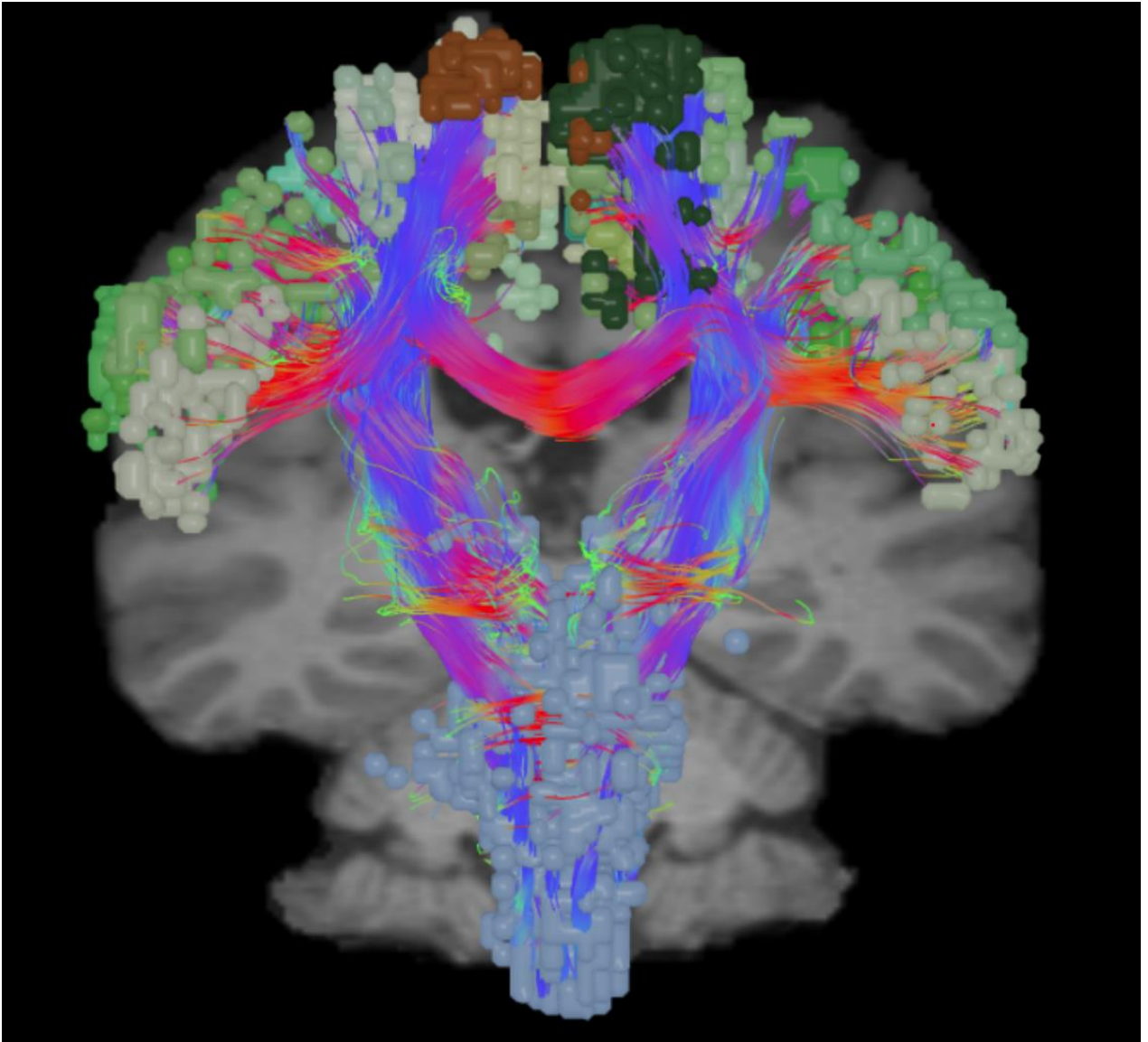
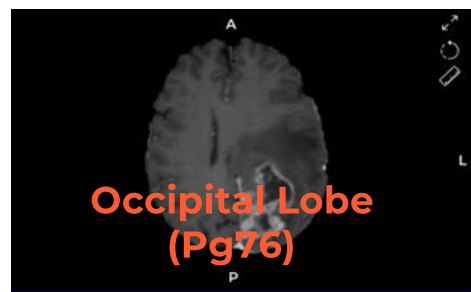
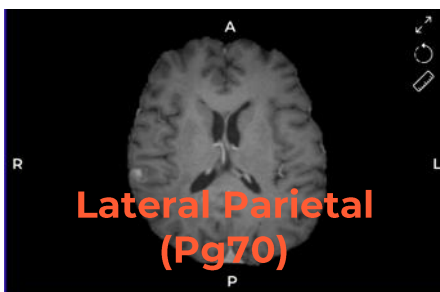
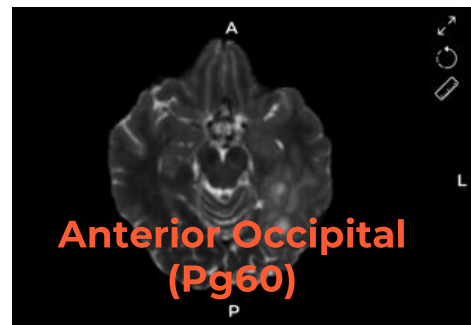
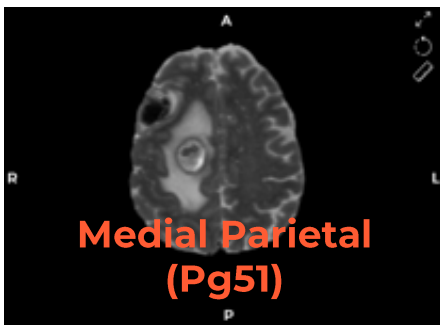
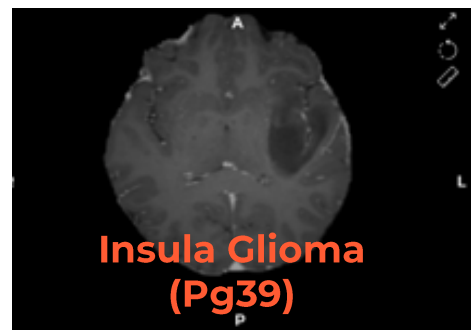
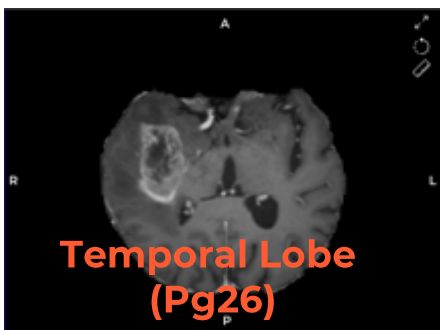
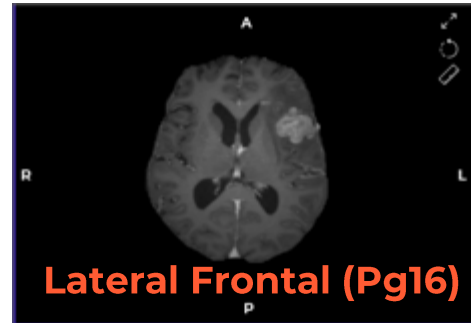
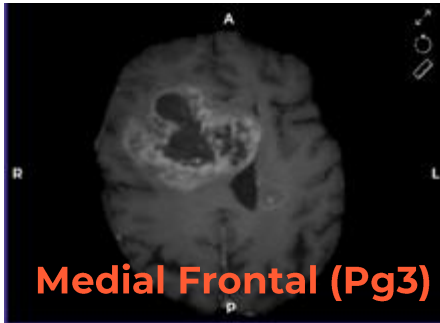


The 8 disconnections



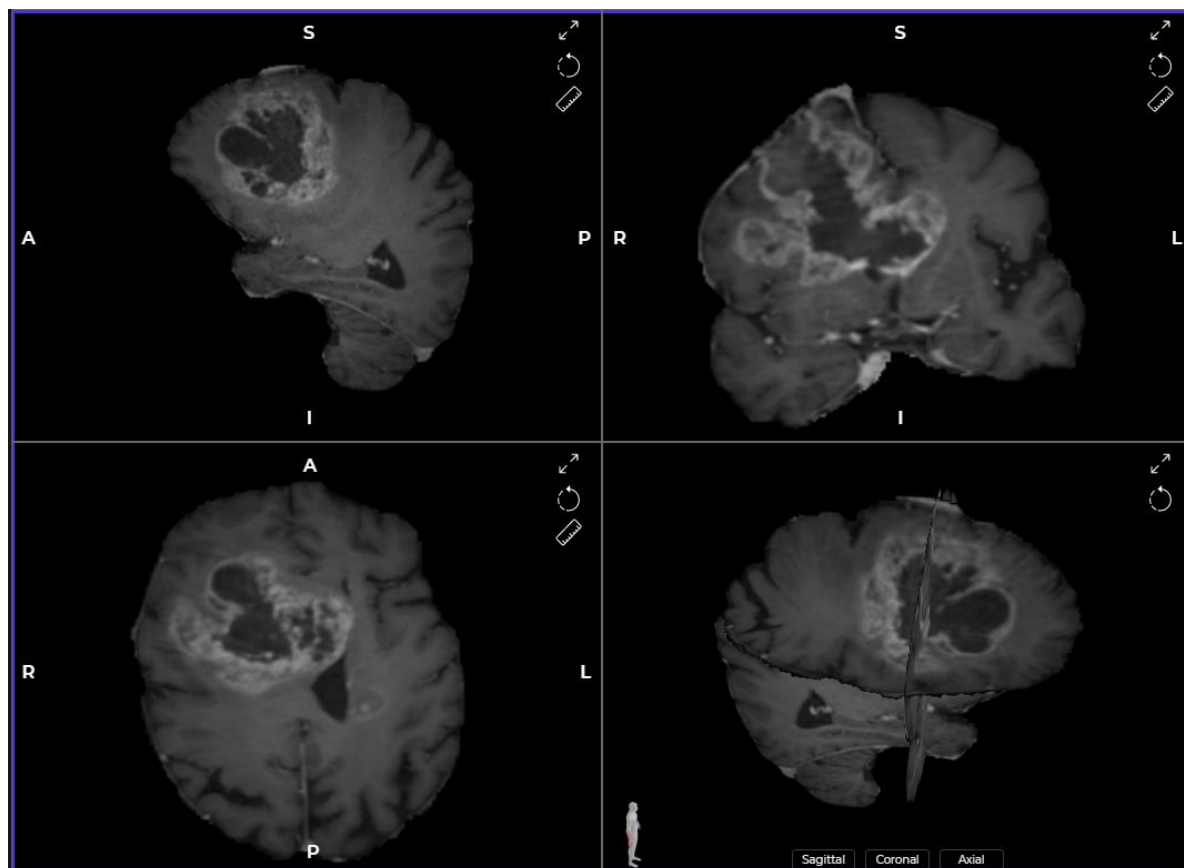
OMNISCIENT NEUROTECHNOLOGY WORKSHOP
 PART 2: INFORMING NEUROSURGICAL DISSECTIONS
 WITH CONNECTOMICS

Cases



CASE 1

Medial Frontal Tumor (BOTH)



Launching the case

1. Find the case by searching and launching **"MedFront"**
2. Select workflow: Click **Surgical planning**
3. Select brain region: Hover over **Medial Frontal** and click **Both sides**

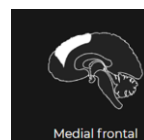


Medial frontal

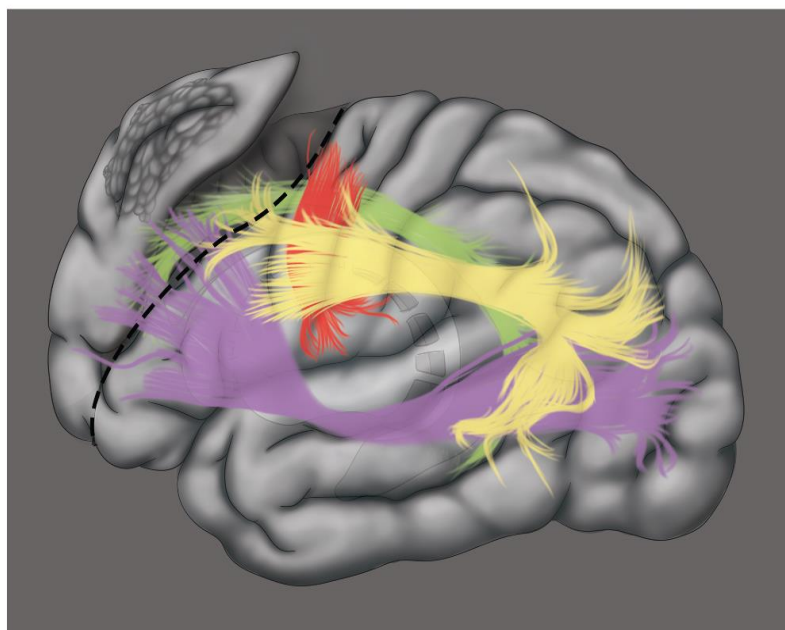
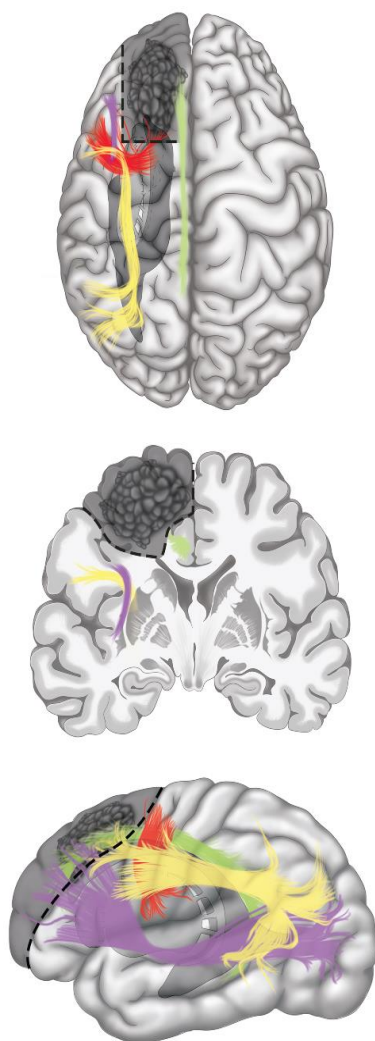
Left

Right

Both sides

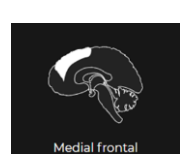


Medial Frontal

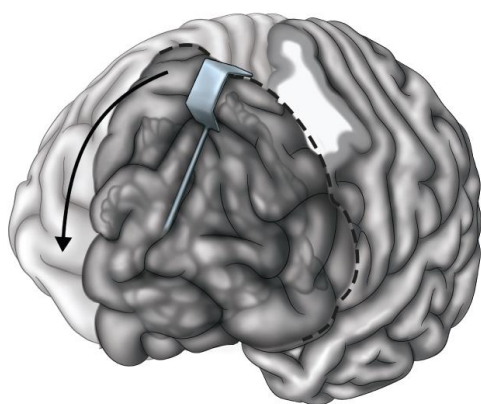


KEY TRACTS OF THE CUT

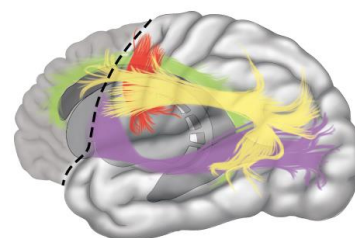
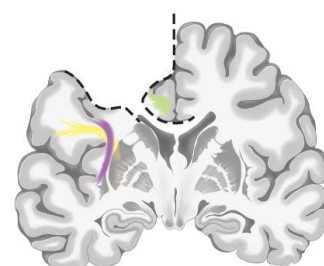
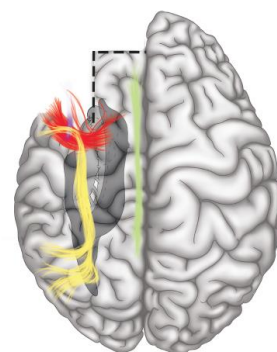
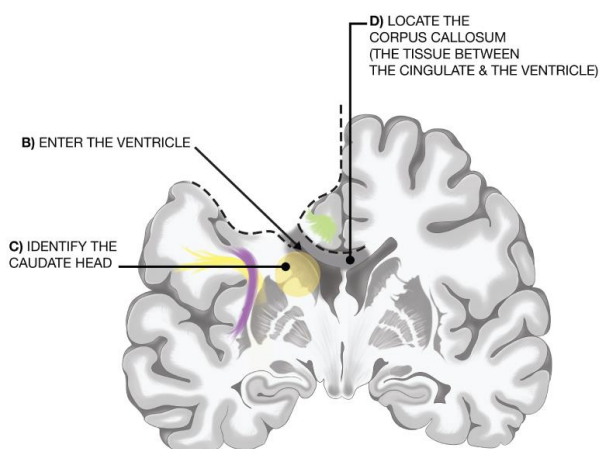
- | | |
|------------|--------|
| ■ CINGULUM | ■ SLF |
| ■ FAT | ■ IFOF |

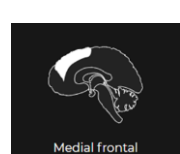


Medial steps

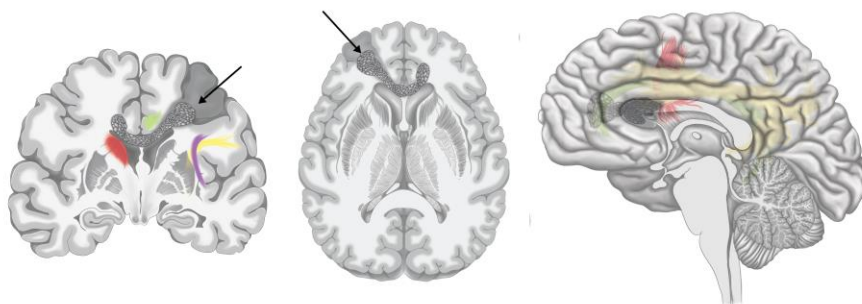


A) MEDIAL FRONTAL DISSECTION
FOLDED FORWARD

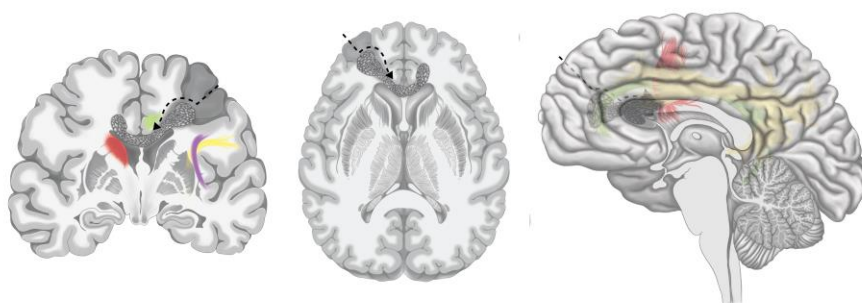




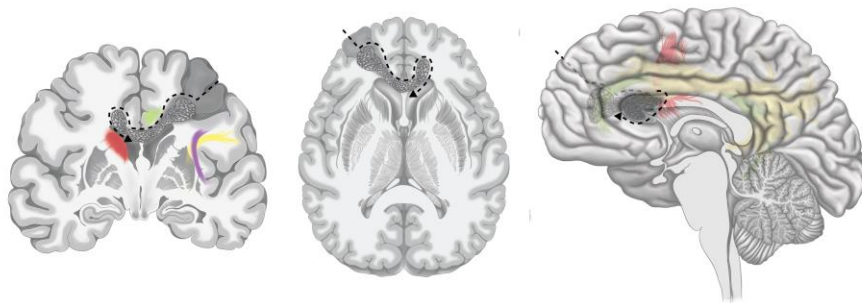
Corpus callosum



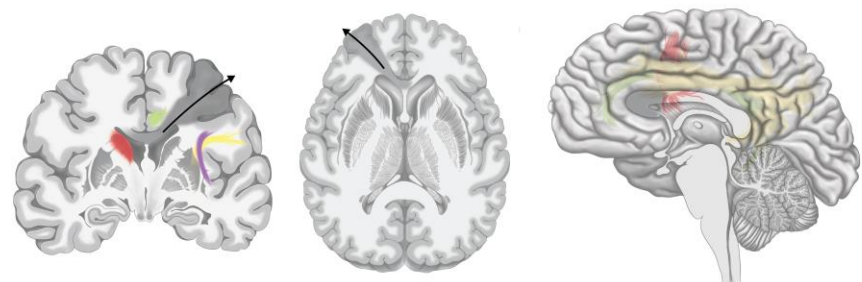
STEP 1: ENTER MIDDLE FRONTAL GYRUS TO MEET FRONTAL LOBE



STEP 2: DISSECT MEDIAL PLANE TO THE CINGULATE SULCUS,
DEVIATE LATERALLY TO AVOID IT



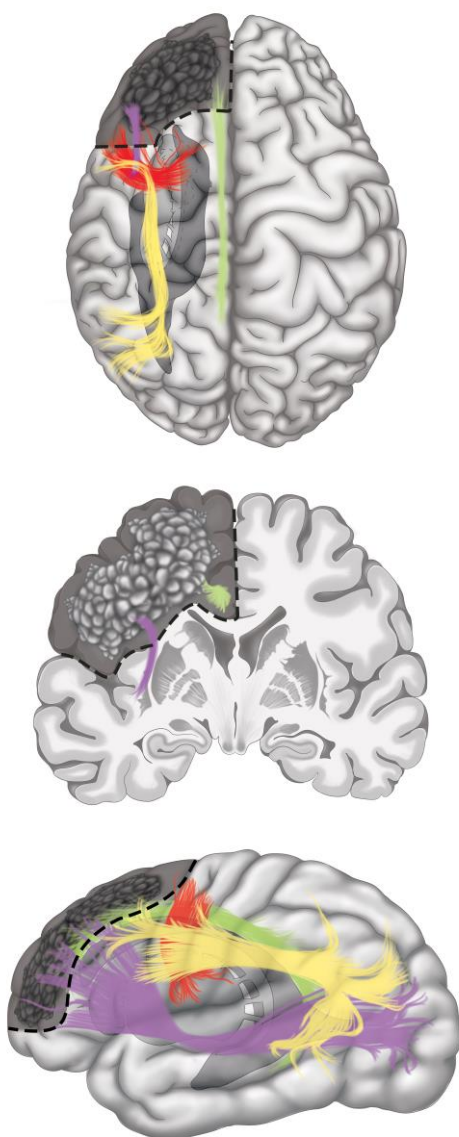
STEP 3: WORK CIRCUMFERENTIALLY AROUND TUMOR
TO REMOVE FROM FRONTAL LOBE.
AVOID CAUDATE NUCLEUS TO ENTER THE VENTRICLE BETWEEN CINGULUM & CAUDATE.

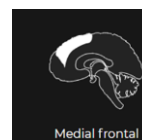


STEP 4: AMPUTATE THE TUMOR AT THE CORPUS CALLOSUM



Orbitofrontal sparing

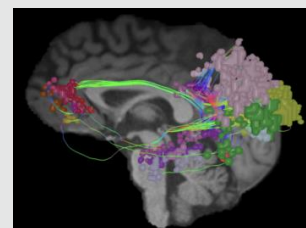




Functional regions of concern

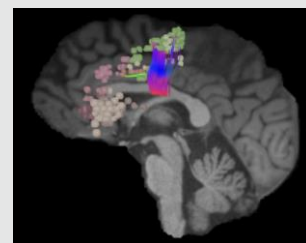
Default mode network (DMN)

A critical network involved with cognitive and emotional regulation. Active during rest and sleep. Coordinates with other networks for passive sensory processing. Dysfunctions associated with neuropsychiatric disorders and may contribute to difficulty in processing social situations and information.



Salience network (SN)

Involved in cognitive, emotional and motivational function. Monitors the external world and decides how other brain networks react to new information and stimuli in particular activating and deactivating the CEN and DMN.

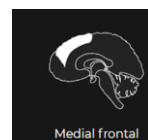


Corticospinal tract

Connects sensorimotor cortex to spinal cord.

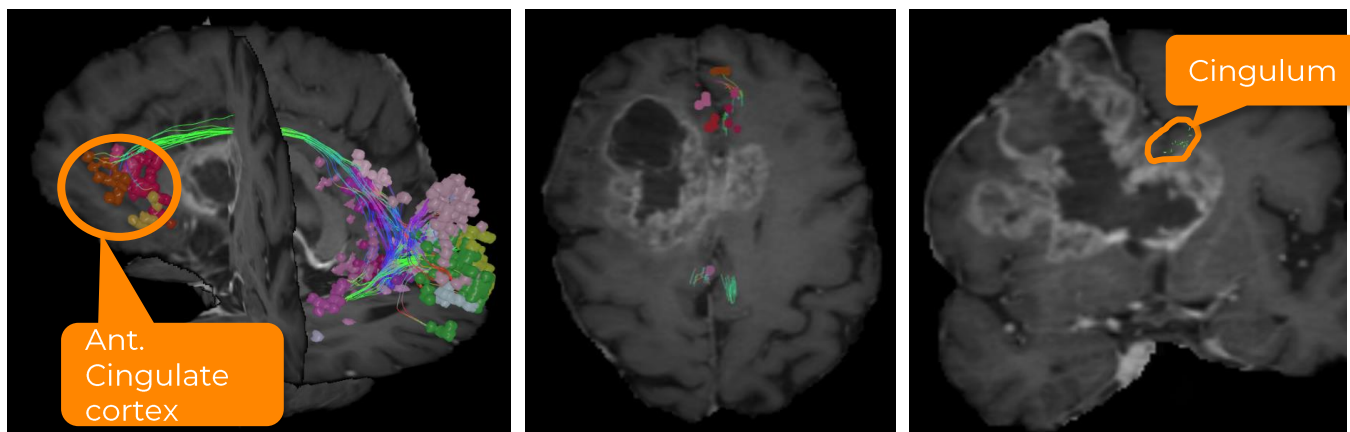
Frontal aslant tract (FAT)

Connects salience network to itself and thus links SMA to Broca's area.

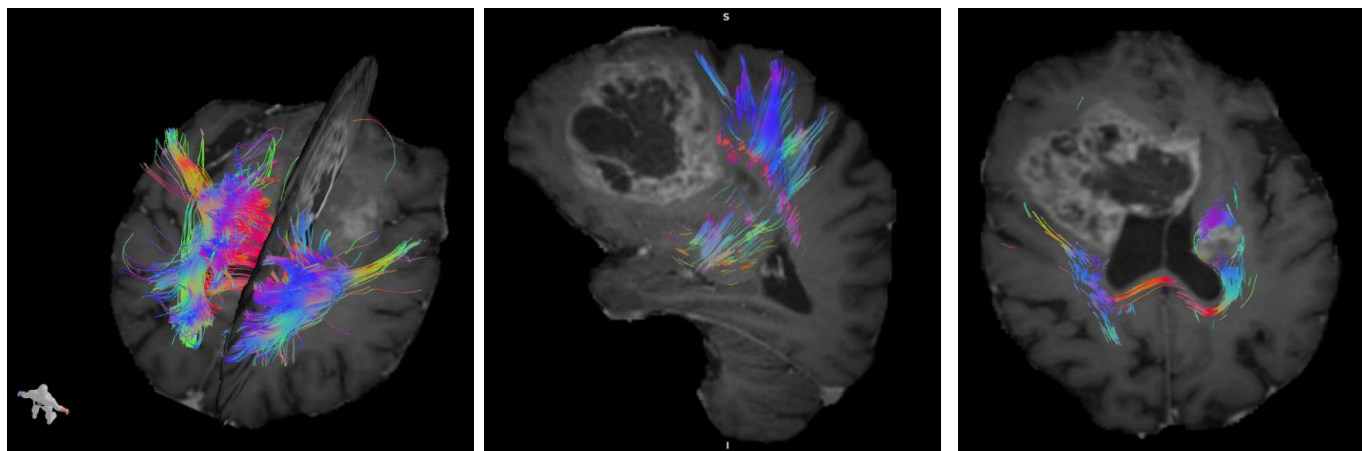


Examining functional areas

Default mode network

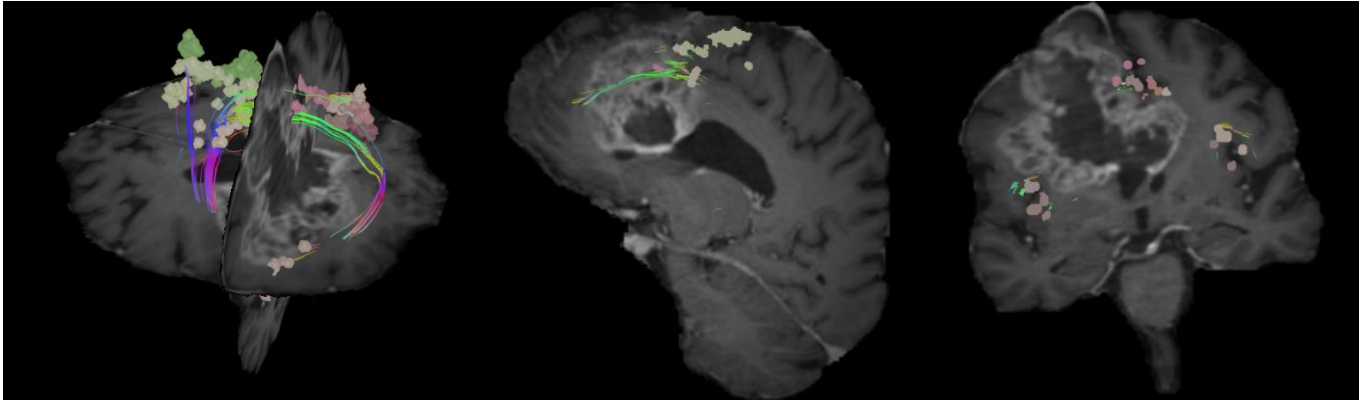


Corticospinal tract

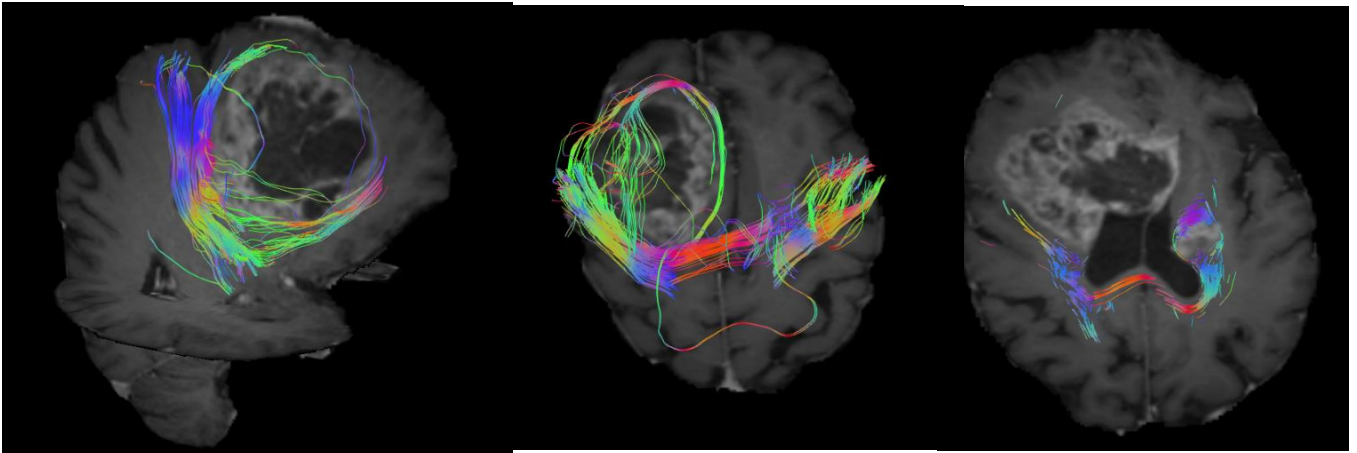


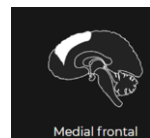


Salience network



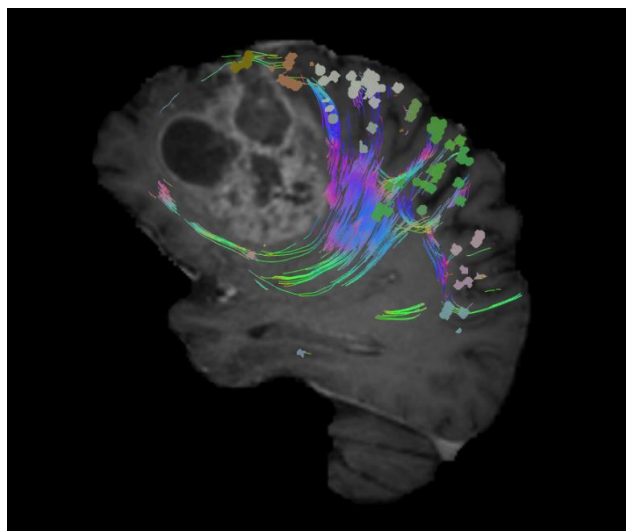
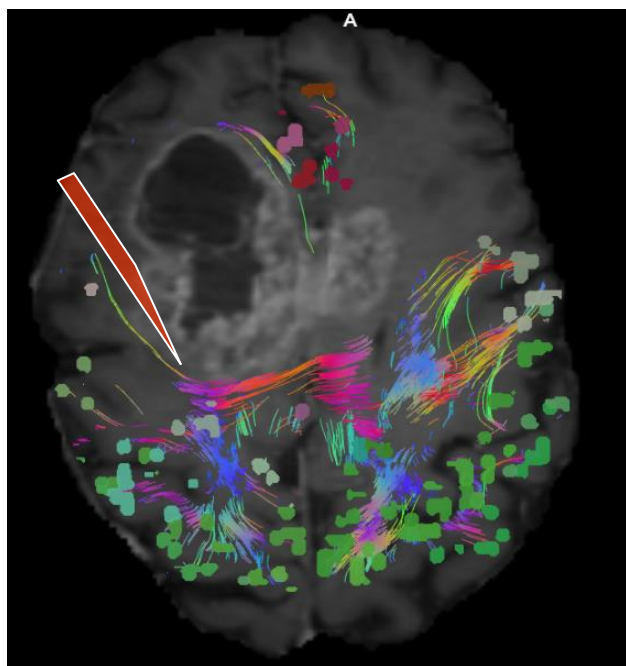
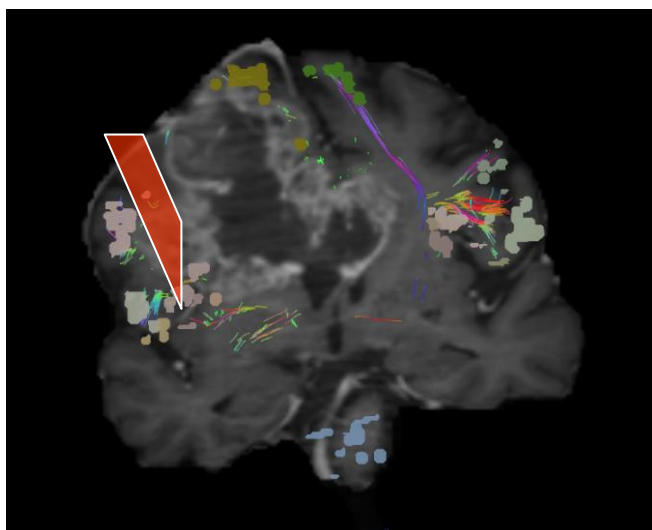
Frontal aslant tract

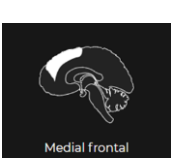




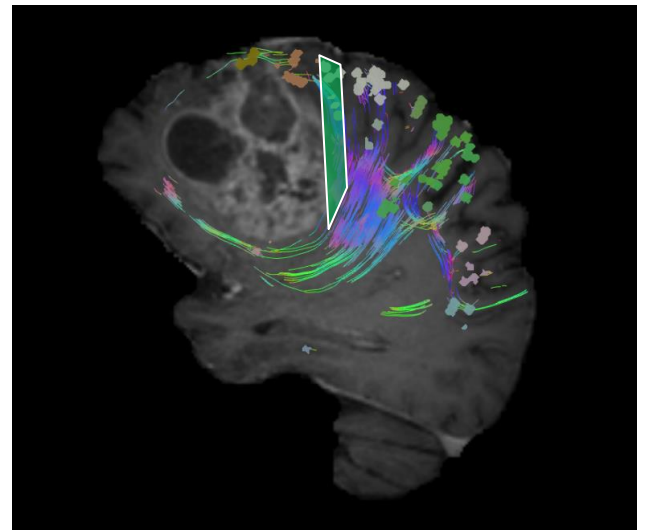
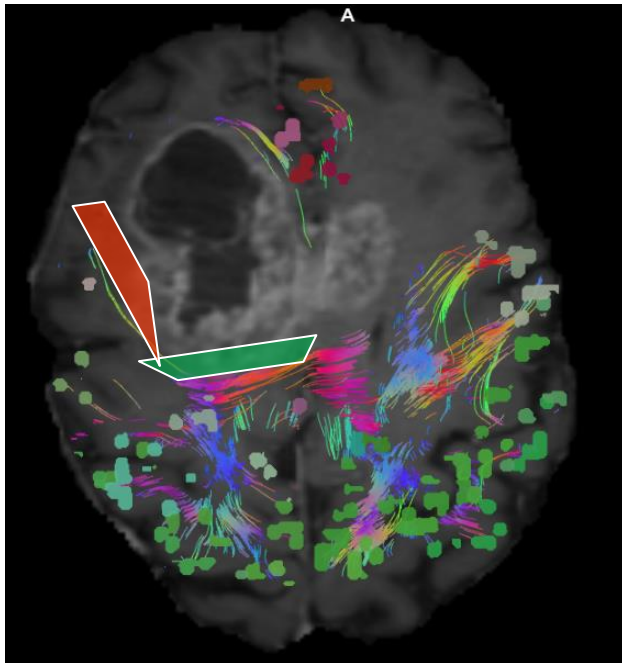
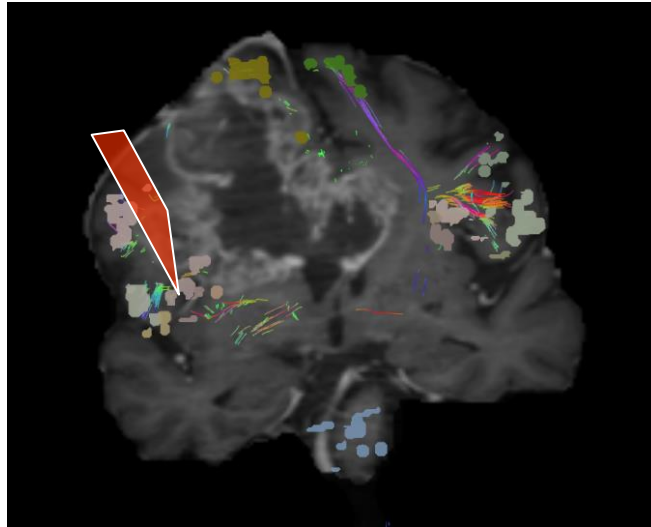
Planning the disconnection

First cut - Lateral

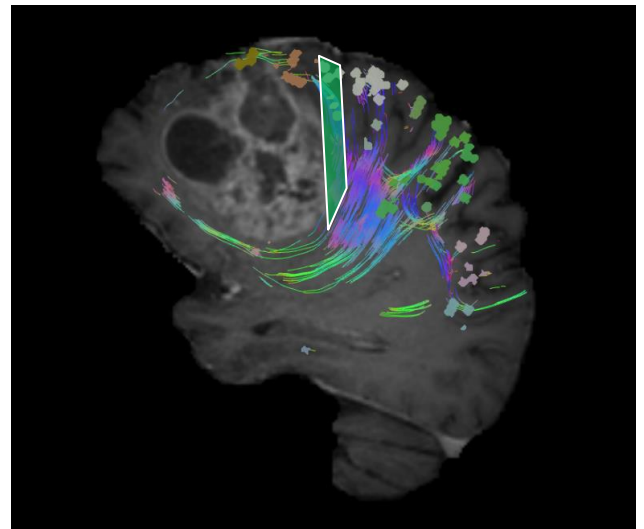
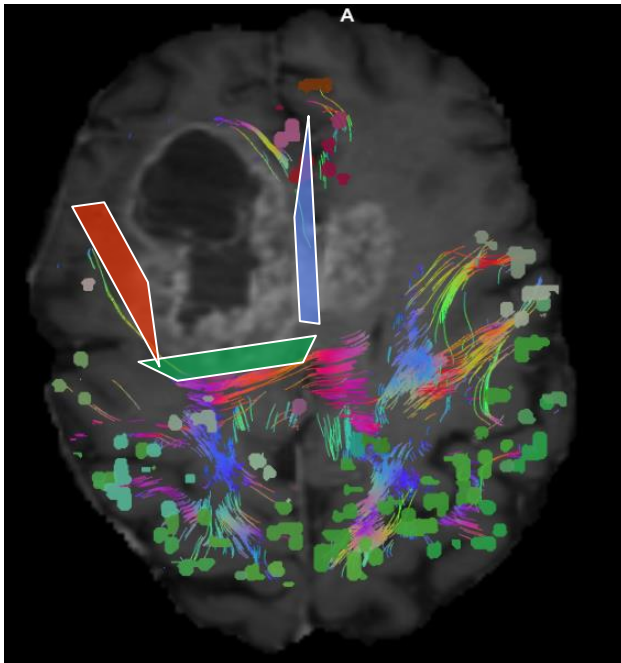
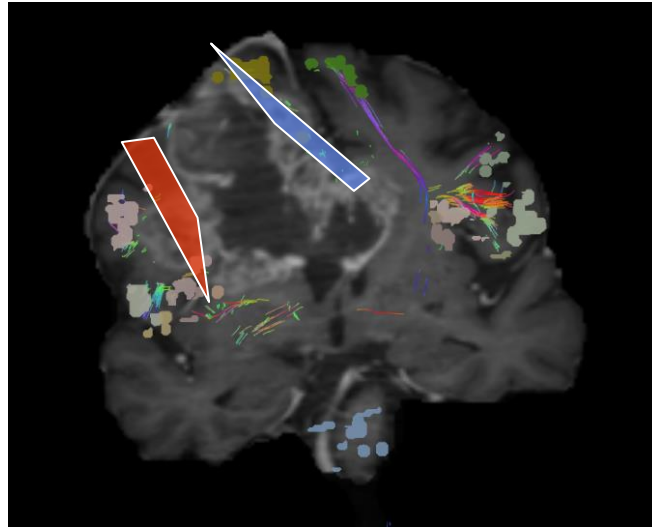




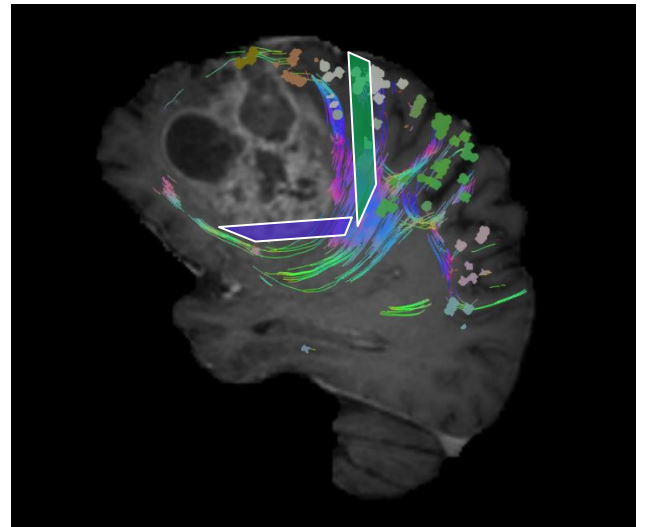
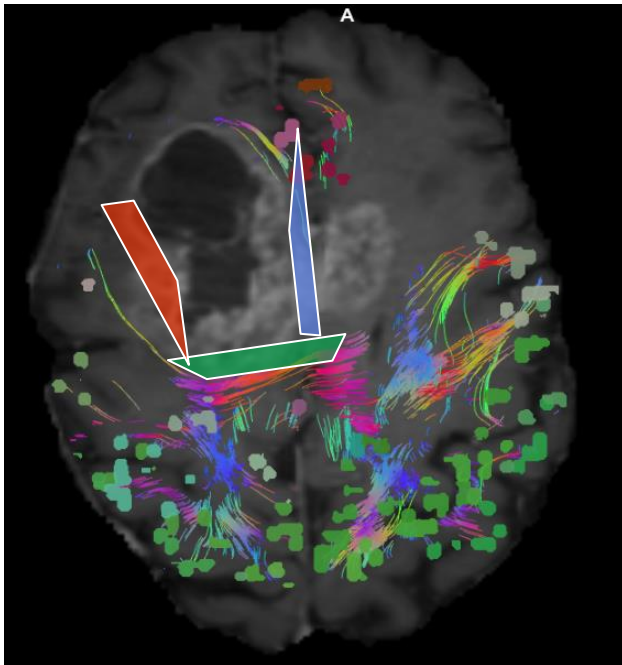
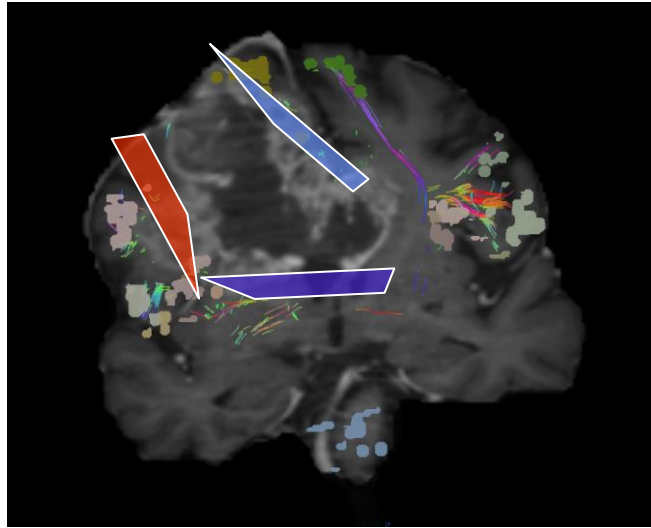
Second cut - Posterior



Third cut – Medial

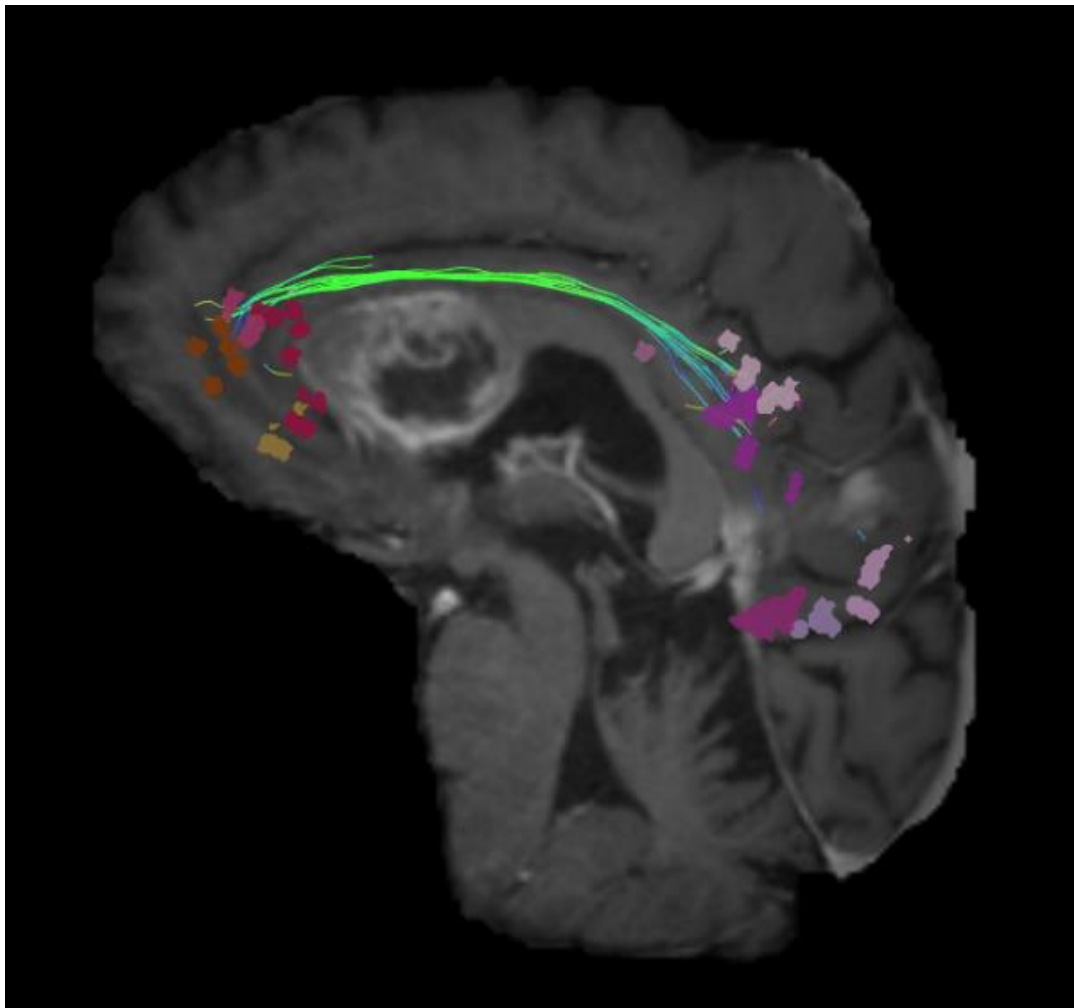


Fourth cut - Deep



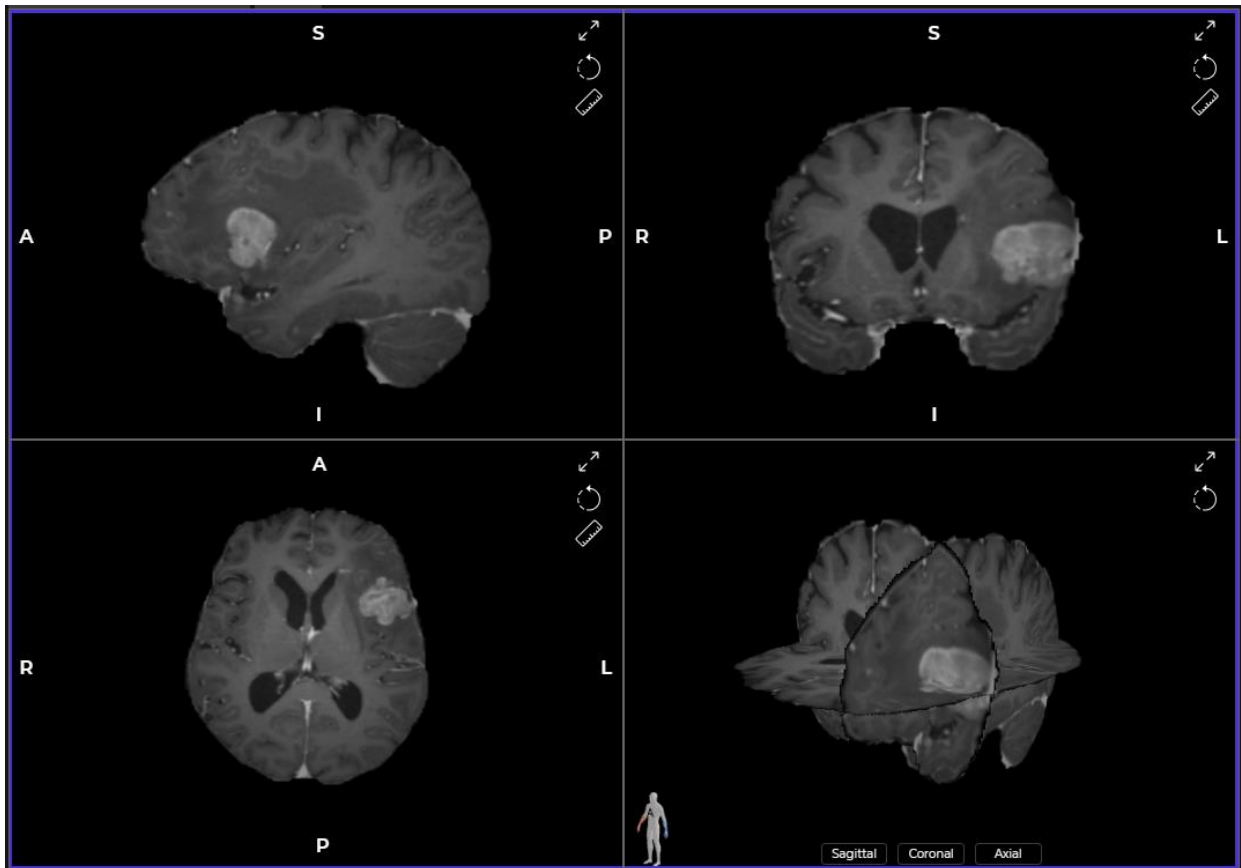


Fourth cut - Deep



CASE 2

Lateral Frontal Tumor (LEFT)



Launching the case

1. Find the case by searching and launching **“LatFront”**
2. Select workflow: Click **Surgical planning**
3. Select brain region: Hover over **Lateral frontal** and click **Left**

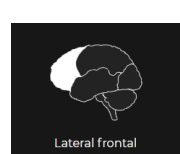


Lateral frontal

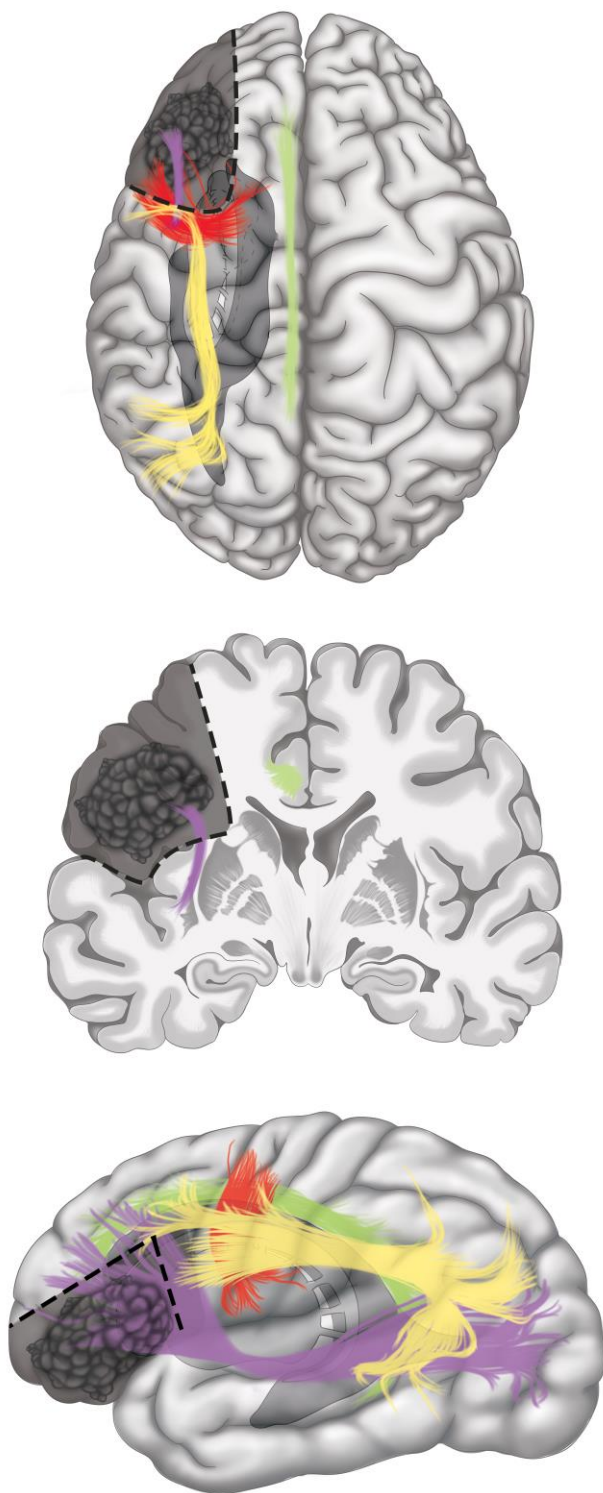
Left

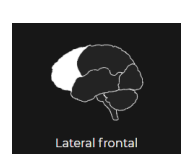
Right

Both sides



Lateral Frontal Disconnection

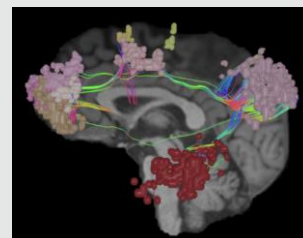




Functional regions of concern

Central executive network (CEN)

Active during tasks and decision making. CEN deficits such as abnormal connectivity patterns have been reported in major psychiatric and neurological disorders e.g. depression, schizophrenia, autism.

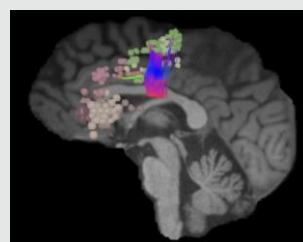


Frontal aslant tract (FAT)

Connects salience network to itself and thus links SMA to Broca's area.

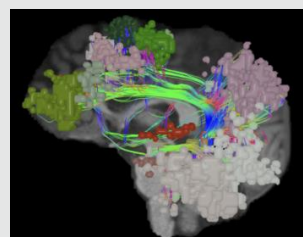
Salience network (SN)

Involved in cognitive, emotional and motivational function. Monitors the external world and decides how other brain networks react to new information and stimuli in particular activating and deactivating the CEN and DMN.



Language system

Often referred to as an “eloquent region” of the brain due to its critical role in and independent function. Recent neuroimaging publications have extended anatomical classification of network including new cortical parcellations and tract pathways

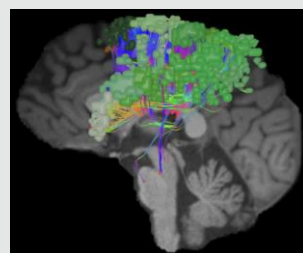


Corticospinal tract

Connects sensorimotor cortex to spinal cord.

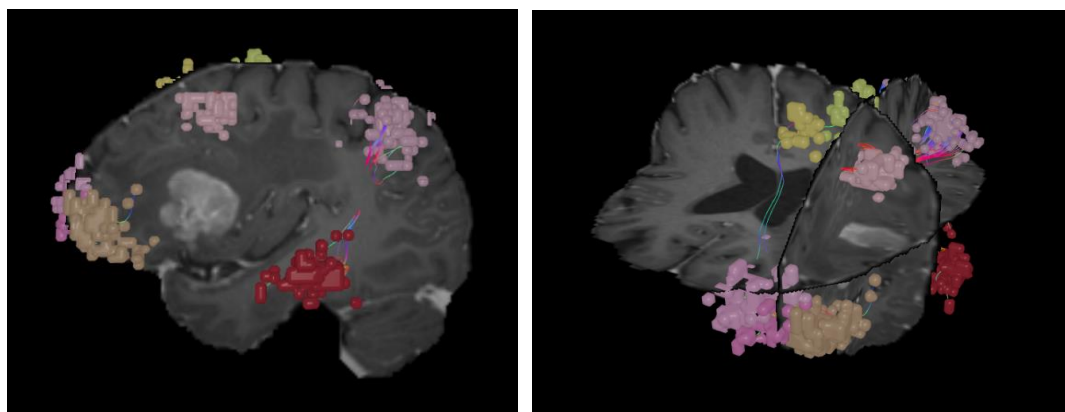
Sensorimotor network

Responsible for sensing physical inputs, converting them to electrical signals to initiate a physical response. Abnormalities can cause sensory and movement disorders, degenerative diseases, developmental delays and mental health disorders

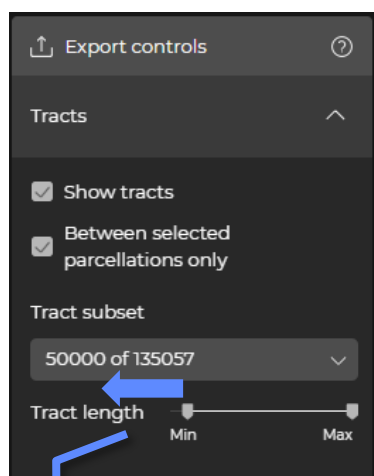


Regions at Risk

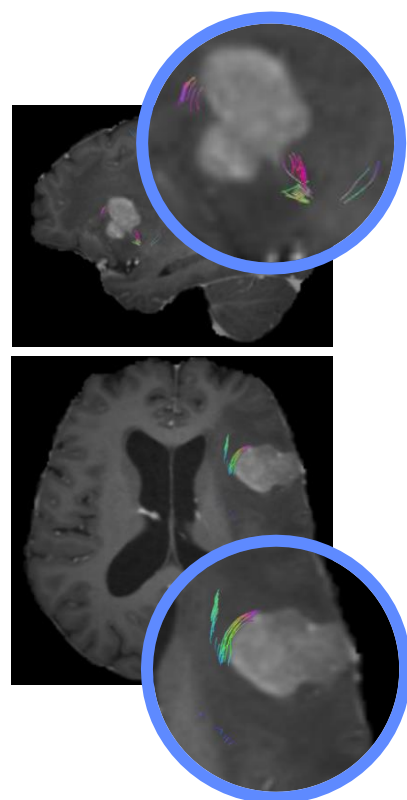
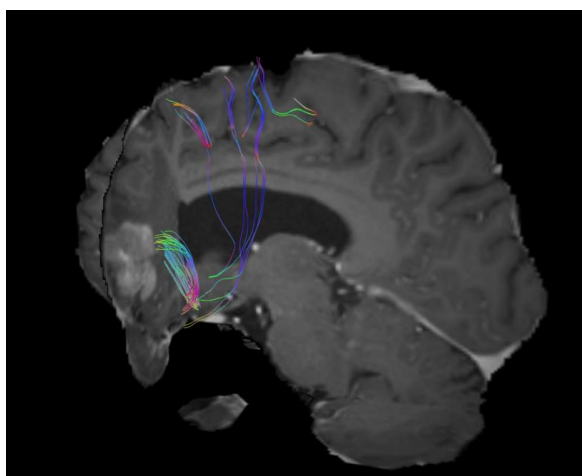
Central executive network

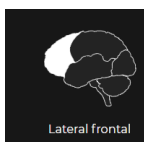


Frontal aslant tract

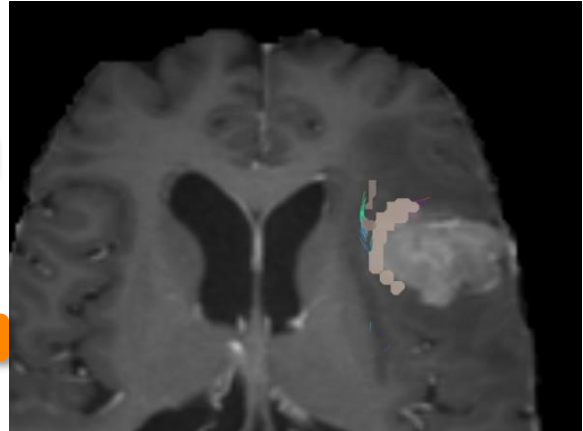
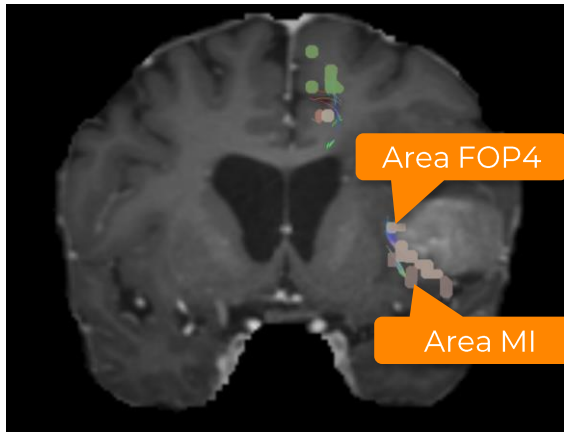
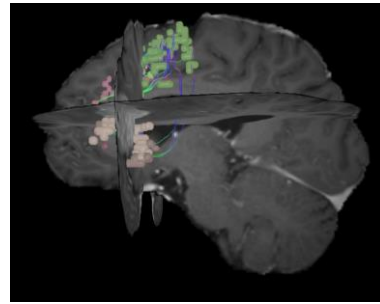


Reduce **Tract length** to minimum to examine in greater detail.

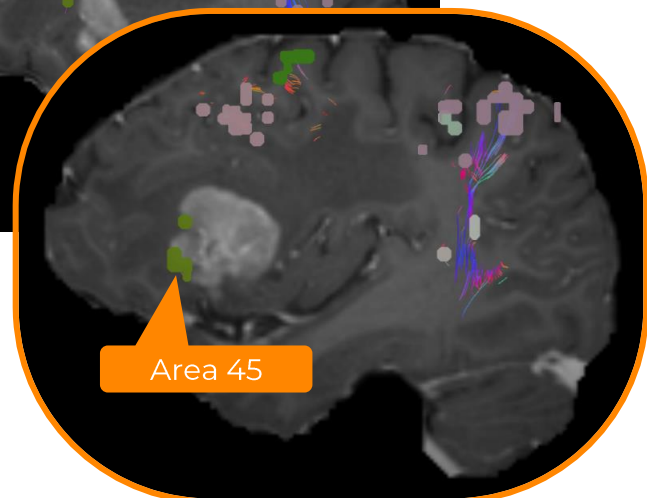
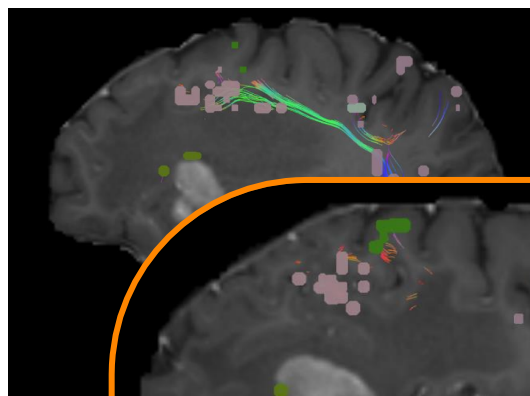
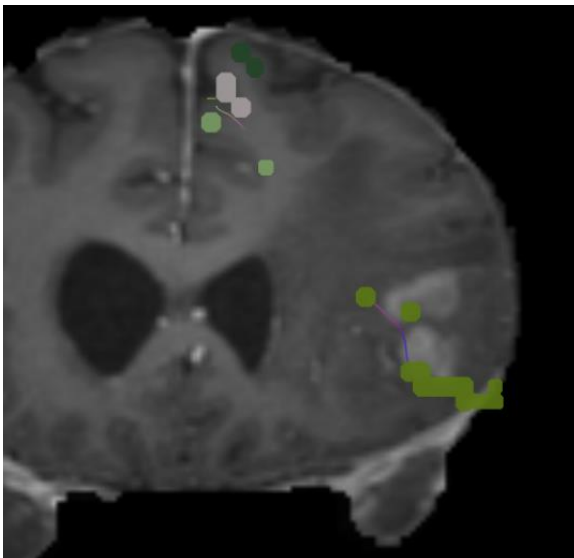
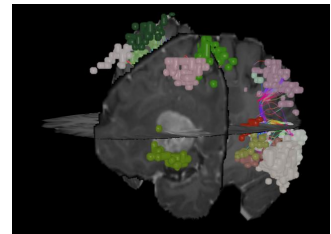




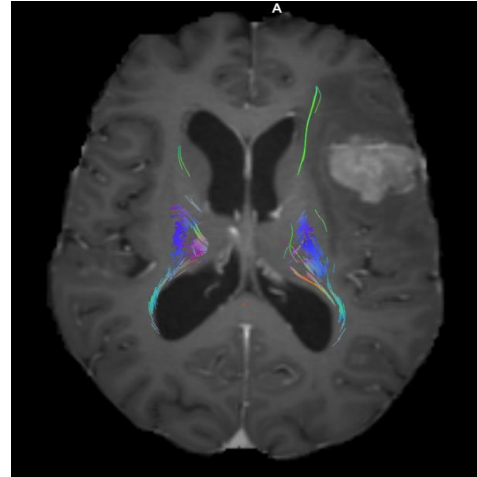
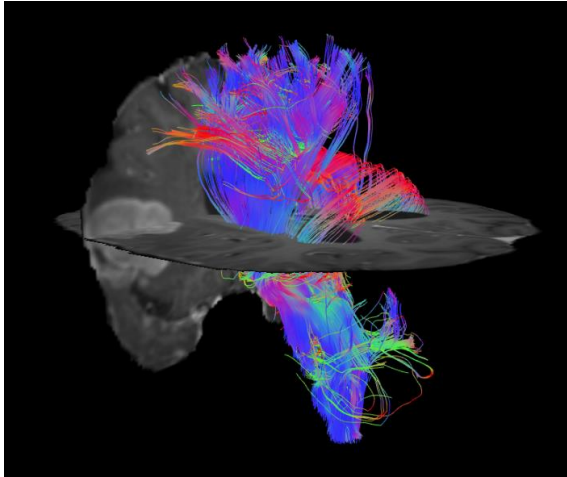
Saliience network



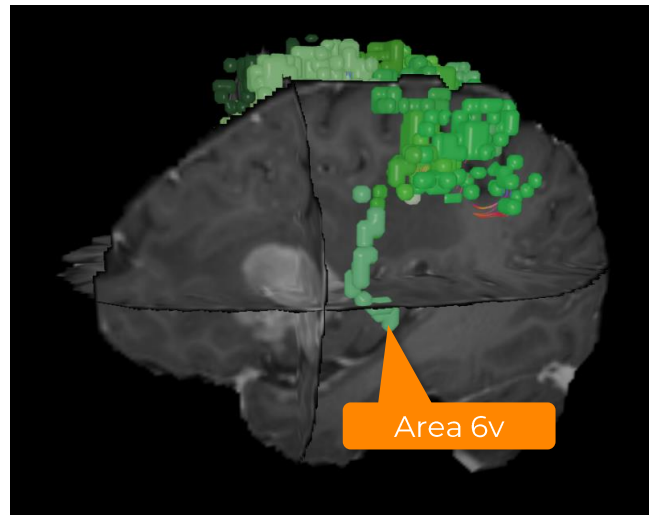
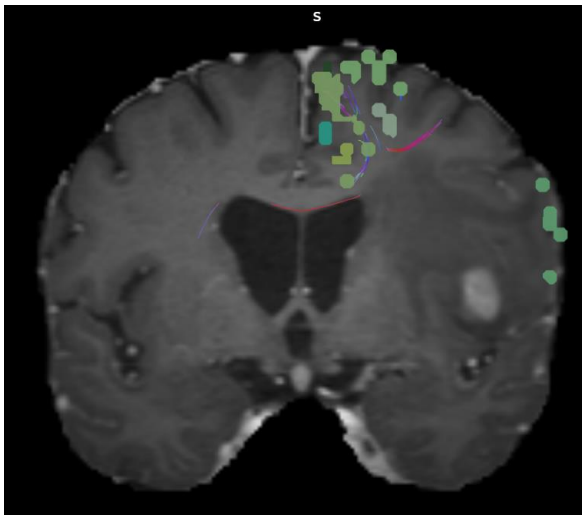
Language system



Corticospinal tract

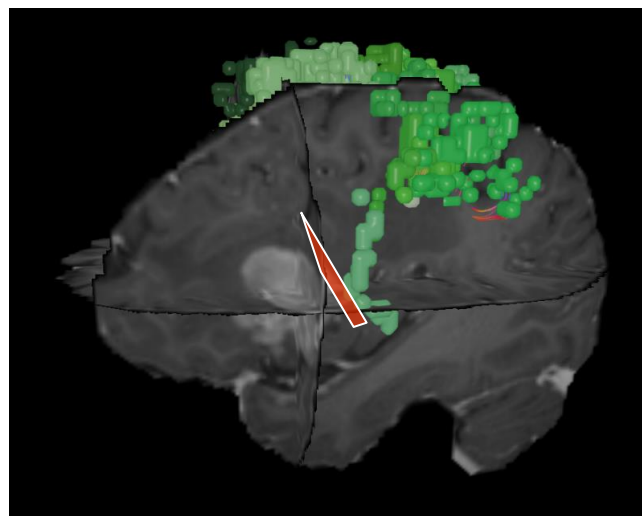
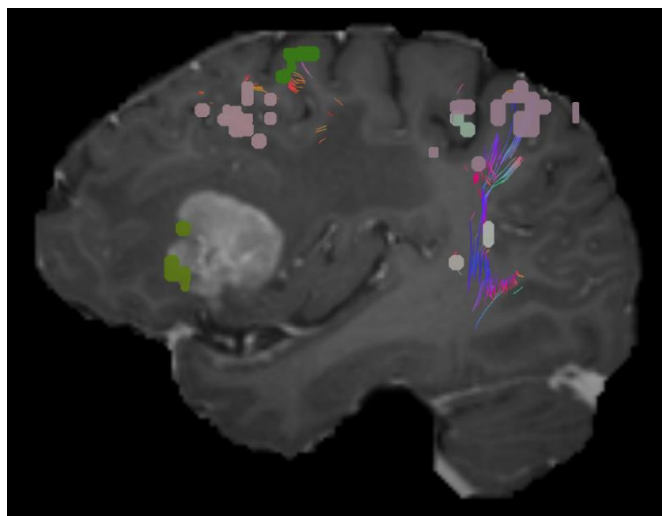
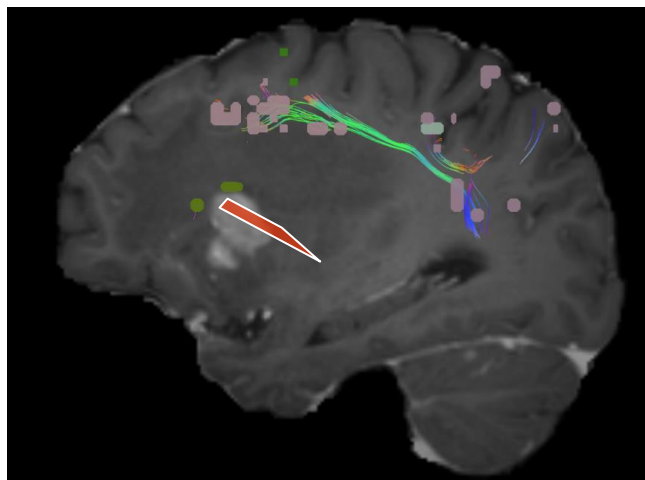
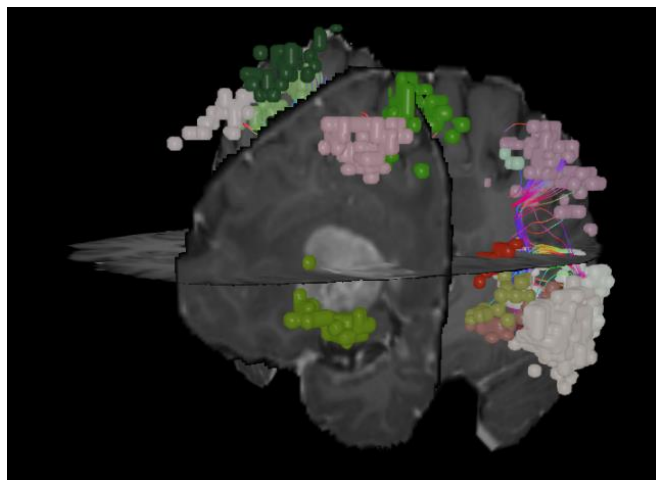


Sensorimotor system

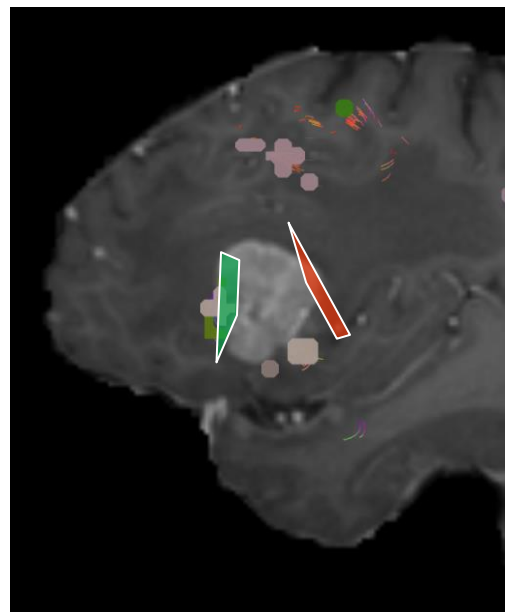
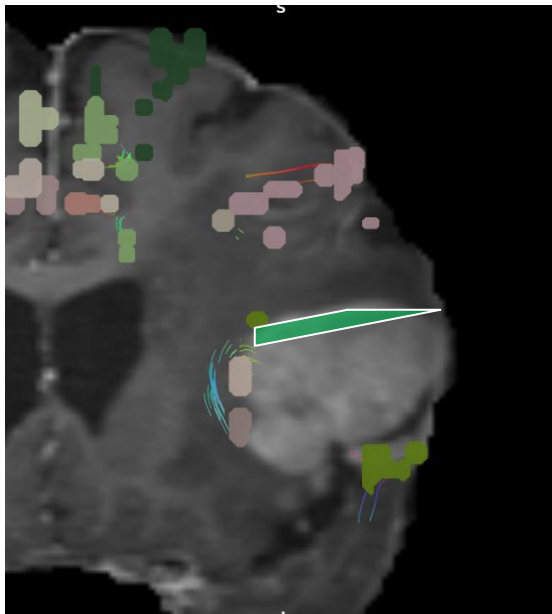
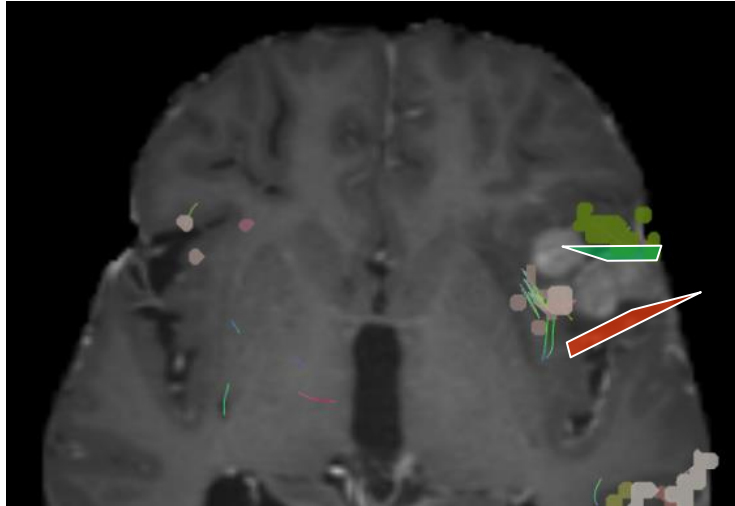


Planning the disconnection

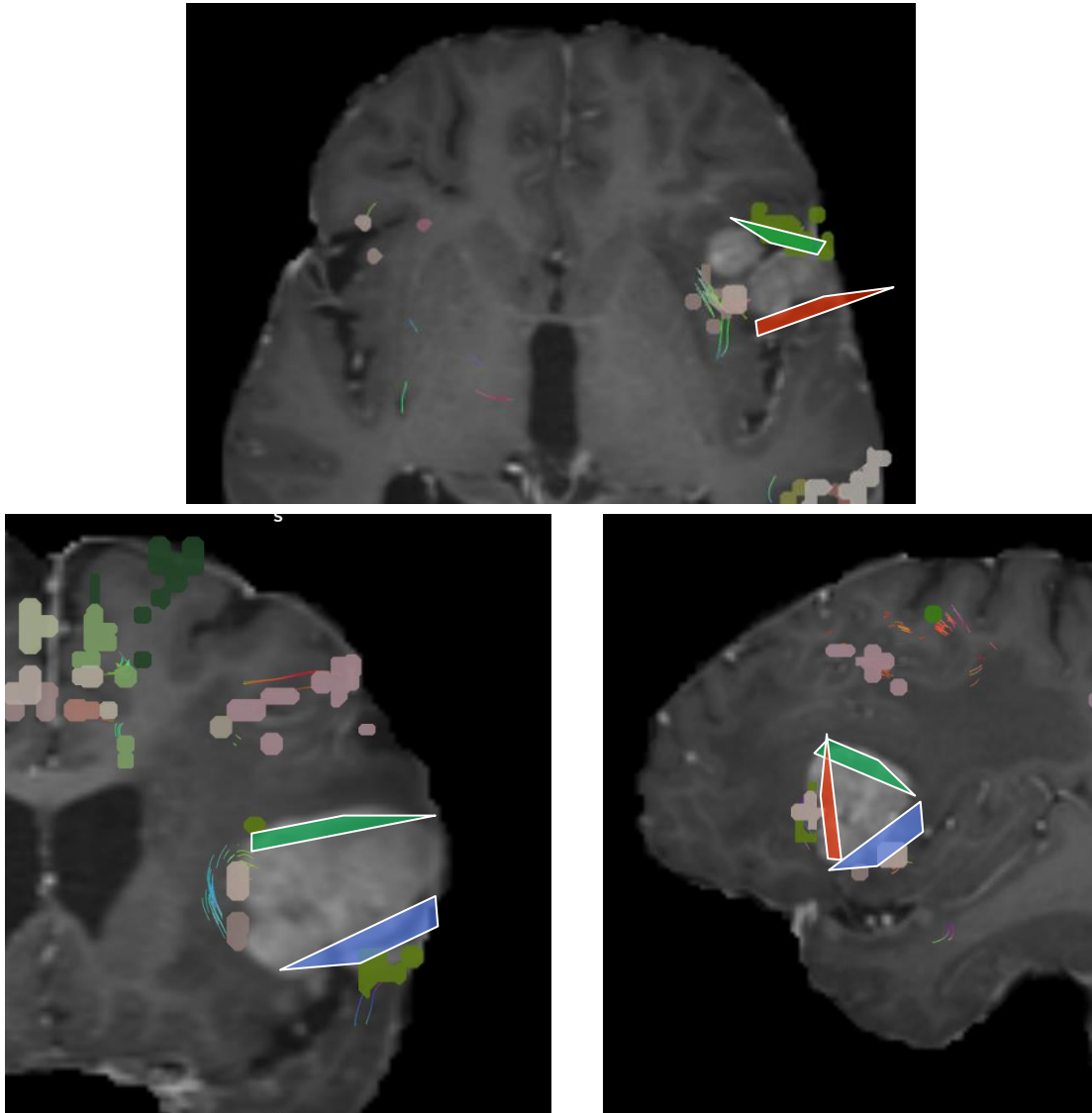
First cut - Posterior

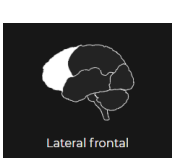


Second cut - Anterior

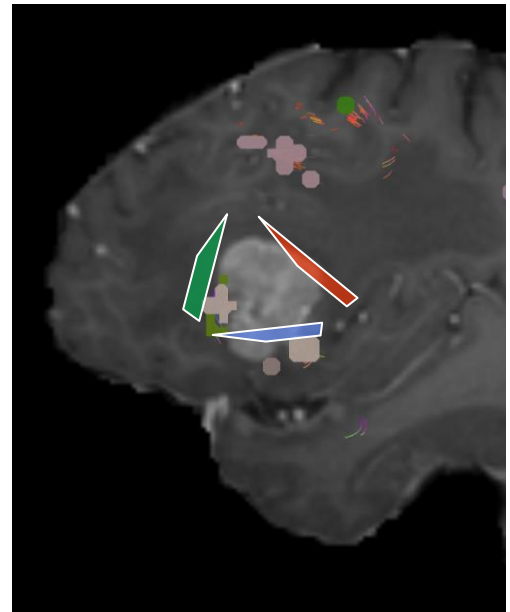
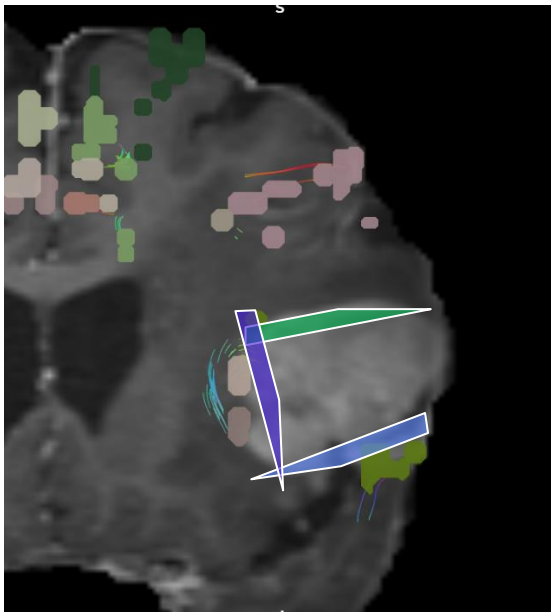
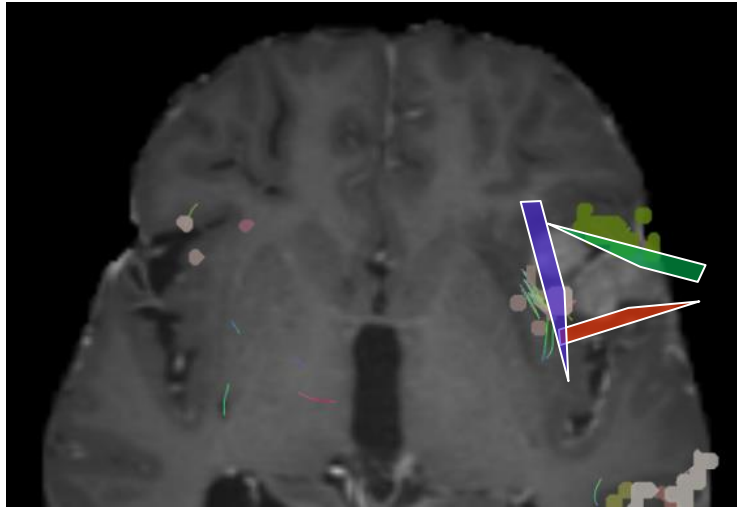


Third cut - Opercular



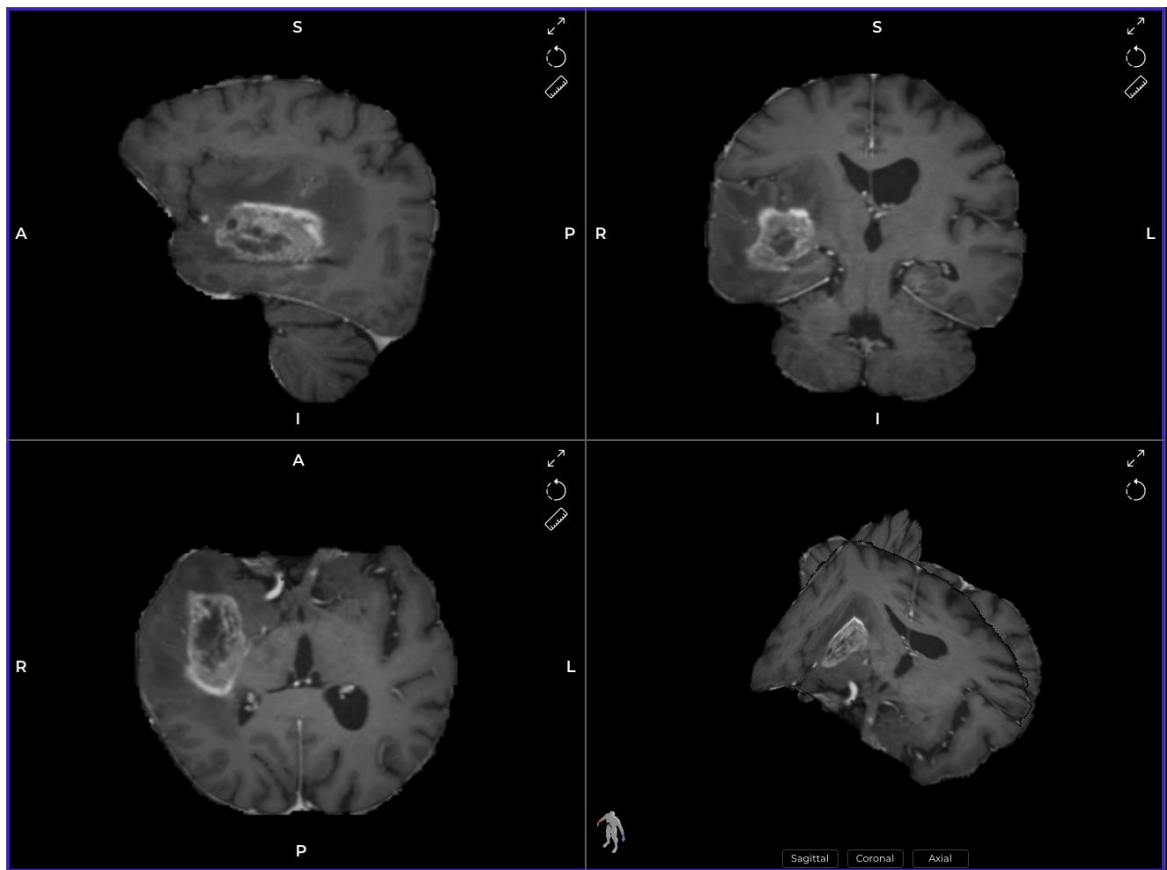


Fourth cut - Deep



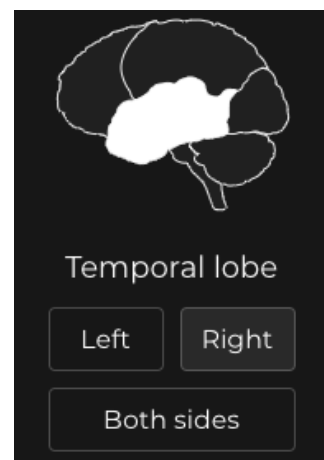
CASE 3

Temporal Lobe Tumor (RIGHT)

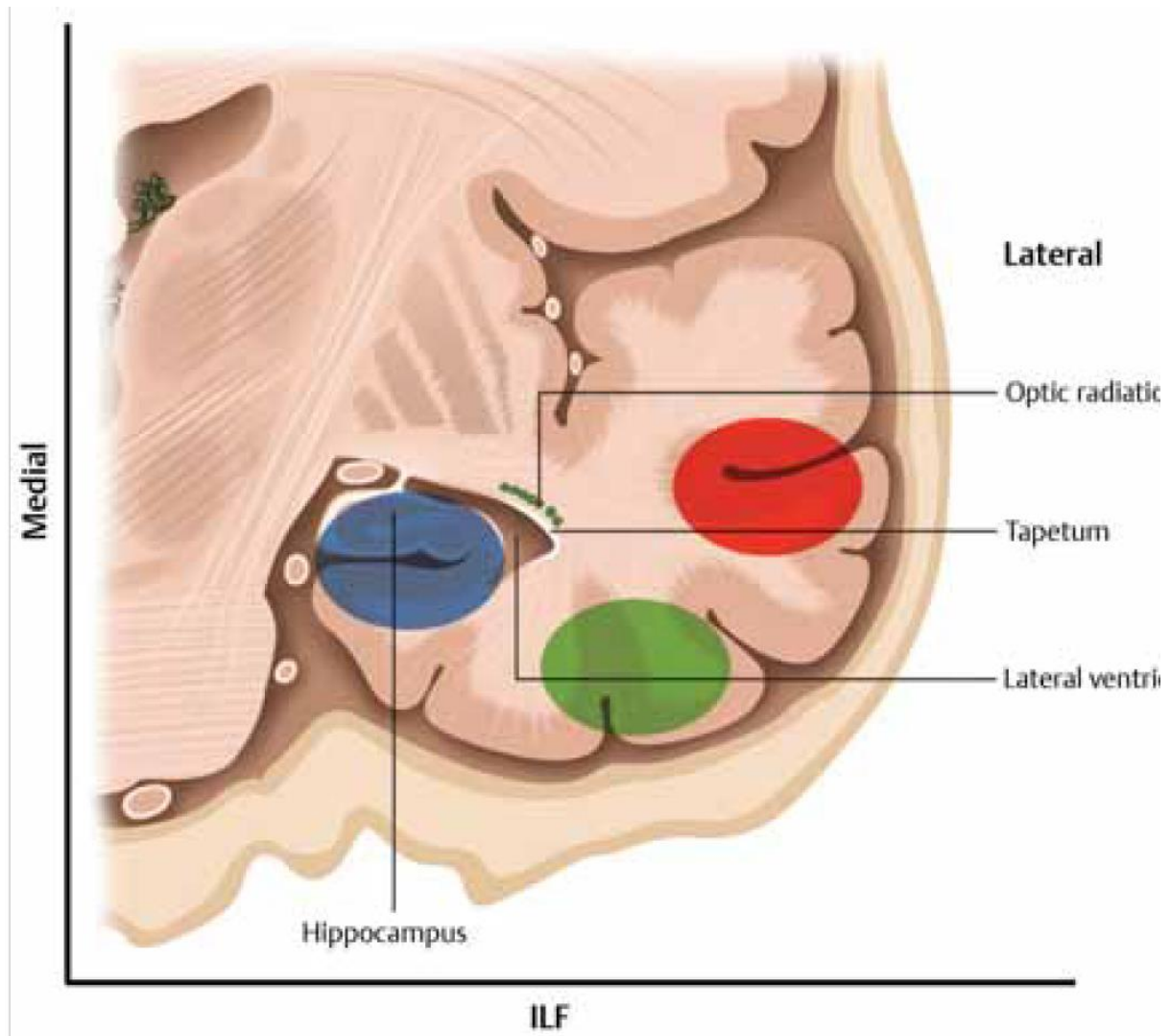


Launching the case

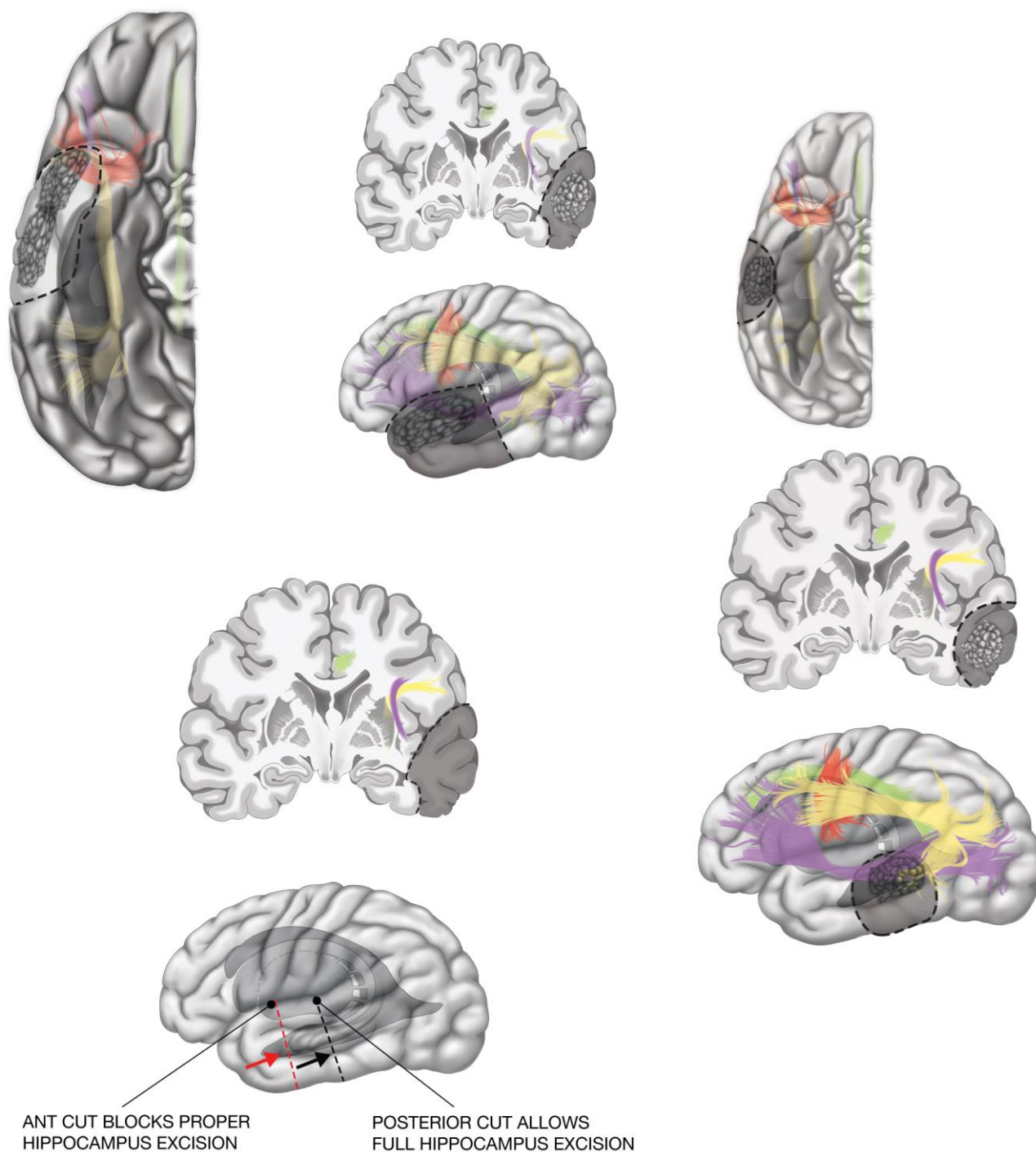
1. Find the case by searching and launching **"TempLobe"**
2. Select workflow: Click **Surgical planning**
3. Select brain region: Hover over **Temporal lobe** and click **Right**



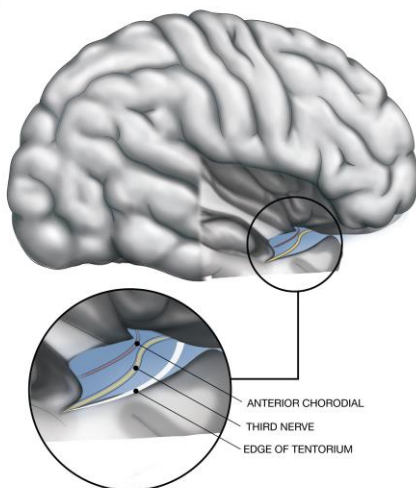
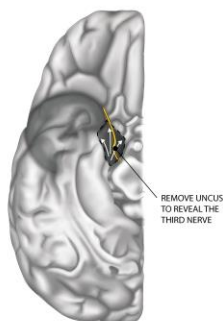
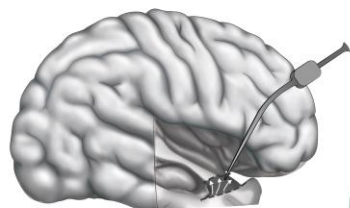
3 Tract Systems



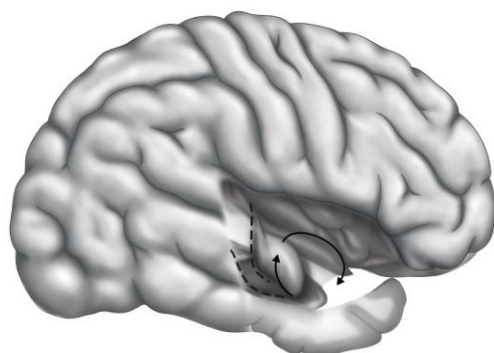
Temporal Disconnection



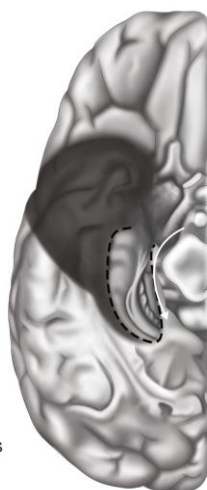
Medial Structure Steps



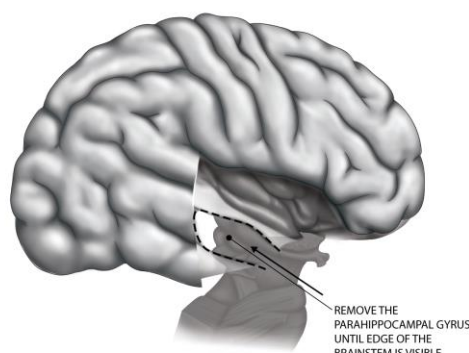
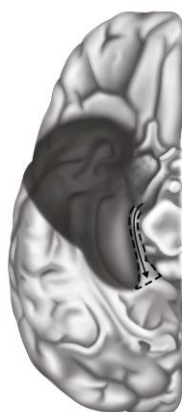
Uncus



FIND TEMPORAL HORN & FOLD DOWNWARD TO CONFIRM BOUNDRIES OF HIPPOCAMPUS

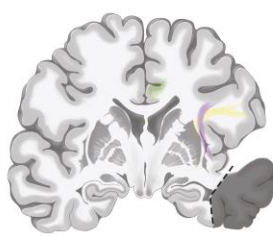
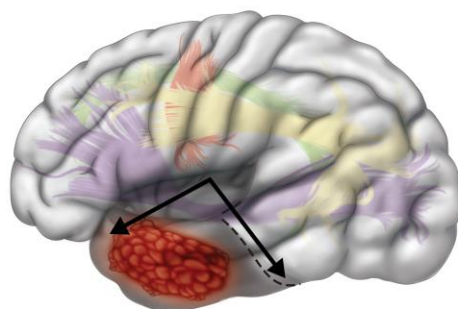
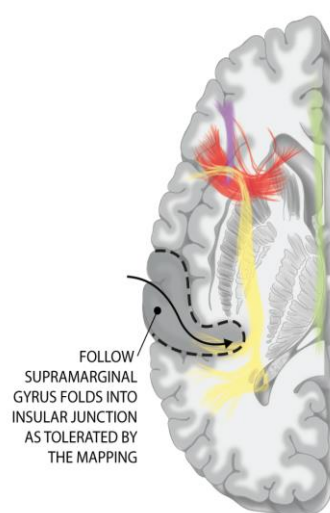
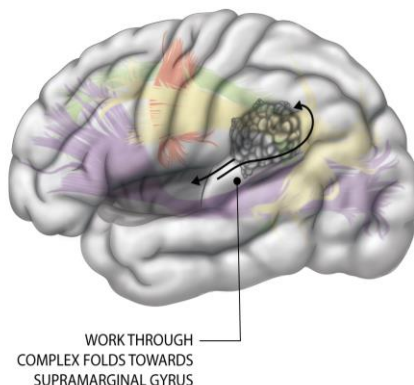
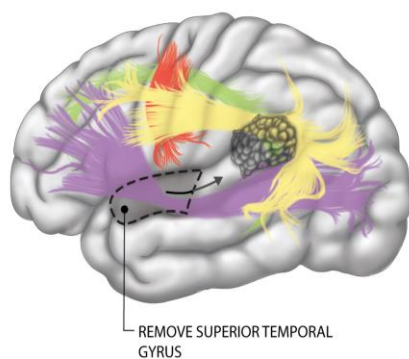


Hippocampus

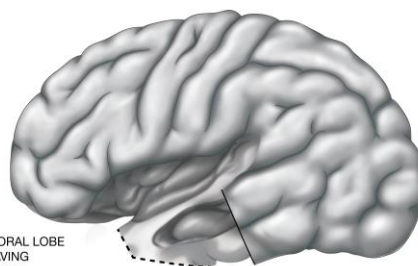


PHG

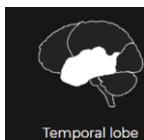
TPO Junction steps



2. JOIN PIAL CUTS FROM SYLVIAN FISSURE TO POSTERIOR TEMPORAL RUNNING JUST LATERAL TO THE HIPPOCAMPUS IN SAGGITAL PLANE



3. REMOVE TEMPORAL LOBE IN ONE PIECE LEAVING MEDIAL STRUCTURES



Functional regions of concern

Corticospinal tract

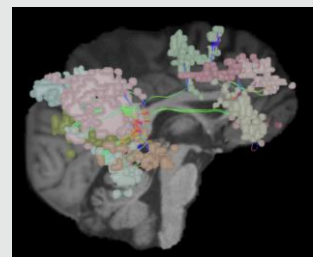
Connects sensorimotor cortex to spinal cord.

Inf. fronto-occipital fasciculus (IFOF)

Associated with semantic language processing and goal-oriented behavior.

Ventral attention network (VAN)

Involved with stimulus driven attention. Damage results in hemispatial neglect and other cognitive dysfunction.

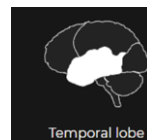


Inf. Longitudinal fasciculus (ILF)

One of the major occipitotemporal association tracts associated with visual to memory transfer

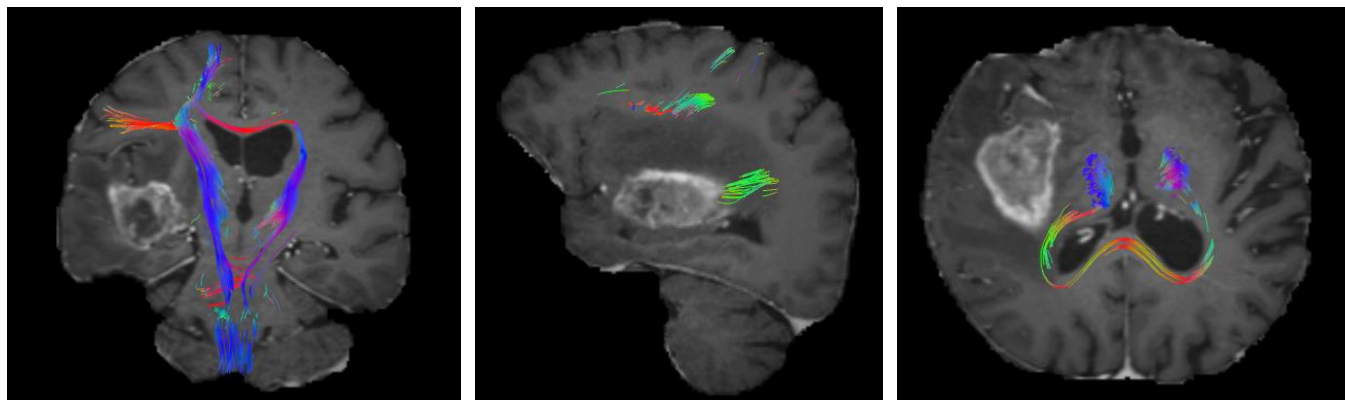
Optic radiations

Connects lateral geniculate nucleus with primary visual cortex.

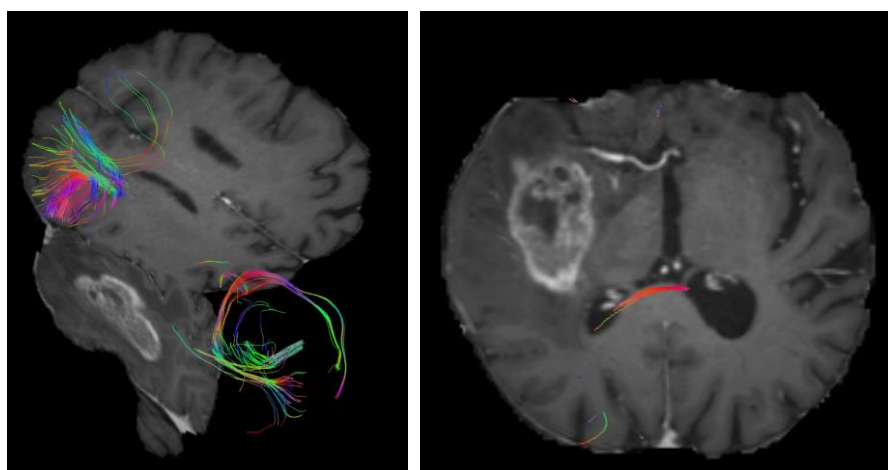


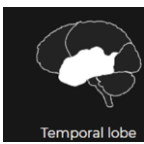
Examining functional areas

Corticospinal tract

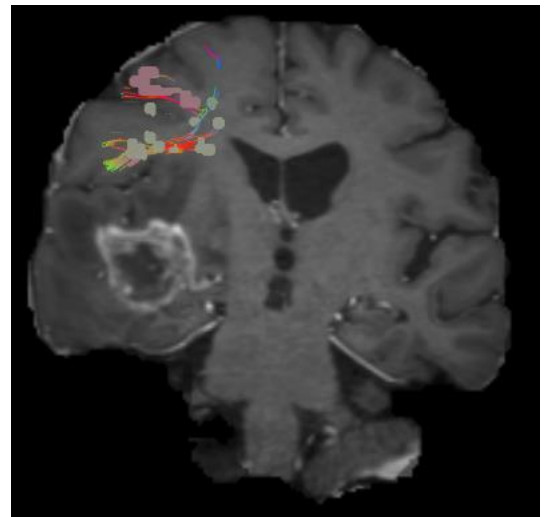
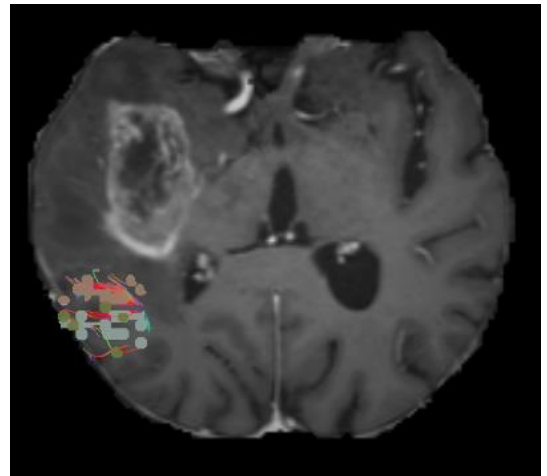
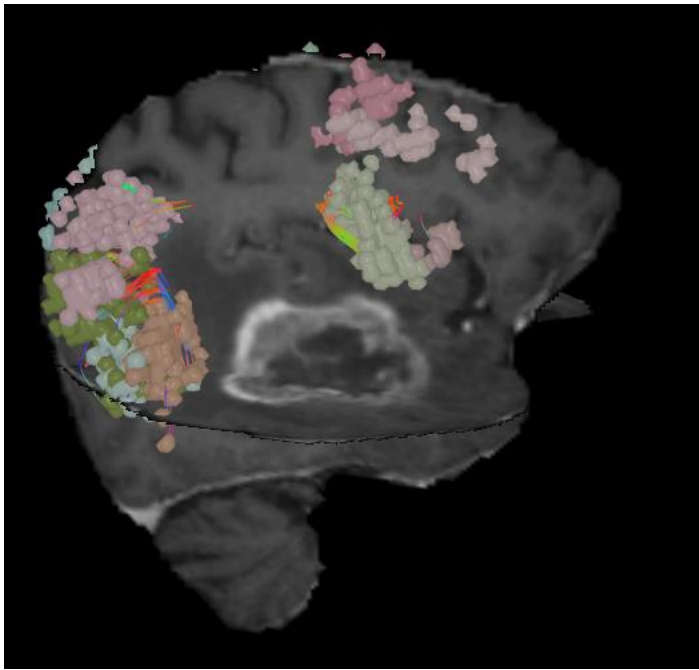


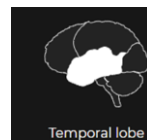
Inf. Fronto-occipital fasciculus



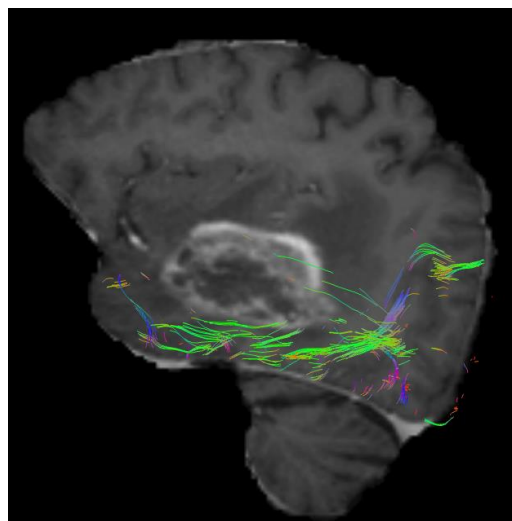
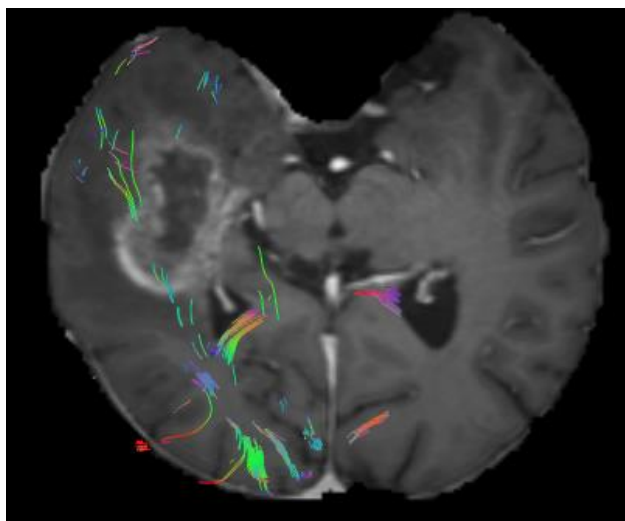


Ventral attention network (VAN)

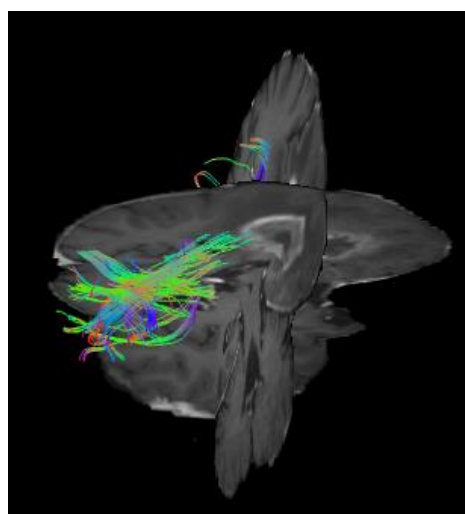
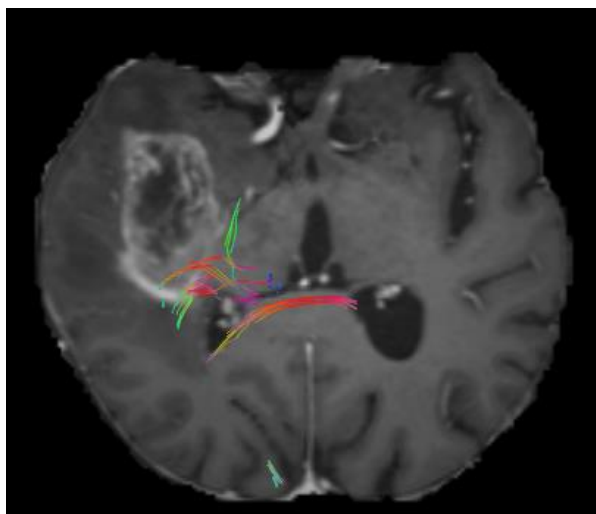




Inf. Longitudinal fasciculus



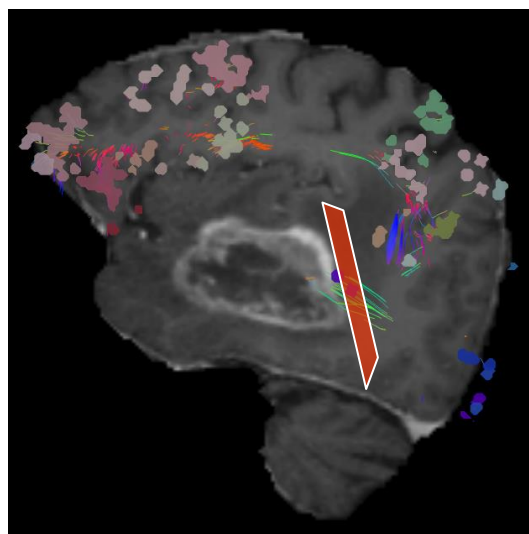
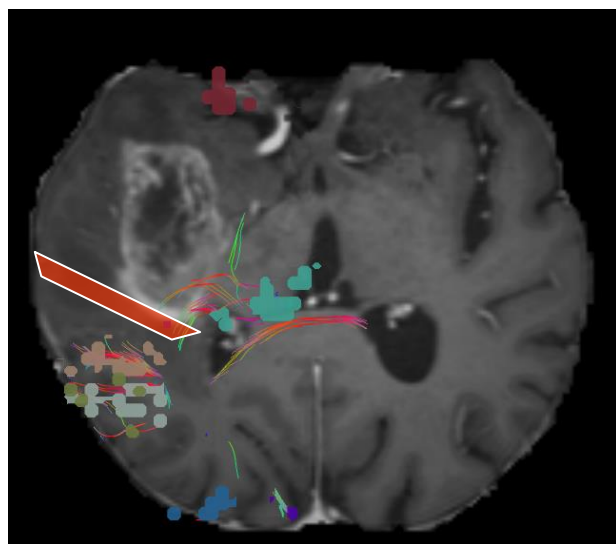
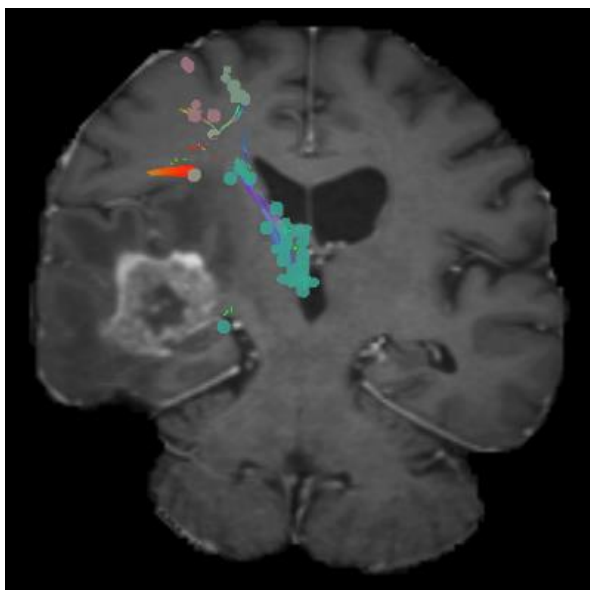
Optic radiations

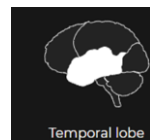




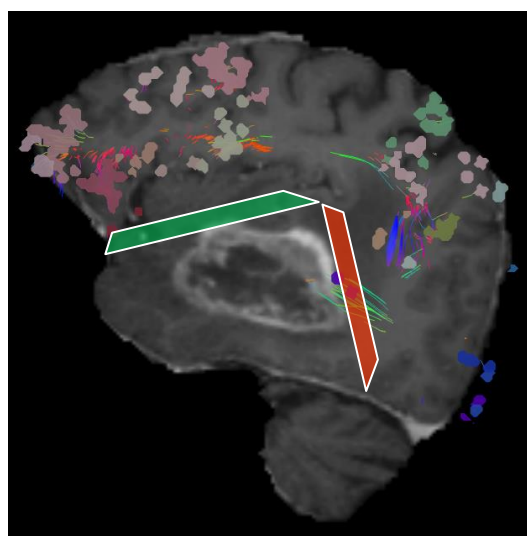
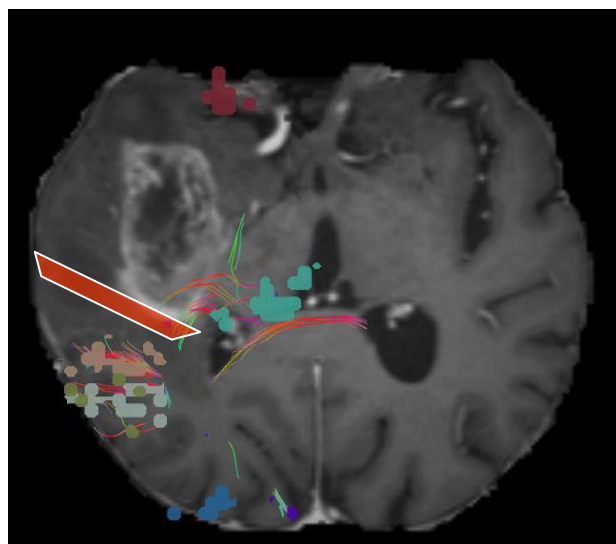
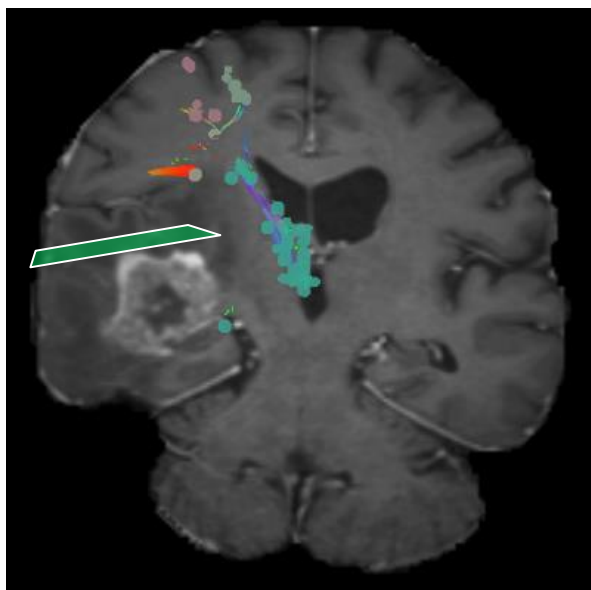
Planning the disconnection

First cut - Posterior



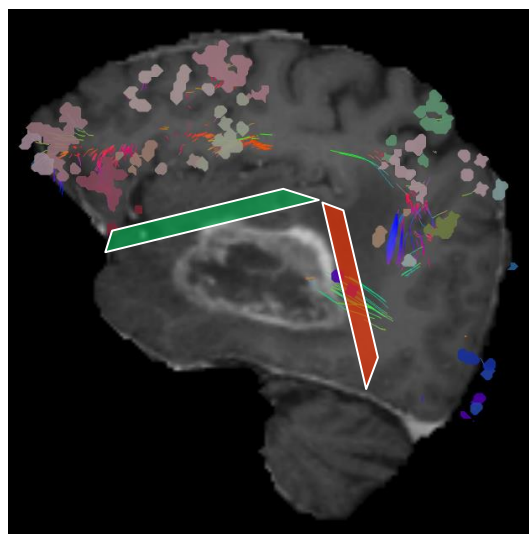
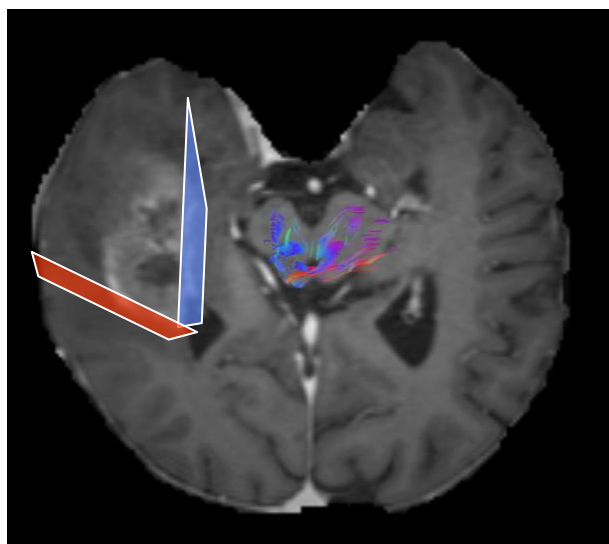
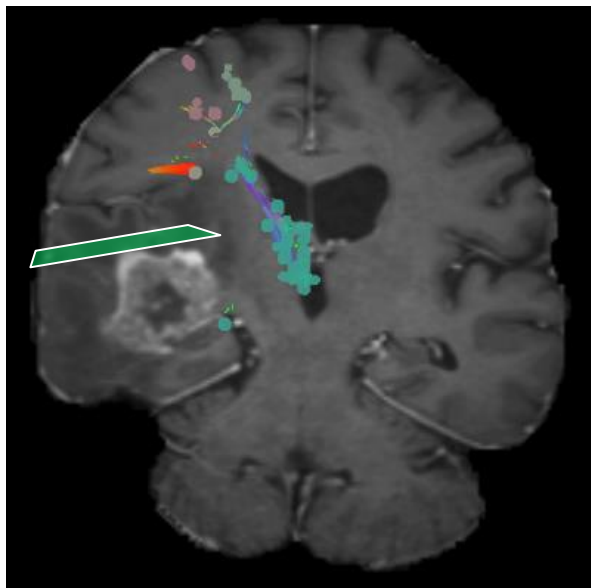


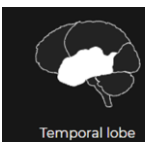
Second cut - STG



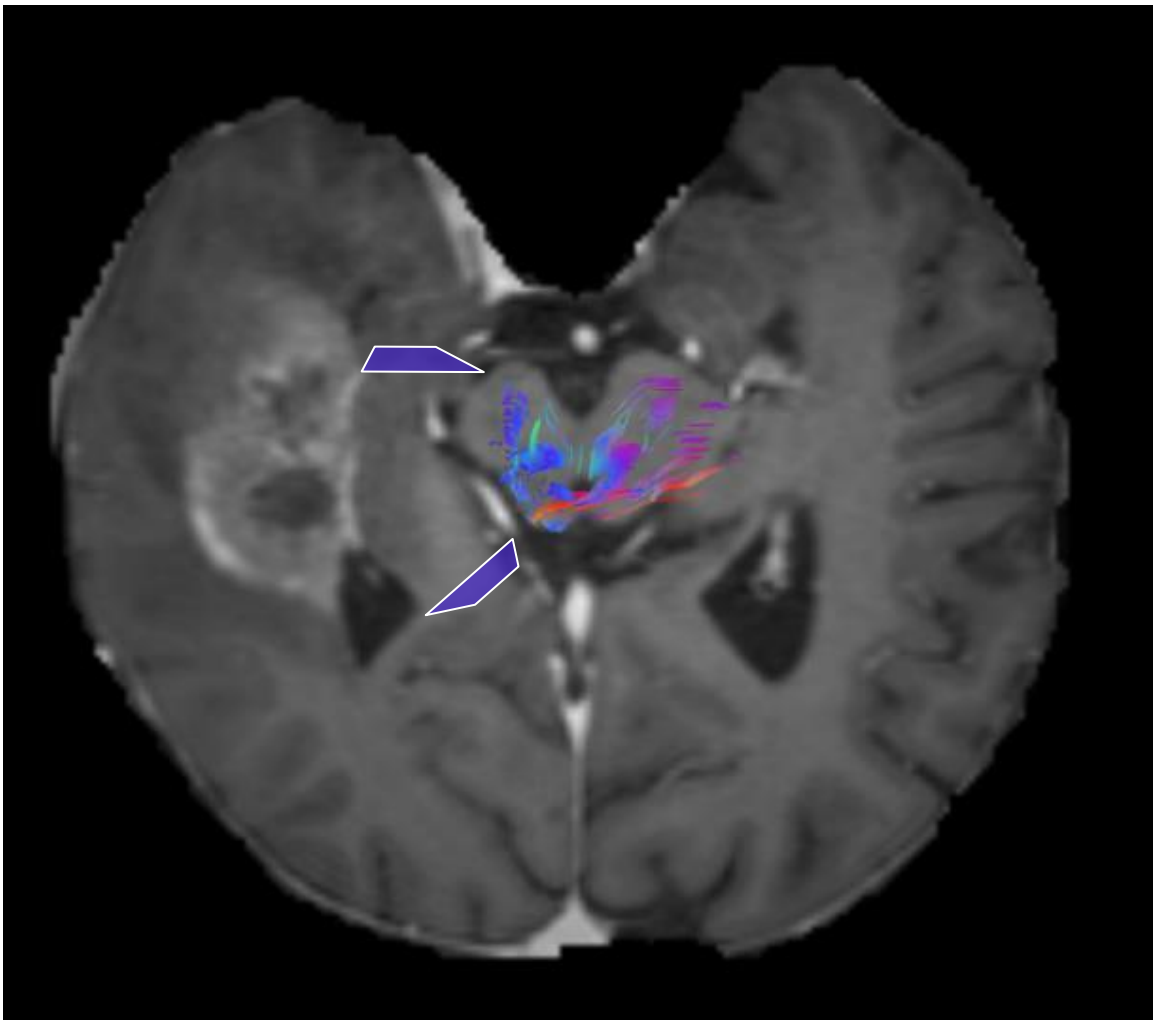


Third cut – Temporal Floor



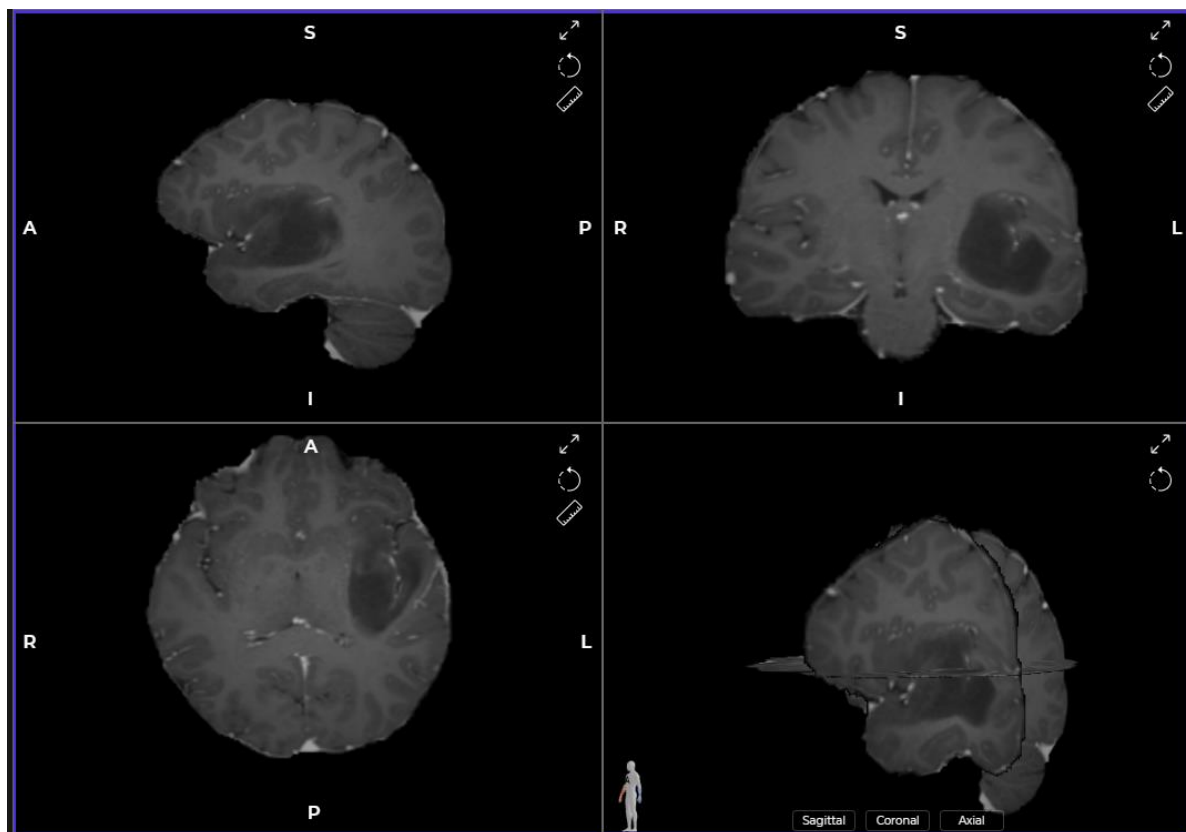


Fourth cut – Medial temporal lobe



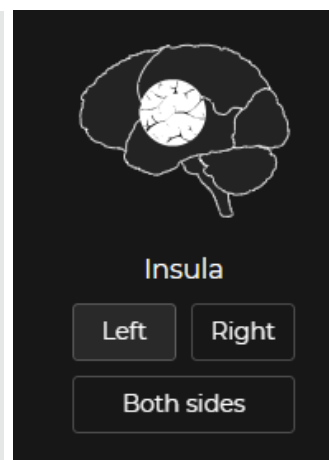
CASE 4

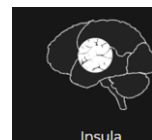
Insula glioma (LEFT)



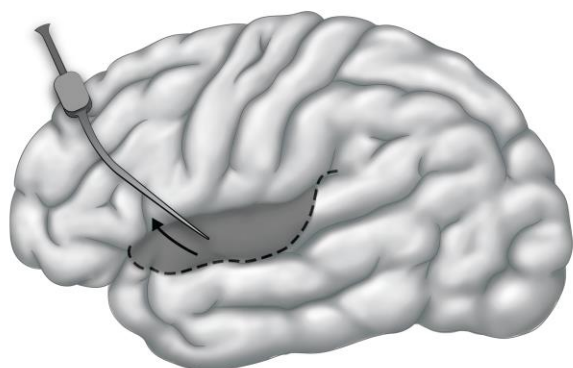
Launching the case

1. Find the case by searching and launching **“Insula”**
2. Select workflow: Click **Surgical planning**
3. Select brain region: Hover over **Insula** and click **Left**

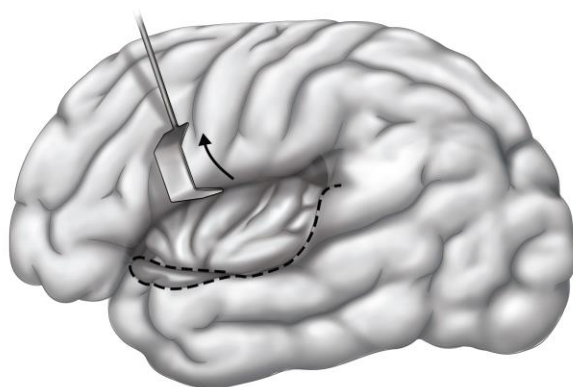




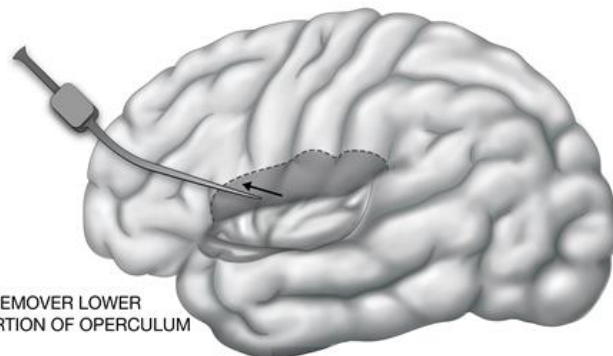
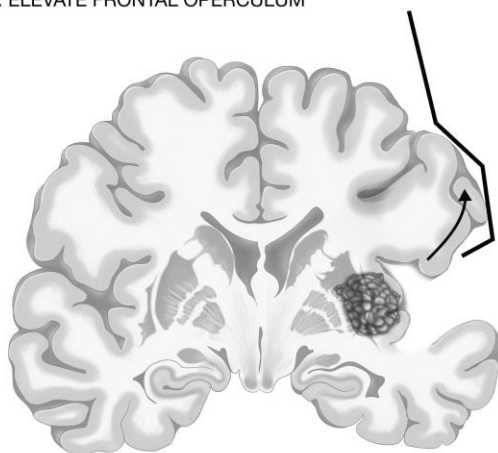
Transopercular Steps- Temporal



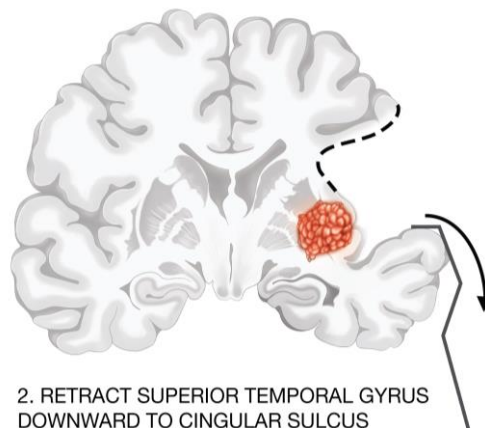
1. REMOVE SUPERIOR
TEMPORAL GYRUS



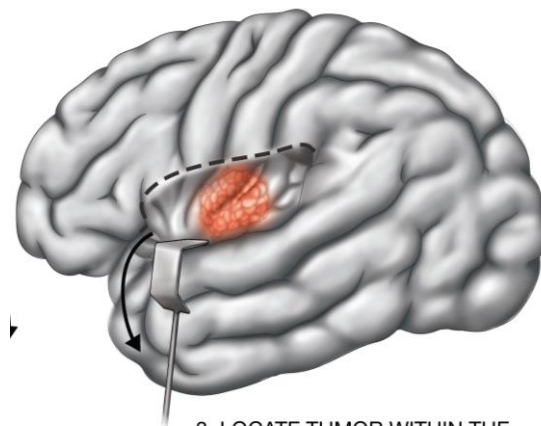
2. ELEVATE FRONTAL OPERCULUM



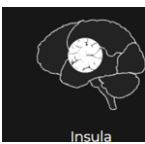
1. REMOVE LOWER
PORTION OF OPERCULUM



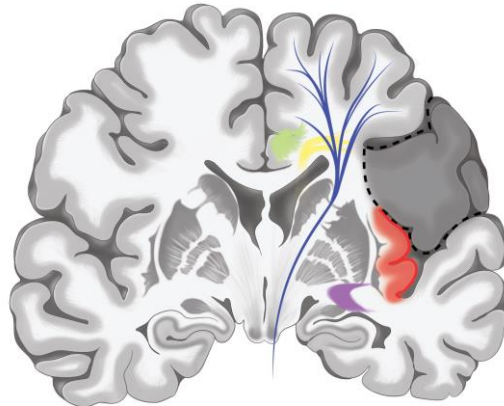
2. RETRACT SUPERIOR TEMPORAL GYRUS
DOWNWARD TO CINGULAR SULCUS



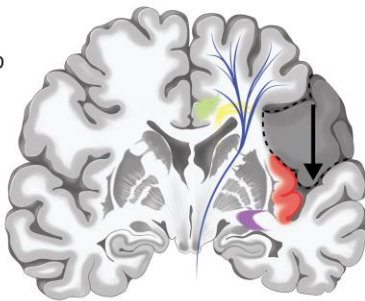
3. LOCATE TUMOR WITHIN THE
INSULA



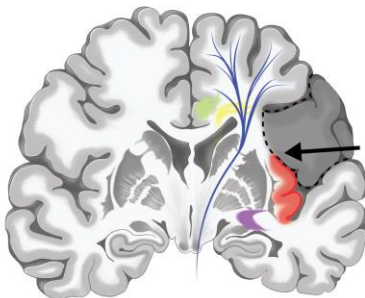
Transopercular Steps- Supra-Sylvian



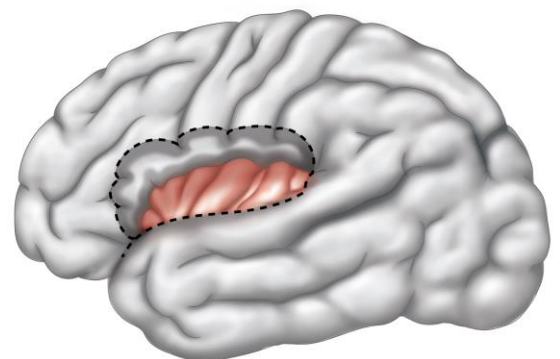
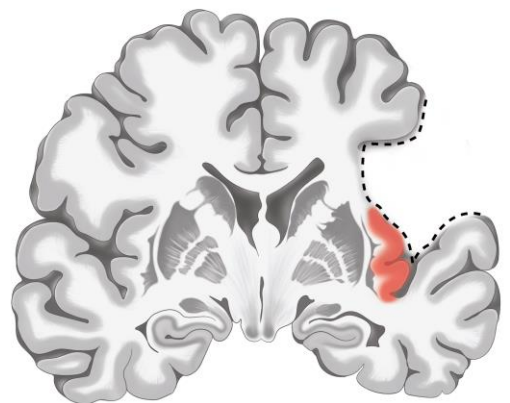
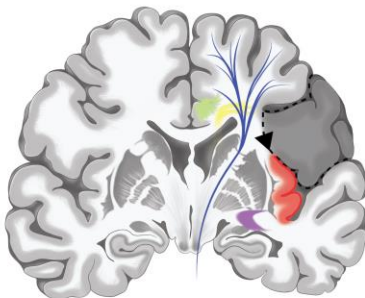
STEP 1: WORK DOWNWARD
IN THIS DIRECTION UNTIL
YOU FIND THE PIA OF THE
SYLVIAN FISSURE



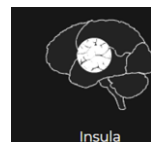
STEP 2: WORK INWARDS
UNTIL YOU FIND THE
INSULAR SULCUS



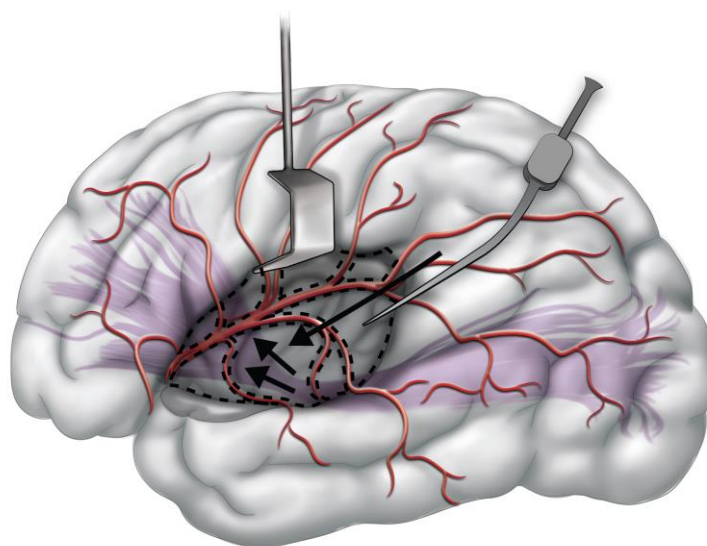
STEP 3: STEP CUT
DOWNWARD TO MEET THE
POINT



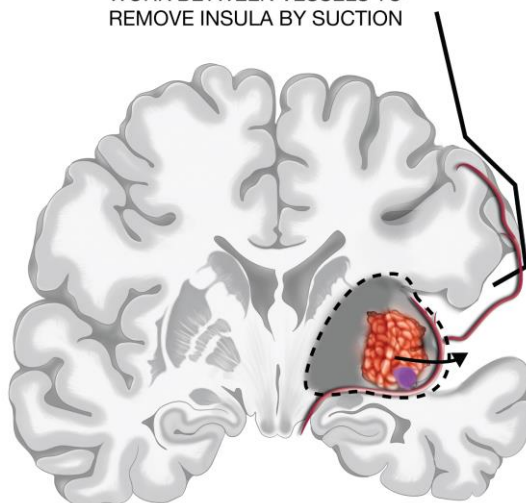
FINAL PRODUCT SHOULD RESEMBLE THIS

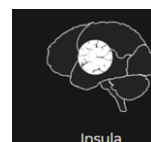


Insula Steps



WORK BETWEEN VESSELS TO
REMOVE INSULA BY SUCTION





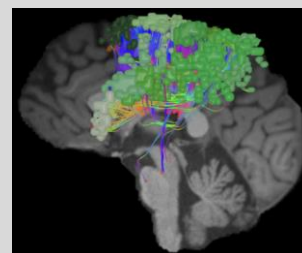
Functional regions of concern

Corticospinal tract

Connects sensorimotor cortex to spinal cord.

Sensorimotor system

Responsible for sensing physical inputs, converting them to electrical signals to initiate a physical response. Abnormalities can cause sensory and movement disorders, degenerative diseases, developmental delays and mental health disorders

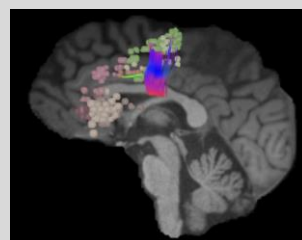


Frontal aslant tract (FAT)

Connects salience network to itself and thus links SMA to Broca's area.

Salience network

Involved in cognitive, emotional and motivational function. Monitors the external world and decides how other brain networks react to new information and stimuli in particular activating and deactivating the CEN and DMN.

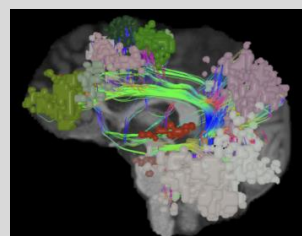


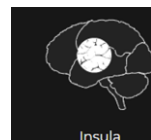
Inf. fronto-occipital fasciculus (IFOF)

Associated with semantic language processing and goal-oriented behavior.

Language system

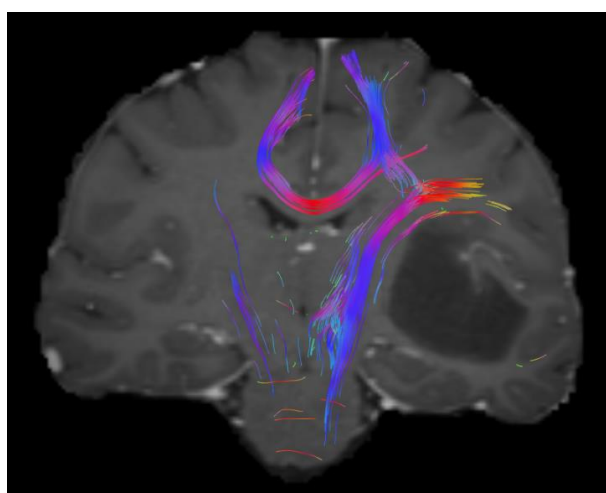
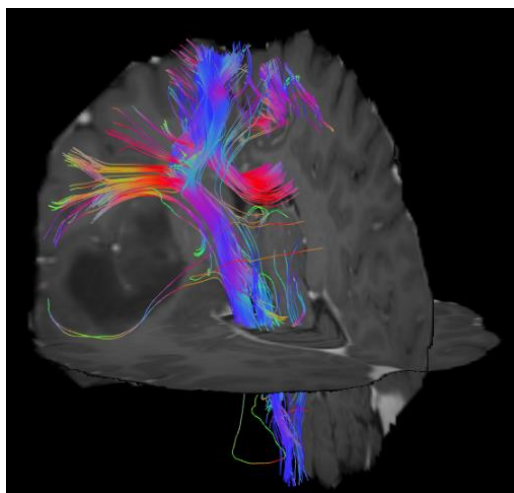
Often referred to as an “eloquent region” of the brain due to its critical role in and independent function. Recent neuroimaging publications have extended anatomical classification of network including new cortical parcellations and tract pathways



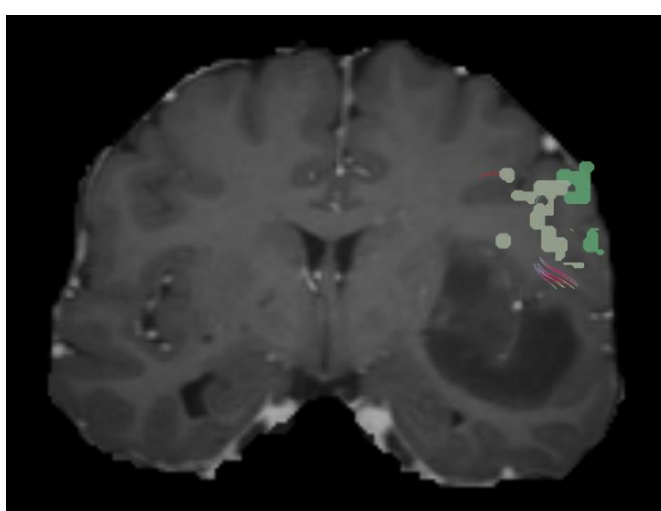
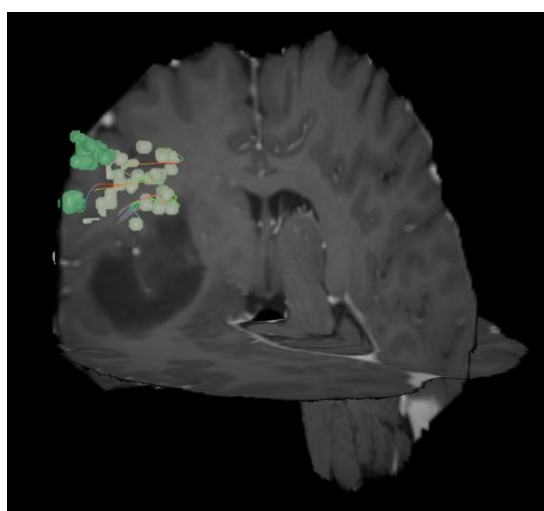


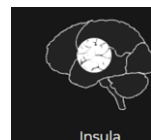
Examining functional areas

Corticospinal tract

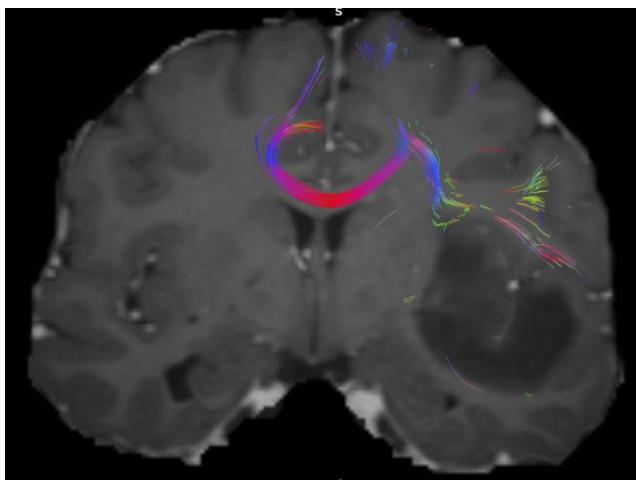
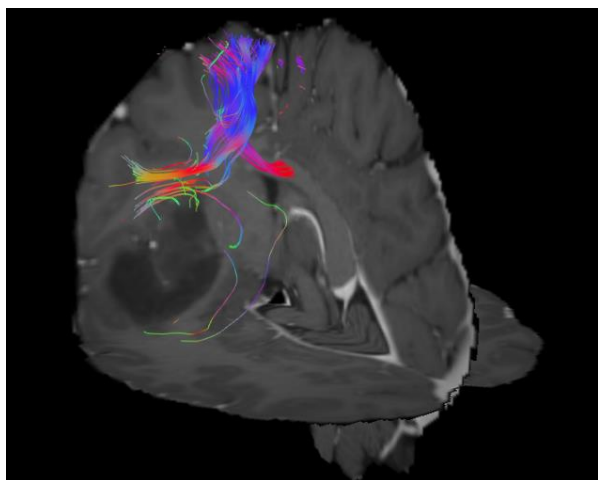


Sensorimotor system

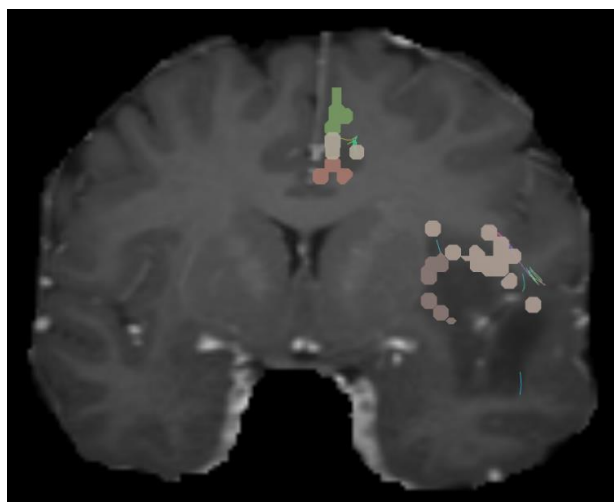
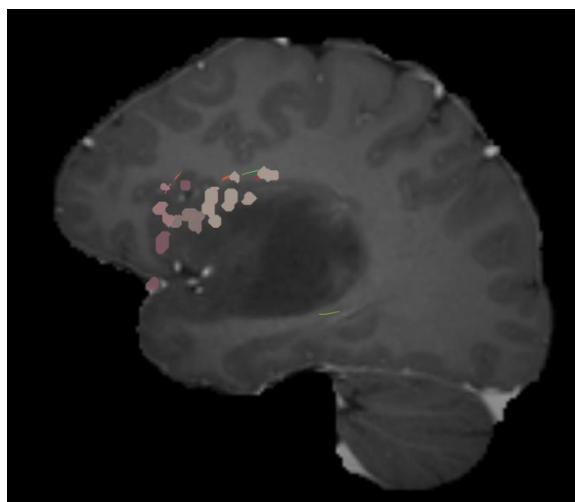


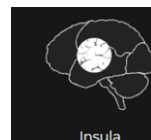


Frontal aslant tract

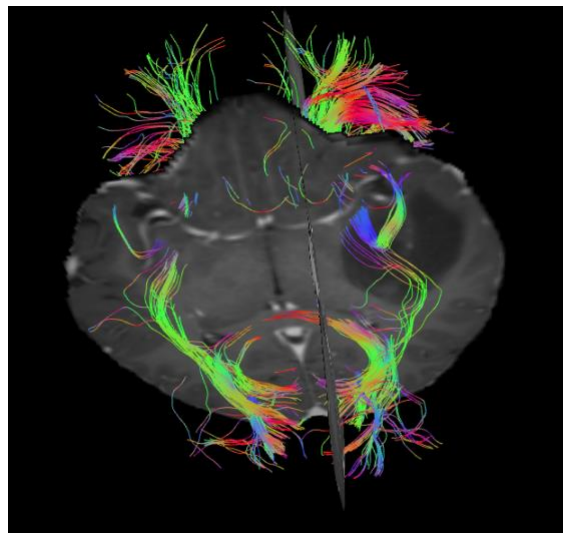
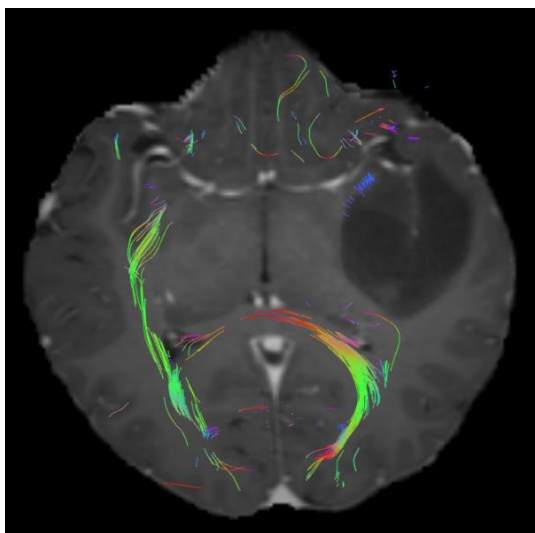


Salience network

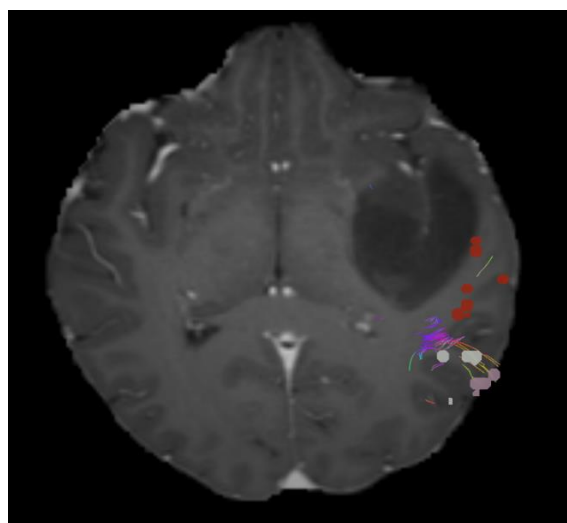
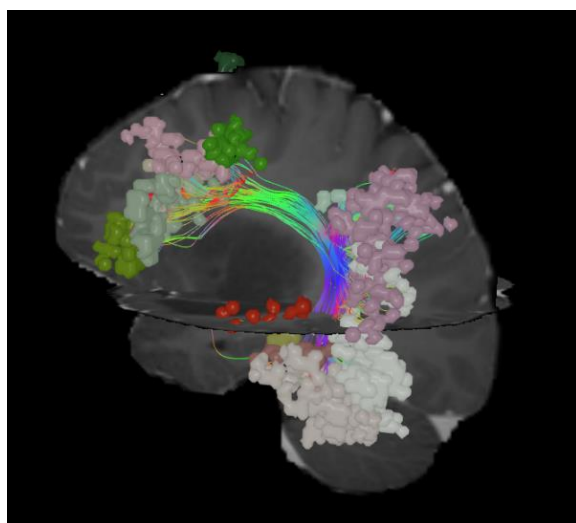


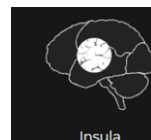


Inf. fronto-occipital fasciculus



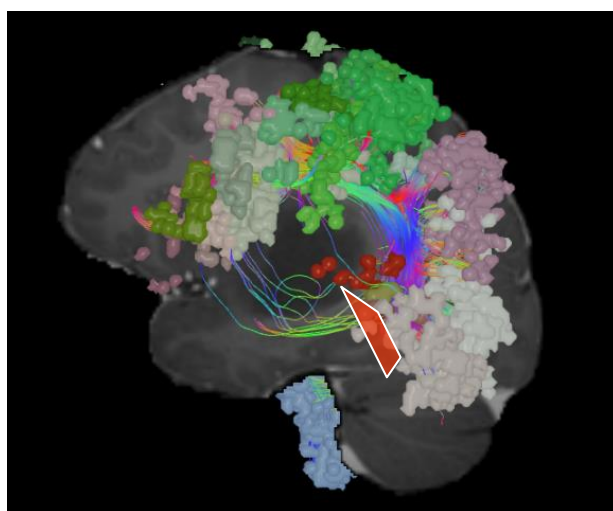
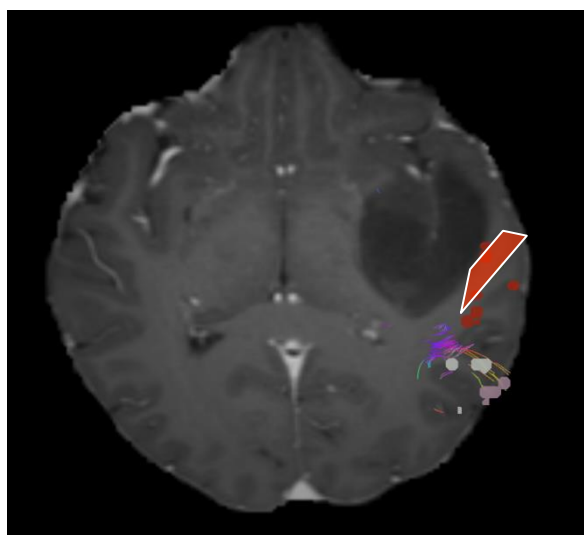
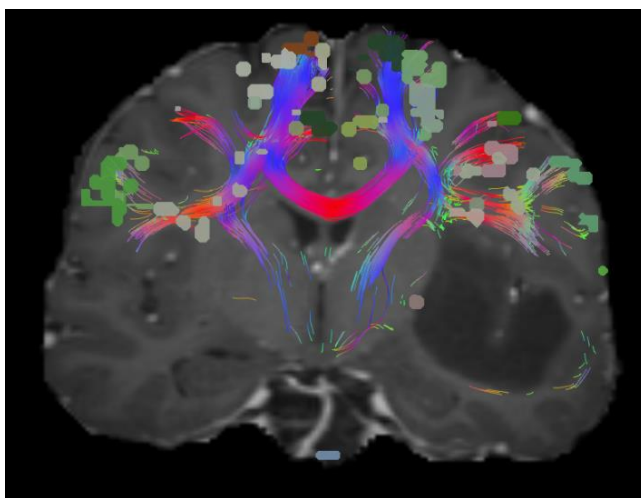
Language system

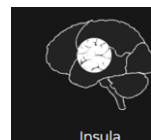




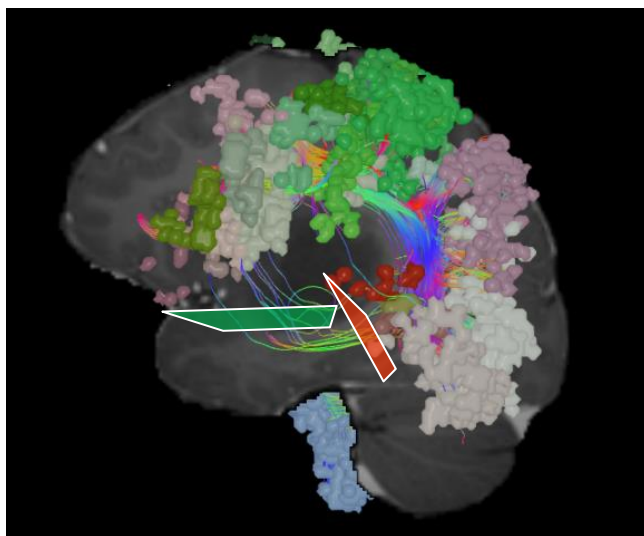
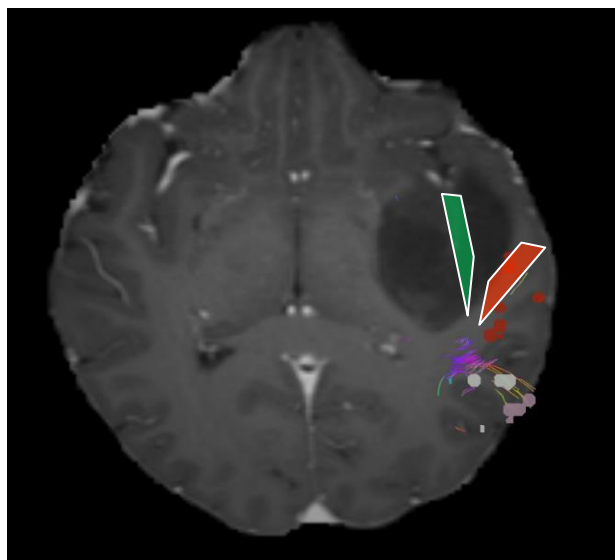
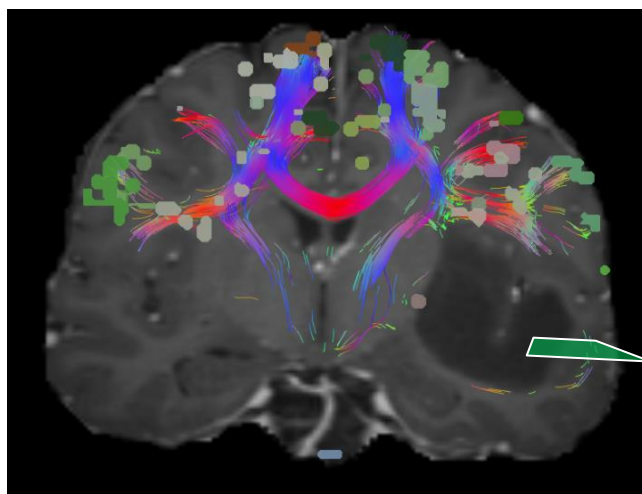
Planning the disconnection

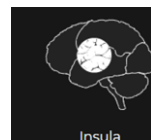
First cut - Posterior



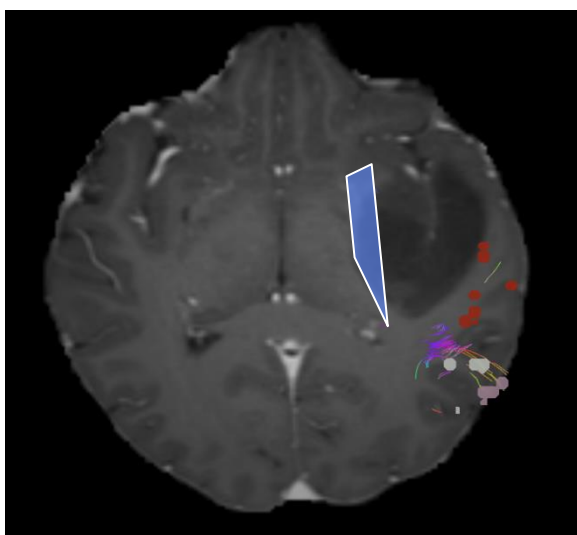
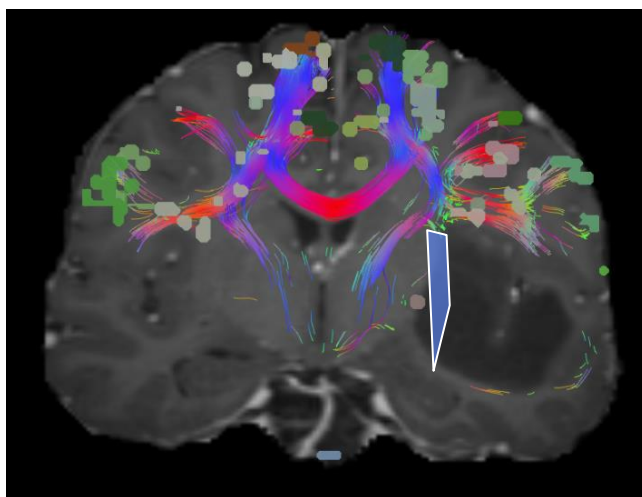


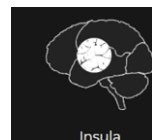
Second cut - STG



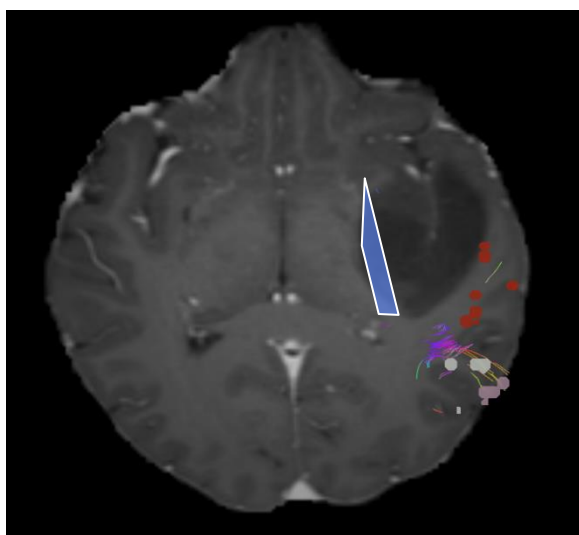
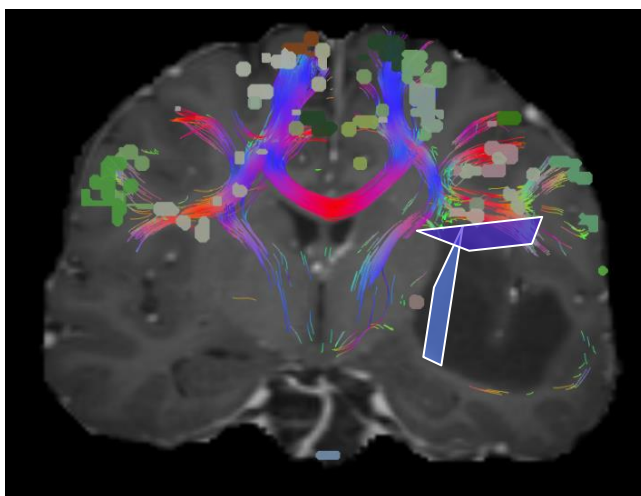


Third cut – Insula deep



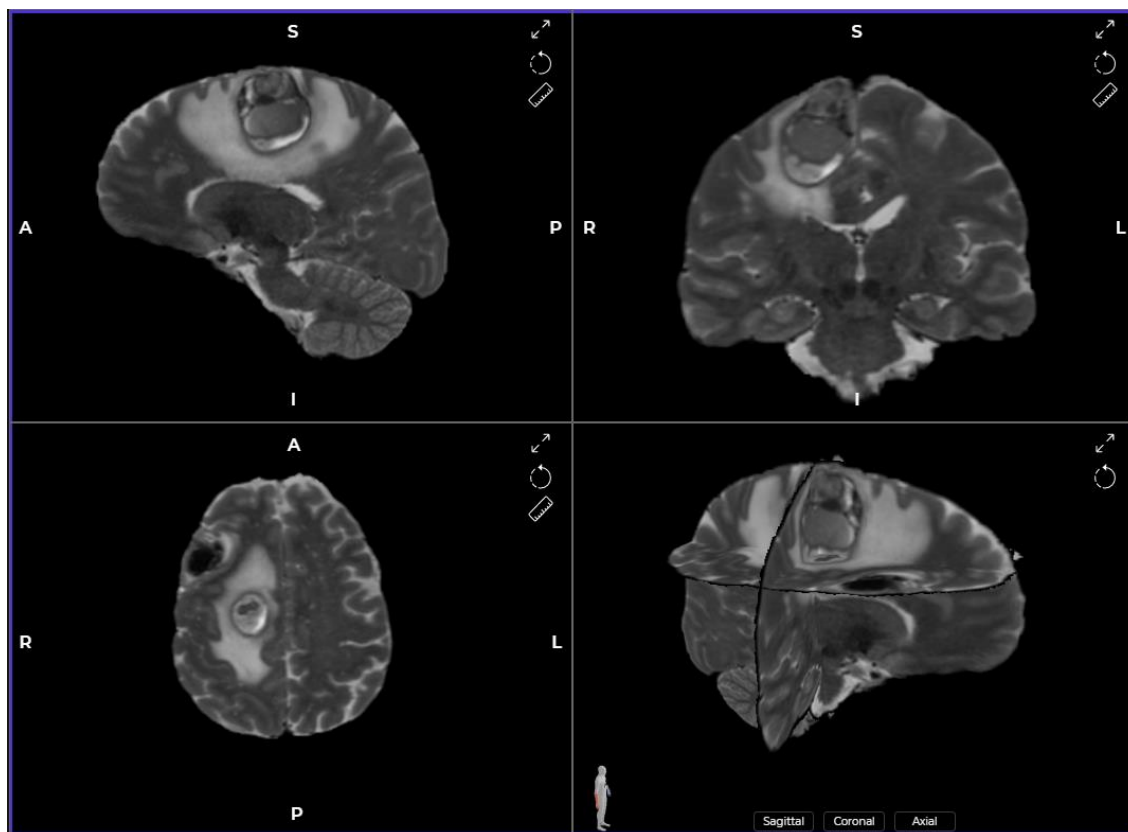


Fourth cut



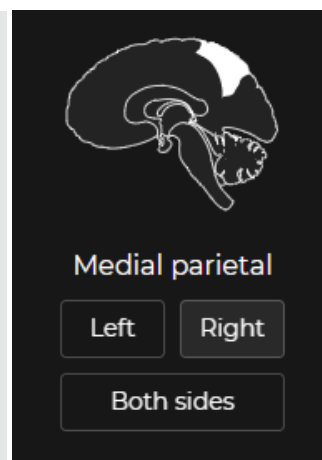
CASE 5

Medial parietal (RIGHT)



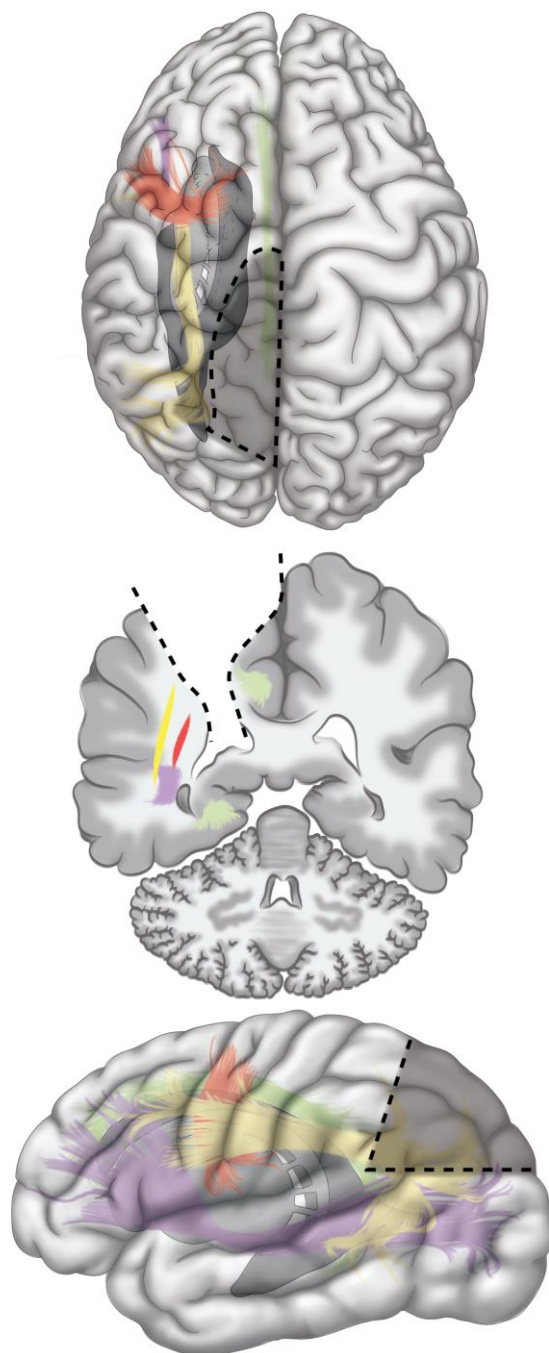
Launching the case

1. Find the case by searching and launching **"MedPar"**
2. Select workflow: Click **Surgical planning**
3. Select brain region: Hover over **Medial parietal** and click **Right**



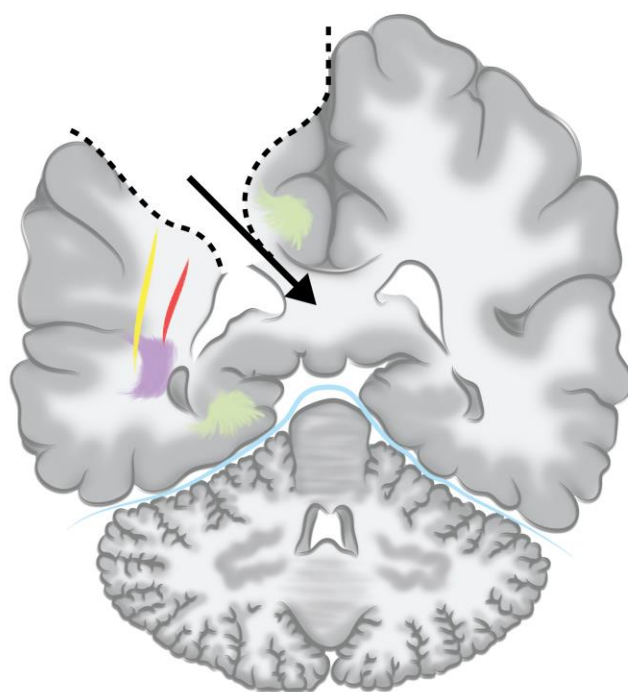
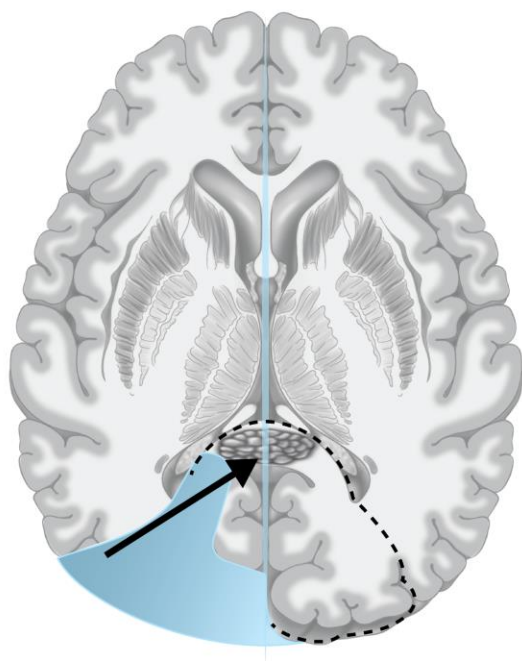


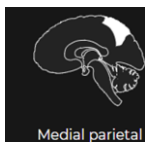
Medial Parietal





Medial Steps





Functional regions of concern

Corticospinal tract

Connects sensorimotor cortex to spinal cord.

Optic radiations

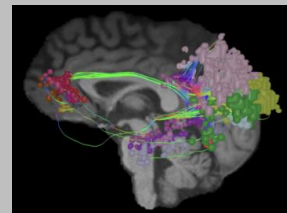
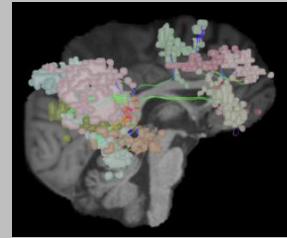
Connects lateral geniculate nucleus with primary visual cortex.

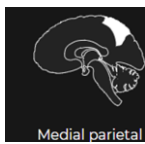
Ventral attention network (VAN)

Involved with stimulus driven attention. Damage results in hemispatial neglect and other cognitive dysfunction

Default mode network (DMN)

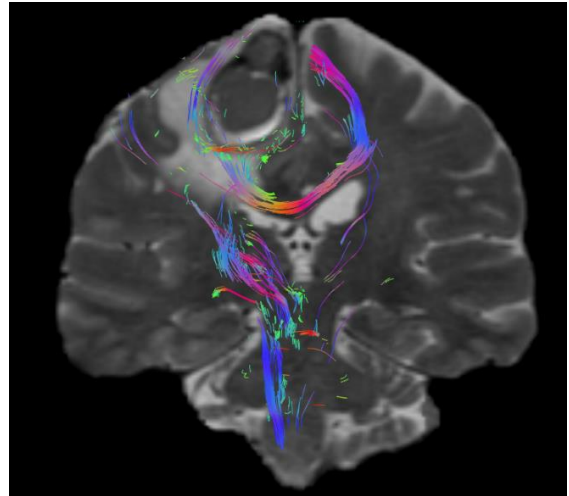
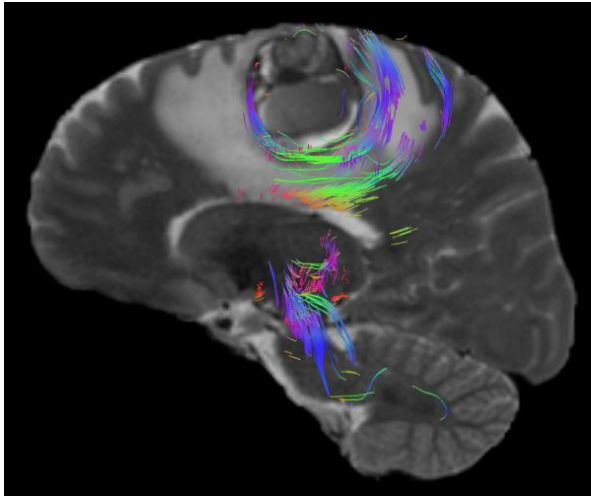
A critical network involved with cognitive and emotional regulation. Active during rest and sleep. Coordinates with other networks for passive sensory processing. Dysfunctions associated with neuropsychiatric disorders and may contribute to difficulty in processing social situations and information.



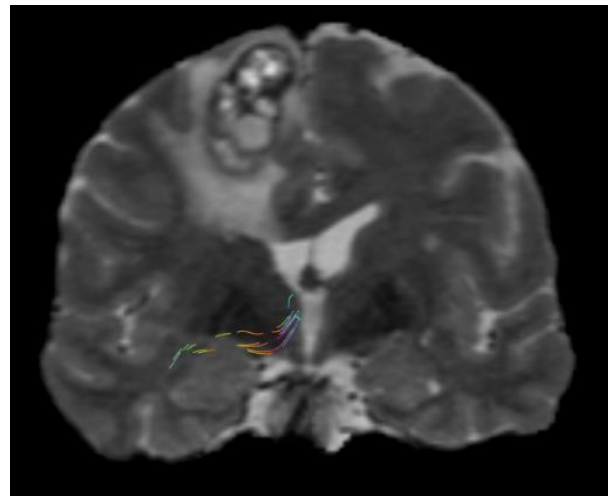
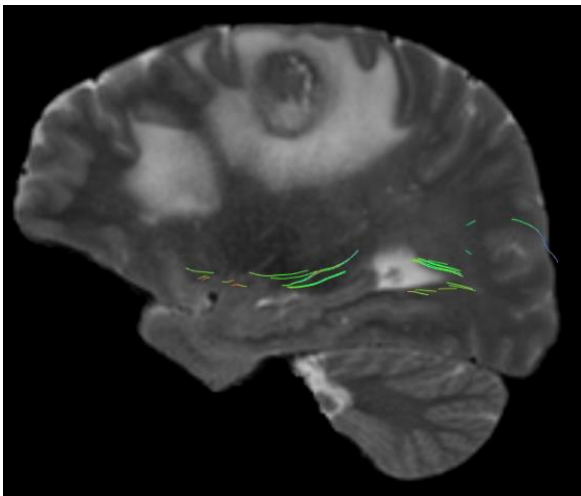


Examining functional areas

Corticospinal tract

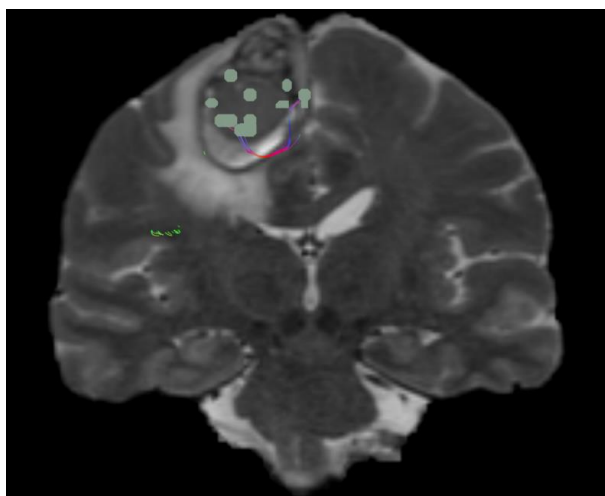
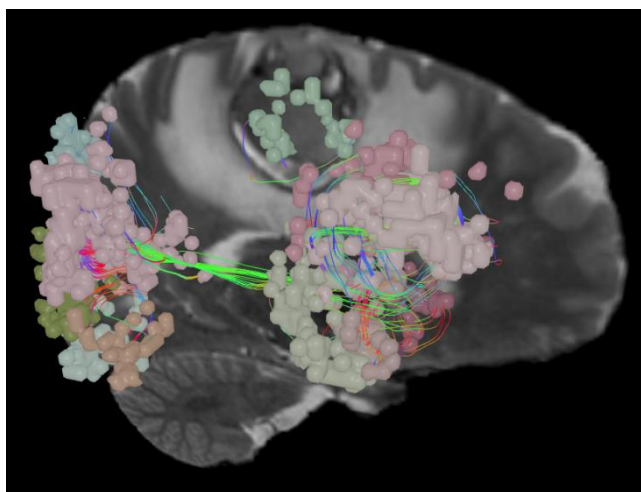


Optic radiations

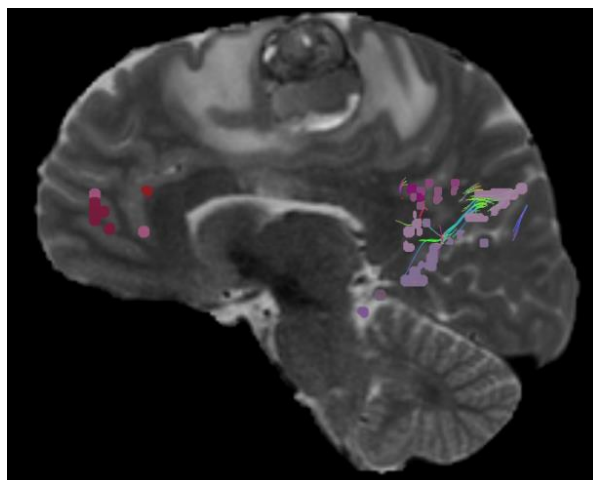
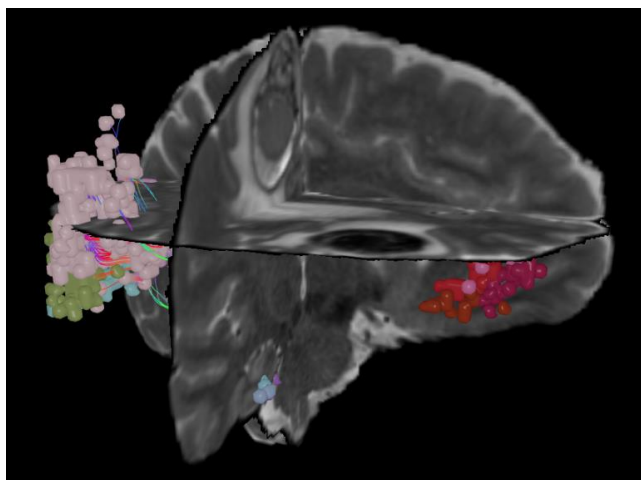




Ventral attention network



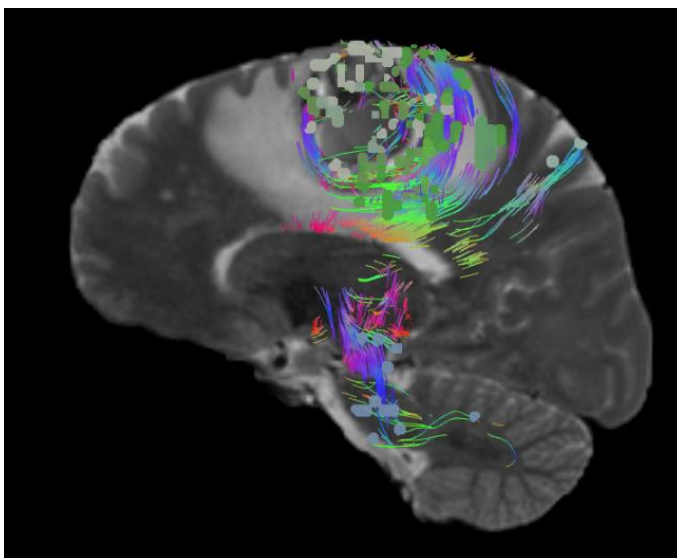
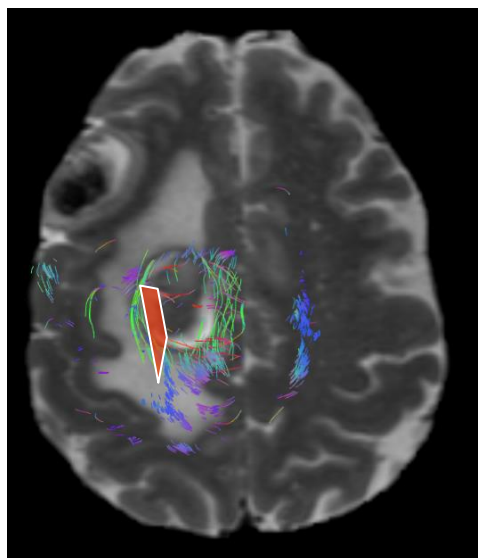
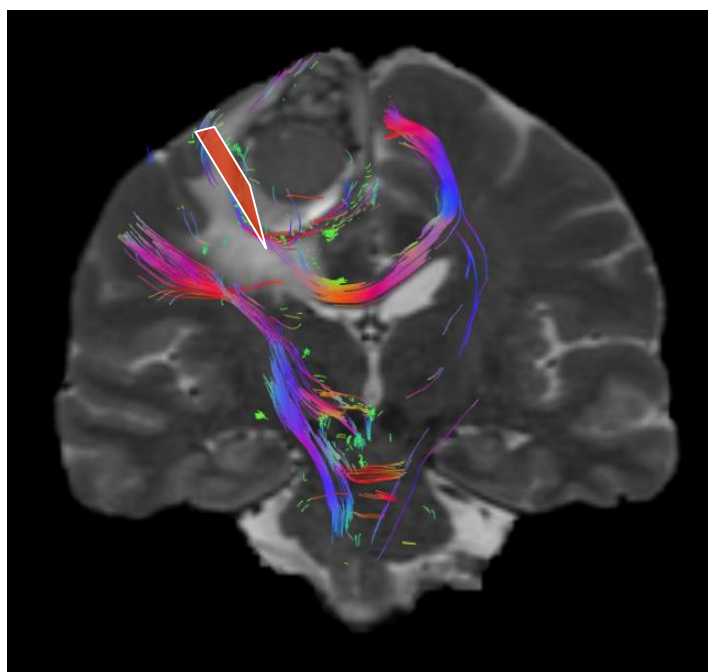
Default mode network





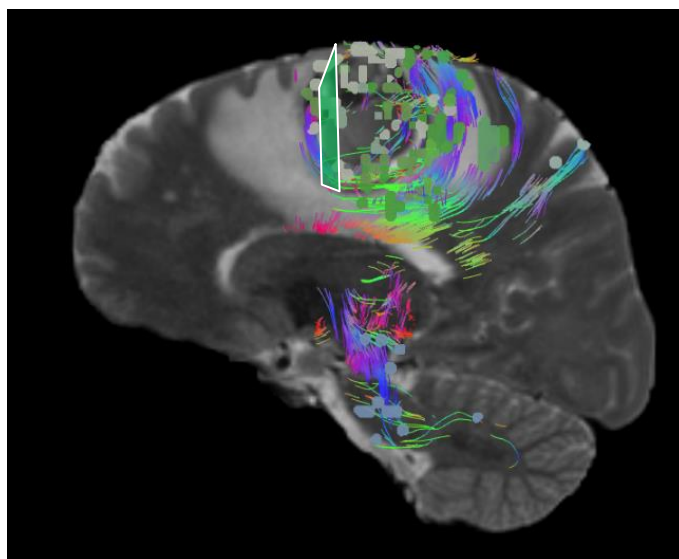
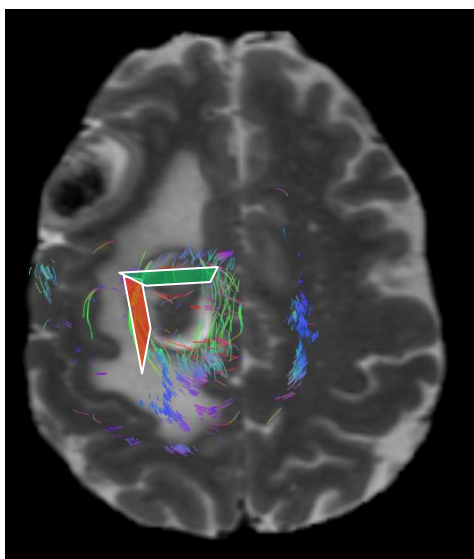
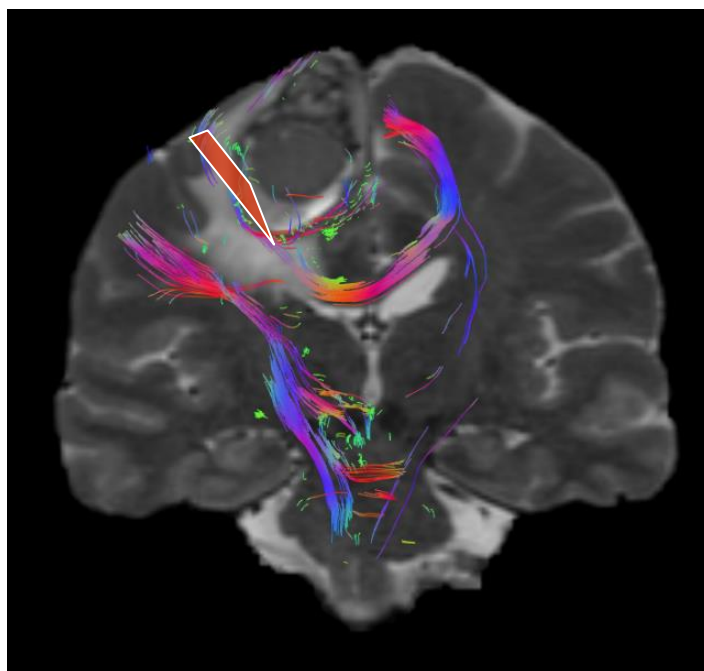
Planning the disconnection

First cut - Lateral



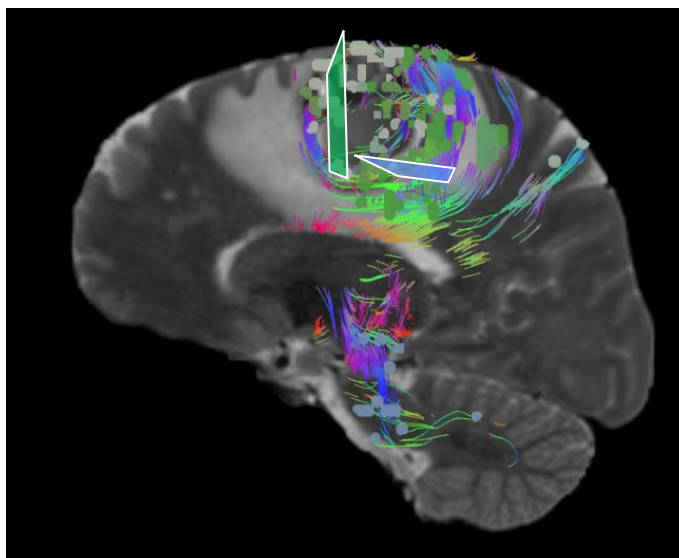
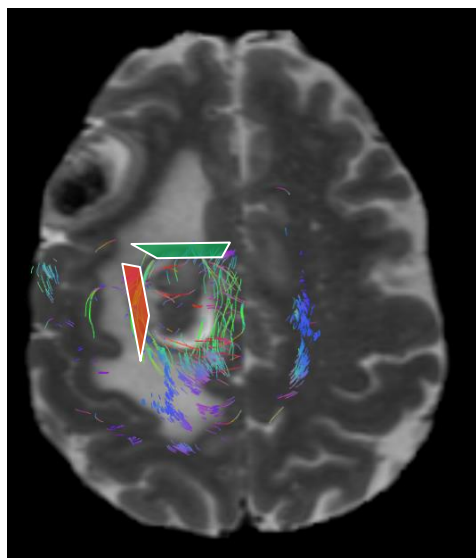
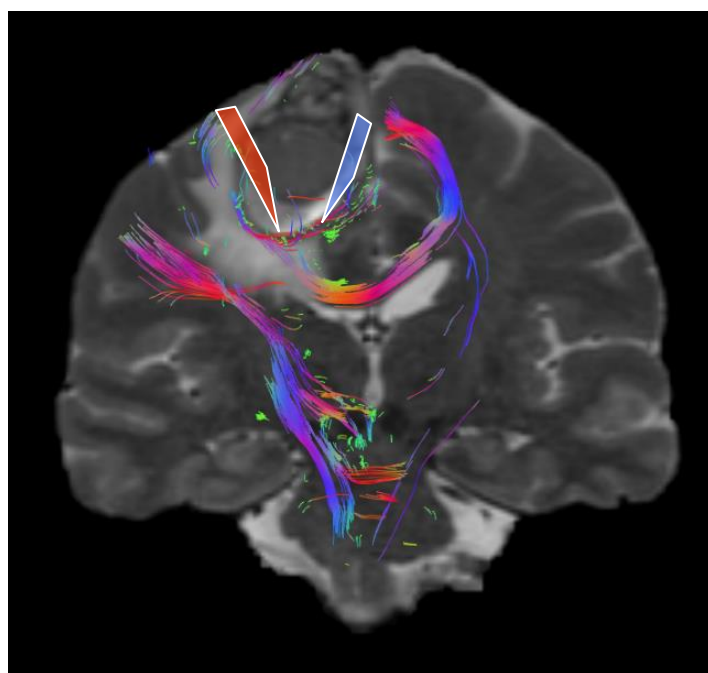


Second cut - Anterior



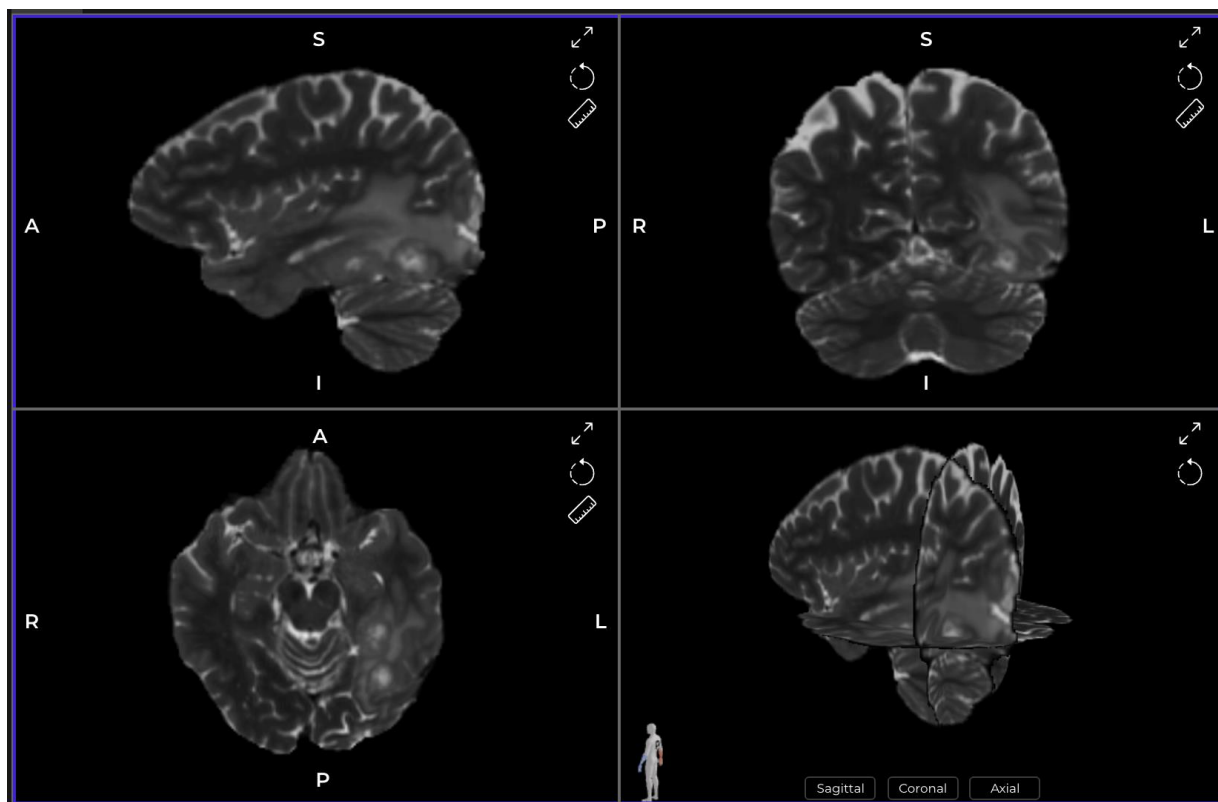


Third cut - Medial



CASE 6

Anterior Occipital Tumor (LEFT)



Launching the case

1. Find the case by searching and launching **“AntOcc”**
2. Select workflow: Click **Surgical planning**
3. Select brain region: Hover over **Anterior occipital** and click **Left**



Anterior occipital

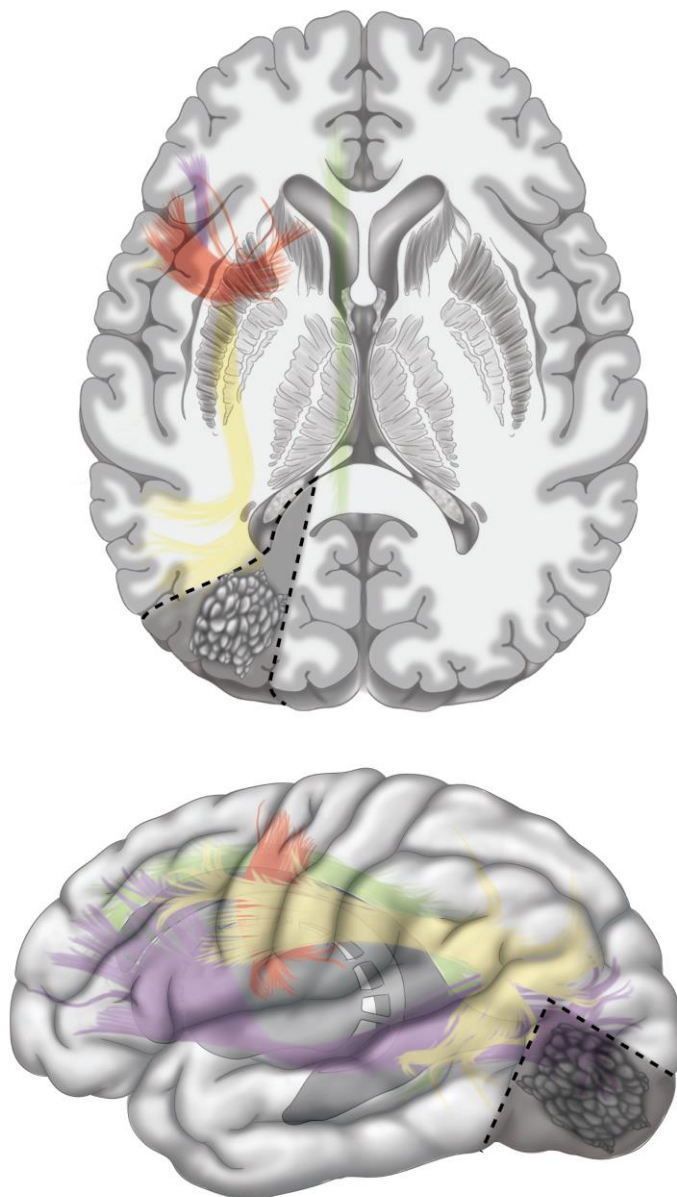
Left

Right

Both sides



Anterior Occipital





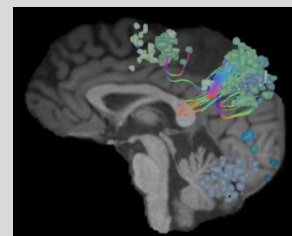
Functional regions of concern

Corticospinal tract

Connects sensorimotor cortex to spinal cord.

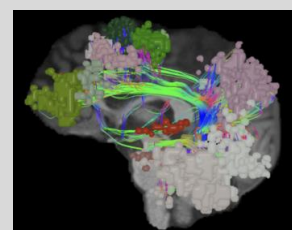
Dorsal attention network

The DAN holds attention for a person to focus and ignore miscellaneous noises or environmental changes. In addition to attentional and sensory disruption due to neurodegenerative disorders, the DAN is also associated with neuropsychiatric disorders, like schizophrenia.



Language system

Often referred to as an “eloquent region” of the brain due to its critical role in and independent function. Recent neuroimaging publications have extended anatomical classification of network including new cortical parcellations and tract pathways



Inf. longitudinal fasciculus (ILF)

One of the major occipitotemporal association tracts associated with visual to memory transfer

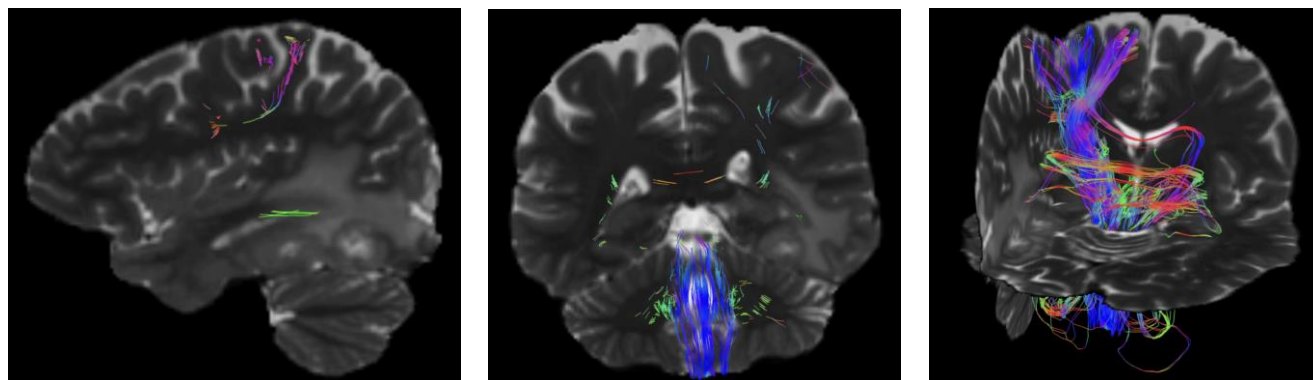
Optic radiations

Connects lateral geniculate nucleus with primary visual cortex.

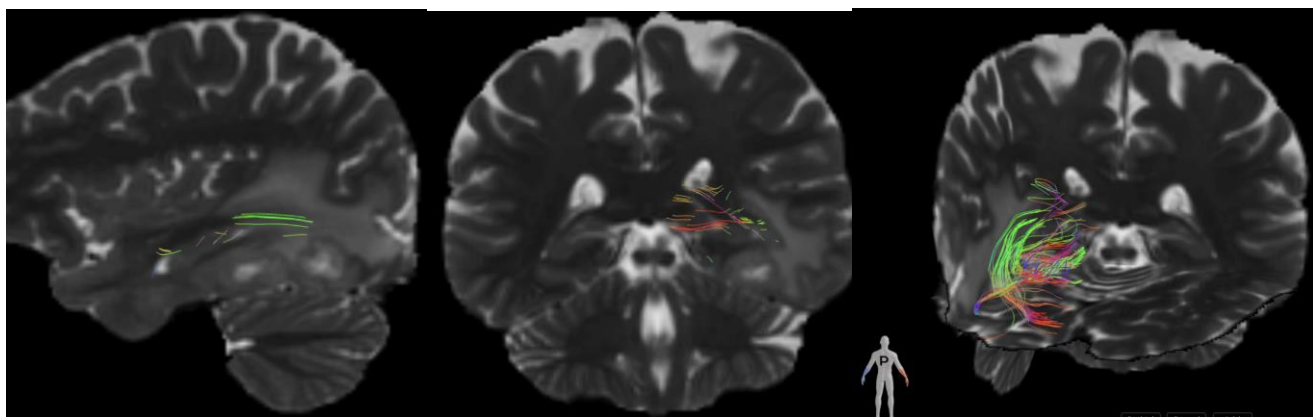


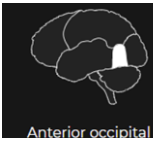
Examining functional areas

Corticospinal tract

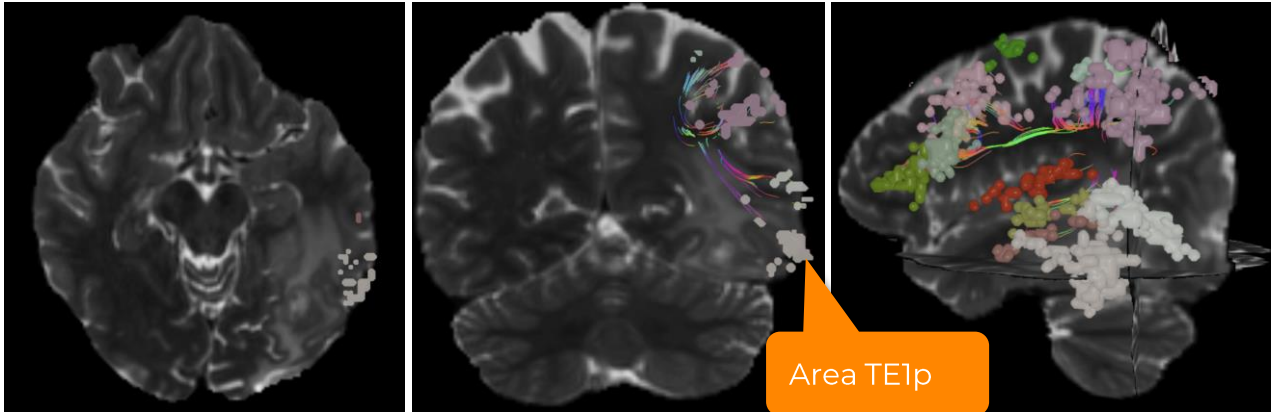


Optic radiations

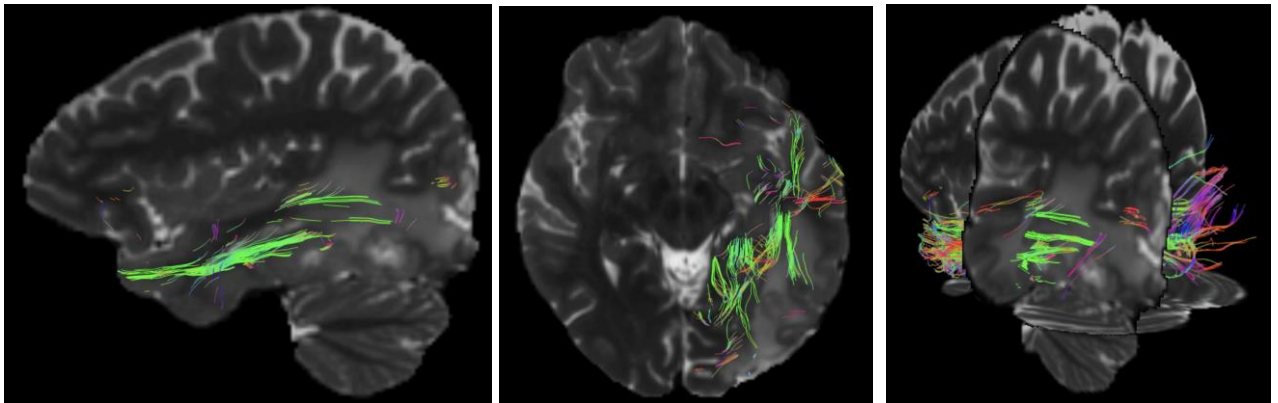


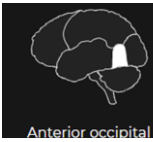


Language system

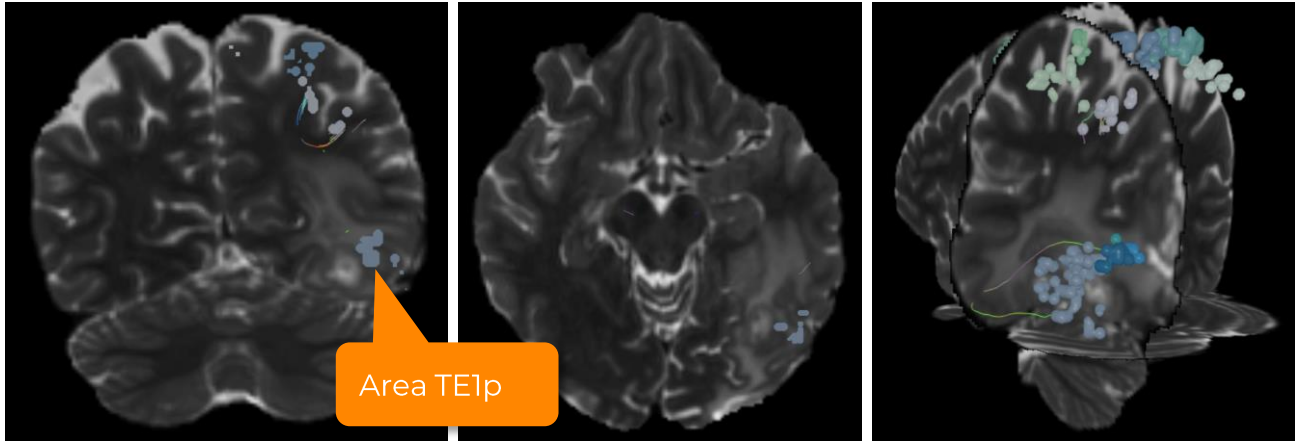


Inf. longitudinal fasciculus





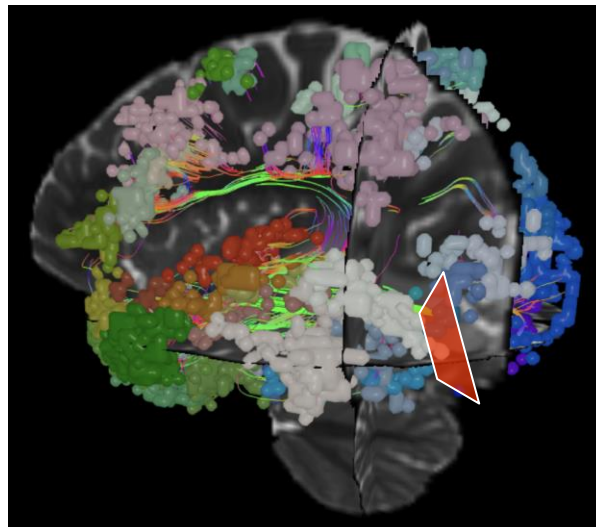
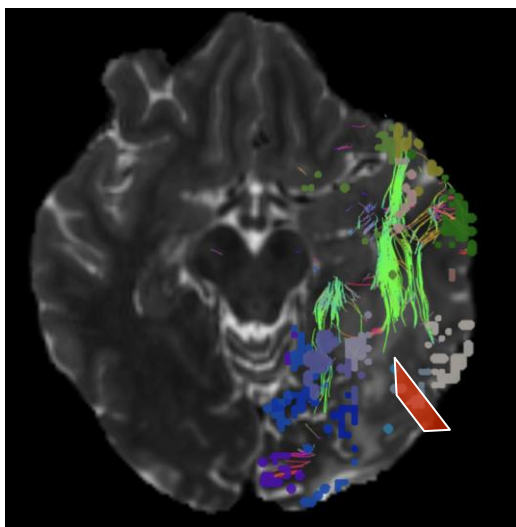
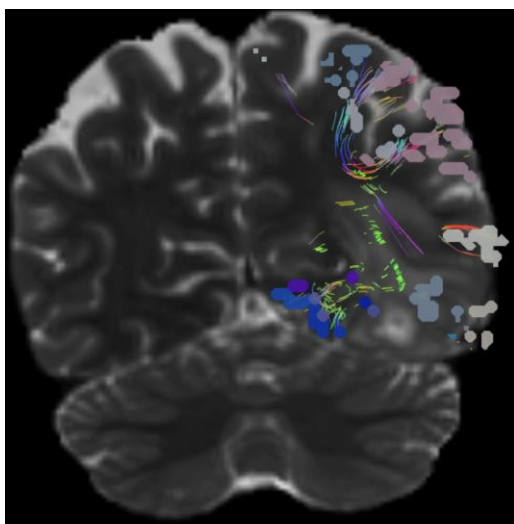
Dorsal attention network

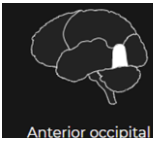




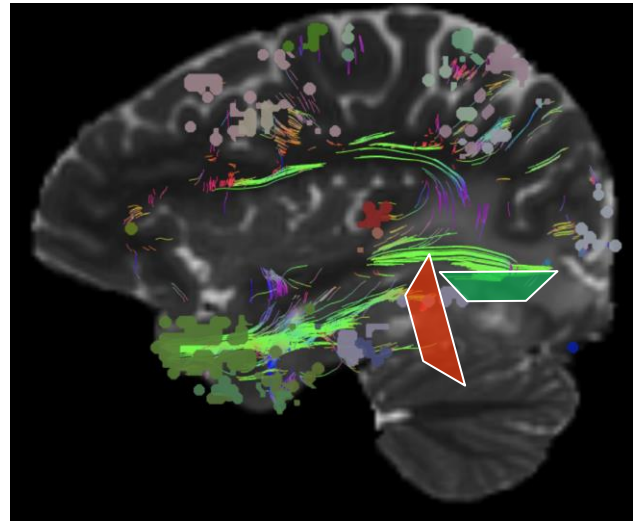
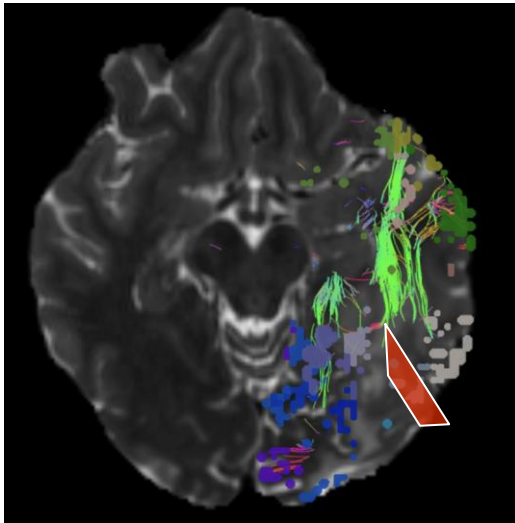
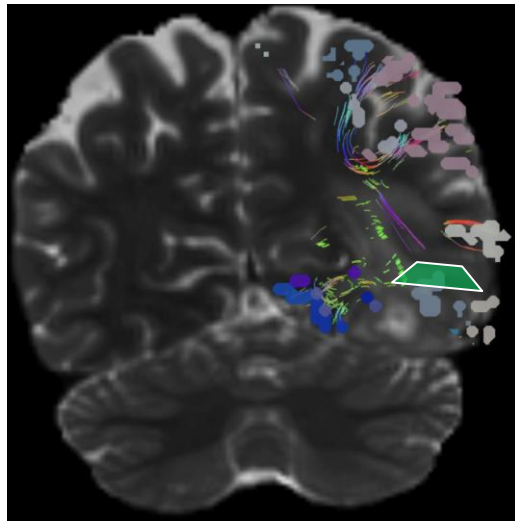
Planning the disconnection

First cut - Anterior



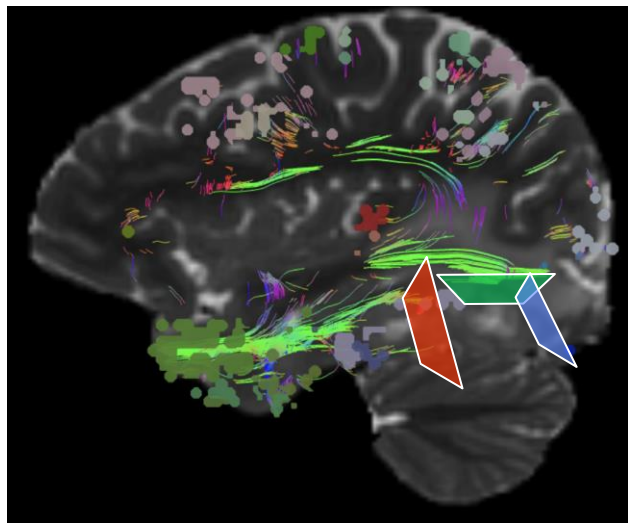
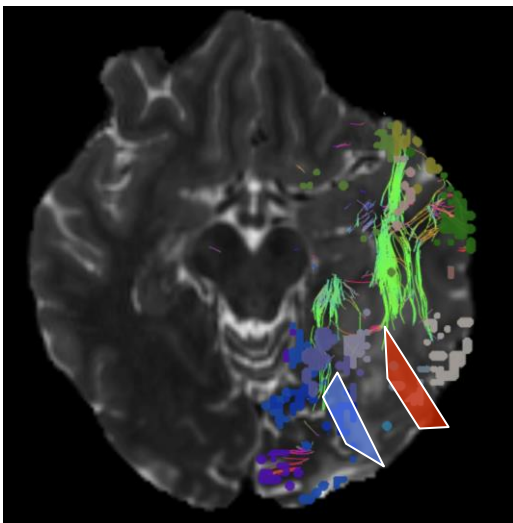
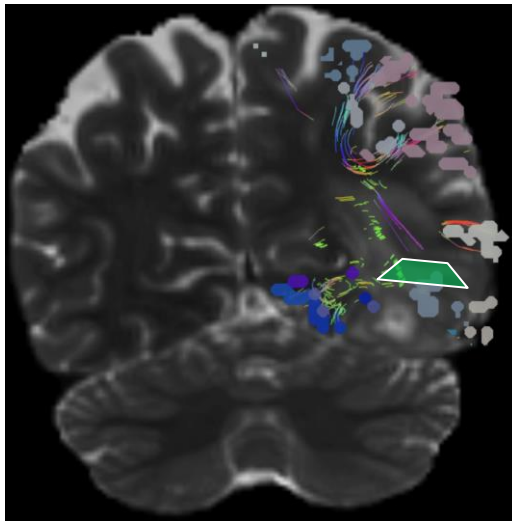


Second cut - Superior



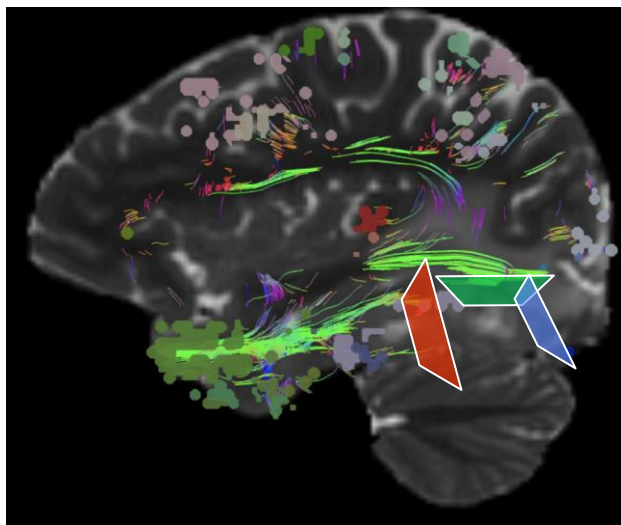
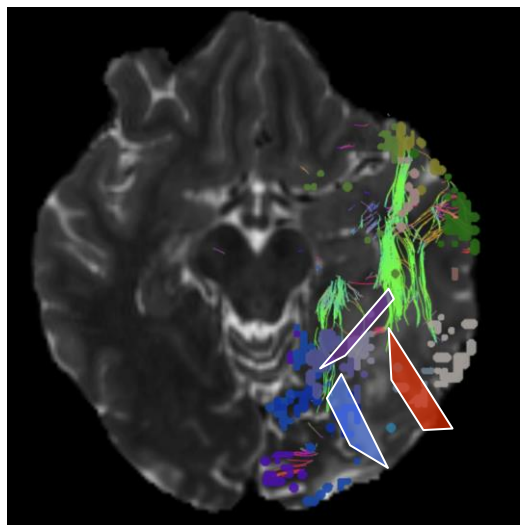
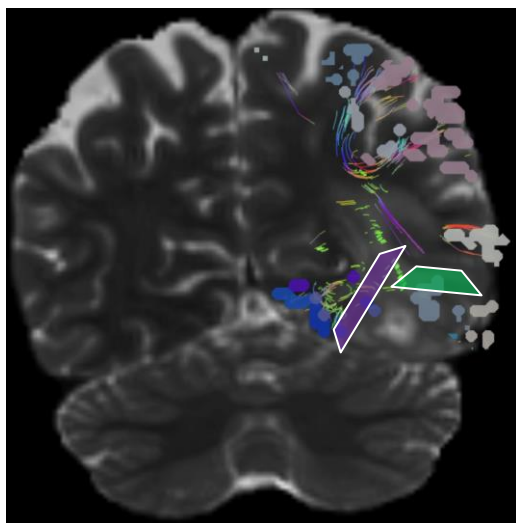


Third cut -Posterior



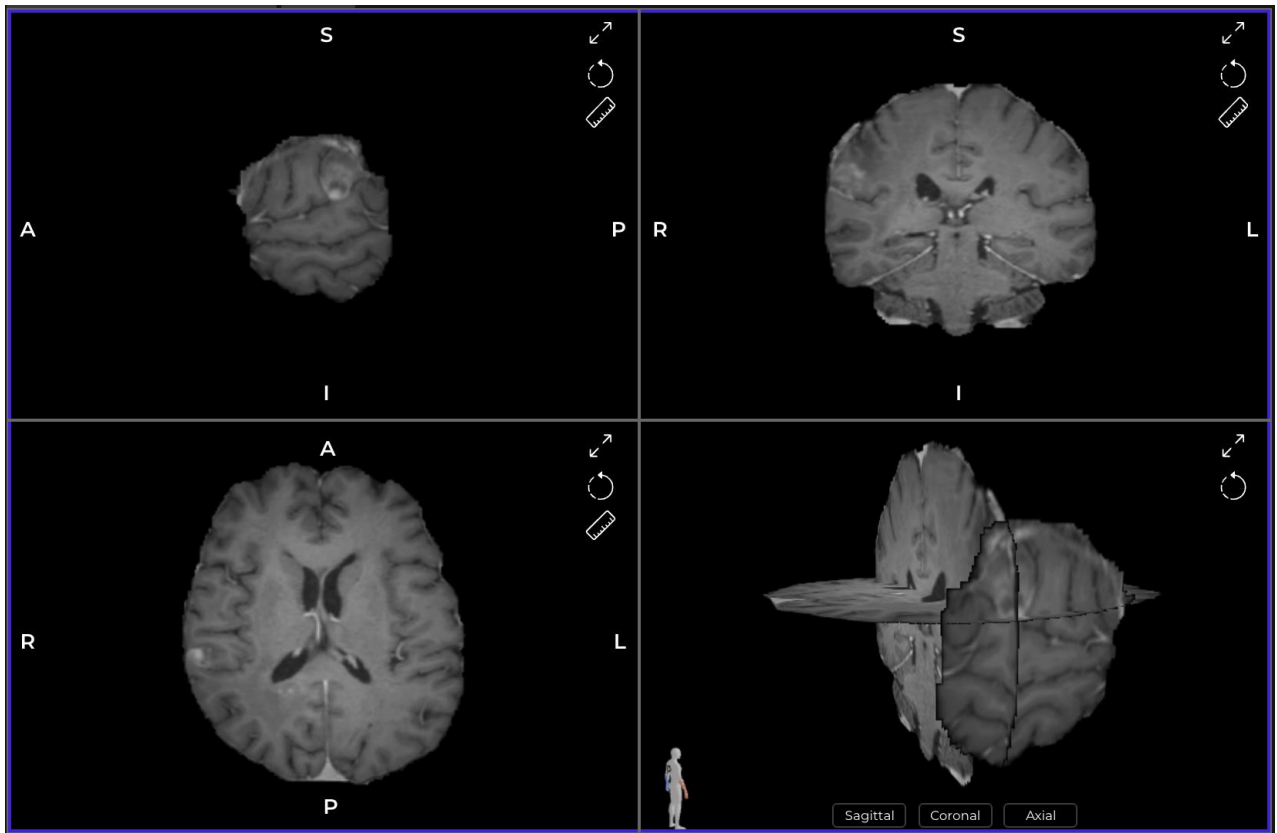


Fourth cut - Deep



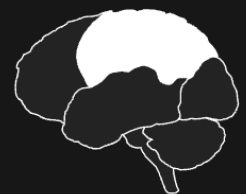
CASE 7

Lateral parietal (Right)



Launching the case

1. Find the case by searching and launching **“LatPar”**
2. Select workflow: Click **Surgical planning**
3. Select brain region: Hover over **Lateral parietal** and click **Right**



Lateral parietal

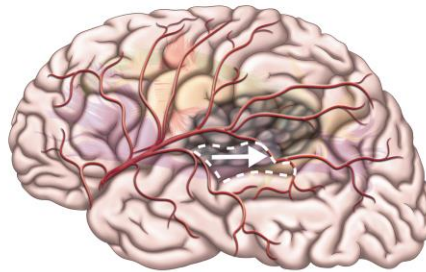
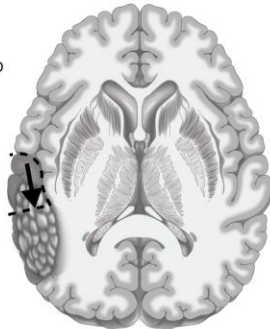
Left

Right

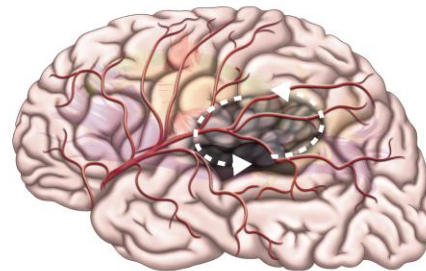
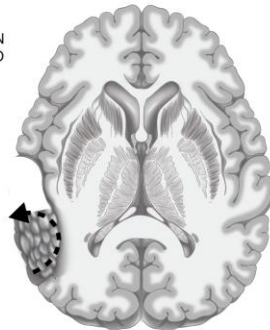
Both sides

Lateral Parietal Cut

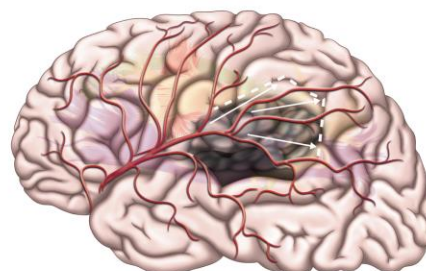
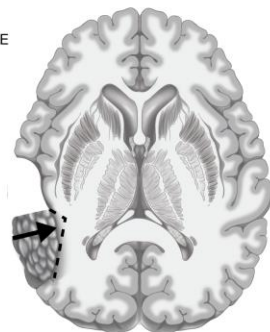
STEP 1: SUBPIALLY RESECT INVOLVED STG TO LOCATE THE POSTERIOR INSULA AS TOLERATED BY THE MAPPING



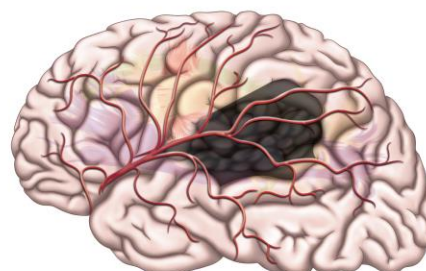
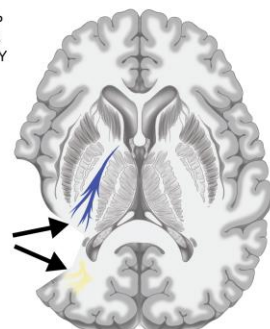
STEP 2: SUBPIALLY RESECT INVOLVED SMG AS TOLERATED IN A CORKSCREW TYPE FASHION TO SKELETONIZE THE VESSELS OF THE MCA

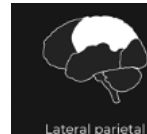


STEP 3: JOIN THE WINDOWS BETWEEN THE ARTERIES TO MAKE THE AREA A SINGLE CAVITY



STEP 4: RESECT DEEP TISSUE UP TO THE BASE OF TRACTS IN THIS SINGLE CAVITY AS TOLERATED BY THE MAPPING





Functional regions of concern

Corticospinal tract

Connects sensorimotor cortex to spinal cord.

Sensorimotor network

Responsible for sensing physical inputs, converting them to electrical signals to initiate a physical response. Abnormalities can cause sensory and movement disorders, degenerative diseases, developmental delays and mental health disorders.

Optic radiations

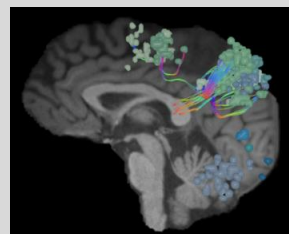
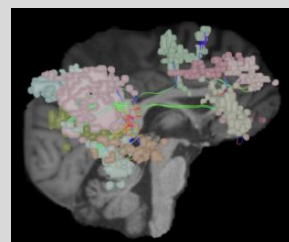
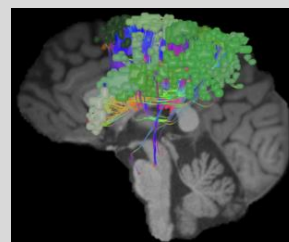
Connects lateral geniculate nucleus with primary visual cortex.

Ventral attention network

Involved with stimulus driven attention. Damage results in hemispatial neglect and other cognitive dysfunction

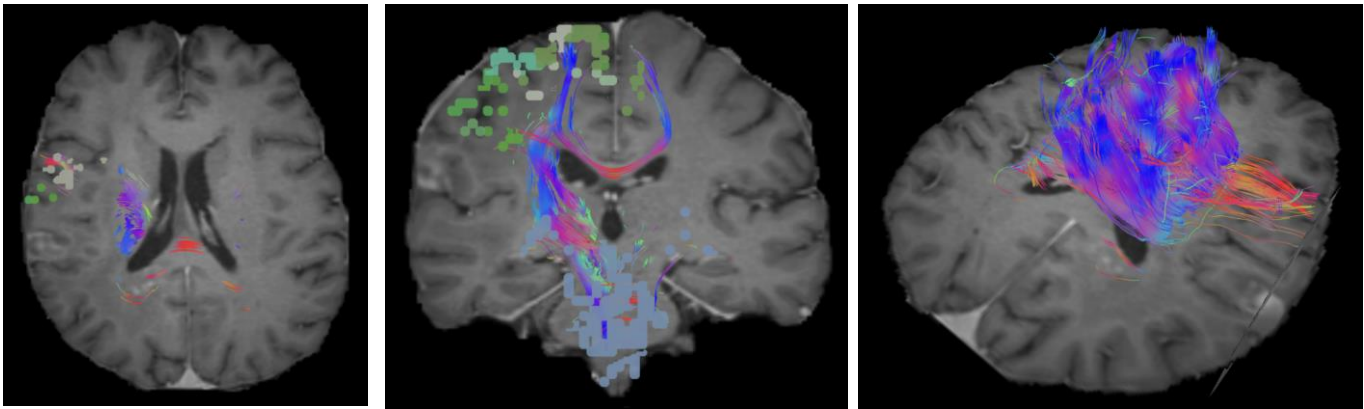
Dorsal attention network

The DAN holds attention for a person to focus and ignore miscellaneous noises or environmental changes. In addition to attentional and sensory disruption due to neurodegenerative disorders, the DAN is also associated with neuropsychiatric disorders, like schizophrenia.

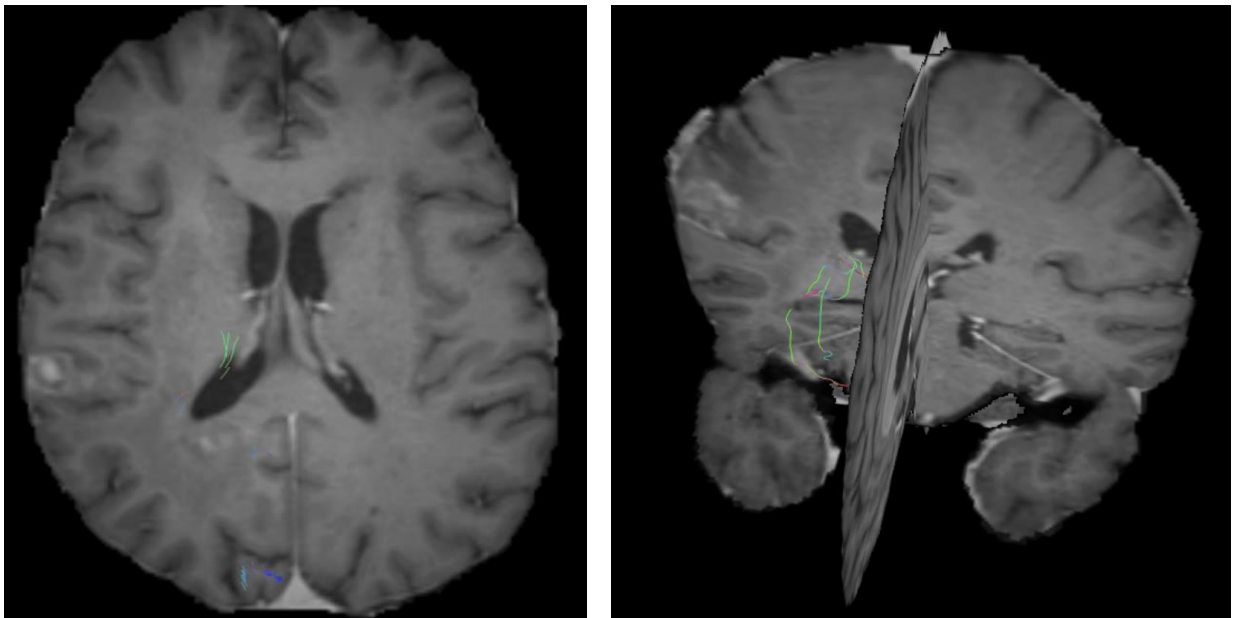


Examining functional areas

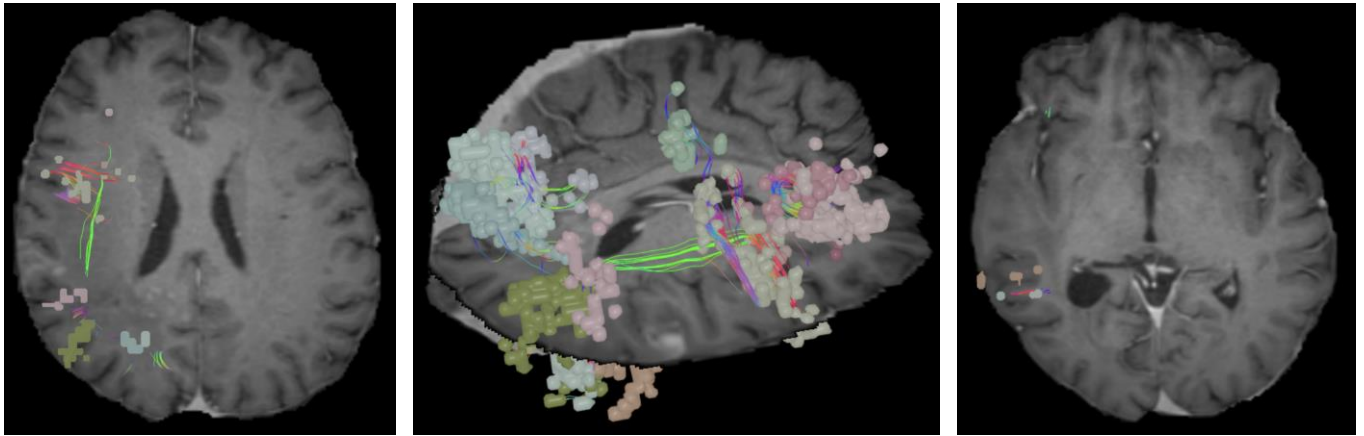
Corticospinal tract and sensorimotor



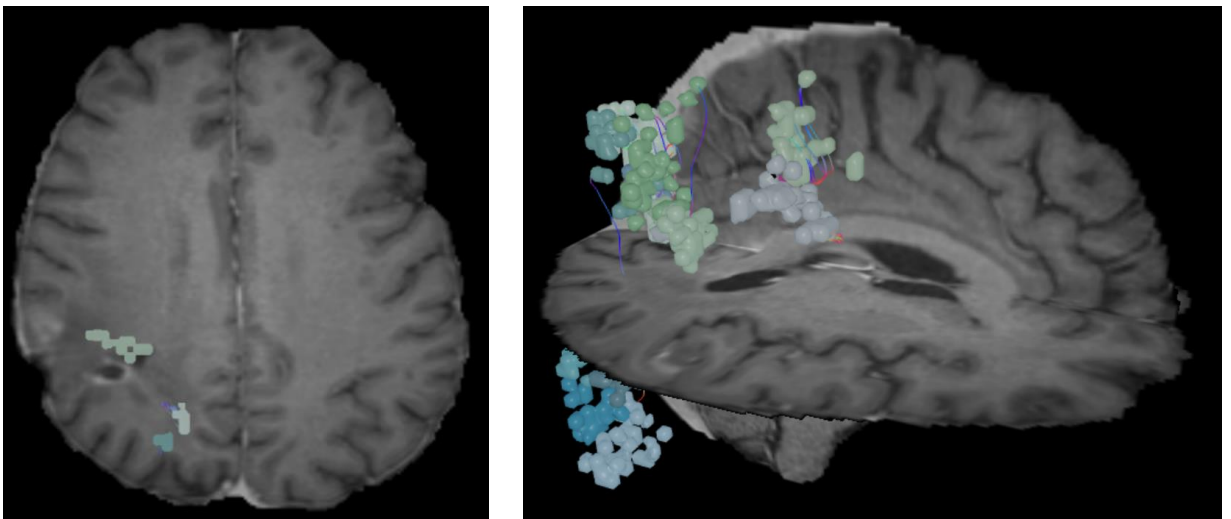
Optic radiations



Ventral attention network



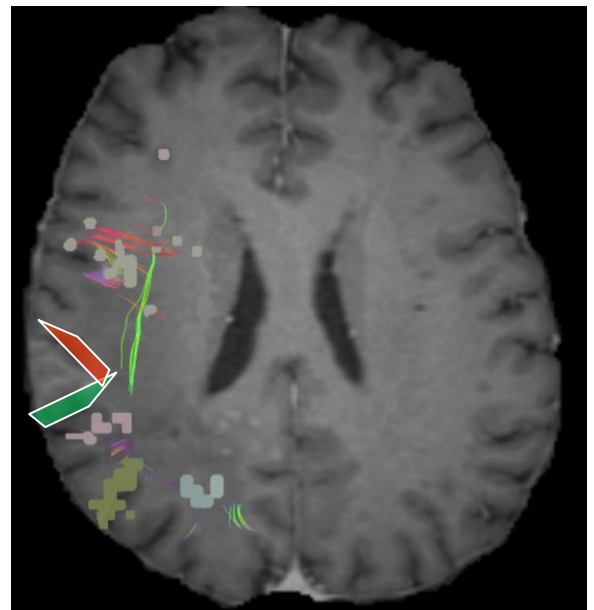
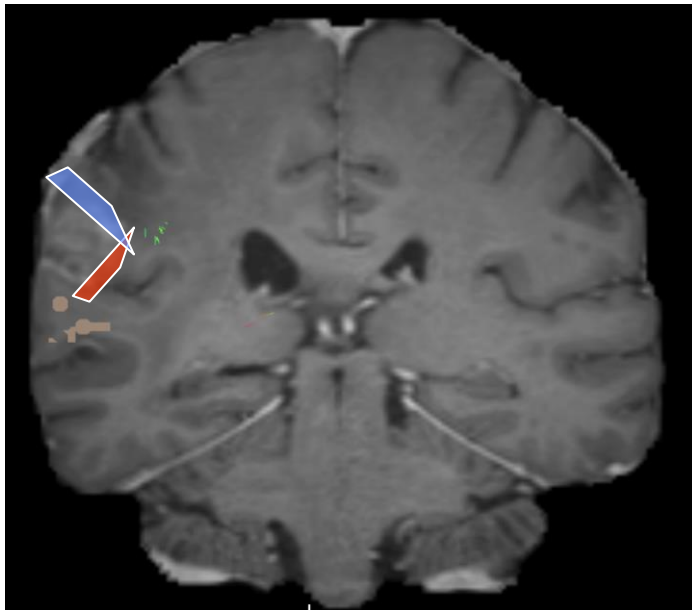
Dorsal attention network





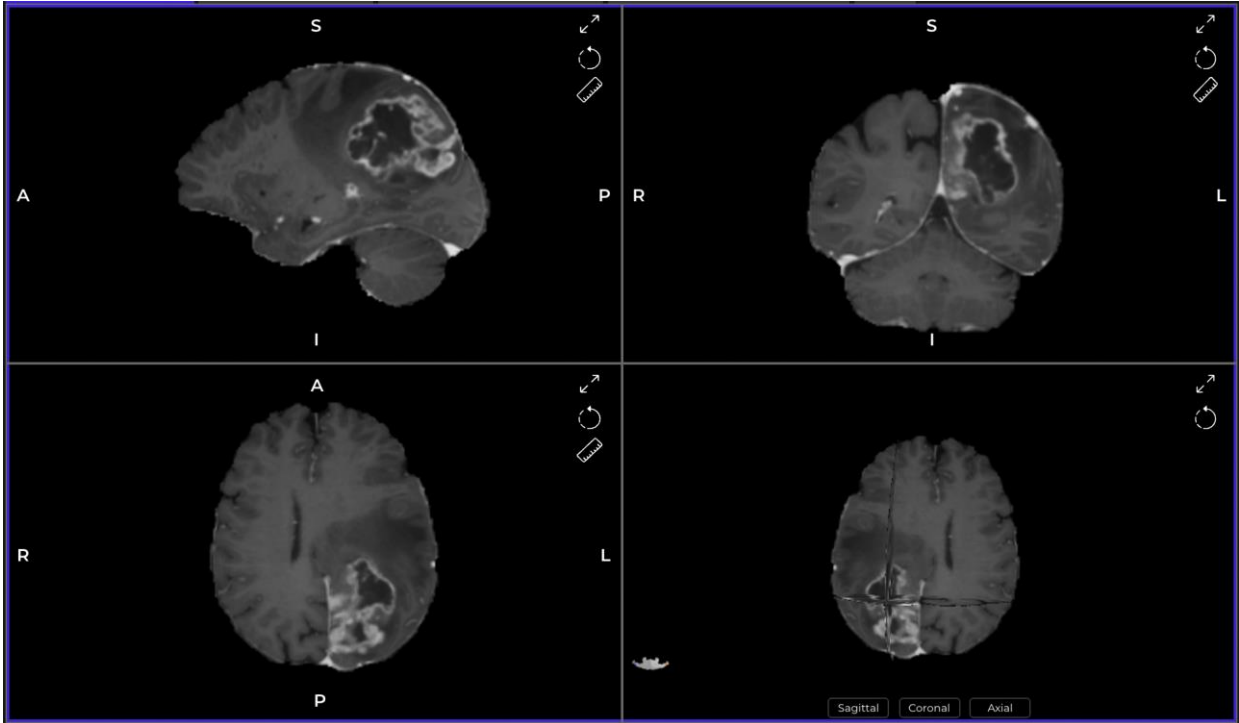
Planning the disconnection

Cuts – “Surrounded on all sides”



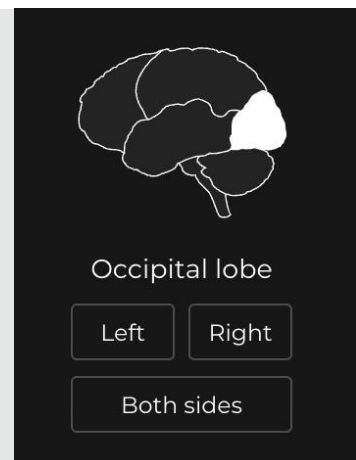
CASE 8

Occipital Lobe Tumor (LEFT)

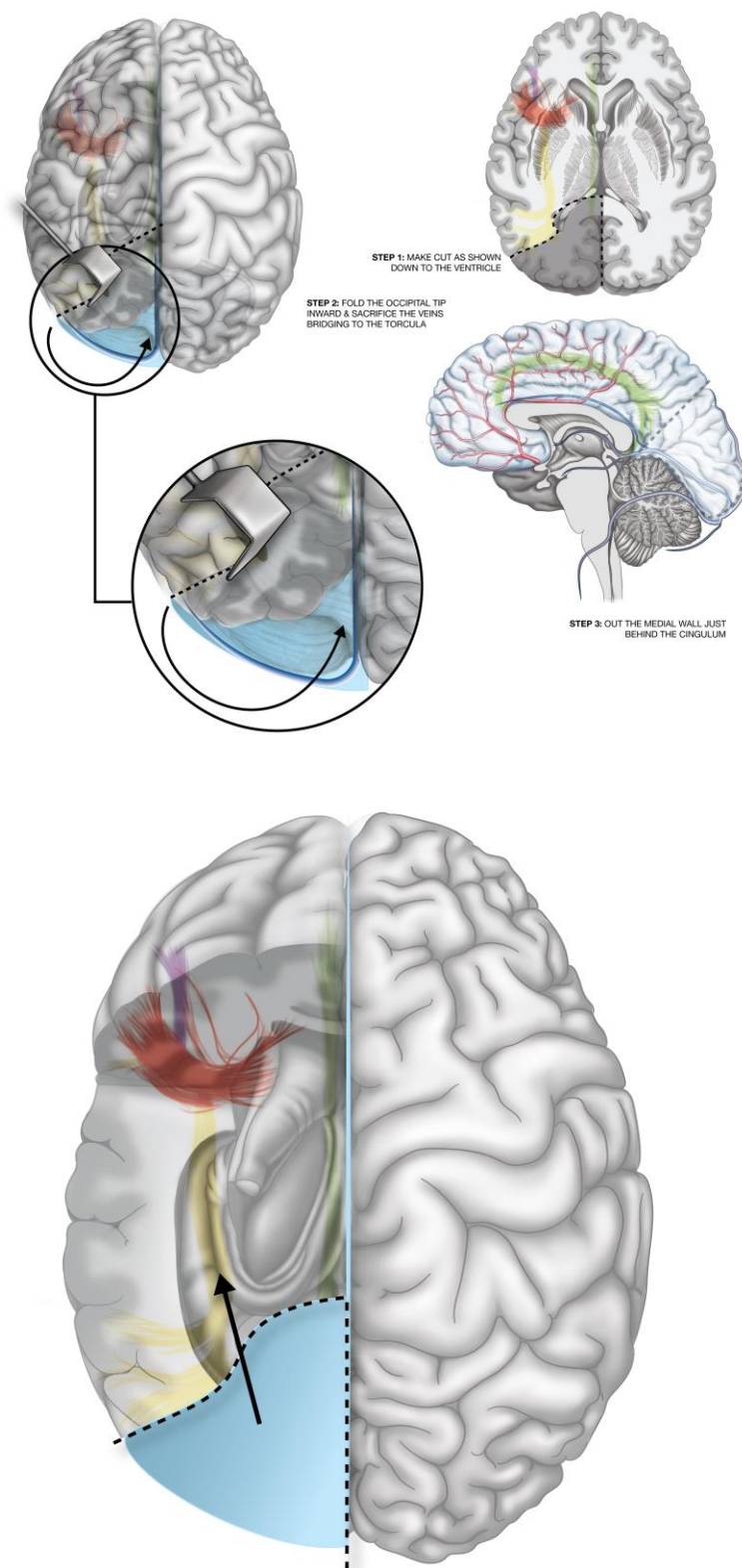


Launching the case

1. Find the case by searching and launching **"OccLob"**
2. Select workflow: Click **Surgical planning**
3. Select brain region: Hover over **Occipital Lobe** and click **Left**



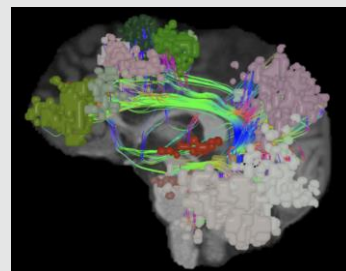
Occipital Cut



Functional regions of concern

Language system

Often referred to as an “eloquent region” of the brain due to its critical role in and independent function. Recent neuroimaging publications have extended anatomical classification of network including new cortical parcellations and tract pathways

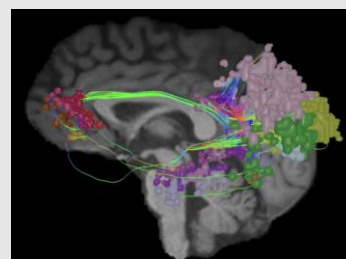


Optic radiations

Connects lateral geniculate nucleus with primary visual cortex

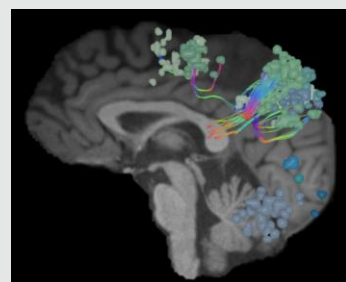
Default mode network

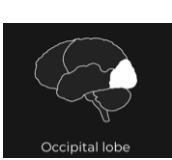
A critical network involved with cognitive and emotional regulation. Active during rest and sleep. Coordinates with other networks for passive sensory processing. Dysfunctions associated with neuropsychiatric disorders and may contribute to difficulty in processing social situations and information.



Dorsal attention network

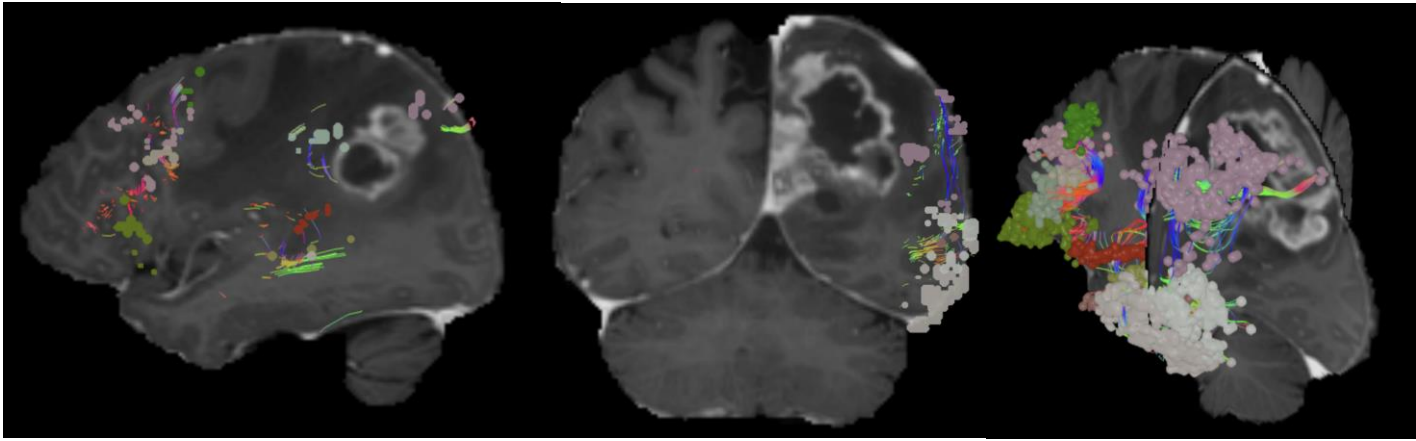
The DAN holds attention for a person to focus and ignore miscellaneous noises or environmental changes. In addition to attentional and sensory disruption due to neurodegenerative disorders, the DAN is also associated with neuropsychiatric disorders, like schizophrenia.



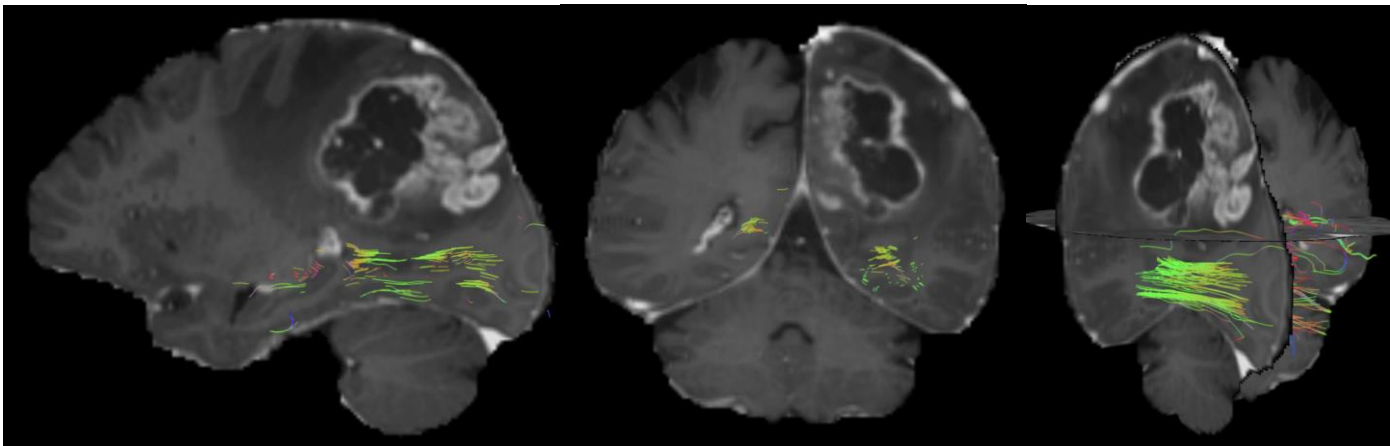


Examining functional areas

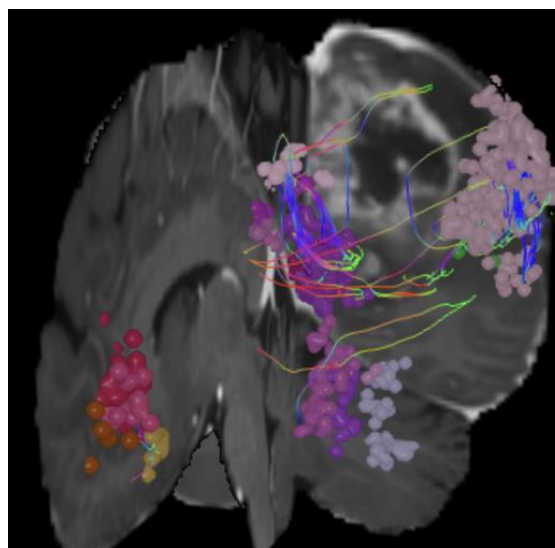
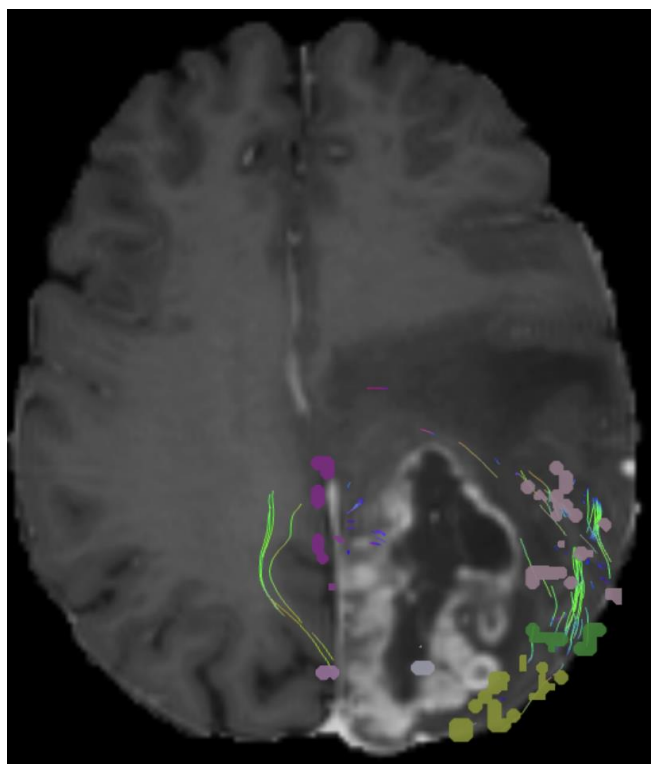
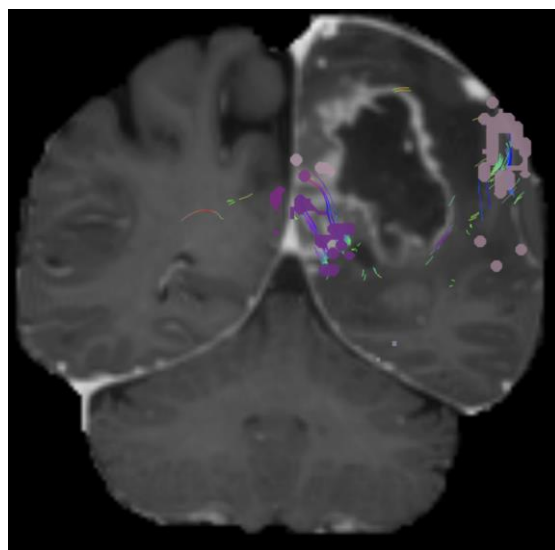
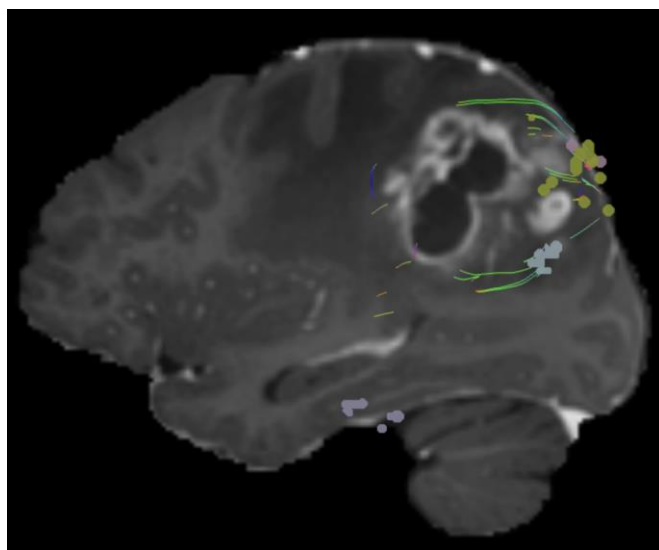
Language system



Optic radiations

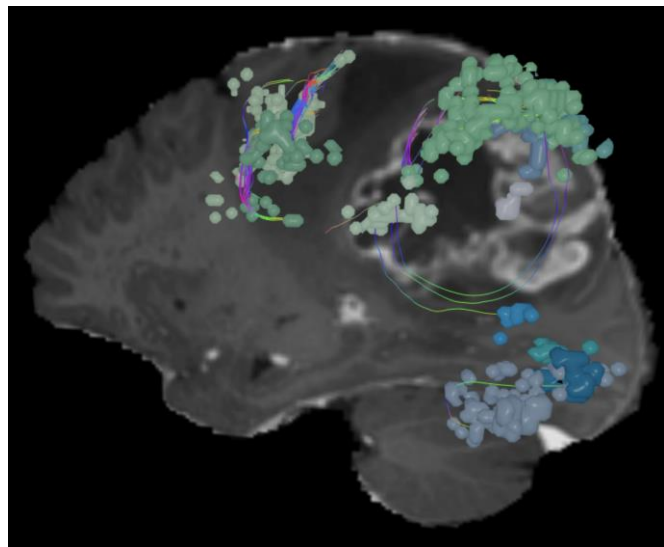
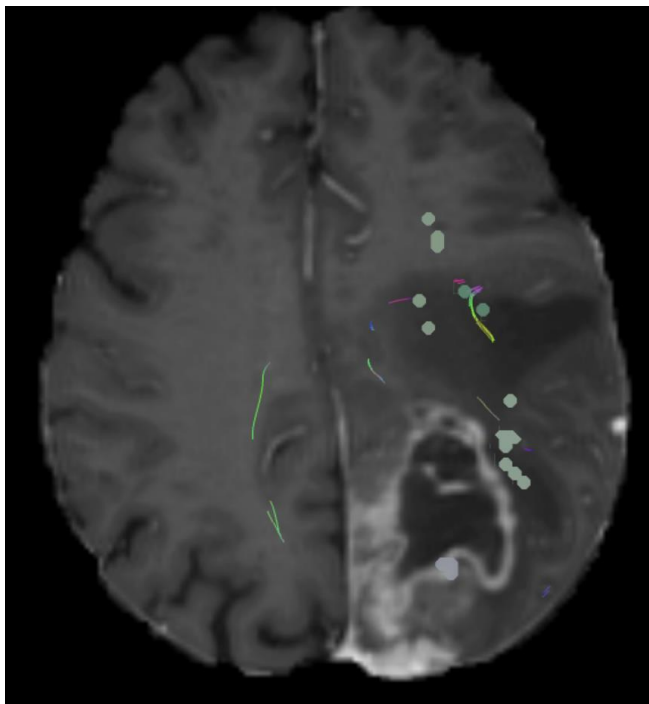
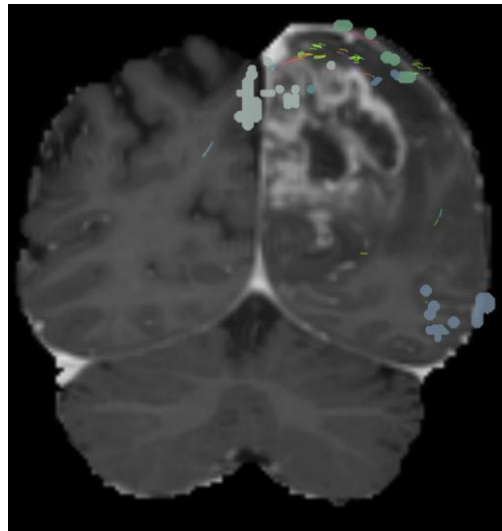
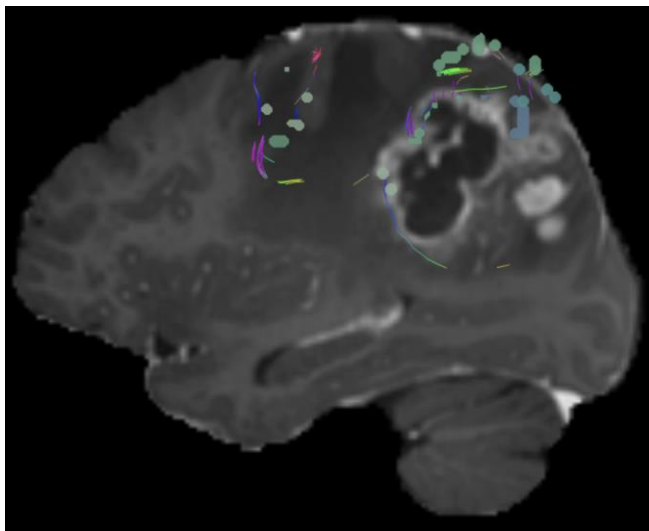


Default mode network





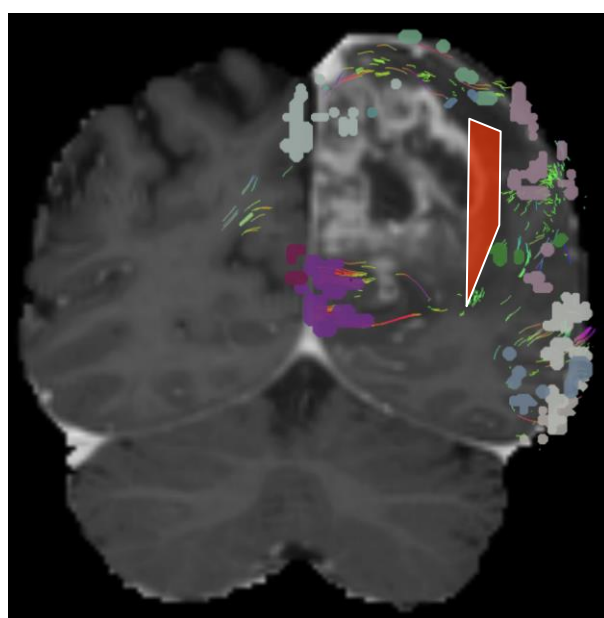
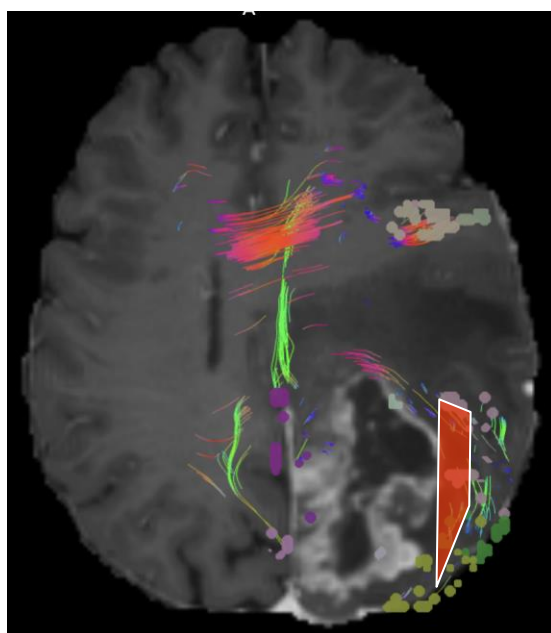
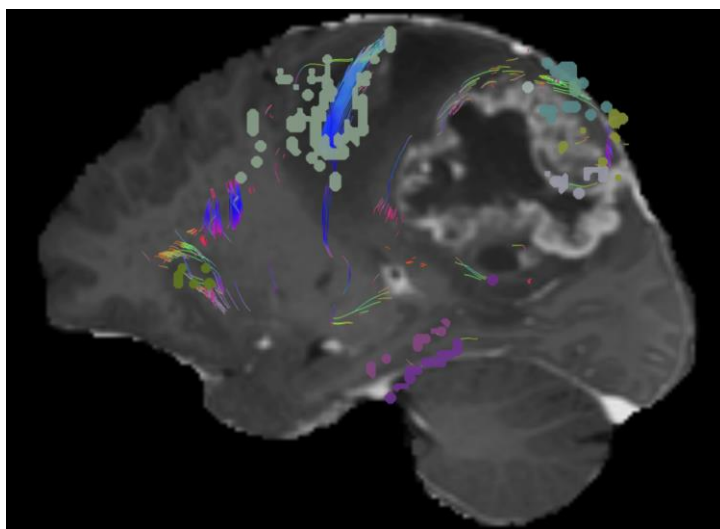
Dorsal attention network



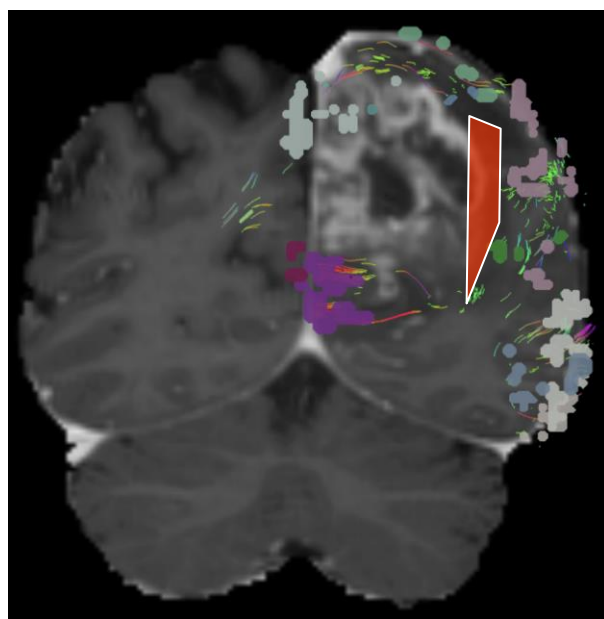
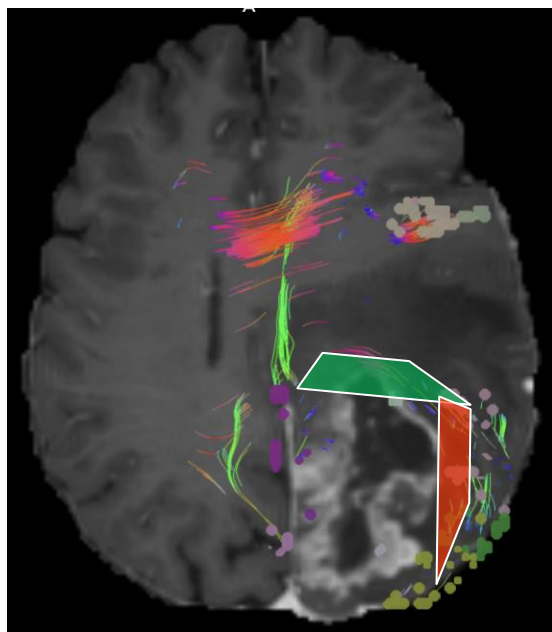
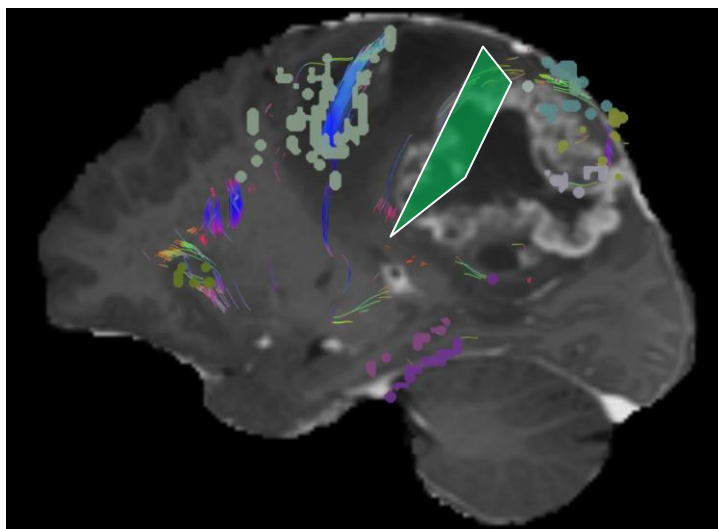


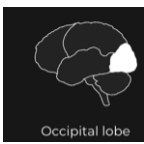
Planning the disconnection

First cut - Lateral

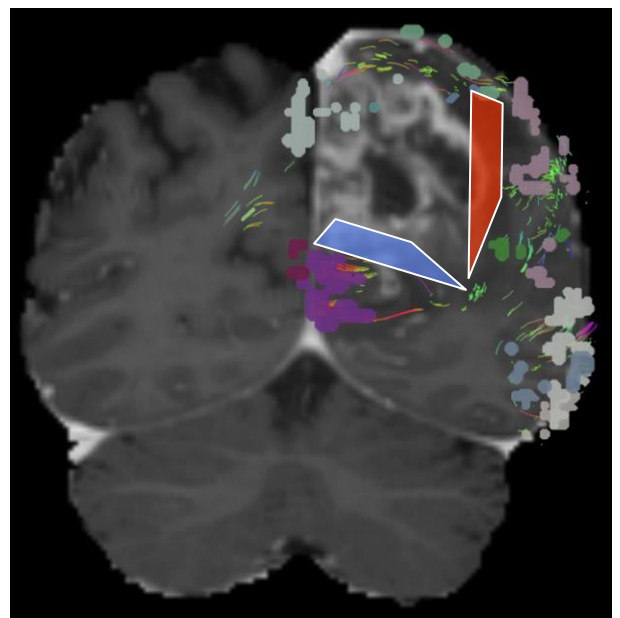
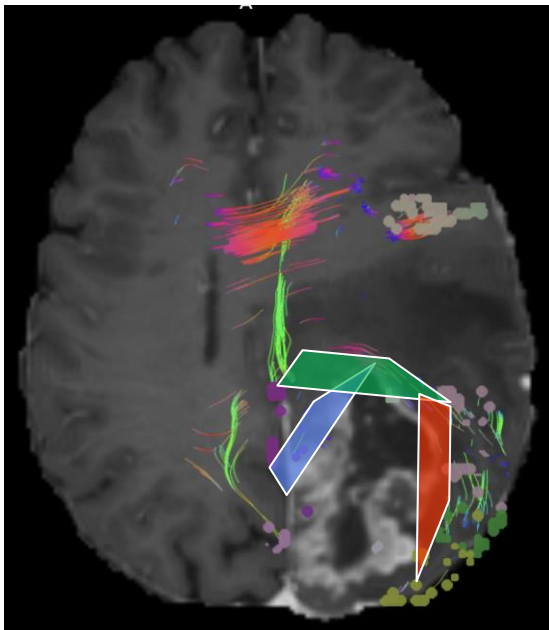
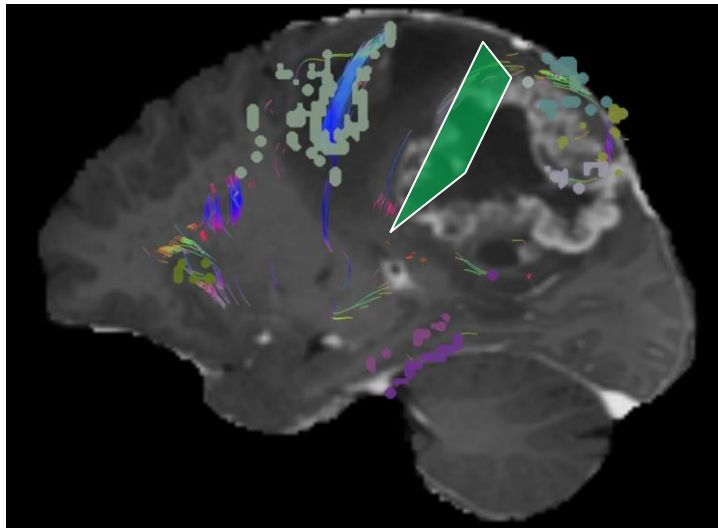


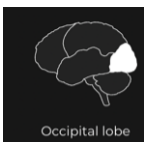
Second cut - Anterior





Third cut - Medial





Fourth cut - Inferior

