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شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

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شبكة المعلومات الجامعية

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التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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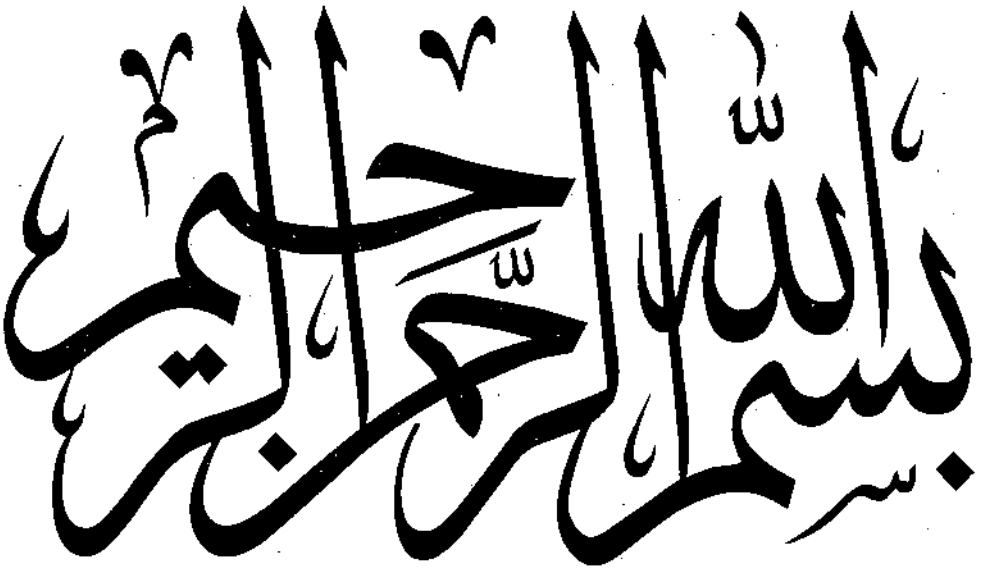
بسم الله الرحمن الرحيم

EFFECT OF FRUCTOSE AND N-NITROSOMORPHOLINE ON ENZYMES ALTERATION IN LIVER OF *Bufo regularis*

Thesis

Submitted to the Faculty of Science

Alexandria University

For the Degree of Ph.D. in Zoology

By

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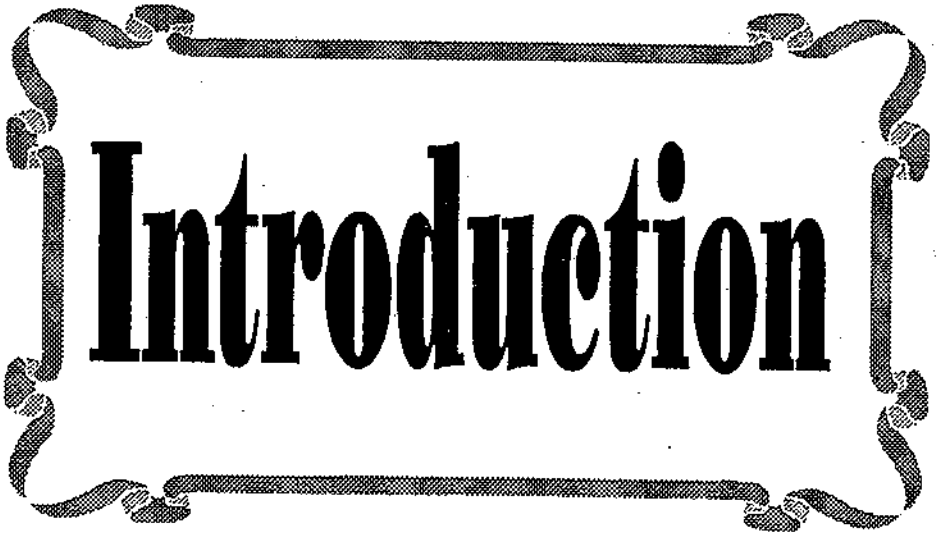
CONTENTS

List of Abbreviations

ACP	:	Acid phosphatase
ALP	:	Alkaline phosphatase
ATP	:	Adenosine triphosphate
bc	:	Blood cells
Bc	:	Bil canaliculus
BD	:	Bile ductule
BV	:	Blood vessels
C	:	Blood capillary
Cm	:	Cell membrane
Cy	:	Cytoplasm
Dg		Dense granles
g	:	glycogen
G		Golgi apparatus
G6PDH	:	Glucose-6-phosphate dehydrogenase
GA	:	Glutaraldehyde
gm	:	Gram
H	:	Heterochromatin
Kg	:	Kilogram
L	:	Lysosome
LD	:	Lipid droplets

LDH	:	Lactic dehydrogenase
M	:	Mitochondria
mg	:	Milligram
ml	:	Millilitre
Mv		Microvilli
MVB	:	Multivesicular body
N	:	Nucleus
Ne	:	Nuclear envelope
NNM	:	N-nitrosomorpholine
Nu	:	Nucleolus
O_5O_4	:	Osmium tetroxide
P	:	Pigment
PK		Pyruvate kinase
PMVB		Ploymorphic Multivesicular bodies
PS		peroxisome
r	:	Ribosomes
RER	:	Rough endoplasmic reticulum
S	:	Sinusoid
SDH	:	Succinic dehydrogenase
SER	:	Smooth endoplasmic reticulum
V	:	Vacuole

Chapter (I)



INTRODUCTION

The industrialized countries are facing, among others, three major challenges: to control the cost of health care, to offer to their aging population a real opportunity to live, not only longer, but also better and to provide more and more "busy" consumers, a choice of healthy processed or ready-to-eat foods.

At the same time, progress in the biosciences supports the hypothesis that, beyond providing nutrition, diet also may modulate various functions in the body that are relevant to health.

The concepts in nutrition are changing from a past emphasis on the absence of adverse effects to an emphasis on the promising use of foods to promote a state of well-being, better health and reduction of the risk of diseases. These concepts have recently become popular with consumers.

Although there are still many people who know a little about nutrition itself, consumer awareness of the subject and its relationship to health is nevertheless growing appreciably. Finally, advances in food science and technology are providing the food industry with increasingly effective techniques to control and improve the physical structure and the chemical composition of food products ***(Marcel, 1999)***.

A number of studies to determine how dietary factors influence various disease processes continue to be conducted ***(John and Rodgers, 1997)***.

In most foods free fructose is accompanied by free glucose and sucrose in various proportions. Fructose in excess of glucose is particularly abundant in honey, apple, pears and their juices. However, most ingested free fructose is from added sources. Fructose is accompanied by sorbital in both pears and apples ***(Richmond et al., 1981 and Wralstad and Shallenberger, 1981)***. An excess of fructose is unusual in berries, vegetables and legumes.

Epidemiological studies have made it increasingly clear that the various types of cancer in different regions of the world are dependent upon exogenous, causal factors. The investigation of nutritional and other environmentally derived influences in animal experiments has established that a vast array of compounds are capable of playing a role in tumorigenesis. It is recognized that the detection and subsequent regulation of these compounds are of prime importance for the management of neoplasia in man. Furthermore,it is evident that neoplastic development is a multistep process, the problem of the different stages at which exogenous factors could interact has merited emphasis ***(Moore and Kitagawa, 1986)***.

A variety of metabolic aberrations particularly in carbohydrate metabolism were found in cancer cells ***(Weber, 1977 and Pitot, 1990)***.

Investigations in a number of animal models and some observations in man indicated that the development of the neoplastic phenotype is characterized by an ordered pattern of the metabolic and morphological changes leading from preneoplastic cellular alterations through

intermediate stages to benign and malignant neoplastic cell populations ***(Bannasch, 1984).***

Fundamental aberrations in carbohydrate metabolism have been demonstrated in focal hepatic lesions emerging early during hepatocarcinogenesis induced in rat liver by limited oral administration of N-nitrosomorphaline ***(Klimek and Bannasch, 1990).***

It has been suggested that the deviations in carbohydrate metabolism indicated by the focal glycogenosis and related alterations in the enzyme histochemical pattern might be a pathogenetic principle of hepatocarcinogenesis ***(Bannasch et al., 1984)***. If the assumption that the deviations in carbohydrates metabolism do indeed play a pathogenetic role in the process of hepatocarcinogenesis is valid, an enhancement of these metabolic alterations will promote the development of hepatic tumors. In rodents, the focal hepatic glycogenesis during early stages of hepatocarcinogenesis has attracted particular attention ***(Bannasch, 1968)***.

It is worth mentioning that major changes in carbohydrate metabolism such as alterations in glycogen content, a reduction in the activities of glucose-6-phosphatase and adenylate cyclase and an increase in the glyceraldehyde-3-phosphate dehydrogenase and glucose-6-phosphate dehydrogenase activities were observed in the focal lesions in rats treated with N-nitrosomorpholine (NNM) ***(Klimek and Bannasch, 1990)***. These changes have been interpreted as indicators of ordered pattern of metabolic changes during carcinogenesis ***(Klimek et al., 1984; Ehemann et al., 1986 and Seelmann-Eggebert et al., 1987)***.