



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Ain Shams University Information Network  
جامعة عين شمس

شبكة المعلومات الجامعية

@ ASUNET



# شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



شبكة المعلومات الجامعية

# جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

## قسم

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



## يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of  
15-25- c and relative humidity 20-40%

# بعض الوثائق الأصلية تالفة



# بالرسالة صفحات لم ترد بالاصل

B7E. E

**EFFECT OF DIFFERENT PROTEINS  
SUPPLEMENTATION ON PROTEIN  
MALNOURISHED RATS**

**THESIS**

Submitted to Biochemistry Department,  
Faculty of Agriculture, Cairo University

In Partial Fulfillment for the Degree of

**M.Sc. in Biochemistry**

Presented By

**MONA AHMED MAHMOUD GHONEIM**  
B.Sc. Agric. Biochemistry , Cairo University , 1995

**Department of Biochemistry  
Faculty of Agriculture  
Cairo University**

2002

# **EFFECT OF DIFFERENT PROTEINS SUPPLEMENTATION ON PROTEIN MALNOURISHED RATS**

## **THESIS**

Submitted to Biochemistry Department,  
Faculty of Agriculture, Cairo University

In Partial Fulfillment for the Degree of

**M.Sc. in Biochemistry**

Presented By

**MONA AHMED MAHMOUD GHONEIM**  
B.Sc. Agric. Biochemistry , Cairo University , 1995

**Department of Biochemistry  
Faculty of Agriculture  
Cairo University  
2002**

**Under the supervision of:**

**Prof. Dr. Abdel Kader Moursy Abdel Samad**

Professor of Biochemistry and Head of Biochemistry  
Department, Faculty of Agriculture, Cairo University.

**Dr. Magdy Abdel Aleem Shaalan**

Assoc. Prof. of Biochemistry, Biochemistry Department, Faculty  
of Agriculture, Cairo University.

**Dr. Gada Ibrahim Eisa**

Assoc. Prof., Radioisotopes Department, Atomic Energy  
Authority.

## APPROVAL SHEET

**Title :** EFFECT OF DIFFERENT PROTEINS SUPPLEMENTATION  
ON PROTEIN MALNOURISHED RATS.

**Name :** Mona Ahmed Mahmoud Ghoneim

**M.Sc. Thesis approved by :**

M. Shaaban

G. E. El-Desoky

Megdy Shalaby

[Signature]

**Committee in charge**

**Date :** 9/3/2002

**Cairo University  
2002**

Name of Candidate: **MONA MAHMOUD AHMED GHONEIM**

Degree : **M. Sc.**

Title of Thesis :

**Effect of different proteins supplementation on protein malnourished rats**

Supervisors :

1. Prof. Dr. Abdel Kader Moursy Abdel Samad  
Head of Biochemistry Department, faculty of Agriculture, Cairo University.
2. Dr. Magdy Abdel Aleem Shaalan  
Assoc. Prof. of Biochemistry, Faculty of Agriculture, Cairo University.
3. Dr. Gada Ibrahim Eisa  
Assoc. Prof. , The Egyptian Atomic Energy Authority.

Department : **Biochemistry**

Branch :

Approval : **9 / 3 / 2002**

**ABSTRACT**

This thesis discusses the use of two types of plant proteins; Soya bean and Pea nut, as a low price alternative to the animal proteins in protein malnutrition treatment.

Eighty growing female rats were divided into two groups; **The control group** that received a balanced diet (20% casein) for 85 days and **the experimental group** that was feed on a low protein diet (5% casein) for 29 days. After the period of protein deprivation, the depleted rats were divided into three groups and each group was refed with a different protein sources diet for 56 day: 20% casein (casein group), 20% soybean protein (soy bean group) and 20% peanut protein (peanut group). Each diet was supplemented with a vitamin and salt mixture (6.5% ). Serum total protein, albumin, Globulin, Cholesterol, TG, ALT, AST,  $T_4$ ,  $T_3$ ,  $T_4/T_3$  and  $FT_3$  were determined at day 29 of protein deprivation period and at the end of each week (8 weeks) of refeeding period.

The obtained results led to the recommendation of using soybeans protein and/or peanuts protein as a good source of protein, especially soybeans protein for protein malnutrition cases. They reduce the cholesterol and triglycerides levels.



# **ACKNOWLEDGEMENTS**

## ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to *Prof. Dr. Abdel Kader Moursy Abdel Samad*, Professor of Biochemistry and Head of Biochemistry Department, Faculty of Agriculture, Cairo University, for his kind supervision, tutorial guidance and encouragement throughout the course of this thesis.

My thanks and gratitude are also extended to *Assoc. Prof. Dr. Magdy Abdel Aleem Shaalan*, Assoc. Prof. of Biochemistry, Faculty of Agriculture, Cairo University, for his supervision, help and cooperation throughout the course of this thesis.

I would like also to express my grateful and deep thanks to *Assoc. Prof. Dr. Gada Ibrahim Essa*, Assoc. Prof., Radioisotopes Department, Atomic Energy Authority, for her supervision, advice, help and cooperation during the course of this thesis.

I would like to thank *Assoc. Prof. Dr. Iman Ismail Abd El-Gawad*, Assoc. Prof., Radioisotopes Department, Atomic Energy Authority, for her help, guidance and encouragement through out this work.

# CONTENTS

	Page
List of Tables	i
List of Figures	iii
<b>1. INTRODUCTION</b>	<b>1</b>
<b>2. REVIEWS OF LITERATURE</b>	<b>3</b>
2.1. <i>Effect of Malnutrition on Protein Parameters</i>	3
2.2. <i>Effect of Malnutrition on Lipid Parameters</i>	8
2.2.1 <i>On Fatty Acids</i>	8
2.2.2 <i>On cholesterol, triglycerides and VLDL</i>	9
2.3. <i>Effect of malnutrition on liver</i>	12
2.4. <i>Effect of malnutrition on thyroid hormone</i>	13
2.5. <i>Effect of malnutrition on other parameters</i>	15
2.6. <i>Plant Protein</i>	15
2.6.1 <i>Effect of plant protein on biochemical parameters</i>	17
<b>3. MATERIALS AND METHODS</b>	<b>24</b>
3.1. <i>Animals feed and Management</i>	24
3.2. <i>Peanut and Soy Bean Meals</i>	25
3.2.1 <i>Meal Preparation</i>	25
3.3. <i>Collection of serum blood samples</i>	26
3.4. <i>Biochemical Studies</i>	26
3.4.1 <i>Serum Total Protein</i>	26
3.4.2 <i>Serum Albumin</i>	27
3.4.3 <i>Serum Cholesterol</i>	28
3.4.4 <i>Triglycerides</i>	30
3.4.5 <i>Alanine aminotransferase (ALT) or (GPT)</i>	31
3.4.6 <i>Aspartate aminotransferase (AST) or (GOT)</i>	33

<i>3.5. Radioimmunoassay of hormone</i>	34
<i>3.5.1 Thyroxine hormone or 3,5,3',5'-tetraiodothyronine (T<sub>4</sub>)</i>	35
<i>3.5.2 Triiodothyronine (T<sub>3</sub>)</i>	37
<i>3.5.3 Free triiodothyronine (Free T<sub>3</sub>)</i>	39
<b>4. RESULTS AND DISCUSSION</b>	42
<i>4.1. Body weight</i>	42
<i>4.2. Serum total protein (TP)</i>	43
<i>4.3. Serum Albumin (A)</i>	46
<i>4.4. Serum globulin (G)</i>	48
<i>4.5. A/G ratio</i>	52
<i>4.6. Serum cholesterol</i>	55
<i>4.7. Serum Triglycerides (TG)</i>	58
<i>4.8. Serum Alanine aminotransferase ALT and Aspartate aminotransferase AST</i>	61
<i>4.9. Serum thyroid hormones</i>	66
<b>5. SUMMARY</b>	77
<b>6. REFERENCES</b>	80
<b>ARABIC SUMMARY</b>	

## List of Tables

	Page
Table (1): Composition of control and different diets.	25
Table (2): The mean values of rat body weight (g).	43
Table(3): Mean values for serum total protein analysis (g/dL) in control and malnutrition groups.	44
Table(4): The mean values for serum total protein (g/dL) after supplementation period.	44
Table (5): Summary of two-way analysis of variance for protein parameters of mean values of the different groups and weeks.	46
Table (6): Mean values for serum albumin analysis (g/dL) in control and malnutrition groups.	47
Table(7): The mean values for serum albumin (g/dL) after supplementation period.	47
Table (8): Mean values for serum globulin analysis (g/dL) in control and malnutrition groups.	48
Table(9): The mean values for serum globulin (g/dL) after supplementation period.	50
Table (10): Mean values for A/G ratio in control and malnutrition groups.	52
Table (11):The mean values for A/G ratio after supplementation period.	54
Table (12): Mean values for serum cholesterol analysis (mg/dL) in control and malnutrition groups.	55
Table (13):The mean values for serum cholesterol (mg/dL) after supplementation period.	56
Table (14): Summary of two-way analysis of variance for serum cholesterol and serum triglycerides of mean values of the different groups and weeks.	56
Table (15): Mean values for serum triglycerides analysis (mg/dL) in control and malnutrition groups.	58
Table (16): The mean values of serum triglycerides analysis (mg/dL) after supplementation period.	59
Table (17): Mean values for serum A L T (U/l) in control and malnutrition groups.	62
Table (18): Mean values for serum A S T (U/l) in control and malnutrition groups.	62
Table (19): The mean values of serum A L T (U/l) after supplementation period.	65
Table (20): The mean values of serum A S T (U/l) after supplementation period.	65

Table (21): Summary of two-way analysis of variance for A.L.T. and A S T mean values of the different groups and weeks.	66
Table (22): Mean values for serum thyroid hormone T <sub>4</sub> (µg/dL) in control and malnutrition groups.	67
Table (23): Mean values for serum thyroid hormone T <sub>3</sub> (ng/dL) in control and malnutrition groups.	67
Table (24): Mean values for serum thyroid hormone Free T <sub>3</sub> (pg/ml) in control and malnutrition groups.	68
Table (25): Mean values for calculated T <sub>4</sub> /T <sub>3</sub> ratio in control and malnutrition groups.	68
Table (26): The mean values for serum thyroid hormone T <sub>4</sub> (µg/dL) after supplementation period.	69
Table (27): The mean values for serum thyroid hormone T <sub>3</sub> (ng/dL) after supplementation period.	71
Table (28): The mean values for serum thyroid hormone Free T <sub>3</sub> (pg/ml) after supplementation period.	71
Table (29): The mean values of calculated ratio T <sub>4</sub> /T <sub>3</sub> after supplementation period.	74
Table (30): Summary of two-way analysis of variance for serum thyroid hormones parameters of mean value of the different groups and weeks.	74