تقييم الإدراك الوظيفي في مرضى ضعف السمع بعد التأهيل السمعي

رسالة مقدمه من

الطبيبة/ غادة أبو الحديد محمد

توطئة للحصول على درجة الدكتوراه

في

أمراض السمع والصمم

تحت إشراف

الأستاذ الدكتور/ أحمد سامح فريد

عميد طب قصر العينى

كلية الطب – جامعة القاهرة

الدكتورة/ عبير عثمان دبوس

مدرس أمراض السمع والصمم

كلية الطب – جامعة القاهرة

الدكتورة/ أميرة ماجد الشناوي

مدرس أمراض السمع والصمم

كلية الطب – جامعة القاهرة

كلية الطب – جامعة القاهرة (٢٠٠٩)

Abstract:

Objective: To study the cognitive functions of rehabilitated hearing impaired (HI) patients using auditory perception skills and P300 event related potential.
Methods: Aided speech discrimination score (WDS %) and acoustic P300 were recorded in free field for 40 rehabilitated (hearing aids, cochlear implants) HI adults and compared to 10 normal hearing controls.
Results: Rehabilitated HI patients had statistically significant longer P300 latencies and less WDS % compared to the controls. There was no statistically significant difference between mean P300 latency without and with the device at any degree of hearing loss. There was a statistically significant inverse correlation between P300 latency and age of hearing loss and WDS%, and a direct correlation between P300 latency and duration of hearing loss and hearing threshold. There was a statistically significant difference as regards regular use of the device among subjects with different speech performance categories. Subjects who use the device regularly showed higher percentage of positive responses than subjects who don't use it regularly. Subjects with excellent speech performance showed the statistically significant lowest mean P300 latencies.
Conclusion: Amplification increases the detectability of P300 and shortens its latency. P300 elicited by tonal contrasts is a neurophysiologic indicator of the discrimination abilities.

***Keywords*: cochlear implants, cognitive functions, hearing impaired individuals, hearing aids, P300 cognitive event related potential, speech discrimination.**

Assessment of Cognitive Functions in Rehabilitated Hearing Impaired Patients

Thesis submitted in partial fulfillment for the requirements of
M.D. Degree in Audiological Medicine

By:
Ghada Abo-El-Hadid Mohamed
M.Sc.

Supervised by:

Prof. Dr. Ahmed Sameh Farid

Professor of ENT and Audiology

And Dean of the Faculty of Medicine,

Faculty of Medicine, Cairo University

Dr. Abeir Osman Dabbous

Assistant Professor of Audiology

Faculty of Medicine, Cairo University

Dr. Amira Maged El Shennawy

Lecturer of Audiology

Faculty of Medicine, Cairo University

Faculty of Medicine
Cairo University
2009

Acknowledgment

First and foremost thanks to God, the most merciful. It is my pleasure to acknowledge the help of many in making this work possible.

I would like to express my deepest gratitude and appreciation to **Prof. Dr. Ahmed Sameh Farid** Dean of the Faculty of Medicine, Cairo University, for the supervision of the thesis and for support and advice during all phases of work.

I also wish to express my sincere gratitude to **Dr. Abeir Dabbous** Assistant Professor of audiology, Faculty of Medicine, Cairo University, for her encouragement, suggestions and patience that considerably affected my work.

My deep thanks and gratitude to **Dr. Amira El Shennway** Lecturer of audiology, Faculty of Medicine, Cairo University, for her kindness, patience, meticulous revision and encouragement had really refined this work.

Thanks to my mother, my husband and rest of my family for their encouragement and tolerance. And thanks to every one who gave me a hand in this work.

Introduction and Rationale

Cognitive function is a term used to describe the individual capacity to analyze and utilize the incoming information to coordinate behavior. It constitutes such specific functions such as perception, attention, memory, and complex skills such as reading. Cognitive processing is a complex mental activity that cannot have a single generator structure, but most probably involves a number of areas of cortical and sub-cortical regions **(Musiek and Lee, 1999)**.

Hearing impaired individuals' brains process stimuli with greater accuracy and in a more effective manner when these individuals use their personal hearing aids or cochlear implant. The effect on cortical event related potentials (ERPs) and behavioral measures of discrimination are dependent on the degree of sensorineural hearing loss (SNHL), the intensity of the stimuli, and the level of cortical auditory processing that the response measure is assessing (**Korczak et al., 2005**).

P300 is an endogenous component of late evoked response to visual, somato-sensory or auditory task-relevant stimuli. This event-related potential (ERP) closely reflects cognitive functions such as stimulus discrimination and processing as well as attention capabilities **(Franco, 2001)**. .

P300 could be used to monitor perception abilities, as they offer insight into the complex processing strategies of the auditory system **(Musiek and Lee, 1999)**. P300 is an objective test and it can be applied in all age ranges provided that the subjects understand the required task.

P300 provide information about the biological processes underlying speech processing. For this reason, ERPs are of great value to hearing scientists and audiologists to assess the improvements in the neural processing of speech with amplification (hearing aids, cochlear implants) (**Martin et al., 2008).** In hearing impaired subjects who are users of electronic devices, the test should be conducted in free field **(Beynon et al., 2002).**

Rationale:

The study is issued to focus on the cognitive functions of rehabilitated hearing impaired patients.

Aim of the Work

To study the cognitive functions of rehabilitated hearing impaired patients using auditory perception skills and P300 event related potential recorded in free field

List of Abbreviations

ABR	Auditory Brainstem response
ACE	Advanced Combination Encoder
AEP	Auditory evoked potentials
CAPD	Central Auditory Processing Disorder
CI	Cochlear Implant
CIS	Continuous Interleaved Sampling
CNS	Central nervous system
CNV	Contingent Negative Variation
CT	Computed Tomography
DSP	Digital Signal Processing
Ecoch.G	Electrocochleography
ERP	Event Related Potential
FDA	Food Drug Adminstration
HA	Hearing Aid
HI	Hearing Impaired
MMN	Mismatch Negativity
MPEAK	Multi PEAK
MRI	Magnetic Resonance Imaging
PBKG	Phonetically Balanced Kinder Garden
SD	standard deviation
SNHL	Sensorineural Hearing Loss
SPEAK	Spectral peak
SPL	Sound Pressure Level
SRT	Speech Reception Threshold
US	United States
WDS%	Word discrimination score percentage

List of Content

List of Figures

List of Tables