Recent Advances in Contact Lenses

Essay
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List of Abbreviation

AA:	**A**cuvue **A**dvance
ACT:	**A**symmetric **C**orneal **T**echnology
AO:	**A**cuvue **O**asys
ASD:	**A**cademic **S**kills **D**isorder
AV2:	**A**cu**v**ue **2**
CL:	**C**ontact **L**ens
DA:	**D**iacetone **a**crylamide
Dk:	Oxygen Permeability
Dk/t:	Oxygen Transmissibility
DMA:	**D**i**m**ethyl **a**crylamide
E:	Modulus of **E**lasticity
EDTA:	**E**thylene **d**iamine **t**etra**a**cetic acid
FDA:	**F**ood and **D**rug **A**dministration
FND:	**F**ocus **N**ight and **D**ay
GVHD:	**G**raft **V**ersus **H**ost **D**isease
IC:	**I**rregular **C**ornea
LASEK:	**L**aser **A**ssisted **S**ub **E**pithelial **K**eratectomy
LASIK:	**L**aser **As**sisted **I**n Situ **K**eratomelusis
MAA:	**M**eth**a**crylic **a**cid
MEMS:	**M**icro-machined **E**lectro **M**echanical **S**ystems
MMA:	**M**ethyl **m**eth**a**crylate
MPa:	**M**ega**Pa**scal
NCVE:	**N**-**C**arboxy **v**inyl **e**ster
NVP:	**N**-**V**inyl **p**yrrolidone
OSD:	**O**cular **S**urface **D**isease
OZ:	**O**ptical **Z**one
PBVC:	**P**oly **b**utanol **v**inyl **c**arbamate
PC:	**P**hosphoryl **c**holine
PED:	**P**ersistent **E**pithelial **D**efect
pHEMA:	**p**oly **h**ydroxy**e**thyl**m**eth**a**crylate
PLGA:	**P**oly **l**actic-co-**g**lycolic **a**cid
PMMA:	**P**oly **m**ethyl**m**eth**a**crylate
PV:	**P**ure **V**ision
PVP:	**P**oly **v**inyl **p**yrrolidone

RGP:	**R**igid **G**as **P**ermeable
SiH:	**Si**licone **H**ydrogel
t:	**T**hickness of the lens
TPVC:	**T**rimethylsiloxysily **p**ropyl **v**inyl **c**arbamate
TRIS:	**Tri**methyl**S**iloxy silane
USAN:	**U**nited **S**tates **A**dopted **N**ame
US FDA:	**U**nited **S**tates **F**ood and **D**rug **A**dministration

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Introduction

Contact lenses (CLs) have become an excellent alternative to spectacles. There are two different forms of CLs; soft and rigid. Soft lenses are typically made from the traditional hydrogel. More recently, soft lenses are also being made from the newer silicone hydrogel (SiH) material. A basic knowledge of CL materials is essential in the management of clinical complications frequently seen in practice. The optimal CL material is one that meets or exceeds the oxygen requirements of the cornea. The other form is rigid CL; traditional rigid lenses were made of polymethylmethacrylate (PMMA), but are now more commonly prescribed in one of the many gas permeable (GP) materials ***(Jones, 2008).***

Three techniques can be employed to manufacture CLs; lathe cutting, spin casting and cast molding. As CLs rest against the highly sensitive eye ball, CLs need to be of the highest quality ***(Hough, 2008).***

Contact lenses are commonly used now for the correction of presbyopia. There are several available options, including single vision CL and spectacle over correction for near, monovision, RGP multifocal and bifocal lens designs and soft bifocal lens designs ***(Bennett, 2008).***

Contact lenses correction for astigmatism has made significant toric advances over the last years. There are two types: soft toric and toric RGP CLs which include: Front surface toric, back surface toric and bitoric CLs. Each has its advantage and disadvantage ***(Russell and Slonim, 2009).***

Keratoconus is an asymmetric bilateral ectasia and thinning of the cornea resulting in increasing steepening of the cornea. The treatment of keratoconus can be implemented by the use of CL of various kinds such as, piggyback, hybrid, scleral and Rose K CL. depending on the severity of keratoconus, a CL is chosen that will give the best visual acuity and tolerance ***(Garcia and Alio, 2007)*.**

Aspheric CLs were made to correct spherical refractive error and ocular spherical aberration, but many studies found that the fitting of aspheric design soft CL does not result in superior visual acuity or aberration control compared with equivalent spherical design soft CL ***(Dietze and Cox, 2006).***

Overnight orthokeratology, or corneal reshaping is utilizing reverse-geometry rigid CL to change the shape of the cornea. This is a temporary, reversible technique. Currently, it is most commonly used to flatten the central corneal curvature temporarily and reduce the corneal eccentricity. So, it is used with myopia and with-the-rule astigmatism. Recently it is also used in treatment of hyperopia ***(Barr et al., 2009).***

Contact lenses have a variety of therapeutic applications in the management of corneal diseases. Common indications for use are relief of pain, promotion of corneal healing and control of corneal hydration ***(Rubinstein, 2008).***

The majority of ocular medications are delivered to the eye topically in the form of eye drop. CLs could potentially also be used to deliver medications to the eye. Recently, progress has been made in developing a drug eluting CL ***(Ciolino et al., 2009).***

Colored or tinted lenses are very common today. The most common uses of them are for cosmetic purposes, along with vision correction. There are four types of tinted CLs: visibility, enhancement, opaque color and light-filtering tints ***(Gerald, 2009).***

Any part of the eye may become disfigured due to trauma, ocular disease or congenital defects. Prosthetic CLs may be used to improve the appearance of a disfigured cornea, sclera or iris. These lenses may also be used to replace an enucleated eye, to patch an eye during vision therapy or to treat binocular diplopia ***(Carol et al., 2006).***

Aim of the work

Review of literature concerning the recent modalities and technology in CLs to treat different errors of refraction and other eye diseases.