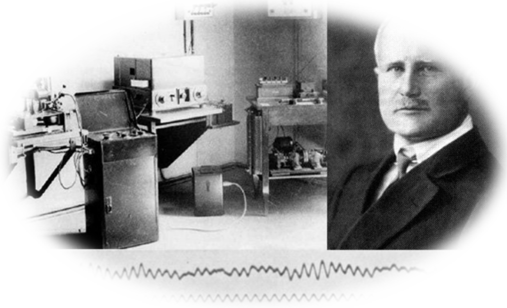
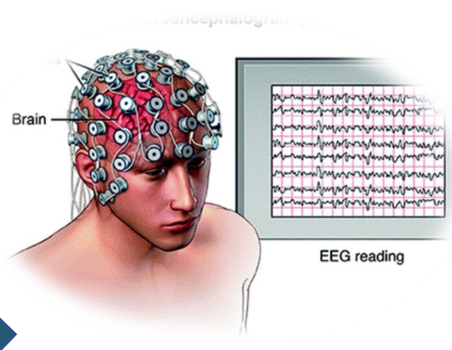
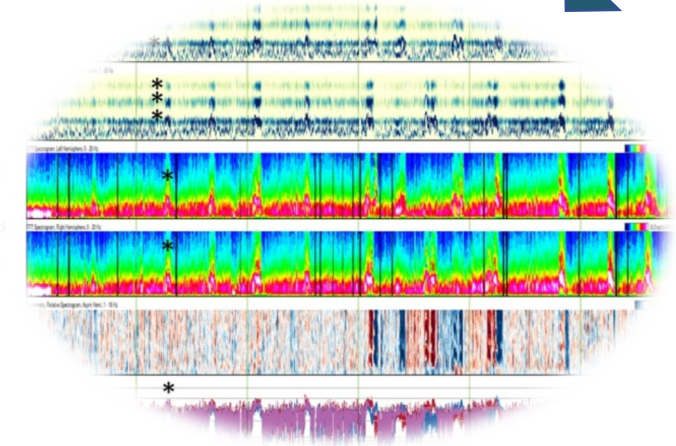
EEG spectral exponent as a synthetic index for the longitudinal assessment of stroke recovery



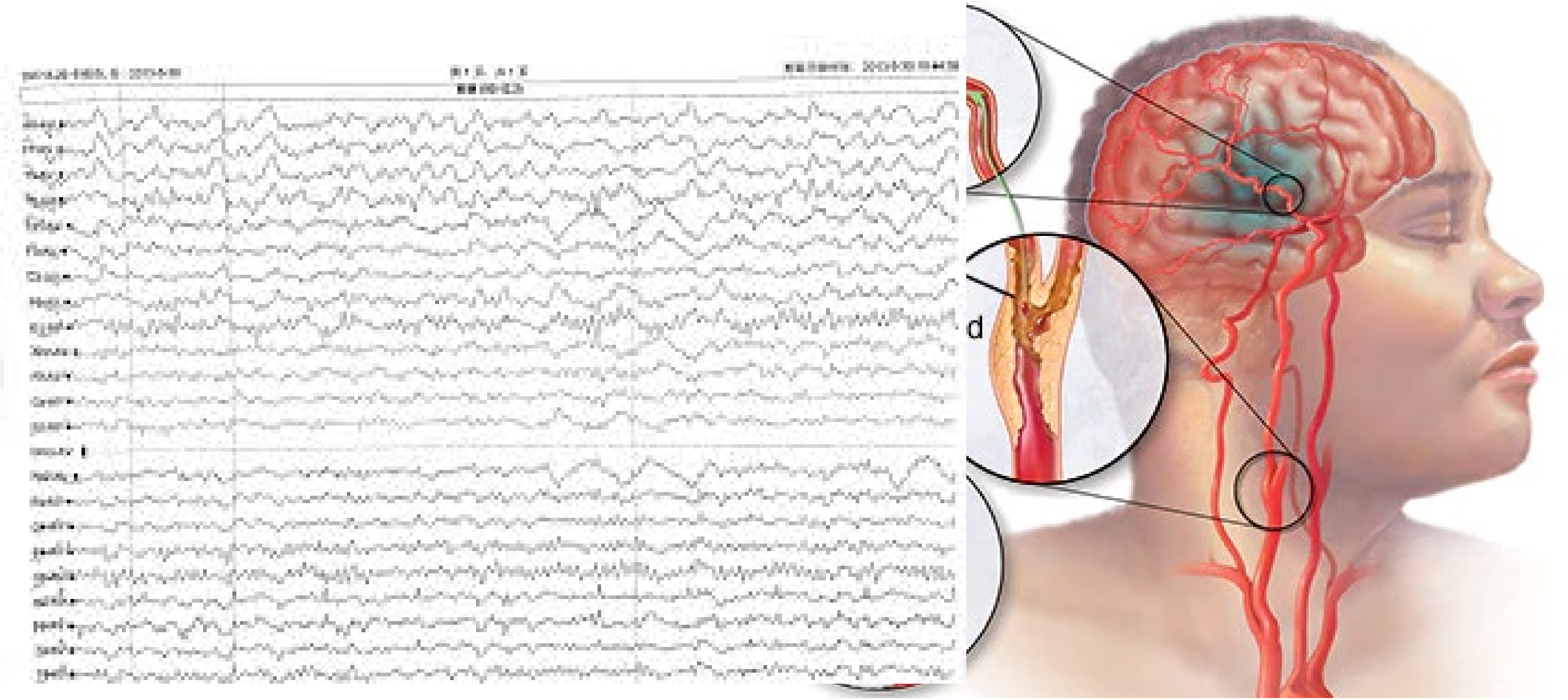


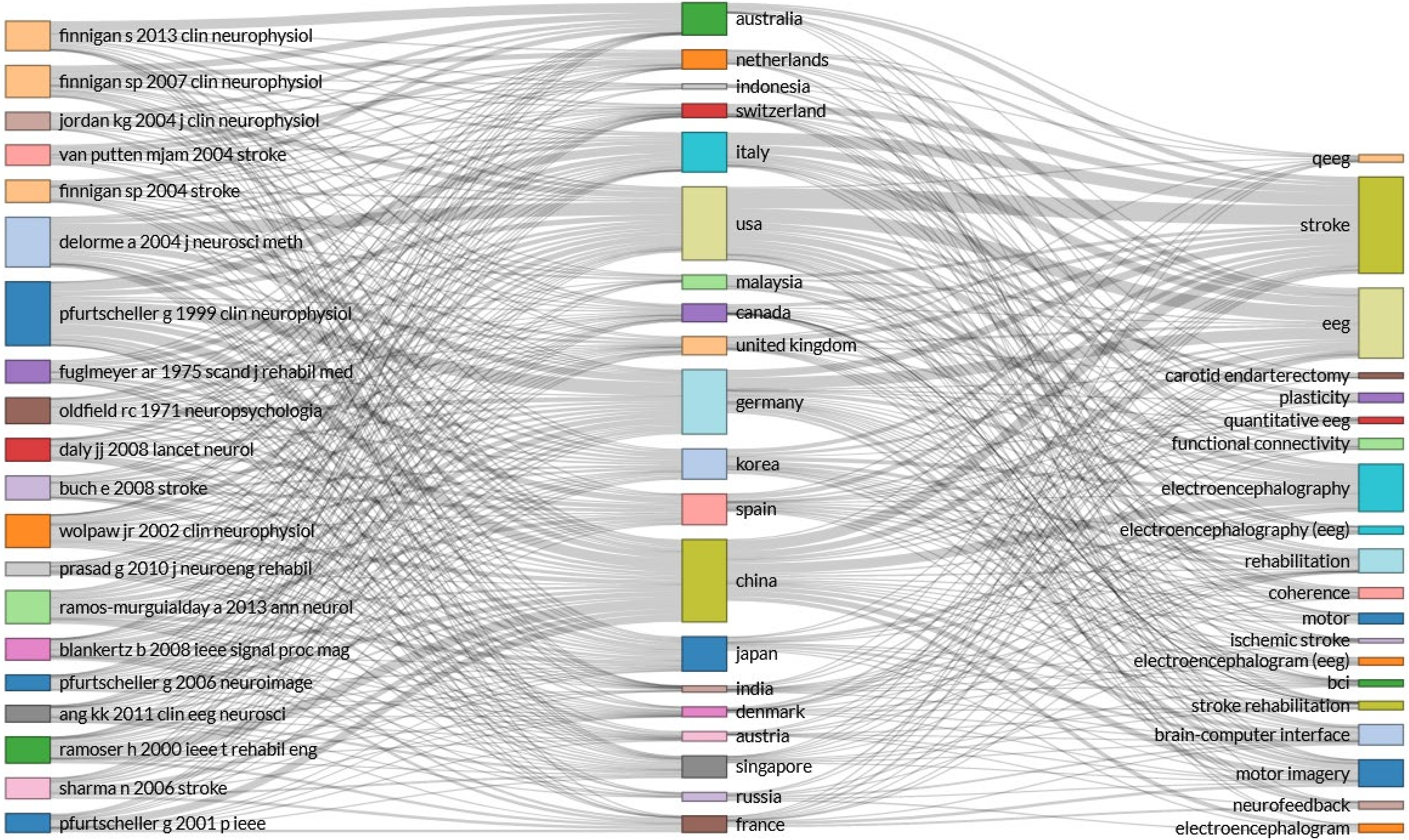


Dott. Jacopo Lanzone
IRCCS ICS Maugeri Milano

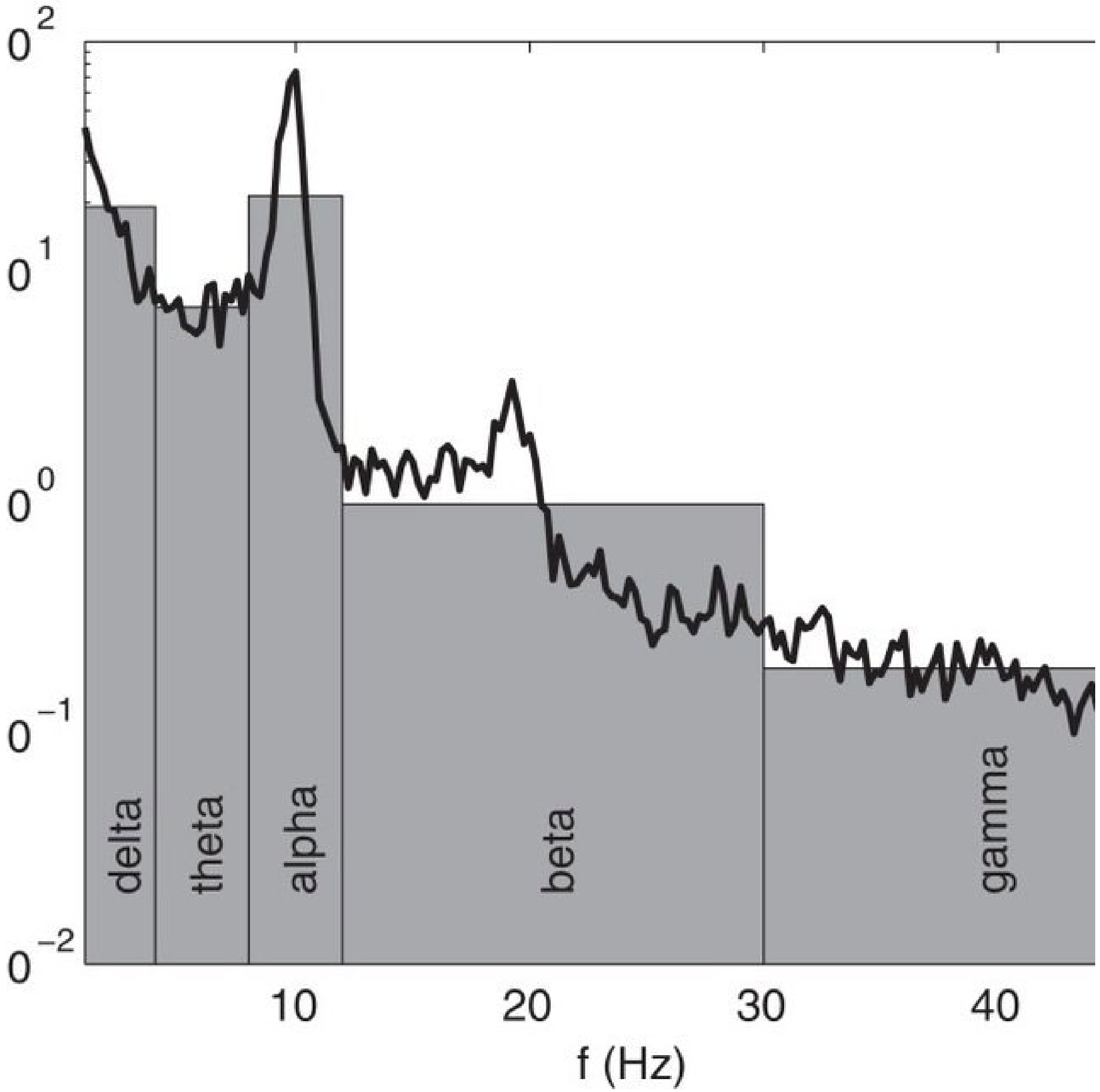
I have no competing interests to disclose

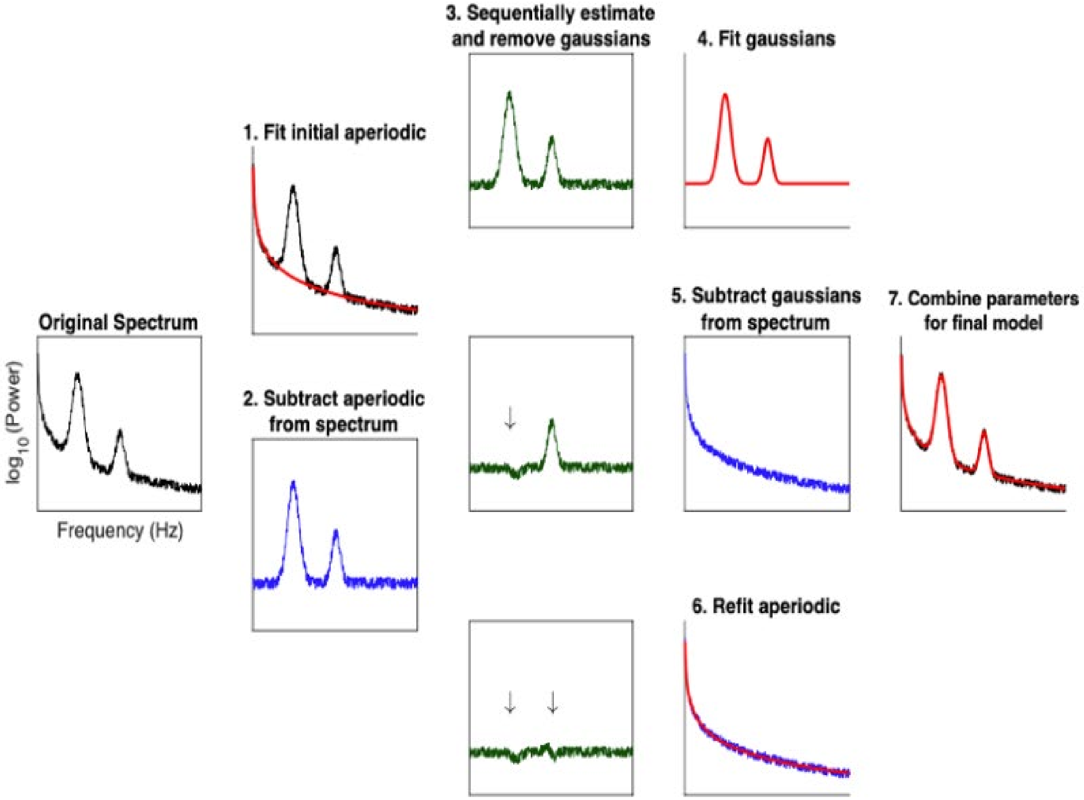
Stroke and EEG?



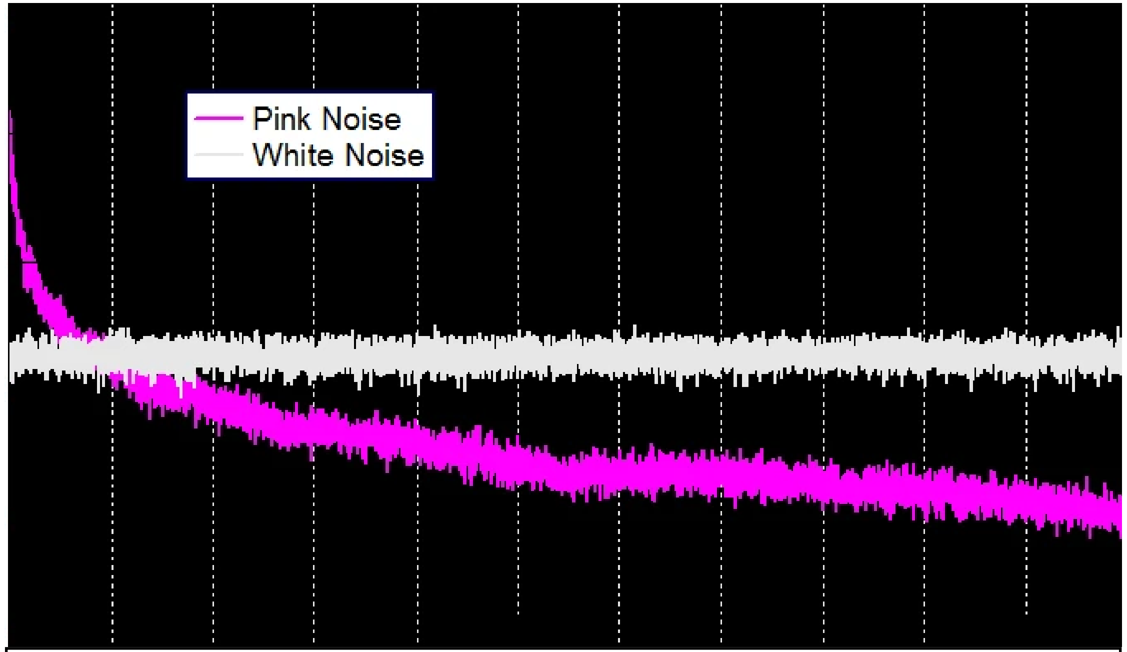

finnigan s 2013 clin neurophysiol
finnigan sp 2007 clin neurophysiol
jordan kg 2004 j clin neurophysiol
van putten mjam 2004 stroke
finnigan sp 2004 stroke
delorme a 2004 j neurosci meth
pfurtscheller g 1999 clin neurophysiol
fuglmeyer ar 1975 scand j rehabil med
oldfield rc 1971 neuropsychologia
daly jj 2008 lancet neurol
buch e 2008 stroke
wolpaw jr 2002 clin neurophysiol
prasad g 2010 j neuroeng rehabil
ramos-murguialday a 2013 ann neurol
blankertz b 2008 ieee signal proc mag
pfurtscheller g 2006 neuroimage
ang kk 2011 clin eeg neurosci
ramoser h 2000 ieee t rehabil eng
sharma n 2006 stroke
pfurtscheller g 2001 p ieee
australia
netherlands
indonesia
switzerland
italy
usa
malaysia
canada
united kingdom
germany
korea
spain
china
japan
india
denmark
austria
singapore
russia
france
qeeg
stroke
eeg
carotid endarterectomy
plasticity
quantitative eeg
functional connectivity
electroencephalography
electroencephalography (eeg)
rehabilitation
coherence
motor
ischemic stroke
electroencephalogram (eeg)
bci
stroke rehabilitation
brain-computer interface
motor imagery
neurofeedback
electroencephalogram

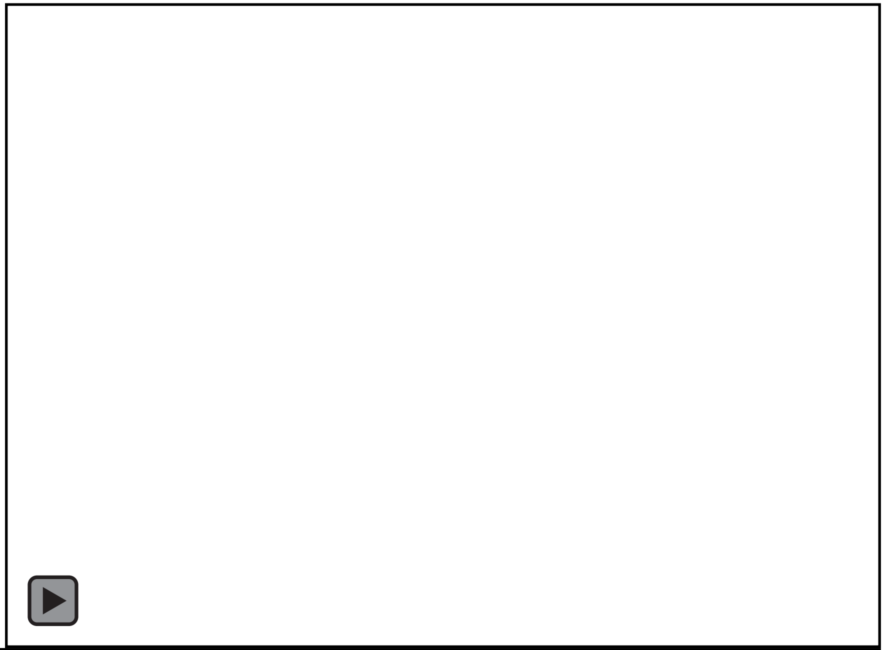
Narrow band approach vs. 1/f approach

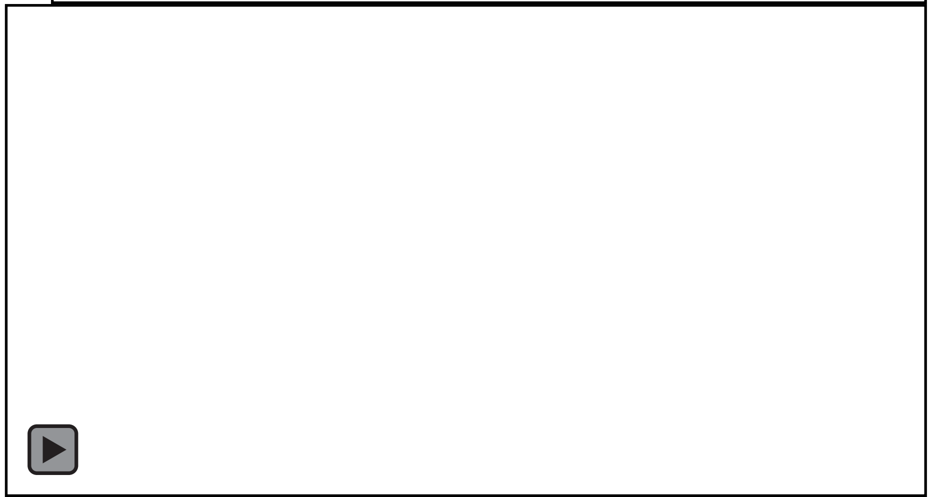


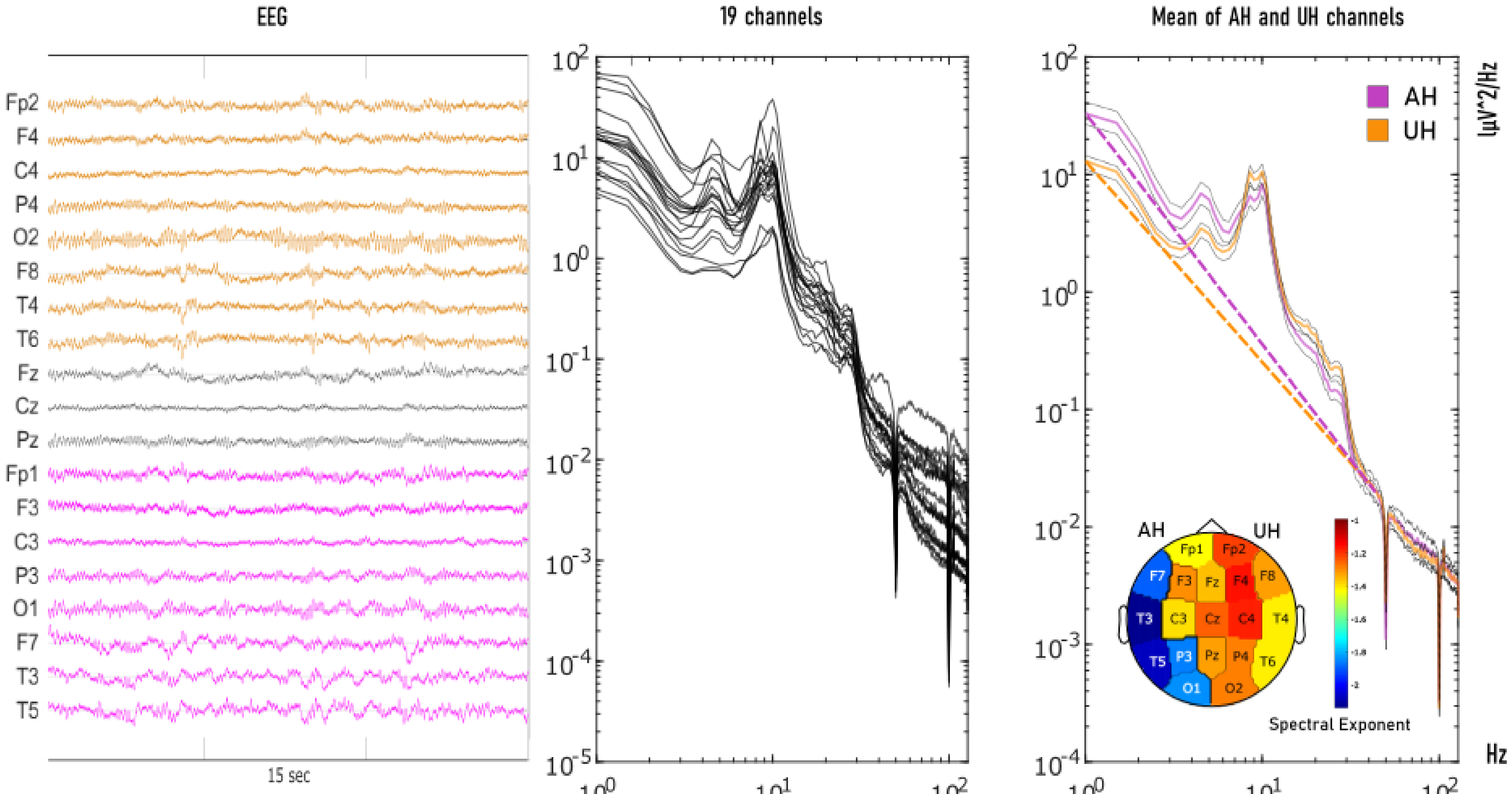


1/f and whise noise, causal against casual

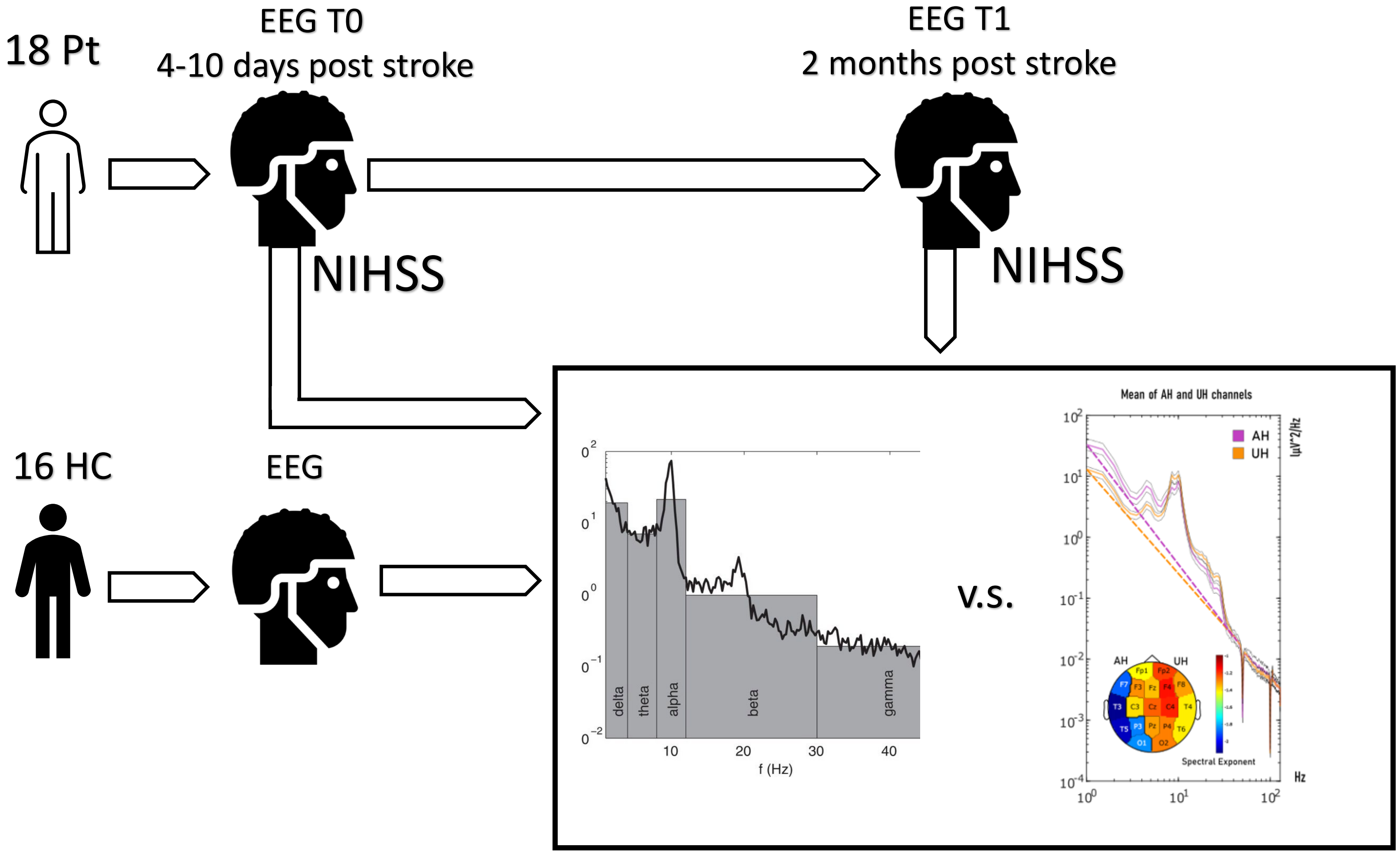


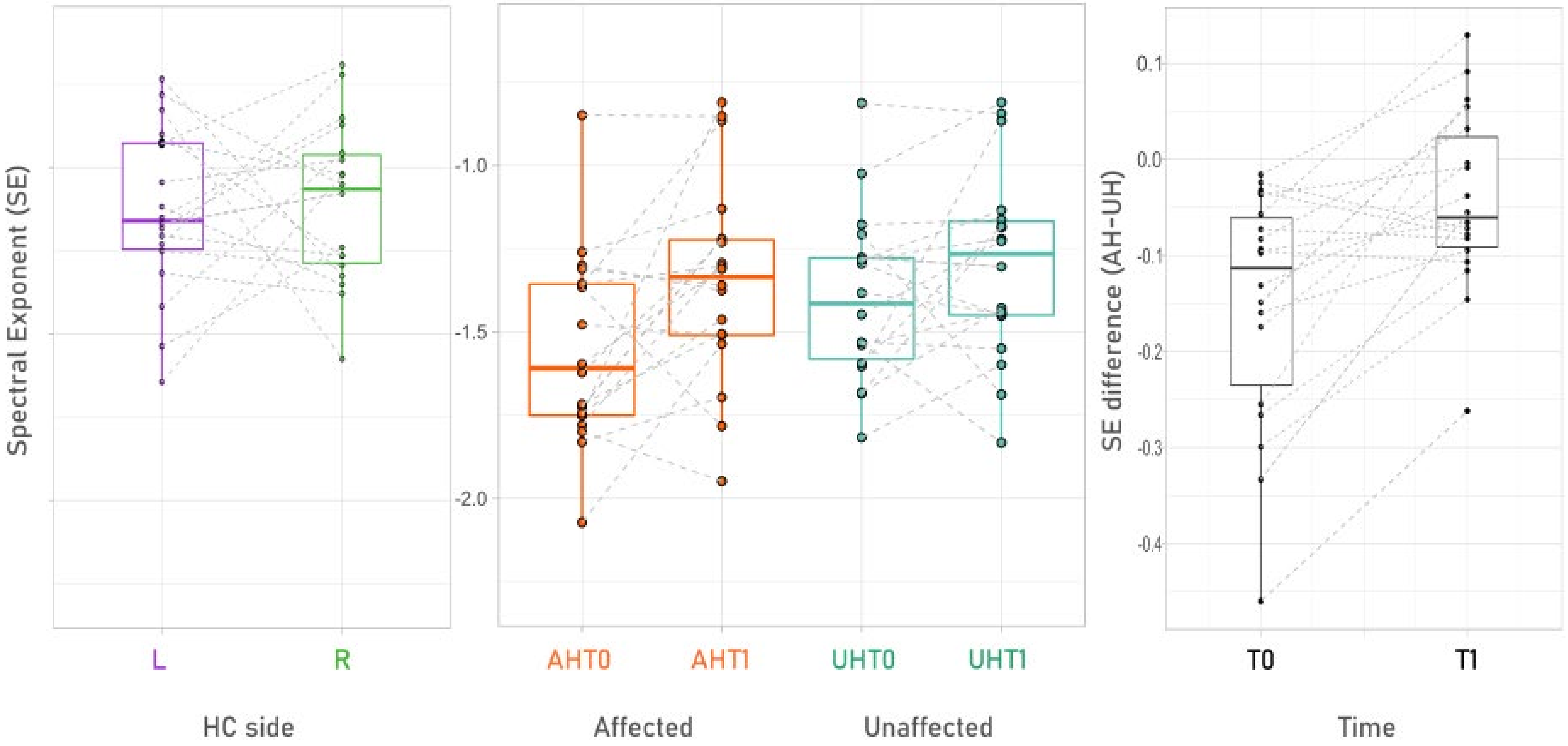




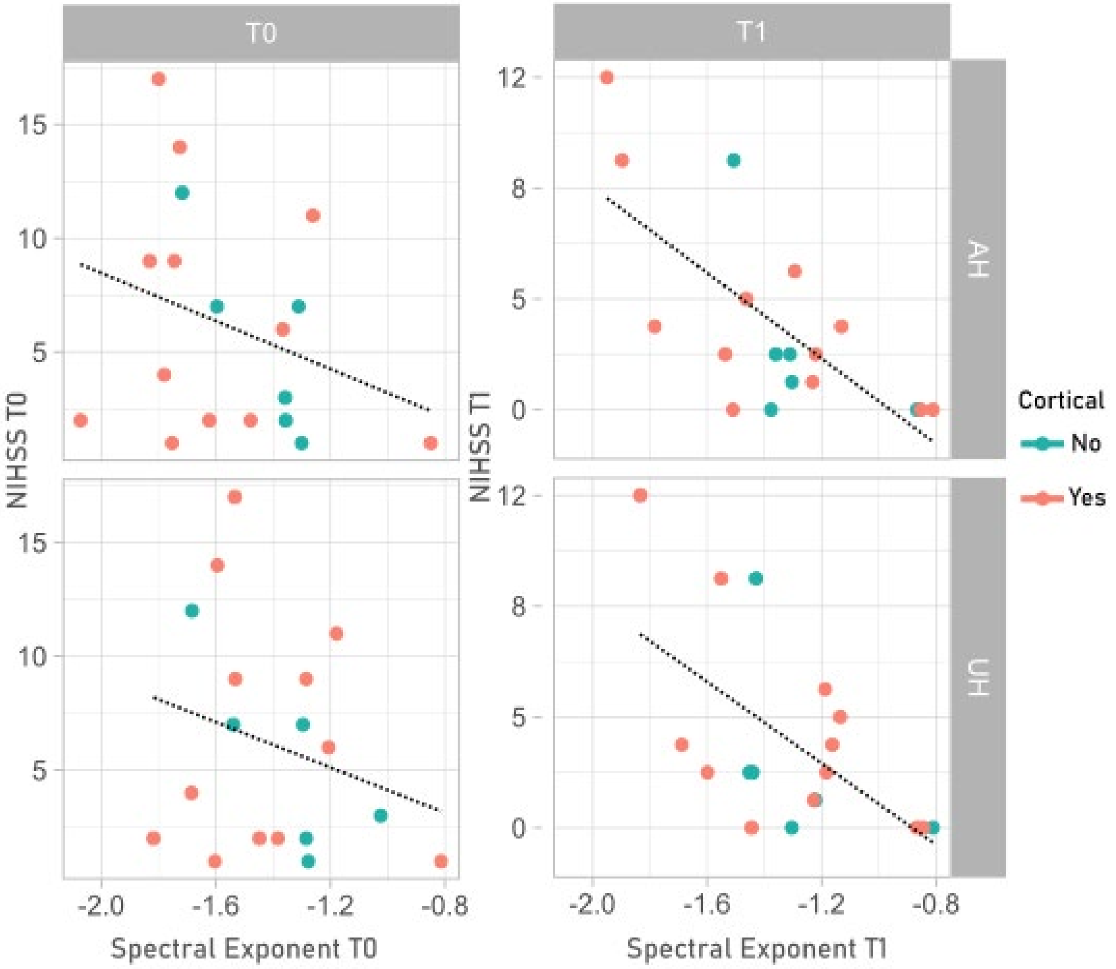

EEG
Fp2
F4
C4
P4
O2
F8
T4
T6
Fz
Cz
Pz
Fp1
F3
C3
P3
O1
F7
T3
T5
15 sec
19 channels
Mean of AH and UH channels
AH
UH
|µV^2/Hz
Hz
Spectral Exponent

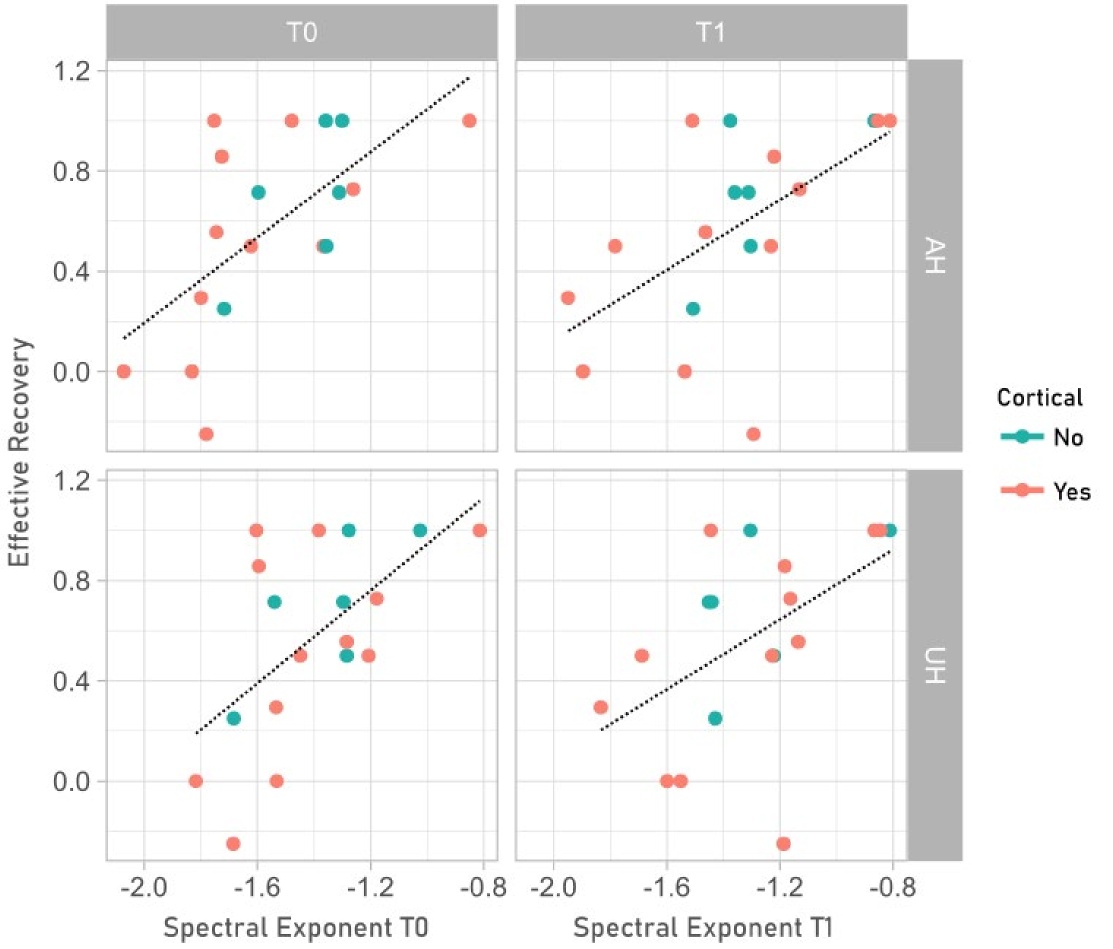
Disegno dello studio





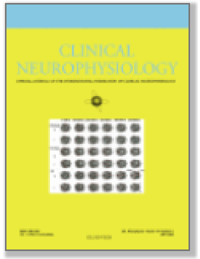
Spectral Exponent (SE)
-1.0
-1.5
-2.0
L
R
HC side
AHT0
AHT1
UHT0
UHT1
Affected
Unaffected
SE difference (AH-UH)
0.1
0.0
-0.1
-0.2
-0.3
-0.4
T0
T1
Time





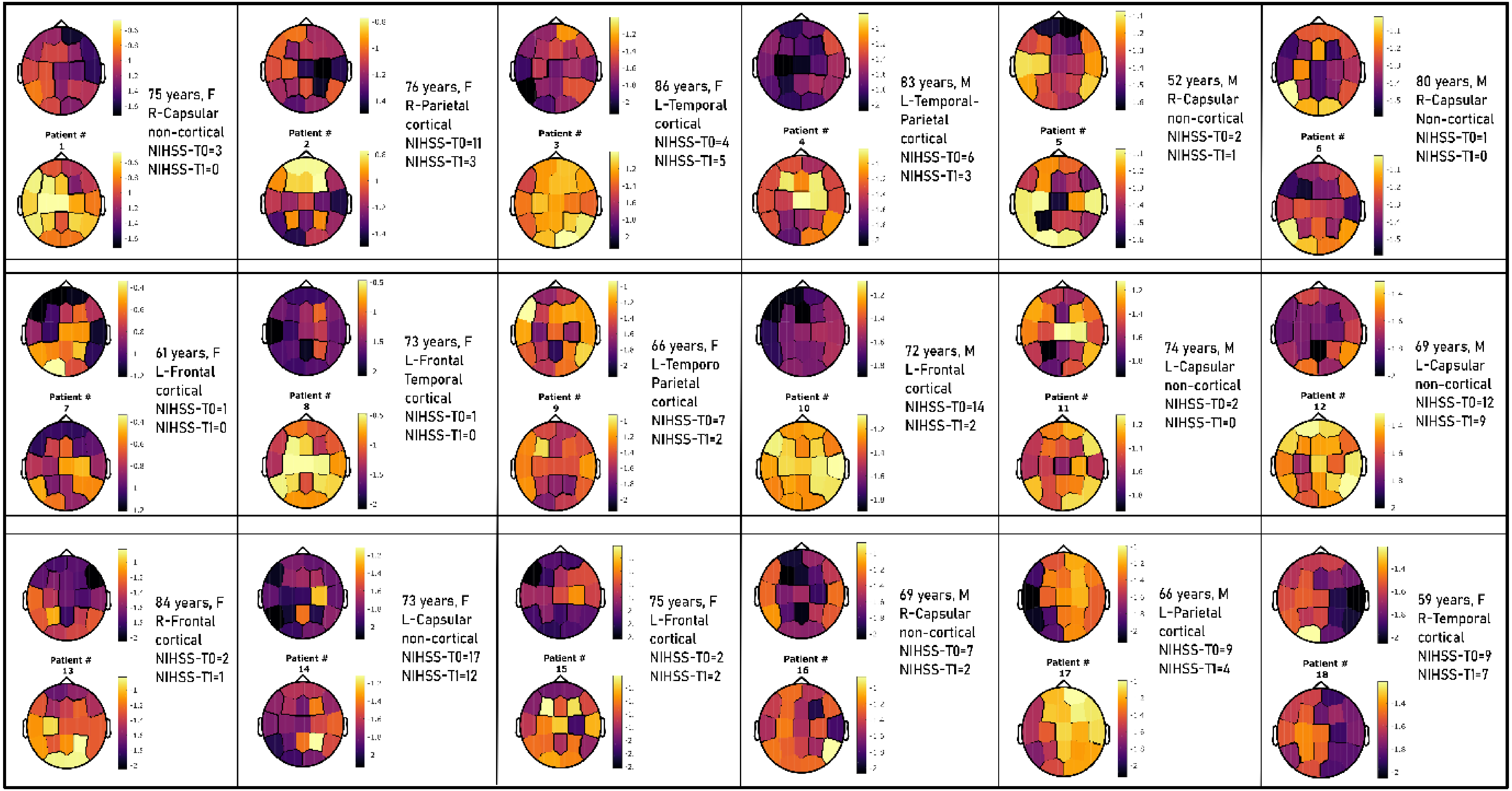
$$ER = 100 * \frac{NIHSS\ at\ T0 - NIHSS\ at\ T1}{NIHSS\ at\ T0 - 0}$$

Clinical Neurophysiology
Volume 137, May 2022, Pages 92-101



EEG spectral exponent as a synthetic index for the longitudinal assessment of stroke recovery

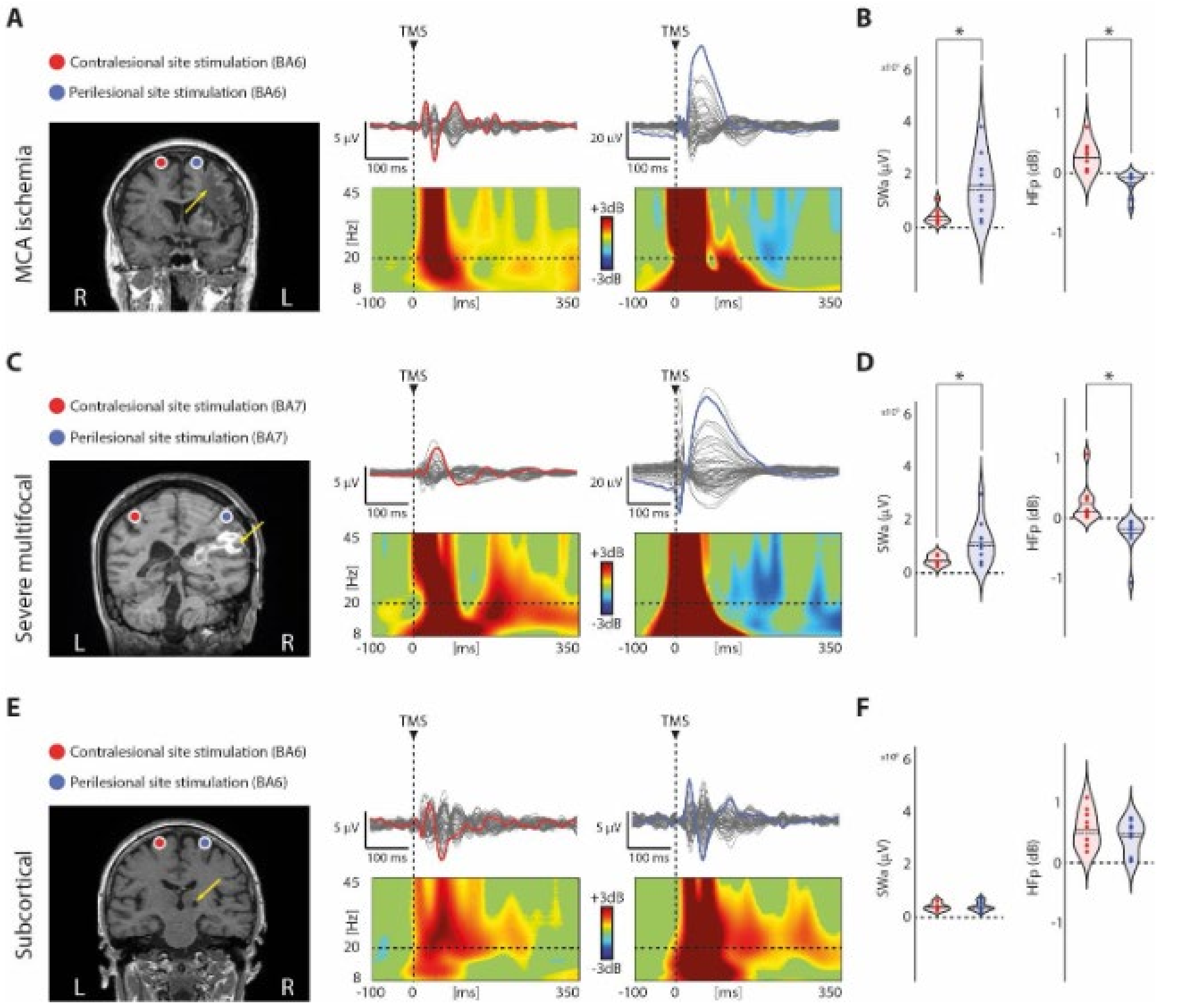
J. Lanzone [a], M.A. Colombo [b], S. Sarasso [b], F. Zappasodi [c], M. Rosanova [b], M. Massimini [b, d], V. Di Lazzaro [e], G. Assenza [e]


Patient # 1
75 years, F
R-Capsular
non-cortical
NIHSS-T0=3
NIHSS-T1=0
Patient # 2
76 years, F
R-Parietal
cortical
NIHSS-T0=11
NIHSS-T1=3
Patient # 3
86 years, F
L-Temporal
cortical
NIHSS-T0=4
NIHSS-T1=5
Patient # 4
83 years, M
L-Temporal-
Parietal
cortical
NIHSS-T0=6
NIHSS-T1=3
Patient # 5
52 years, M
R-Capsular
non-cortical
NIHSS-T0=2
NIHSS-T1=1
Patient # 6
80 years, M
R-Capsular
Non-cortical
NIHSS-T0=1
NIHSS-T1=0
Patient # 7
61 years, F
L-Frontal
cortical
NIHSS-T0=1
NIHSS-T1=0
Patient # 8
73 years, F
L-Frontal
Temporal
cortical
NIHSS-T0=1
NIHSS-T1=0
Patient # 9
66 years, F
L-Temporo
Parietal
cortical
NIHSS-T0=7
NIHSS-T1=2
Patient # 10
72 years, M
L-Frontal
cortical
NIHSS-T0=14
NIHSS-T1=2
Patient # 11
74 years, M
L-Capsular
non-cortical
NIHSS-T0=2
NIHSS-T1=0
Patient # 12
69 years, M
L-Capsular
non-cortical
NIHSS-T0=12
NIHSS-T1=9
Patient # 13
84 years, F
R-Frontal
cortical
NIHSS-T0=2
NIHSS-T1=1
Patient # 14
73 years, F
L-Capsular
non-cortical
NIHSS-T0=17
NIHSS-T1=12
Patient # 15
75 years, F
L-Frontal
cortical
NIHSS-T0=2
NIHSS-T1=2
Patient # 16
69 years, M
R-Capsular
non-cortical
NIHSS-T0=7
NIHSS-T1=2
Patient # 17
66 years, M
L-Parietal
cortical
NIHSS-T0=9
NIHSS-T1=4
Patient # 18
59 years, F
R-Temporal
cortical
NIHSS-T0=9
NIHSS-T1=7

Local sleep-like cortical reactivity in the awake brain after focal injury

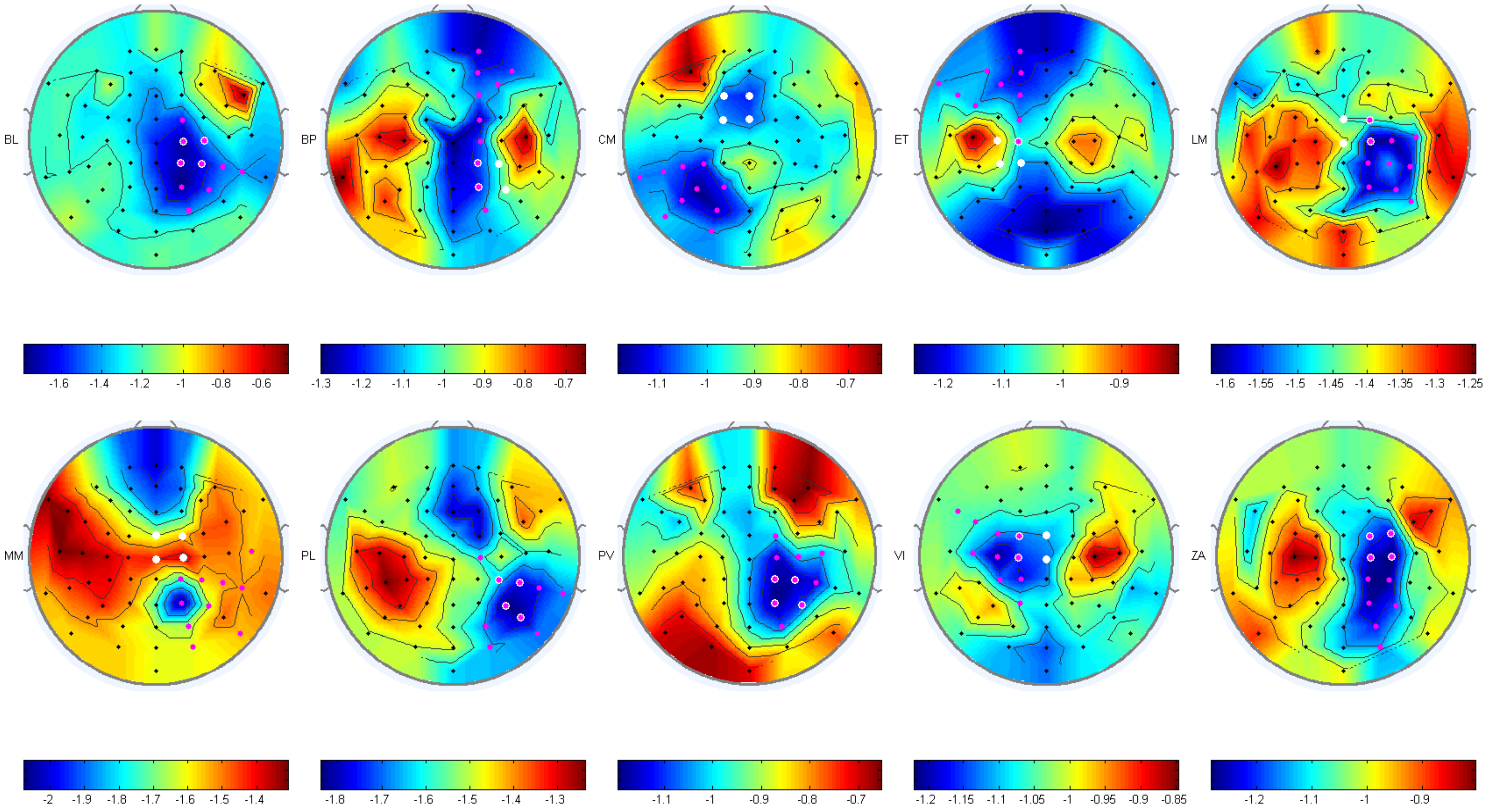
Simone Sarasso, Sasha D'Ambrosio, Matteo Fecchio, Silvia Casarotto, Alessandro Viganò, Cristina Landi, Giulia Mattavelli, Olivia Gosseries, Matteo Quarenghi, Steven Laureys, Guya Devalle, Mario Rosanova, Marcello Massimini

doi: https://doi.org/10.1101/2019.12.19.882290

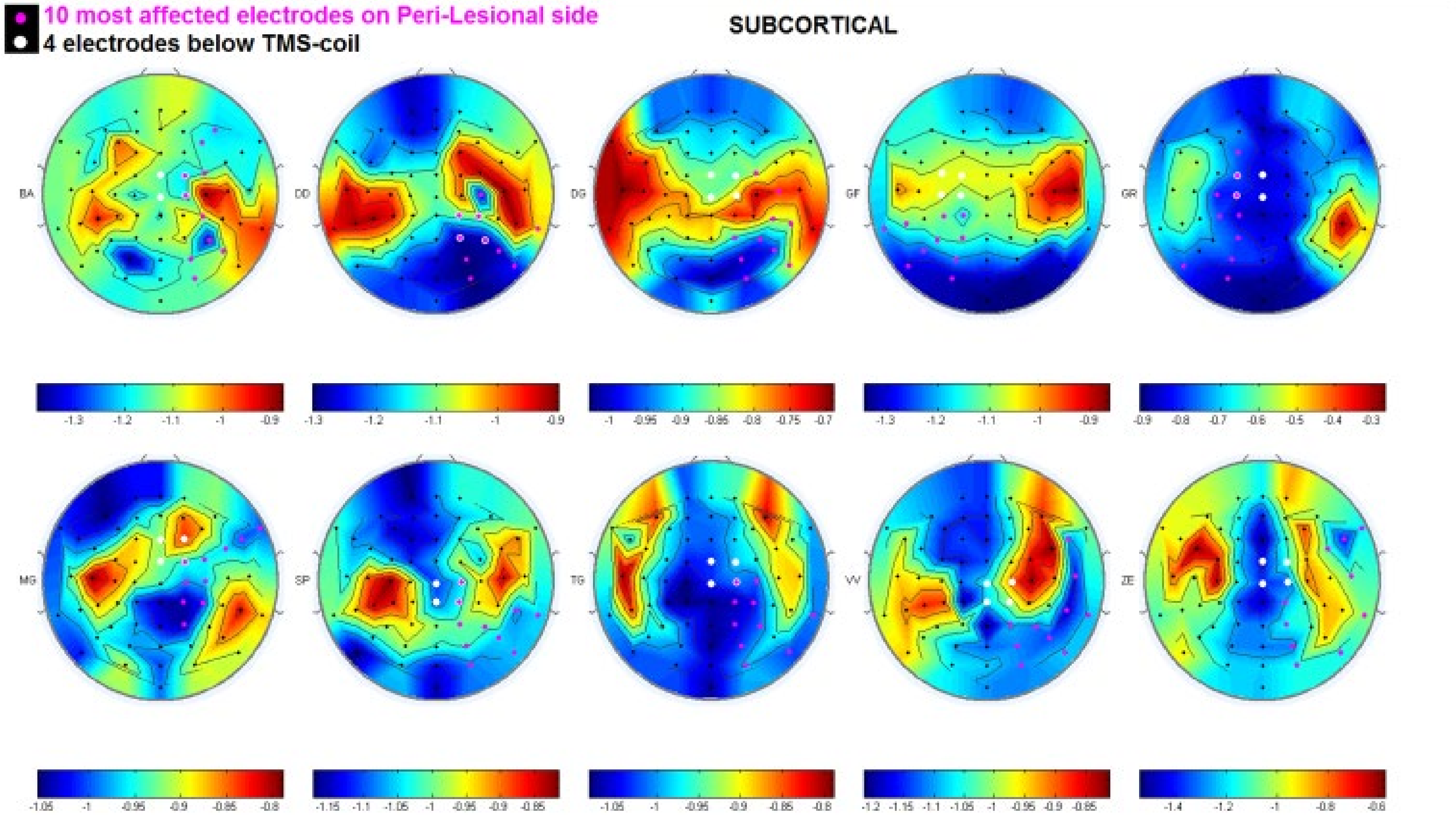


10 most affected electrodes on Peri-Lesional side
4 electrodes below TMS-coil

CORTICAL



Courtesy of M.Colombo



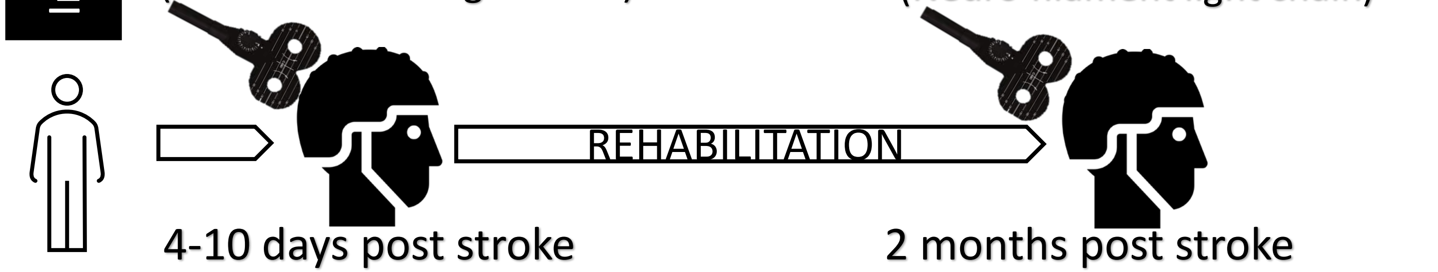
Courtesy of M.Colombo

30 pt and counting

Intervention

EEG
EEG-TMS
SIMOA BIOMARKES
(Neuro filament light chain)

EEG
EEG-TMS
SIMOA BIOMARKES
(Neuro filament light chain)



4-10 days post stroke

2 months post stroke

Outcome

NIHSS
FIM
FM-UE
Stroke Volume

NIHSS
FIM
FM-UE

Reproducibility

Link with volume

Source space distribution

Links with EEG-TMS perturbation

Relation with biomarkers

Predictive outcome model

EEG informed non invasive neurostimulation


Not for everyone
PIC•COLLAGE