The Academy of Brain Stimulation
Education and Certification

TMS Targets

- Overview -

Disclaimer

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TMS Targets

Many of the brain regions discussed as potential **targets for TMS are ideally defined anatomically or functionally** in terms of individual structural or functional brain scans.

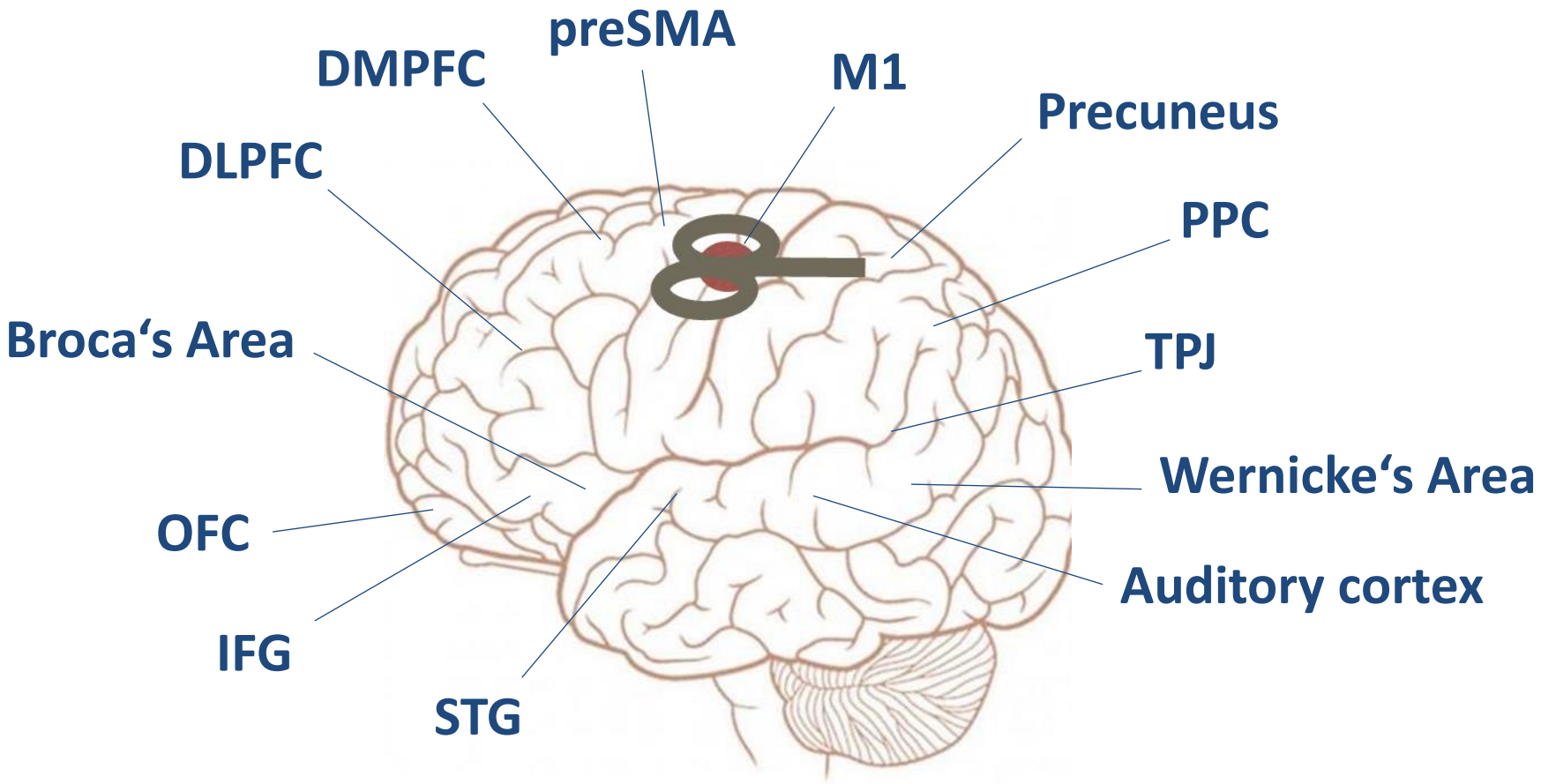
Such fMRI guided TMS neuronavigation is the most accurate method of targeting a given brain region in a given patient with high accuracy and reliability.

However, the exact added value for clinical outcomes remains debated.

In our target overviews we discuss simpler and more cost-effective alternatives for targeting certain brain regions, guiding the coil positioning using scalp based landmark approaches.

Please note that such one size fits all approaches inherently suffer from inter individual variability in the correspondence between the proposed scalp landmark and the assumed underlying brain structures.

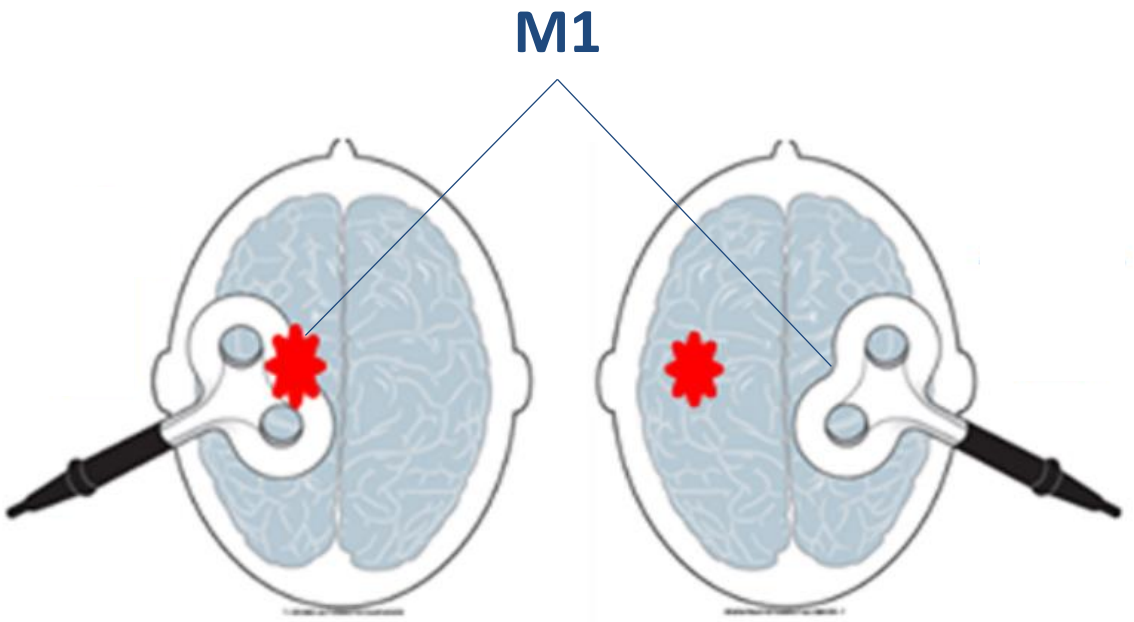
TMS Targets


preSMA
DMPFC
M1
Precuneus
DLPFC
PPC
Broca‘s Area
TPJ
Wernicke‘s Area
OFC
Auditory cortex
IFG
STG

Primary motor cortex (M1)

Coil position/orientation/type:

- **Motor hot spot** (hand area) determination with cortical mapping procedure
- **Coil handle points in the lateral-posterior direction at 45 degrees** relative to the midline
- Standard **figure-eight coil**



Treatment examples:

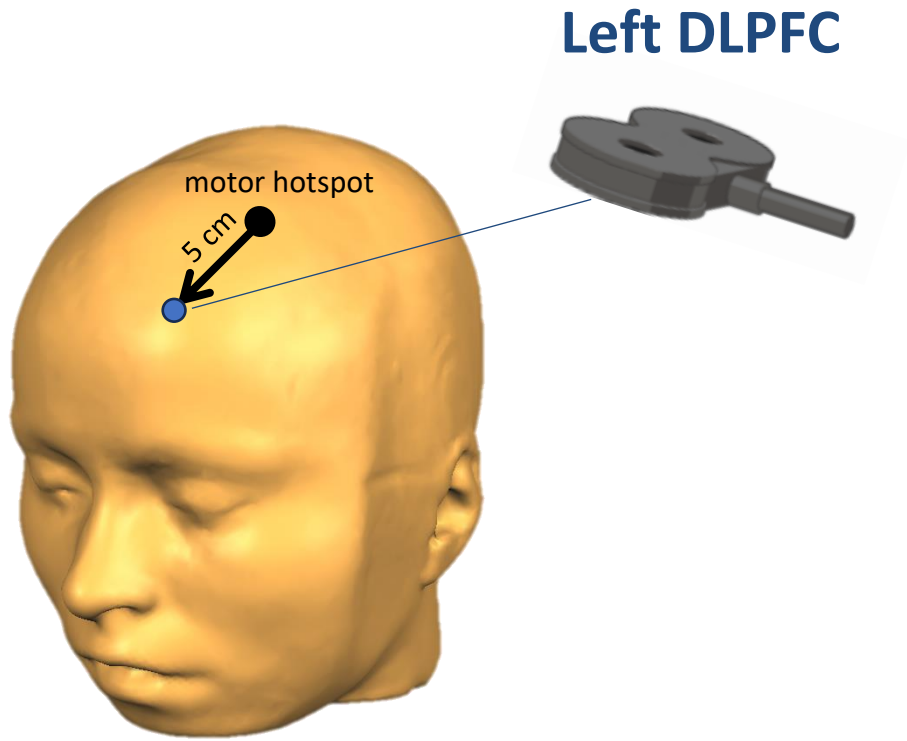
Left & right M1
Motor stroke (hand recovery)
Neuropathic pain
Fibromyalgia
Parkinson‘s disease (leg area)

Dorsolateral prefrontal cortex (DLPFC)

5/6/7cm-rule

Coil position/orientation/type:

- **5/6/7cm anterior to motor hotspot**
  - Parallel to midline
- **Coil handle points in the lateral-posterior direction at 45 degrees** relative to the midline
- Standard **figure-eight coil**



Treatment examples:

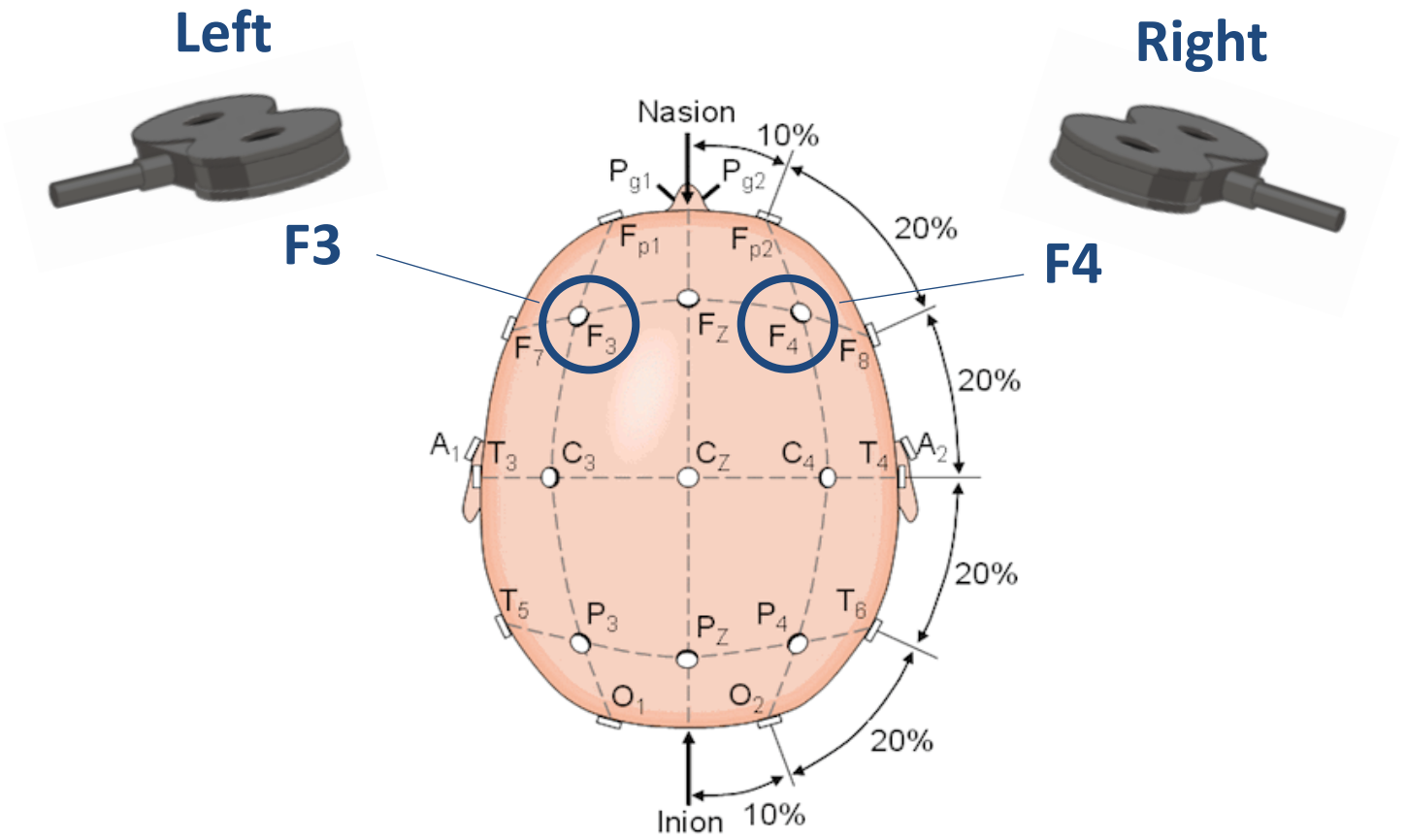
F3	F4
Depression	Depression
Schizophrenia (negative symptoms)	OCD
	PTSD

Dorsolateral prefrontal cortex (DLPFC)

F3/F4 (10/20 system)

Coil position/orientation/type:

- **F3/F4** (based on 10/20 system)
- **Coil handle points in the lateral-posterior direction at 45 degrees** relative to the midline
- same as motor cortex stimulation
- Standard **figure-eight coil**



Treatment examples:

F3	F4
Depression	Depression
Schizophrenia (negative symptoms)	OCD
	PTSD

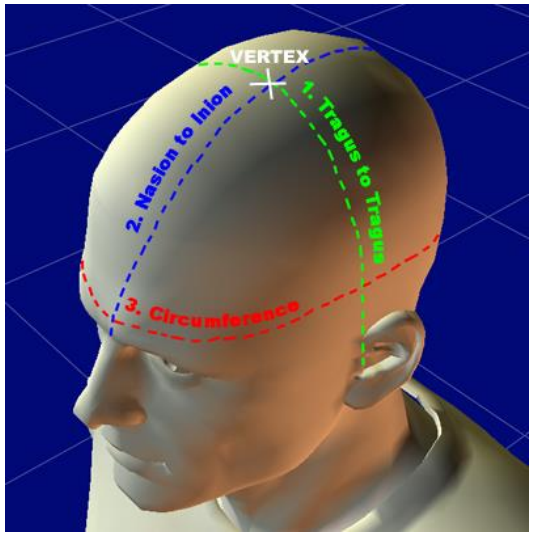
Dorsolateral prefrontal cortex (DLPFC)

Beam F3/F4

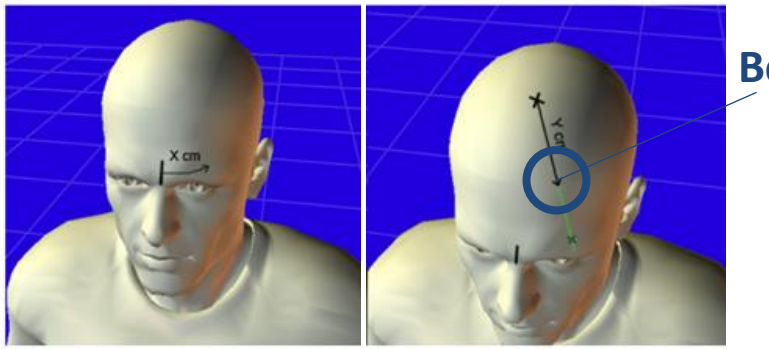
Coil position/orientation/type:

- **Beam F3/F4**
- **Coil handle points in the lateral-posterior direction at 45 degrees** relative to the midline
- same as motor cortex stimulation
- Standard **figure-eight coil**

⚠ *Beam F3/F4 is not identical to F3/F4 (10/20 system)*



(F3) Distance along circumference from midline (X):	(F3) Distance from vertex (Y):
6.45 cm	**9.46 cm** **Adjusted*: 9.81 cm**



BA9 BA8 BA43 Location System
Will Beam & Jeff Borckardt
Web Interface Developed 6/7/2010

1. Tragus to Tragus (CM):	37
2. Nasion to Inion (CM):	35
3. Circumference (CM):	56,5
	Calculate

Beam F4:
Same coordinates on right hemisphere

Treatment examples:

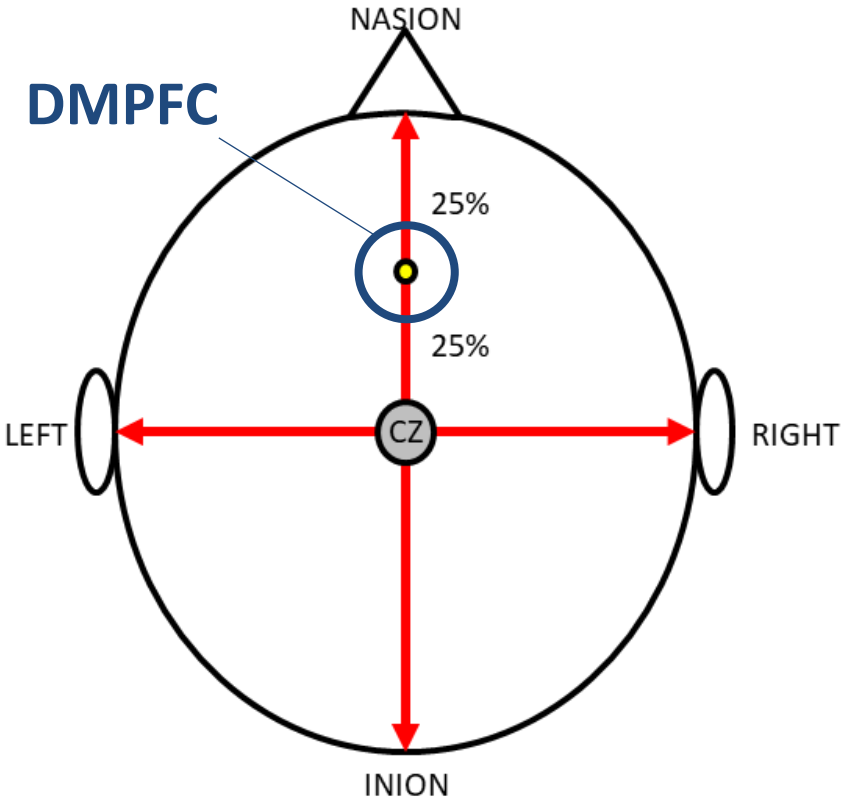
F3	F4
Depression	Depression
Schizophrenia (negative symptoms)	OCD
	PTSD
Addiction	

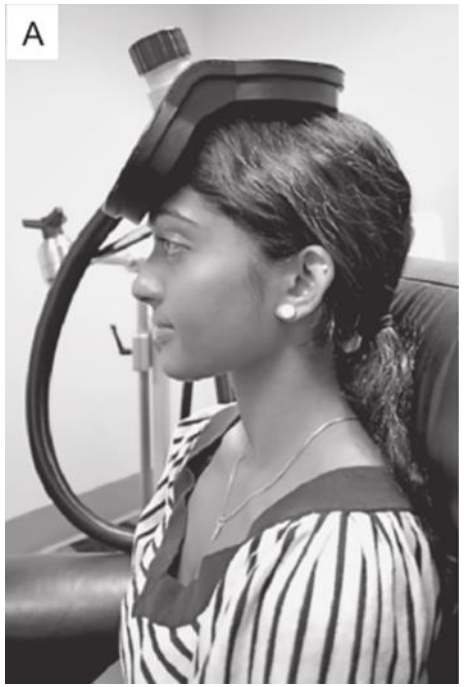
Free online interface: **http://clinicalresearcher.org/F3/**

Dorsomedial prefrontal cortex (DMPFC)

Coil position/orientation/type:

- **Move 25% of the nasion-inion distance from nasion to CZ**
- **Coil handle points backwards** along the midline = bilateral DMPFC
- **Coil handle points to the right** = preferential stimulation of left hemisphere
- **Double-cone coil**





Treatment examples:

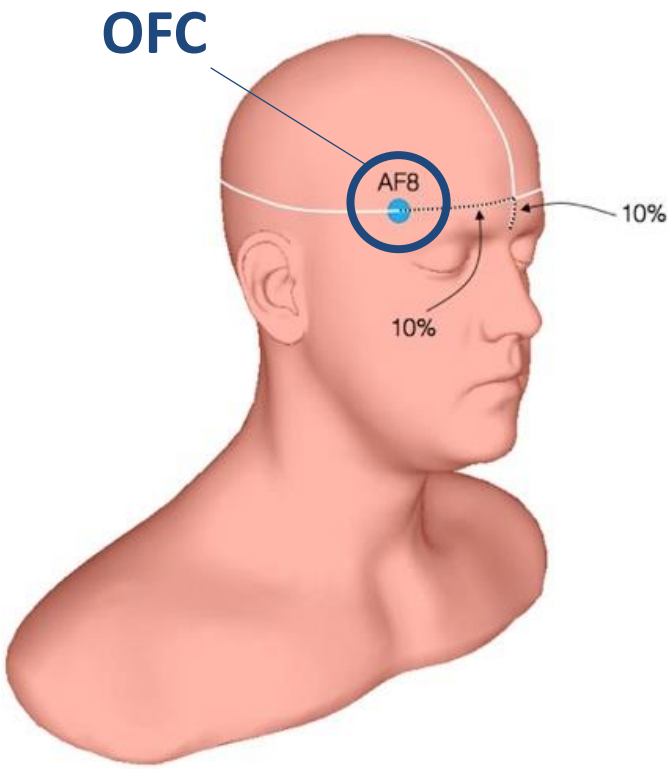
Bilateral DMPFC	Preference left
OCD	Depression

Right Orbitofrontal Cortex (OFC)

AF8 electrode postition

Coil position/orientation/type:

- **AF8**
  - **Move 10% of the nasion-inion distance from the nasion to CZ**
  - **Move 10% of the head circumference to the right hemisphere**
- **Coil handle pointing downwards**
- **Double-cone coil**



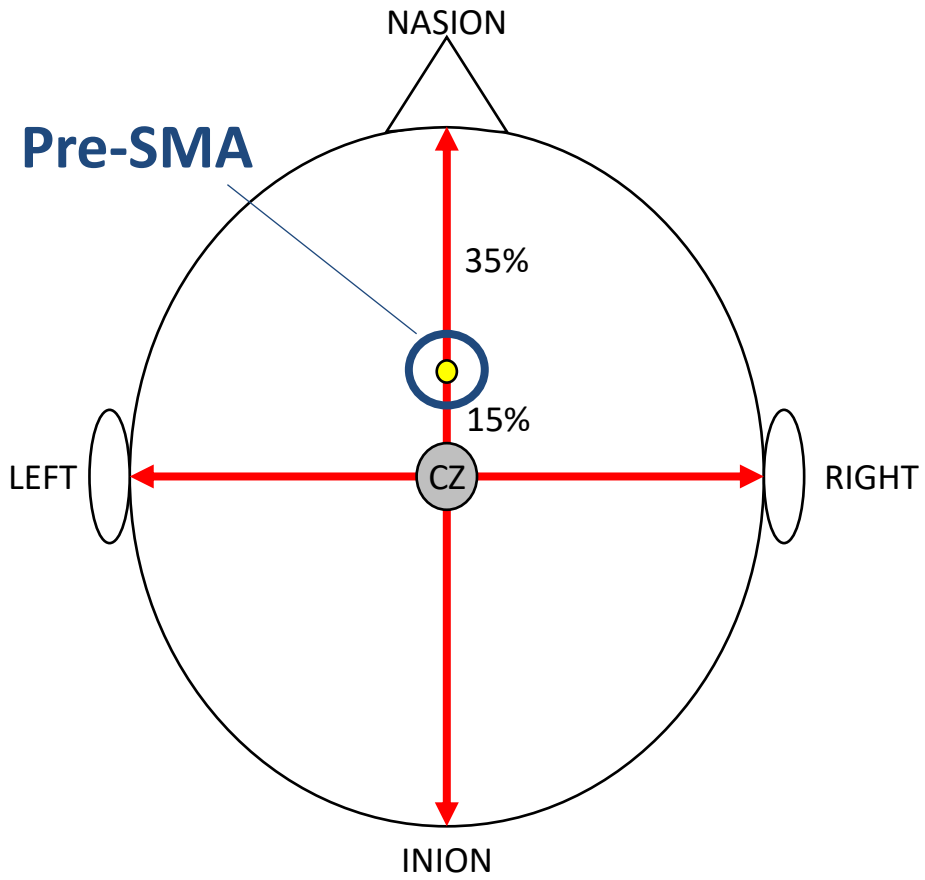
Treatment examples:

Right OFC
OCD
Depression

Pre-Supplementary Moror Area (pre-SMA)

Coil position/orientation/type:

- **Move 35% of the nasion-inion distance from the nasion to CZ**
- **Coil handle points to the back**
- Standard **figure-eight coil**



Treatment examples:

Bilateral pre-SMA

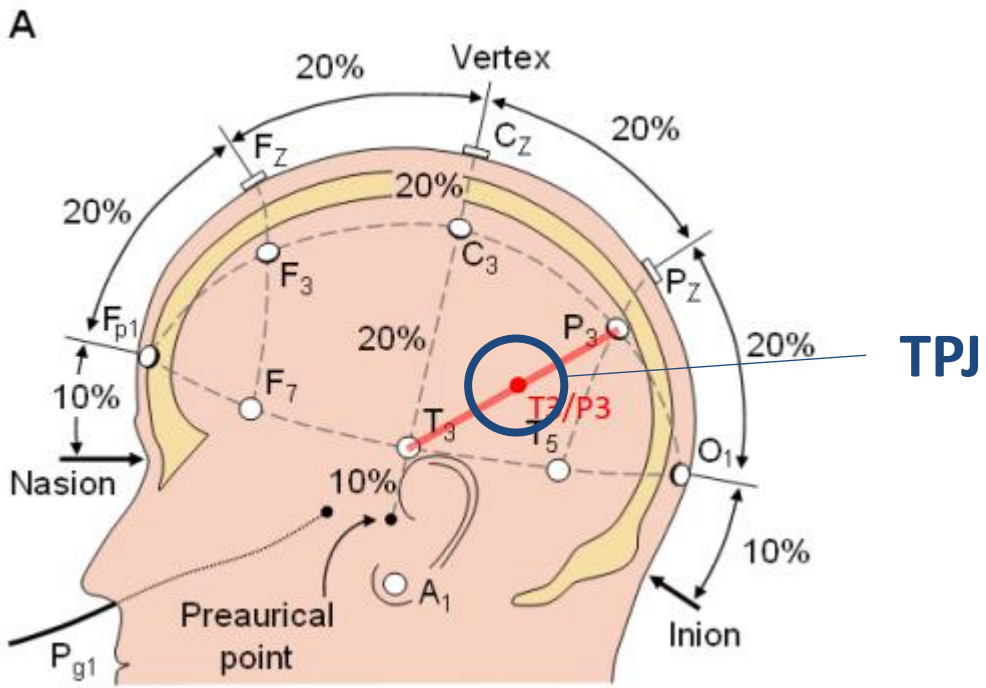
OCD

Temporoparietal junction (TPJ)

T3/P3 or T4/P4 (10/20 system)

Coil position/orientation/type:

- **Midpoint between T3/P3** or **T4/P4** (10/20 system)
- No consensus on preferred coil orientation → **coil handle pointing upwards** seems best
- Standard **figure-eight coil**



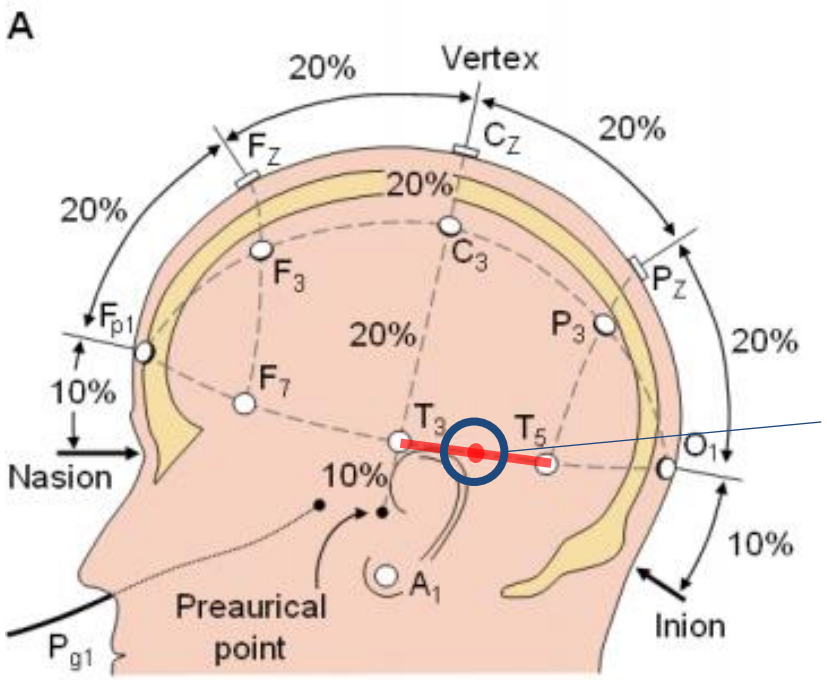
Treatment examples:

TPJ
Tinnitus
Schizophrenia (positive symptoms)

Auditory cortex
T3-T5 / T4-T6 (10/20 system)

Coil position/orientation/type:

- **Midpoint between T3-T5 or T4-T6** (10/20 system)
- Accurate coil positioning may require MRI data
- **Coil handle points to the back**
- Standard **figure-eight coil**



Left auditory cortex

Left auditory cortex

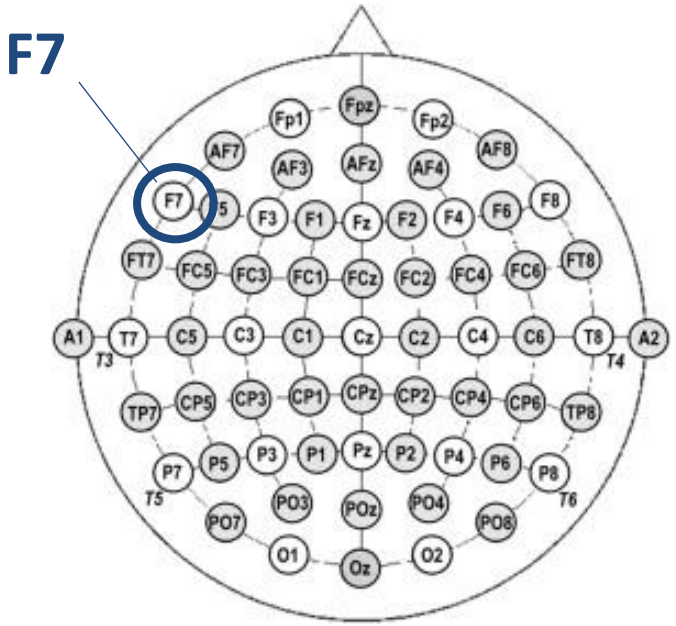
Tinnitus

Broca‘s Area

F7 electrode position

Coil position/orientation/type:

- **F7**
- Accurate coil positioning may require the induction of speech arrest or MRI data (BA44/45)
- **Coil handle points to the back**
- Standard **figure-eight coil**



Treatment examples:

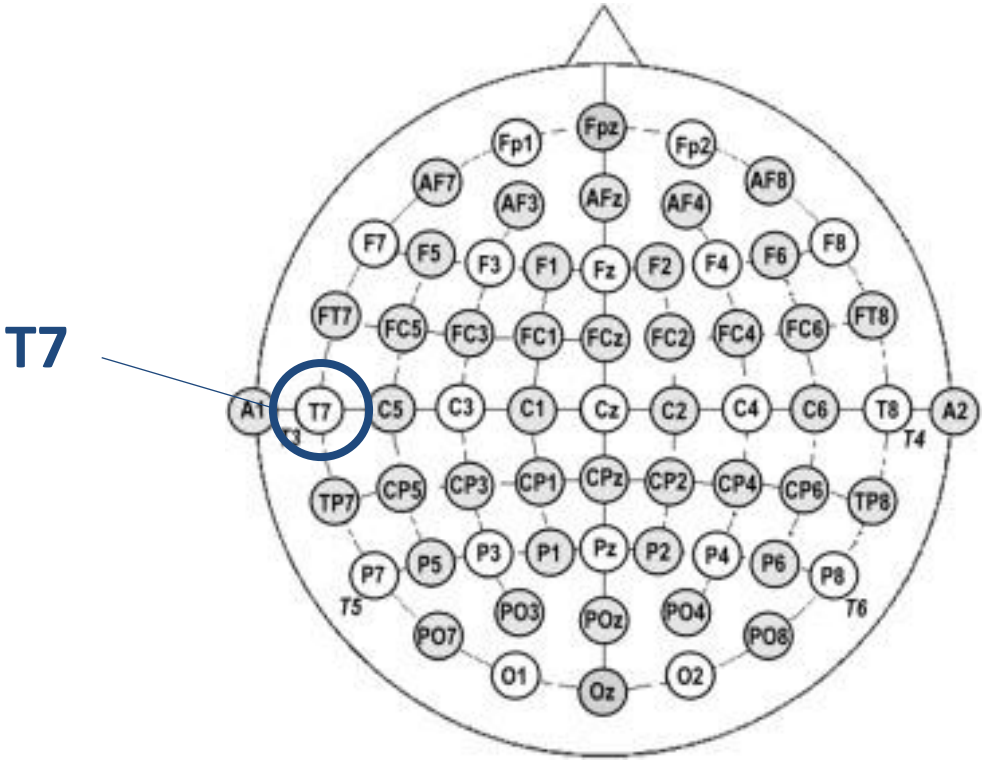
Broca‘s Area
Alzheimer‘s disease

Wernicke‘s Area

T7 electrode position

Coil position/orientation/type:

- **T7**
- Accurate coil positioning may require MRI data
- **Coil handle points to the back**
- Standard **figure-eight coil**



Treatment examples:

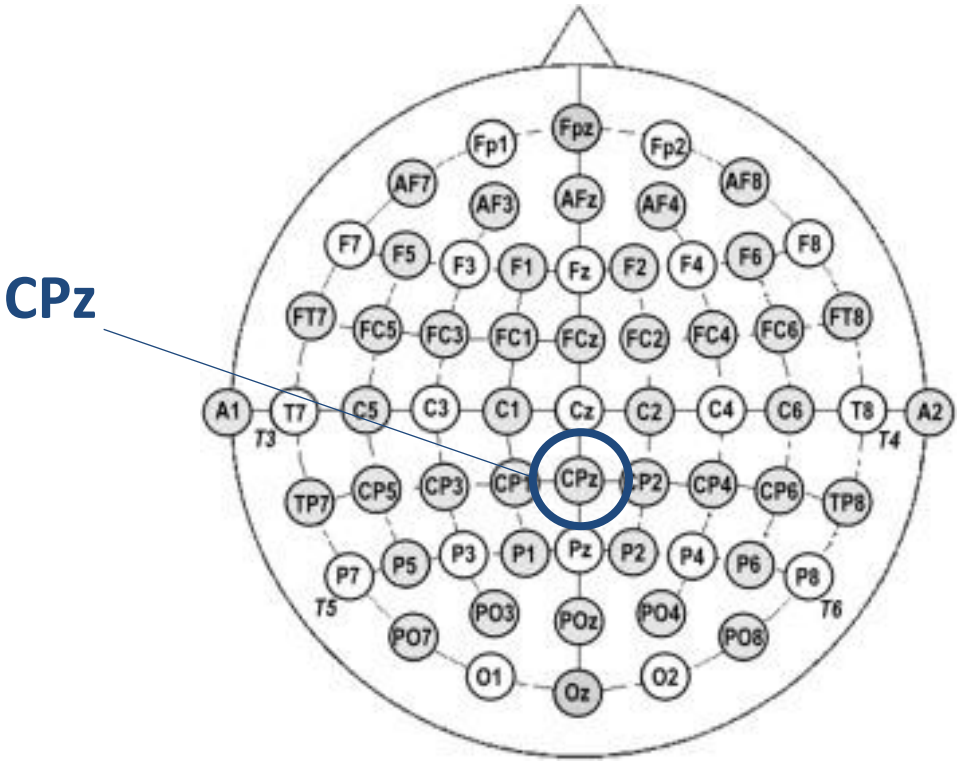
Wernicke‘s Area
Alzheimer‘s disease

Precuneus

CPz electrode position

Coil position/orientation/type:

- CPz
- Accurate coil positioning may require MRI data
- **Coil handle points to the back**
- Standard **figure-eight coil**



Treatment examples:

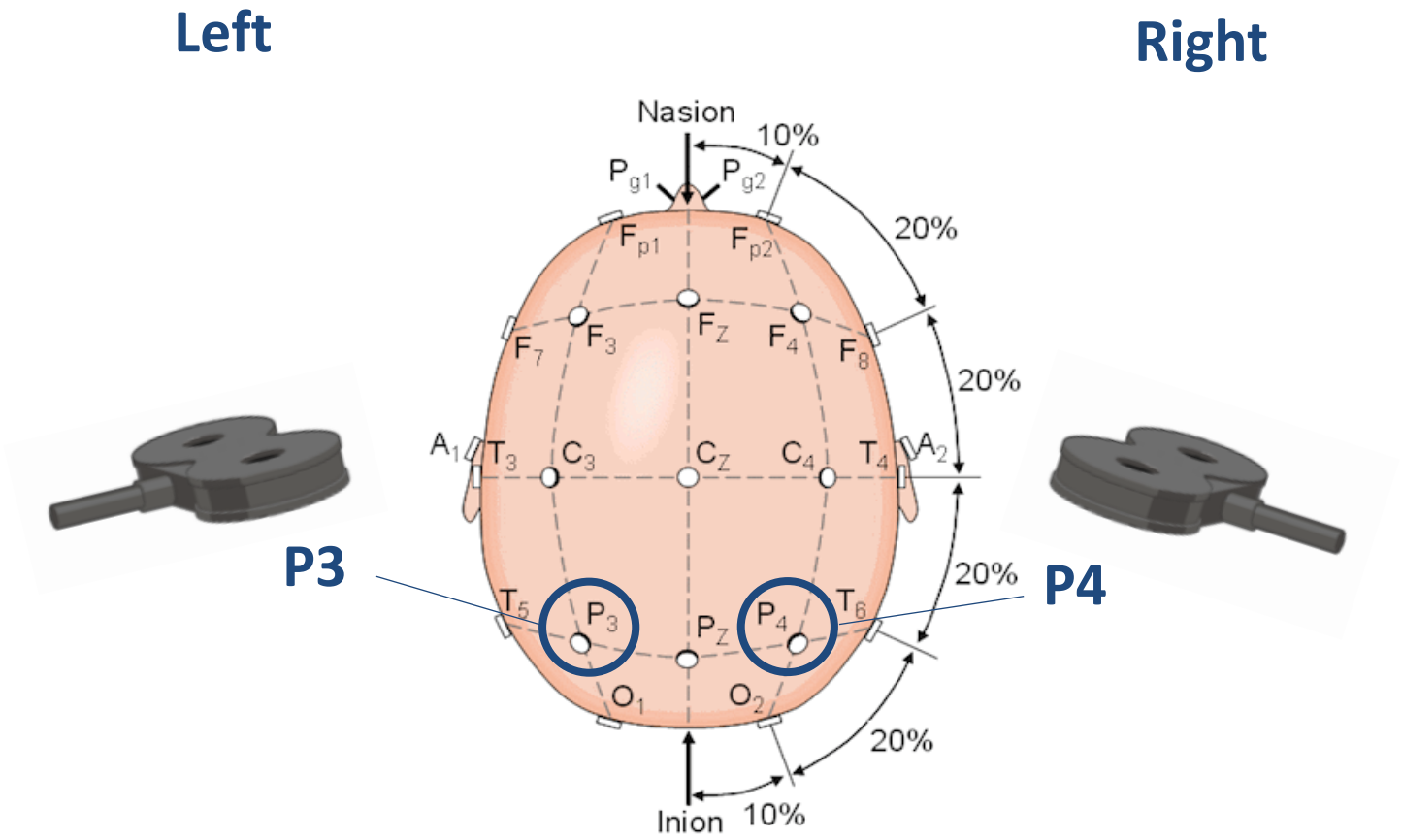
Precuneus
Alzheimer‘s disease

Posterior Parietal Cortex (PPC)

Contralesional P3/P4

Coil position/orientation/type:

- **Contralesional P3/P4** (10/20 system)
- **Coil handle points in the lateral-posterior direction at 45 degrees** relative to the midline
- Standard **figure-eight coil**



Treatment examples:

PPC
Hemispatial neglect

Inferior frontal gyrus (IFG)

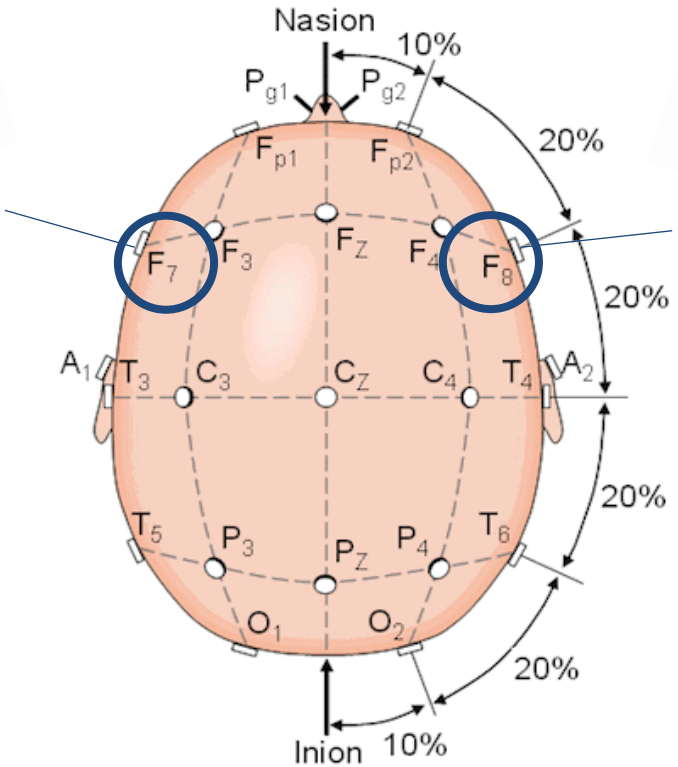
F7/F8 (10/20 system)

Coil position/orientation/type:

- F7/F8 (10/20 system)
- Accurate coil positioning may require MRI data (BA45)
- **Coil handle points to the back**
- Standard **figure-eight coil**

Left

F7



F8

Right

Treatment examples:

(right) IFG

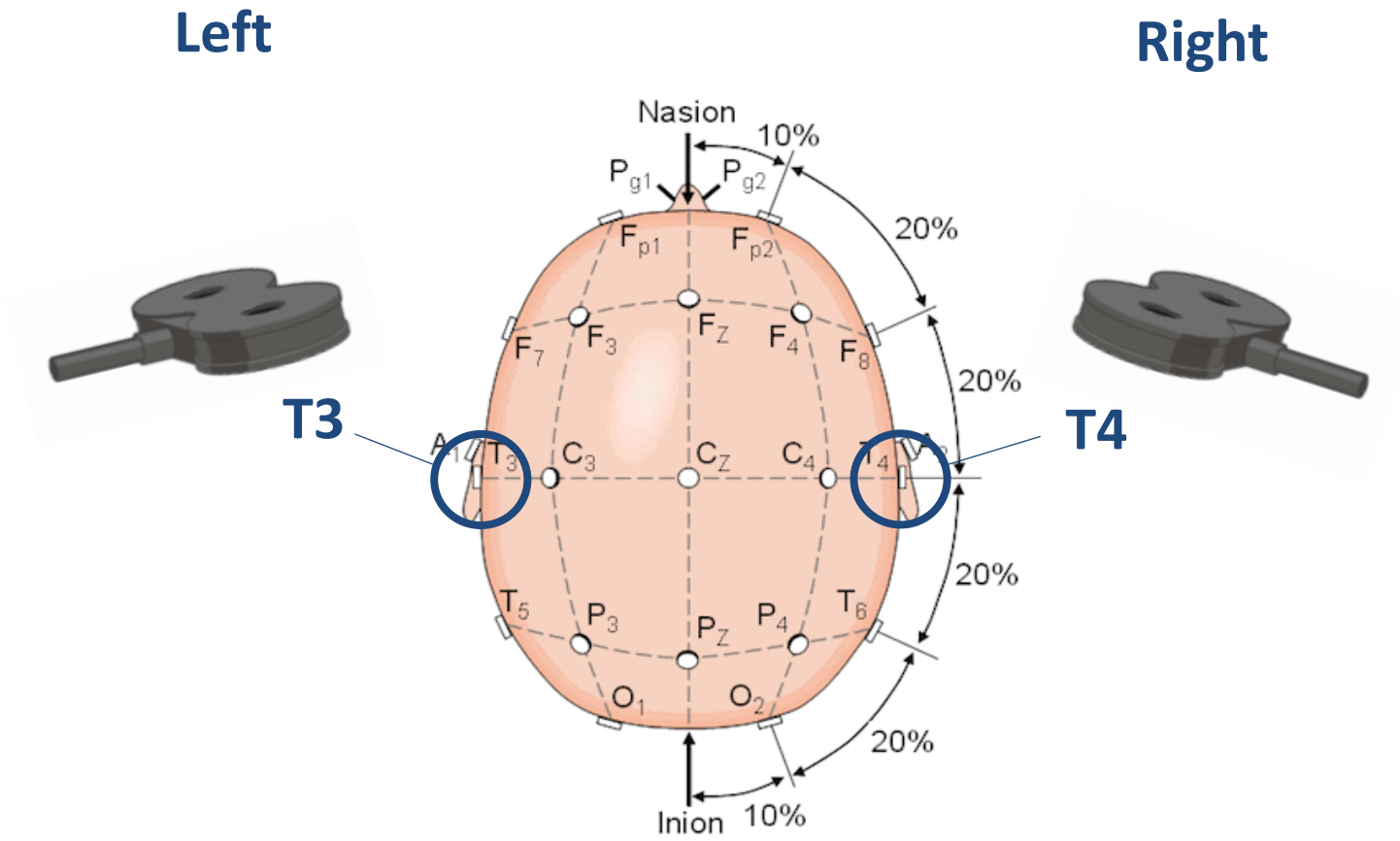
Post-stroke aphasia

Superior temporal gyrus (STG)

T3/T4 (10/20 system)

Coil position/orientation/type:

- T3/T4 (10/20 system)
- Accurate coil positioning may require MRI data
- **Coil handle points to the back**
- Standard **figure-eight coil**



Treatment examples:

STG
Schizophrenia (auditory-verbal hallucinations)

Inferior parietal lobule (IPL)

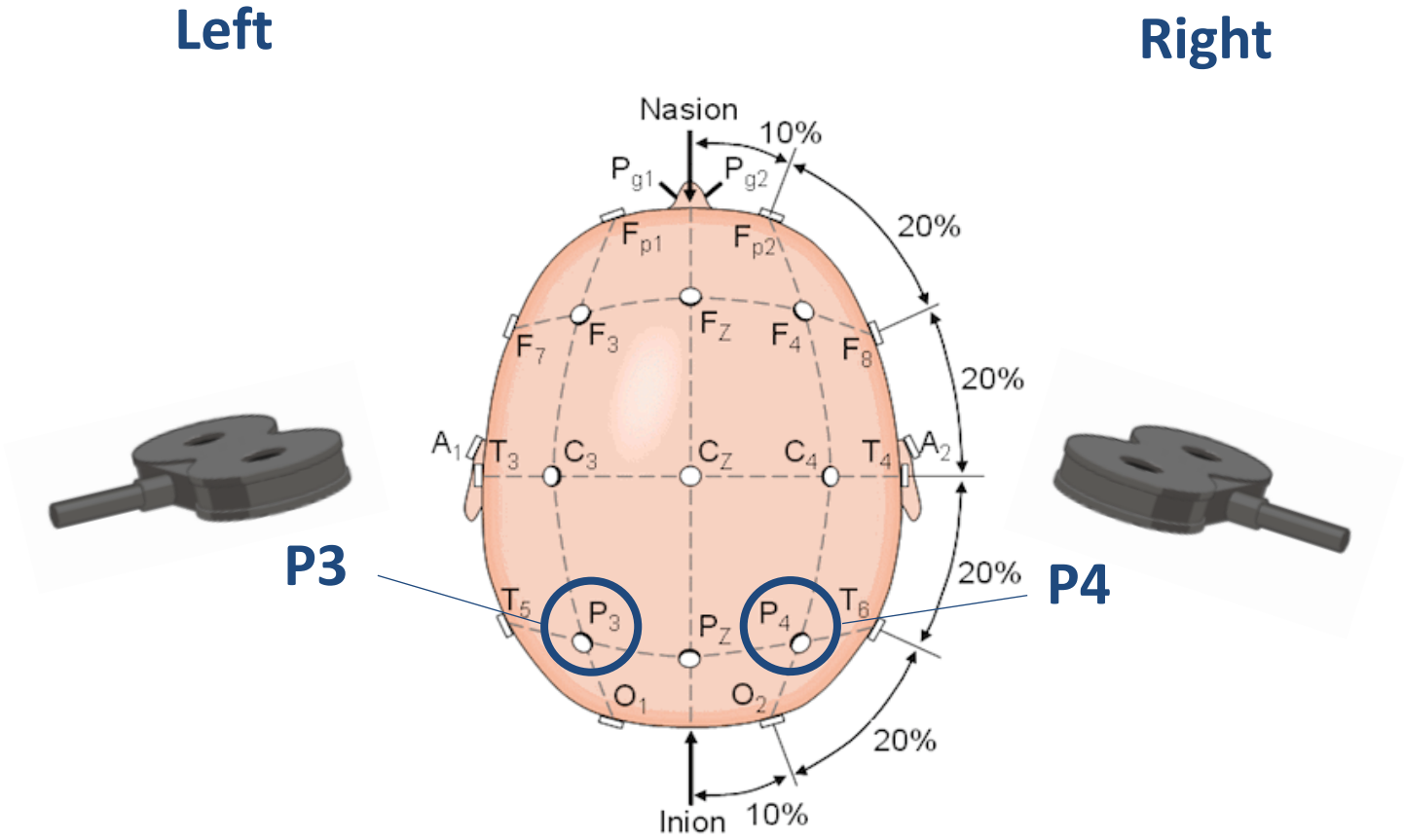
P3/P4 (10/20 system)

Coil position/orientation/type:

- P3/P4 (10/20 system)
- Accurate coil positioning may require MRI data
- **Coil handle points in the lateral-posterior direction at 45 degrees** relative to the midline
- Standard **figure-eight coil**

Treatment examples:

STG
Alzheimer‘s disease



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