University of Antwerp
Faculty of Medicine and Health Sciences

ACTA Academisch Centrum Tandheelkunde Amsterdam

UZA

Exploring Frequency Following Response (FFR) Changes Following Orofacial Treatment in Somatosensory Tinnitus: a Pilot Study

Background and rationale

Tinnitus or 'ringing in the ears' is a conscious perception of a sound in the absence of a corresponding auditory source. It affects 10 to 15% of the adult population. Somatosensory tinnitus is a subtype of tinnitus that is related to dysfunctions and pain in the cervical spine or to temporomandibular dysfunction (TMD).

Our previous research has shown that treatment targeting neck dysfunctions and pain and TMD is effective in 53 to 61% of cases.

Additional information is needed on the exact pathophysiology of somatosensory tinnitus and on the working mechanisms for treatment.

Frequency-Following Responses (FFRs), figure 1, are a way to investigate the neurophysiological link between the auditory and somatosensory systems. It is an electrophysiological measurement in which the response to sound is measured via electrodes applied to the scalp, see figure 2.

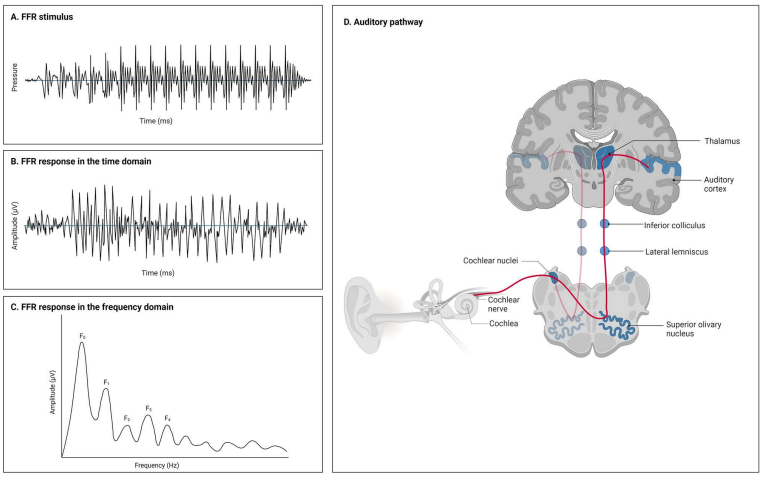

Figure 1:
A Waveform of a typical speech stimulus used to obtain the FFR: a 170 ms /da/ stimulus. **B** FFR response in the time domain. The FFR reflects temporal and spectral features of the eliciting stimulus. **C** By applying a Fast-Fourier transform, the FFR response can be interpreted in the frequency domain. **D** Schematic representation of the auditory pathway. The FFR is generated mainly in the auditory midbrain, but receives contributions by the entire auditory pathway. Created with BioRender.com

Figure 2:
Subject undergoing FFR measurement (picture with consent)

Background info on Auditory Evoked Potentials in tinnitus? Scan here:

Background information on FFRs? Scan here

Objectives are to study 1. if FFRs are reliable, and 2. whether FFR parameters change after treatment of somatosensory tinnitus.

Study design

Longitudinal cohort study. By comparing the two FFR measures before the start of the treatment, their test-retest reliability within this specific population can be assessed. Changes in FFR before and after treatment will be analysed and related to tinnitus changes, see figure 3.

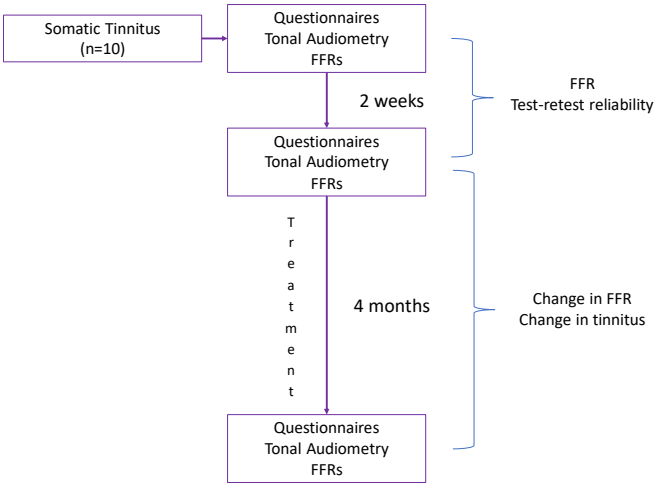

Figure 3: Flow chart of study design

Practical aspects

Ongoing collaboration between the University of Antwerp, the Antwerp University Hospital and ACTA Amsterdam.

Project is part of an **ongoing research line** on tinnitus and serves as a basis for future grant applications.

Students are expected to **travel** to ACTA Amsterdam for these measurements (measurements on Mondays). It is estimated that three participants can be included and measured on one day.

All **measuring devices are available** in Antwerp (Audiometer "Stand Alone" Grason – Stadler PELLO, incl. headphones for air conduction and bone conductor; Intelligent Hearing Systems Duet, including laptop with SmartEP software). Students will receive specific training to perform all measurements.

Ethical approval has been obtained.

Supervising team and contact information

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