شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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التوثيق الالكتروني والميكروفيلم

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بالرسالة صفحات لم ترد بالاصل

A STUDY ON THE BIOCHEMICAL AND IMMUNOCHEMICAL CHANGES IN EXPERIMENTALLY INDUCED OBESITY IN ANIMALS

THESIS

Submitted in Partial Fulfillment of the Requirement of M. D. Degree in Medical Biochemistry

By

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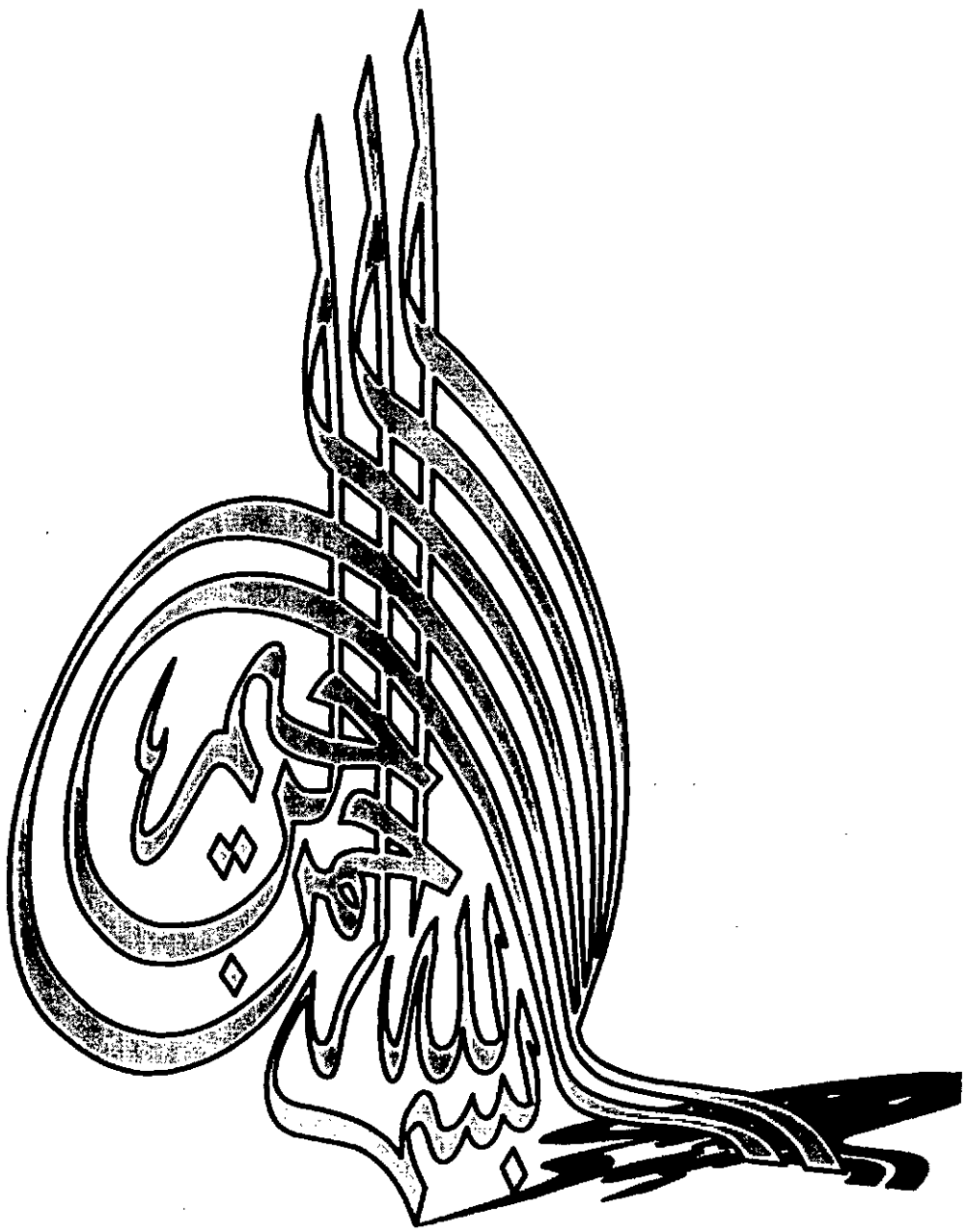
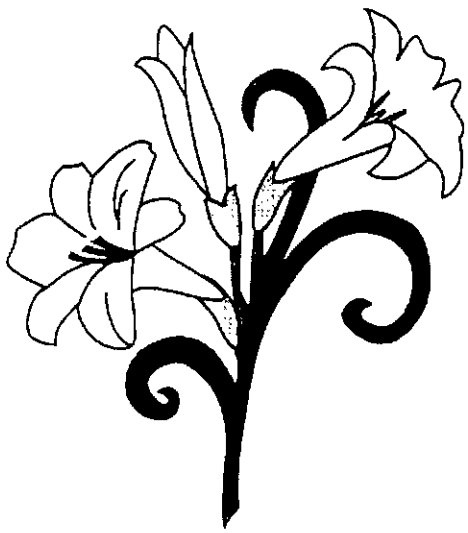

بسم الله الرحمن الرحيم

TO MY PARENTS

TO MY HUSPAND & MY SON



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List of Abbreviations

- ☆ -**AGEs**: Advanced glycation end products.
- ☆ -**BAT**: Brown adipose tissue.
- ☆ -**BMI**: Body Mass Index.
- ☆ -**C**: Complement.
- ☆ -**CD**: Cluster of differentiation.
- ☆ -**CPM**: Count per minute.
- ☆ -**CR**: Complement receptor.
- ☆ -**EDRF**: Endothelium derived relaxation factor.
- ☆ -**FFA**: Free fatty acids.
- ☆ -**GLUT**: Glucose transporter.
- ☆ -**GSH**: Reduced glutathione.
- ☆ -**GSSG**: Oxidized glutathione.
- ☆ -**HDL**: High density lipoproteins.
- ☆ -**HFD**: High fat diet.
- ☆ -**IDDM**: Insulin dependent diabetes mellitus.
- ☆ -**IFNγ**: Interferon Gamma.
- ☆ -**Ig**: Immunoglobulin.
- ☆ -**IGF**: Insulin like growth factor.
- ☆ -**IL**: Interluken.
- ☆ -**LBM**: Lean body mass.
- ☆ -**LC-CoA**: Long chain fatty acyl-CoA.
- ☆ -**LDL**: Low density lipoproteins.
- ☆ -**MDA**: Malondialdehyde.
- ☆ -**NEG**: Non enzymatic glycation.
- ☆ -**NIDDM**: Non insulin dependent diabetes mellitus.
- ☆ -**OGTT**: Oral glucose tolerance test.
- ☆ -**PDGF**: Platelets derived growth factor.
- ☆ -**PKC**: Protein kinase C.
- ☆ -**PMN**: Polymorphnuclear leukocytes.
- ☆ -**PUFA**: Poly-unsaturated fatty acids.
- ☆ -**RMR**: Resting metabolic rate.
- ☆ -**ROS**: Reactive oxygen species.
- ☆ -**SOD**: Superoxide dismutase.
- ☆ -**STATs**: Signal transducers and activators of transcription.
- ☆ -**TBA**: Thiobarbituric acid.
- ☆ -**TEF**: Thermic effect of food.
- ☆ -**TNF**: Tumor necrosis factor.
- ☆ -**VLDL**: Very low density lipoproteins.

CONTENTS

INTRODUCTION

OBESITY

Obesity is usually a descriptive term for excess body fat. Assessment of the presence and extent of obesity is often subjective and influenced by cosmetic and cultural considerations.[1] However recent interest has focused on the increased mortality and morbidity associated with both the extent and pattern of obesity. [2] Therefore methods for accurate measurement of the amount and distribution of fat have become an important clinical consideration

The cause of increased mortality and morbidity associated with obesity is not yet known. Obesity is associated with an increased incidence of diabetes, hypertension, increased levels of triacylglycerols, total cholesterol, very low density lipoproteins (VLDL) cholesterol, low density lipoproteins (LDL) cholesterol, and decreased levels of high density lipoproteins (HDL) cholesterol, all of which are risk factors for the development of vascular disease. Also it has been known for many years that obesity is associated with insulin resistance and impaired glucose tolerance. [3]

Regulation of energy storage, intake and expenditure:

The primary form in which potential chemical energy is stored in the body is fat (Triglycerides). The high caloric density and the hydrophobic nature of triglycerides permit efficient energy storage without adverse osmotic

consequences. The first low of thermodynamics which states that the amount of stored energy equals the difference between energy intake and work, is uniformly applicable to biologic systems. The amount of triglycerides in adipose tissue is the cumulative sum overtime of the differences between energy (Food) intake, and energy expenditure (mainly resting metabolism and physical activity). Although homeostatic mechanisms keep this difference very close to zero, very small imbalances over a long period can have a large cummulative effect. The current availability of highly palatable calorically dense foods and a sedentary life style promote weight gain. For example non obese adults ingest about 900,000 k cal of food per year, about 3500 k cal of chemical energy is contained in 0.45 kg (1lb) of adipose tissue. If intake exceeds expenditure by 2% daily for a year, the result would be an increase of 18,000 k cal or approximately 2.3 kg (5 lb.).[4]The fattest man in the world died recently in his mid forties weighting 465 kg. Even his enormous accumulation of fat, required an excess equivalent to only a small bar of chocolate each day.[5] However because energy expenditure increases as weight increases, the weight gained would somewhat compensate for this imbalance.[6] This degree of control is achieved by coordinate effects on energy intake and expenditure mediated through endocrine and neural signals that emanate from adipose tissue,[7] and the endocrine, [8]

neurologic, [9] and gastrointestinal[10] systems are integrated by the central nervous system.[9] Short-term (daily) food intake is not closely correlated with energy expenditure or energy stores in adults, [11] or children. [12] One or more mechanisms are needed to integrate short term determinants of energy intake (e.g. Hepatic glycogen content, fatty acid oxidation, and plasma glucose). [13] With more direct monitoring of long term energy stores (fat mass) such integration is central to the regulation of body fat stores.[14] The relative constancy of energy storage is the result of the coordinate activity of a complex system with components ranging from the highest cortical centers to the adipocytes, no single node or lobe in the system functions in isolation as shown in figure 1, a large number of factors originating throughout the body sent afferent signals to a smaller numbers of functional centers in the central nervous system, which then mediate interaction with efferent pathways to regulate energy expenditure (e.g. through the sympathetic and parasympathetic nervous systems and thyroid hormones) and energy intake (through eating behavior). [15]

The substances shown in figure (1) interact at many levels, for example the effect of cholecystokinine on satiety is dependent on parasympathetic afferent [16] and the release of insulin is increased by cholecystokinine and parasympathetic efferent and inhibited by sympathetic efferent. [17] The