WILL SUSTAINED RELEASE OCULAR FORMULATIONS REVOLUTIONISE THE RETINAL THERAPEUTICS MARKET?

GROUP 12
DARA BELL
ARRON COLEMAN
LARA GIBNEY
MIKEY O’CONNOR
RETINAL THERAPEUTICS MARKET VALUED AT OVER $3 BILLION IN 2013.
DIABETIC RETINOPATHY (DR)/
DIABETIC MACULAR EDEMA (DME)

• Leading cause of blindness in working-aged population affecting over 8 million people living in the U.S.

• Abnormal growth of blood vessels in attempt to restore normal bloodflow to ischemic retina.

• Leads to development of diabetic macular edema (DME).

• Poorly developed blood vessels cause leakage of water, blood cells and proteins into surrounding retinal tissue.

• Results in dysfunction of macula and decreased vision.
AGE RELATED MACULAR DEGENERATION (AMD)

• Degenerative retinal disease causing progressive loss of central vision.
• Leading cause of irreversible vision loss in individuals over the age of 50 affecting 11 million people in the U.S.
• Promotes the growth of new, weak blood vessels behind the retina that leak lipids and serum into macular cells
• Leads to progressive death of macular cells.
CURRENT PHARMACOLOGICAL TREATMENTS

• Growth of immature endothelial blood vessel in DR and AMD promoted by vascular endothelial growth factor (VEGF).

• Current treatments aimed at inhibiting VEGF and reducing blood vessel formation.

• All current anti-VEGF treatments are in the form of intra-vitreal injections.
PROBLEMS WITH CURRENT PRODUCTS ON THE MARKET?

- Risks associated with intra-vitreal injections.
- Administration requires an ophthalmologist.
- Dosage frequency.
- Cost effectiveness.
CANDIDATES FOR SRDF:

- Have neither a very long (>8 hours) nor a very short half life (<2 hours)
- Possess a therapeutic index
- Contain desirable absorption and solubility characteristics
- Administered in relatively small doses
- Used for treating chronic instead of acute conditions.
POSTERIOR SOLUTIONS:

Figure 1. Intra-vitreal implants, biodegradable or non-biodegradable

Figure 2. Sustained Release of an Anti-Glaucoma Drug: Demonstration of Efficacy of a Liposomal Formulation in the Rabbit Eye
ADVANTAGES OF SRDF OVER OTHER CONVENTIONAL FORMS:

- Decreased local and systemic side effects which results in reduced gastrointestinal irritation
- Reduction in cost
- Reduction in dosing frequency
- Reduction of fluctuations in circulating drug levels
- Improvement in patient compliance and reduced patient care time

Figure 1. Plasma Drug Concentration Profile for Conventional Release, a Sustained Release and Zero Order Controlled Release
ONE DOES NOT SIMPLY CONVERT ALL OCULAR DOSAGE FORMS TO SUSTAINED RELEASE OCULAR DRUG FORMULATIONS
DISADVANTAGES OF SRDF:

• Dose dumping.
• Poor systemic availability in general.
• Reduction in the potential for dosage adjustment.
• It is unpredictable for in-vitro and in-vivo correlation.
CURRENT SUSTAIN RELEASE THERAPIES FOR DME/AMD

OZURDEX (DEXAMETHASONE IMPLANT)

- A sustain release biodegradable implant
- FDA approved since 2014
- A corticosteroid that blocks chemical pathways which leads to inflammation, leakage from the retinal blood vessels and swelling of the retina.
- Advantages: long duration (4-6 months)
  Small injection, no stitches needed
- Disadvantages: can cause increased I.O.P, therefore regular monitoring is necessary.
  Can potentially result in cataracts
Ozurdex is an implant which gets injected into the vitreous humour of the eye.

The biodegradable material of the implant mixes with the dexamethasone (the active drug) forming the rod shaped implant.

Once injected into the eye, the vitreous gel causes the implant to slowly dissolve, releasing the drug dexamethasone.

It works by suppressing inflammation which inhibits inflammatory cytokines and results in decreased oedema, capillary leakage, fibrin deposition and migration of inflammatory cells.
FLUOCINOLONE ACETONIDE (FA) INTRAVITREAL IMPLANT (ILUVIEN)

• A sustain released non-biodegradable implant
• FDA approved since 2014
• Advantages: long duration (up to 36 months)
• Disadvantages: eye infections, inflammation or increased IOP and cataracts.
• How it works: iluvien is similar to ozurdex as it is a small implant injected into the eye. The drug released from the implant is fluocinolone acetonide.
THE FUTURE OF THE RETINAL THERAPEUTICS MARKET

1. Future projected prevalence of key diseases
2. Factors affecting demand for retinal products
INCREASING DEMAND FOR OCULAR THERAPY AS A RESULT OF A GREYING POPULATION

PROJECTED NO. OF PEOPLE AGED OVER 60 (GLOBAL) UP TO 2050

The over 60 age group will rise from 750 million in 2010 to roughly 1 billion in 2020 and 2 billion in 2050 - Retinal diseases such as macular degeneration, and Diabetic retinopathy occur at a rate of 7.6%, and 1.9%, respectively, in populations over 40
RISE IN RETINAL DISEASE PROMINENCE

AMD - approx. 18 million in 2010-35 million in 2020

- More than 25 companies are currently working on developing sustained release drug delivery systems

Env1305, sustained release treatment of AMD. Long term studies to assess pharm kinetics starting this year
RISE IN RETINAL DISEASE PROMINENCE

Diabetic Macular Edema

-Approx. 33 million people worldwide-

-ENV1105 treatment of DME, sustained release, minimum of 6 months

Retinal diseases market – $6500m in 2013 to $12,400m in 2019

Sustained ocular release market-2014 Market research study predicted The overall market is likely to be more than USD 6 billion in the coming decade. [Smith- 2015].
Retinal market 2013

- DME: 38%
- AMD: 12%
- RVO: 7%
- Other: 43%
ARE THERE ANY QUESTIONS?
I HOPE NOT
References


2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3306122/


References


