FACULTY OF MEDICINE AND HEALTH SCIENCES

BrainComm

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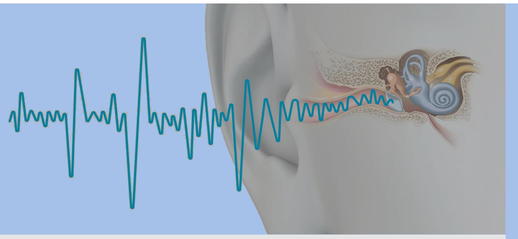


AN AUDITORY BIOMARKER FOR PARKINSON'S DISEASE?

Background

> There is convincing clinical evidence of alterations in auditory function in patients with Parkinson's disease (PD). However, the nature of these alterations has not been clarified sufficiently.

> Auditory function involves a number of structures in the brainstem. According to the Braak & Braak hypothesis, synuclein pathology affects caudal brainstem structures early in the premotor stages of PD. Therefore, the question is whether brainstem nuclei involved in auditory processing are affected in these early stages and whether the investigation of auditory function could serve as a biomarker for PD.

> The aim of this preliminary study is to investigate the differences in auditory function between patients with PD and matched healthy control participants (HCs).

Research questions

> Are auditory deficits intrinsic to Parkinson's disease?

> Is there an effect of dopaminergic medication on auditory processing in PD?

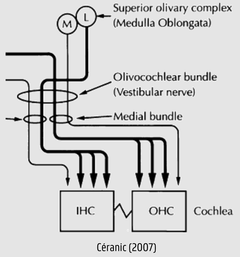
Method

> Inclusion

- 25 participants with idiopathic PD
  Tested with (on) and without (off) dopaminergic medication

- 25 HCs matched for age, gender, education

> Comprehensive audiological test battery



Céranic (2007)

Subjective measurements

- Liminar tonal audiometry
- Speech audiometry (in noise)

Objective measurements

- Transient evoked otoacoustic emissions (TEOAEs)
- Distortion product otoacoustic emissions (DPOAEs)

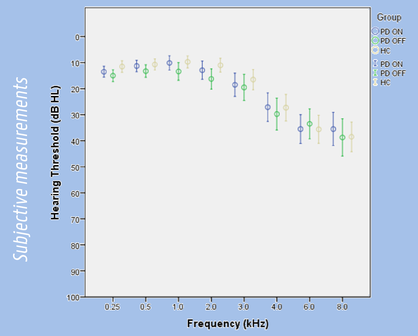


Figure 1. Liminar tonal audiometry in patients with PD and HCs.

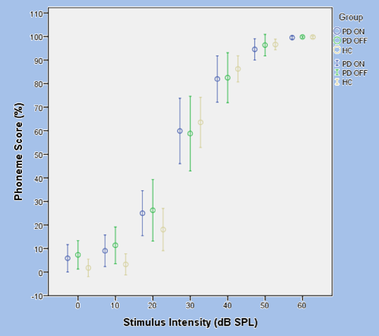


Figure 2. Speech audiometry in patients with PD and HCs .

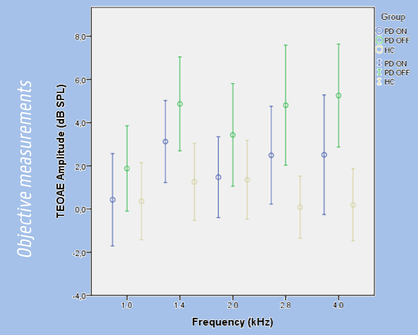


Figure 3. Transient evoked otoacoustic emissions (TEOAEs) in patients with PD and HCs (SNR > 0) .

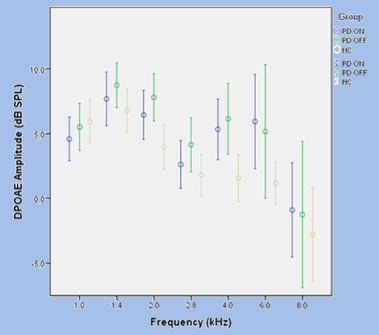


Figure 4. Distortion product otoacoustic emissions (DPOAEs) in patients with PD and HCs (SNR > 0).

Results

Subjective measurements

> No significant differences between patients with PD and HC (Fig. 1 & 2)
> No effect of dopaminergic medication in patients with PD (Fig. 1 & 2)

Objective measurements

> Significantly higher TEOAE response amplitudes in PD OFF versus PD ON and HC (Fig. 3)
> Trend for higher DPOAE response amplitudes in PD OFF versus HC (Fig. 4)

Conclusion

> Since OAE amplitude is regulated by the olivocochlear efferent system, the current results could indicate a dysfunction of this system, which is known to be inhibitory.

> Higher OAE responses were found when patients were tested without dopaminergic medication (off). This finding suggests a modulatory effect of dopaminergic medication on the efferent auditory system in PD.

> Further work needs to be done to establish whether objective auditory measurements might serve as biomarkers in the different stages of the disease process.

References

> Braak & Braak (2000). Pathoanatomy of Parkinson's disease. *Journal of Neurology.*
> Céranic (2007). The value of otoacoustic emissions in the investigation of noise damage. *Audiological Medicine.*
> Pisani et al. (2015). An investigation of hearing impairment in de-novo Parkinson's disease patients: A preliminary study. *Parkinsonism and Related Disorders.*
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