# PLASMA FIBRONECTIN IN DIABETIC RETINOPATHY

#### **Thesis**

Submitted to Faculty of Science

Ain Shams University

In Partial Fulfillment of

Master of Science

Bv

Haimaa Mitwally Yousiff-

B.Sc. Biochemistry

Supervised By

Prof. Dr. Nadia M. Abdallah

Professor and Head of Biochemistry Department
Faculty of Science
Ain Shams University

#### Prof. Dr. Gehan K. Hasan Ali

Professor of Clinical Pathology Faculty of Medicine Ain Shams University

### Dr. Hala M. El-Desouky

Lecturer of Biochemistry Faculty of Science Ain Shams University



1996







## CONTENTS

	Page
Abstract	I
Acknowledgement	$\Pi$
Aim of the work	IV
Abbreviations	V
List of Figures	VII
List of Tables	IX
PART I: INTRODUCTION	
A. Fibronectin	1
1. The structure of fibronectin	2
1.1. Primary structure	4
1.2. Secondary structure and tertiary structure	12
2. Synthesis of fibronectin	12
3. Properties of fibronectin	13
3.1. Biological properties	13
3.2. Chemical properties	13
3.3. Physical properties	13
4. Interactions and functions of fibronectin	14
4.1. Interaction with collagen, fibrin and	14
fibrinogen	
4.2. Interaction with glycosaminoglycans	16
4.3. Interaction with cells	17
4.4. Interaction with bacteria	18
4.5. Interaction with viruses	19
4.6. Interaction with macrophages and	19
granulocytes	
4.7. Interaction with platelets	20
4.8. Role of fibronectin in wound healing	20
4.9. Relation to pituitary function	22
4.10. Relation to male infertility	22

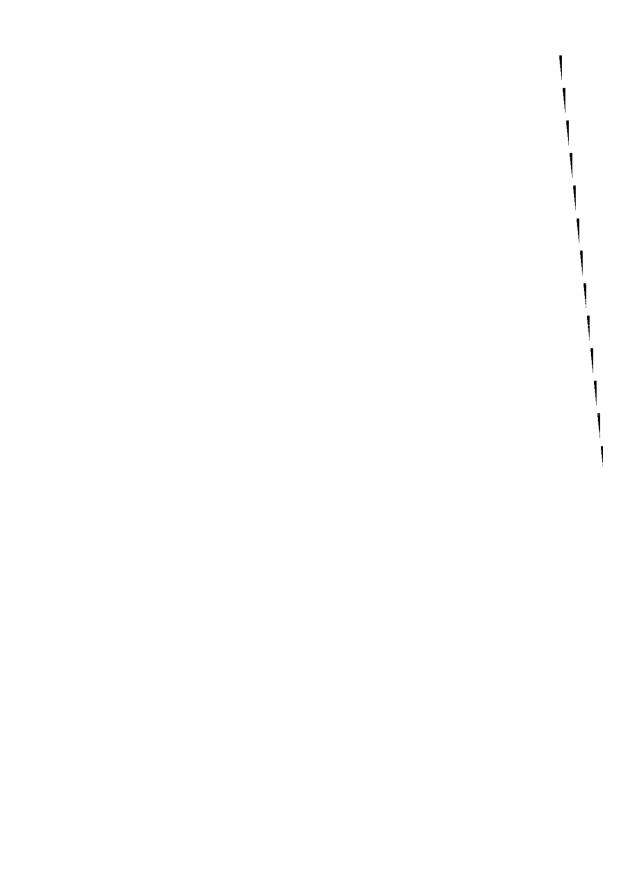
В.	Physiological variations in plasma fibronectin	22
le	vel	
	l. Age	23
	2. Sex	23
	3. Obesity	23
	4. Genetic factors	24
	5. Pregnancy	24
<i>C</i> .	Pathological variations in plasma fibronectin	24
le	vel	
	l. Infections	24
	2. Burns	25
	3. Trauma and operations	25
	4. Starvation	26
	5. Sickle cell anaemia	26
	6. Plasma fibronectin level in patients with cancer	26
	7. Rheumatic diseases	27
	8. Plasma fibronectin in liver diseases	27
	9. Plasma fibronectin in kidney diseases	30
	10. Plasma fibronectin in bone diseases	31
	ll. Plasma fibronectin in diabetes mellitus	31
	12. Plasma fibronectin in diabetic retinopathy	32
D.	Views concerning plasma fibronectin assay	36
	l. Sample collection and preparation	36
	2. Methods of determination of fibronectin	36
	2.l. Electro-immunoassay	36
	2.l.l. Rocket immunoelectrophoresis	37
	2.1.2. Combined electrophoresis immuno-	38
	fluorescence technique.	
	2.2. Enzyme-linked immuno sorbent assay	39
	(ELISA)	
	2.3. Radioimmunoassay (RIA)	40
	2.4. Radial immunodiffusion	42
	2.5. Turbidimetry	44

2.6. Nephelometry	45
PART II: MATERIALS AND METHODS	48
A. Subjects	48
Blood samples	49
Urine samples	49
B. Methods	51
l. Quantitative determination of blood sugar	51
2. Quantitative determination of transaminases in	52
serum	
3. Semiquantitative determination of micro	54
albuminuria	
4. Plasma fibronectin assay using single radial	54
immunodiffusion	
C. Statistical analysis	62
PART III: RESULTS	66
PART IV. DISCUSSION	88
PART V:	
SUMMARY	101
REFERENCES	103
ARABIC SUMMARY	137
ARABIC ABSTRACT	

#### ABSTRACT

Using radial immuno-diffusion technique, plasma fibronectin was measured in forty diabetic patients (30 patients with diabetic retinopathy, which further subdivided into 12 background cases and 18 proliferative cases, and 10 diabetic patients without retinopathy) and in 10 healthy control subjects. The results showed that plasma fibronectin level in diabetic patients with retinopathy was significantly higher than either control subjects or diabetic patients without retinopathy, there significant was no difference in plasma fibronectin level between control subjects or diabetic patients without retinopathy and there was no significant difference in fibronectin levels background between and proliferative diabetic patients with retinopathy.

From this study, it is concluded that, plasma fibronectin can be used as a marker of microvascular complications of diabetes but can not reflect the disease severity or type of retinopathy.



# Acknowledgement

"First and foremost, thanks are due to ALLAH the Beneficient and Merciful".

I would like to express my deep thanks and gratitude to **Prof. Dr. Nadia M. Abdallah**, Professor and Head of Biochemistry Department, Faculty of Science, Ain Shams University, for giving me the honour of working under her supervision, for her valuable help and guidance through out the whole work and above all for her inforgettable sincere encouragement.

I wish also to record my deepest gratitude to Prof. Dr. Gehan K. Hasan Ali, Professor of Clinical Pathology Department, Faculty of Medicine, Ain Shams University, for suggesting the topic of this work and sound advice given throughout the course of the present work and during the writting of the thesis.

I wish also to convey a meaningful message of gratitude to **Dr. Hala Mahdy El-Desouky**, Lecturer of Biochemistry Department, Faculty of Science, Ain Shams University, for her sincer advice, critical reading and writing of the thesis and active supervision.

I would like to express may deep thanks and gratitude to **Dr. Alaa Fathy Mahmoud,** Lecturer in Ophthalmology Department, Faculty of Medicine, Ain Shams University, for his help in sample collection.

Finally my deep thanks to all the dear members of my family for their continuous encouragement, help and patience.

#### AIM OF THE WORK

This piece of work was designed to study the level of plasma fibronectin in diabetic patients with retinopathy (background and proliferative retinopathy) to establish the relation between plasma fibronectin and microangiopathy as a vascular complication of diabetes.