PARIETAL LOBE

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Thematic topics

- Surface anatomy
- Cytoarchitectural cortical fields
- Functional organization
- Symptoms from parietal lobe dysfunction
- White matter connections
- Surgical approaches to atrium via parietal lobe
- Phase reversal

Surface anatomy

Anatomy: Surfaces of the parietal lobe

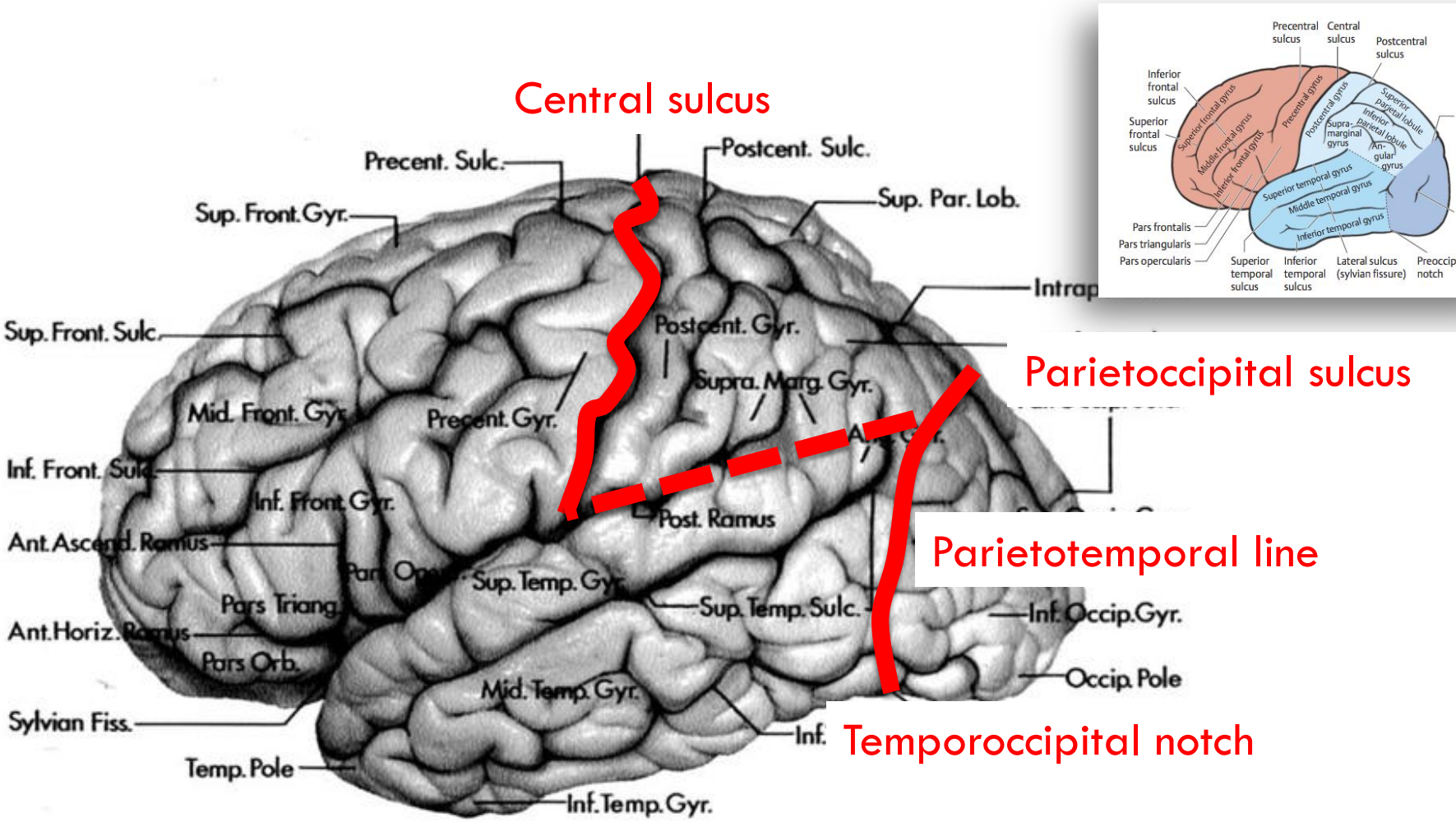
- Lateral
- Medial
- Sylvian (parietal operculum): faces the sylvian surface of the temporal lobe and the insula

Anatomy: Borders of the parietal lobe

- **Borders of the lateral surface:**
  - from central sulcus → the upper half of the parietotemporal line (parieto-occipital sulcus)
  - posterior end of the sylvian fissure and the extended sylvian line

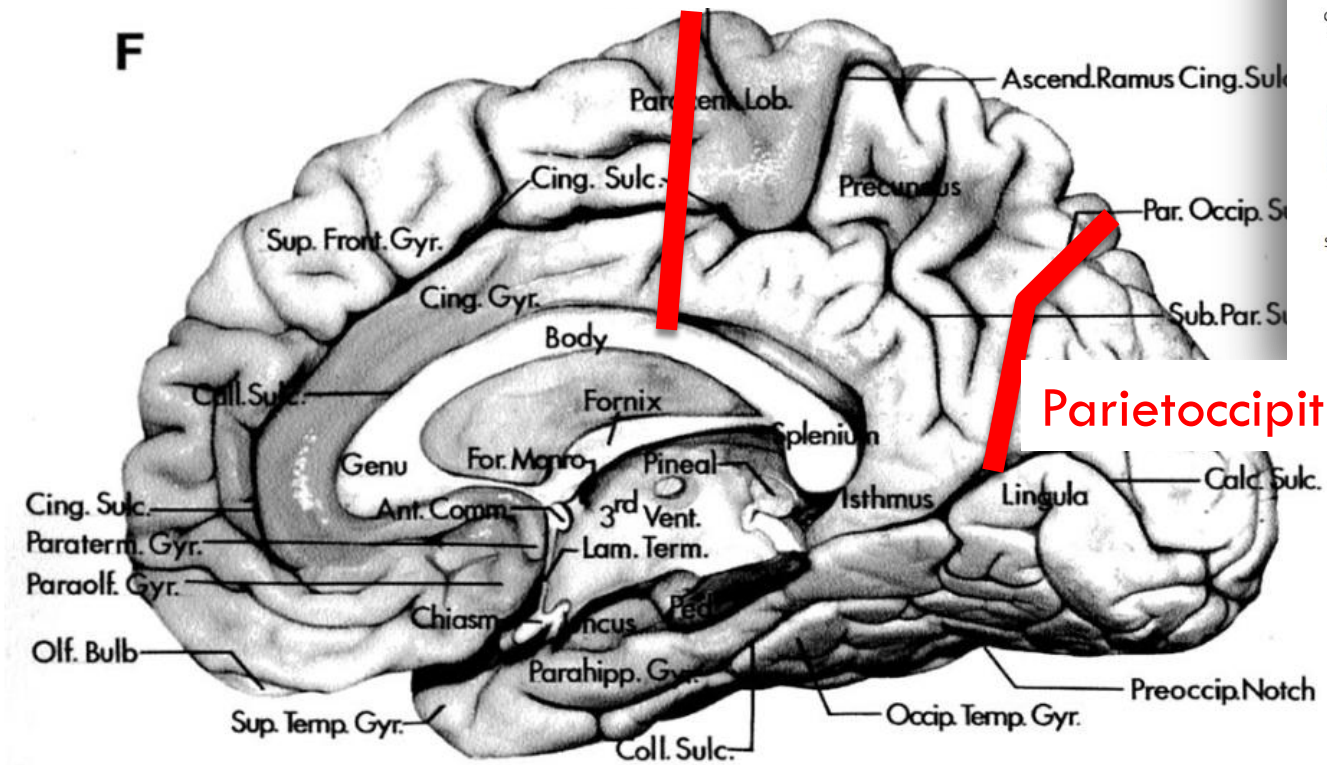
- **Borders of medial surface:**
  - from a line extending downward from the upper end of the central sulcus (look for cingulate sulcus) to the corpus callosum → the parieto-occipital sulcus

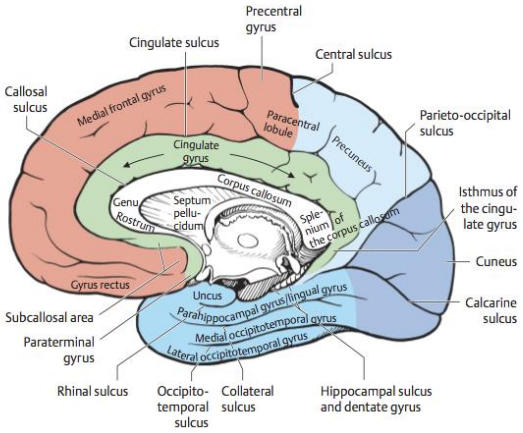
Lateral surface of cerebrum



Medial surface of cerebrum

Central sulcus





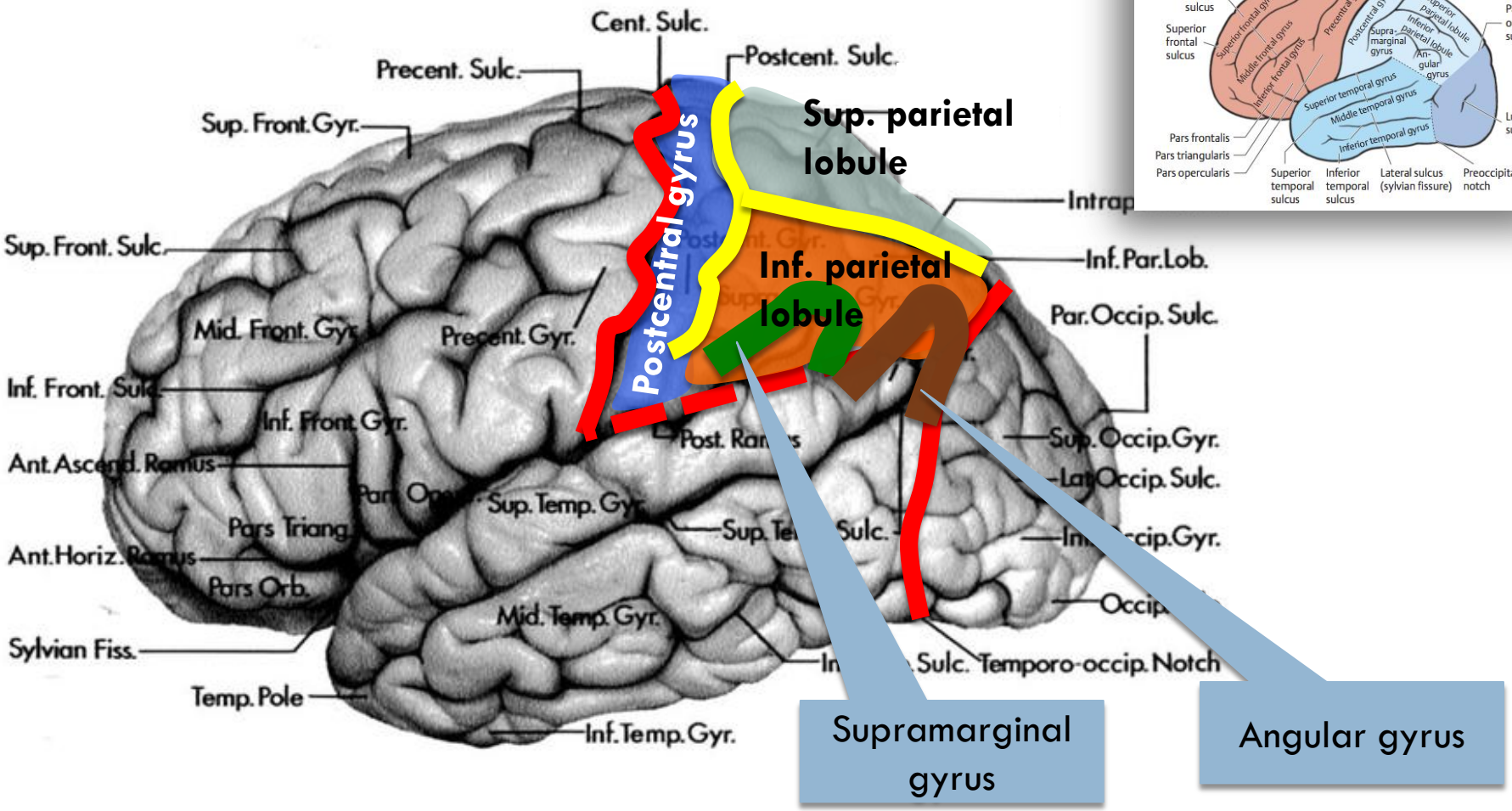
Parietoccipital sulcus

Anatomy: lateral surface

- **Sulci:** look for the **T**
  - postcentral sulcus
  - intraparietal sulcus

- **Parietal lobules (divided by intraperietal sulcus):**
  - superior parietal lobule
  - inferior parietal lobule
    - supramarginal gyrus
    - angular gyrus

Sulci and gyri of parietal lobe: lateral surface

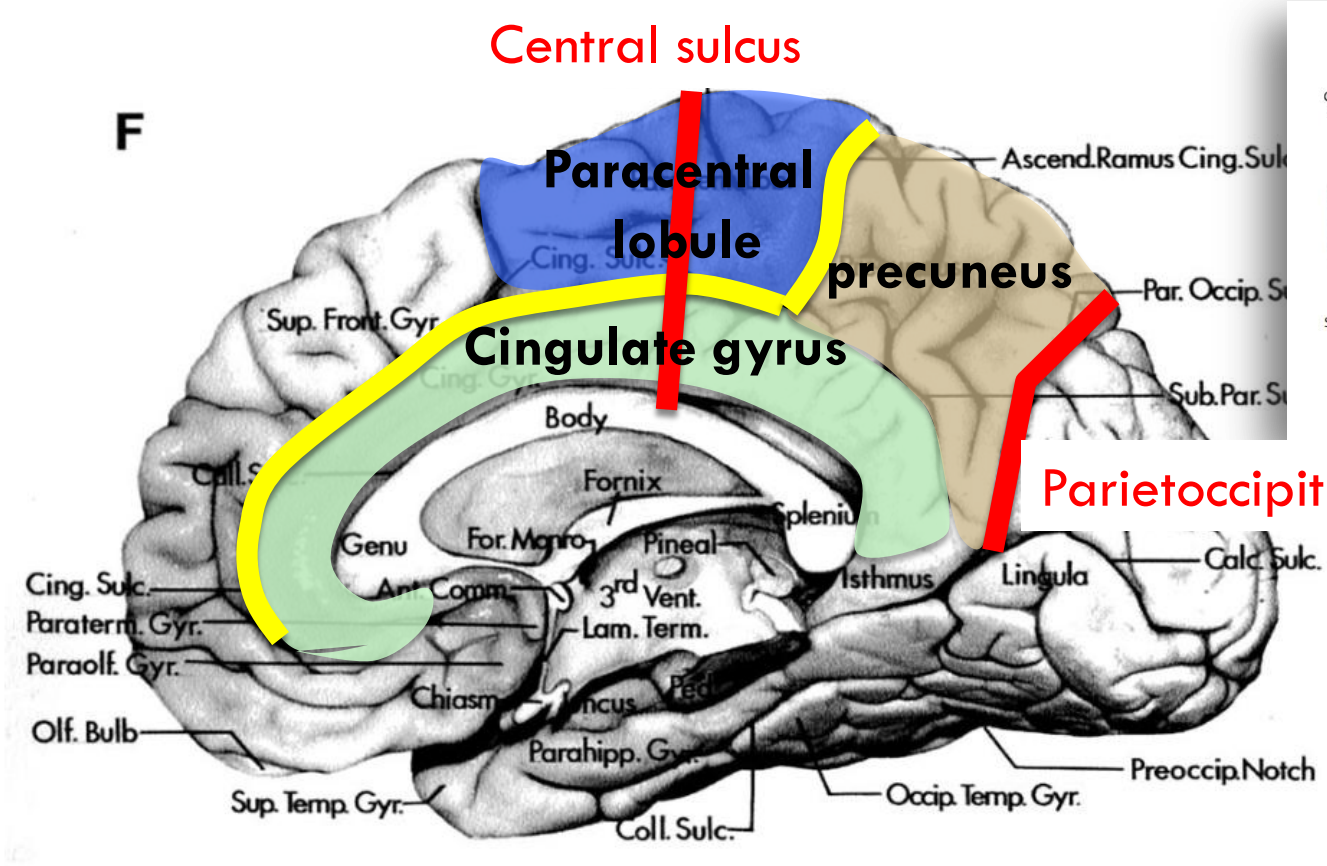


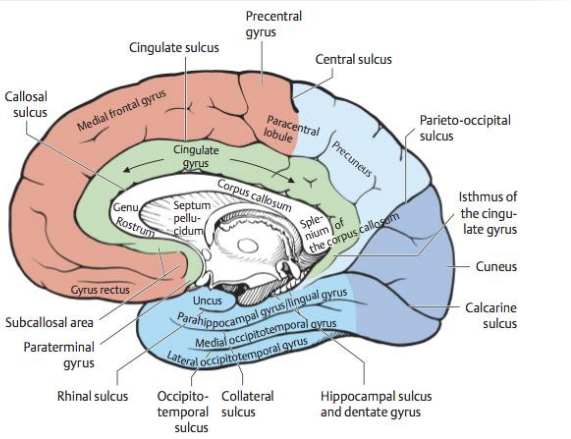
Anatomy: medial surface

- **Sulci:**
  - Ascending ramus of cingulate gyrus

- **Paracentral lobule (posterior ½)**
- **Precuneus**
- **Cingulate gyrus (posterior part)**

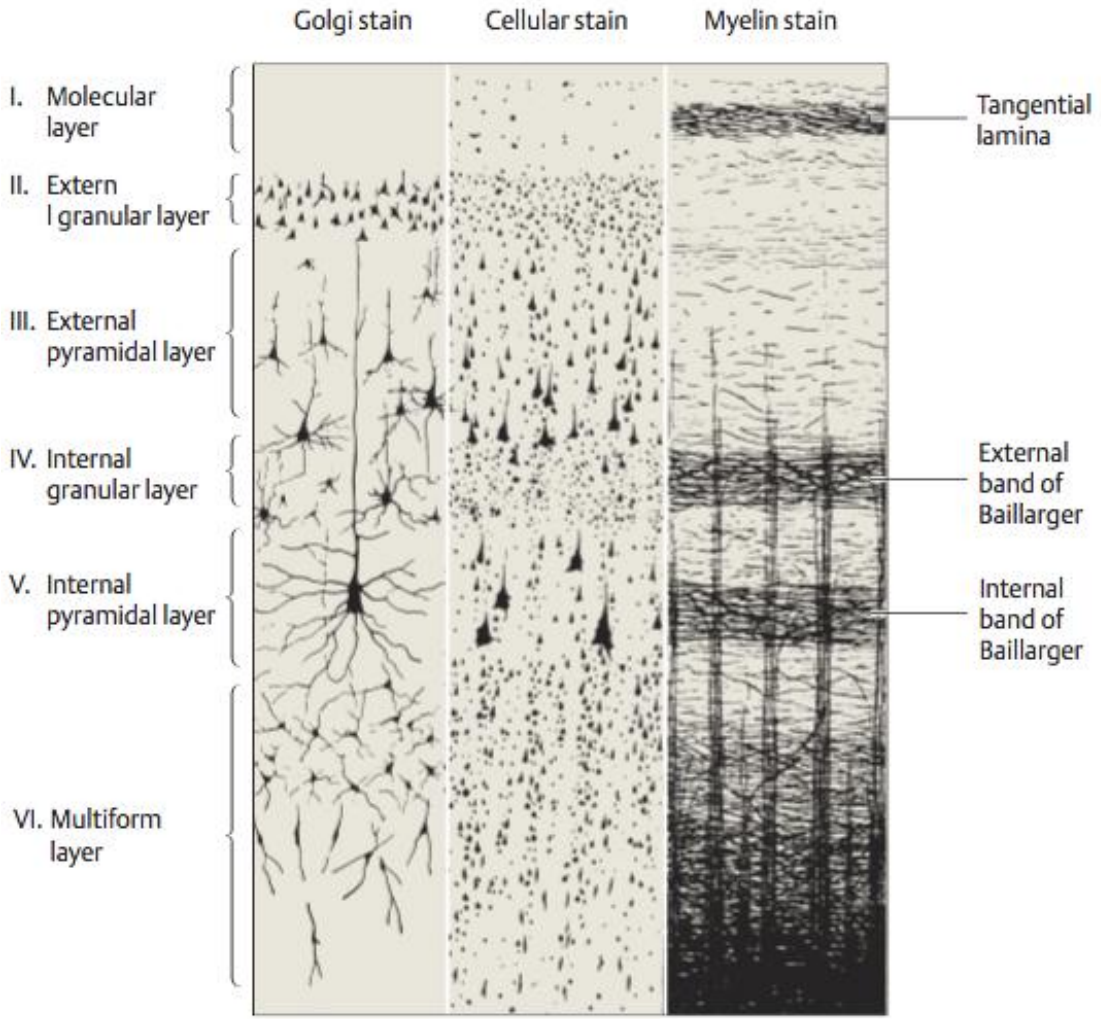
Medial surface of cerebrum





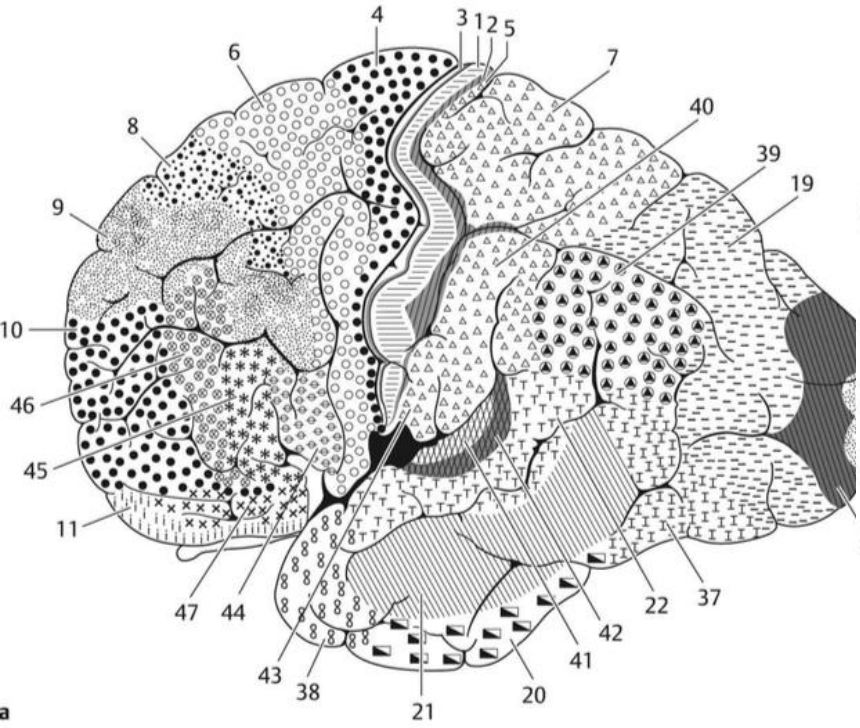
Cytoarchitectural cortical fields of parietal lobe

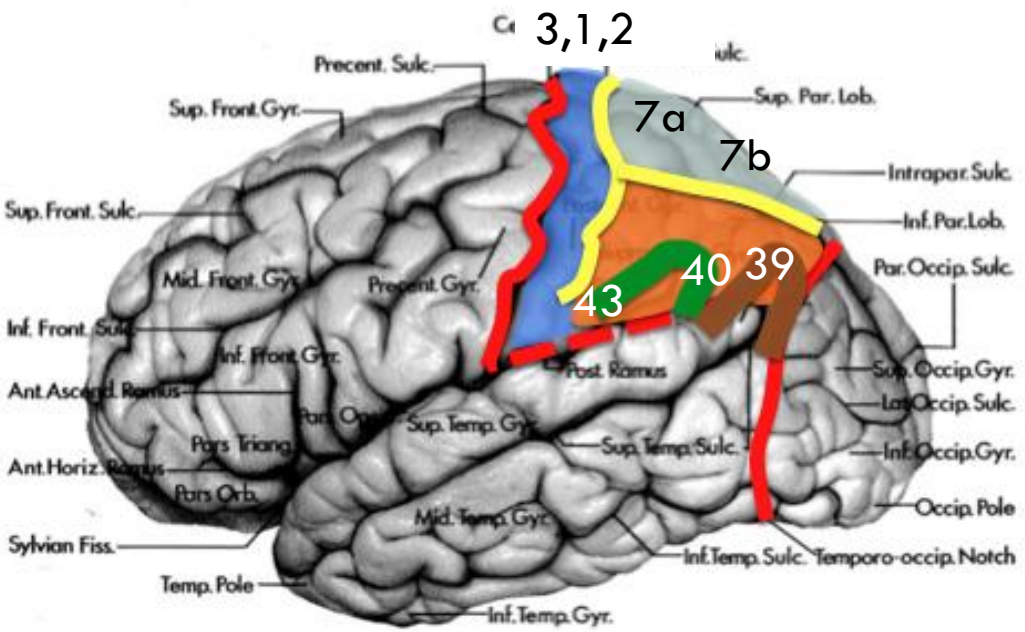
Cytoarchitecture of cerebral cortex



Lateral surface

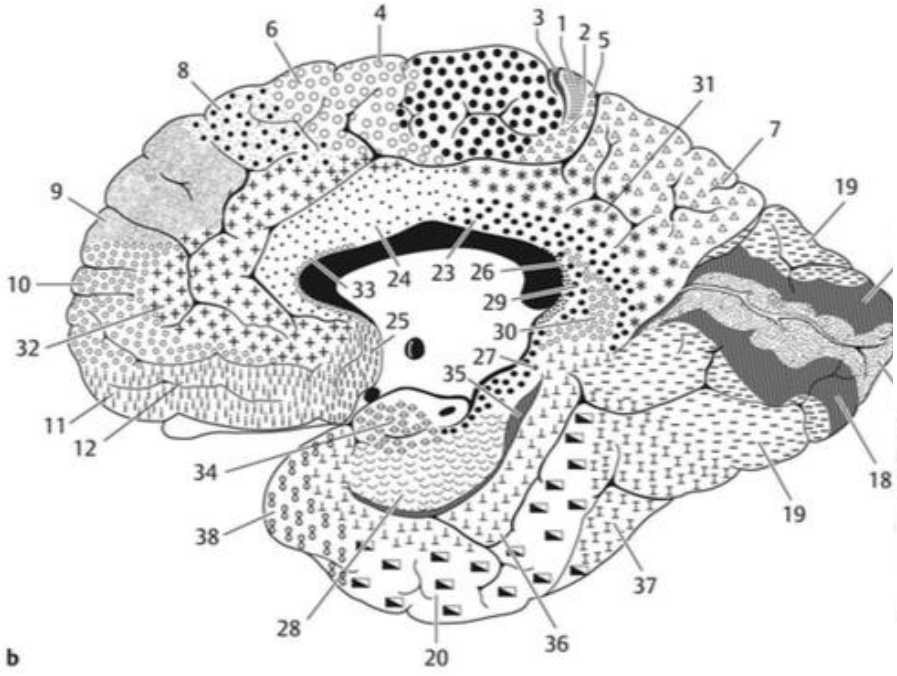
Brodmann fields

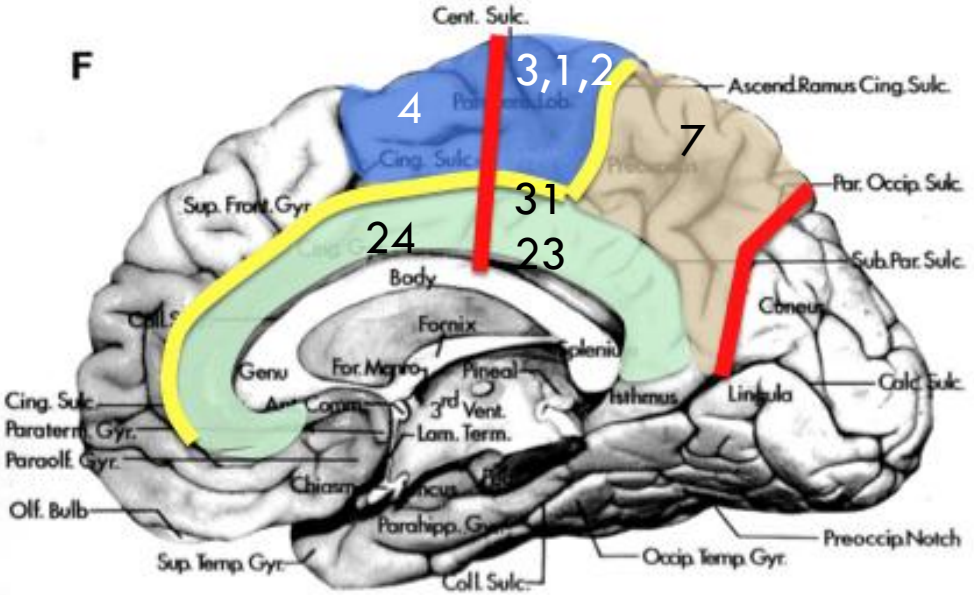




Cytorarchitectural cortical fields: Medial surface

Brodmann fields





Functional organization of parietal lobe

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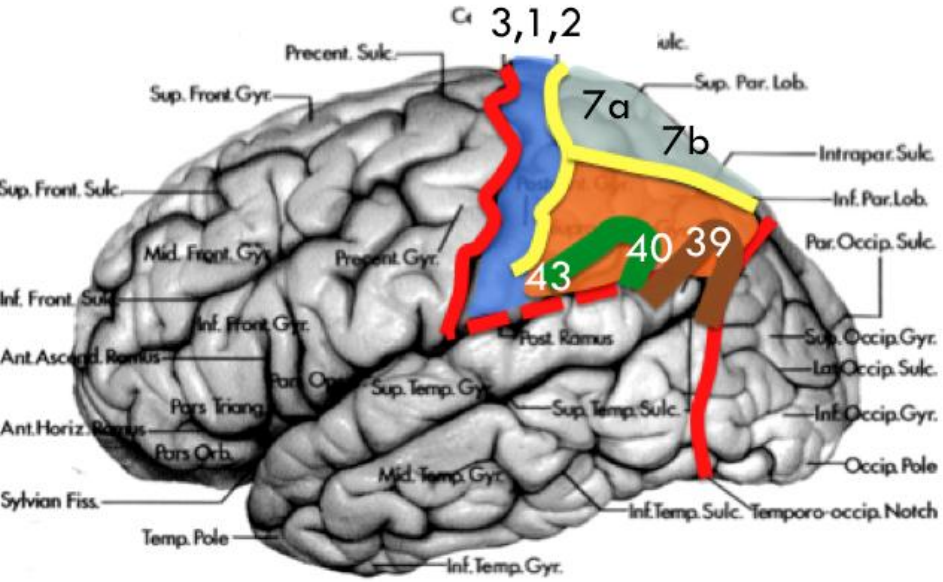
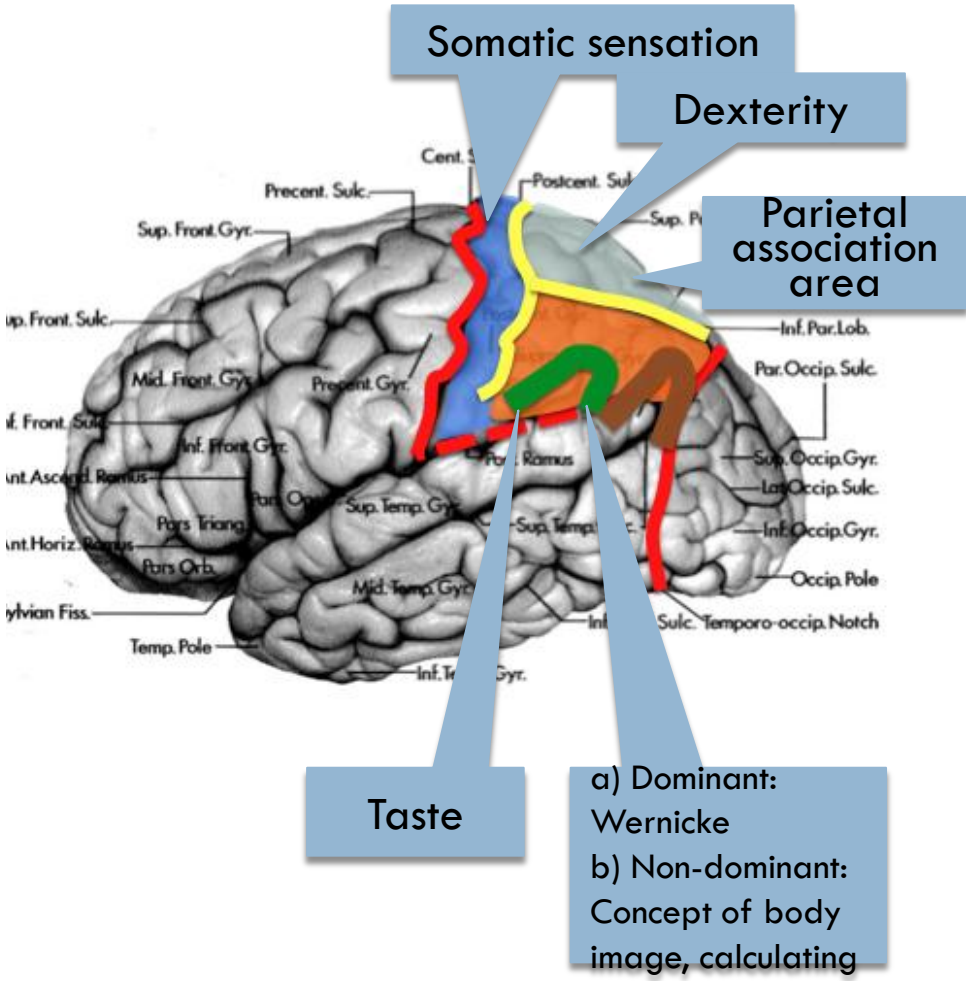
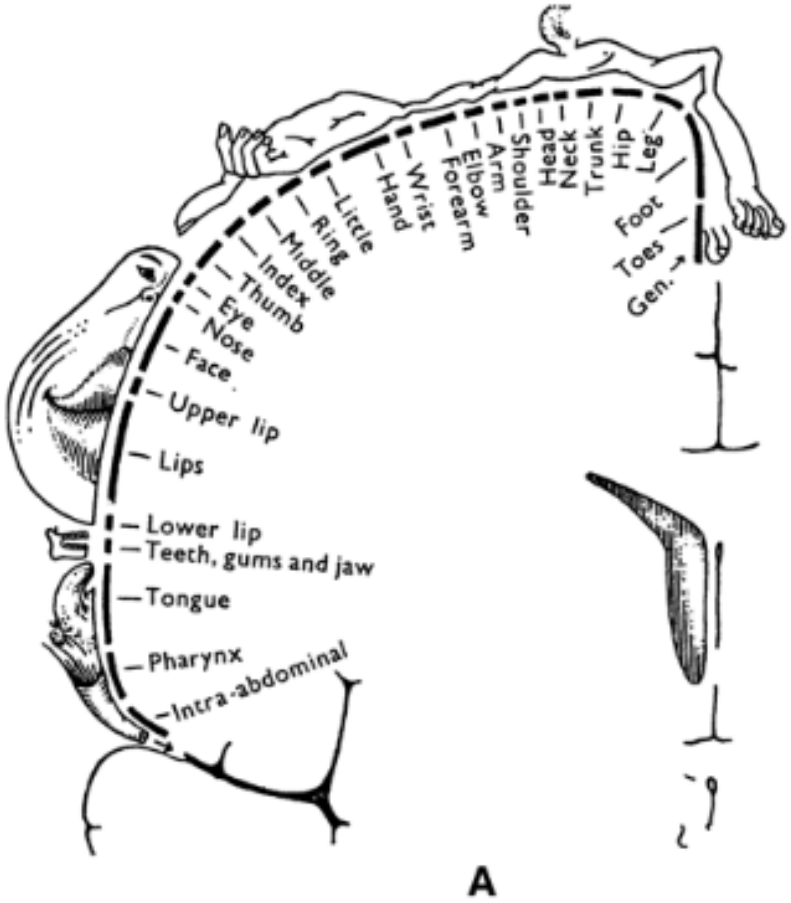




Somatosensory cortex



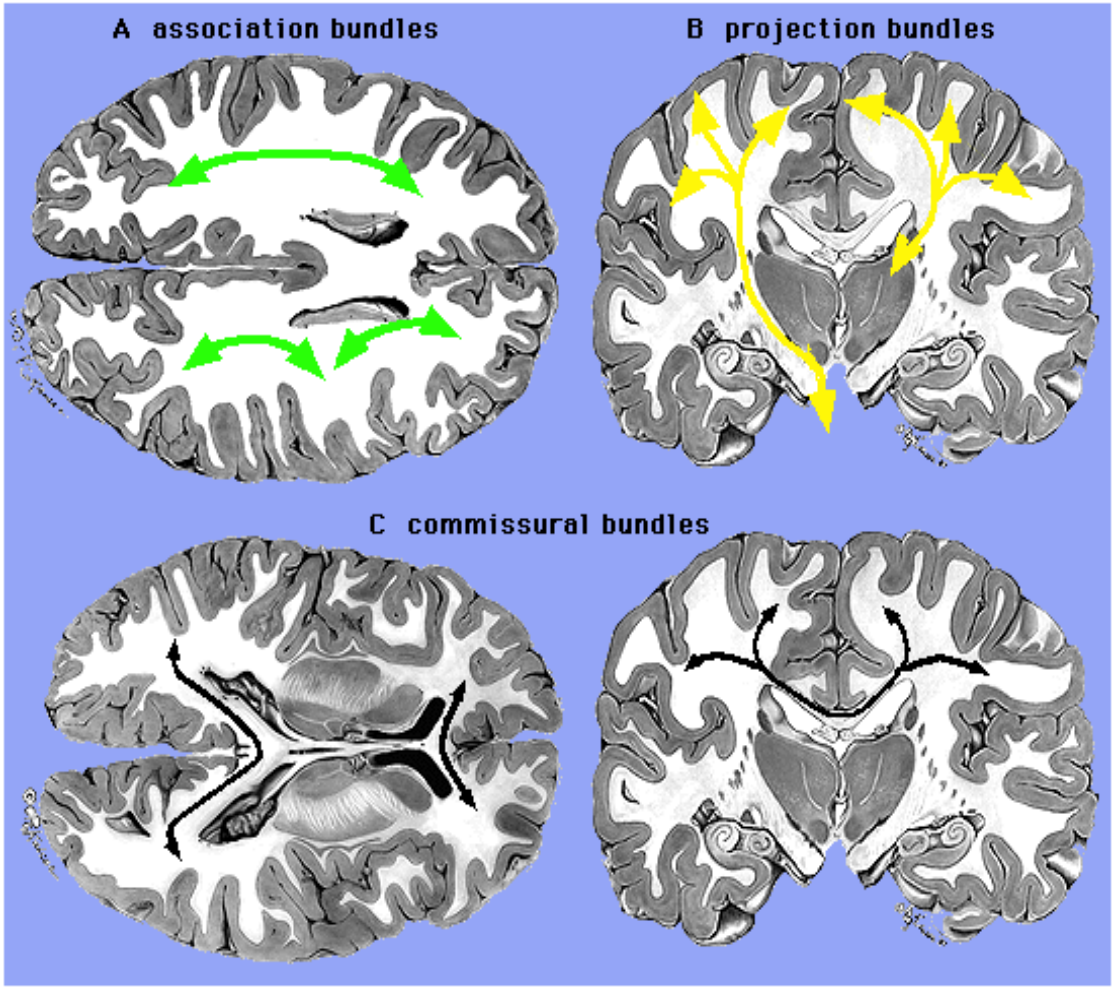
Based on cortical stimulation during neurosurgical procedures (Penfield & Rasmussen)

Symptoms from parietal lobe dysfunction

Location of lesion	Symptoms
Somatosensory cortex (#3,1,2)	Contralateral disturbances of cortical sensation: • Postural sensation • Passive movement • Light touch • 2 point discrimination • Astereognosia
Supramarginal gyrus (dominant hemisphere)	• Wernicke aphasia (difficulty naming objects, difficulty comprehending language) • Gerstmann's syndrome (confusion right – left, finger agnosia, acalculia, agraphia)
Supramarginal gyrus (non dominant hemisphere)	• Unaware of opposite limbs • Anosoagnosia • Geographical agnosia
Optic radiation	Lower homonymous quadranopia

White matter connections of parietal lobe

Types of cerebral white matter fibers



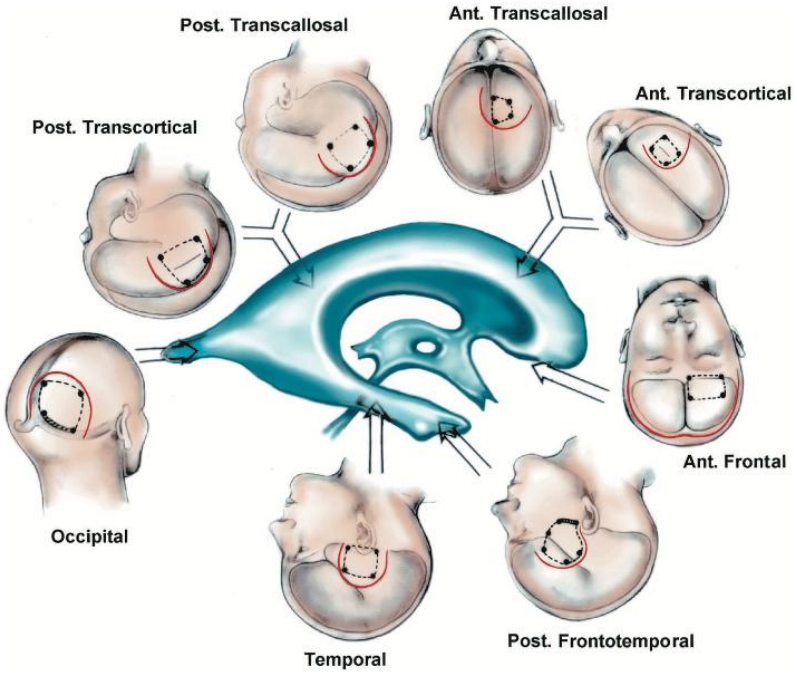
- Association fibers: different areas in the same hemisphere
- Commissural fibers: corresponding areas of both hemispheres
- Projection fibers: fibers running vertically through hemispheres

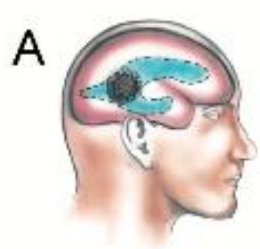
White matter fibers ending to (OR) originating from parietal lobe

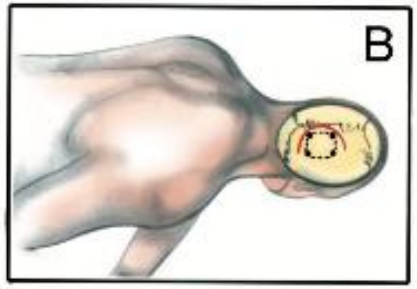
- Association fibers
  - Superior longitudinal fasciculus: connects the frontal, parietal, temporal and occipital lobes
  - Cingulum: connects frontal & parietal lobes to the para-hippocampal gyrus and adjacent temporal gyri
- Commissural fibers
  - Fibers from corpus callosum
- Projecion fibers
  - Thalamocortical fibers from ventral posterior nucleus (VPN) of thalamus

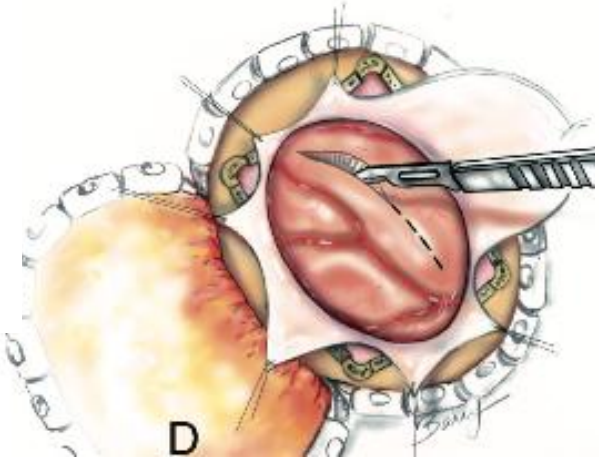
Surgical approaches to atrium via parietal lobe

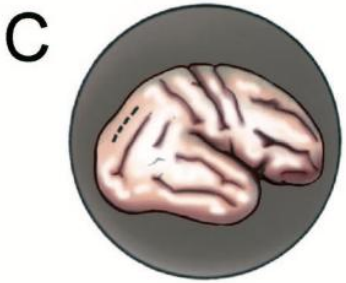
Approaches to lateral ventricles





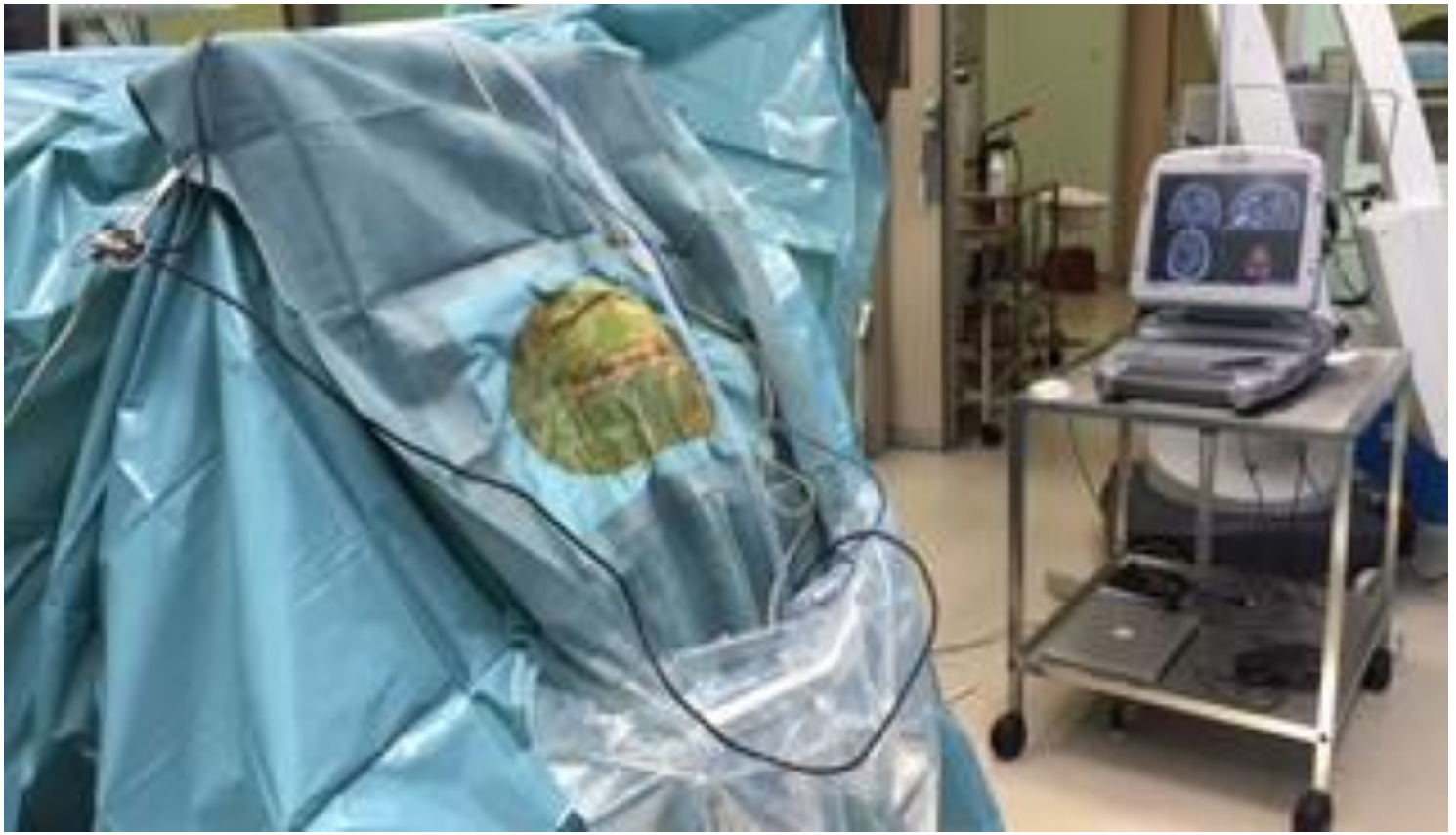






Phase reversal

Intraoperative setup



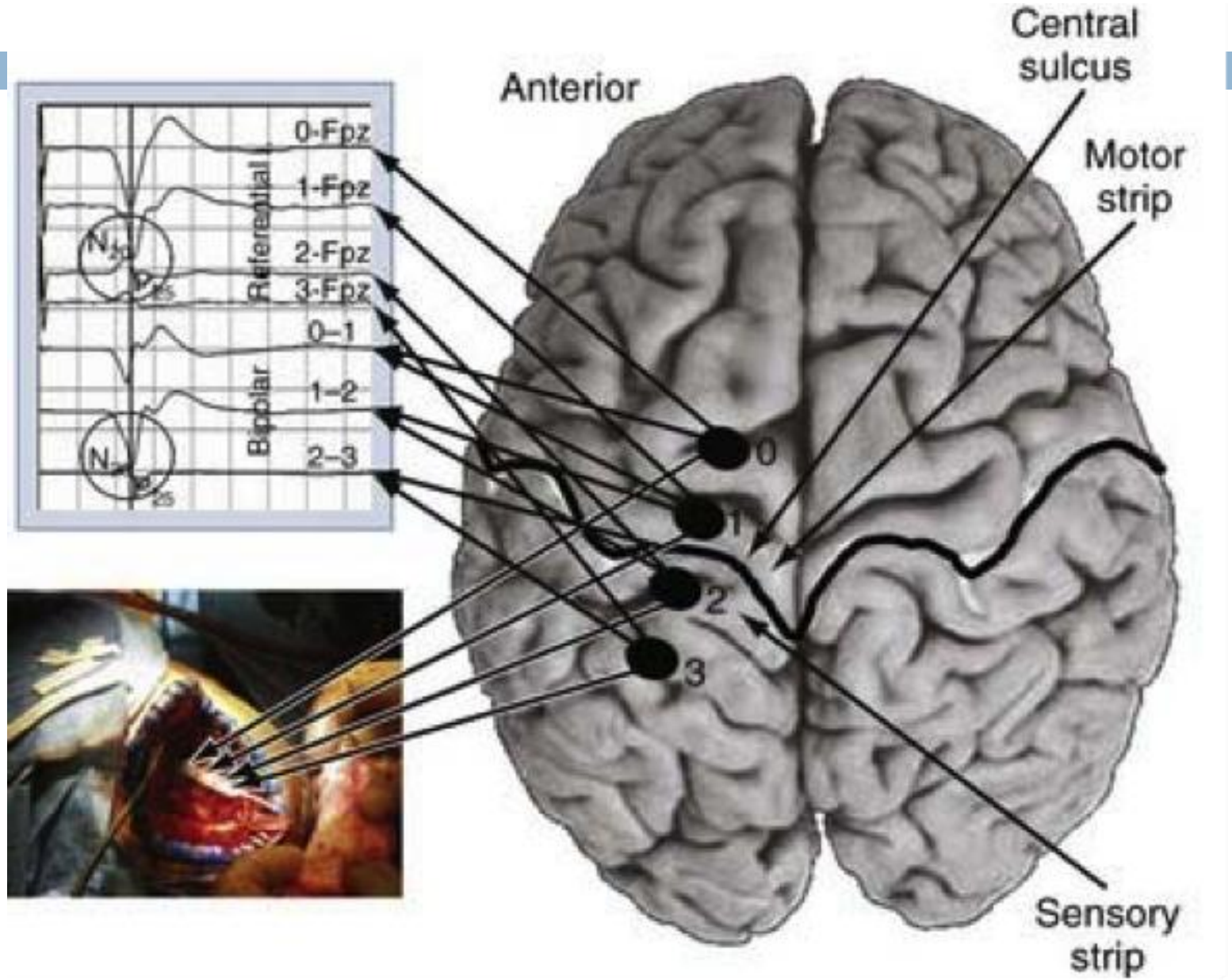
Intraoperative neurophysiologic mapping

- Motor mapping is performed with a 5-mm ball probe (Model E1564, Valleylab, Gosport, UK) that is applied on the dura over the suspected M1 area. The probe functions as the anode and is referenced to a cathode placed at Fz. Electromyographic recording needles are placed in bipolar fashion in the orbicularis oculi, orbicularis oris, trapezius, deltoid, biceps, triceps, flexor carpi ulnaris, abductor pollicis brevis, first dorsal interosseus, quadriceps, tibialis anterior, and abductor hallucis muscles. Stimulation consists of short trains of five to nine stimuli at a rate of one train per second, a pulse width of 500 μsec, and a 4-msec interspike interval. Stimulation is begun at each location starting at 5 mA and increased in 1-mA steps until a motor response is elicited or the maximal stimulus of 25 mA is reached.
- Ice-cold R/L is kept ready in the field to irrigate the dura should a seizure occur. Barbiturates may be given intravenously as well if necessary.
  In our experience, the mean stimulation amplitude required to generate an evoked response is 13.0 ± 4.2 mA (range, 7 to 22.4 mA). Stimulation is halted when the first electromyographic response is noted.

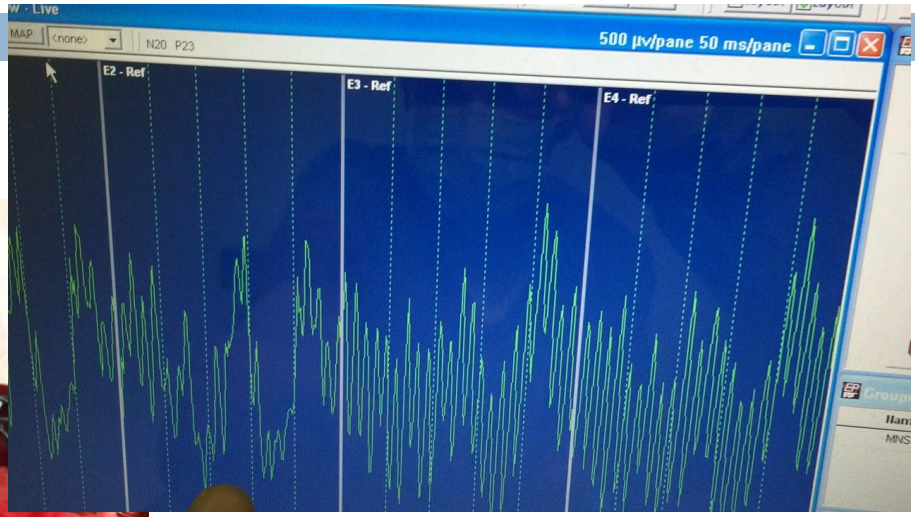
Intraoperative neurophysiologic mapping

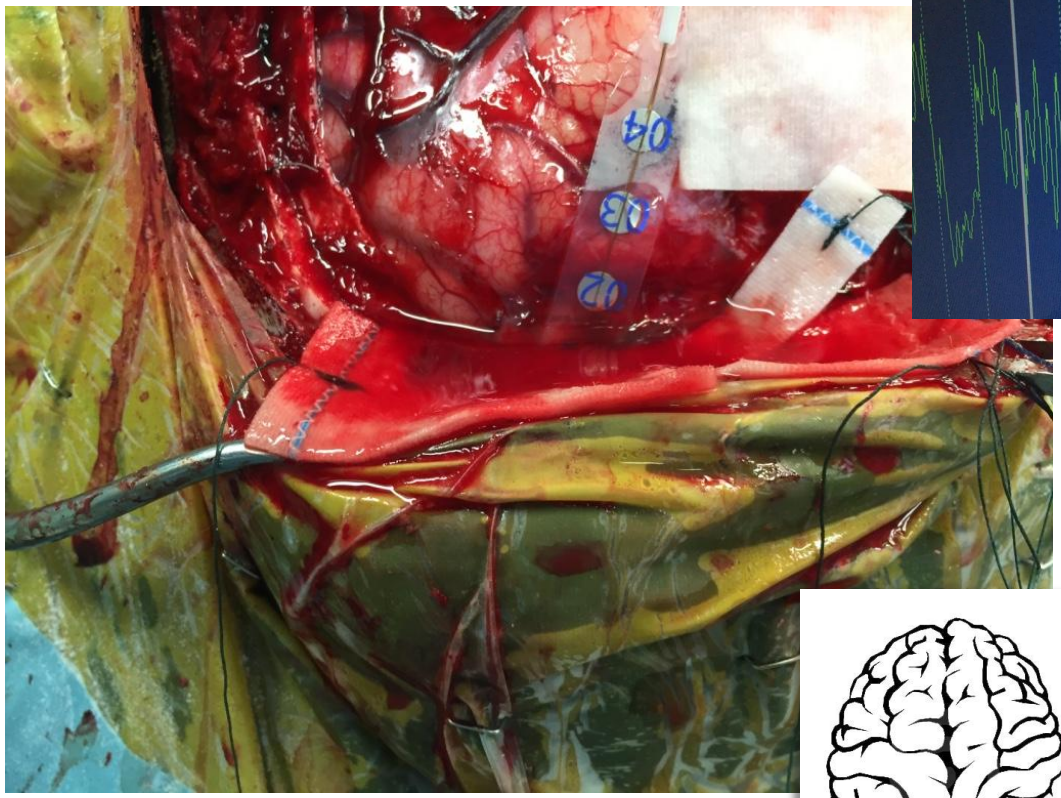
- Use of the SSEP phase reversal method to localize M1 extradurally. Contacts 0 to 3 of a typical 4-contact paddle-type electrode are shown with placement across the underlying central sulcus. The *upper left* waveforms show the SSEP in each contact. Reversal of the phase occurs between contacts 1 and 2 in this example.
- The *inset* at the *lower left* is the intraoperative photo of this technique being used, which reveals the relative size of the lead to the craniotomy. By placing the lead in different positions, the path of the sulcus can be mapped epidurally

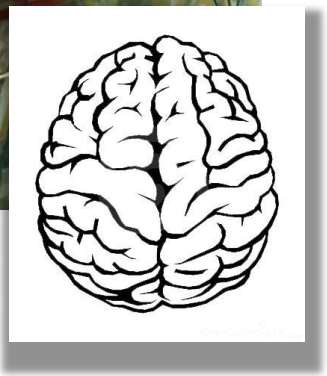
Intraoperative neurophysiologic mapping

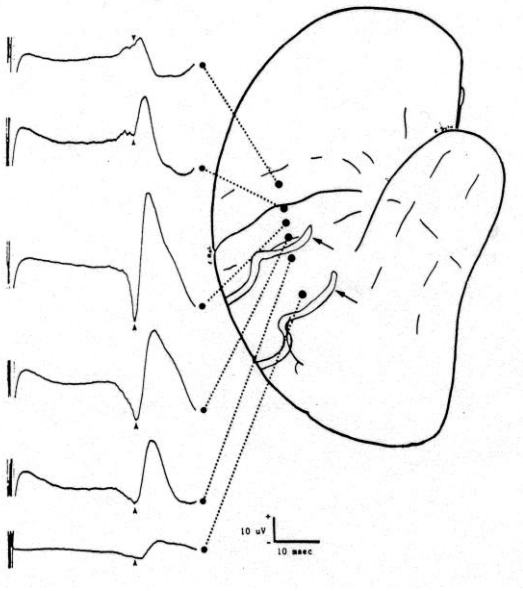


Phase reversal









Cortical mapping

Intraoperative video


THANK YOU FOR LISTENING