شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

HANAA ALY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

Study the Role of Glutathione-S-Transferase Gene Polymorphism and its Relation to Aluminium level in Autistic Children (Interventional Study)

Thesis
Submitted for Partial Fulfillment of the Ph.D degree in Environmental Medical Science

By
Sara Said Abdelkawi Elgammal
M.BBCh. Ain Shams University (2005)
M.Sc.in Pediatrics-Ain Shams University (2011)

Faculty of Graduate Studies and Environmental Research
Ain Shams University
2022

APPROVAL SHEET

Study the Role of Glutathione-S-Transferase Gene Polymorphism and its Relation to Aluminium level in Autistic Children (Interventional Study)

Submitted By

Sara Said Abdelkawi Elgammal

M.BBch.- Ain Shams University (2005)
M.Sc.in Pediatrics-Ain Shams University (2011)

A Thesis Submitted in Partial Fulfillment of The Requirement for the Ph.D. Degree In Environmental Sciences
Department of Environmental Medical Sciences

This thesis was discussed and approved by:

The committee Signature

1- Prof. Dr. Mostafa Hassan Ragab
Prof. of Community Medicine and Environment,
Department of Environmental Medical Sciences
Faculty of Graduate Studies and Environmental Research
Ain Shams University

2- Prof. Dr. Ehab Raga Abd El-Raouf
Prof. of Clinical Genetics ,
National Research Center

3- Prof. Dr. Nevin Ezzeldin Sharaf
Prof. of Environmental Medicine,
Environmental and Occupational Medicine Department
National Research Center

4- Prof. Dr. Prof. Dr. Hala Ibrahim Awadalla
Prof. of Community Medicine and Environment,
Department of Environmental Medical Sciences
Faculty of Graduate Studies and Environmental Research
Ain Shams University

2022

Study the Role of Glutathione-S-Transferase Gene Polymorphism and its Relation to Aluminium level in Autistic Children (Interventional Study)

Thesis

Submitted for Partial Fulfillment of the Ph.D degree in Environmental Medical Science

By

Sara Said Abdelkawi Elgammal

M.BBCh.- Ain Shams University (2005)

M.Sc.in Pediatrics-Ain Shams University (2011)

Supervised by

Prof. Dr. Hala Ibrahim Awadalla

Professor of Community and Environmental Medicine

Department of Environmental Medical Sciences

Faculty of Graduate Studies and Environmental Research,

Ain Shams University

Prof. Dr. Mohamed Abd Elkader Al-khafif (Late)

Professor of Medical Biochemistry

Department of Environmental Medical Sciences

Faculty of Graduate Studies and Environmental Research,

Ain Shams University

Prof. Dr. Nevin Ezzeldin Sharaf

Professor of Environmental Medicine

Environmental and Occupational Medicine Department

National Research Centre

Assist. Prof. Dr. Gehan Moubarz Mahdy

Assistant Professor of Environmental Biochemistry and Molecular Biology

Environmental and Occupational Medicine Department

National Research Centre

Dr. Ahmed Mamdouh AbdelGwad

Lecturer of Environmental Medical Science

Faculty of Graduate Studies and Environmental Research,

Ain Shams University

Faculty of Graduate Studies and Environmental Research

Ain Shams University

2022

Acknowledgment

First and foremost, all thanks and gratefulness are to **Almighty ALLAH** The most Merciful most Gracious and Giving, for His blessings, guidance, and His compassion.

The completion of this undertaking study could not have been possible without the participation, assistance and guidance of professionals whose names are glowing in the scientific field, their contributions are sincerely appreciated and gratefully acknowledged.

God bless the soul of ***Prof. Dr. Mohamed Abd Elkader Al-khafif (late),*** Professor of Medical Biochemistry, *Department of Environmental Medical Sciences,* Faculty of Graduate Studies and Environmental Research, Ain Shams University, for his continuous encouragement with kind guidance, he conferred his wide experiences on me. He was always supporting me from the very beginning of the study and was eager to get the best out of me through professional thoughtful guidelines. I would have been even happier if he could have reached this day and witness what we achieved. Allah bless his soul and may he rest in peace.

I would like to express my deepest thanks and profound gratitude to ***Prof. Dr. Hala Ibrahim Awadalla,*** Professor of Community and Environmental Medicine *Department of Environmental Medical Sciences,* Faculty of Graduate Studies and Environmental Research, Ain Shams University. It was such a great honor to work under her kind guidance. Her continuous help, combined with her sincere support obliged me to bear the responsibility towards this study. The statistics of the study as well as the review, could not have been fulfilled without her sincere effort.

I am also very indebted to ***Prof. Dr. Nevin Ezzeldin Sharaf,*** Professor of Environmental Medicine, Environmental and Occupational Medicine Department, National Research Centre, For her outstanding support, valuable time, and for her keen interest on me at every stage of this research. Her timely advice, meticulous scrutiny, scholarly advice and scientific approach have helped me to a very great extent to accomplish this task.

I am also immensely grateful to ***Assist. Prof. Dr. Gehan Moubarz Mahdy,*** Assistant Professor of Environmental Biochemistry and

Molecular Biology, Environmental and Occupational Medicine Department, National Research Centre, who was behaving with the utmost courtesy towards me throughout the whole work providing me the attention, care, and advice. She had an extremely important role in this study, specially in genetics and clinical process.

I am sincerely thankful to ***Dr. Ahmed Mamdouh AbdelGwad,*** Lecturer of Environmental Medical Science, Faculty of Graduate Studies and Environmental Research, Ain Shams University, for his continuous help throughout the course of this work.

My sincere thanks to ***Prof. Dr. Noha Muhammad Hegazy Ibrahim,*** Professor of Occupational Medicine, Department of Environmental and Occupational Medicine, for her kind and careful supervision, support, and valuable guidance all through the work.

With all the gratitude, I extend my thanks and appreciation to ***Prof. Dr. Ehab Ragaa Abdel Raouf***, Professor of Clinical Genetics and NeuroPediatrics, founder and director of Learning Disability and Neuro Rehabilitation Clinic, Center of Excellence of Medical Research, National Research Center, who offered me the precious golden seed of this study, through allowing me to use his professionally organized clinic, creating great opportunities, that would have not arisen without his patience in supporting me overcoming the odds. I am very grateful for him, for adopting and embracing the study.

I am profoundly grateful to ***Dr. Amal Elsaeid,*** Researcher of Clinical Genetics at Department of Children with Special needs, for her constant support and encouragement throughout my study, specially during the clinic times, she sincerely helped and supported me through the work with the diagnosis and selection of children's cases.

I would like to extend my thanks to ***Prof. Dr.*** **Sohair koraa**, Egyptian Atomic Energy Authority for her effort in chemistry analysis. Appreciations.

I would like to express my appreciation to the patients, and their families, for their mindful cooperation.

Sara Said El Gammal

Dedication

To:

This study is wholeheartedly dedicated to my beloved family members specifically my parents, who have been always my source of inspiration and strength, my kids (Nadin, Mahmoud and Farida) and my husband who continually provide their moral, spiritual, and emotional support.

List of Contents

List of Tables

List of Figures

List of Figures Cont...