P300Study: Overview

This document offers a high-level overview of the P300Study, as presented at the ADHD2025 Congress. The study investigates the potential of visual ERP (vERP) features—particularly the P300 wave—as predictive biomarkers of response to methylphenidate (MPH) in adults with ADHD.

Objective

To evaluate whether P300 components in a visual oddball ERP paradigm can predict treatment response to MPH in adults with ADHD, and to develop a clinically useful, EEG-based decision support tool.

Key Highlights

- **Phase 1 completed**: Clinical and EEG data were collected from 40 adult patients referred for ADHD evaluation.
- A three-stimulus visual oddball paradigm was used to elicit P300 responses.
- Metrics analyzed:
  - Mean amplitude within 280–450 ms
  - Peak latency
  - Area Under the Curve (AUC)
- Preliminary observations revealed reduced P300 amplitude and prolonged latency in untreated adults with ADHD (suggesting a responder subgroup profile).

Ongoing Work

- **Phase 2 underway**: Includes comparison of ERP data before and under MPH treatment to evaluate changes over time and support longitudinal analysis of P300 waveform development.

Clinical Setting

The study was conducted in a specialized outpatient neurology clinic, with standardized EEG protocols. ERP data were manually inspected and processed using MNE-Python.

Software Tool

A dedicated Python-based application, *P300Study*, was created for artifact rejection, metric extraction, and waveform visualization, following EEG-BIDS and FAIR open science standards.

> *This document is part of the Supplementary Material for the poster titled* "***Clinical utility of the P300 wave as a biomarker for methylphenidate response in adult patients with ADHD: First phase report***"*, 10th World Congress on ADHD – Prague, May 2025.*