# EEG/EP Patient Report

## Physician/Practice Information:

[redacted]

**Study Technician:** [redacted]

**Ordering Physician:** [redacted]

Signature

## Patient Information:

**Name:** [redacted]

**ID:** 10780

**Birth Date:** [redacted]

## Study Information:

**Order Notes:**

**Data-Set ID:** 16454

**Date Uploaded:** 06/29/2019

## Test Notes:

## Study Findings:

An audiogram was performed and no significant hearing deficits in regards to affecting the EEG/ERP test were noted.
Task Performance Results demonstrated mildly low Button Press Accuracy and markedly prolonged Median Reaction Time. Although the Button Press Accuracy is low, it is adequate enough to result in reliable N200 and P3b measures. Low Button Press Accuracy is consistent with impaired attention and is directly correlated with P3a amplitude, which is a measure of focal attention and executive function. Prolonged Median Reaction Time is consistent with impaired stimulus processing and executive function. False alarms were minimally high, which may reflect prefrontal pathology that results in observable deficits in behavioral inhibition.
The P50 Standard Average Amplitude is normal. The P50 Latency is prolonged, which has been shown to be associated with concussion.
The N100 Standard Peak Amplitude and Average Amplitude are decreased, consistent with impaired attention and memory.
The P200 Standard Peak Amplitude is decreased, which contributes to slow reaction times and reduced accuracy of stimulus classification.
The N200 Target Peak Amplitude and Latency were not computed by the Cognision software. The Average Amplitude is decreased. This is consistent with impaired executive function and attention.
The P3b Target Peak Amplitude and Average Amplitude are decreased. The Latency is normal. This is consistent with impaired stimulus evaluation and classification speed.
The Slow Wave Target Latency is normal.
The P3a Distractor Peak Amplitude and Average Amplitude are decreased, consistent with impaired executive function.
Peak Alpha Frequency is normal.
There is significant right-left asymmetry noted in the P3b Frontal lobe amplitudes, with the left side being decreased compared to the right. In the context of Traumatic Brain Injury (TBI), this likely indicates a localized trauma in the left frontal region.
The completed Questionnaire provided by the referring healthcare provider indicates the patient, a 21-year-old male, is a professional baseball player who was hit on the right side of the head/neck by a baseball thrown by the pitcher on 9/1/2018. The ball struck the patient just under the helmet at the right occiput/upper cervical area of the neck. No concussion protocol was given or assessed. There was no loss of consciousness or symptoms of amnesia following the accident. Post injury, the patient reports continuing headaches, neck pain, cognitive impairment, anxiety, migraines and extreme fatigue. There is no previous history of these symptoms. Cranial nerves 1,4,5 and 8 were tested. On cranial nerve 8 there was slight wobbling and unsteadiness during Mittlemeyer's marching test with eyes closed. The auditory portion of cranial nerve 8 test was not performed due to no tuning fork available. No other focal neurological symptoms noted.

CLINICAL IMPRESSION:
The EEG/ERP Study demonstrates that this patient has significantly impaired brain function with impairment of executive function, attention, stimulus processing, memory, reaction time, stimulus classification, stimulus evaluation, and classification speed.
These findings and the presence of both a delayed median reaction time and an asymmetry of P3b amplitude in the frontal region combined with a history of head trauma and/or whiplash are consistent with traumatic brain injury (TBI).

Based on the available history, this has been present only after the injury on 9/1/2018 and it is medically probable that the residual cognitive impairment is due to a traumatic brain injury that occurred in the accident on the above indicated date.

David W. Brandes, MS, MD, FAAN, FAHA

## Study Protocol:

Auditory_Oddball_Active_3_03

| *Test Name* | *Test Description* | *Patient Instructions* |
|---|---|---|
| Auditory_Oddball_Training_2_01 | | Press button with your dominant hand (red button for right-handed and blue button for left-handed) when you hear the high-pitched tone. |
| Auditory_Oddball_Active_3_01 | | Press button with your dominant hand (red button for right-handed and blue button for left-handed) when you hear the high-pitched tone. |
| EEG | EEG capture | |

| | | |
|---|---|---|
| Pure Tone Audiometry | | |

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**Name:** [redacted]

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## Study Information:

**Order Notes:**

**Date Uploaded:** 06/29/2019

## Test Name:

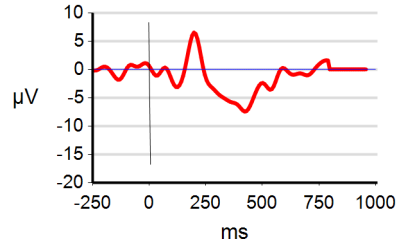
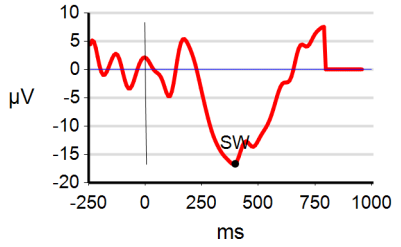
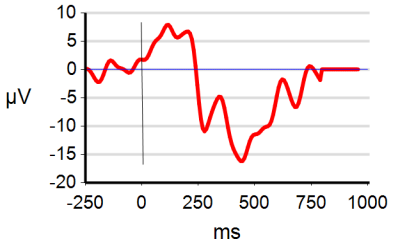
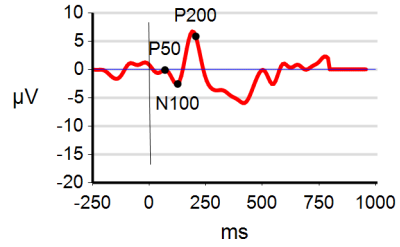
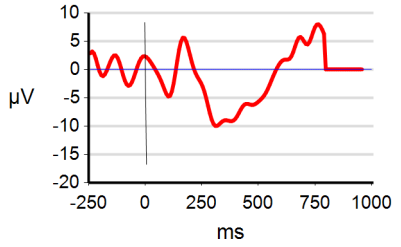
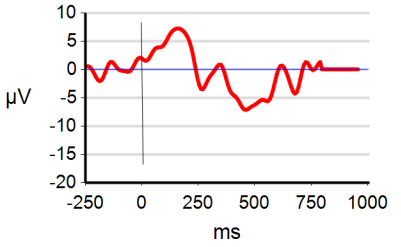
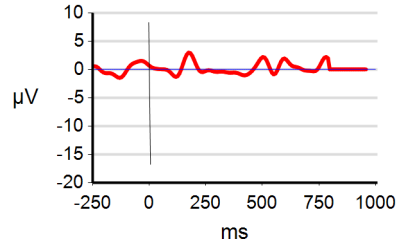
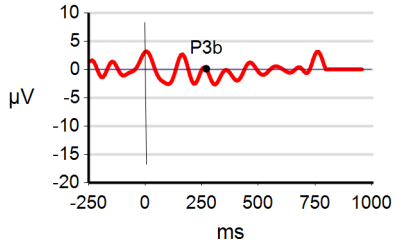
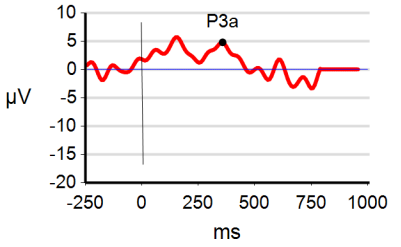
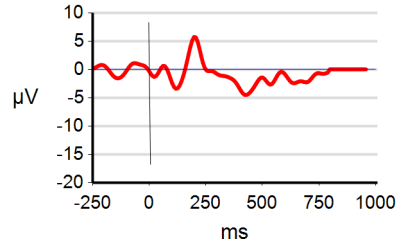
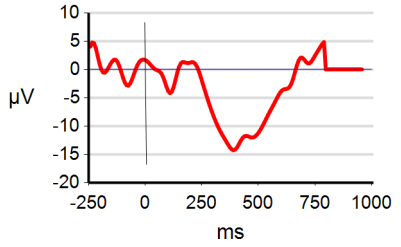
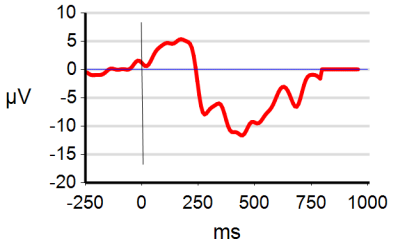
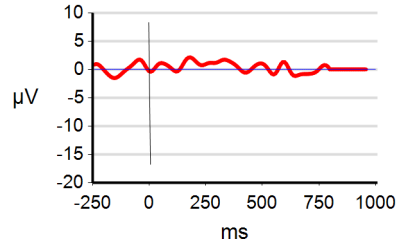
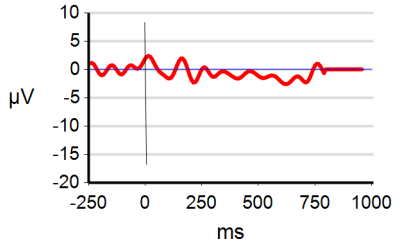
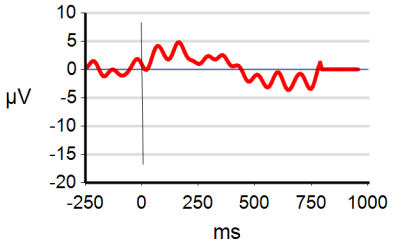
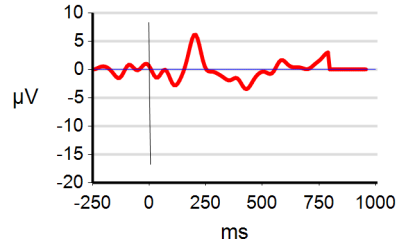
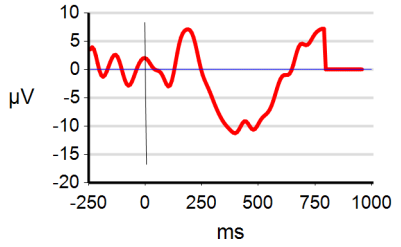
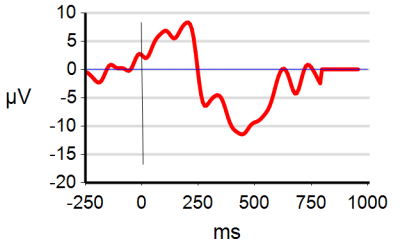
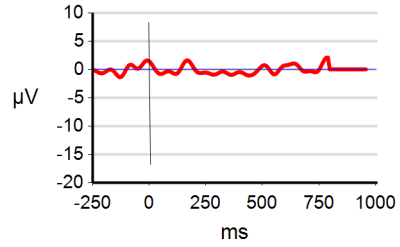
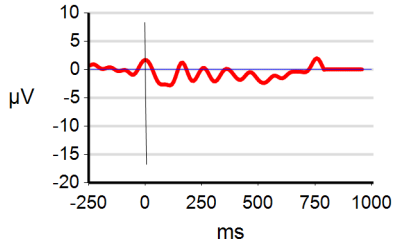
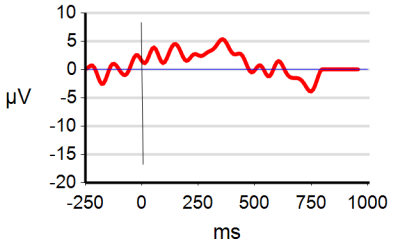
Auditory_Oddball_Active_3_01

TASK PERFORMANCE

| *Feature* | *Value* |
|---|---|
| Button Press Accuracy (%) | 90.0 |
| False Alarms (%) | 0.6 |
| Median Reaction Time (ms) | 508.0 |

ERP FEATURES

| *Feature* | *Stimulus* | *Amplitude (µV)* | *Latency (ms)* | *Avg Amplitude (µV)* |
|---|---|---|---|---|
| P50 | Standard | 0.52 | 67.4 | -0.18 |
| N100 | Standard | -2.26 | 120.0 | -1.09 |
| P200 | Standard | 5.43 | 203.2 | 2.25 |
| N200 | Target | n/a | n/a | -0.36 |
| P3b | Target | 0.34 | 264.0 | -5.38 |
| SW | Target | -9.18 | 397.3 | -6.34 |
| P3a | Distractor | 0.45 | 352.0 | -1.22 |

| | ERP WAVEFORMS | | |
|---|---|---|---|
| ***Electrode*** | ***Standard (91)*** | ***Target (53)*** | ***Distractor (37)*** |
| Fz |  |  |  |
| Cz |  |  |  |
| Pz |  |  |  |
| F3 |  |  |  |
| P3 |  |  |  |
| F4 |  |  |  |
| P4 |  |  |  |

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## Patient Information:

**Name:** [redacted]

**ID:** 10780

**Birth Date:** [redacted]

## Study Information:

**Order Notes:**

**Date Uploaded:** 06/29/2019

## Test Name:

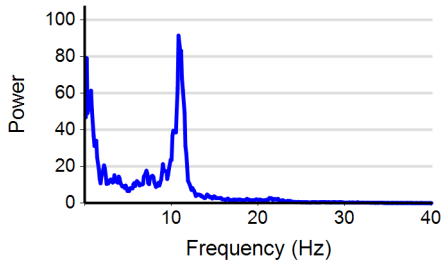
Pure Tone Audiometry

EEG FEATURES

| *Feature* | *Peak Frequency* | *Power* |
|---|---|---|
| Peak Alpha | 10.82 | 87.6 |

EEG POWER SPECTRUM

P3

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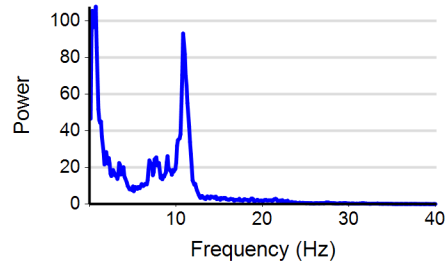


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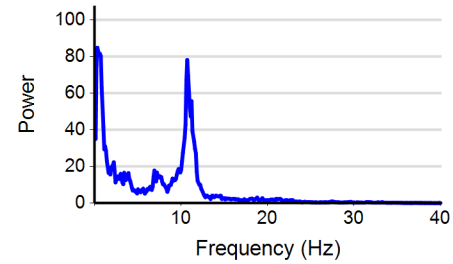
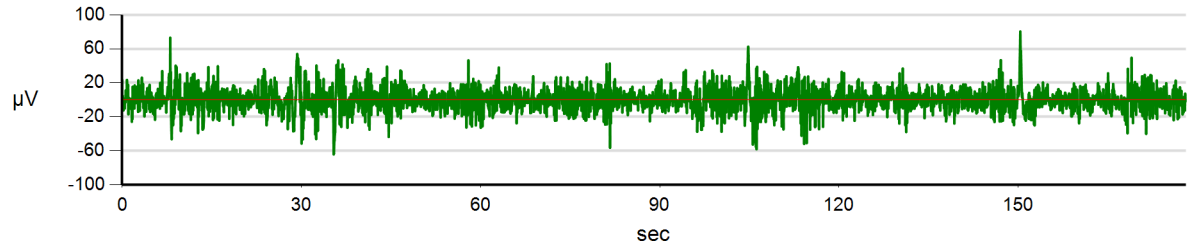
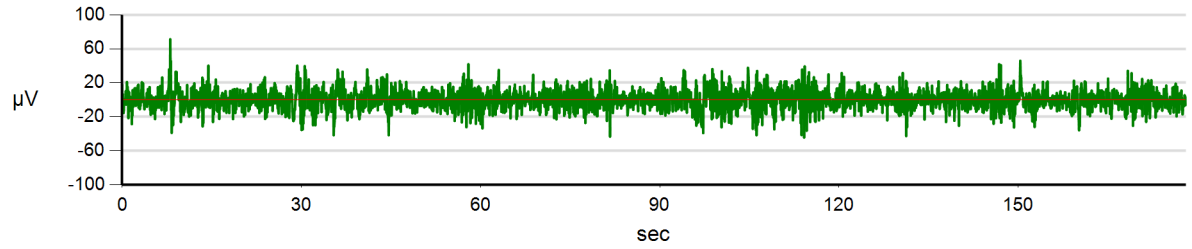
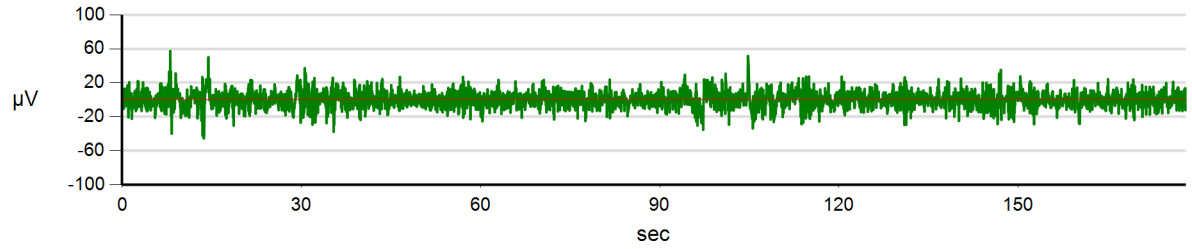
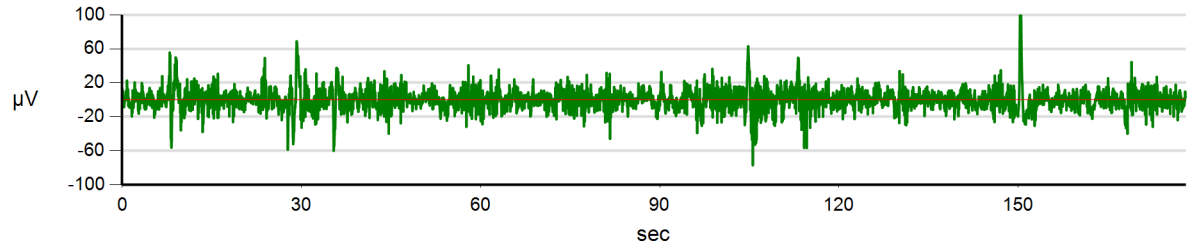
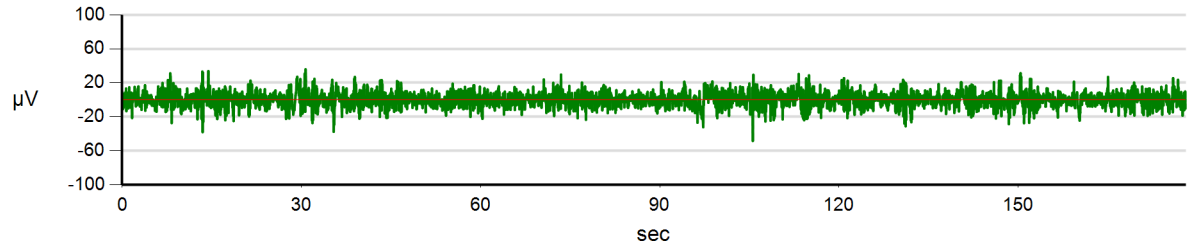
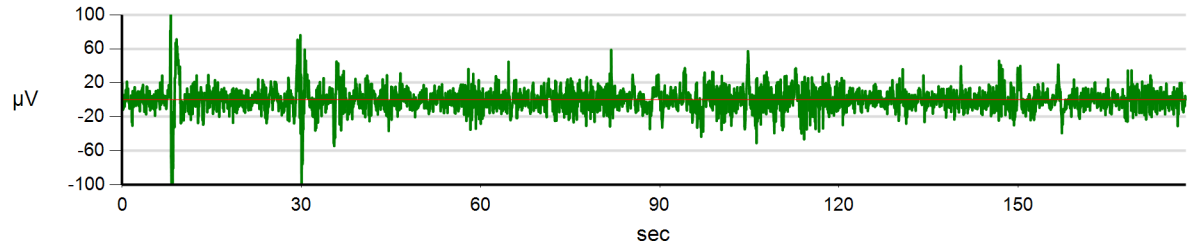
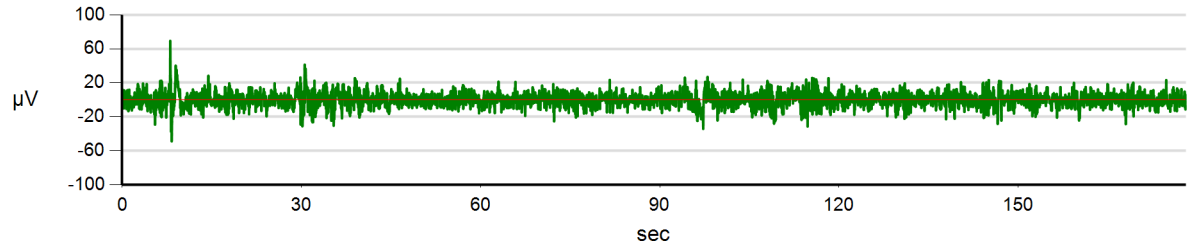


| | EEG WAVEFORMS |
|---|---|
| ***Electrode*** | ***Standard*** |
| Fz |  |
| Cz |  |
| Pz |  |
| F3 |  |
| P3 |  |
| F4 |  |
| P4 |  |

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**Study Technician:** [redacted]

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## Test Name:

Pure Tone Audiometry

AUDIOGRAM