Intravitreal implants in management of posterior segment diseases

Essay

Submitted for Partial Fulfillment of Master Degree In ophthalmology

By

Mohammad Saleh Mohammad Sallam

M.B.B.Ch

Supervised by

Professor : Mohammad Omar Rashed

Professor of ophthalmology

Faculty of Medicine, Ain Shams University

Dr. Mohammad Moghazy Mahgoub

Ass.professor of ophthalmology

Faculty of Medicine, Ain Shams University

Faculty of Medicine

Ain Shams University

2013

الجسيمات المزروعه داخل الجسم الزجاجي فى علاج أمراض القطعة الخلفية للعين

رسالة توطئة للحصول على درجة الماجستير في طب وجراحة العيون

مقدمة من الطبيب

محمد صالح محمد سلام

بكالوريوس الطب والجراحة

تحت إشراف

أ.د.محمد عمر راشد

استاذ طب وجراحة العيون

كلية الطب - جامعة عين شمس

د.محمد مغازى محجوب

استاذ مساعد طب وجراحة العيون

كلية الطب - جامعة عين شمس

كلية الطب

جامعة عين شمس

2013

List of Abbreviations

BCVA	*Best corrected visual acuity*
BRB	*Blood retinal barrier*
CME	*Cystoid macular edema*
CMV	*Cytomegalo virus*
3D	*3 dimensional*
DM	*Diabetes Mellitus*
DME	*Diabetic macular edema*
DNA	*Double stranded nucleic acid*
EBV	*Epstein barr virus*
ECT	*Encapsulated cell technology*
EVA	*Ethylene vinyl acetate*
FAME	*Flucinolone acetonide in diabetic macular edema*
FDA	*Food and drug administration*
Fig	*Figure*
Gd-DTPA	*Gadolinium diethylene triamino pentaacetic acid*
H-110	*5-hexadecanoyl amino fluorescein*
HAART	*Highly active anti-retroviral therapy*
HPMC	*Hydroxy propyl methyl cellulose*
IOP	*Intraocular pressure*
IVMP	*Intravenous methyl prednisolone*
MRI	*Magnetic resonance imaging*
PGA	*Polyglycolic acid*
PLA	*Polylactic acid*
PLGA	*Polylactic co-glycolic acid*
PVA	*Polyvinyl alchol*

List of Abbreviations

RPE	*Retinal pigment epithelium*
STRIDE	*Sustained triamcilinone release for inhibition of Diabetic macular edema*
TA	*Triamcilinone*
USA	*United States of America*
VA	*Visual acuity*
VEGF	*Vascular endothelial growth factor*
VZV	*Varicella zoster virus*

Description *page*

List of Contents

List of Figures

List of Figures

List of Figures

List of Tables

Acknowledgements

First of all, I thank God for without his help I couldn't have accomplished this work.

I would like to express my thanks and gratitude to Professor: ***Mohammad Omar Rashed***, Professor of ophthalmology, Faculty of Medicine, Ain Shams University.

I would also like to express my thanks and deep appreciation to Assistant Prof. ***Mohammad Moghazy Mahgoub***, assistant professor of ophthalmology, Faculty of Medicine, Ain Shams University, for his helpful advice, guidance and support.

Finally, I would like to thank my family for their caring and support.

Introduction

The unique anatomy and physiology of the eye renders it difficult to achieve an effective drug concentration at the target site. Therefore, efficient delivery of a drug past the protective ocular barriers accompanied with minimization of its systemic side effects remains a major challenge ***(Rupenthal and Alany, 2007).***

Diseases affecting the posterior segment of the eye are difficult to treat and take longer to combat by employing conventional topical or systemic drug delivery ***(Maurice, 2001).***

Research has been directed at specialized drug delivery technologies to the tissues of the posterior segment of the eye ***(Visor, 1994).***

Pharmacokinetics describes the quantitative relationship between administered dose and tissue concentration over time, it is an important tool in drug development. To optimize drug concentration at the target sites, pharmacokinetic studies are useful ***(Kim et al., 2004).***

Convential techniques as fluorescein, MRI and 3D simulation eye models are methods of assessing ocular drug distribution **(Li et al., 2008).**

A variety of approaches for drug delivery to the posterior segment of the eye have been explored over the last few decades. These approaches include direct intravitreal injections, drug loaded microparticle carriers as microspheres, nanospheres, and liposomes, transscleral drug delivery devices, and intravitreal devices using polymers **(Davis et al., 2004).**

The pharmaceutical world is becoming more and more aware of intraocular drug delivery challenges, and revolutionary therapeutic advances are being invented and implemented which may have the potential to vastly improve patient care and quality of life. Among these most promising developments are intravitreal drug delivery devices designed to deliver drugs with precision directly to the vitreous, retina, and choroid ***(Ashton et al., 2000).***

An intraocular device can be designed as either biodegradable or non-biodegradable ***(Choonara et al., 2010).***

With the continued development of more potent drugs combined with research into novel delivery methods, there is a realistic hope that optimal therapeutic drug delivery for diseases of the posterior segment will be available in the near future ***(Shalin et al., 2010).***

AIM OF WORK

To review types and indications of intravitreal implants in management of posterior segment diseases with highlighting of the expected benefits versus potential complications.