

**EFFECT OF IRRADIATION ON CERTAIN PITUITARY
HORMONES IN PATIENTS WITH MALIGNANT
DISEASES BEFORE & AFTER RADIOTHERAPY.**

Thesis

*Submitted For Partial fulfilment
of The M.Sc. Degree of
Biochemistry*

By

SAMIRA MOHAMED AHMED MOHAMED

Supervisors

Prof. Dr. MOHAMED MOHAMED ABD EL FATTAH

*Professor & Chairman Of Biochemistry Department,
Faculty of Science
Ain Shams University*

M. Abd El Fattah

Prof. Dr. ABD EL HALIM ABD EL HADY MOUSTAFA

*Professor of Biochemistry
Faculty of Science
Ain Shams University*

Abd El Halim

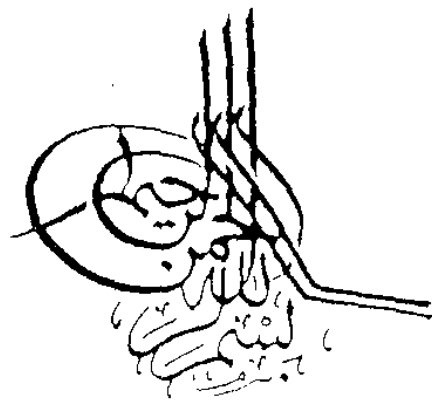
Assist. Prof. MAHMOUD S. MAHMOUD

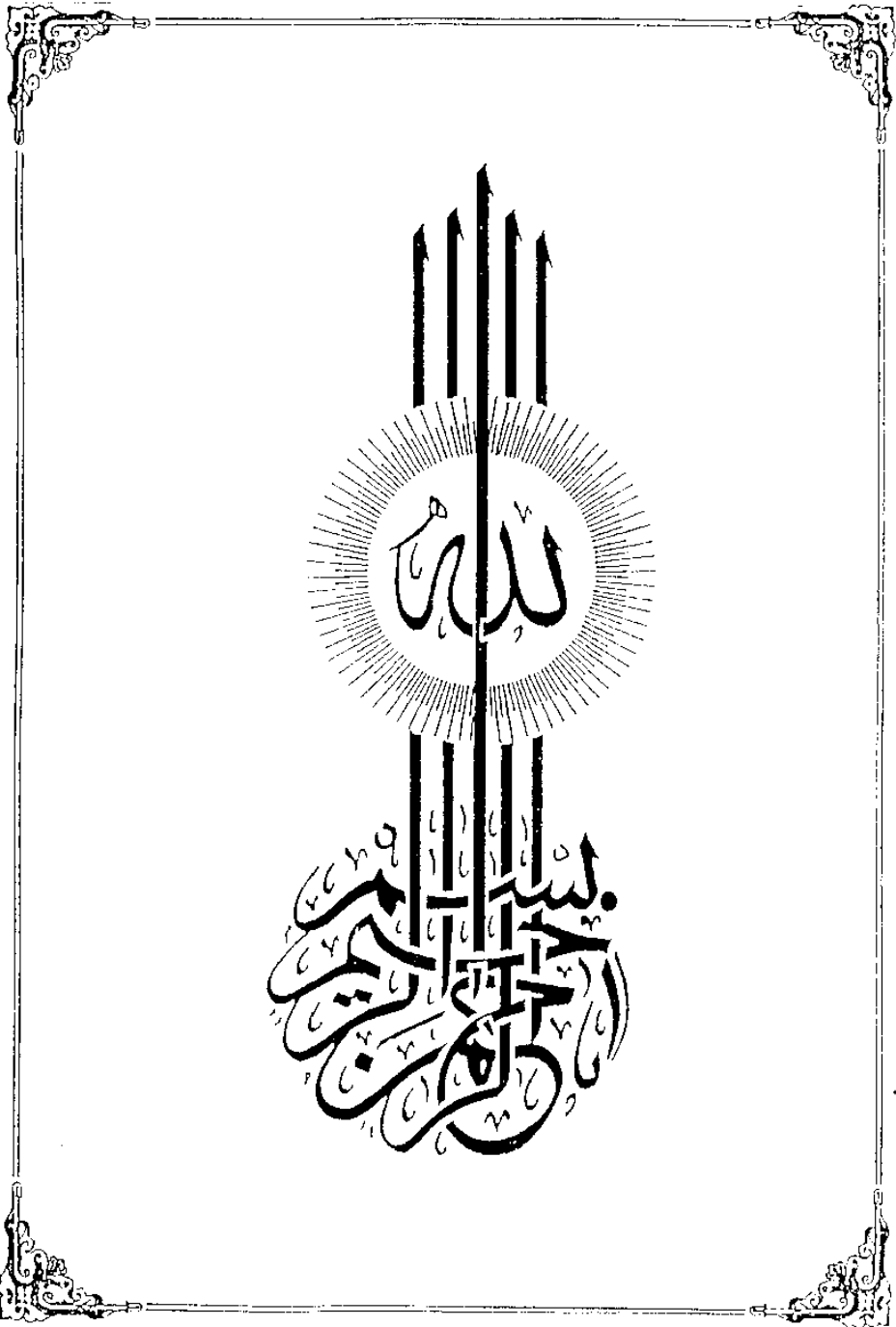
*Assis. professor of Clinical chemistry
National Center for Radiation
Research and Technology*

*Ain Shams University
Faculty of Science
Biochemistry Department*



1993





بسم الله الرحمن الرحيم

﴿ الحمد لله الذي هدانا
لهذا وما كنا لنهتدي
لولا أن هدانا الله ﴾

صدق الله العظيم

(سورة الأعراف - آية ٤٣)

to my daughter

ACKNOWLEDEMENTS

I wish to express my sincere gratitude and deep thanks , **Prof. Dr. MOHAMED ABD EL FATTAH**, head of Biochemistry Department, Faculty of Science Ain Shams University, and for, **Prof. Dr. ABD EL HALIM ABD EL HADY**, Professor of Biochemistry, Faculty of Science Ain Shams University, for their active supervision, continuous help, and critical reading of manuscript.

Thanks are extended to **Dr. MAHMOUD S. MAUMOUD**, assist Professor of clinical chemistry , National center for radiation research and Technology, for participation in supervision, continuous and valuable advice throughout the work.

I am thankful to **Dr. MOUSTAFA M. EL RASAD**, assist professor of Biochemistry, Faculty of Medicine Ain Shams University, for unlimited help, support and for allpwing me to do the practical part in the unit of tumour markars.

I would like to my thanks to **prof. Dr. SAMY A. EL BADAWY** professor of radiotherapy, national caner institute , for providing all the facilities to get the samples of this work and for revising the part of radiation therapy for head and neck tumours.

Great thanks are expressed to **prof. Dr. MOHAMED A. MANSOUR** , head of radiation health department at (NCRRT) for his

continuous encouragement. Deep thanks are also to **Dr. WAFAA ABDEL LATIEF** of radiotherapy at (NC RRT) for revisioning the part of discussion.

I would like to express my greet thank to all the staff of national center for radiation research and technology.

CONTENTS

	<i>Page</i>
<i>-Introduction & Aim of the work.....</i>	<i>1</i>
<i>-Review of Literature.....</i>	<i>2</i>
• <i>Radiation & hypothalamic-pituitary function.....</i>	<i>2</i>
• <i>General concepts of radiation therapy.....</i>	<i>6</i>
• <i>Physics of radiation.....</i>	<i>6</i>
• <i>Effect of ionizing radiation on living organism.....</i>	<i>10</i>
• <i>Technical considerations of Radiation therapy</i> <i>of head and neck tumours.....</i>	<i>17</i>
• <i>Neoplasms of the Nervous System.....</i>	<i>21</i>
• <i>Radiotherapy for Carcinoma of the nasopharynx</i>	<i>25</i>
• <i>Hypopituitarism after external Irradiation.....</i>	<i>30</i>
• <i>Effect of irradiation of Serum Protein.....</i>	<i>48</i>
<i>-Patients & Methods.....</i>	<i>51</i>
<i>-Results.....</i>	<i>81</i>
<i>-Discussion.....</i>	<i>141</i>
<i>-Summary.....</i>	<i>150</i>
<i>-Conclusions & Recommendations.....</i>	<i>153</i>
<i>-References.....</i>	<i>155</i>
<i>- Arabic Summary</i>	

LIST OF ABBREVIATIONS

<i>ACTH</i>	<i>: Adrenocorticotrophic hormone.</i>
<i>CNS</i>	<i>: Central nervous system.</i>
<i>ELISA</i>	<i>: Enzyme linked immunosorbent assay.</i>
<i>FSH</i>	<i>: Follicle stimulating hormone.</i>
<i>GH</i>	<i>: Growth hormone.</i>
<i>GHRH</i>	<i>: Growth hormone releasing hormone.</i>
<i>GRF</i>	<i>: Growth hormone releasing factor.</i>
<i>GRF-44</i>	<i>: Synthetic Growth hormone releasing factor.</i>
<i>GTH</i>	<i>: Gonadotropic hormone.</i>
<i>LH</i>	<i>: Luteinizing hormone.</i>
<i>LHRH</i>	<i>: Luteinizing hormone releasing hormone.</i>
<i>MSH</i>	<i>: Melanocyte stimulating hormone.</i>
<i>NPC</i>	<i>: Nasopharyngeal carcinoma.</i>
<i>PRL</i>	<i>: Prolactin.</i>
<i>RT</i>	<i>: Radiotherapy.</i>
<i>TSH</i>	<i>: Thyroid stimulating hormone.</i>

LIST OF TABLES

	<i>Page</i>
Table (1) (a) : <i>The conc. of hormones GH, PRL, FSH & LH in the sera of control group.....</i>	(83)
Table (1) (b) : <i>The conc. of serum total protein & plasma fractions in the sera of control group.....</i>	(84)
Table (2) (a) : <i>The conc. of hormones GH, PRL, FSH & LH in the sera of patients of group (A) before & after radiotherapy.....</i>	(86)
Table (2) (b) : <i>The conc. of serum total protein & plasma fractions in the sera of patients of group (A) before & after radiotherapy.....</i>	(87)
Table (3) : <i>Mean values $\pm$ S.E. of growth hormone (GH) in the sera of patients of group (A) before & after radiotherapy compared to control group.....</i>	(88)
Table (4) : <i>Mean values $\pm$ S.E. of Prolactin (PRL) in the sera of patients of group (A) before & after radiotherapy compared to control group.....</i>	(91)
Table (5) : <i>Mean values $\pm$ S.E. of Follicle stimulating hormone (FSH) in the sera of patients of group (A) before & after radiotherapy compared to control group.....</i>	(94)
Table (6) : <i>Mean values $\pm$ S.E. of Luteinizing hormone (LH) in the sera of patients of group (A) before & after radiotherapy compared to control group.....</i>	(97)

Table (7)	: Mean values $\pm$ S.E. of Serum total protein in the sera of patients of group (A) before & after radiotherapy compared to control group.....	(100)
Table (8)	: Mean values $\pm$ S.E. of albumin in the sera of patients of group (A) before & after radiotherapy compared to control group.....	(103)
Table (9)	: Mean values $\pm$ S.E. of α_1 -globulin in the sera of patients of group (A) before & after radiotherapy compared to control group.....	(105)
Table (10)	: Mean values $\pm$ S.E. of α_2 globulin in the sera of patients of group (A) before & after radiotherapy compared to control group.....	(107)
Table (11)	: Mean values $\pm$ S.E. of β -globulin in the sera of patients of group (A) before & after radiotherapy compared to control group.....	(109)
Table (12)	: Mean values $\pm$ S.E. of γ -globulin in the sera of patients of group (A) before & after radiotherapy compared to control group.....	(111)
Table (13) (a)	: The conc. of hormones GH, PRL, FSH & LH in the sera of patients of group (B) before & after radiotherapy.....	(114)
Table (13) (b)	: The conc. of Serum total protein & plasma fractions in the sera of patients of group (B) before & after radiotherapy.....	(115)

Table (14)	: Mean values $\pm$ S.E. of growth hormone (GH) in the sera of patients of group (B) before & after radiotherapy compared to control group.....	(116)
Table (15)	: Mean values $\pm$ S.E. of Prolactin (PRL) in the sera of patients of group (B) before & after radiotherapy compared to control group.....	(119)
Table (16)	: Mean values $\pm$ S.E. of Follicle stimulating hormone (FSH) concentration in the sera of patients of group (B) before & after radiotherapy compared to control group.....	(122)
Table (17)	: Mean values $\pm$ S.E. of Luteinizing hormone (LH) concentration in the sera of patients of group (B) before & after radiotherapy compared to control group.....	(125)
Table (18)	: Mean values $\pm$ S.E. of Total protein in the sera of patients of group (B) before & after radiotherapy compared to control group.....	(128)
Table (19)	: Mean values $\pm$ S.E. of albumin in the sera of patients of group (B) before & after radiotherapy compared to control group.....	(131)
Table (20)	: Mean values $\pm$ S.E. of α_1 -globulin concentration in the sera of patients of group (B) before & after radiotherapy compared to control group.....	(133)

- Table (21)** : Mean values $\pm$ S.E. of α_2 -globulin in the sera of patients of group (B) before & after radiotherapy compared to control group..... (135)
- Table (22)** : Mean values $\pm$ S.E. of β -globulin in the sera of patients of group (B) before & after radiotherapy compared to control group..... (137)
- Table (23)** : Mean values $\pm$ S.E. of γ -globulin in the sera of patients of group (B) before & after radiotherapy compared to control group..... (139)

LIST OF FIGURES

	<i>Page</i>
Fig (A) : The main components of the hypothalamic-pituitary portal system.....	(2)
Fig (B) : 50 kv philips contact machine.....	(18)
Fig (C) : Theratron 780 cobalt 60 unit.....	(19)
Fig (D) : Showing the nasopharynx and related structures....	(26)
Fig (E) : Radiotherapy fields for carcinoma of nasopharynx.	(29)
Fig (F) : Diagram for treatment of carcinoma of nasopharynx.....	(53)
Fig (G) : principle of enzyme immunoassays.....	(57)
Fig (H) : The pinciple of electrophoresis.....	(73)
Fig (I) : Mean values of Growth hormone (GH) concentration in the sera of patients of group (A) before & after radiotherapy compared to control group.....	(89)
Fig (2) : Mean values of Prolactin (PRL) concentration in the sera of patients of group (A) before & after radiotherapy compared to control group.....	(92)
Fig (3) : Mean values of Follicle stimulating hormone (FSH) concentration in the sera of patients of group (A) before & after radiotherapy compared to control group.....	(95)

- Fig (4)** : Mean values of Luteinizing hormone (LH) concentration in the sera of patients of group (A) before & after radiotherapy compared to control group..... (98)
- Fig (5)** : Mean values of Total protein concentration in the sera of patients of group (A) before & after radiotherapy compared to control group..... (101)
- Fig (6)** : Mean values of Protein fractions concentration in the sera of patients of group (A) before & after radiotherapy compared to control group..... (112)
- Fig (7)** : Mean values of growth hormone (GH) concentration in the sera of patients of group (B) before & after radiotherapy compared to control group..... (117)
- Fig (8)** : Mean values of Prolactin (PRL) concentration in the sera of patients of group (B) before & after radiotherapy compared to control group..... (120)
- Fig (9)** : Mean values of Follicle stimulating hormone (FSH) concentration in the sera of patients of group (B) before & after radiotherapy compared to control group..... (123)
- Fig (10)** : Mean values of Luteinizing hormone (LH) concentration in the sera of patients of group (B) before & after radiotherapy compared to control group..... (126)