بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــســـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

Evaluation of the heparin surface modified intraocular lens implantation in diabetic patients

MD Thesis
For Partial Fulfillment of
Doctorate Degree
in
Ophthalmology

Submitted by
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FACULTY OF MEDICINE
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1999

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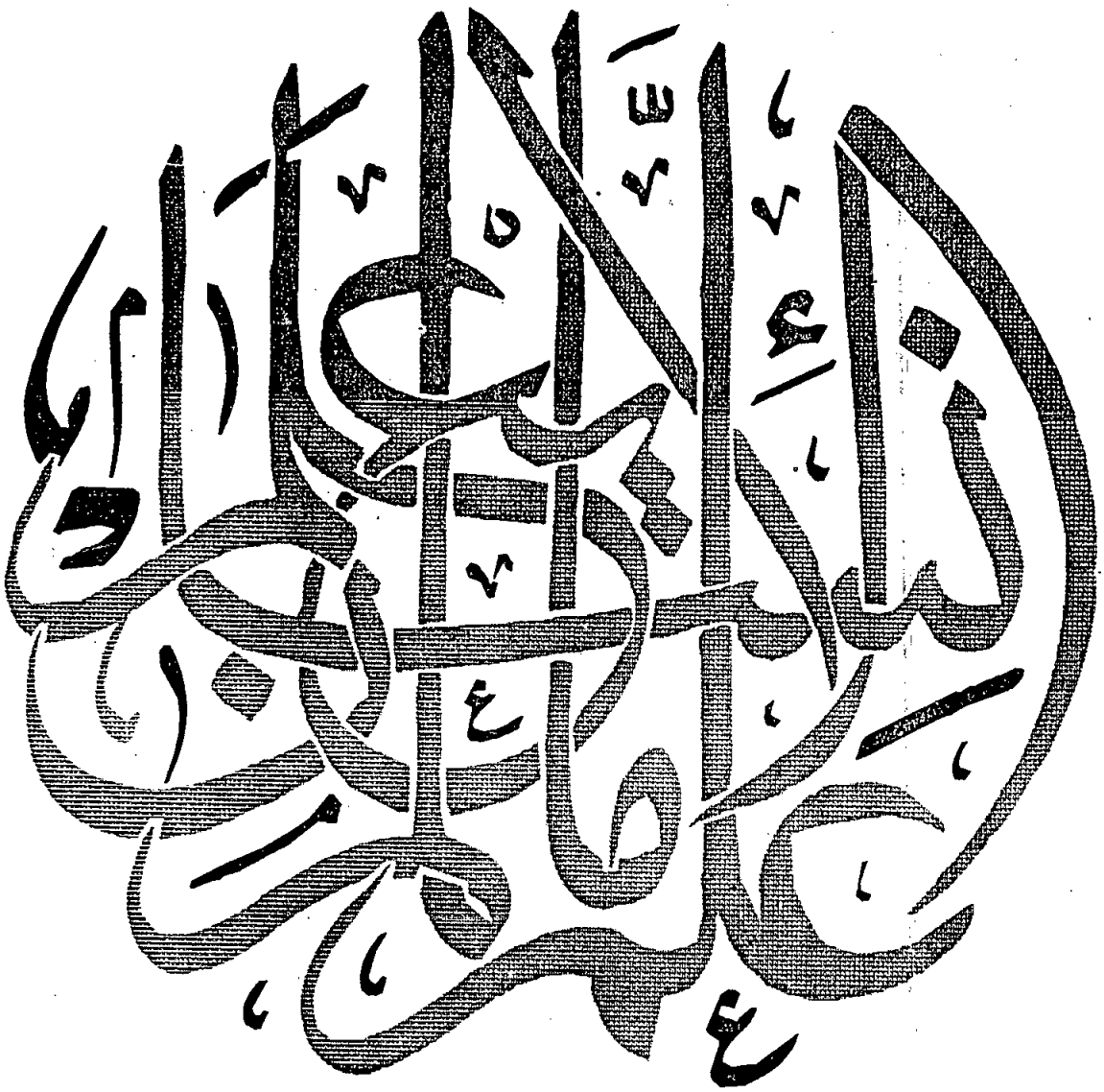

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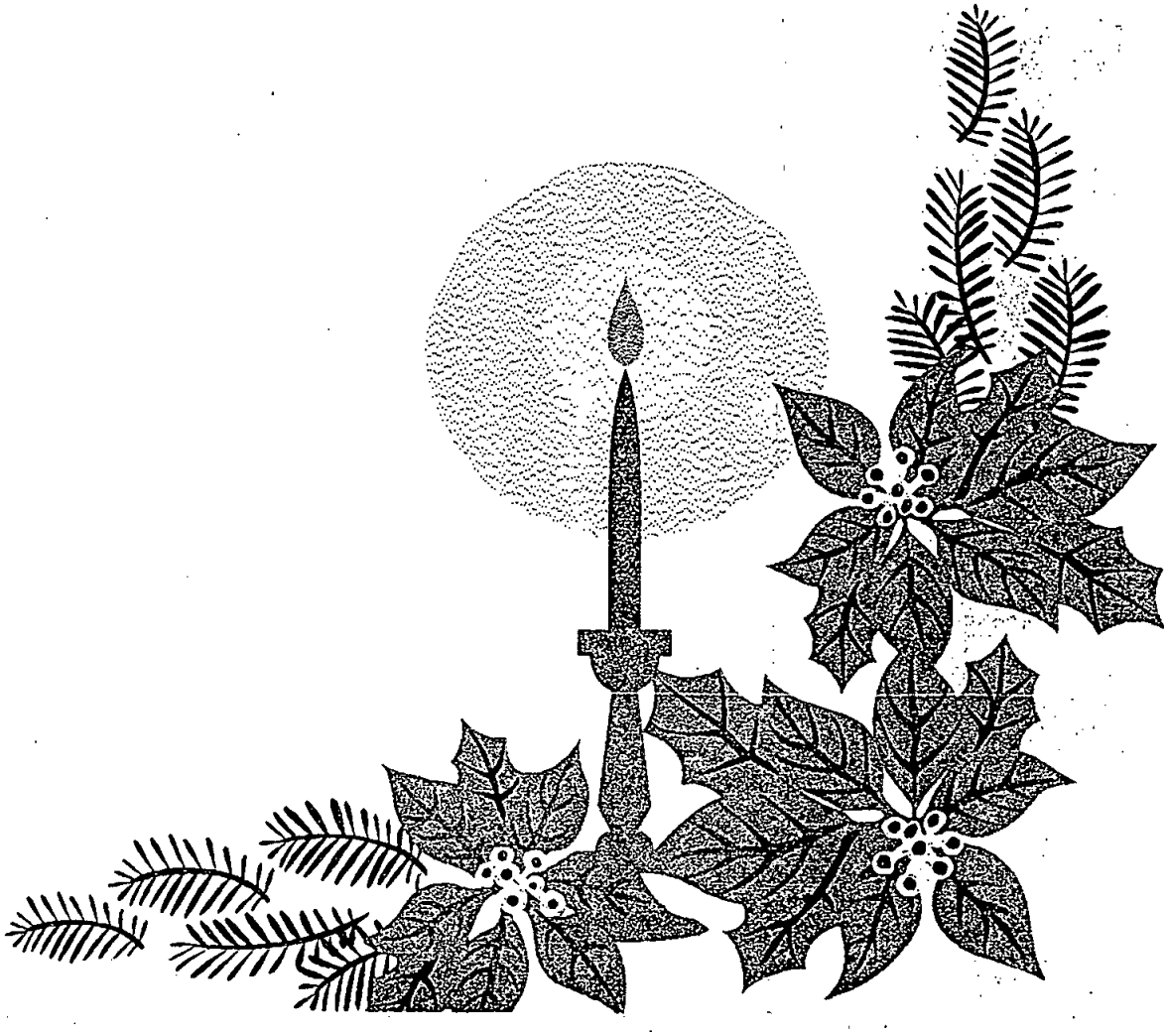
Khalid El-Khoraby

List of Abbreviation

µg:	Microgram
^0C:	Degree centigrade
A^0:	Angstrom
ARI:	Aldose Reductase Inhibitor
AST:	Asperitate Aminotransferese
CME:	Cystoid macular edema
D:	Diopter
DM:	Diabetes mellitus
DR:	Diabetic Retinopathy
ECCE:	Extracapsular cataract extraction
FBS:	Fasting blood sugar
HSM:	Heparin Surface Modified
I.O.P:	Intraocular Pressure
ICCE:	Intracapsular cataract extraction
IOL:	Intraocular Lens
IPs:	Implant precipitates
LECs:	Lens epithelial cells
mg/dl:	Milligram/deciliter
mm:	Millimeter
mmHg:	Millimeter mercury
Nd:YAG:	Neodymium, Yttrium-Aluminum Garnet
NDDG:	National Diabetes Data Group
NH:	Amino
NPDR:	Non-proliferative diabetic retinopathy
PC:	Posterior Capsule
PCO:	Posterior capsule opacification
PDR:	Proliferative diabetic retinopathy
PGE_2:	Prostaglandin E_2
Phaco:	Phacoemulsification
PMMA:	Polymethylmethacrylate
PVA:	Polyvinyl pyrrolidone
SEM:	Scanning Electron microscope
SP:	Surface-passivated
SRK:	Sanders, Retzlaff and Kraff
U.S.:	United States
VA:	Visual Acuity
Vs.:	Versus
WBCs	White Blood Cells

Contents

Introduction



Introduction

Polymethylmethacrylate (PMMA) had been the material of choice for intraocular lenses (IOLs) since the first IOL was implanted in a human eye in 1949. PMMA was almost considered to be biologically inert. Yet an increasing number of studies had found that PMMA could cause intraocular inflammation. It elicits an inflammatory response when implanted subcutaneously *(Jennette et al., 1982)* and activates complements in vitro *(Mondino et al., 1985)*. Clinical studies and histologic examination of enucleated human eyes indicated that a foreign body reaction probably occurs in all eyes after IOL implantation *(Wolter, 1983; Wolter, 1985; Ohara, 1985)*.

There is a good reason to believe that this foreign body reaction leads to some clinical problems such as uveitis, synechia formation, and the occurrence of cell and pigment deposits on the IOL surface. In some cases, the acute inflammatory reaction developed into a chronic postoperative anterior uveitis *(Apple et al., 1984)*. In some patients, and particularly in eyes with damaged blood - ocular barriers, such as diabetic and uveitic eyes, this lack of IOL biocompatibility may contribute to ongoing inflammation, progressive damage to the corneal endothelium, glaucoma, thickening of the posterior capsule, or cystoid macular edema. The concern about IOL biocompatibility has led to improved IOL materials and PMMA IOL surface modification.

Some researchers sought to reduce inflammation by designing a lens in which heparin is covalently bonded to the PMMA surface to make it hydrophilic. It was hypothesized that the hydrophilic surface of this

heparin surface modified IOL (HSM IOL) would reduce cell adherence and decrease electrostatic force, preventing the power that attracts particles. Extensive biological testing of HSM IOLs, both in vitro and in vivo, including implantation in monkeys, had strongly suggested that this modified surface is more biocompatible than regular PMMA ***(Larsson et al., 1989; Lundgren et al., 1992)***.

The clinical studies previously conducted on HSM lenses had mainly included regular, non-complicated, low risk patients with senile cataracts. These studies had confirmed the reduced cellular reaction on HSM lenses seen preclinically ***(Borgioli et al., 1992; Lai and Fan, 1996)***. The difference in the prevalence of cellular deposits between HSM and PMMA lenses was most pronounced in these studies and statistically significant 3 months postoperatively and decreased with longer follow - up times. However some studies suggest that in routine implantation there is no significant clinical benefit ***(Momose andThapa, 1993).***

The heparin-coated IOL is in a state of constant molecular motion, and its negative charge repels bacteria and WBCs, because they share the same surface charge. A growing body of international research experience in Europe and Asia suggested that heparin appears to provide an increased level of biocompatibility and very promising clinical outcomes ***(Trocme, 1998)***.

So, It seemed reasonable to study patients who may have an increased risk of postoperative inflammatory reactions as, for example patients with exfoliation, uveitis, glaucoma or diabetes. In the case of exfoliation syndrome, HSM lenses were associated with significantly less

cellular deposits, fibrinoid reaction and posterior synechia *(Zetterstrom et al., 1992; Ravalico et al., 1994)* less posterior capsule opacification *(Zetterstrom, 1993)*. In the case of uveitis where a recurrence of the uveitis postoperatively can result in decreased tolerance of the lens within the eye, sporadic cases have been implanted with HSM lenses *(Philipson et al., 1992; Percival and Pia, 1993)*.

In Diabetic patients, sporadic cases have been implanted with HSM lenses. *Lin et al., (1994)* showed that there was no statistically significant difference between HSM and PMMA IOL in visual acuity, corneal edema, anterior chamber reaction, and amount of posterior synechia formation and IOL deposits, but in another study, the results indicated that heparin surface modification increases the biocompatibility of PMMA IOLs by significantly reducing the postoperative foreign body for at least one year following cataract surgery *(Condon et al., 1995)*.

Aim of the Work