



Aircraft Cabin Air – Neurotoxicity

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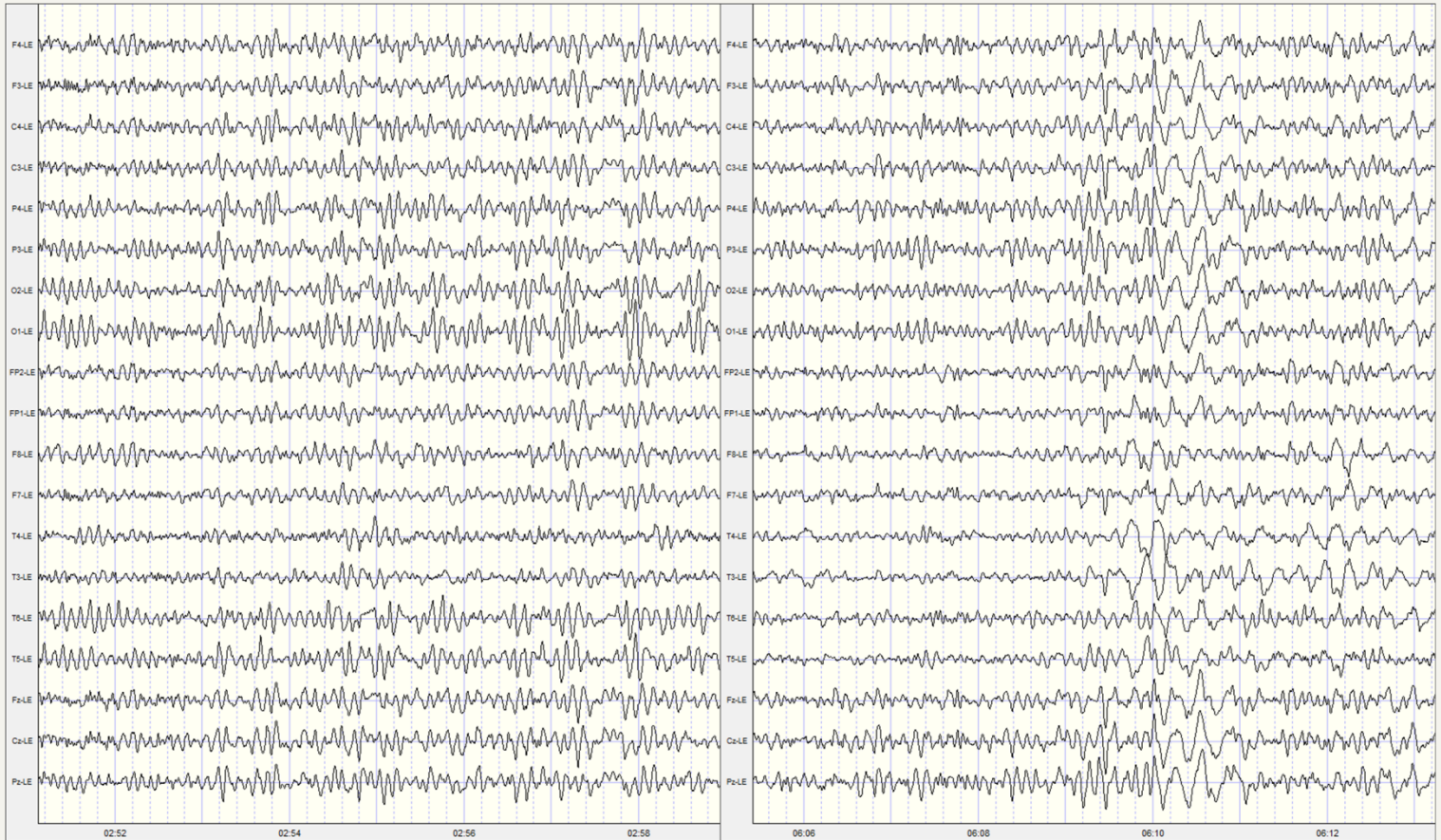
Neurophysiology

qEEG – ERP - EP



Neurophysiology

- EEG

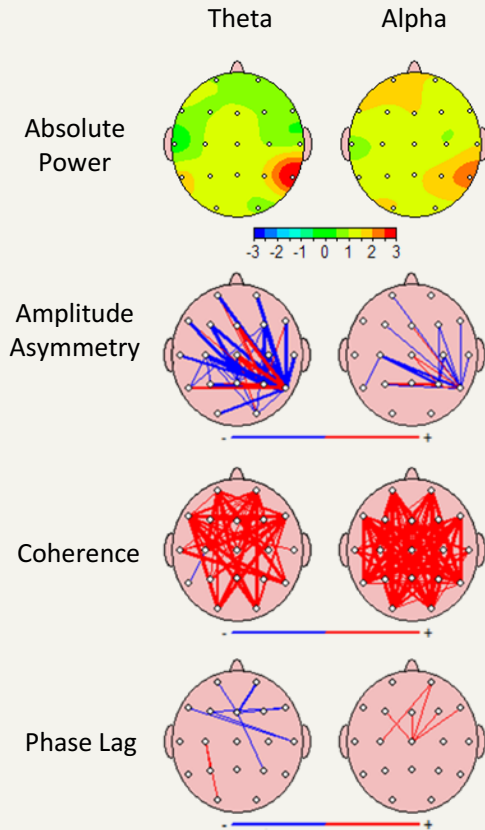




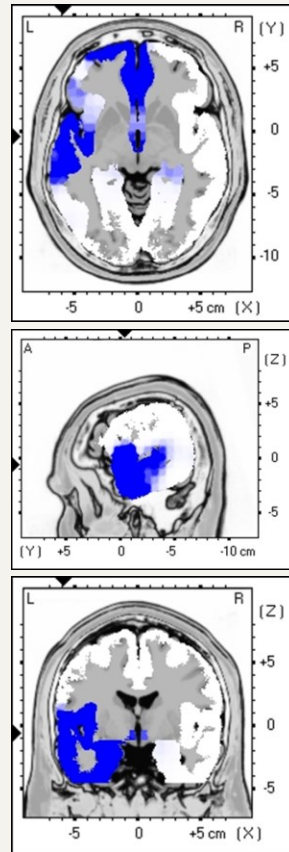
Neurophysiology

qEEG

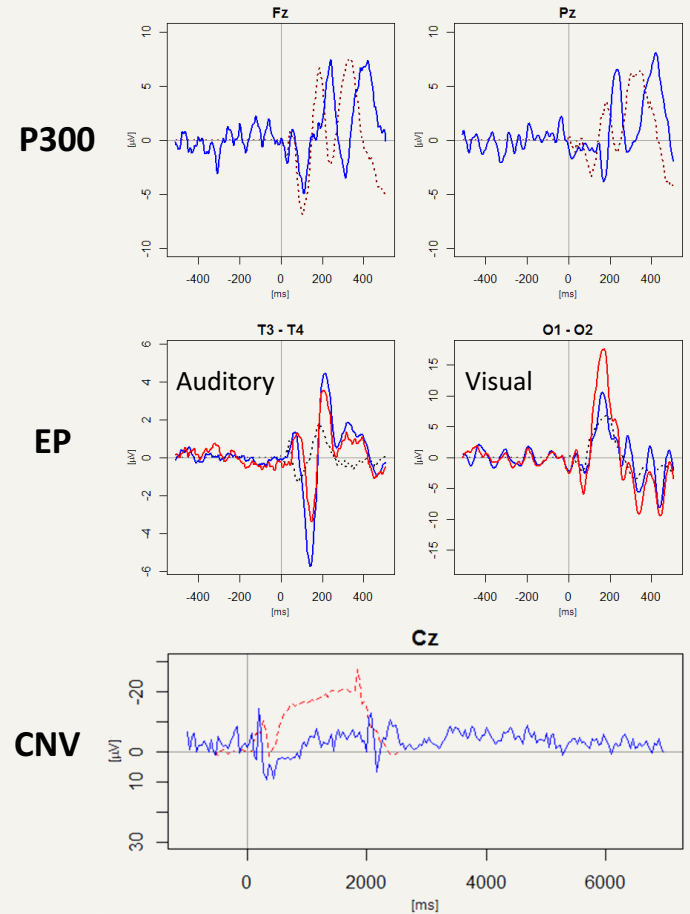
2D Topography



3D Source Analysis



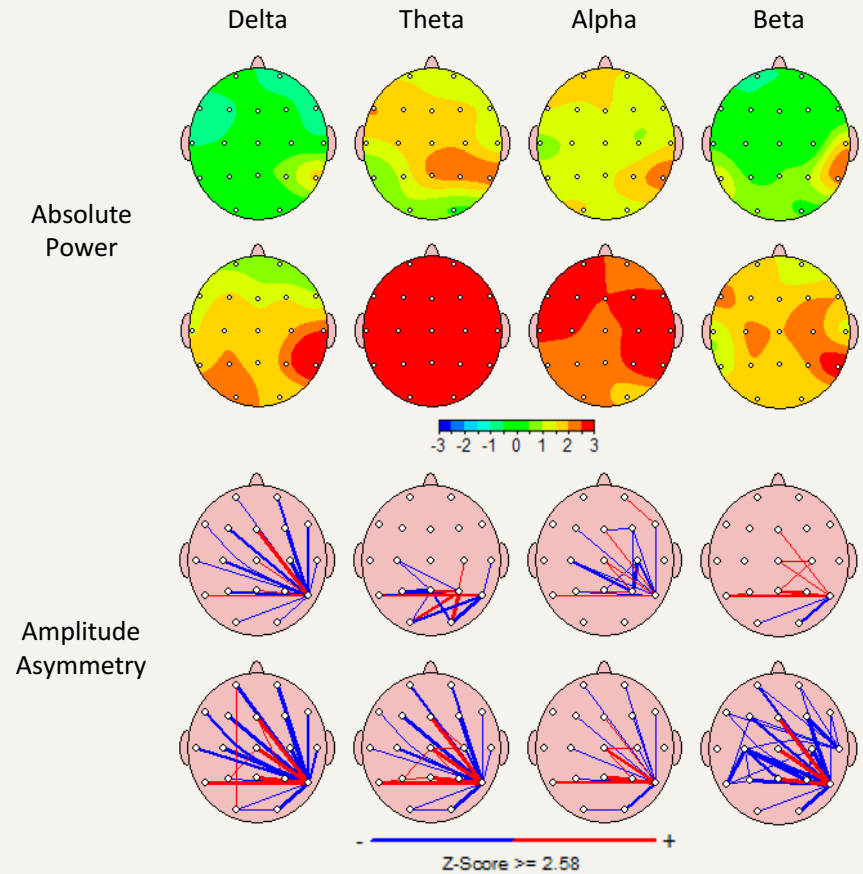
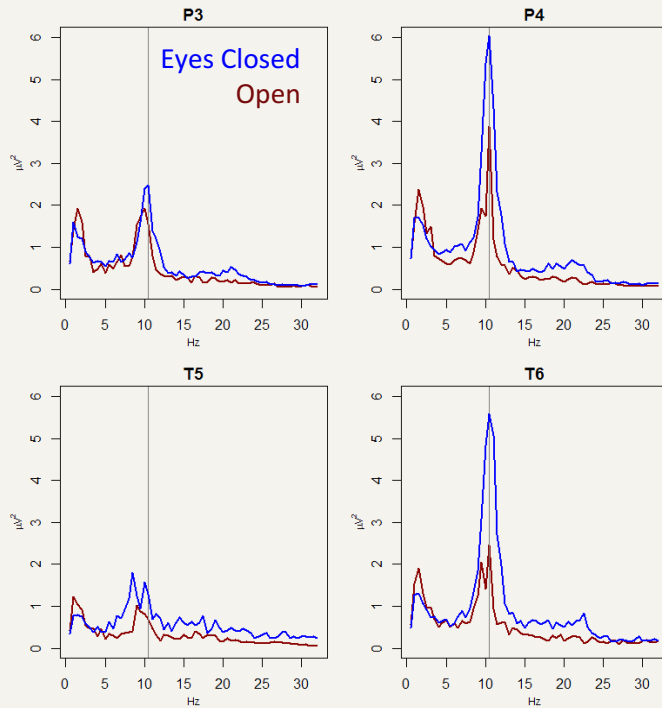
Event Related Potentials





Neurophysiology

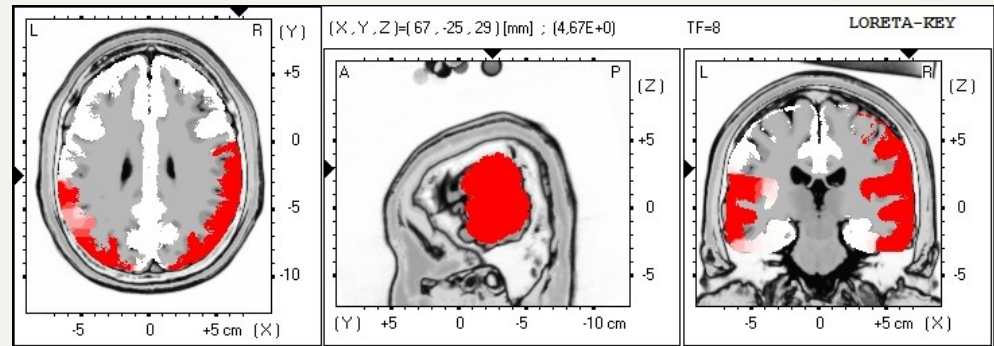
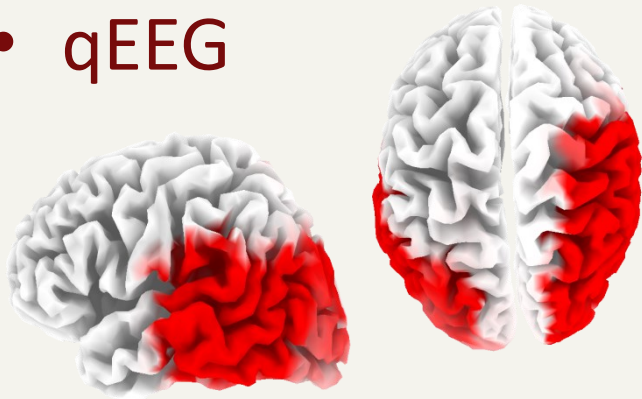
- qEEG
 - 2D topography



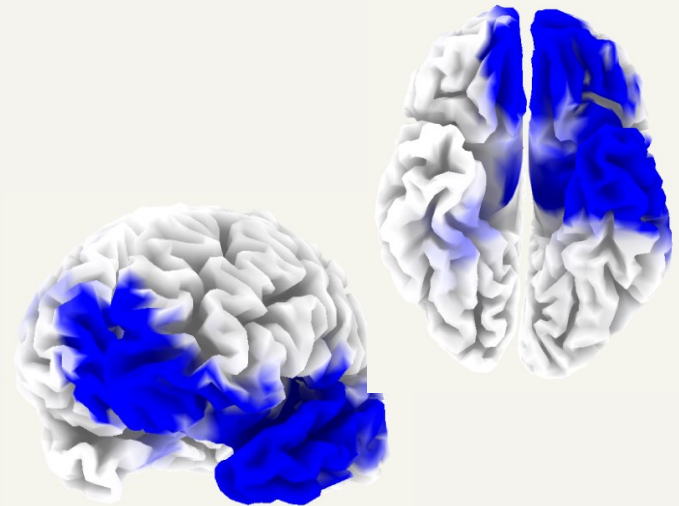
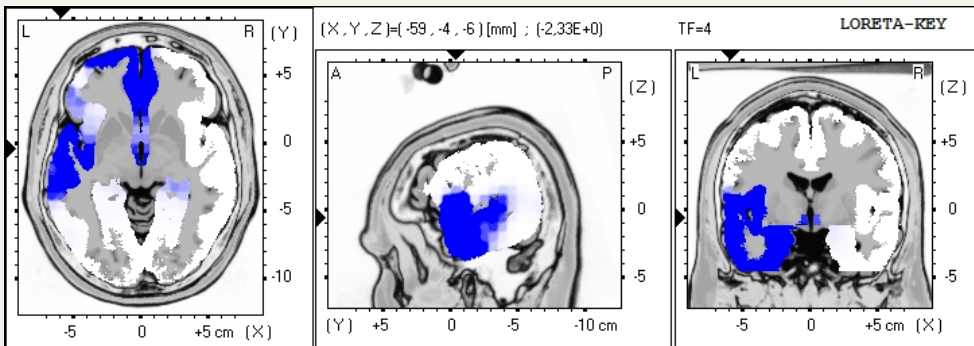


Neurophysiology

- qEEG



- LORETA 3D Source Analysis





Preliminary Results

Total subjects: 30



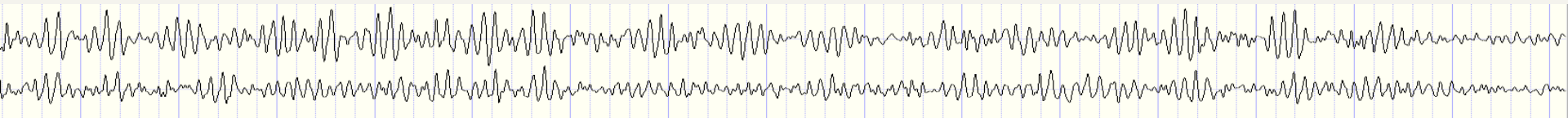
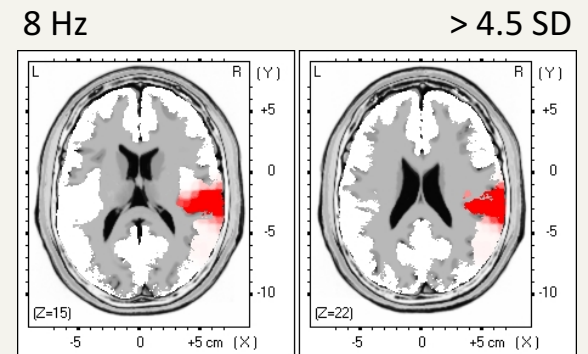
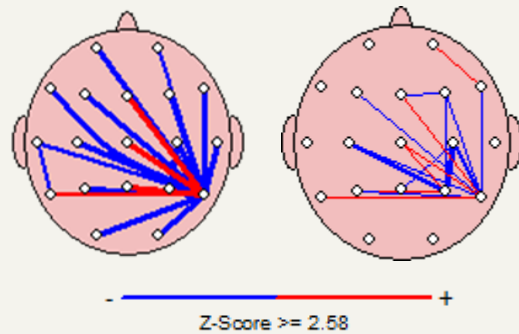
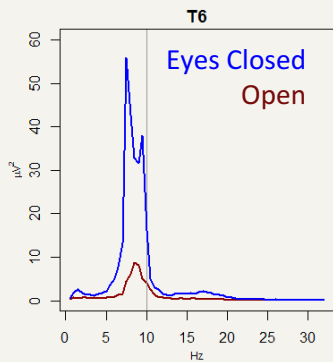
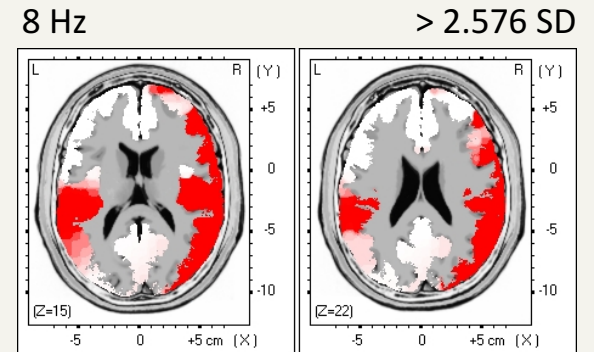
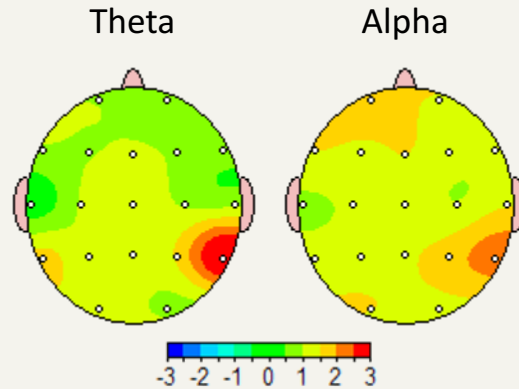
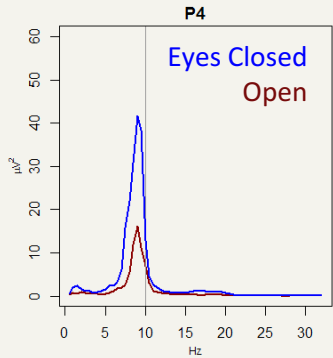
Neurophysiology

- **Subjects**
 - 30 (of 100+)
 - Pilots, Flight Attendants
Frequent Flyers, Ground Crew
 - 25-67 years of age
 - 2-42 years of flying
 - Active or
Non-active for 6 months – 22 years



Group 1

Total subjects: 25 of 30

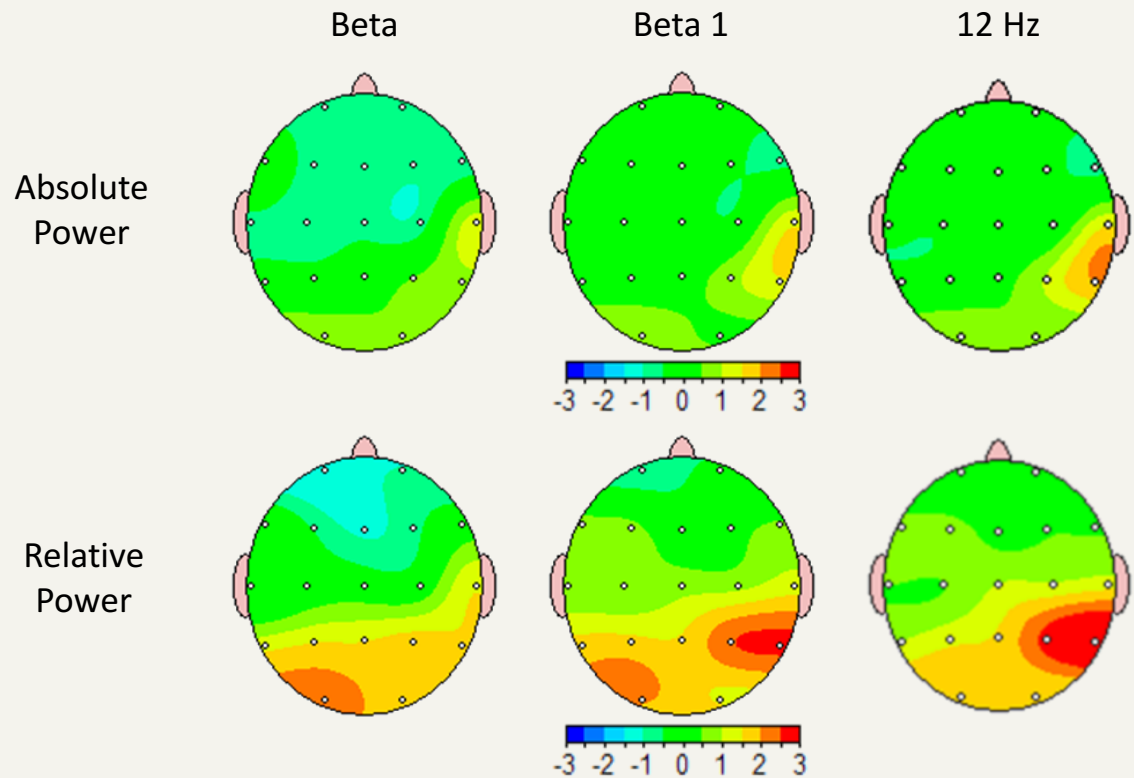
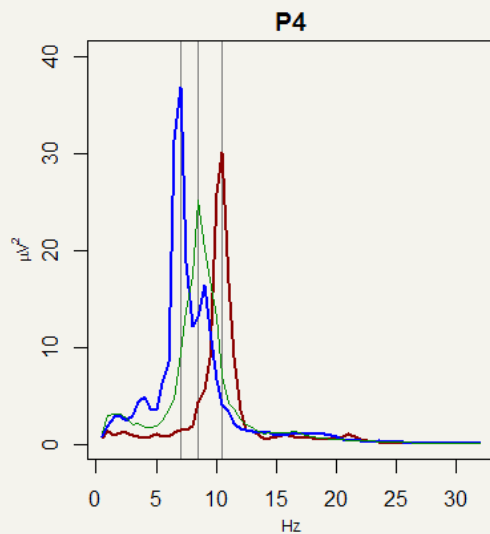




Group 1

Total subjects: 25 of 30

- 2D Topography

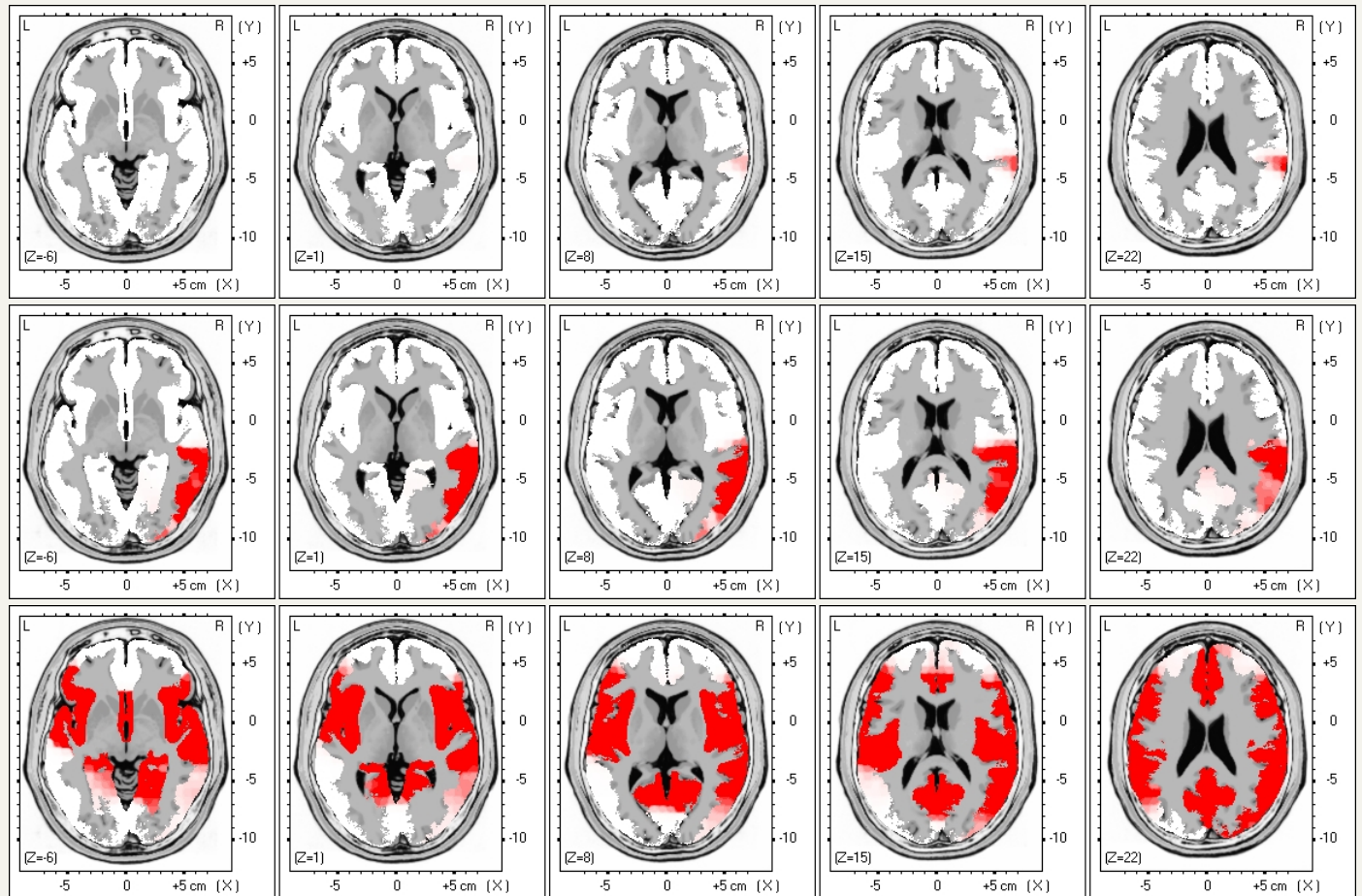




Group 1

Total subjects: 25 of 30

- LORETA

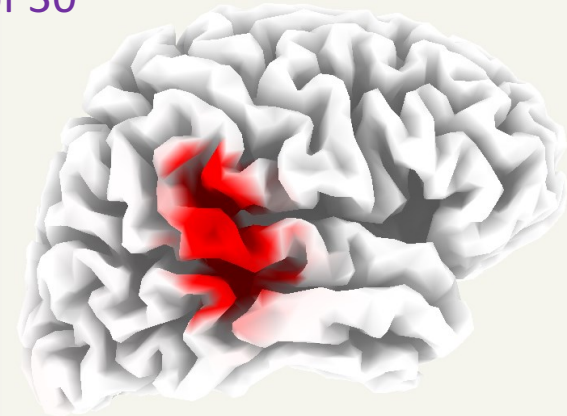




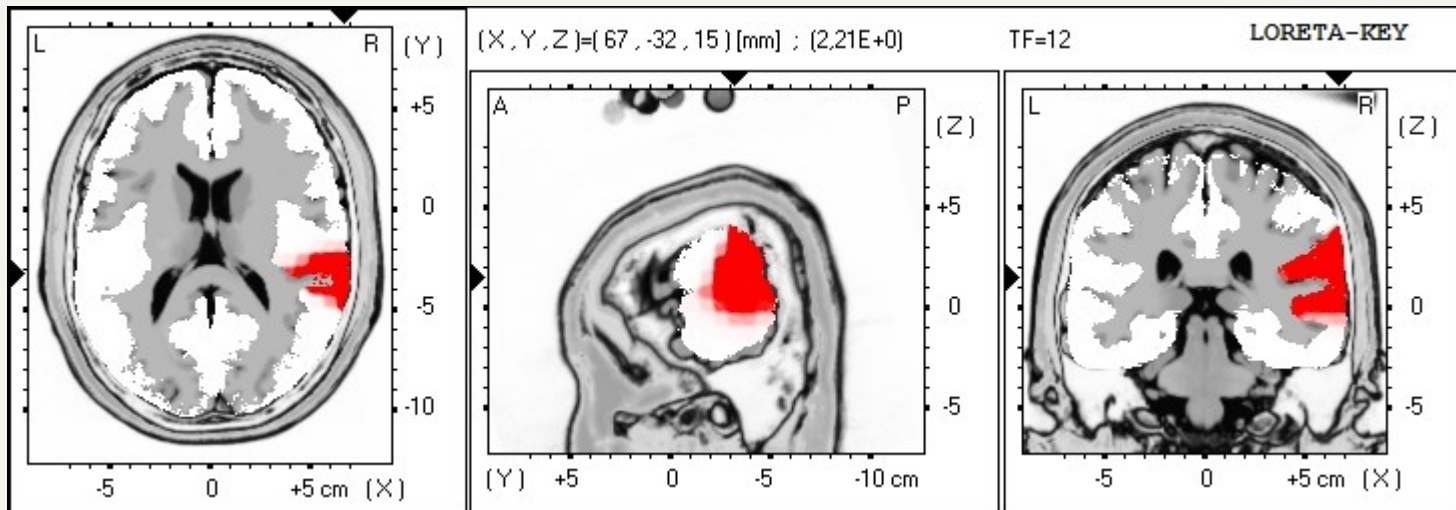
Group 1

Total subjects: 25 of 30

- qEEG
 - 3D LORETA



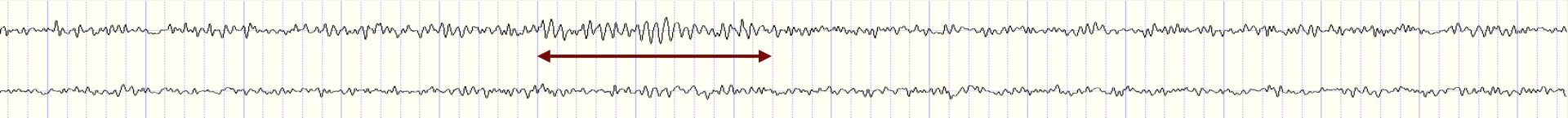
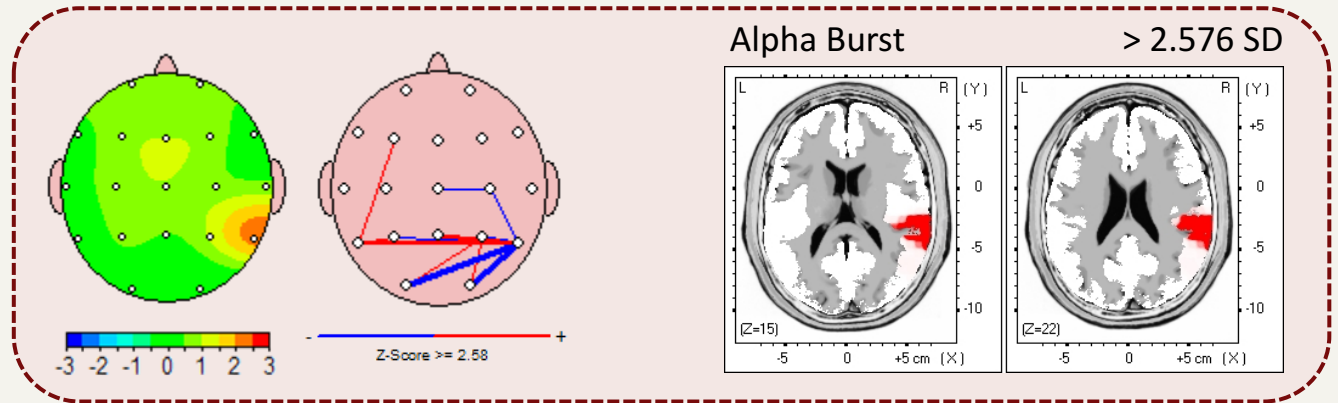
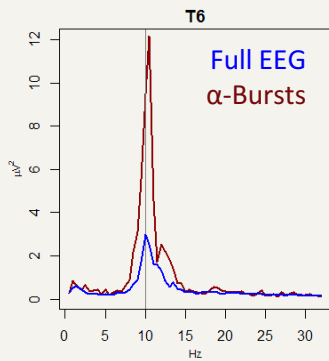
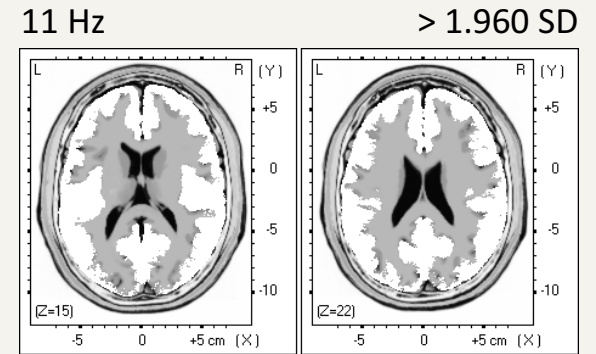
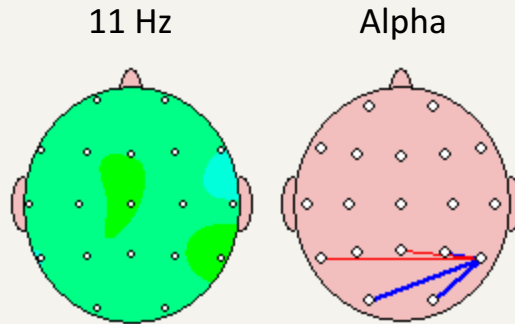
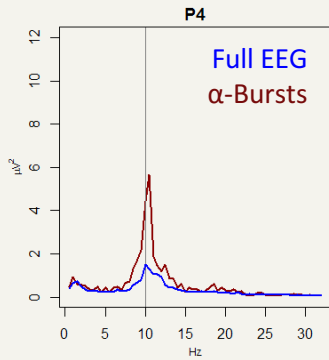
Right Hemisphere





Group 2

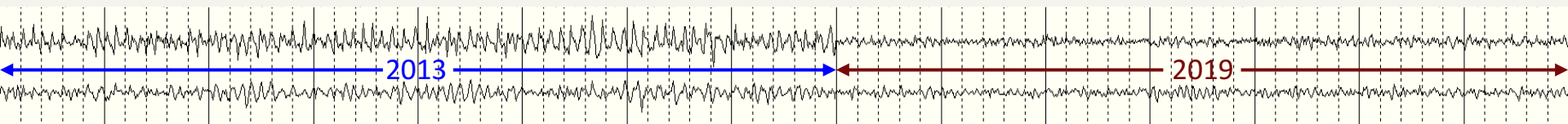
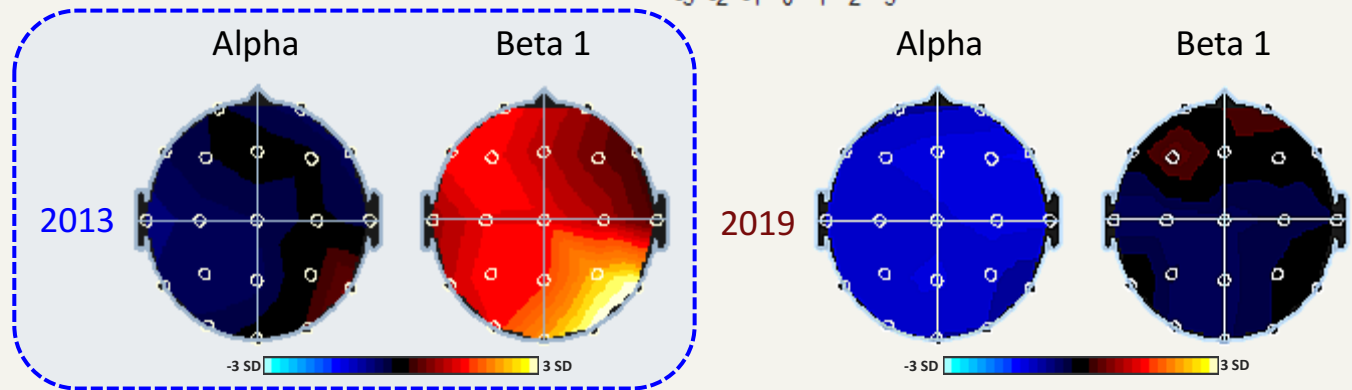
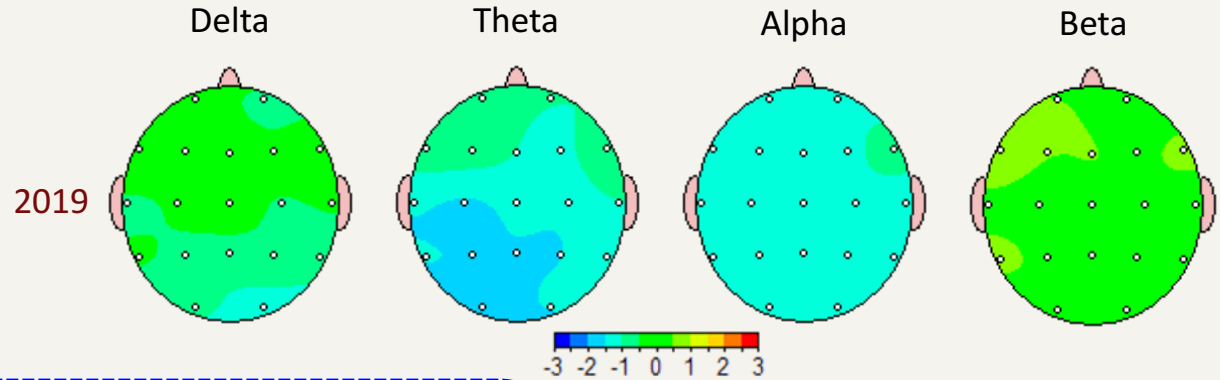
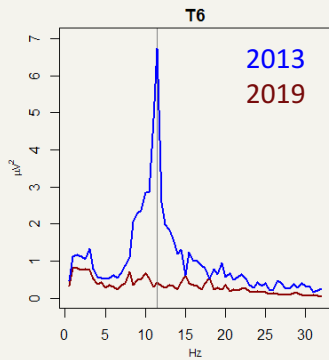
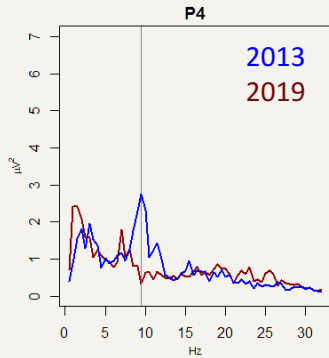
Total subjects: 4 of 30





(Group 3)

Total subjects: 1 of 30





Pattern Distribution

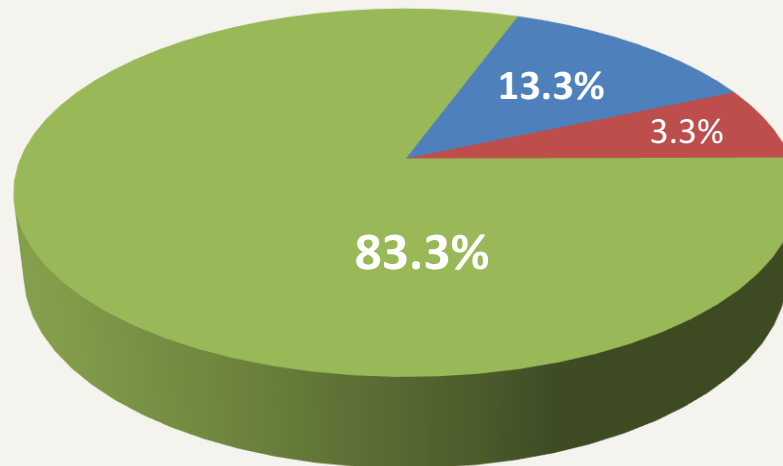
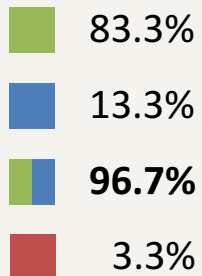
Total subjects: 30

Group 1

- **Prominent** base rhythm
- R-Post-central, R-Superior Temporal
- Peak Frequency: 7-12 Hz
- Pilot, Flight Attendant
Frequent Flyer, Ground Crew

Group 2

- **Minimal** base rhythm
- R-Post-central, R-Superior Temporal
- Peak Frequency: 9-12 Hz
- Pilot, Flight Attendant
Frequent Flyer



(Group 3)

- Absent base rhythm
- Frequent Flyer



Connecting the dots



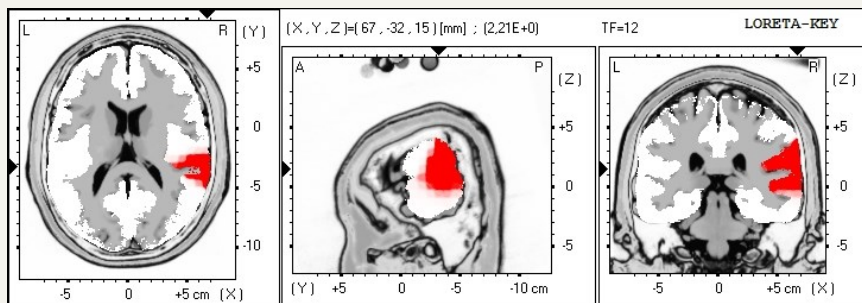
Cognitive (dys)functions

- **Functions**

- Sensory integration
- Attention
- Executive functions

- **Symptoms**

- Hypersensitivity
- Attention problems
- Losing train of thought
- Unable to multitask
- Trouble following conversations
- Difficulty remembering steps in a multi-step process
- Slow processing





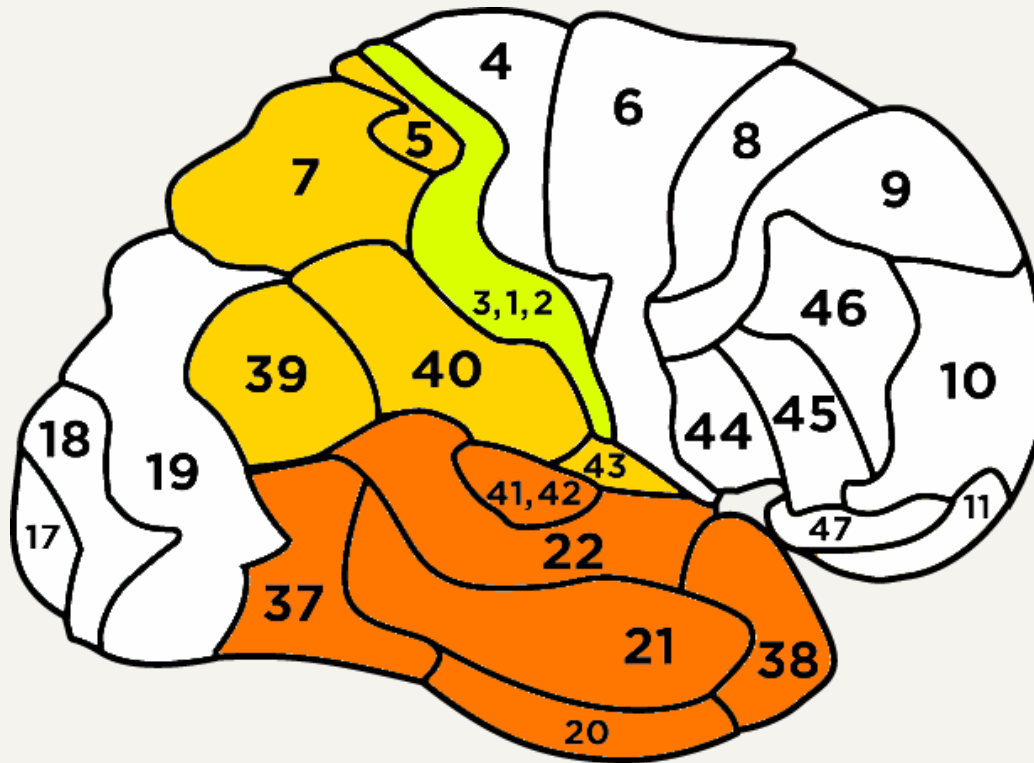
Cholinergic System

- **Organophosphates**
 - Bleed Air - Tricresyl phosphate (TCP)
 - Desinsectants
 - Flame Retardants
- **Carbamates**
 - Desinsectants
- **Metals**
 - Aluminum



Cholinergic System

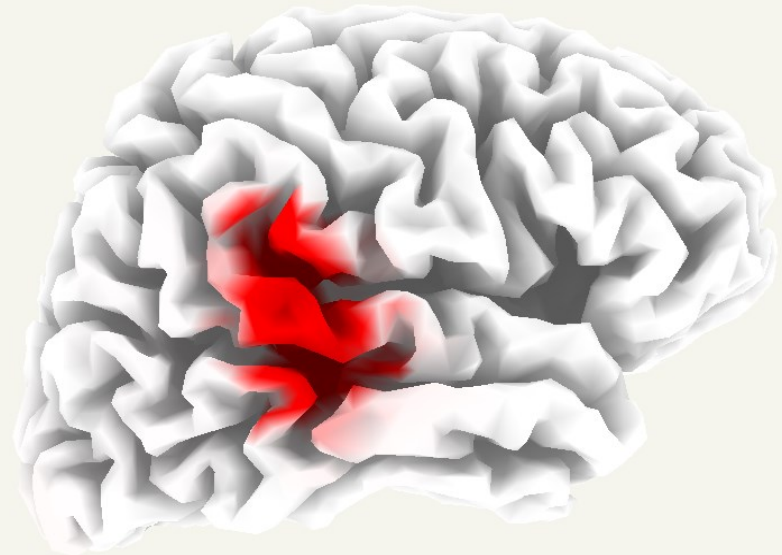
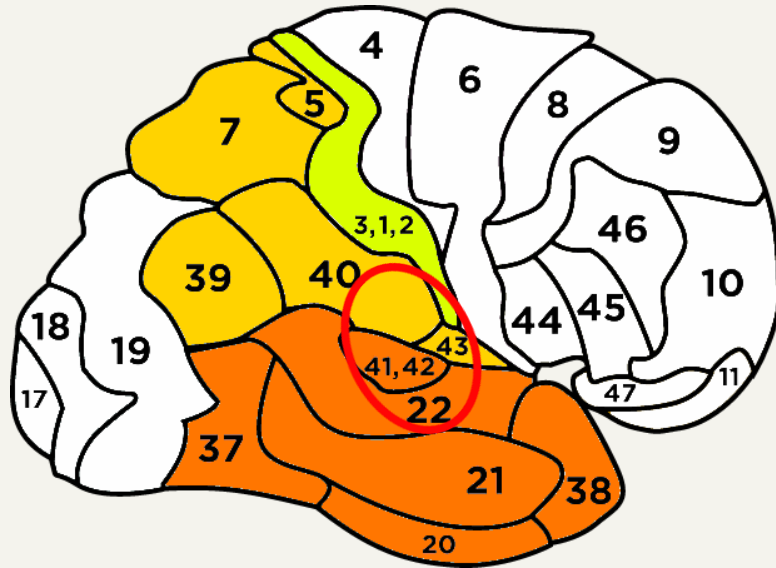
- Acetylcholinesterase (AChE)





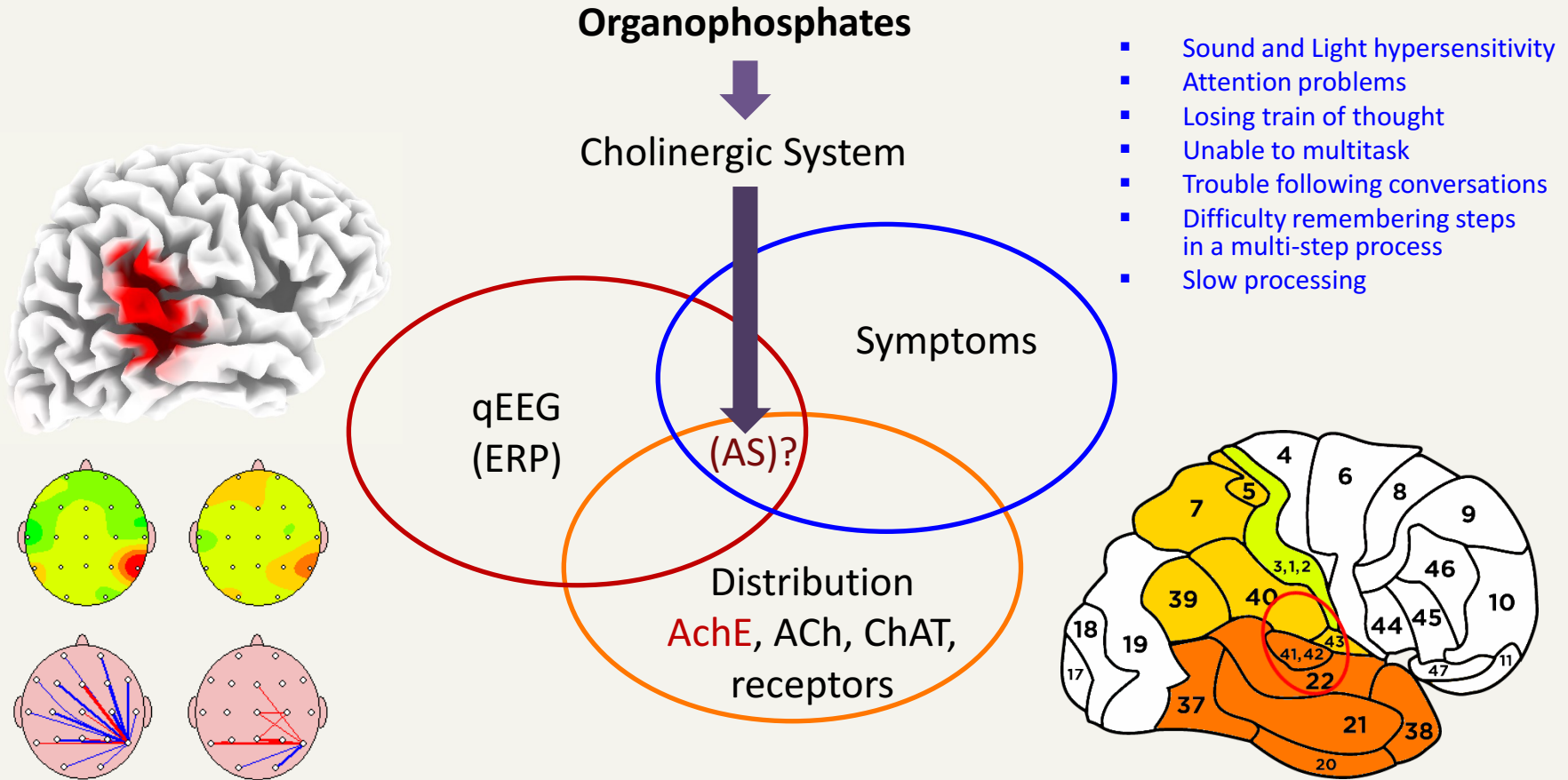
Cholinergic System

- Acetylcholinesterase (AChE)





Aerotoxic Signature (AS)?





Thank you for your attention

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