SYNAPCELL

40Hz-Auditory Steady State Response

Auditory Evoked Potential, a Powerful Biomarker for Information Processing

A Powerful Window into Information Processing

The main challenge in preclinical research is finding biomarkers that can be applied across both **clinical and preclinical** settings. The 40Hz-ASSR is a non-invasive biomarker detectable in both humans and rodents. It measures how well the auditory cortex **processes information** and generates synchronous activity at a specific frequency. Disruptions in ASSR are linked to disorders such as **schizophrenia**, **bipolar disorder**, and **autism spectrum disorder**.

Why EEG Phenotyping ?

Translational

This Evoked Potential can be observed in **humans and animals** at a peak frequency of 40Hz. Several **non-invasive** experimental protocols are commonly **used in the clinic** on human patients.

Objective

40Hz-ASSR provides a **robust** and **specific** measure of brain resonance to auditory stimuli in **freely-moving** animals.

Sensitivity to Neuropsychiatric Conditions

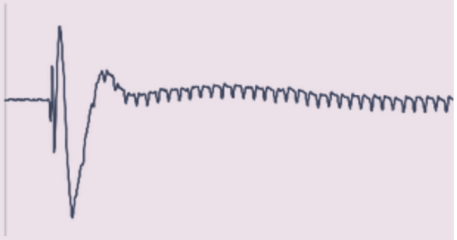
The 40-Hz ASSR is **sensitive to alterations** in neural circuits that are often disturbed in **neuropsychiatric conditions**. This sensitivity enhances its utility in both understanding and diagnosing these conditions.

How Do We Produce an Auditory Response?

ASSR Paradigm

Animals will be stimulated with a train of sound pulses of 5ms at 40Hz, lasting 2s with a resting period of 8s. This procedure is repeated 360 times, lasting 1 hour in total.

Resulting Cortical Response



First stimulus triggers a greater response, followed by a train of resonance.

Case Study: Characterizing a Neurodevelopmental Disorder Model

Step 1

Electrode **implantation**
Model selection (EEG)

Step 2

40Hz-ASSR recording

Step 3

Analysis : **Evoked Power** and **Inter-Trial Coherence**

Results

Grand Average of Responses

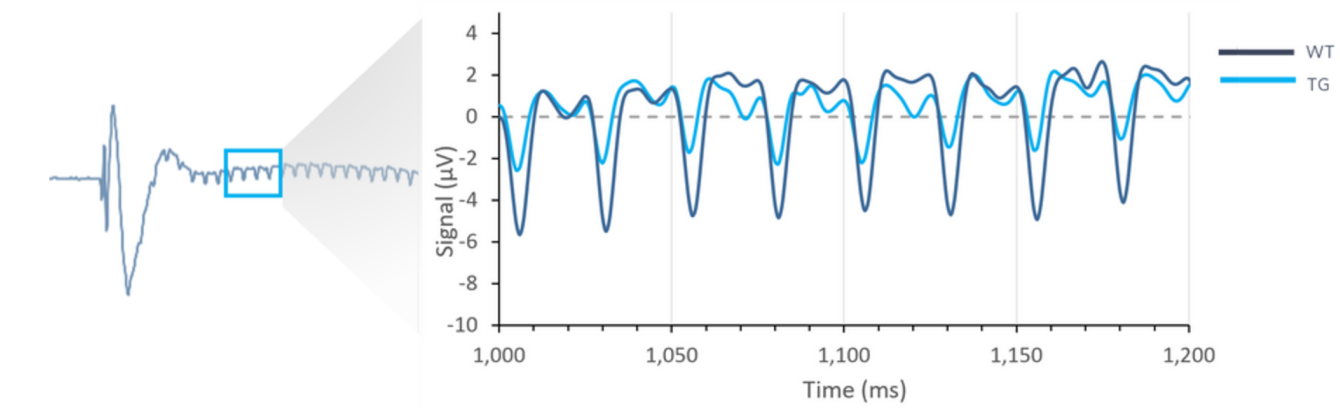


Figure 1 - Close-up of the grand average of responses to the 40Hz-ASSR for both genotypes.
Dark blue : WT animals (n=15); **Light blue** : Transgenic animals (n=15).

The amplitude of response to the 40Hz ASSR stimulation is significantly decreased for the transgenic animals.

Evoked Power & Inter-Trial Coherence

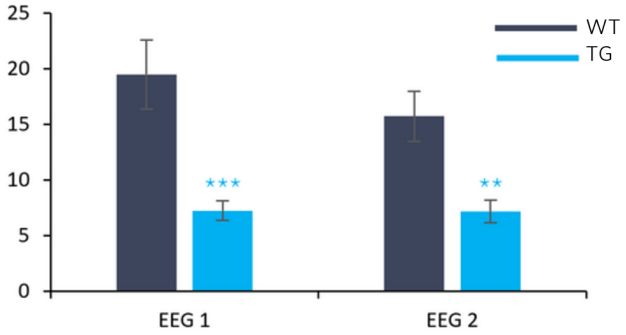


Figure 2 – Evoked power measured in WT and Transgenic rats for 2 recordings, n=15 animals per genotype.

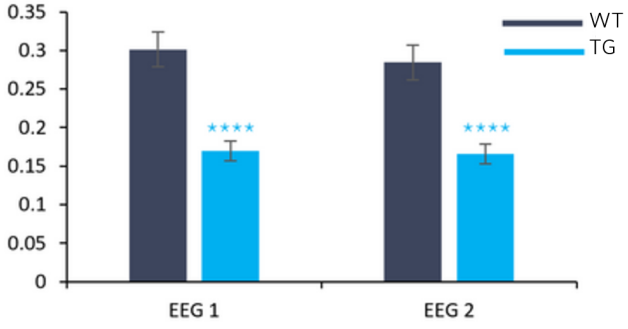


Figure 3 – Inter-Trial Coherence index measured in WT and Transgenic animals for 2 recordings, n=15 animals per genotype.