

What is FFR/cABR?

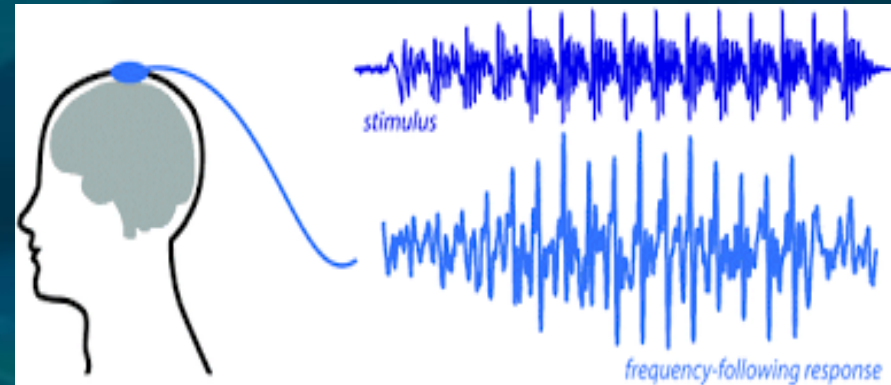
AEPS TO SPEECH STIMULI

Auditory Processing Disorder

- “A subject with APD does not have a defined anatomical abnormality, but has an apparent hearing difficulty in difficult listening situations.”
 - Nina Kraus and Samira Anderson, 2016
- cABR/FFR can provide an **objective** measurement of an abnormal auditory response to a speech token that is unaffected by immediate attention, cognitive functioning, language skills, or motivation in the presence of apparently normal peripheral auditory function.
- At this time, cABR/FFR is **not** sufficient to diagnose APD by itself, but it provides excellent support to other behavioral measures.

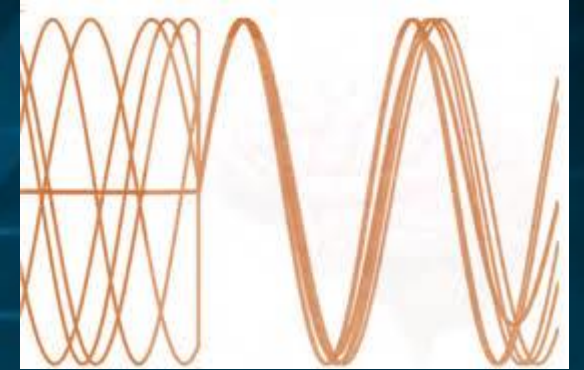
Why measure cABR/FFR?

- “Accurate manifestations of stimulus timing in the auditory brainstem is a hallmark of normal perception.”
- “Less synchronous cABR/FFR responses can be improved (i.e. made more synchronous) by perceptual (auditory) training. These changes are preattentive and precede behavioral learning.”



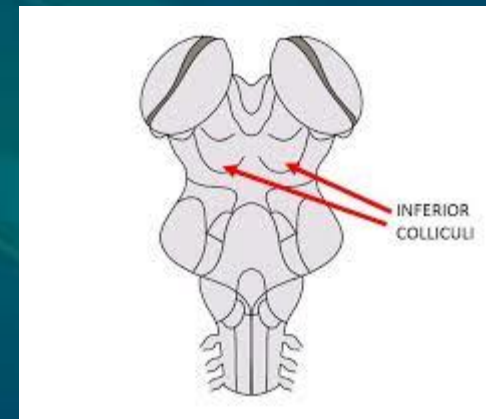
Auditory Evoked Potentials

- EEG recorded in response to sound stimulation
- The response is related in a **time-locked** fashion to changes in the sound stimulation.
- There is a **regularity**:
 - Response occurs at a fixed interval
 - Resulting waveforms correspond to changes in the sound stimulus.
 - We expect the auditory system to function at high performance level over time: poor synchrony or poor consistency is abnormal.



Generators

- Many cognitive neuroscience models argue that cortical structures should be focus for understanding complex auditory and speech processing.
- Subcortical regions have been regarded as passive relay stations.
 - Inferior Colliculus and Lateral Lemniscus are subcortical



Hub

- However, Auditory Neuroscience Laboratory's (ANL) research emphasizes midbrain (inferior colliculus) as a **hub** in which afferent and efferent pathways interact.
- As a hub, the inferior colliculus contains a meeting point for both afferent and efferent fibers of the auditory pathway.
 - The IC receives input from lower brainstem nuclei (including auditory periphery),
 - but it also is impacted by learning via cortical, limbic and cerebellar feedback.
- Language is an experience-dependent behavior.
 - **Feedback affects performance.**
 - **Behavior** has impact on how auditory signal is encoded, and therefore, understood.
 - Sensory and cognitive and reward circuitry in brain interact.

