



# **Multifocal Electroretinogram and Multifocal Visual Evoked Potential Studies as Early Detectors of Diabetic Retinopathy in Type I Diabetes Mellitus**

*Thesis Submitted in partial Fulfill of the M.D. Degree in  
Clinical Neurophysiology*

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**FACULTY OF MEDICINE**

**CAIRO UNIVERSITY**

**2014**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَيَسْأَلُونَكَ عَنِ الرُّوحِ ۖ قُلِ الرُّوحُ مِنْ  
أَمْرِ رَبِّي وَمَا أُوتِيتُمْ مِنَ الْعِلْمِ إِلَّا قَلِيلًا

[سورة الإسراء - 85]

## **Abstract**

**Aim:** to detect preclinical stage of diabetic retinopathy in type I Diabetic children using the mfERG and mfVEP tests.

**Method:** 60 eyes of 30 diabetic child and 40 eyes of matched age and sex 20 healthy children were examined and confirmed with no diabetic retinopathy by ophthalmological examinations and flourescein angiography. The diabetic patients with at least 10 years duration type I DM.

mfERG and mfVEP were recorded using the RETi scan system (Roland consult, Wiesbaden ,Germany). Quadrants analysis of the amplitude and implicit time of P1 wave of the mfERG and also quadrant analysis of the amplitude and implicit time of P wave in mfVEP were used to compare between patient groups and controls.

**Result:** The P1 wave amplitude showed statistically significant reduction in all quadrants in both mfERG and mfVEP tests, with no statistical significant difference concerning the peak time except in the lower temporal and lower nasal quadrants in mfVEP tests. The results were statistically correlated with the duration, age and HbA1c level.

## **Conclusion**

The mfERG and mfVEP reduction in amplitude may be used as a predictor for the development of diabetic retinopathy in the inner layers of the retina in subclinical cases.

## **Key words**

Type I DM; Preclinical DR detection; mfERG; mfVEP; Quadrant analysis.

## **ACKNOWLEDGEMENTS**

*-I am deeply indebted to **Prof.Dr. Saly ElKholi, Professor of Clinical Neurophysiology ,Faculty of medicine, Cairo University** ,who suggested the idea of the thesis and gave me the way to go on in this work and who guided me a lot and from whom I learned a lot.*

*- I would like to extend my gratitude to **Dr.Zeinab ElSenbary, Professor of ophthalmology, Faculty of medicine, Cairo University**, for her guidance and revision and for sharing her experienced view. Her valuable suggestions influenced greatly the work,*

*-My cordial and faithful thanks for **Dr. Mona Nada, Professor of Neurophysiology, Faculty of medicine, Cairo University** for her fruitful help and indebted support, with genuine interest and complete guidance.*

*-Special thank to **Prof.Dr .Neveen ElFayoumy ,Assistant Prof.of Clinical Neurophysiology ,Faculty of medicine, Cairo University** for her thorough supervision and attention in every detail in the work and for consuming a lot of her valuable time, thanks for being my first line of help.*

*-I really appreciate the unforgettable support by **Prof.Dr. Amira El Gohary Assistant Prof.of Clinical Neurophysiology ,Faculty of medicine, Cairo University** I will always remember it.*

*-I would like to extend by special thank for the grateful support from **prof. Dr. Mona Mamdouh the head of the endocrinology unit, Abu el Rich pediatric hospital, faculty of medicine, Cairo University** and **Dr.Mohammed Ismail , lecturer in Diabetes, Endocrine and Metabolic Pediatric unit (DEMPU) Abu el Rich pediatric hospital, faculty of medicine, Cairo University.***

*My Special thanks and gratefulness for the support I received from **Dr.Hossam Eldin Mohammed, Resident in the Eye diagnostic laser unit, ophthalmology department , faculty of medicine, Cairo University .***

*-Finally, I m fully grateful to all my professors, colleagues and technicians in our department and madame; Hala, technician in the Eye diagnostic laser unit, ophthalmology department , faculty of medicine, Cairo University, too numerous to*

*mention, for the creative and challenging atmosphere in which I have been fortunate to work in.*

## ***Dedication***

*To my dear husband, my life  
rosette Ingy, my unbelievable  
twins and my caring parents  
and sisters  
who have  
“la plus grande aptitude a` la  
patience et la comprehension”*

*I have followed many of the paths they took*

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## **List of Abbreviations**

AGEs: advanced glycation end products

AIDS: Acquired Immune Deficiency Syndrome

ATP: Adenosine triphosphate

CRT: cathode ray tubes

DAG, diacylglycerol

DEMPU : The Diabetes Endocrine and Metabolism Paediatric Unit .

DHAP: dihydroxyacetonephosphate

DM: Diabetes Mellitus

DR: Diabetic Retinopathy

GAPDH: glyceraldehyde 3-phosphate dehydrogenase

HBA1c: glycosylated haemoglobin

HDL: High density lipoprotein

HVF: hemifield visual loss

IRMA : intra-retinal microvascular abnormalities

ISCEV: the International Society for clinical Electrophysiology of vision

ITs: implicit times

LCD: liquid crystal display

LGN: the lateral geniculate nucleus

ME: macular edema

mfERG: multifocal electroretinography