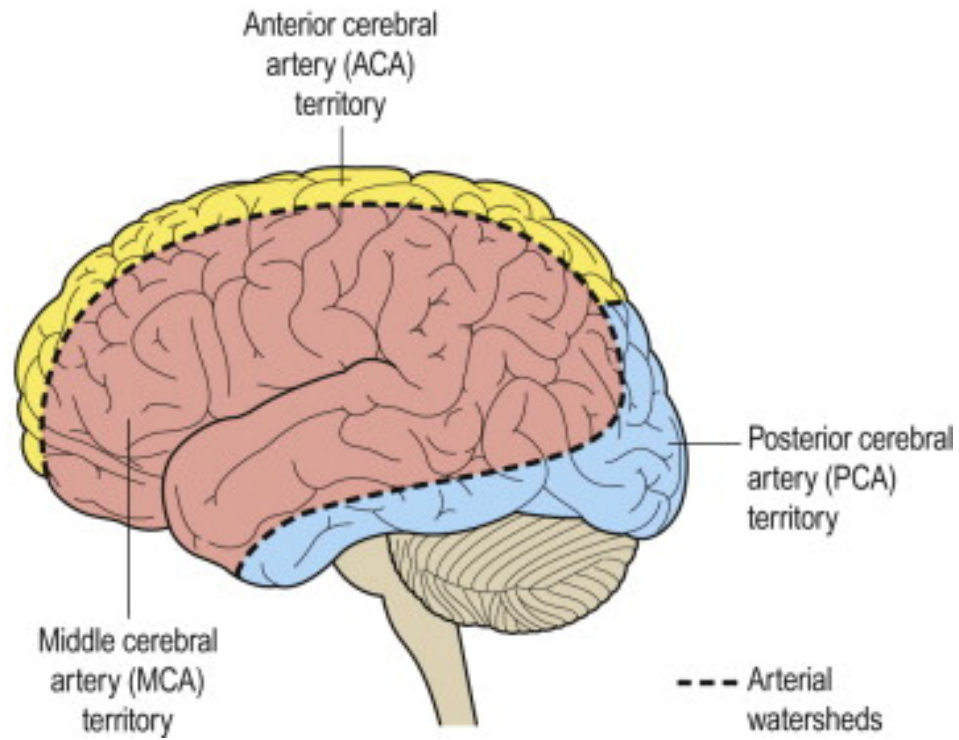


**Spinal Cord**



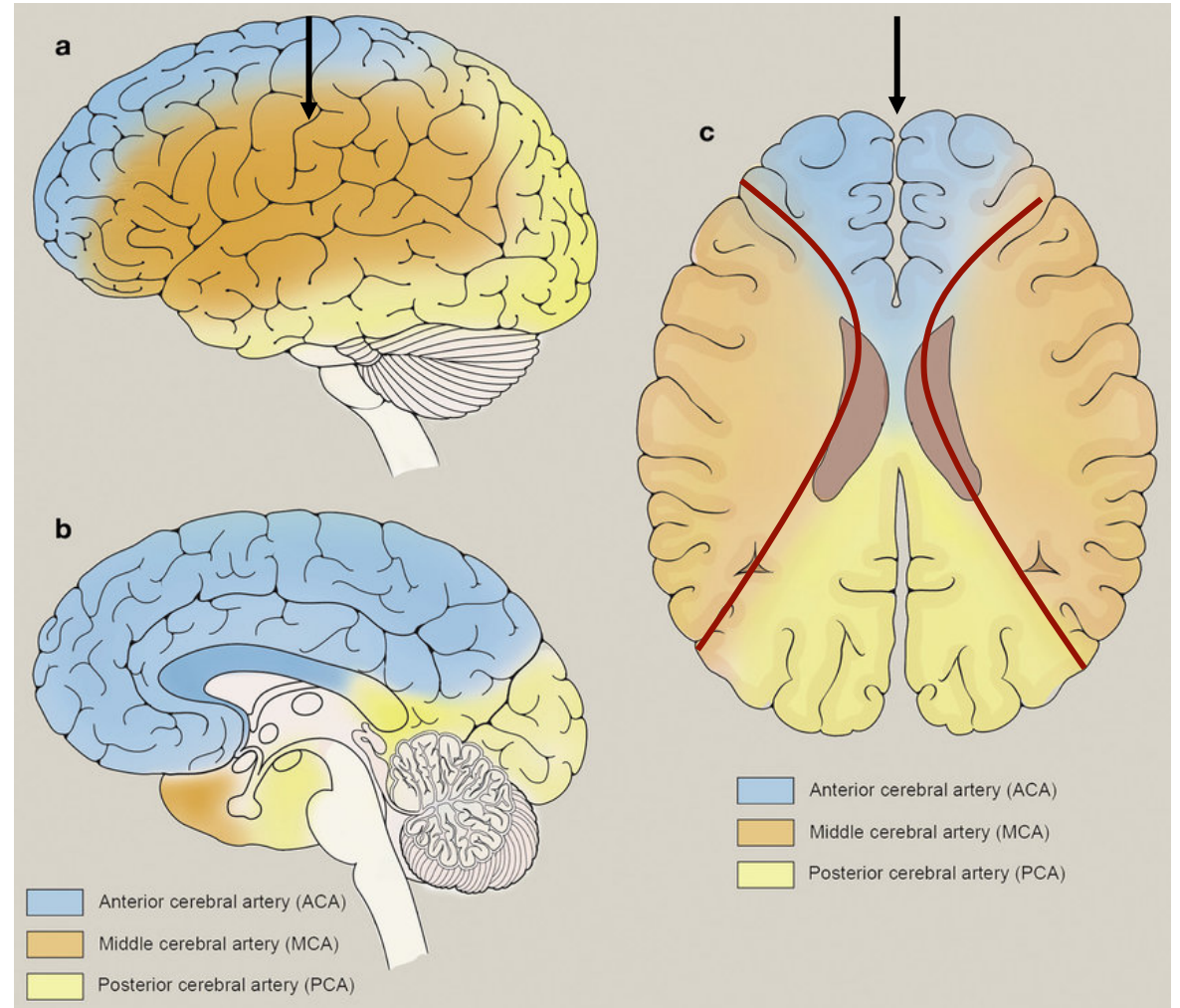
Only vibration spared in legs

# Cerebral Cortex Vasculature Review

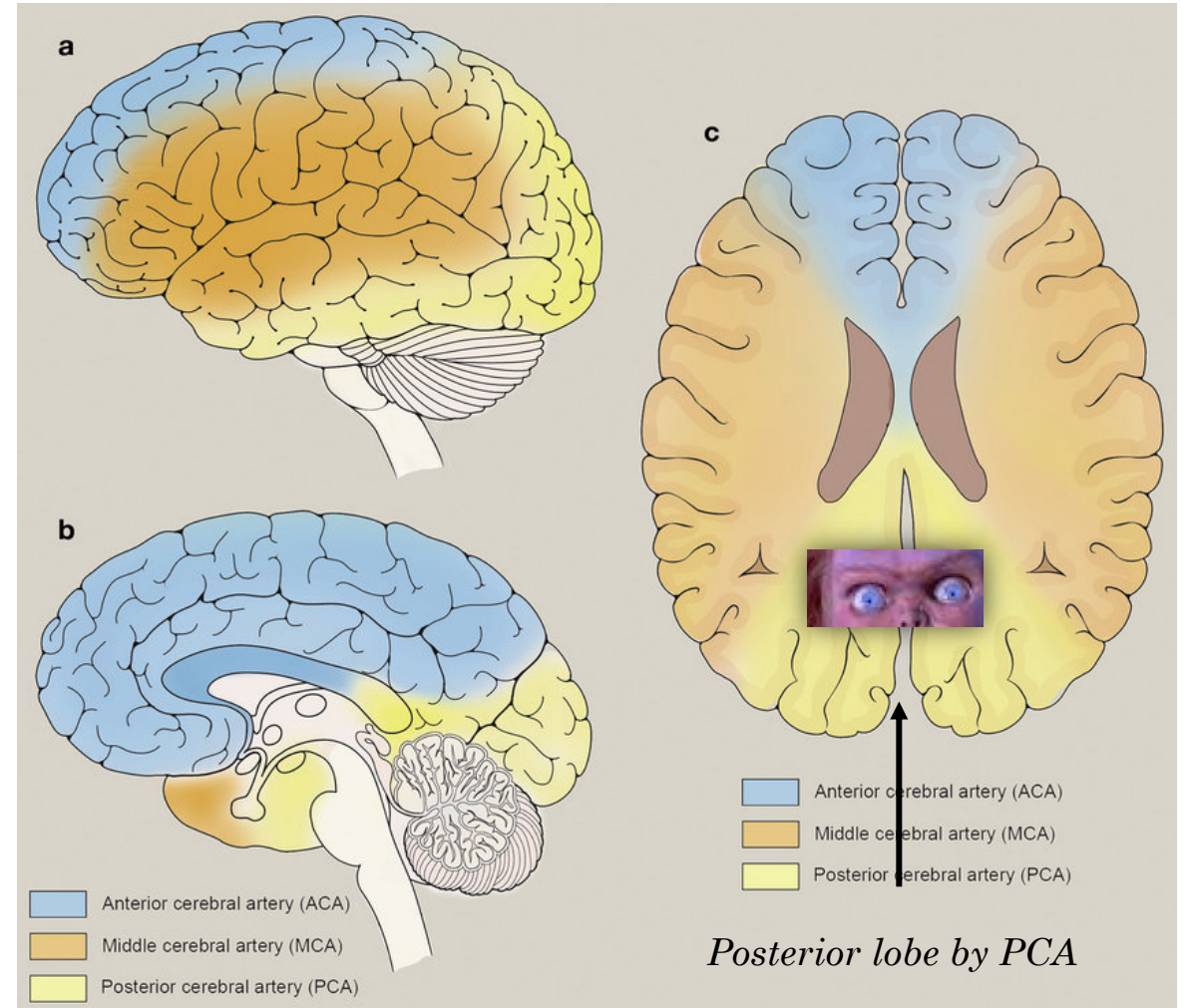
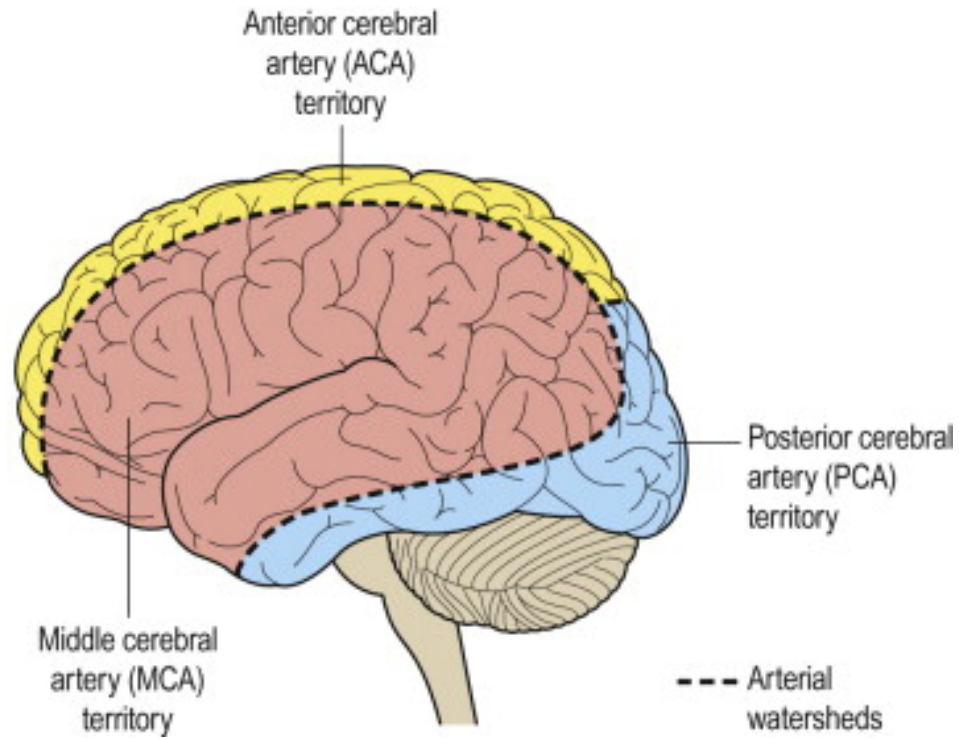


*Lateral Cortex by MCA*

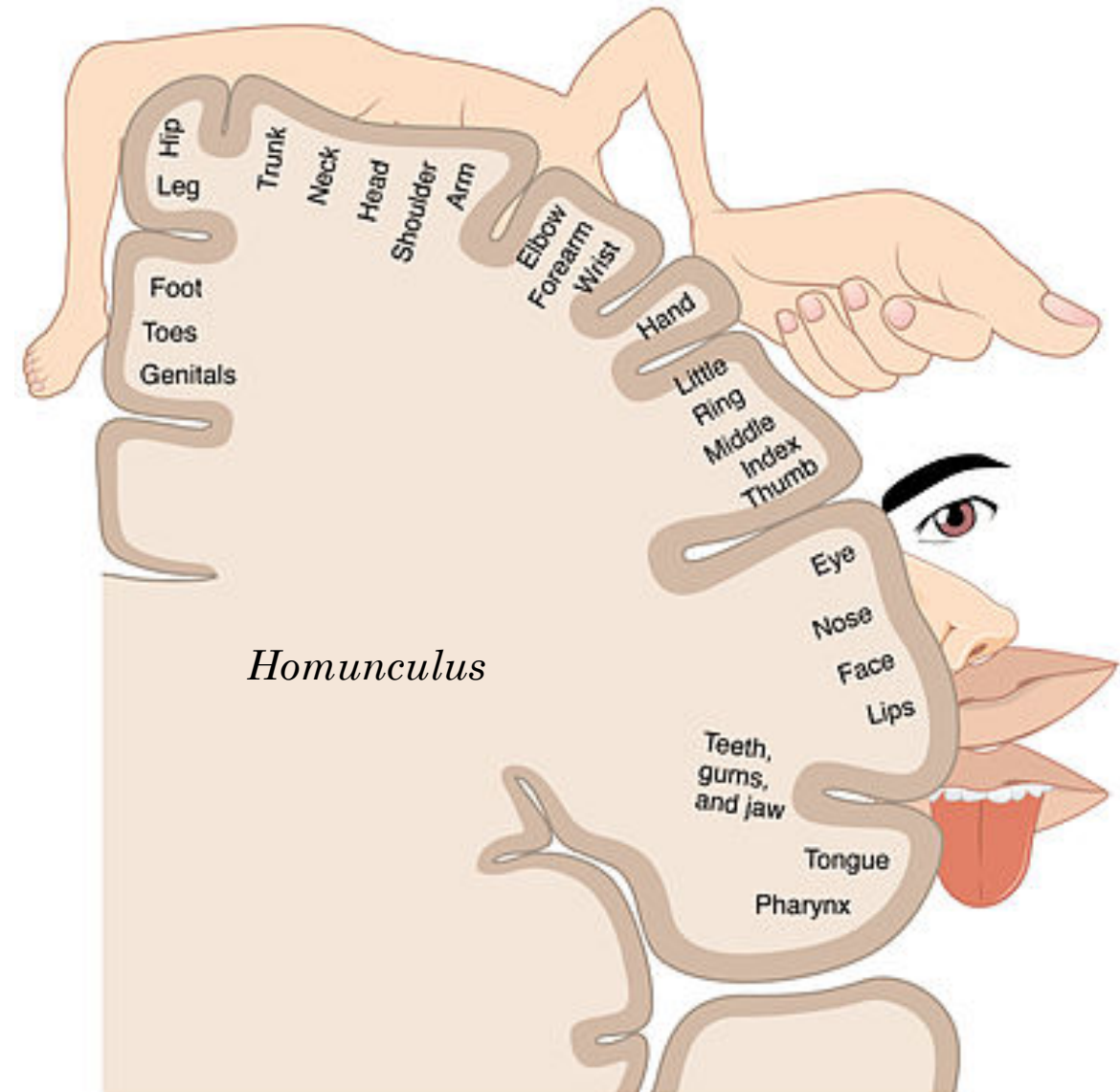
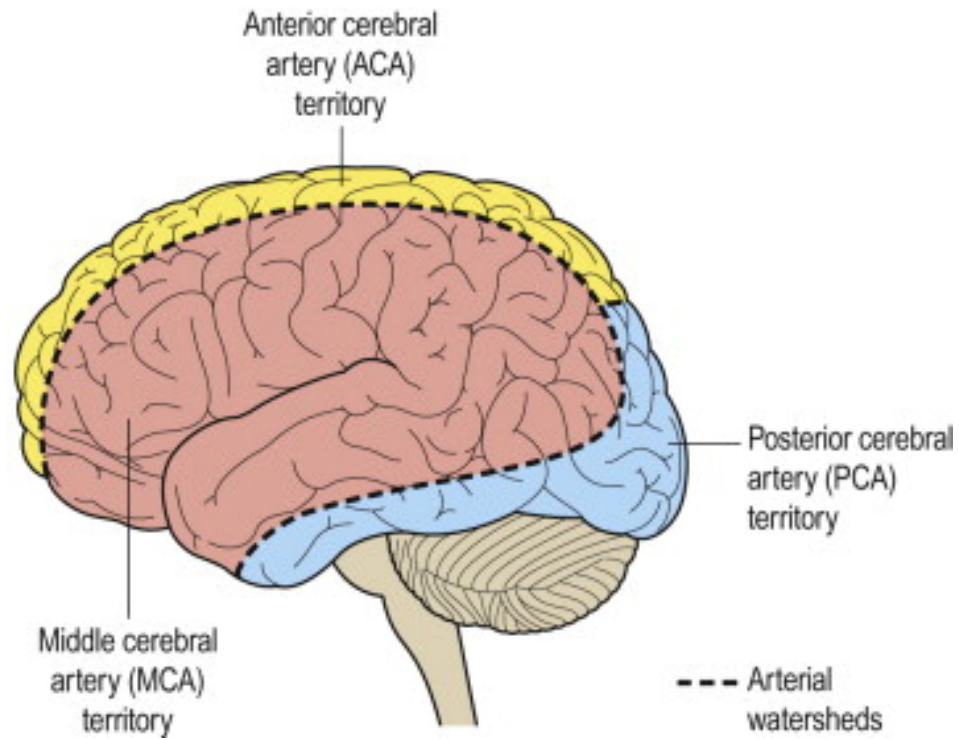
*Medial Segments by ACA*



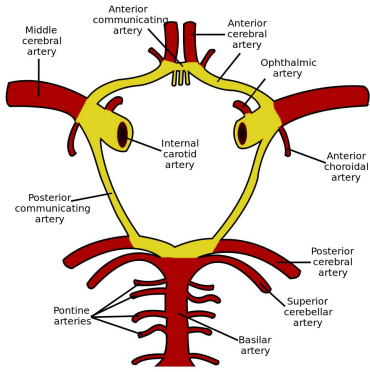
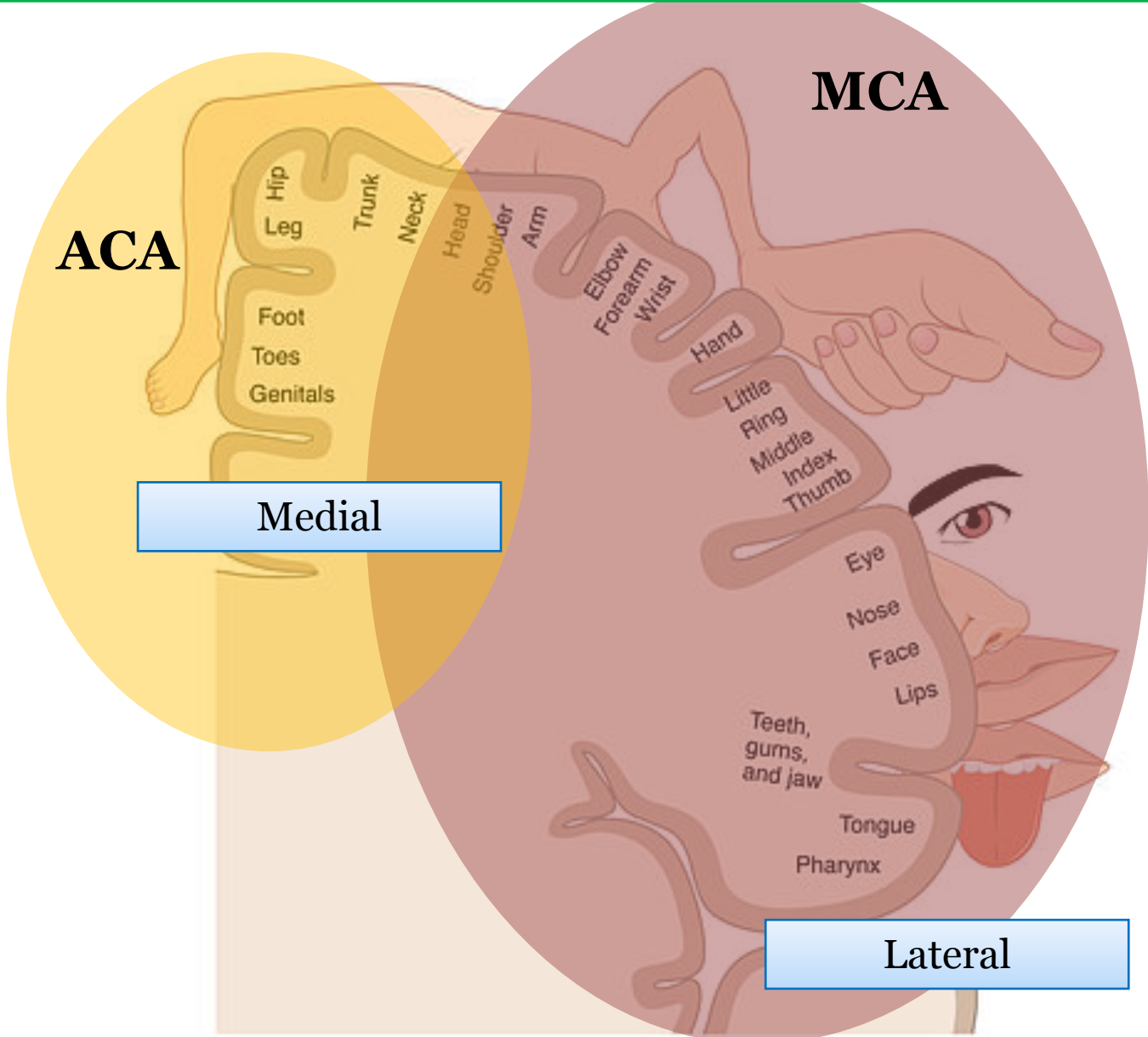
# Cerebral Cortex Vasculature Review



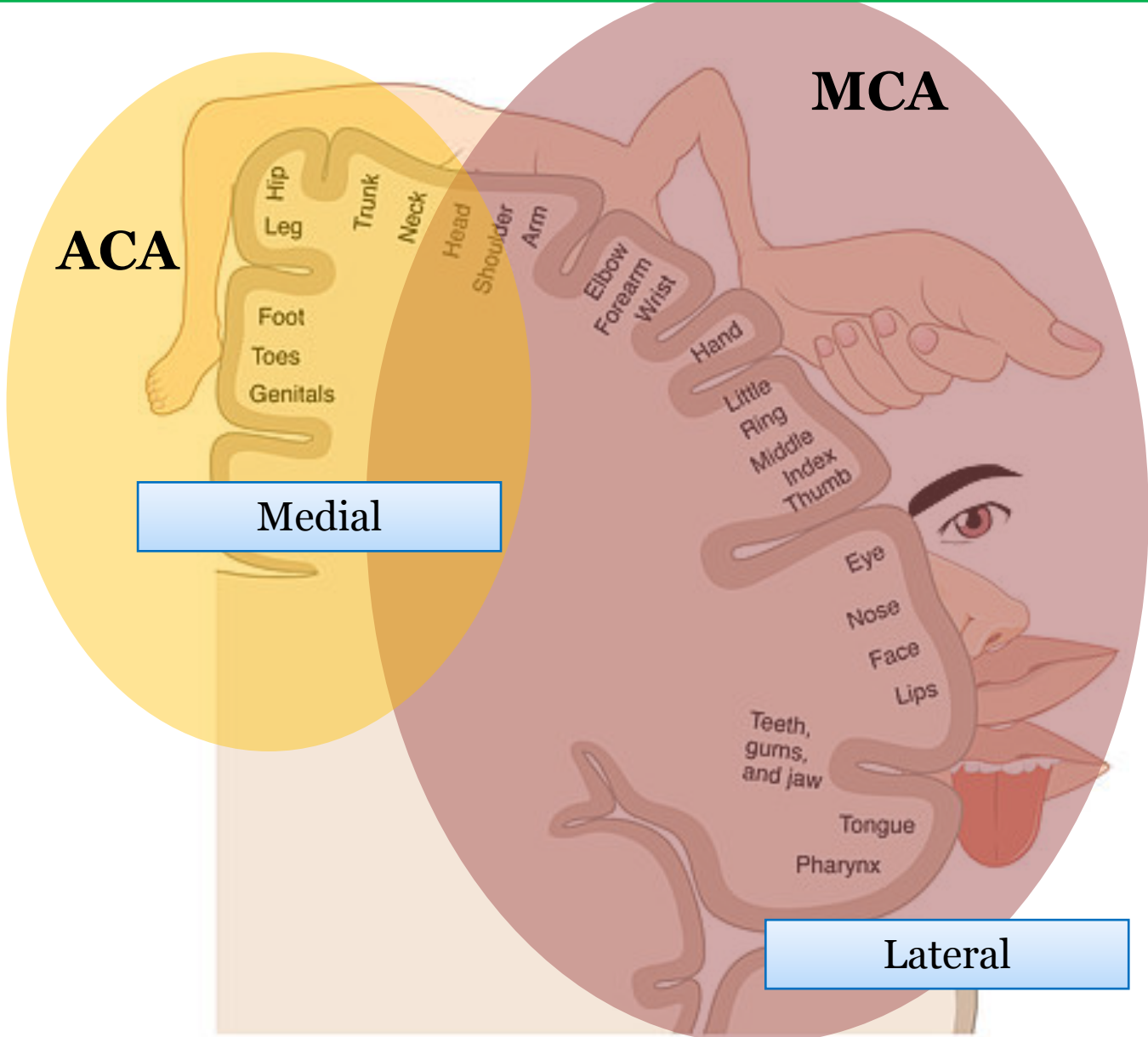
# Cerebral Cortex Vasculature Review



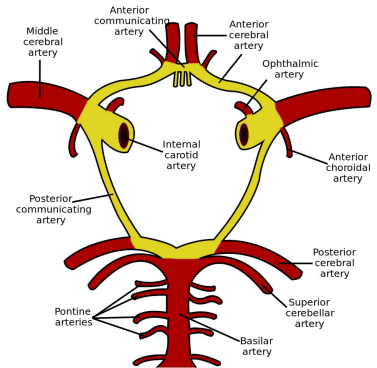
# Cerebral Cortex Vasculature Review



# Cerebral Cortex Vasculature Review



Spared

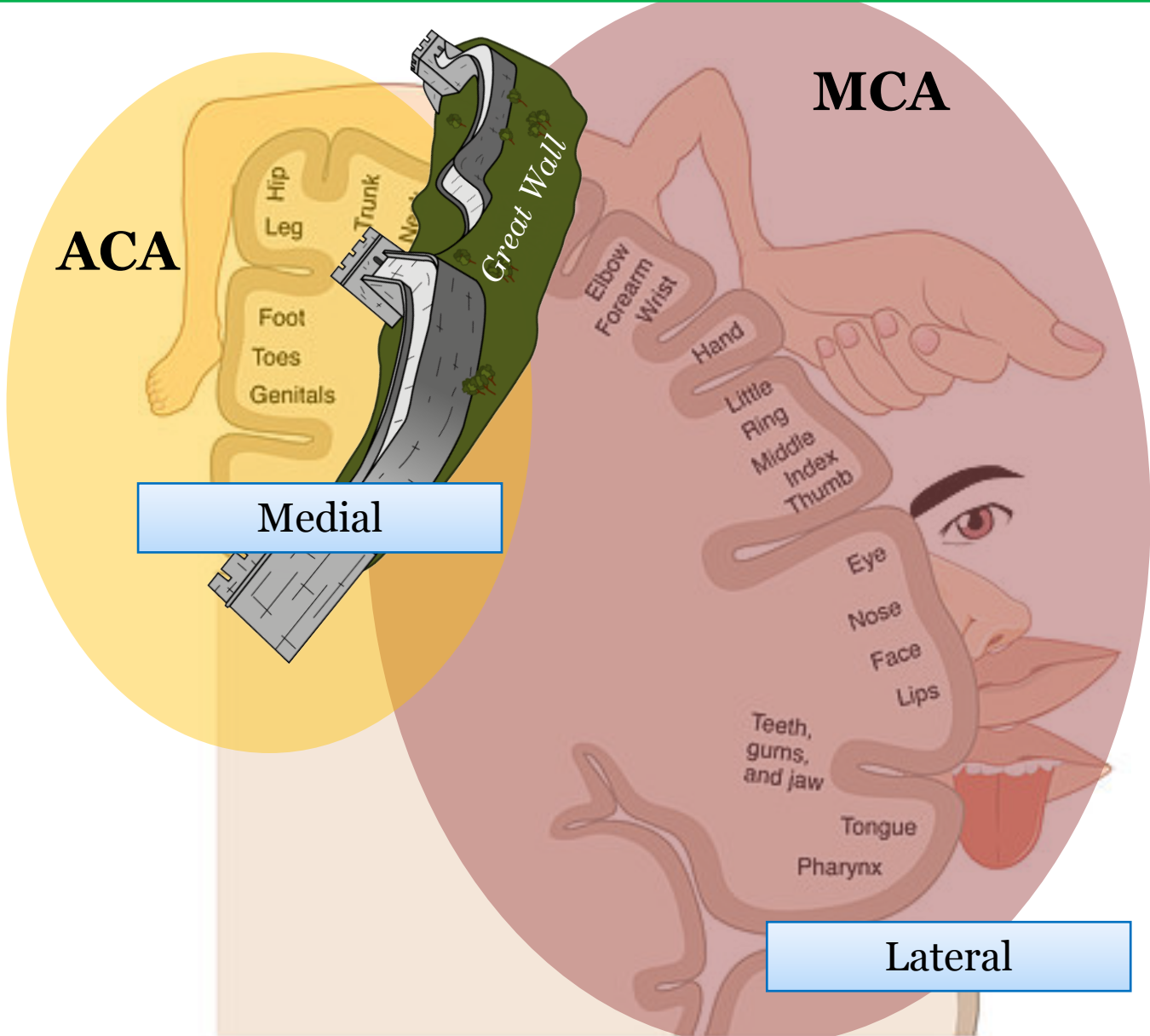
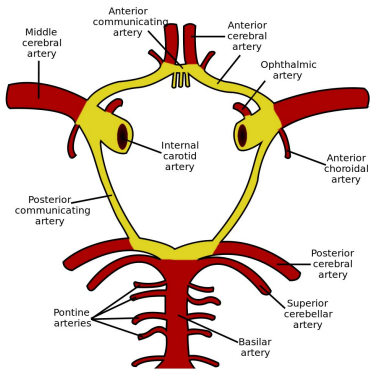




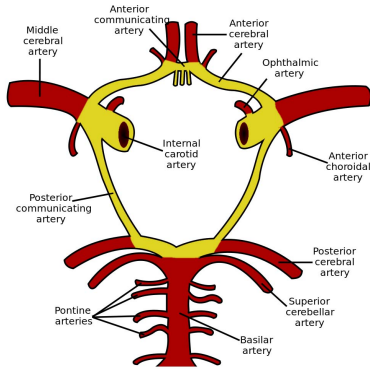
# Cerebral Cortex Vasculature Review



Affected



Spared



Lateral

# ACA vs MCA Acute Stroke Presentation

ACA	MCA	
<ul style="list-style-type: none"><li>Weakness/numbness in contralateral <b>Leg ONLY</b></li><li>+/- urinary incontinence</li><li>Return of primitive reflexes (eg Babinski)</li></ul>	<b>L MCA:</b> <ul style="list-style-type: none"><li>R arm/face weakness &amp; numbness.</li><li><b>LEG=SPARED.</b></li><li>Aphasia</li></ul>	<b>R MCA:</b> <ul style="list-style-type: none"><li>L arm/face weakness &amp; numbness.</li><li><b>LEG=SPARED.</b></li><li>L-sided hemineglect</li></ul>



# ACA vs MCA Acute Stroke Presentation



Spared

## MCA

### L MCA:

- R arm/face weakness & numbness.
- **LEG=SPARED.**
- Aphasia

### R MCA:

- L arm/face weakness & numbness.
- **LEG=SPARED.**
- L-sided hemineglect



Spared

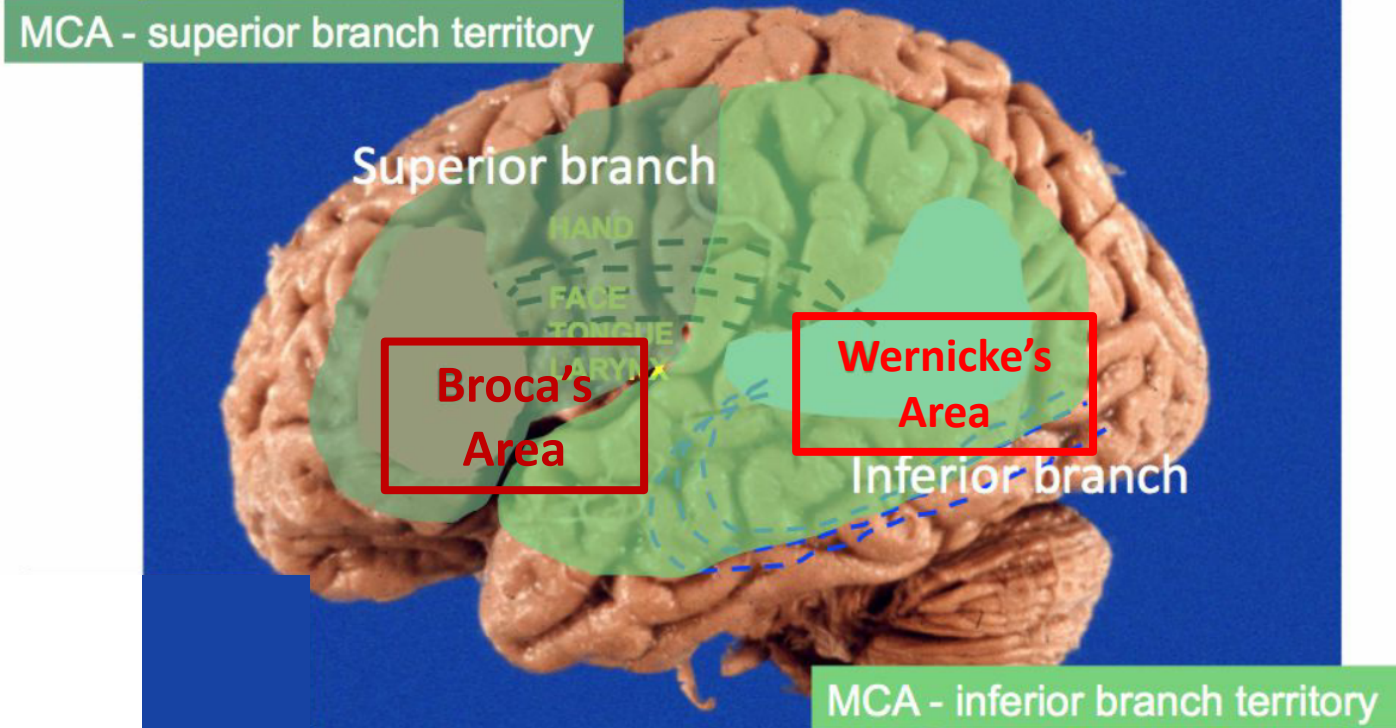
# Left MCA Superior vs Inferior Branch

## L MCA Superior Branch

- **Broca's aphasia (Broca's=Broken)**
  - Broken Speech Machinery

## L MCA Inferior Branch

- **Wernicke's aphasia (word salad)**
  - Wrong Speech ('were' and 'Nick' make no sense)



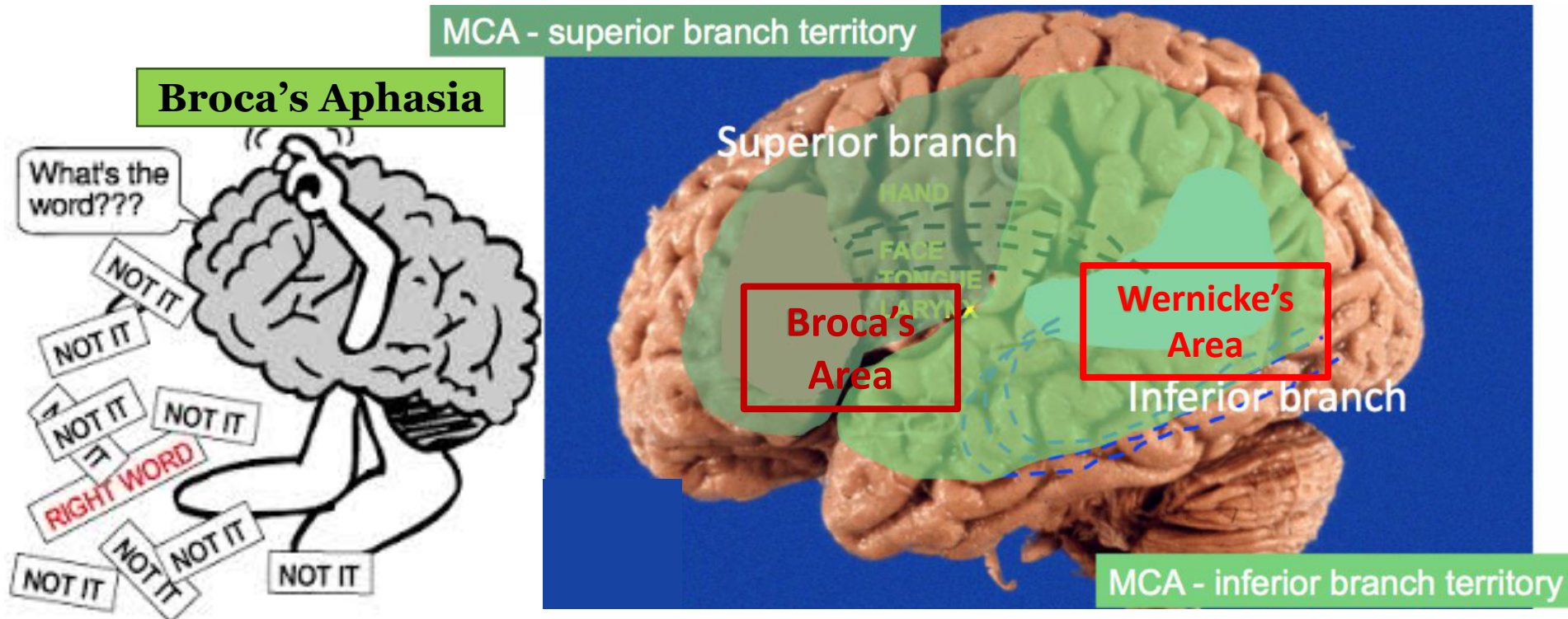
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# Left MCA Superior vs Inferior Branch

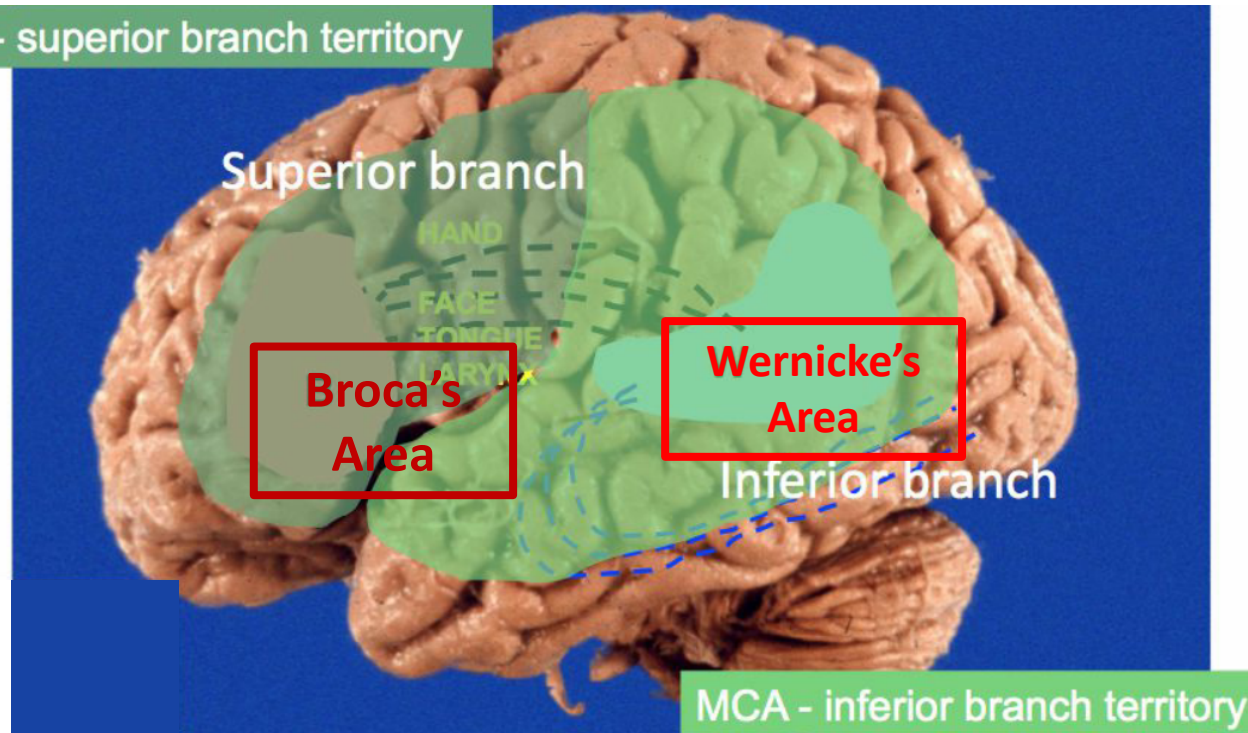
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  - Broken Speech Machinery

## L MCA Inferior Branch

- **Wernicke's aphasia (word salad)**
  - Wrong Speech ('were' and 'Nick' make no sense)

MCA - superior branch territory



Wernicke's  
Aphasia



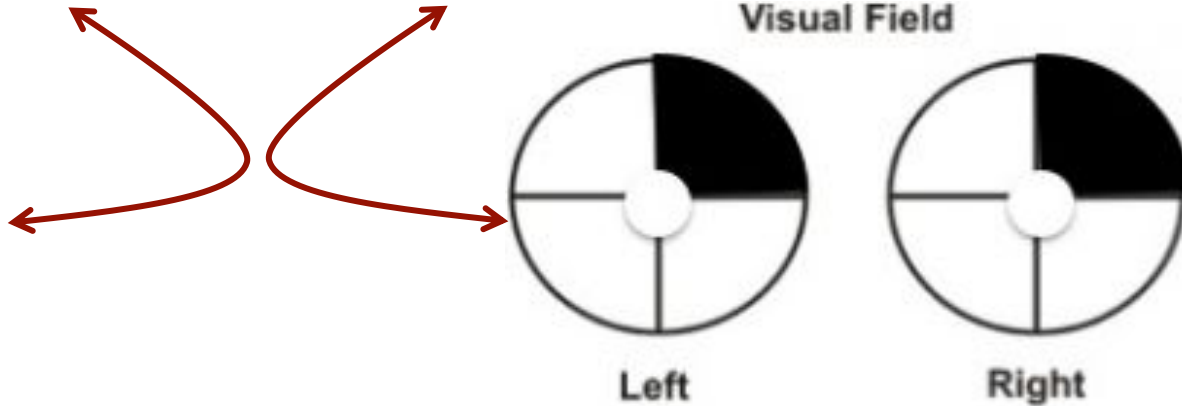
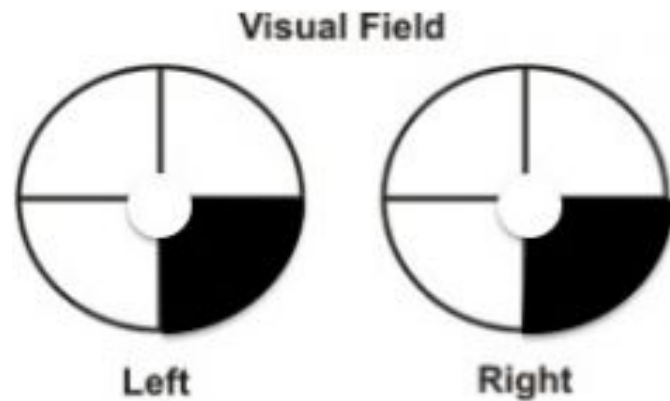
# Left MCA Superior vs Inferior Branch

## L MCA Superior Branch

- Broca's aphasia (broken speech)
- **R-sided pie-on-the-floor**

## L MCA Inferior Branch

- Wernicke's aphasia (word salad)
- **R-sided pie-in-the-sky**



# MCA Stroke Summary

	Entire L MCA	Superior L MCA	Inferior L MCA	Entire R MCA	Superior R MCA	Inferior R MCA
Motor/ Sensory Involvement		Boards won't ask	Boards won't ask		Boards won't ask	Boards won't ask
Language	Boards won't ask			Boards won't ask		
Visual	Boards won't ask			Boards won't ask		
Hemineglect						



# MCA Stroke Summary

	Entire L MCA	Superior L MCA	Inferior L MCA	Entire R MCA	Superior R MCA	Inferior R MCA
<b>Motor/ Sensory Involvement</b>	R Face+Arm, NO LEG	Boards won't ask	Boards won't ask	L Face+Arm, NO LEG	Boards won't ask	Boards won't ask
<b>Language</b>	Boards won't ask			Boards won't ask		
<b>Visual</b>	Boards won't ask			Boards won't ask		
<b>Hemineglect</b>						



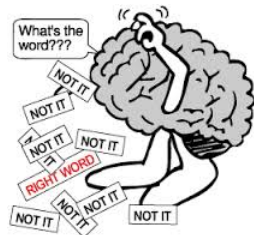
Spared



Spared

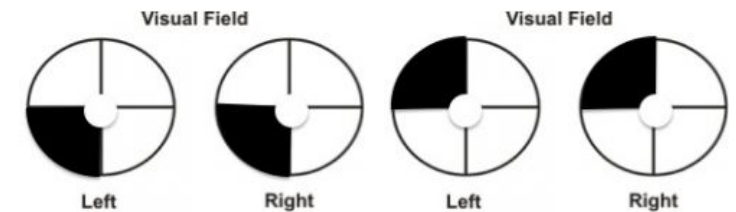
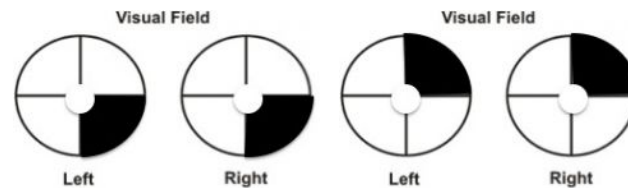
# MCA Stroke Summary

	Entire L MCA	Superior L MCA	Inferior L MCA	Entire R MCA	Superior R MCA	Inferior R MCA
<b>Motor/ Sensory Involvement</b>	R Face+Arm, NO LEG	Boards won't ask	Boards won't ask	L Face+Arm, NO LEG	Boards won't ask	Boards won't ask
<b>Language</b>	Boards won't ask	Broca's Aphasia	Wernicke's Aphasia	Boards won't ask	None	None
<b>Visual</b>	Boards won't ask			Boards won't ask		
<b>Hemineglect</b>						



# MCA Stroke Summary

	Entire L MCA	Superior L MCA	Inferior L MCA	Entire R MCA	Superior R MCA	Inferior R MCA
<b>Motor/ Sensory Involvement</b>	R Face+Arm, NO LEG	Boards won't ask	Boards won't ask	L Face+Arm, NO LEG	Boards won't ask	Boards won't ask
<b>Language</b>	Boards won't ask	Broca's Aphasia	Wernicke's Aphasia	Boards won't ask	None	None
<b>Visual</b>	Boards won't ask	R Pie-On- The-Floor	R-Pie-In-The- Sky	Boards won't ask	L-Pie-On- The-Floor	L-Pie-In-The- Sky
<b>Hemineglect</b>						



# MCA Stroke Summary

	Entire L MCA	Superior L MCA	Inferior L MCA	Entire R MCA	Superior R MCA	Inferior R MCA
<b>Motor/ Sensory Involvement</b>	R Face+Arm, NO LEG	Boards won't ask	Boards won't ask	L Face+Arm, NO LEG	Boards won't ask	Boards won't ask
<b>Language</b>	Boards won't ask	Broca's Aphasia	Wernicke's Aphasia	Boards won't ask	None	None
<b>Visual</b>	Boards won't ask	R Pie-On- The-Floor	R-Pie-In-The- Sky	Boards won't ask	L-Pie-On- The-Floor	L-Pie-In-The- Sky
<b>Hemineglect</b>	None	None	None	L-sided hemineglect	L-sided hemineglect	None



# PCA Infarction

## Dunkin' Donuts Visual Deficit

- Contralateral PCA infarction = Homonymous Hemianopsia with Macular Sparing

left eye



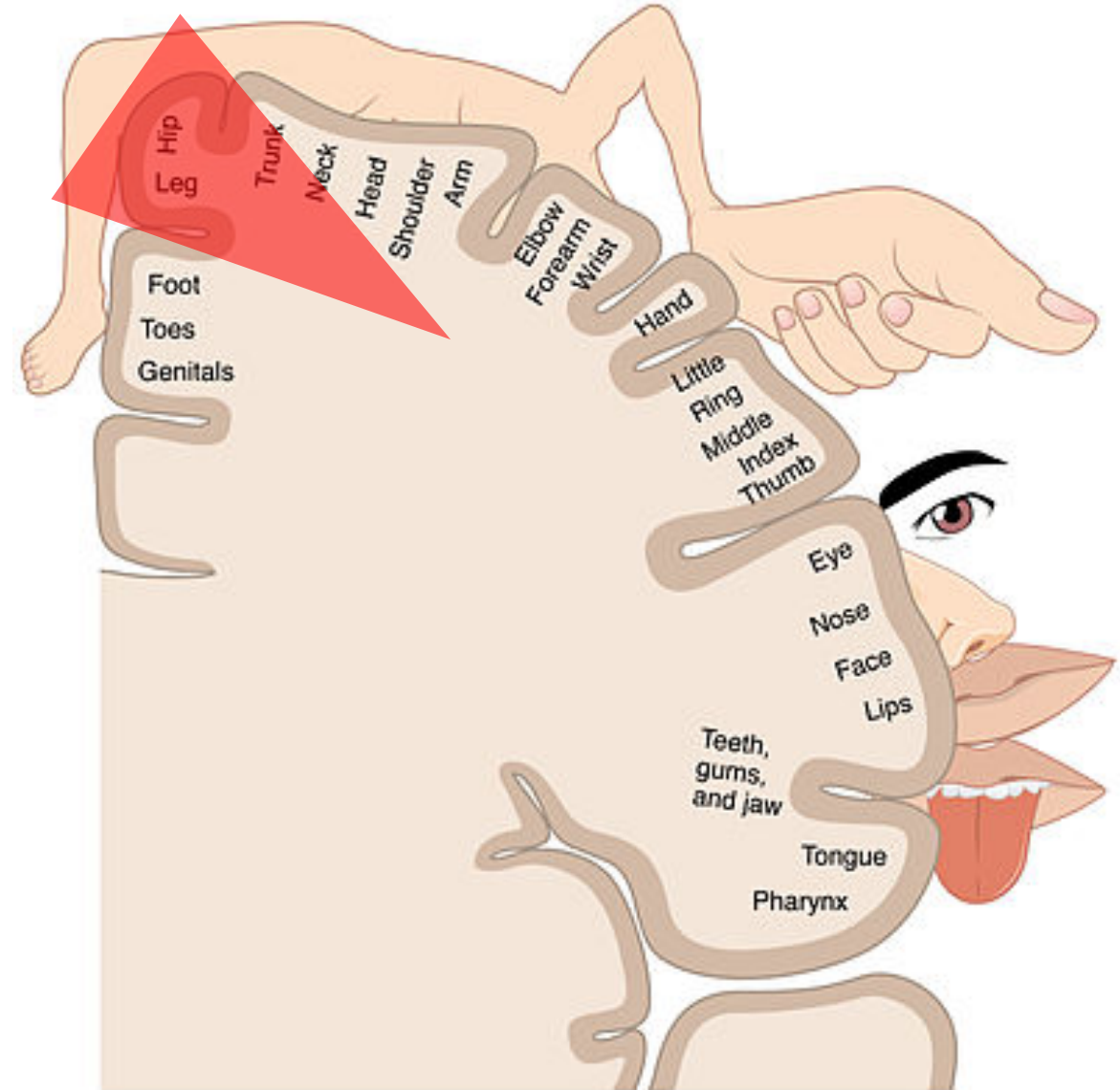
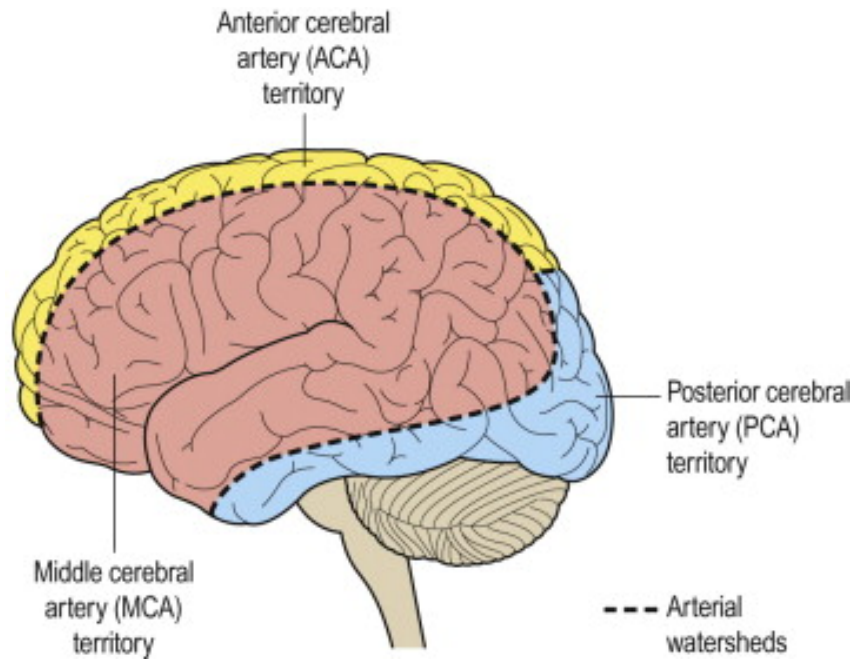
right eye



# Watershed Infarction

## *Clinical Scenario*

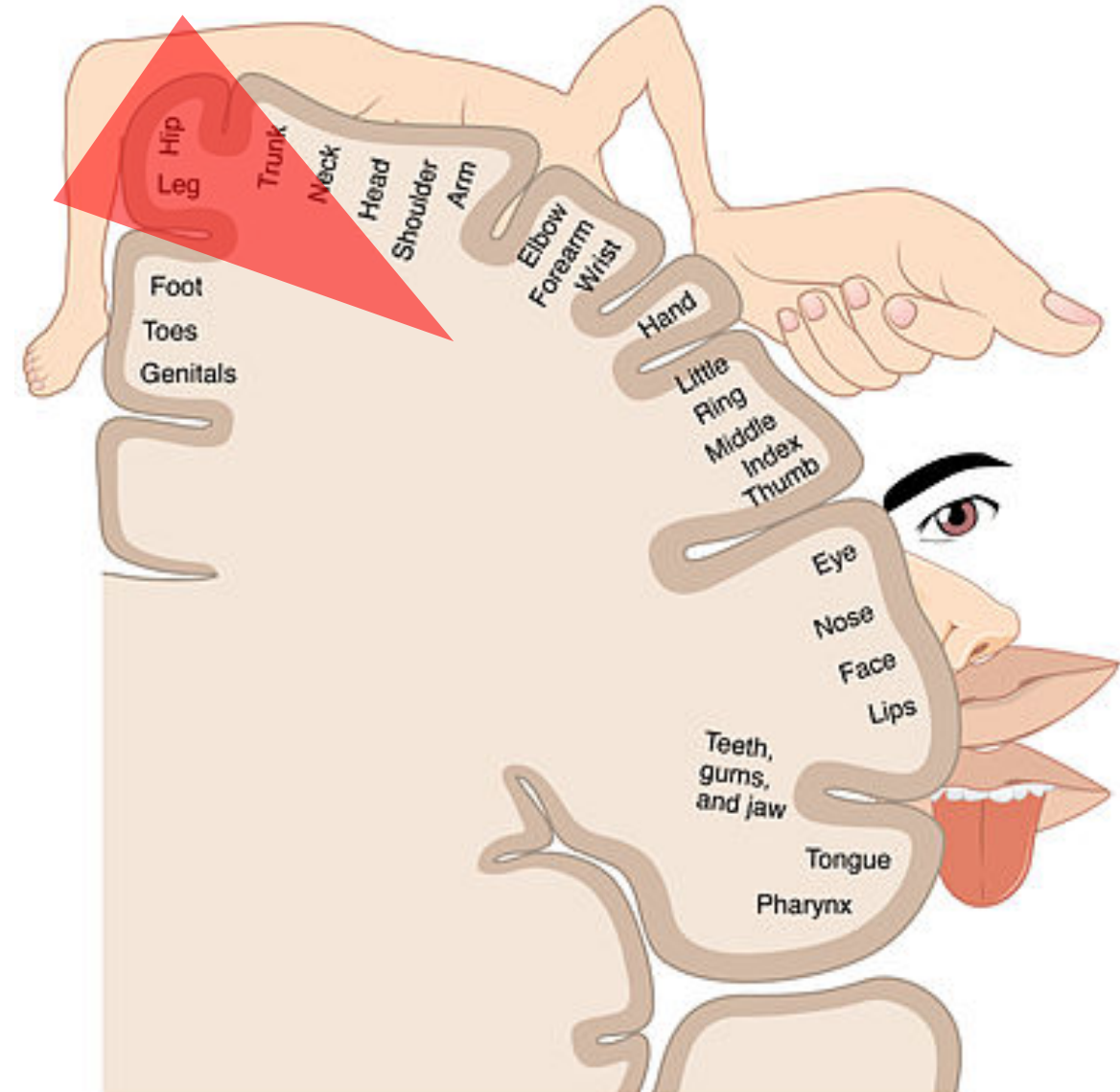
- *Hypoperfusion* (e.g. MI, surgery, GI bleed)
- **Result** → *ACA/MCA borderzone infarction*



# Watershed Infarction

## *Clinical Scenario*

- *Hypoperfusion* (e.g. MI, surgery, GI bleed)
- **Result** → *ACA/MCA borderzone infarction*  
*Man in the Barrel Syndrome*



# Roadmap

*(Strokes for the Boards)*

Circle of Willis

Lacunar

Brainstem

Spinal Cord

ACA

MCA

PCA

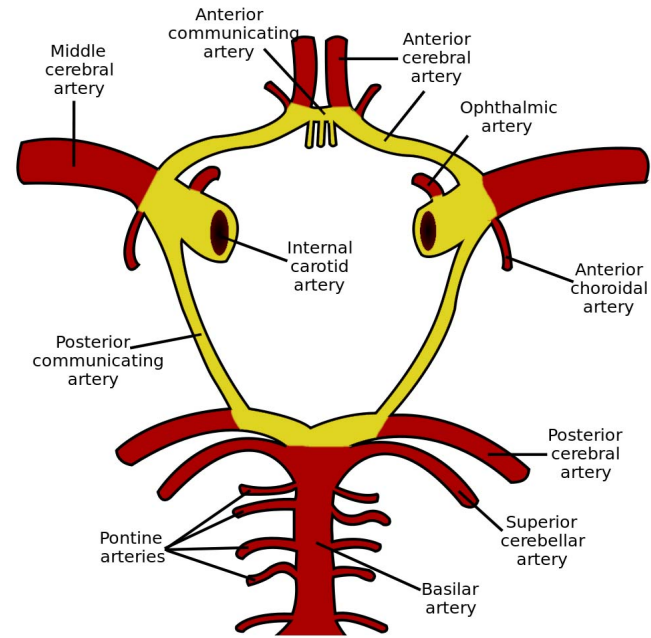
Watershed



Affected



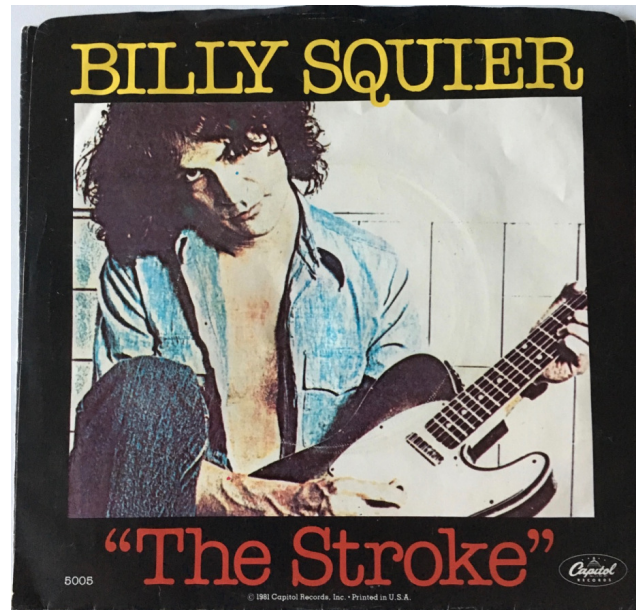
Spared





# Stroke Localization (Part 1)

*for USMLE Step One*



Benjamin Tanenbaum  
UMass Class of 2021

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