NIRSIT LITE

NIRSIT LITE KIDS

NIRSIT LITE

Device & Channel Information

OBELAB

NIRSIT LITE

Brain Imaging System

NIRSIT LITE for Research

OBELAB introduces a new functional Near-Infrared Spectroscopy (fNIRS) system called NIRSIT LITE!
NIRSIT LITE has two different versions: one is NIRSIT LITE Adult and the other is NIRSIT LITE KIDS.
It also comes with software that allows monitoring of the distribution of brain oxygen saturation by channel.
These systems are specially designed to monitor hemodynamic responses in the prefrontal cortex region.

Key Features

- Ultra lightweight and wearable
- Safe optical measurement with no radiation
- Seamless wireless connection via BLE(Bluetooth Low Energy) connector
- Ergonomically designed to fit different head sizes comfortably
- Made of safe medical-grade silicon with no skin irritation
- Real-time monitoring of Oxy and Deoxy hemoglobin concentration changes
- 15 standard channels and 2 short separation channels
- Synchronization with Task Presentation software such as E-Prime, PsychoPy, and Psychtoolbox
- Supports SNIRF, CSV formats for instant data export
- The easy-to-use proprietary analysis tool (also supports data export for open-source tools like Homer and NIRS-SPM)
- Simultaneous tracking of head motion using a 9-axis motion sensor

Application Areas

Brain Health

Neuro-Marketing

Brain Development

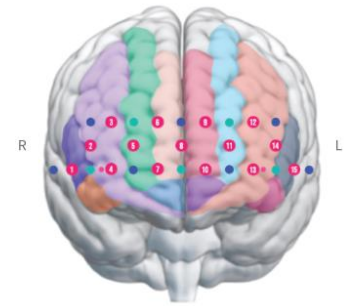
Neurofeedback

NIRSIT LITE

Brain Imaging System

Technical Specifications

Optode distance	for Adult: Regular 3cm / for Kids: 2.5cm
Number of channels	15 channels (regular) 4 channels (0.8cm, for Adult: 1.9cm / for Kids: 1.6cm)
Number of Optical Elements	Source : 5 Detector : 7 (regular) 4 (multi-distance)
Wavelength	780nm, 850nm
Weight	for Adult: 202g / for Kids: 193g
Sampling rate	8.138 Hz (about 8 samples/sec)
Motion sensor	9-axis
Operating time	5 hours (1000mAh rechargeable battery)
Wireless comm	BLE (Bluetooth Low Energy 5.0, 2.4GHz)
Recommended PC spec.	≥ Window 10, ≥ RAM 8GB, SSD
Warranty	1 Year



Accessories

NIRSIT LITE	Strap BLE Dongle USB cable Charger USB memory (Manual, SW installer)

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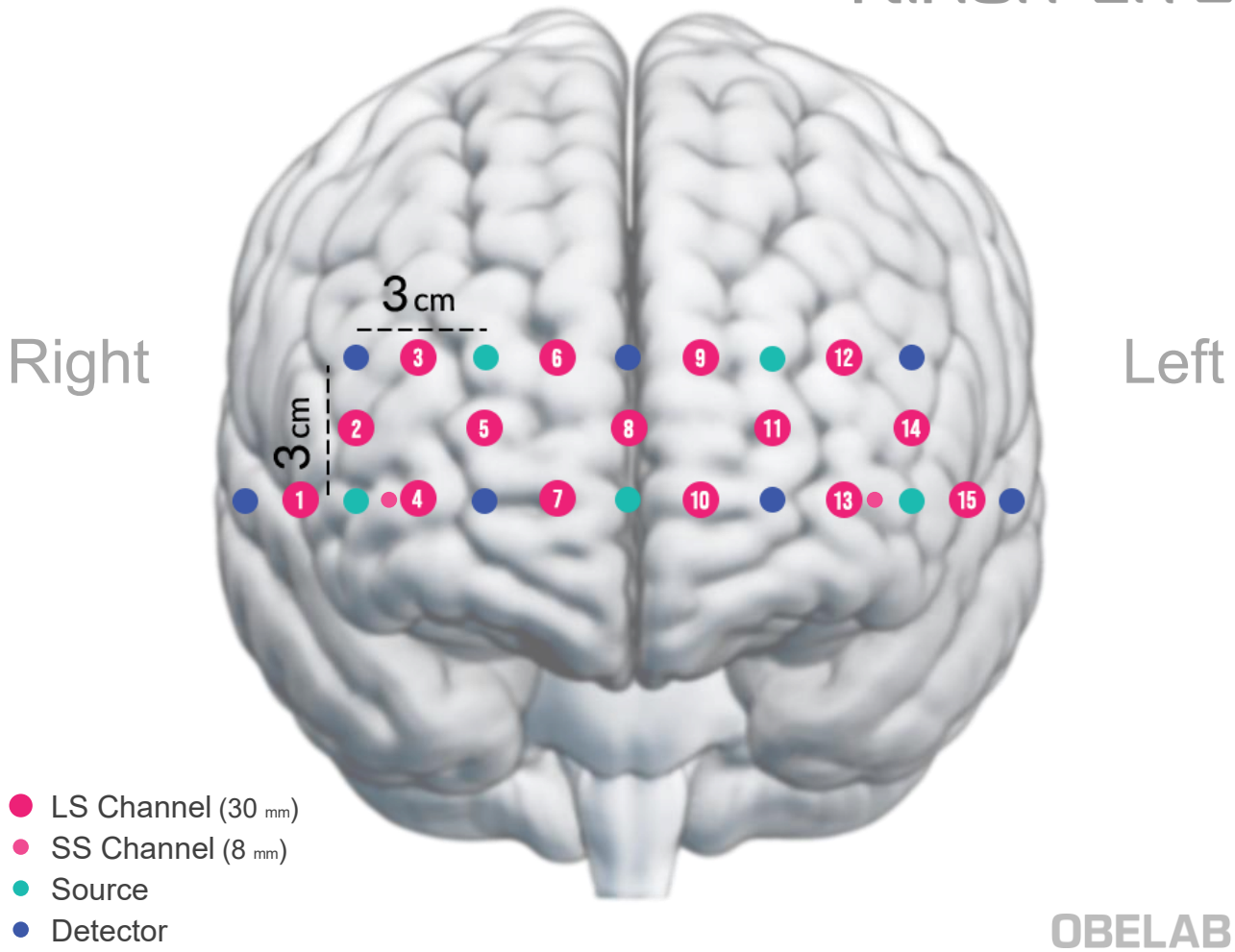
Contents of this brochure are subject to change without notice, regarding the updates on channel topology estimation or specifications of the device.

For information on the device, please contact the OBELAB Customer Support Center.

Source-Detector & Channel Information

NIRSIT LITE



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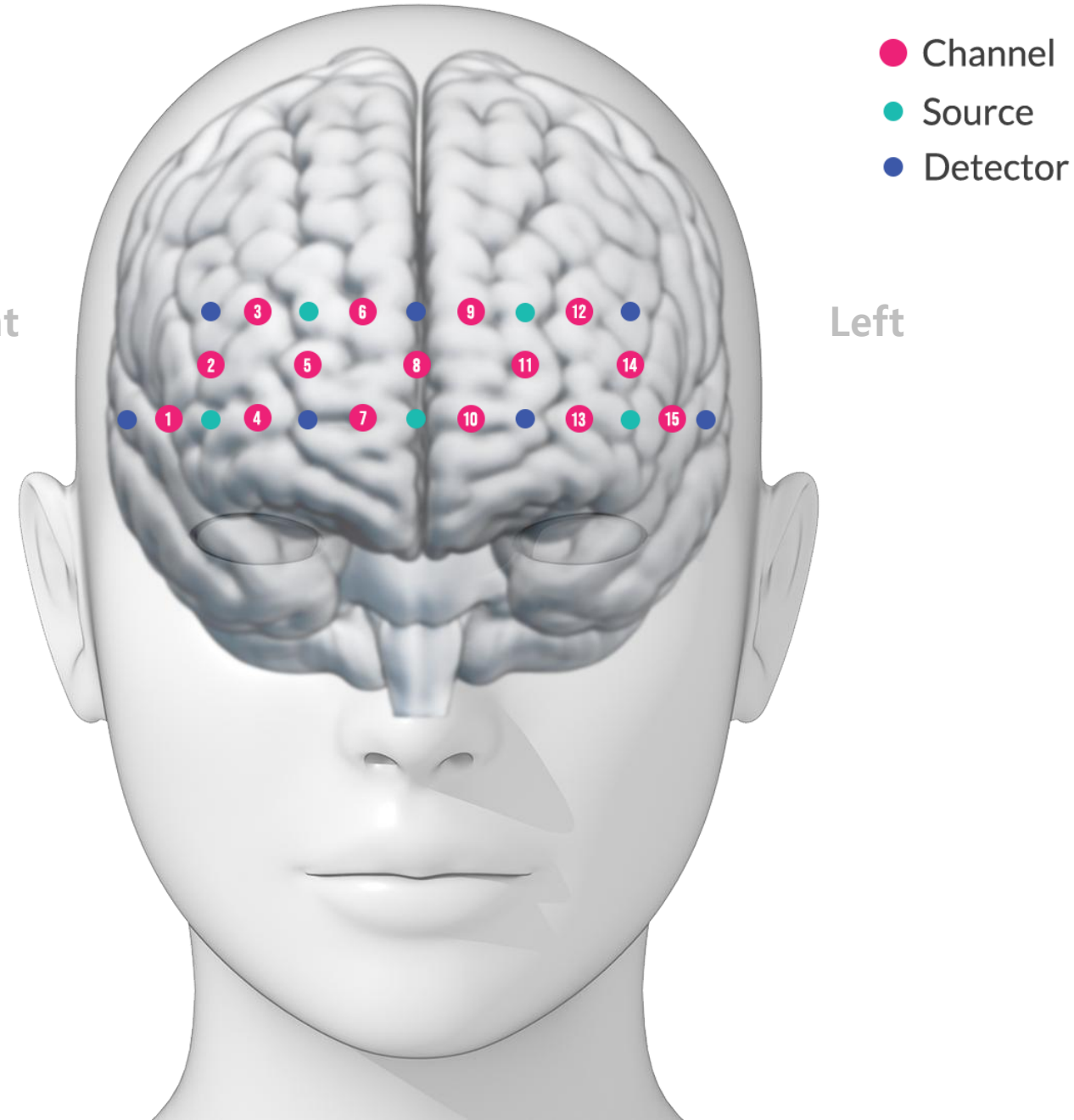
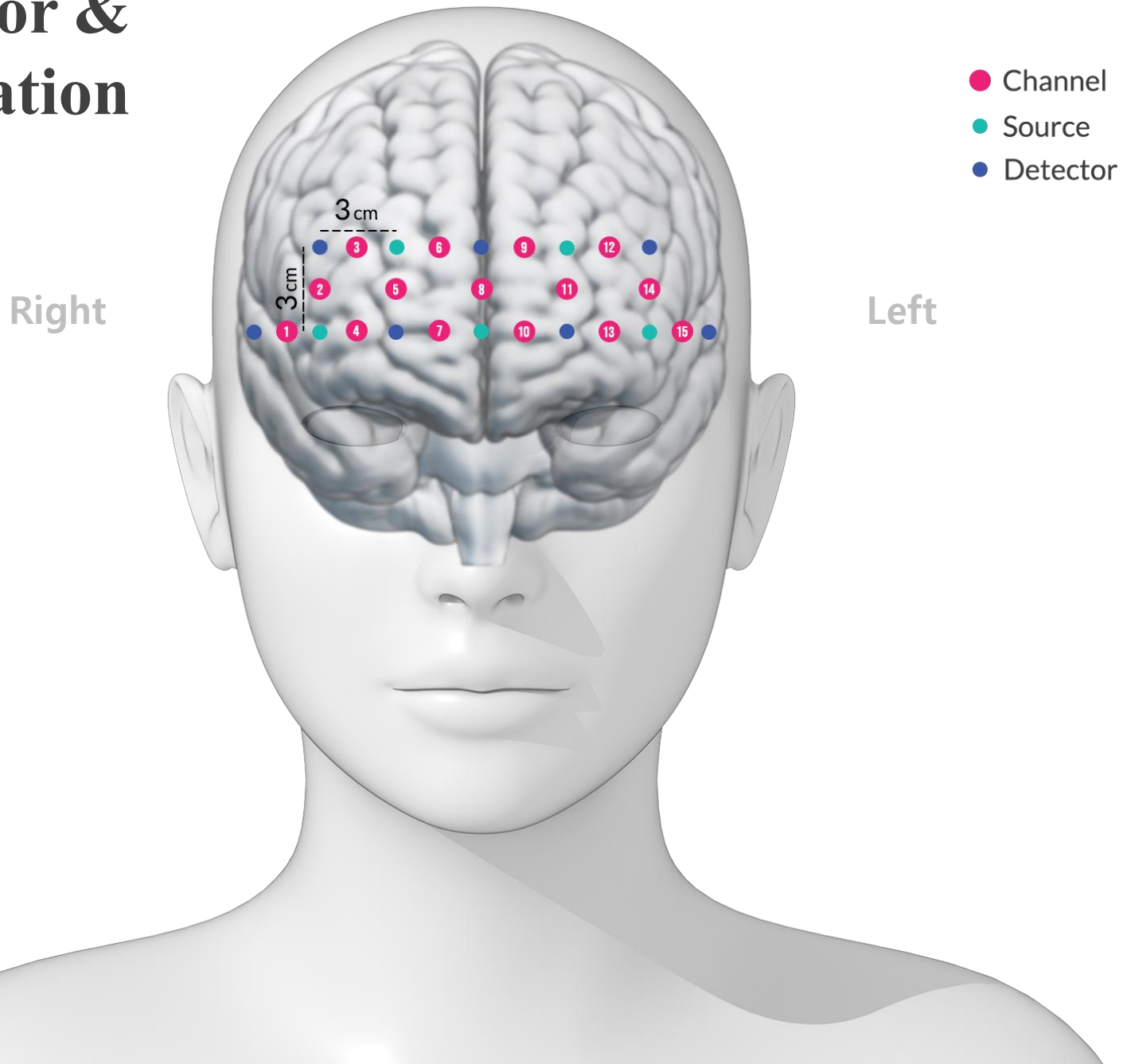
Source-Detector & Channel Information



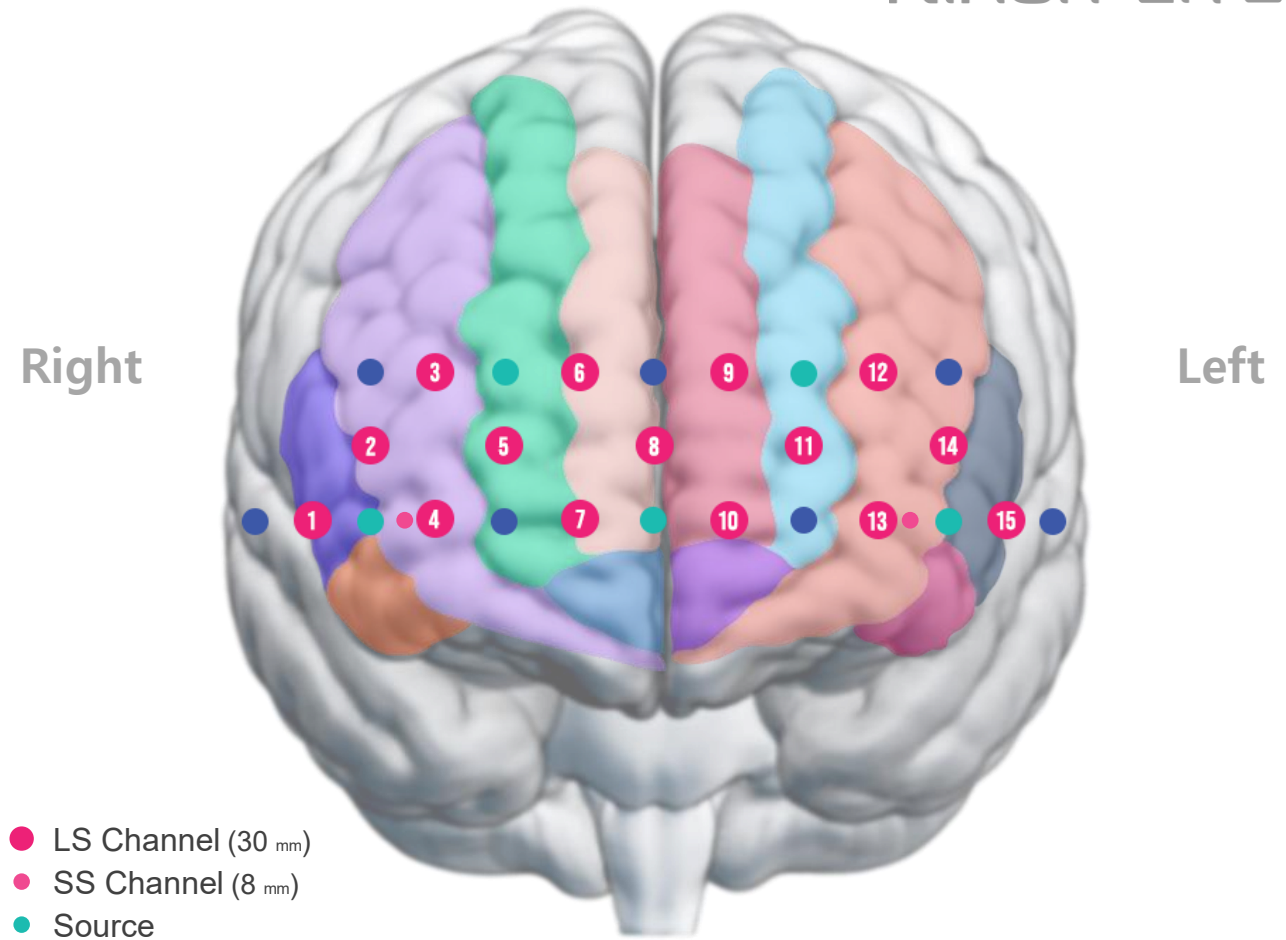
Source-Detector & Channel Information



AAL Label

on 3D Brian Templates

NIRSIT LITE



OBELAB

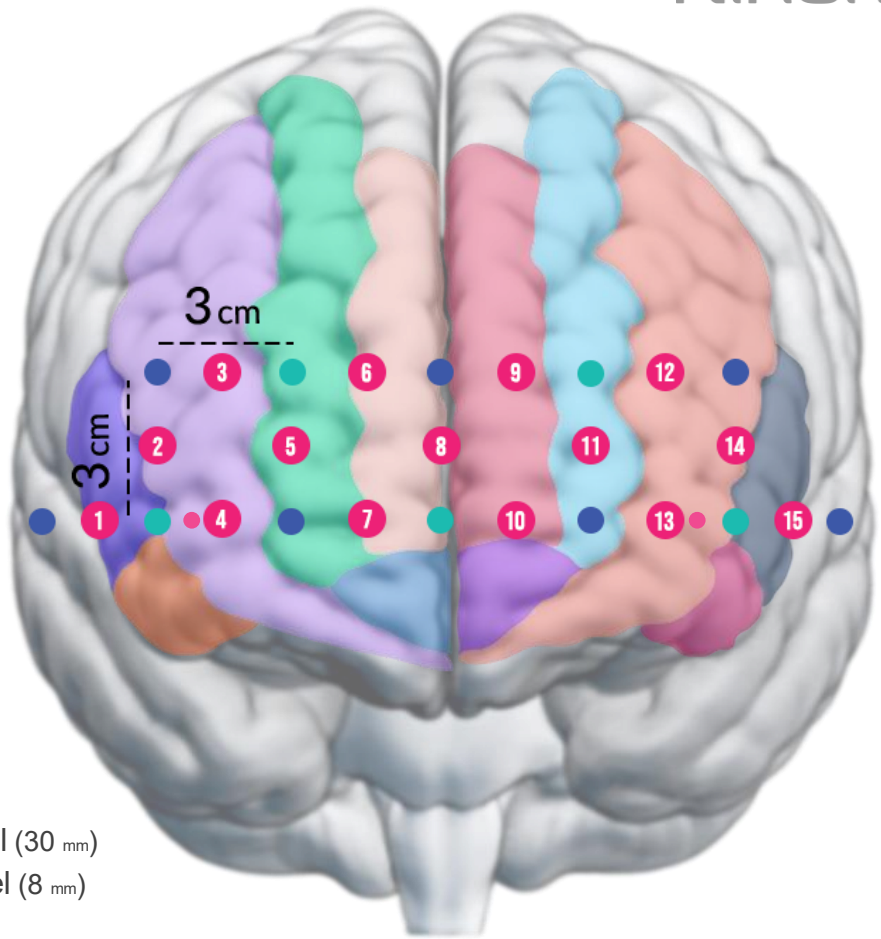
AAL index	Label	Location
3	Superior Frontal Gyrus, Dorsolateral	Left
4	Superior Frontal Gyrus, Dorsolateral	Right
5	Middle Frontal Gyrus	Left
6	Middle Frontal Gyrus	Right
9	Inferior Frontal Gyrus, Triangular Part	Left
10	Inferior Frontal Gyrus, Triangular Part	Right
11	Inferior Frontal Gyrus, Pars Orbitalis	Left
12	Inferior Frontal Gyrus, Pars Orbitalis	Right
19	Superior Frontal Gyrus, Medial	Left
20	Superior Frontal Gyrus, Medial	Right
21	Superior Frontal Gyrus, Medial Orbital	Left
22	Superior Frontal Gyrus, Medial Orbital	Right

OBELAB

AAL Label

on 3D Brian Templates

NIRSIT LITE



- LS Channel (30 mm)
- SS Channel (8 mm)
- Source
- Detector

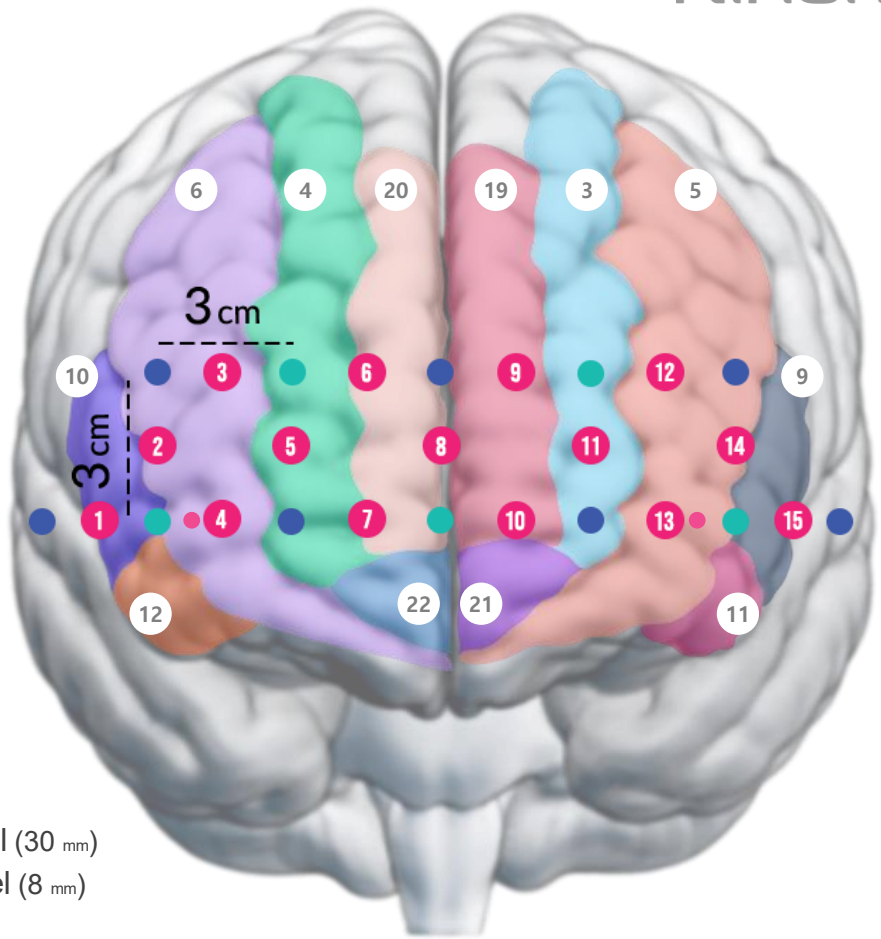
OBELAB

AAL index	Label	Location
3	Superior Frontal Gyrus, Dorsolateral	Left
4	Superior Frontal Gyrus, Dorsolateral	Right
5	Middle Frontal Gyrus	Left
6	Middle Frontal Gyrus	Right
9	Inferior Frontal Gyrus, Triangular Part	Left
10	Inferior Frontal Gyrus, Triangular Part	Right
11	Inferior Frontal Gyrus, Pars Orbitalis	Left
12	Inferior Frontal Gyrus, Pars Orbitalis	Right
19	Superior Frontal Gyrus, Medial	Left
20	Superior Frontal Gyrus, Medial	Right
21	Superior Frontal Gyrus, Medial Orbital	Left
22	Superior Frontal Gyrus, Medial Orbital	Right

AAL Label

on 3D Brian Templates

NIRSIT LITE



OBELAB

AAL index	Label	Location
3	Superior Frontal Gyrus, Dorsolateral	Left
4	Superior Frontal Gyrus, Dorsolateral	Right
5	Middle Frontal Gyrus	Left
6	Middle Frontal Gyrus	Right
9	Inferior Frontal Gyrus, Triangular Part	Left
10	Inferior Frontal Gyrus, Triangular Part	Right
11	Inferior Frontal Gyrus, Pars Orbitalis	Left
12	Inferior Frontal Gyrus, Pars Orbitalis	Right
19	Superior Frontal Gyrus, Medial	Left
20	Superior Frontal Gyrus, Medial	Right
21	Superior Frontal Gyrus, Medial Orbital	Left
22	Superior Frontal Gyrus, Medial Orbital	Right

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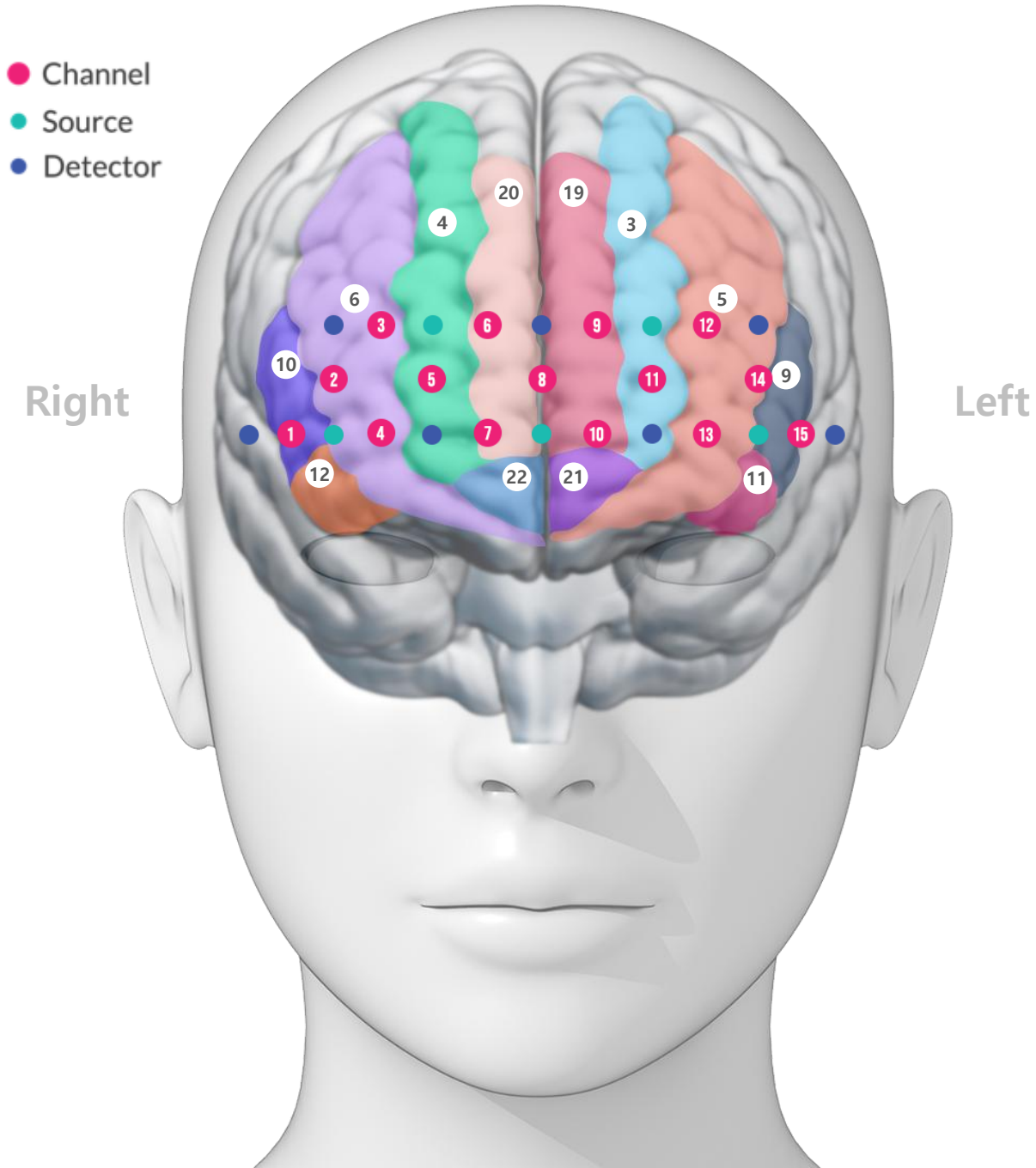
AAL Label

on 3D Brian Templates

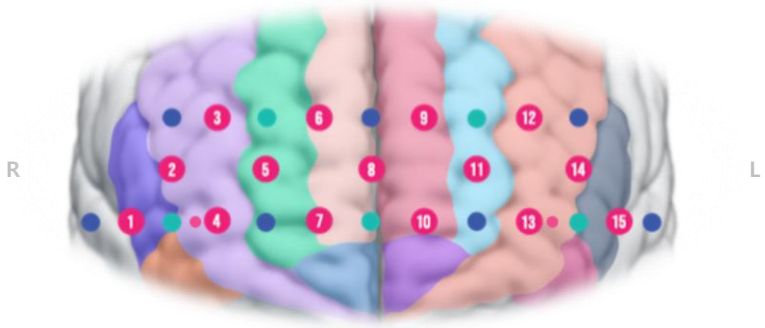


AAL index	Label	Location
3	Superior Frontal Gyrus, Dorsolateral	Left
4	Superior Frontal Gyrus, Dorsolateral	Right
5	Middle Frontal Gyrus	Left
6	Middle Frontal Gyrus	Right
9	Inferior Frontal Gyrus, Triangular Part	Left
10	Inferior Frontal Gyrus, Triangular Part	Right
11	Inferior Frontal Gyrus, Pars Orbitalis	Left
12	Inferior Frontal Gyrus, Pars Orbitalis	Right
19	Superior Frontal Gyrus, Medial	Left
20	Superior Frontal Gyrus, Medial	Right
21	Superior Frontal Gyrus, Medial Orbital	Left
22	Superior Frontal Gyrus, Medial Orbital	Right

AAL Label

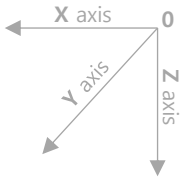
on 3D Brian Templates

AAL index	Label	Location	AAL index	Label	Location
3	Superior Frontal Gyrus, Dorsolateral	Left	11	Inferior Frontal Gyrus, Pars Orbitalis	Left
4	Superior Frontal Gyrus, Dorsolateral	Right	12	Inferior Frontal Gyrus, Pars Orbitalis	Right
5	Middle Frontal Gyrus	Left	19	Superior Frontal Gyrus, Medial	Left
6	Middle Frontal Gyrus	Right	20	Superior Frontal Gyrus, Medial	Right
9	Inferior Frontal Gyrus, Triangular Part	Left	21	Superior Frontal Gyrus, Medial Orbital	Left
10	Inferior Frontal Gyrus, Triangular Part	Right	22	Superior Frontal Gyrus, Medial Orbital	Right

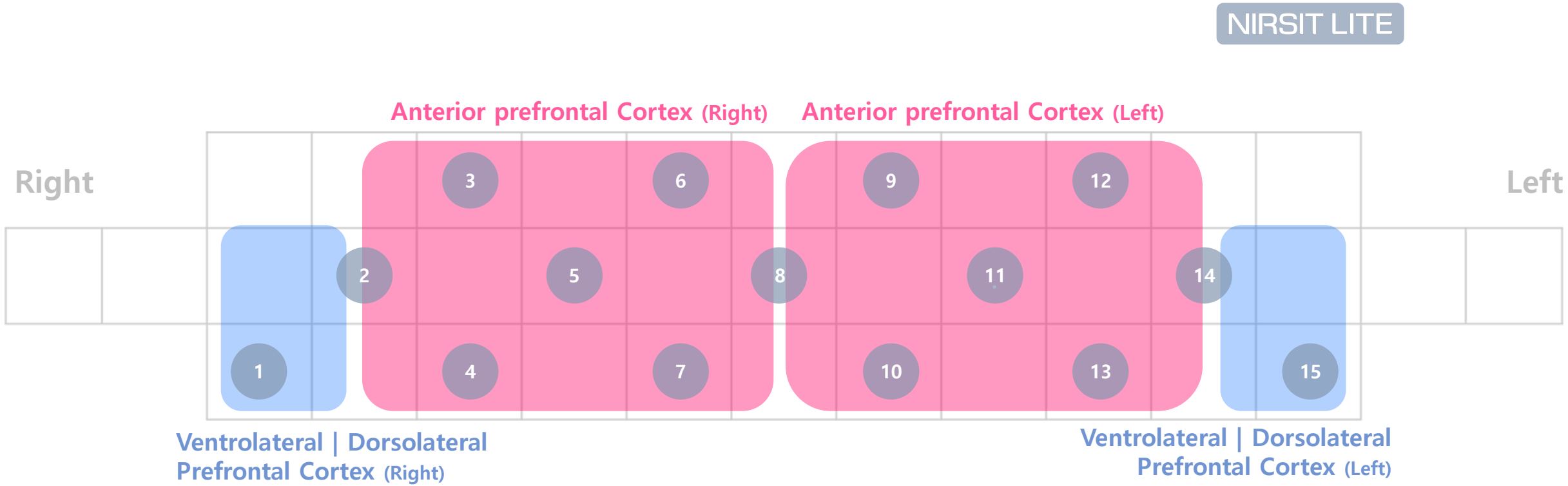


Estimated MNI Coordinates & AAL Label

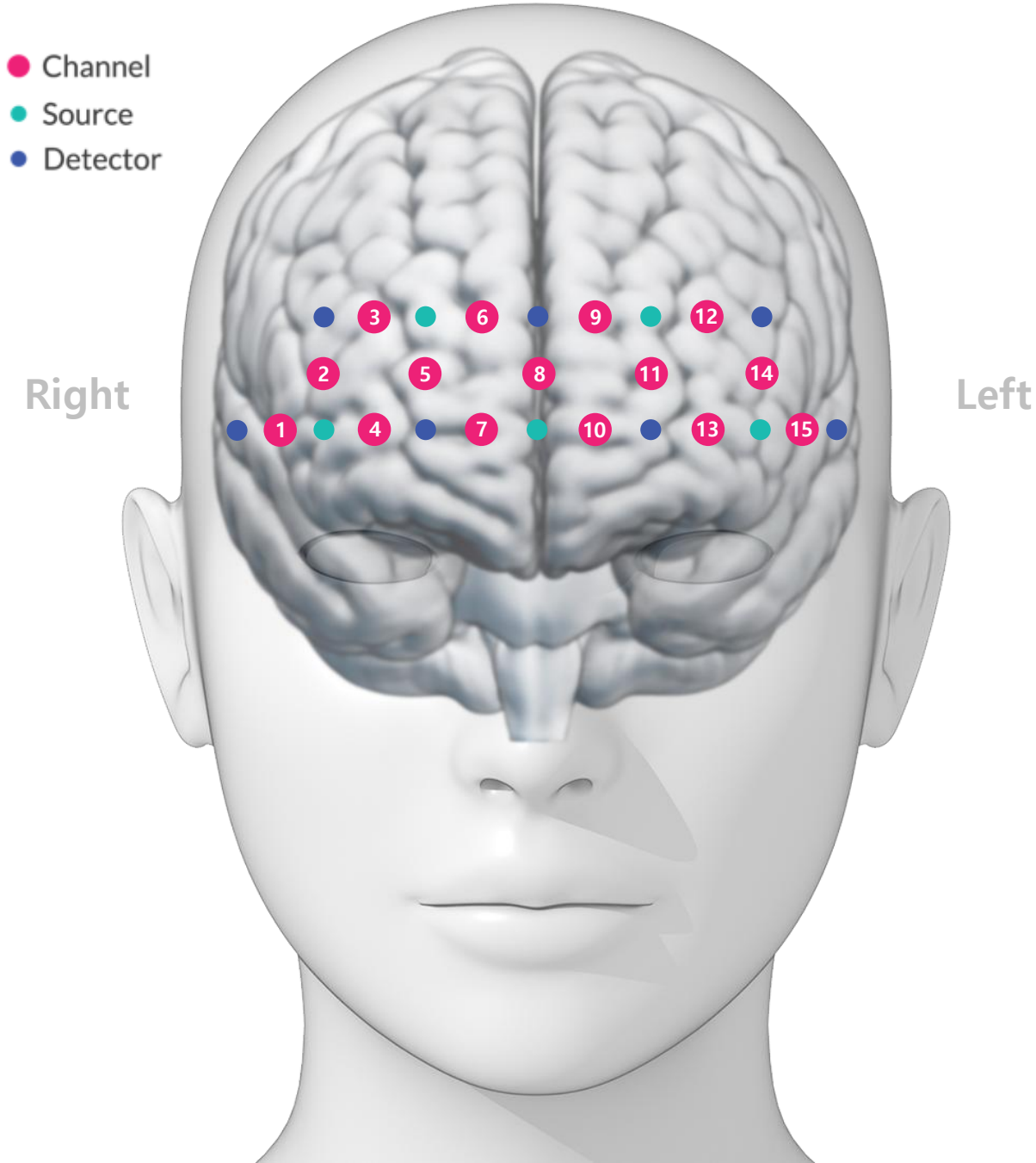
Channel	X	Y	Z	Location	AAL _index (AAL3v1)	Label 1	Label 2	Label 3
CH 1	54.67	44.00	0.00	Right	10 | 12	Inferior Frontal Gyrus, Triangular Part	Inferior Frontal Gyrus, pars orbitalis	
CH 2	48.00	52.67	12.67	Right	6 | 10	Middle Frontal Gyrus	Inferior Frontal Gyrus, Triangular Part	
CH 3	36.33	58.33	24.67	Right	6	Middle Frontal Gyrus		
CH 4	39.00	64.67	0.00	Right	6	Middle Frontal Gyrus		
CH 5	26.33	69.67	12.67	Right	4	Superior Frontal Gyrus, Dorsolateral		
CH 6	13.67	69.00	24.67	Right	20 | 4	Superior Frontal Gyrus, Medial	Superior Frontal Gyrus, Dorsolateral	
CH 7	14.33	73.00	0.33	Right	20 | 4 | 22	Superior Frontal Gyrus, Medial	Superior Frontal Gyrus, Dorsolateral	Superior Frontal Gyrus, Medial Orbital
CH 8	0.33	68.00	11.33	Center	20 | 19	Superior Frontal Gyrus, Medial	Superior Frontal Gyrus, Medial	
CH 9	-13.00	68.00	24.00	Left	19 | 3	Superior Frontal Gyrus, Medial	Superior Frontal Gyrus, Dorsolateral	
CH 10	-14.33	73.00	0.00	Left	19 | 3 | 21	Superior Frontal Gyrus, Medial	Superior Frontal Gyrus, Dorsolateral	Superior Frontal Gyrus, Medial Orbital
CH 11	-26.00	68.00	12.00	Left	3	Superior Frontal Gyrus, Dorsolateral		
CH 12	-35.67	57.67	23.67	Left	5	Middle Frontal Gyrus		
CH 13	-38.00	63.00	0.00	Left	5	Middle Frontal Gyrus		
CH 14	-45.67	51.67	12.33	Left	5 | 9	Middle Frontal Gyrus	Inferior Frontal Gyrus, Triangular Part	
CH 15	-52.33	43.67	-0.33	Left	9 | 11	Inferior Frontal Gyrus, Triangular Part	Inferior Frontal Gyrus, Pars Orbitalis	



Brodmann Mapping of NIRSIT LITE Channels

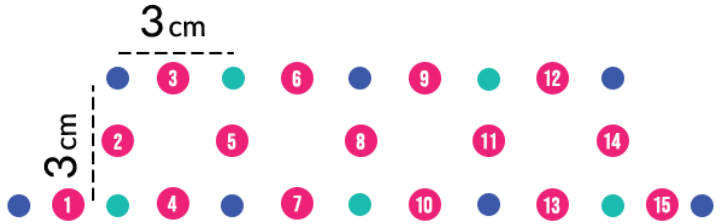


Estimated MNI Coordinates & BA Label



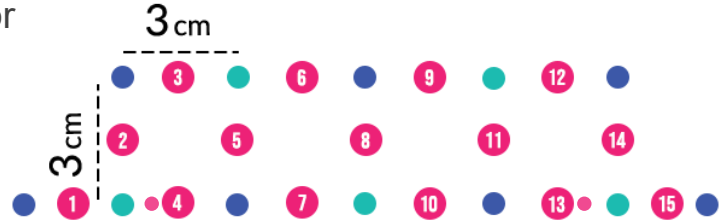
Channel	X	Y	Z	Location	BA	BA Label
CH 1	54.67	44.00	0.00	Right	46	Dorsolateral Prefrontal
CH 2	48.00	52.67	12.67	Right	10	Anterior Prefrontal
CH 3	36.33	58.33	24.67	Right	10	Anterior Prefrontal
CH 4	39.00	64.67	0.00	Right	10	Anterior Prefrontal
CH 5	26.33	69.67	12.67	Right	10	Anterior Prefrontal
CH 6	13.67	69.00	24.67	Right	10	Anterior Prefrontal
CH 7	14.33	73.00	0.33	Right	10	Anterior Prefrontal
CH 8	0.33	68.00	11.33	Center	10	Anterior Prefrontal
CH 9	-13.00	68.00	24.00	Left	10	Anterior Prefrontal
CH 10	-14.33	73.00	0.00	Left	10	Anterior Prefrontal
CH 11	-26.00	68.00	12.00	Left	10	Anterior Prefrontal
CH 12	-35.67	57.67	23.67	Left	10	Anterior Prefrontal
CH 13	-38.00	63.00	0.00	Left	10	Anterior Prefrontal
CH 14	-45.67	51.67	12.33	Left	10	Anterior Prefrontal
CH 15	-52.33	43.67	-0.33	Left	47	Orbital Part of IFG

Channel
Source
Detector

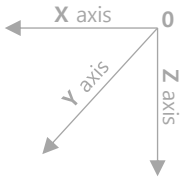


Channel
Source
Detector

LS Channel (30 mm)
SS Channel (8 mm)
Source
Detector



LS Channel (30 mm)
SS Channel (8 mm)
Source
Detector



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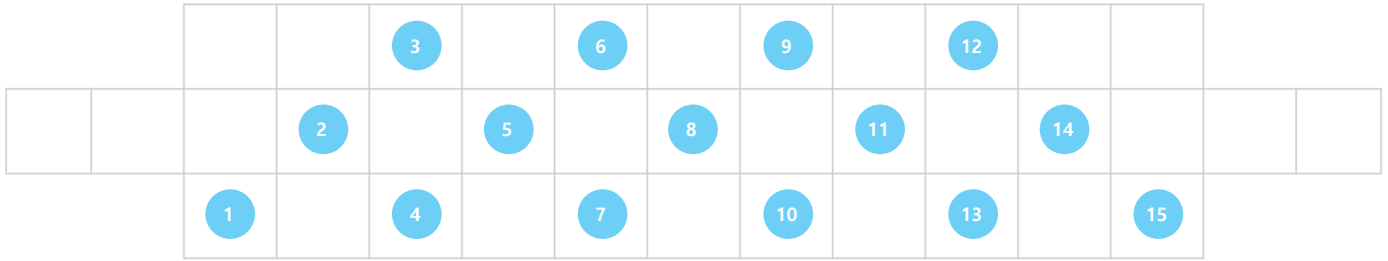
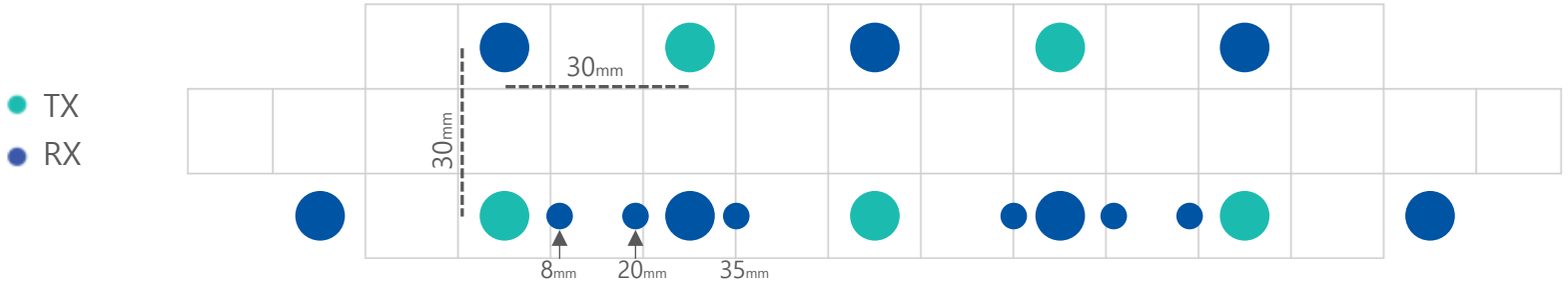


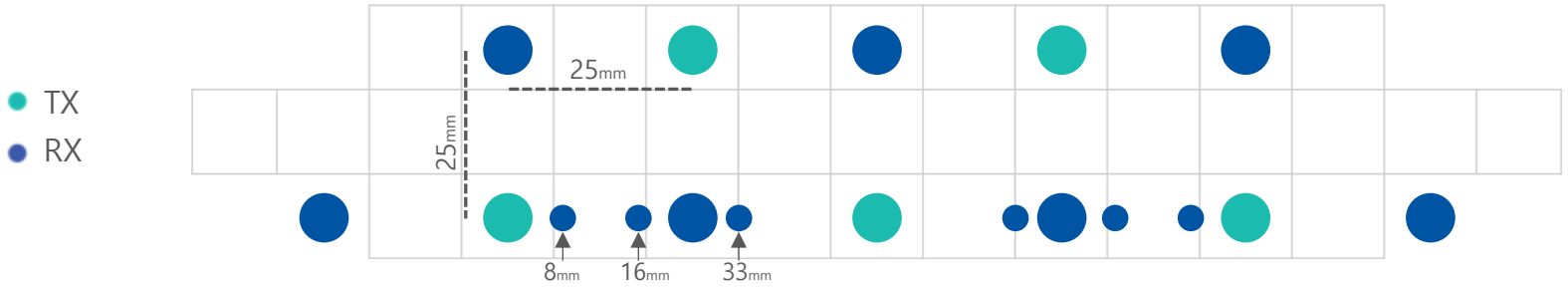
Right

Left

NIRSIT LITE



NIRSIT LITE KIDS



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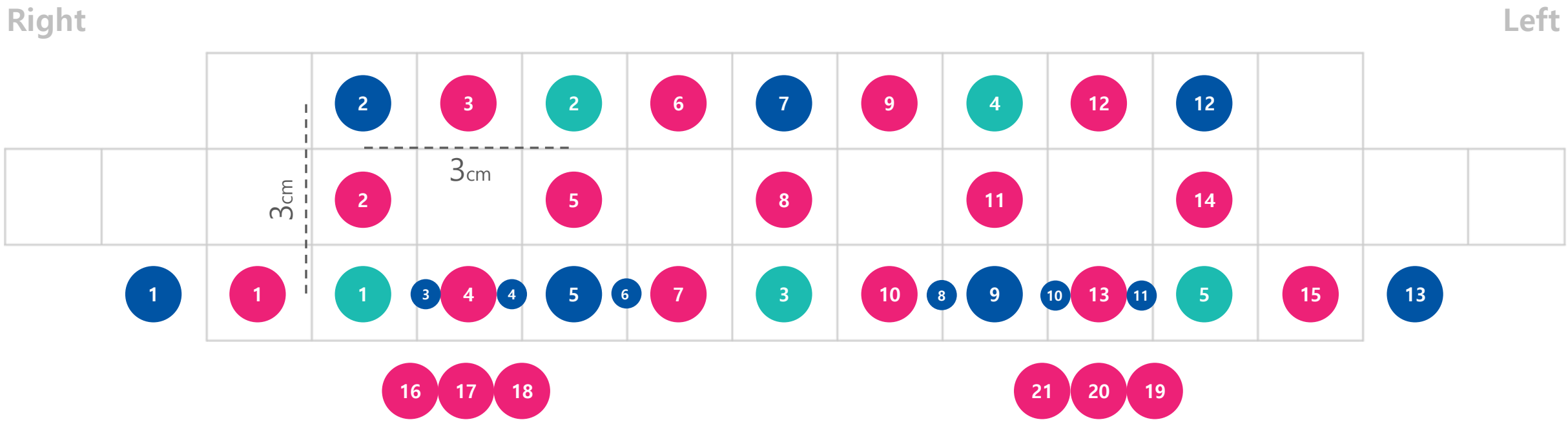
NIRSIT LITE Channels & Sensors

- Channel
- Source
- Detector

Source ~ Detector : 3cm

NIRSIT LITE



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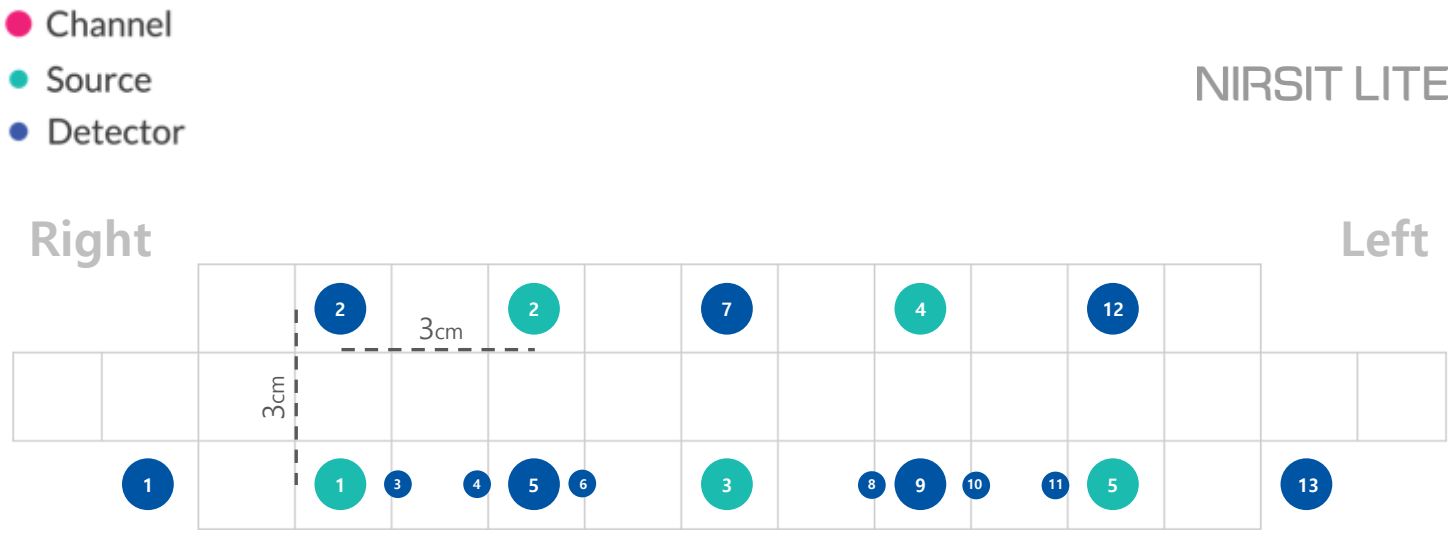
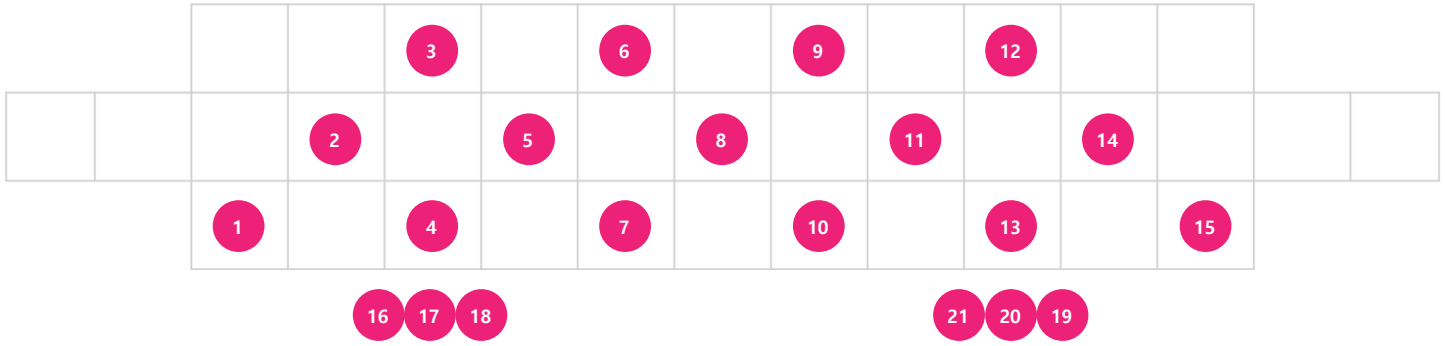
NIRSIT LITE Channel & Source-Detector Information

Channel	Source	Detector	Distance (cm)	
			Adult	Kids
CH 1	1	1	3	2.5
CH 2	1	2	3	2.5
CH 3	2	2	3	2.5
CH 4	1	5	3	2.5
CH 5	2	5	3	2.5
CH 6	2	7	3	2.5
CH 7	3	5	3	2.5
CH 8	3	7	3	2.5
CH 9	4	7	3	2.5
CH 10	3	9	3	2.5
CH 11	4	9	3	2.5
CH 12	4	12	3	2.5
CH 13	5	9	3	2.5
CH 14	5	12	3	2.5
CH 15	5	13	3	2.5
CH 16	1	3	0.8	
CH 17	1	4	2	
CH 18	1	6	3.5 (Not yet supported)	
CH 19	5	11	0.8	
CH 20	5	10	2	
CH 21	5	8	3.5 (Not yet supported)	

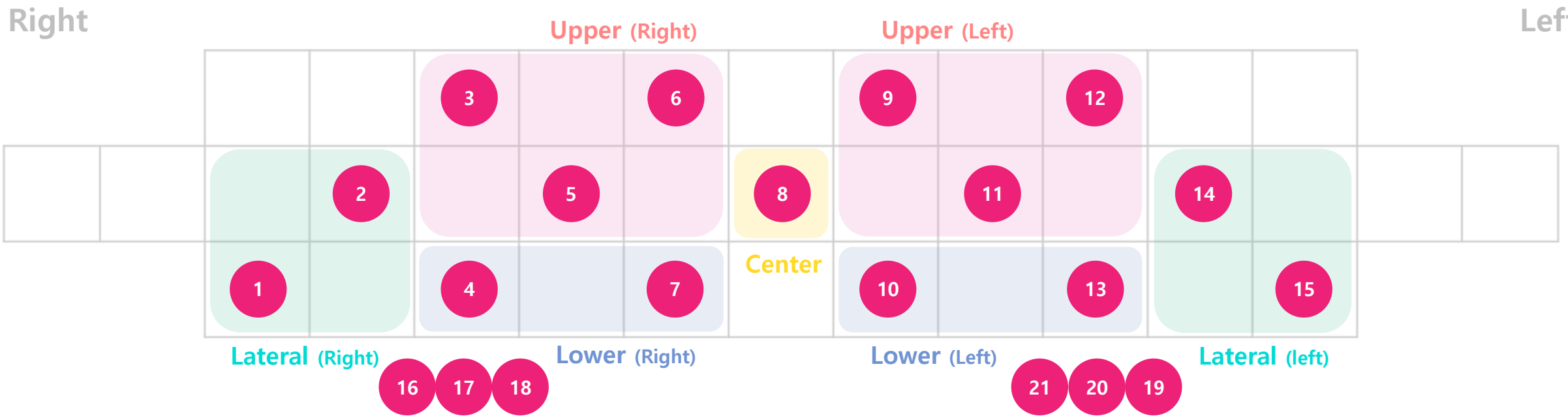


Source ~ Detector : 3cm



Connectivity-based Channel Clustering: Grouping 1

NIRSIT LITE



- Channel grouping estimated by hierarchical clustering analysis of functional connectivity across channels
- Hierarchical Clustering Analysis using agglomerative WARD method, n = 885 (Resting-state, n = 325; Task, n = 400; Movie-viewing, n =160)
- See next page for further details.

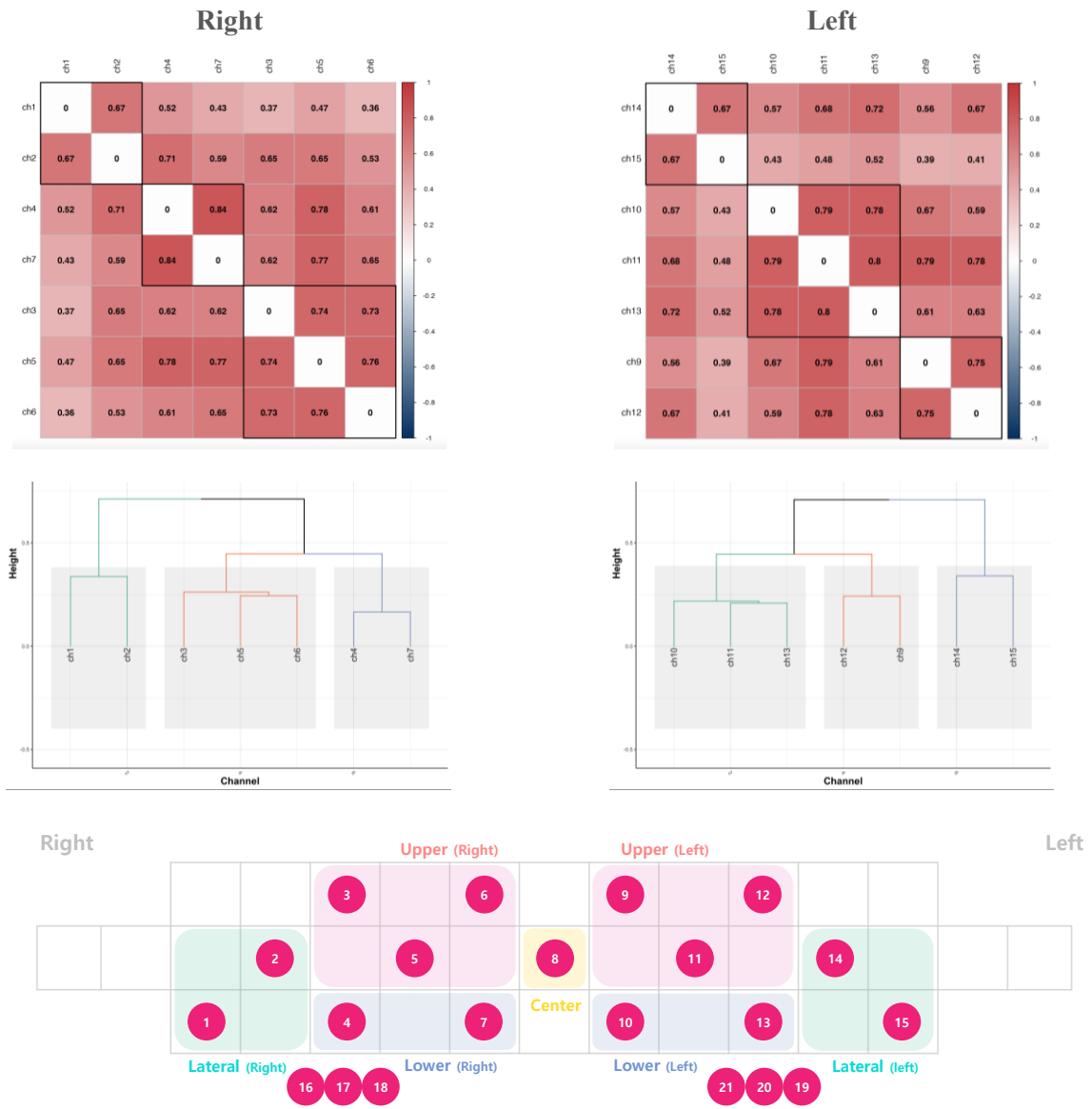
Grouping 1 - method

Method

- Samples (n = 825)
  - Resting-State Dataset (n = 325)
  - Task Dataset (n = 400)
  - Movie-viewing Dataset (n = 160)

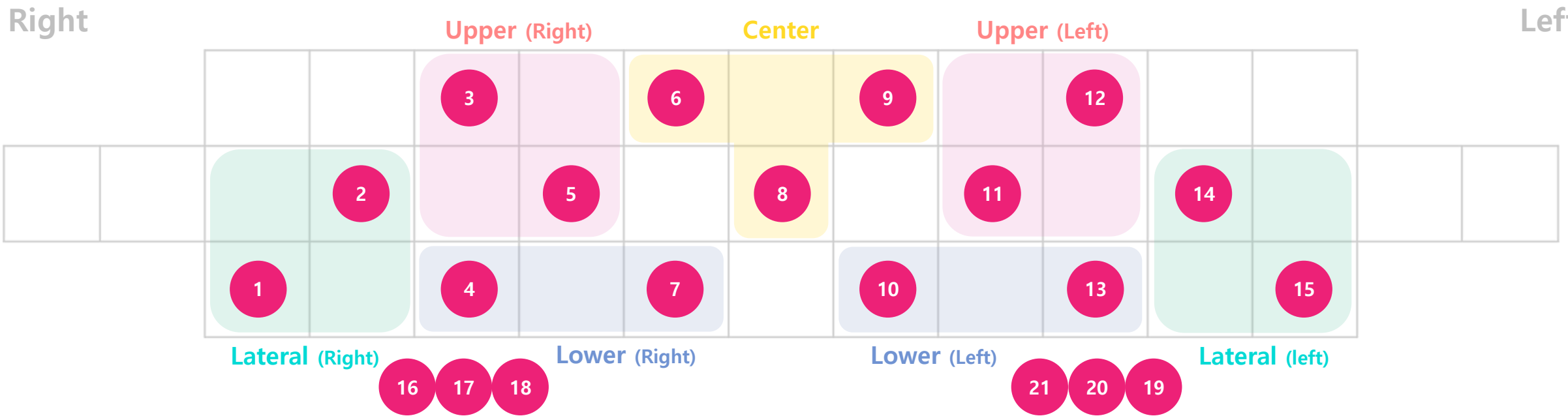
- Signal Processing
  - Channel pruning based on SNR
  - Light intensity to dOD conversion
  - dOD to HB concentration conversion
    using Modified Beer-Lambert Law
  - Band-pass filtered with cutoff frequency (.008-.09Hz)
  - Extraction of HbO2 time-series for all channels
  - Calculation of functional connectivity
    between the time-series of all channels
    using the pairwise Pearson correlation coefficient
  - Dividing connectivity matrix into left & right hemisphere
    to account for hemispheric specialization

- Hierarchical Clustering Analysis
  - Agglomerative Hierarchical Clustering in each hemisphere
  - Distance Metric : 1- correlation coefficient
  - WARD linkage method, # of Cluster = 7



Connectivity-based Channel Clustering: Grouping 2

NIRSIT LITE



- Channel grouping estimated by hierarchical clustering analysis of functional connectivity across channels
- Hierarchical Clustering Analysis using agglomerative WARD method, n = 885 (Resting-state, n = 325; Task, n = 400; Movie-viewing, n =160)
- See next page for further details.

Grouping 2 - method

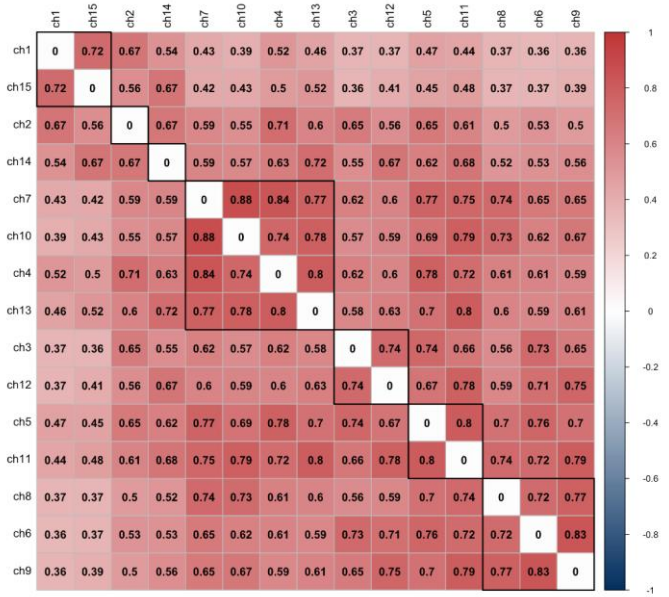
Method

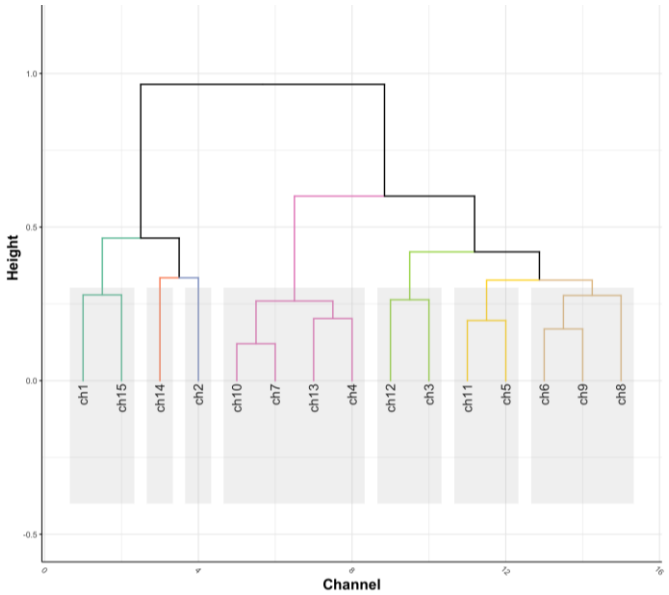
- Samples (n = 825)
  - Resting-State Dataset (n = 325)
  - Task Dataset (n = 400)
  - Movie-viewing Dataset (n = 160)

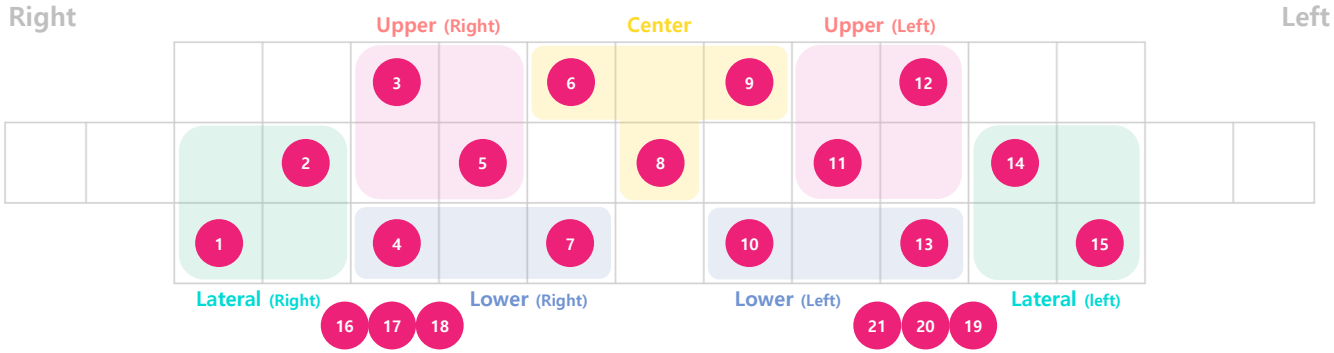
- Signal Processing
  - Channel pruning based on SNR
  - Light intensity to dOD conversion
  - dOD to HB concentration conversion
    using Modified Beer-Lambert Law
  - Band-pass filtered with cutoff frequency (.008-.09Hz)
  - Extraction of HbO2 time-series for all channels
  - Calculation of functional connectivity
    between the time-series of all channels
    using the pairwise Pearson correlation coefficient

- Hierarchical Clustering Analysis
  - Agglomerative Hierarchical Clustering within the whole PFC
  - Distance Metric : 1- correlation coefficient
  - WARD linkage method, # of Cluster = 7

Whole PFC







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