Psychophysical hearing tests of a new sound coding strategy for cochlear implant users

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The objective of the study is to answer the following questions:a) Does the PLS-strategy improve pitch- and speech-perception?b) How does the number of harmonics in consecutive channels influence frequency discrimination, in speech coding strategies...

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Hearing disorders
Study type	Interventional

Summary

ID

NL-OMON35409

Source
ToetsingOnline

Brief title
A new sound coding strategy for cochlear implants

Condition

- Hearing disorders

Synonym
deafness, hearing impairment

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Groningen
Source(s) of monetary or material Support: STW

Intervention

Keyword: cochlear implants, frequency difference limen, loudness function, sound encoding

Outcome measures

Primary outcome

The study endpoints are:

a) The difference in performance between PLS and the existing HiRes-strategy in

pitch and speech perception.

b) The influence of the number of harmonics at consecutive channels on the just

noticeable difference in frequency in HiRes and PLS.

c) Loudness perception in HiRes and PLS.

Secondary outcome

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Study description

Background summary

Cochlear implantation is the primary treatment for bilateral severe hearing loss or deafness. A cochlear implant provides hearing through direct electrical stimulation of the cochlear nerve. There are over 1800 cochlear implant users in the Netherlands. Although their speech perception in quiet situations is reasonable, pitch perception, music appreciation, intonation recognition as well as voice recognition are still poor. Multiple reasons presumably contribute to this poor performance. One of the reasons is that it is unlikely that only around 20 electrodes in the watery perilymph in the inner ear fully take over the functionality of around 13,000 finely tuned normally-functioning sensory hair cells. Another reason are the limitations of the current sound processings strategy of cochlear implants. Whereas normal hearing uses tonotopic as well as temporal cues for the determination of pitch, most cochlear implants provide only the tonotopic cues. The electrical stimulation patterns provided by the implant do not contain fine-structured temporal information.

Study objective

The objective of the study is to answer the following questions:
a) Does the PLS-strategy improve pitch- and speech-perception?
b) How does the number of harmonics in consecutive channels influence frequency discrimination, in speech coding strategies HiRes and PLS?

Study design

Psychophysical hearing tests, intraparticipant comparison, evaluation after 10 participants.

Intervention

Psychophysical experiments: Loudness scaling test; frequency discrimination test; speech perception test (in silence and noise).

Study burden and risks

The participants will spend a total of 10 hours (distributed over 2 visits) performing the following psychophysical experiments: Loudness scaling test; pitch discrimination test; speech recognition test.
The burden is that participants may find the experiments difficult and tiring. There are no known risks associated with the experiments.
The benefit for the patient group as a whole is that if the PLS-strategy proves useful, it can be applied in software upgrades of their regular sound processor. It may resolve one of the primary complaints of current implant users: poor speech perception in noise. Furthermore, knowledge about pitch perception using temporal cues will help the field to develop better strategies. There is no immediate benefit for the individual test subject.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

- >18 years
- Advanced Bionics cochlear implant users

Exclusion criteria

Unability to cooperate in the experiments

Study design

Design

Study phase:	2
Study type:	Interventional
Intervention model:	Crossover
Masking:	Single blinded (masking used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	07-04-2010
Enrollment:	10
Type:	Actual

Ethics review

Approved WMO Date:	08-04-2009
Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)
Approved WMO Date:	27-08-2010
Application type:	Amendment
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL17057.042.09