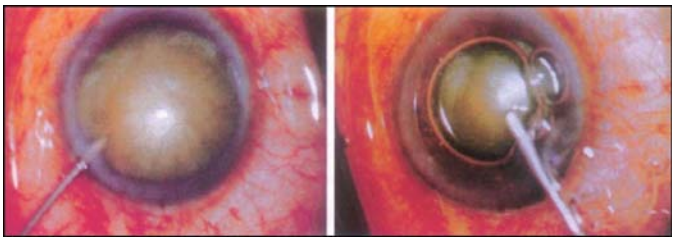
Manual of Ophthalmic Drugs and Dosages



Manual of Ophthalmic Drugs and Dosages

Editor
Ashok Garg
MS, PhD, FIAO (Bel), FRSM, ADM, FAIMS, FICA
International and National Gold Medalist
Medical Director
Garg Eye Institute and Research Centre
235, Model Town, Dabra Chowk,
Hisar (Haryana)-125005
India

Foreword by
David Meyer

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Phones: +91-11-23272143, +91-11-23272703, +91-11-23282021, +91-11-23245672
Fax: +91-11-23276490, +91-11-23245683
e-mail: jaypee@jaypeebrothers.com
Visit our website: www.jaypeebrothers.com

Branches

- 202 Batavia Chambers, 8 Kumara Krupa Road, Kumara Park East, **Bangalore** 560 001, Phones: +91-80-22285971, +91-80-22382956, +91-80-30614073, Tele Fax: +91-80-22281761
  e-mail: jaypeebc@bgl.vsnl.net.in
- 282 IIIrd Floor, Khaleel Shirazi Estate, Fountain Plaza
  Pantheon Road, **Chennai** 600 008
  Phones: +91-44-28262665, +91-44-28269897
  Fax: +91-44-28262331 e-mail: jpmedpub@md3.vsnl.net.in
- 4-2-1067/1-3, Ist Floor, Balaji Building, Ramkote
  Cross Road, **Hyderabad** 500 095
  Phones: +91-40-55610020, +91-40-24758498
  Fax: +91-40-24758499 e-mail: jpmedpub@rediffmail.com
- 1A Indian Mirror Street, Wellington Square
  Kolkata 700 013, Phone: +91-33-22451926 Fax: +91-33-22456075
  e-mail: jpbcal@cal.vsnl.net.in
- 106 Amit Industrial Estate, 61 Dr SS Rao Road, Near MGM Hospital
  Parel, **Mumbai** 400 012, Phones: +91-22-24124863, +91-22-24104532, +91-22-30926896
  Fax: +91-22-24160828 e-mail: jpmedpub@bom7.vsnl.net.in

Manual of Ophthalmic Drugs and Dosages

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This Manual is Dedicated to
My Respected and Param Pujya Guru
Sant Ram Rahim Singh Ji, DSS Sirsa
for his Blessings, Inspiration and
Encouragement

Foreword

Medicines, drugs and chemicals have fascinated mankind for many centuries. Stimulated by the basic human instincts of experimentation, observation and plain curiosity modern medicine has developed the study of ocular pharmacology into an accurate and elaborate science. The knowledge of ophthalmic physiology, molecular biology and therapeutics is expanding so rapidly that it proves to be very difficult for the practicing ophthalmologist to keep abreast with all the available drugs and their individual dosages in our field, let alone in the rest of medicine. In our daily practice it would be wonderful to have access to Goodman and Gillman or Martindale at our desks or in our "pockets", but alas these texts are so bulky that they usually are only reserved for libraries.

As a busy clinician himself, **Dr Ashok Garg** has experienced the need for an inexpensive, simple but comprehensive International Pocket Manual of Ophthalmic Drugs and Dosages that may be available on every clinic desk or carried around in our lab coat pockets comfortably. Based on the ever popular two editions of

his ***Textbook of Ocular Therapeutics***, this manual comes complete with all classes of drugs as well as their individual dosages currently and historically available to ophthalmologists.

I foresee that not only nurse practitioners, pharmacists, residents and medical officers but experienced practicing ophthalmologists as well will find this pocket manual of daily value in their practices. It's conciseness will furthermore remind us of the fact that our knowledge of therapeutics is evolving and that our understanding of drug actions constantly changes. Do keep an open mind to this truth.

David Meyer
MBChB, HonnsBSc (Pharm), MFGP (SA), MMed (Ophth), FC Ophth (SA), PhD
Professor and Chairman
Department of Ophthalmology
Faculty of Health Sciences
University of Stellenbosch
TYGERBERG 7505
South Africa
Tel. +27-21-9389380
Fax +27-21-9318437
e-mail: dm2@sun.ac.za
Website: www.sun.ac.za/eye

Preface

Dedicated Research in Ocular Pharmacotherapeutics have made tremendous progress specially in last one decade. A number of new ophthalmic therapeutic products are now available commercially specially in the field of Topical Antibiotics, Antiglaucoma, steroidal and non-steroidal anti-inflammatory drugs, antiallergics and ophthalmic dyes to treat various ophthalmic diseases in a better way.

This *Manual of Ophthalmic Drugs and Dosages* has been prepared to provide reliable, succinct and rapid access to objective drug information and facilitate therapeutic decision making. This manual is a comprehensive ophthalmic drug information resource, which provide drug product information in a concise format.

Every effort has been made to incorporate the latest advances made in different branches of ocular therapeutics. This Manual is designed in a pharmacotherapeutic format with emphasis on drug entities, commercial product information and specific formulation availability.

I am highly thankful to Prof. David Meyer (South Africa) a pioneer in Ocular Therapeutics at an International level, who has kindly agreed to write Foreword for this International Manual. I am also grateful to my dear friend Dr Amar Agarwal and my family members who gave me

encouragement and constant support to compile this manual.

My special thanks to Shri JP Vij, Chairman and Managing Director, and Mr Tarun Duneja, General Manager (Publishing) and all staff members of M/s Jaypee Brothers Medical Publisher (P) Ltd. who extended full cooperation and always ready to include my last minute instructions in preparing this quality Manual and worked hard to publish it expeditiously.

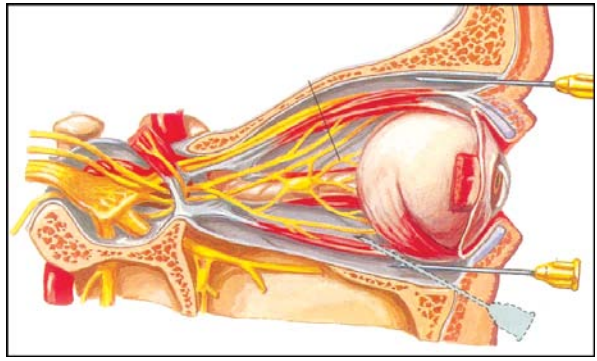
I hope this Manual shall be valuable companion to every ophthalmologist.

Ashok Garg

Contents

Chapter One

Routes of Administration and Drug Delivery Systems in Ophthalmology



For ocular drugs to be effective an ideal drug delivery system (DDS) should deliver the drug at the receptor site in ocular tissues in relatively high concentration to elicit the desired pharmacological response. Most of the ophthalmic drugs are applied topically in the form of eye drops. The time course of drug deliver from an eye drop follows a first order kinetics. It is well known that about 1% or less of an applied dose is absorbed across the cornea topically to reach the anterior segment of eye.

The major problem in the drug treatment (topical) of ocular diseases is the difficulty of achieving a sufficient quantity of drug at the desired site of action. The tight junctions of Iris Capillaries and Retina act as a barrier to the diffusion of drugs from the blood into the aqueous and vitreous and the cornea acts as a barrier to drugs applied locally. Another factor quite important is the rate of removal from the eye of any drug that does actually penetrate into the aqueous or vitreous because although inflammation may reduce the barrier to penetration of the drug into the eye, the associated hypraemia will also speed the removal of the drug from the eye.

During the last decade research is going on in Ophthalmic field for a suitable mode of Ocular therapy to provide higher and sustained penetration of the drugs into the Ocular tissues and anterior chamber promptly and effectively.

Most important factor which modify drug penetration is slow release of the drug thereby increasing the contact

time of the drug to the Ocular structures. The duration of drug action in the eye can be extended by

a. Reducing drainage through the use of viscosity enhancing agents.
b. Improving corneal drug penetration. An ideal drug delivery system should have (i) Spatial placement (ii) Controlled drug delivery.

The route of administration are local and systemic for ocular diseases.

LOCAL APPLICATION

Local application of drugs for the treatment of superficial eye diseases is a very satisfactory route. When the desired site of action of the drug is inside the eye then the problems of ocular barrier arises.

Corneal Barrier

For practical purposes cornea can be considered to consist of three layers. The outer and inner layers. The epithelium and the endothelium prevent water soluble agents, e.g. ionised molecules passing into the eye, but permit the passage of lipid soluble agents whereas the corneal stroma resists the passage of lipid soluble agents but freely allows the passage of water soluble agents. Drugs with dual capability are usually capable of changing from lipid solubility to water solubility of ionisation. The effectiveness of corneal barrier may be considerably reduced by damage to the corneal epithelium.

Scleral Barrier

The sclera, unlike cornea, does not act as a differential solubility barrier and is relatively porous. However, there is unidirectional flow across the sclera from inside to outside of the eye. The intraocular pressure may be partially responsible for this.

METHODS OF LOCAL APPLICATION OF DRUGS

a. Application to corneal surface
b. Sub-conjunctival route
c. Retrobulbar route
d. Direct injection into the aqueous or vitreous

(a) Application to the Corneal Surface

The drug through this route must fulfil the necessary criteria for passing the corneal barrier to penetrate into the eye.

Formally, the drug delivery kinetics, passing through this route, can be deivided in two parts.

First Order Kinetics

In this conc of drug available for penetration falls off exponentially as the medication is diluted and washed away by the tear film and drug conc achieved in posterior segment of the eye is very less. This type of drug delivery is provided by aqueous or high viscosity solutions, ointments or hydrogel drug delivery system.

Zero Order Kinetics

In this system drug is held in reservior and is released into the tear film at the constant rate to provide constant drug conc in the cornea or aqueous.

This drug delivery system is provided by Ocuserts, Soluble Ophthalmic Drug Inserts (SODI) and the osmotic pumps, and liposomal drug delivery system, Cotton pledgets and filter paper strips.

Application to the corneal surface may be in the form of topical drops, ointments, gels viscous preparations, constant release membranes and soft lenses. Topical drops route is commonly used to treat various ocular infections, inflammation and as topical anaesthesia in Modern Cataract Surgery, Phacoemulsification and Lasik Surgery.

The passage of the drug is aided by damage to the corneal epithelium and on the amount of drug in contact with cornea and duration of contact.

When topical drops are used, much is lost because it is washed away by the tears.

Viscous and ointment preparations of drugs including oil suspensions and methyl cellulose solution prolong contact time. This reduces the total quantity of drug given to the patients as well as reducing the unwanted frequency of medication giving better patient compliance.

MEMBRANE BOUND DEVICES

Ocusert System

This system was the first ophthalmic drug delivery system, approved by US FDA for use in human beings.

Ocuserts provide zero order Kinetics drug release.

The ocuserts is a device with a two membrane sandwich with a pilocarpine reservior in the centre. The copolymeric membrane is ethylene vinylacetate also encased between the membranes is a white titanium dioxide ring that aids in visualizing and handling the inserts.

Ocuserts not only provides zero order delivery of the drug but the total amount of drug needed for therapeutic effect is much less than what used as drops or suspension.

Ocuserts are soft and extremely flexible and can be placed either under the upper or lower lid.

The problems with ocuserts can be cost factor, foreign body sensation or incidental loss of ocusert from the cul-de-sac. Other type of ocuserts are diffusible units, osmotic units and erodible units. Drugs that can be delivered through ocuserts are pilocarpine, antibiotics, steroids carbachol or a combination.

Drug Impregnated Inserts

Soluble ophthalmic drug inserts (SODI) were first introduced in seventies and are made of polymers of acrylamide, ethlacrylate and vinyl pyrolidone. SODI dissolve in the cul-de-sac and is capable to provide detectable drugs levels in the cornea upto 48 hours.

Wafers were introduced into eighties. Warfers are soluble ophthalmic inserts made of succinylated collagen. These wafers are 6 × 12 mm in size and are inserted into the inferior cul-de-sac. Antibiotics can be delivered through this route.

Hydrogel Contact Lens Delivery

The hydrogel contact lenses (soft lenses) by virtue of their high water content and large intermolecular pore size, absorb water soluble drugs and release them initially in a high pulse and then release gradually. Hydrogel lenses can be used to deliver water soluble drugs like dexamethasone, antibiotics and pilocarpine. These lenses can be an excellent route of administration. The lens is inserted into the eye after being presoaked in the drug solution. This device is often used in the management of dry eye disorders.

Osmotic Pumps

Osmotic pump, recently introduced, is the drug delivery system of future to treat various ocular diseases commonly. Osmotic pumps contain salt enclosed in one compartment and drug enclosed in an adjacent compartment. Both compartments have flexible walls.

This type of device can deliver any type of medication into the eye regardless of its solubility or molecular weight. The development of new polymeric membranes for use as drug inserts envelops, has recently begun.

Research work is going on for suitable new site specific drugs delivery system, one side coated hydroly propyl cellulose inserts, sub-tenon administration of drug through collagen sponges connected with silicon tube. Work is going on for Margan Therapeutic Lens as continuous corneal perfusion system and, on colloidal suspension

capsules with an oily core in which drugs is dissolved (nano capsules).

PERIOCULAR ADMINISTRATION

When higher concentrations of drugs are required they can be injected locally into the periocular tissues. Periocular drug administration include injection under bulbar conjunctiva, under Tenon capsule (Sub-Tenon's) and behind globe itself and peribulbar route. Drugs most often delivered in this manner include steroids and antibiotics. Local anaesthetics are commonly injected through peribulbar route prior to cataract extraction and other intra-ocular surgical procedures.

Subconjunctival Route

This route including injection under the bulbar conjunctiva used to achieve high concentrations of drug in the anterior chamber. Antibiotics, steroids, mydriatics can be given by this route.

Subconjunctival injections are painful, so this route is used only in severe cases of ocular inflammation or infection of the anterior segment.

Retrobulbar Route

Drugs can be delivered to the back of the orbit by retro-bulbar injections. This is the route for local anaesthesia in Ocular Surgery. Steroids may also be injected by this route to reduce optic nerve or posterior segment inflammation.

INTRACAMERAL ADMINISTRATION

Intracameral administration involves placing drug directly into the anterior chamber of the eye. This is most commonly associated with cataract extraction, IOL implantation and Phacoemulsification during which a viscoelastic substance is injected into the anterior chamber to protect the corneal endothelium. Antibiotics are not routinely injected into the anterior chamber as there is significant risk of complications as well as drug toxicity.

INTRAVITREAL ADMINISTRATION

The intravitreal injection is primarily reserved as a last effort to save eye with severe acute infection or intraocular inflammation. Intravitreal antibiotics is the treatment of choice for endophthalmitis. Intravitreal liquid silicone is used for the treatment of complicated Retinal Detachment. Recently intravitreal ganciclovir has been used with success in treating cytomegaloretinitis in patient with AIDS.

PARABULBAR (FLUSH) ADMINISTRATION

This is new administration route for local anaesthesia which is highly useful, safe, effective and technically easier. This method consist of a limbal sub-Tenon administration of retrobulbar anaesthesia using a blunt irrigating cannula. This technique can be used involving anterior and posterior segment surgery.

PERIBULBAR ADMINISTRATION

Peribulbar administration is mainly used for giving local anaesthesia for modern intraocular surgery. Since the exit of retrobulbar route, peribulbar is safe and effective route of administring local anaesthesia. Peribulbar route is safe because here local injection is given out of muscle cone and complications like intraconal haemorrhage or damage to optic nerve are ruled out.

In this method a cocktail of lignocaine and bupivacaine is injected at the junction of lateral 1/3rd and medial 2/3rd of inferior orbital rim by 26 guage 1″ long needle which is directed backward and medially to its whole length. At present after topical anaesthesia, peribulbar anaesthesia is most commonly used method of giving local anaesthesia worldwide.

Direct Injection into the Globe

Drugs are often introduced into the eye during ocular surgery. Care is taken that the conc of drug, the vehicle and the type of preservative is suitable. Antibiotics may be injected directly into the aqueous and vitreous in cases of endophthalmits.

SYSTEMIC ADMINISTRATION

General rules for system drug administration apply but there is an effective blood aqueous and blood vitreous barrier so that intraocular levels of systemically administered drugs are usually lower than the serum.

Most drugs will cross the aqueous and vitreous in cases of ocular inflammatory diseases which increases permeability. In systemic administration drugs can be given orally or by intramuscular intravenous injections.

Although most ocular diseases respond to topical therapy but certain ocular disorders require systemic drug administration. Oral administration of certain drugs may be most effective route of drug delivery. Carbonic anhydrase inhibitors for treatment of glaucoma, steroids for optic neuritis, uveitis, analgesics for the management of pain associated with ocular trauma, antibiotic therapy for ocular infections and antihistaminic therapy for acute ocular allergy are few examples of oral administation.

Parental administration include intramuscular (IM) and intravenous (IV) injections. Hydroxy cobalamin (Vitamin B_{12}) and certain antibiotics are given through IM route. Continuous IV infusion of various antibiotics may be required for treatment of endophthalmitis and other severe ocular infections.

The futuristic considerations in ocular drug delivery system is to make drug delivery in therapeutic conc in the posterior segment of the globe. The new modifications in ocular DDS design must not only work on the corneal route for drug absorption but also of other routes like scleral route. There is also need of sophisticated technology to monitor the pharmaco Kinetics.

MEDICATIONS FORMS USED IN OPHTHALMOLOGY

Solutions and Suspensions

This is one of the most common form of Drug Delivery System being used in ophthalmology today. Most of the topical ocular preparations are commercially available as solutions or suspensions, which are applied directly to the eye from the bottle via sterile eye dropper provided along with.

Patient should be cautioned about touching the dropper tip to the eye as it can lead to contamination of the medication beside causing ocular injury. Patient should not also touch tip of the dropper with hand to avoid contamination of preparation. Suspension forms should be shaken before use to provide an accurate dosage of drug.

Ointments

This is second most common form of drug delivery system used in ophthalmology. The main purpose for an ophthalmic ointment vehicle is to prolong drug contact time with the eye. Ointments are specially useful for treating children who may not cooperate for topically applied solutions. Ointments are specially useful for medicating ocular injuries such as corneal abrasions where the eye needs to be patched. Always administer solutions before ointments as ointments preclude entry of subsequent drops. In general put 0.25-0.50 inch ribbon of ointment with a sweeping motion inside the lower lid by squeezing the tube gently and slowly release the eyelid. Ask the patient to close

the eye for 1-2 minutes and remove excessive ointment around the eye. Patients should be cautioned about temporary blurring of visioin due to ointment. Patients should avoid activities requiring visual acuity until blurring clears.

Gels

In modern ophthalmic drug delivery systems gels are fast gaining importance. Ophthalmic gels are similar in viscosity and clinical usage to ophthalmic ointments. Gels provide prolonged contact time for medication within the precorneal tear film.

Sprays

Some ophthalmic medications like mydriatics and cycloplegics alone or in combination can be administered as spray to the eye to dilate pupil or cycloplegic examination. This form is specially used for paediatric patients and solution is administered using a sterile perfume atomizer or plastic spray bottle.

Lid Scrubs

Certain commercial ophthalmic preparations (eyelid cleansers, antibiotic solutions or ointments) can be applied directly to eyelid margin for the treatment of noninfectious Blepharitis. This is ideally achieved by applying the medication to the end of the special cotton tipped applicator and then scrubbing the eyelid margins several times daily.

Gauze pads supplied with commercially available eyelid cleansers are also suitable.

DRUG DELIVERY IMPLANTS

- Vitrasert implant
- Retisert
- Posurdex
- Encapsulated cell therapy

Vitrasert Implant

One of the initial drug delivery devices for vitreoretinal disease is the Vitrasert implant for AIDS-related cytomegalovirus retinitis. The product was developed by Control Delivery Systems (Watertown Mass) using its Aeon technology, a controlled rate and duration of release delivery system. The device is surgically implanted into the vitreous where it releases the antiviral drug ganciclovir. The device is replaced when the drug is depleted, usually after six to eight months.

Retisert

Using a technology similar to Vitrasert called Envision TD. Bausch Lomb and Control Delivery Systems are developing Retisert, an intravitreal device containing the steroid fluocinolone acetonide, which is currently in clinical studies for posterior uveitis, diabetic macular edema and AMD.

Posurdex

Another steroid-releasing device being developed by Oculex is Posurdex, a slow-released dexamethasone intravitreal implant currently in human trials for persistent macular edema associated with diabetic retinopathy, uveitis, vein occlusion and Irvine-Gass syndrome. Posurdex uses a completely biodegradable polymer that dissolves over time.

Encapsulated Cell Therapy

An interesting technology being developed by Paris' Neurotech S.A. is Encapsulated Cell Therapy. Their lead product, NT-501, consists of encapsulated retinal pigment epithelial cells, which are genetically modified to secrete ciliary neurotrophic factor for the treatment of retinitis pigmentosa. CNTF is a protein that may prevent generation of photoreceptors in RP. The cells are inside a membrane designated to permit the intake of oxygen and nutrients and the release of CNTF. The cells are maintained in a biological matrix that supports their long-term survival *in vivo*. The current prototype is about 10 mm long and may be able to be implanted into the vitreous and anchored to the sclera in 15 minutes.

IONTOPHORESIS

As an alternative to parenteral or systemic delivery, iontophoresis is being investigated for ocular uses. By applying an electrical current to a topically applied drug,

iontophoresis is capable of pushing it through specific tissues to a target treatment area. Depending on the charge of the drug, a positive or negative charge can propel it. Iontophoresis has been used for transdermal delivery of anti-inflammatory drug.

Eyegate and Ocuphor are two ophthalmic iontophoresis systems being investigated. Similar to transdermal delivery, iontophoresis may offer a less invasive alternative to injections or delivery implants.

MEDICATION DEVICES USED IN OPHTHALMOLOGY

Contact Lenses

Therapeutic soft contact lenses with high water content are of great benefit in treating several ophthalmic diseases. Soft contact lenses can absorb water soluble drugs and release them into the eye over a prolonged duration. These lenses are specially useful in promoting substained release of solutions or suspensions that normally would be removed quickly from the external ocular tissues. Therapeutic soft contact lenses are used commonly as drug delivery devices in the management of dry eye disorders. Sometimes these lenses are also used for the treatment of ocular infections, specially bacterial corneal ulcers.

Corneal Shields

Porcine or bovine scleral collagen shields are commercially available which are usually non-cross linked and homogenized. Corneal shields are generally placed as a

bandage on the cornea following surgery or injury to protect and lubricate the cornea. For treating bacterial corneal ulcers corneal shields are used in conjunction with topical antibiotics with good results.

Cotton Pledgets

Small cotton pieces can be soaked with topical ophthalmic solutions and placed in conjunctival sac. Such devices certainly allow a prolonged ocular contact time with solutions that are normally instilled topically into the eye. Generally cotton pledgets are used for the administration of mydriatic solutions. This drug delivery device promotes maximum mydriasis in an effort to break posterior synechiae or to dilate sluggish pupils.

Filter Paper Strips

Fluorescein strips are commercially available as drug impregnated filter paper strips (Sodium Fluorescein, Rose Bengal or Flurexon). These filter strips help to ensure sterility of sodium Fluorescein which can be easily contaminated with Pseudomonas aergenosa when prepared in solution. These test strips are used diagnostically to identify corneal injuries and infections. Schirmer tear test strips are also available commercially for diagnosing dry eye disorders.

Artificial Tear Inserts

A specially designed rod-shaped pellet of hydroxy propyl cellulose without preservative is commercially available to

be inserted into the inferior conjunctival sac with a special applicator. Following insertion, these devices absorbs fluid, swells and then releases the nonmedicated polymer to the eye for a duration of 24 hours. Ocuserts are specially used in the treatment of dry eye disorders.

Membrane Bound Inserts

Ocuserts are membrane controlled drug delivery system which deliver a constant quantity of medication to the eye for a week continuously. Pilocarpine Ocuserts are commonly used in the treatment of glaucoma. These Ocuserts are placed on to bulbar conjunctiva under the upper or lower eyelid. Pilocarpine Ocusert is a useful substitute for Pilocarpine drops or gel in glaucoma patients who have poor compliance with more frequent drug instillation.

PRACTICAL TIPS FOR USE OF VARIOUS OPHTHALMIC MEDICATIONS

Proper administration of ophthalmic drugs is absolutely essential to achieve optimal therapeutic results. Here I shall describe several common practical points which should be informed to the patients before starting any ophthalmic formulation.

(a) Never instill more than one properly placed drop of ophthalmic solution or suspension into the affected eye. Normal eye retains 10 mcl of fluid on an average. Generally Eye Dropper delivers 25-50 mcl/drop of fluid.

For proper placement of drop into the eye ask the patient to tilt head backward or lie down in supine position with gaze upward. Gently grasp lower eyelid below eyelashes and pull the eyelid away from the eye to form a pouch. Put dropper directly over eye. Avoid contact of dropper with the eye. Keep the dropper tip about one inch away from the eye. Look upward before instilling the drop. Release the lid slowly and close the eye gently for 2-3 minutes.

(b) Systemic absorption of ophthalmic solution or suspension can be minimized by compressing the canaliculus and lacrimal sac for 3-5 minutes after instillation. This compressing certainly retards the passage of drops via nasolacrimal duct into the areas of potential absorption, like nasal and pharyngeal mucosa.

(c) When multisolution therapy is indicated ideally instill the drops separately at 5 minutes interval. This ensures that first solution drop is not flushed away by the second or second is not diluted by first one.

(d) Certain ophthalmic factors may increase absorption from ophthalmic dose forms, like lax eyelids specially in elderly patients and diseased eyes which forms a great pool for retention of topical solution or suspension.

(e) Discourage the use of eye cup in cases of eye lotions due to risk of contamination and spreading disease.

(f) Ophthalmic suspensions generally mix with tears poorly and remain in the lower cul-de-sac longer than solutions.

(g) Ophthalmic ointments are helpful in maintaining contact between ocular tissues and drug by decreasing the rate as slow as 0.5% per minute. Ophthalmic ointments provide maximum contact between drug and ocular tissues.

(h) Ophthalmic ointments should be instilled preferably at bed time as it may impede delivery of other ophthalmic drugs to the affected eye by acting as a barrier to contact.

(i) Ointments may blur vision during waking hours, so bed time use is generally recommended.

(j) Monitor expiration dates of ophthalmic medications. Do not use outdated drugs.

(k) Ophthalmic solutions and ointments are generally misused. Patient use these medications on their own without counselling ophthalmologists. Appropriate patient education and counselling with prescribing and dispensing of ophthalmic medicines is essential.

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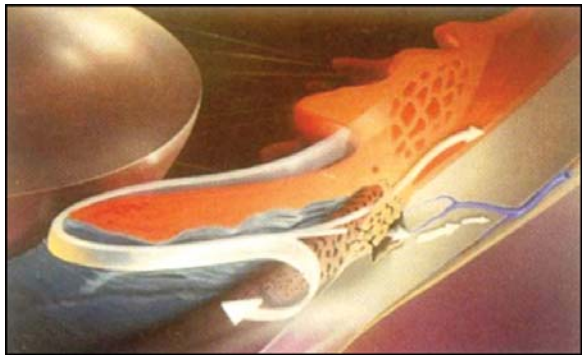
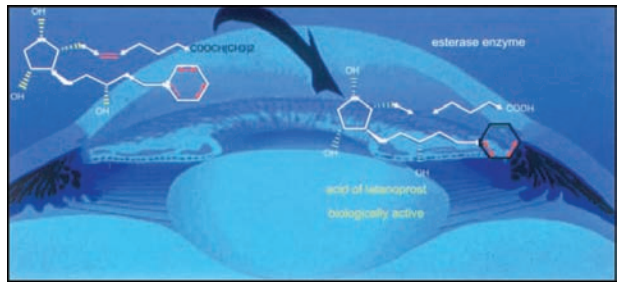
Chapter Two

Topical and Systemic Ophthalmic Drugs with Common Dosages





ANTIBIOTIC THERAPY

Topical Antibiotics: Solutions and Ointments

Usual Dosage

Topical Drops:

Three to four times a day depending upon severity of the infection.

Ointment:

One time preferably at bed time dosage can be increased depending upon severity of the infective condition.

a. Gentamicin solution or ointment 0.3%.
b. Tobramycin solution or ointment 0.3%.
c. Amikacin solution 0.3%.
d. Sisomycin solution or ointment 0.3%.
e. Neomycin solution 0.17% and ointment 5 mg/gm.
f. Framycetin solution or ointment 0.5% and 1.0%.
g. Chloramphenicol solution 0.4-1% and ointment 0.5%.
h. Erythromycin ointment 0.5%.
i. Polymixin B 0.5-1.0% in combination with neomycin 0.35%.
   Ointment 1-1.5 mg/gm with neomycin.
j. Polymixin B 10000 units and bacitracin 500 units/gm in ointment.
k. Sulphacetamide solution 10%, 20%, 30% and ointment 10%.
l. Sulfisoxazole solution or ointment 4%.
m. Tetracycline ointment or suspension 1%.
   Chlortetracyclin ointment 1%.
n. Trimethoprim 0.1% and Polymixin B 10000 units/ml.

o. Norfloxacin solution or ointment 0.3%.
p. Ciprofloxacin solution or ointment 0.3%.
q. Ofloxacin solution or ointment 0.3%.
r. Pefloxacil solution or ointment 0.3%.
s. Lomefloxacin solution or ointment 0.3%.
t. Sparfloxacin solution or ointment 0.3%.
u. Gatifloxacin solution 0.3%.
v. Moxifloxacin solution 0.5%.

Under Clinical Trials

a. Grepafloxacin solution 0.3%
b. Gemifloxacin solution 0.3%
c. Trovafloxacin solution 0.3%
d. Clinafloxacin solution 0.3%

Systemic Antibiotics in Ophthalmology

Dosage

Standard dosage of systemic antibiotics is mentioned along with individual drug. However dosage may vary depending upon type and severity of ocular infection being treated.

a. Benzyl Penicillin (Penicillin G)
   Parenteral: IM/IV 4-30 million units/24 hour in divided doses 4-6 hourly.
b. Phenoxymethyl Penicillin
   Orally: 200-500 mg 6 hourly
c. Methicillin
   Parenteral: IM/IV 1-2 G 4 hourly.

d. Cloxacillin
   Orally: 250-500 mgm 6 hourly
e. Carboxy Penicillin
   Parenteral: 400-500 mg/kg/day 4 hourly
f. Ampicillin
   Orally: 250-500 mg 4-6 hourly or by parenteral route
g. Amoxycillin
   Orally: 250-500 mgms 4-6 hourly
h. Cefazolin
   Parenteral: 1-6 gm/day 6-8 hourly
i. Cephalothin
   Parenteral: 2-12 gm/day 6-8 hourly
j. Cephapirin
   Parenteral: 1-2 gm every 4 hour
k. Cephaloridine
   Parenteral: 2-4 gm/day 6 hourly
l. Cephadrine
   Oral: IM/IV: 0.5-1 gm every 6 hourly
m. Cephalexin
   Oral: 0.5-1 gm every 6 hourly
n. Cefadroxyl
   Oral: 1 gm every 12 hourly
o. Cefaclor
   Oral: 0.5-1 gm every 8 hourly
p. Cefamandole
   Parenteral: 1 gm every 4 hourly
q. Cefoxitin
   Parenteral: 1-2 gm every 4 hourly

r. Cefuroxime
Parenteral: 750 mgm-1.5 gm every 8 hourly
s. Cefonicid
Parenteral: 1-2 gm every 24 hourly
t. Cefaranide
Parenteral: 1 gm every 12 hourly
u. Cefotiam
Parenteral: 1 gm every 12 hourly
v. Cefotetan
Parenteral: 1 gm every 12 hourly
w. Cefotaxime
Parenteral: 1-2 gm every 4-6 hourly
x. Cefoparazone
Parenteral: 1-4 gm every 4-8 hourly
y. Cefixime
200-400 mg/day
aa. Cefsulodin
Parenteral: 0.5-1 gm 6-12 hourly
bb. Ceftazidime
Parenteral: 1-2 gm every 8-12 hourly
cc. Ceftizoxime
Parenteral: 1-2 gm every 8-12 hourly
dd. Netilmycin
Parenteral: 3-6.5 mg/kg/day 8 hourly
ee. Kanamycin
Parenteral: 15 mg/kg/day 8 hourly
ff. Doxycyline
Oral: 100-200 mg/dose 2-24 hourly

gg. Chlortetracycline
Oral: 250-500 mg/dose 6 hourly
hh. Methacycline
Oral: 150-300 mg/dose 6-12 hourly
ii. Minocycline
Parenteral: 200 mg/dose
jj. Oxytetracycline
Oral: 500 mg 6 hourly
kk. Sulphonamides
Parenteral: 100 mg/kg/day 6-8 hourly
Oral: 2-4 gm/day 6 hourly
ll. Erythromycin
Oral: 1-2 gm/day 6 hourly
Parenteral: 1-4 gm/day continuous drip
mm. Roxithromycin
Oral: 150 mg BD before food intake
nn. Clindamycin
Parenteral: 1-3 gm/day 6 hourly
Oral: 600 mg - 1.8 gm/day 6 hourly
oo. Vancomycin
Parenteral: 2 gm/day 6-12 hourly
pp. Spiramycin
Oral: 6-9 million IU/day in 2-3 divided doses.
qq. Azithromycin
Oral: 500 mg-1 gm once daily
rr. Clarithromycin
Oral: 200-500 mg BD
ss. Norfloxacin
Oral: 400 mg BD
Parenteral: 200-400/day 12 hourly

tt. Ciprofloxacin
Oral: 500-1500 mg/day 6 hourly
Parenteral: 5-10 mg/kg/day 12 hourly

uu. Ofloxacin
Oral: 200-400 mg 6 hourly
Parenteral: 100-200 mg/day/12 hourly
IV infusion: 200 mg infusion over 30 minutes BD

vv. Pefloxacin
Oral: 400 mg BD
IV infusion: 400 mg in 100 ml of 5% Dextrose solution infusion over one hour

ww. Lomefloxacin
Oral: 400 mg once daily

xx. Sparfloxacin
Oral: 400 mg in divided doses

yy. Gemifloxacin
Oral: 400 mg in divided doses

zz. Moxifloxacin
Oral: 500 mg in divided doses

aaa. Levofloxacin
Oral: 500 mg once daily.

bbb. Gatifloxacin
Oral: 400 mg once daily.

ccc. Metronidazole
Oral: 400-800 mgm every 8 hourly
Infusion: 15 mg/kg infusion over 30-60 minutes BD

ddd. Cotrimoxazole
Oral: 1 tablet (Double strength BD (Trimethoprim 160 mg and sulphamethoxazole 800 mg).
Parenteral: 20 mg TMP/kg/day 8 hourly

TOPICAL ANTI-INFLAMMATORY THERAPY

Corticosteroids

Dosage:	*Disease specific*
1. **Hydrocortisone**	
Acetate suspension	- 0.5-2.5%
Acetate solution	- 0.2%
Acetate ointment	- 1.5%
2. **Prednisolone**	
Acetate suspension	- 0.12%, 0.25% and 1.0%
Sodium phosphate solution	- 0.12%, 0.5% and 1.0%
Phosphate solution	- 0.5%
Phosphate ointment	- 0.25%
3. **Dexamethasone**	
Sodium phosphate solution	- 0.1%, 0.05% and 0.01%
Suspension	- 0.1%
Sodium phosphate ointment	- 0.05%
4. **Betamethasone**	
Sodium phosphate solution	- 0.1%
Sodium phosphate ointment	- 0.1%
5. **Triamcinolone acetonide**	
Suspension	- 0.1%
Ointment	- 0.1%
6. **Progesterone like agents**	
Medrysone suspension	- 0.1%

Fluorometholone	
Suspension	- 0.1% and 0.25% (FML forte)
Ointment	- 0.1%
Fluorometholone acetate	
Suspension	0.1%
7. **Rimexolone suspension**	1%
8. **Loteprednol etabonate**	
Solution	- 1% and 0.5%
Suspension	- 0.2%

Corticosteroid Antibiotic Combinations

Dosage

Based on Desired Corticosteroid Dose and Disease Specific

1. Dexamethasone (0.1%) with neomycin (0.5%) in ophthalmic solution form.
2. Dexamethasone (0.1%) with neomycin (0.35%) and Polymixin B (10000 units/ml) suspension or ointment.
3. Dexamethasone (0.1%) with Chloramphenicol (0.5-1%) solution.
4. Dexamethasone (0.1%) with Ciprofloxacin (0.3%) solution.
5. Dexamethasone (0.1%) with Lomefloxacin (0.3%).
6. Dexamethasone (0.1%) with Sparfloxacin (0.3%).
7. Dexamethasone (0.1%) with Gatifloxacin (0.3%)
8. Dexamethasone (0.1%) with Levofloxacin (0.5%)
9. Dexamethasone (0.1%) with Moxifloxacin (0.5%)

10. Dexamethasone (0.1%) with Framycetin (0.3%) suspension.
11. Dexamethasone (0.1%) with Tobramycin (0.3%) suspension.
12. Dexamethasone (0.1%) with Chloramphenicol (1%) and Polymixin B 5000 IU solution and ointment.
13. Dexamethasone (0.1%) with Gentamicin (0.3%) solution.
14. Betamethasone (0.1%) with Neomycin (0.5%) solution.
15. Betamethasone (0.1%) with Chloramphenicol (0.5%) in solution and ointment.
16. Betamethasone (0.1%) with Gentamicin (0.3%) solution.
17. Hydrocortisone (0.5%) with Neomycin (0.5%) ointment and solution.
18. Hydrocortisone (1.5%) and Neomycin (0.5%) ointment.
19. Hydrocortisone (10 mg/gm), Polymixin B 0.5 mg/gm, bacitracin 400 units/gm and Neomycin 5 mg/gm ointment.
20. Hydrocortisone (1%) with Gentamicin (0.3%) suspension.
21. Hydrocortisone (0.5%) with Chloramphenicol (1%) ointment.
22. Hydrocortisone (0.5%) with Chloramphenicol (0.5%) solution.
23. Prednisolone (1%) with Gentamicin (0.3%) suspension.

24. Prednisolone (1%) with Ofloxacin (0.3%) suspension.
25. Prednisolone (1%) with Lomefloxacin (0.3%) suspension.
26. Prednisolone (0.1%) with Levofloxacin (0.5%) suspension.
27. Prednisolone (0.2%) with Sulphacetamide (10%) and Phenyl ephrine (0.12%) solution.
28. Fluorometholone (0.1%) with Neomycin (0.35%) in solution.
29. Fluorometholone (0.1%) with Gentamicin (0.9%) in solution.
30. Fluorometholone (0.1%) with Tobramycin (0.3%) in solution.
31. Fluorometholone (0.1%) with Lomefloxacin (0.3%) in solution.
32. Fluorometholone (0.1%) with Levofloxacin (0.5%) in solution.
33. Prednisolone (0.5%), Neomycin 0.35% and Polymixin B 10000 units/ml suspension.

TOPICAL NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS)

1. **Flurbiprofen**—0.03% solution
   Dosage: 1 drop every 30 minutes, 2 hours pre-operatively
   (Total dose – 4 drops) to prevent intraoperative miosis.

2. **Diclofenac** – 0.1-1% solution
   3-4 times a day for 2 weeks for postoperative inflammation and also useful *qid* for several weeks in cystoid macular edema.
3. **Suprofen** – 1.0% solution
   2 drops at 1, 2 and 3 hours preoperatively or every 4 hours while awake on the day of surgery.
4. **Ketorolac** – 0.5% solution
   3-4 times a day till the desired effect is obtained.
5. **Indomethacin**
   Suspension 0.5-1.0%
   Solution 0.1%
   Four times a day.
6. **Aspirin** – 1% solution, four times a day
7. **Acetyl salicyclic acid** – 0.03% solution, four times a day.
8. **Diflunisol** – 0.03% solution, four times a day.
9. **Oxyphenbutazone** – 10% ointment, 1-2 time
10. **Phenyl butazone** – 10% ointment, 1-2 times.

Immunosuppressive Agents in Ophthalmology

Alkylating Agents

1. **Cyclophosphamide**
   Usual dose is 150-200 mg/day (1-2 mg/kg/day) to be taken orally empty stomach. After 7 days (WBC count) dosage may be reduced by 25-50 mg to stabilise the WBC at about 3000 cells/µl.

2. **Chlorambucil**
   Start at 0.1-0.2 mg/kg/day orally and increased every 3-4 day to total dosage of 10-12 mg/day.

Antimetabolites

1. **Azathioprine**
   Orally start at 1-2 mg/kg/day and gradually increased to 2.5 mg/kg/day.
2. **Methotrexate**
   Dose is variable due to high drug toxicity for 1-4 weeks orally then IM/IV dose of 2.5-15 mg is given over 36-48 hours.
3. **Cyclosporin A**
   Oral 2.5-5 mg/kg/day in an olive oil with milk or juice. Maximum dose 10 mg/kg/day.

ANTIVIRAL THERAPY

a. Idoxuridine
Solution 0.1% and ointment 0.5%
Usual dose: Solution one drop every hour during day and every 2-3 hours at night.
Ointment can be applied 4-6 times a day

b. Vidarabine (Ara-A)
Ointment 0.3%
Intravenous infusion 200 mg/ml
Topical ointment to be applied 5 times a day for 14-21 days.

c. Trifluridine (TFT)

Solution 1%

Dose: 6-9 times a day for 14 days

d. Cytarabine

Ointment – 1%

Injection form – 100 mg/500 mg/1000 mg/ml

Ointment to be put in 6-9 times a day for 14 days.

Systemic form dose is 100 mg/ml/24 hours.

e. Acyclovir

- Ointment—3%
  Dose: 5 times a day for 4 days
- Oral tablet – 200 mg, 400 mg and 800 mg
  Dose: 200-800 mg is given 5 times a day for 10 days.
- For IV preparation 250 mgm powder is available.
  Dose: 5 mg/kg/body weight 8 hourly for 5-10 days

f. BVDU (Bromo-Vinyl Deoxyuridine)

- Solution – 0.1%
  Dose: Put 1-2 drops 8-9 times a day.
- Infection - 7.5-15 mg/kg/day in 3 divided doses for 5 days.

g. Interferons

Parenteral–30-400 million/ml once or twice a day for 14 days

h. Zidovudine (AZT)

Oral capsule 100 mg

Dose: 100-200 mg 8 hourly

i. Famciclovir

Dose: 500-700 mg three times a day for 7 days.

j. Ganciclovir

Parenteral (IV) – 5 mg/kg/body weight for 14-21 days followed by a maintenance dose of 5 mg/kg/day for 5 days/week.

Orally – 500 mg 6 hourly or 1 gm three times a day.

k. Foscarnet

Dose: IV 60 mg/kg over 1 hour, 8 hourly for 14-21 days. Maintenance dose is 90-120 mg/kg IV over 2 hours once daily.

l. Cidofovir (HPMPC)

Parenteral IM/IV 20 mcgm-100 mcgm

m. Lobucavir

Oral 400 mgm twice daily

n. Indinavir

Oral 800 mg every 8 hourly on empty stomach.

o. Ritonavir

Oral 600 mg/12 hours immediately after food.

p. Saquinavir

Oral 600 mg every 8 hours to be taken within 2 hours following meals.

q. Nelfinavir

Oral 750 mg three times a day.

r. Valaciclovir

Oral 1000 mg PO thrice a day for 7 days.

ANTIFUNGAL THERAPY

a. Nystatin

Topical ointment containing 100000 IU of Nystatin.

Dose: 4-5 times a day till the ulcer heals.

b. Amphotericin B

Topical solution 0.075-0.3% in distilled water or dextrose 5% in water solution.

Dose: To be instilled at hourly interval

c. Natamycin

Ophthalmic suspension – 5%

Dose: 1-2 drops 4-6 times a day for 14 days.

d. Clotrimazole

Topical solution 1%

Dose: One drop on hourly basis over the days

e. Miconazole

Ophthalmic solution and applicaps – 1%

Dose: One drop every hour.

f. Econazole

Ointment – 1%

Fresh ophthalmic solution – 1%

Dose: 4-6 times a day.

g. Ketoconazole

Oral in tablet form

Dose: 200-800 mg/24 hours as a single daily dose

Fresh topical preparation (1-5%).

h. Fluconazole

Ophthalmic solution – 0.3%

Dose: One drop at every 4 hour interval

Oral tablet 200-600 mg/day for 21 days.

i. Itraconazole

Oral – 200 mg twice daily for a week.

j. Flucytosine

Oral as 250 mg and 500 mg capsules

Dose: 50-150 mg/kg/day divided in 4 doses for a week.
Topical solution 1%
Dose: One drop every hour

k. Silver Sulphadiazine

Ophthalmic solution and applicaps—1%
Dose: One drop at hourly interval initially then tapering to 4 times a day over 14-21 days.

l. Terbinafine

Oral as 125 mg and 250 mg tablets.
Dose: 250 mg once a day for 2-4 weeks

ANTIGLAUCOMA THERAPY

Miotics

1. Acetyl choline

Available as powder and fresh ophthalmic solution (1 : 100) is prepared before use.
Dose: 0.5-2 ml of this solution is given through intra-cameral route to produce good miosis.

2. Pilocarpine

i. Pilocarpine hydrochloride as topical solution in strengths of 0.25%, 0.50%, 1%, 2%, 3%, 4%, 6%, 8% and 10%.

ii. Pilocarpine nitrate in strength of 1%, 2% and 4% eye drops and sustained release ophthalmic gel.
Dose: Normally 0.5-4% concentrations are used and dosage is one drop three times a day.
Gel doses: Apply 15 mm Ribbon in the conjunctival sac of the affected eye once a day at bed time.

iii. Pilocarpine ocusert P_{20} and P_{40} (Pilocarpine Ocular Therapeutic system).
iv. Pilocarpine 4% gel at bed time.
v. Piloplex (Twice a day has more effect than plain Pilocarpine).
vi. Pilocarpine and epinephrine combination.
Solution (Pilocarpine strength vary from 1-6% and epinephrine 1% solution).
Dose: To instill 1-2 drops in the affected eyes 1-4 times a day.
vii. Pilocarpine – Physostigmine combination. Topical solution containing pilocarpine 2% and Physostigmine 0.25%.
Dose: Instill 1-2 drops 4 times a day.
viii. Pilocarpine nitrate 1% with clonidine 0.125%

3. Carbachol

Topical solution in strengths of 0.75%, 1.5%, 2.25% and 3%.

Dose: 1-2 drops in the eyes up to 3 times a day. Intracameral dose is 0.5 ml into the anterior chamber during ocular surgery. For intracameral use it is available in the conc of 0.01% in 1.5 ml ampoules.

4. Physostigmine

Topical solution 0.25% and 0.5%

Dose: Instill 2 drops 4 times a day.

5. Demecarium

Solution 0.125 and 0.25%

Dose: 1-2 drops twice a day.

6. **Echothiophate**
   Solution – 0.03%, 0.06%, 0.125% and 0.25%
   Dose: 1-2 drops twice day.
7. **Isoflurophate**
   Ointment 0.025% in polyethylene mineral oil gel.
   Dose: Instill 0.25 inch strip ointment once every night.

Alpha Adrenergic Agonists

1. **Apraclonidine**
   Solution 0.5% and 1%
   Dose: One drop 1 hour before laser surgery and one drop immediately after the procedure or three times a day as adjunct to other glaucoma therapy.
2. **Clonidine**
   Solution 0.125%, 0.25% and 0.50%
   Dose: One drop three times a day.
3. **Brimonidine (Alphagan)**
   Topical solution 0.2%
   Dose: One drop two times daily.
4. **Dapirazole**
   Dose: Two drops followed 5 minutes later by 2 drops to reverse mydriasis by phenylephrine and tropicamide.

Sympathomimetics

1. **Epinephrine**
   Available as the hydrochloride, borate and bitartrate salts as topical solution in strengths of 0.5-2%.
   Dose: 1 drop three times a day.

2. **Dipivefrin**
   Topical solution: 0.1%
   Dose: One drop two times a day.

Adrenergic Blocking Agents (Beta blockers)

Usual Dose: Two times a day

1. **Betaxolol**
   Solution: 0.25% and 0.5%
2. **Carteolol**
   Solution: 0.1%
3. **Levobunolol**
   Solution: 0.25% and 0.5%
   Dose: 1-2 drops once a day.
4. **Metipranol**
   Solution: 0.1%, 0.3% and 0.6%
5. **Timolol**
   Solution: 0.25% and 0.5%
   Ophthalmic gel: 0.25% and 0.5%
   0.5% gel forming solution is once a day therapy. It has unique mechanism of gel formation.

Carbonic Anhydrase Inhibitors

1. **Acetazolamide**
   Oral tablets 125 mg, 250 mg and 500 mg sustained release capsules.
   Dose: 250 mg 6 hourly or 500 mg capsule twice a day.
   Parenteral dose – 250-500 mg powder/5-10 ml distilled water.

Topical ophthalmic solution – 5%
Dose one drop 2-3 times a day.

2. **Dichlorphenamide**
   Oral tablet of 50 mg
   Dose: 100 mg every 12 hourly.
3. **Methazolamide**
   Oral as 25 mg and 50 mg tablets
   Dose: 50-100 mg 2-3 times a day
4. **Dorzolamide**
   Topical ophthalmic solution – 2%
   Combination of Topical Dorzolamide (2%) with Timolol maleate (0.5%)
   Dose: One drop three times a day for solo Dorzolamide 2% solution.
   One drop two times a day for combination drop
5. **Brinzolamide**
   Ophthalmic suspension – 1%
   Dose one drop three times a day.
6. **Ethoxazolamide**
   Oral as 125 mg tablets
   Dose: 125 mg tablet four times a day.

Prostaglandins

1. **Latanoprost:**
   Topical ophthalmic solution – 0.005%
   Dose: One drop once daily preferably in the evening
   Combination of Topical Latanoprost (0.005%) and Topical Timolol (0.5%) as topical ophthalmic solution.
   Dose: One drop once daily in the affected eye.

2. **Unoprostone**
   Topical ophthalmic solution – 0.12%
   Dose: One drop twice daily.
3. **Bimatoprost**
   Topical ophthalmic solution – 0.03%
   Dose: One drop once daily, preferably at bed time.
4. **Travoprost**
   Topical ophthalmic solution – 0.004%
   Dose: One drop once daily, in the conjunctival sac, preferably at bed time.

Ocular Hypotensive Lipids (OHL)

Topical ophthalmic solution – 0.01%
Dose: One drop twice daily.

Hyperosmotic Agents

1. **Glycerine**
   Oral solution as 50% and 75% lime flavoured.
   Dose: 1.0–1.5/kg body weight given 1-1.5 hours before surgery.
2. **Isosorbide**
   Oral solution as 45% mint flavoured.
   Dose: 1-2 g/kg given 2-4 times a day.
3. **Mannitol**
   As solution in 5-25%
   Dose: 0.5-2.0 g IV body weight given as usual 15-20% solution over a period of as short as 30 minutes.
4. **Urea powder as 30% solution**
   Dose: 0.5-2 g /kg IV

Antimetabolites/Antifibroproliferative Agents

1. 5-Fluorouracil (5 FU)

Dose: For sub-conjunctival route freshly prepared during filtering surgery, 0.5 cc of solution containing 5 mgm of 5 FU (prepared from commercially available 50 mg/ml to 10 mgm/ml in physiological saline). Postoperatively 5 mg of 5 FU injection is given sub-conjunctivally over a 2 week period.

2. Mitomycin C

Dose: Applied once at the time of Glaucoma surgery. 3 × 2 mm cellular sponge moistened with a 0.02-0.04 mg/ml (0.02-0.04%) mitomycin C applied to the bed of trabeculectomy flap for 4-5 minutes.

3. Daunorubicin

Dose: Intraoperatively it is given on 4 × 4 mm cellulose sponge soaked in daunorubicin (0.2 mg/ml) 0.25 ml is applied below the conjunctival flap over the proposed site for trabeculectomy for 4 minutes.

Neuro-protective and Neuro-regenerative Agents

1. Alpha – 2 agonists
   a. Brimonidine (Alphagan)
      Dosage already mentioned.
   b. NMDA antagonists (on trials)
      - Memantine
      - Eliprodil
      - Riluzole
      - L-Deprenyl

Drugs on trials

- Iso-prostaglandins (0.1% 9-iso. PGE_2)
- Glutamate antagonists
- Myocillin
- Neurotrophins
- Autoimmune modulators
- Free Radical Scavengers

Antiallergy Therapy

Topical Mast Cell Inhibitors

1. **Cromolyn sodium**
   Topical ophthalmic solution as 2% and 4%
   Dose: 1-2 drops 4-6 times a day.
2. **Disodium cromoglycate (DSCG)**
   Solution: 2%
   Dose: 1-2 drops 3-4 times a day.
3. **Lodoxamide**
   Ophthalmic suspension – 0.1%
   Dose: 1-2 drops 4 times a day.
4. **Nedocromil**
   Ophthalmic solution 1%
   Dose: 1-2 drops 4 times a day.
5. **Olopatadine**
   Solution in 0.05% and 1%
   Dose: 1-2 drops 3 times a day
6. **Azelastine hydrochloride**
   Ophthalmic solution 0.05%
   Dose: 1-2 drops 2-4 times a day.

7. **Ketotifen (Topical)**
   Solution in 0.025%
   Dose: 1-2 drops 2 times a day.
8. **Pemirolast Potassium**
   Solution 0.1%
   Dose: 1-2 drops 3 times a day.

Drugs on Trials

Nicotinamide
Picumast
Calmodulin

Antihistamines

Usual dose: 1-2 drops 3-4 times a day

1. Pheniramine maleate 0.3% ophthalmic solution with 0.025% naphazoline HCl
2. Pheniramine maleate 0.5% ophthalmic solution with 0.125% phenylephrin HCl.
3. Pyrilamine maleate 0.1% solution with 0.12% phenylephrine HCl and 0.1% antipyrine.
4. Antazoline 0.5% solution with 0.05% naphazoline HCl.
5. Topical Levocabastine HCl 0.05% suspension available without decongestant.
6. Tetrahydrozoline 0.05% solution with Zinc Sulphate (0.25%).
7. Epinastine HCl
   Solution 0.05%
   Dose: 1-2 drops 3 times a day.

8. Emedastine difumarate
   Suspension 0.05%
   Dose: 1-2 drops 3 times a day.

Decongestants

1. **Phenylephrine HCl**
   Topical solution of 0.125-0.12%
   Dose: 1-2 drops 2-4 times daily (0.12 solution).
2. **Naphazoline HCl**
   Topical solution as 0.012-0.1%
   Dose: 1-2 drops every 2-4 hours.
3. **Tetrahydrozoline**
   Topical solution alone or in combination with antihistamines in conc of 0.05%
   Dose: 1-2 drops 2-4 times a day.
4. **Oxymetazoline HCl**
   Topical solution as 0.025%
   Dose: 1-2 drops every 8 hourly
5. **Rose petal aqueous infusion**
   Topical solution (aqueous infusion in 7.5 ml with 0.1% thiomersal)
   Dose: 1-2 drops thrice a day.
6. **Ephedrine**
   Topical solution 0.05%
   Dose: 1-2 drops 3 times a day.
7. **Emedastine**
   Topical solution 1-2 drops 3 times a day.

Topical NSAIDs

1. **Suprofen**
   Topical solution 0.1%
   Dose: 1-2 drops three times a day.
2. **Ketorolac**
   Topical solution 0.5%
   Dose: 1-2 drops 3-4 times a day.

Topical Steroids

Usual Dose: 1-2 drops 3-4 times a day

- Loteprednol (0.5%) solution
- Rimexolone (1%) solution
- Fluorometholone (0.3%) solution

Topical Immunosuppressors

1. **Cyclosporine**
   Topical ophthalmic solution 2%
   Dose: One drop four times a day.
2. Competitive inhibitors of IgE binding to effector cells (on trials).
3. Adhesion protein molecules (on trials).
4. Cytokine modulators (on trials).

LOCAL ANESTHETIC AGENTS

Injectables Agents

Esters

1. **Procaine**
   Available as 1% (2 ml) ampoules
   Dose: 14 mg/kg body weight (in conc of 0.5-2%).
2. **Chloroprocaine**
   Solution in conc of 0.5-2%.
3. **Tetracaine**
   Solution as 0.25-2%
   Dose: 1.5 mg/kg body weight.

Amides

1. **Lidocaine**
   Solution in conc of 0.5-4%
   For infiltration anaesthesia generally 1% and 2% conc are used.
   Various Lidocaine combinations available are
   - Lidocaine HCl 1.5-5% with 7.5% dextrose.
   - Preservative free 1% Lidocaine HCl ampoules (0.5 ml) for intracameral use during intraocular surgery.
2. **Prilocaine**
   Solution as 0.5-3%
   Dose: 10 mg/kg body weight.
3. **Mepivacaine**
   Injectable solution as 1-2%
   Dose: 7.0 mg/kg body weight.

4. Bupivacaine

As Bupivacaine injectable solution in conc of 0.25-0.75%.

Dose: 2.0 mg/kg body weight

5. Etidocaine

Solution as 0.5-1%

Combination (Etidocaine 1.0-1.5% with 1 : 20000 epinephrine)

6. Centbucridine

Solution as 0.5%

Topical Anesthetic Agents

Usual dose: 1-2 drops for temporary (15-20 minutes) anesthesia to allow ocular examination and manipulation

1. Benoxinate HCl (0.4%) topical solution
2. Proparacaine (0.5% and 0.75%) solution
3. Tetracaine (0.25-1%) solution
4. Lidocaine HCl (4%) solution
5. Centbucridine (1%) solution
6. Coccaine (2%) solution
7. Phenocaine (1%) solution
8. Dimethocaine (2.5%) solution
9. Piperocaine (2%) solution
10. Dibucaine (0.1%) solution
11. Naepaine (2-4%) solution
12. Butacaine (2%) solution

Out of these practically Topical Benoxinate, Proparacaine, Tetracaine, Lidocaine and Centbucridine ophthalmic solutions are used in day to day practice.

MYDRIATICS AND CYCLOPLEGICS

Mydriatic Adrenergic Agents

1. **Adrenaline (Epinephrine)**
   Dose: It produce dilation after the instillation of 4 drops of 1:1000 solution.
2. **Coccaine HCl**
   Solution as 2% and 4% drops.
3. **Phenylephrine**
   Topical solution in conc of 2.5% and 10%
   Dose: One drop 2-3 times.
4. **Hydroxy amphetamine**
   Topical solution 1%
   Dose: One drop 2-3 times.

Cholinergic Antagonist as Cycloplegic Mydriatics

1. **Atropine Sulphate**
   Topical solution in conc of 0.5%, 1%, 2% and 3%
   Ointment – 0.5% and 1% conc.
   Dose: One drop 2-4 times as needed
   Ointment 1-2 times as required.
2. **Homatropine**
   Topical solution 2% and 5%
   Dose: 1-2 drops 3-4 times as required
3. **Scopolamine**
   Solution: 0.25%
   Dose: One drop 2-4 times for 7 days.
4. **Cyclopentolate HCl**
   Topical solution: 0.05%, 1% and 2%
   Dose: One drop 3-4 times as required

5. **Tropicamide**
   Topical solution: 0.5%, 1%
   Dose: One drop 3-4 times as needed.

Mydriatic Combinations

Usual dose: One drop 3-4 times as required.

1. Phenylephrine 5% and cyclopentolate HCl 1%
2. Phenylephrine 10% and scopolamine 0.3%
3. Phenylephrine 5% and tropicamide 0.8%.
4. Cyclopentolate HCl 1% with dexamethasone sodium phosphate 0.1%
5. Atropine sulphate 1% solution with dexamethasone sodium phosphate 0.1%

ARTIFICIAL TEARS AND LUBRICANTS

Methylcellulose or Ethylcellulose Base

1. Hydroxy propyl methylcellulose 0.5% or 1% with 0.01% benzalkonium chloride.
2. Hydroxy ethylcellulose 0.5% with povidone and water soluble polymers, thimerosal 0.004% and EDTA 1%
3. Carboxy methylcellulose (CMC) in conc of 0.5% preservative free
   Usual dosage: 1-2 drops 4-6 times a day.

Polyvinyl Alcohol Base Solutions

1. Polyvinyl alcohol 1.4% and povidone 0.6% with Chlorbutanol 0.5% and NaCl.
   Dose: 1-2 drops 4-6 times a day.

Longer Lasting Mucoadhesive or Increased Viscosity Agents

1. Polycarbophil and Dextran
2. Methylcellulose

These solutions are preservative free.
Dose: 1-2 drops 4-6 times a day.

Polyvinyl Pyrrolidine Polymer Base Tear Solution

1. Adsorbonac sodium chloride 2% or 5% solutions
2. Salt solution with zinc and glycerin

Electrolyte based solution
Dose: 1-2 drops 4 times a day.

Ointments

1. Containing petrolatum (55.5%), Lanolin (2%) and mineral oil (42.5%) (preservative free).
   Dose: Apply 0.25-0.50 inch ribbon of ointment preferably at bed time
2. Ocular Lubricant Ointment (gel) containing hydroxy propyl methylcellulose (2%) with NaCl, KC, CaCl, MgCl, Sodium Acetate and Sodium Citrate (preservative free).
3. Lubricant gel Carbopal 980 (poly acryclic acid) which transforms from gel to liquid upon contact with the ocular tissue.

Ocular Inserts (Solid Devices)

1. Preservative free water soluble polymeric insert (Lacriset) containing 5 mg of hydroxy propyl methyl-cellulose.

Punctal Plugs

1. Silicon plug in 0.3, 0.5, 0.6, 0.7 and 0.8 mm sizes along with inserter tool.
2. Collagen implants
   Collagen implant in 0.2, 0.3, 0.4, 0.5 and 0.6 mm sizes available.

Cyclosporine

It is available as Topical Ophthalmic Emulsion (0.05%) preservative free.
Topical Cyclosporine Emulsion is indicated to increase real time tear production in patients whose tear production is significantly suppressed due to diverse etiology.
Dose: It is available as single use vial. Standard dosage is one drop twice a day in the affected eye.

Miscellaneous Preparations

1. Topical solution containing 2.5% hydroxy propyl methylcellulose with boric acid, EDTA and 0.01% benzalkonium chloride for gonioscopic examinations.
2. Topical solution containing 0.25% tyloxapol and 0.02% benzalkonium chloride for use as cleaning, wetting and lubricating agent for artificial eye wearers.
   Dose: Instill 1-2 drops on to artificial eye 3-4 times a day.

OPHTHALMIC VISCOSURGICAL DEVICES (OVDs)

1. Sodium Hyaluronate
   Available as preloaded syring with 27G, 30G cannula containing sodium hyaluronate 10 mg/ml or 14 mg/ml, store at 2-8°C. Do not freeze. Use the drug at room temperature only.
2. Hyalectin
   Highly viscous 1% solution of sodium hyaluronate of lower molecular weight.
3. Viscoadaptive solution of sodium hyaluronate 2.3% available as single use disposable vial with cannula.
4. Solution containing combination (3 : 1 mixture) of 3% sodium hyaluronate and 4% chondrotin sulfate with 0.45 mg sodium dihydrogen phosphate hydrate and 4-3 mg NaCl.
5. Chondrotin sulphate as 20% solution with 30 gm cannula.
6. Hydroxy propyl methylcellulose 2% solution in 2 ml vials or pre-filled sterilised disposable syringes with 27 gm cannula.
7. Polyacrylamide
   Orcolon (Low concentration polyacrylamide 4.5 mg/ml) solution with 27 gm cannula.
8. Collagel (1.4% collagen type IV) viscoelastic agent.
9. New agents on trial are
   1. Poly TEGMA 40% (Triethyleglycol monomethacrylate)
   2. Poly GLYMA (Glycerol monomethacrylate)

IRRIGATING SOLUTIONS

Intraocular Irrigating Solutions

1. BSS containing
   0.64% NaCl, 0.75% KCl, 0.03% magnesium chloride. 0.043% calcium chloride, 0.39% sodium acetate, 0.17% sodium citrate and sodium hydroxide.
2. BSS plus (mix aseptically before use)
   Part I – 480 ml containing 7.44 mg NaCl, 0.395 mg KCl, 0.433 mg sodium phosphate, 2.19 mg sodium bicarbonate, sodium hydroxide/ml.
   Part II – 20 ml containing 3.85 mg calcium chloride dihydrate, 5 mg magnesium chloride hexahydrate, 23 mg dextrose and 4.6 mg glutathione disulfide/ml.
   These solutions are used during any type of intraocular surgery including phaco emulsification.

Extraocular Irrigating Solutions

These solutions are used for general ophthalmic use including short procedure (excluding intraocular surgery).

EIS containing 0.49% NaCl, 0.075% KCl, 0.048% CaCl, 0.03% magnesium chloride, 0.39% sodium acetate, 0.17% sodium citrate with 0.013% benzalkonium chloride.

SURGICAL ENZYMES

Alpha Chymotrypsin

Available as powder for ophthalmic solution containing 150 units or 300 units with 2 ml sodium chloride diluent per dual chamber univial.

Available as 750 units per *vial* with 9 ml BSS diluent.

Urokinase

Dose: 5000 units of urokinase are dissolved in 2 ml of normal saline. Useful for dissolving blood clot of coagulated hyphaema:

Hyaluronidase

Available as odour less fluffy powder containing 300 units of activity per mg. Freshly prepared before use for local ocular anaesthesia.

Chelating Agents and Mucolytics

i. Sodium EDTA (0.01% solution)
ii. Laevo cysteine (0.1-0.2 molar conc)
iii. Acetyl cysteine (as eye drops in conc. of 5%, 10% and 20%)

Caustic Preparations

i. Pure carbolic acid
ii. 100% alcohol
iii. Hydrogen peroxide (2%)

Cyanoacrylate Tissue Adhesive

n-butyl–2 cyanoacrylate tissue adhesive is used for immediate wound closure in corneal perforations upto 3 mm in length.

Surgical Adjuncts

Fractionated Purified Silicone Oil

Fractionated purified sterile, apyrogenic silicone oil is commercially available for prolonged temponande after surgical treatment for severe retinal detachment, specially retinal detachment with giant tears, proliferative vitreal retinopathy and traumatic retinal detachment.

It is available as 10 ml vial with special flip off seal in a sterile pouch. (Store it at 8°C-24°C). This vial is for single use only. Do not resterilize it. This purified silicone oil is free from toxic residual polymerization catalysts.

Poly Dimethyl Siloxane (Silicone Oil)

It is available as single use 10 and 15 ml vials (injections). It is used for Retinal Detachment Surgery.

Povidone Iodine

It is used prior to eye surgery to prep the periocular region and irrigate the ocular surface.

It is available as 5% solution in 50 ml and 15 ml packs. Povidone iodine is indicated for external use only. It is not recommended for intraocular injection or irrigation.

Absorbable Gelatin Film

It is sterile film available in 100 × 125 mm and 25 × 50 mm sizes.

It is used in many surgical procedures including glaucoma filtration operations, extraocular muscle surgery, diathermy and scleral buckling operations.

Botulinum Toxin Type A

It is available as powder for injection (Lyophilized).

100 units of Lyophilized Clostridium botulinum toxin type A.

It is supplied in vials (Preservative free) containing 0.05 mg albumin (human), 0.9 mg sodium chloride.

It is mainly used in the treatment of blepharospasm to reduce excessive abnormal contractions.

TOPICAL IMMUNE THERAPY

Ophthalmic solution (Aspac) containing 0.1% each of IgG, IgA and 0.05% of IgM in fixed concentrations.

Store in Refrigerator at 2-8°C when the vial is not opened. Once opened it can be stored at room temperature.

Dose: Instill 1-2 drops three to four times a day for a week postoperatively and then gradual tapering over next 7 days.

Topical Hyperosmotic Agent

a. Hypertonic salt agents

1. Topical NaCl solution as 2% and 5% with two water soluble polymers, 0.004% Thimerosal and 0.1% EDTA.
2. Topical NaCl solution 2% or 5% with hydroxy propyl methylcellulose and parabens.
3. Five percent solution also contains propylene glycol sodium borate and boric acid.

   Usual dosage: 1-2 drops 4-6 times a day as required.

4. Topical 6% NaCl ophthalmic gel with petrolatum and lanolin.
   Dose: 0.25 inch ribbon of ointment 1-2 times a day.

b. Glycerine solution

Available as 50% solution of glycerol or propylene glycol with 0.55% chlorobutanol.
Dose: It is applied as slow drip in which many drops are instilled several seconds apart.

c. Glucose 40% ophthalmic ointment in petrolatum and lanolin.
d. Emulsion of poly oxyethylene (0.4%) and silicone oil.

ANTICATARACT THERAPY

Topical Agents

1. Aspirin 1% topical solution
2. Sulindac 1% solution
3. Glutathione 1% solution
4. Benzylacohol 0.07% solution
5. Catalin
   Topical ophthalmic solution in conc of 0.75 mg/15 ml of solvent.
6. Cineraria martima ophthalmic solution (15 ml)
7. Topical solution containing potassium iodide (3.3%), sodium chloride (0.83%) and calcium chloride (1.0%).
   Usual dosage: 1-2 drops 3-4 times till required.

Systemic Therapy

1. Vitamin E therapy
   Dose: 200 mg twice a day and is available as 100 mg and 200 mg capsules.
2. Antioxidant therapy
   i. Mix carotin soft gel capsules containing 15.44 mg of mixed carotenoids in oily suspension (alpha carotene, beta carotene, lutein, cryptoxanthin and zeaxanthin) equivalent to 25000 IU of vitamin A.
   Dose: One capsule daily preferably at bed time.
   ii. Antioxidant capsule containing zinc 30 mg, copper 1.5 mg, selenium 60 mg, manganese 5 mg, vitamin A 6000 IU, vitamin B_{12} 20 mg, vitamin C 200 mg and vitamin E 60 IU.
   Dose: One capsule daily preferably at bed time.
3. Other systemic agents on trials are
   - Sodium salicylate
   - Clinoril
   - GSH
   - Cyclopenthiazide
   - Tetra methyl glutaric acid
   - Spirohydantion
   - NSAIDs like Naproxen, Ansam, Indomethacin, Ibuprofen, Oxyphenbutazone and Paracetamol.

MEDICAL THERAPY FOR AGE-RELATED MACULAR DEGENERATION (AMD)

Antioxidants

Mix-carotin soft gel capsules containing 15.44 of mixed carotenoids (alpha carotene, beta carotene, lutein, cryptoxanthin and zeaxanthin).
Dose: One capsule daily at bed time.

Antiangiogenic Agents

- Interferon
- Thalidomide
- Retinoids
- Amitoride
- Beta cyclodextrin
- AGM 1470

Growth Factors

- Isotretinoin
- VEGF

MEDICAL THERAPY FOR DIABETIC RETINOPATHY

1. D400 available as tablet
   Dose: One tablet three times a day till required.
2. Antioxidants containing beta carotene, vitamin E, zinc
3. Aldose reductase inhibitors
   - Sulindac (250 mg twice daily)
   - Ponalrestat (600 mg daily)
   - Indomethacin and sorbinil (on trials)

4. Cyclo-oxygenase inhibitors
   - Aspirin (325 mg twice daily)
   - Dipyridamole (225 mg daily)
   - Ticlopidine (500 mg daily)
5. Cyclandelate 400 mg 4 times daily.
6. Miscellaneous drugs on trials
   - Calcium dobesilate (Doxium)
   - Suffonyl ureas.
   - Pentoxyfylline
   - Antiangiogenic agents like interferon, retinoids, amiloride, thalidomide, VEGF inhibitor antibodies, Isotretinoin and growth factors.
   - Metabolic inhibitors
   - Vitamin E

OPHTHALMIC DYES

Fluorescein Sodium

1. Topical solution available as 2% solution.

Dose: Instill 1-2 drops of 2% solution for detection of foreign bodies and corneal abrasions.

Topical solution contains – 0.25% Fluorescein sodium, 0.1% Proparacaine HCl, 0.01% Thimerosal preservative.

2. Fluorescein Strips

Available as

- 1 mg strips (boric acid, polysorbate 80 and 0.5% chlorobutanol).
- 9 mg strips
- 0.6 mg and 1 mg strips

- High molecular fluorescein (Higlo) strips for soft lenses.

3. **Intravenous Fluorescein**
   For IV use it is available as 10% and 25% injections.
4. **Oral Fluorescein**
   Can be given by mixing fluorescein powder or vial of 10% injectable fluorescein in a citrus drink.

Fluorexon

Available as 0.35% topical solution in 0.5 ml pipettes
Dose: Instill 1-2 drops.

Rose Bengal

Available as topical 1% solution containing 1% Rose bengal with povidone, sodium borate,
- PEG and 0.01% thimerosal
- Also available as 1.3 mg strip
- Dose: Topically instill 1-2 drops.

Lissamine Green

Available as strile ophthalmic strips. Each strip contains approx. 15 mg of lissamine green.

Indocyanine Green

It is a tri-carbocyanine dye which is used for visualization of choroidal vessels with infrared absorption angiography (ophthalmic angiography). It is indicated for digital indocyanine green video-angiography (ICG-V) and ICG - angiography guided laser photocoagulation.

It is available as powder for injection in 25 mg and 50 mg strengths along with aqueous solvent (pH 5.5-6.5).

Aqueous solvent is specially prepared sterile water for injection to dissolve indocyanine green.

Dosage: Use 40 mg dye in 2 ml of aqueous solvent. Immediately after injected dye bolus (IV) with a 5 ml bolus of normal saline. This injection regimen provides the optimal concentration of dye to the choroidal vasculature following IV injection. This dye is non-toxic on IV administration.

Trypan Blue

Trypan blue is a dye which safely stains the anterior lens capsule during cataract surgery (ECCE, IOL Surgery and Phaco surgery). Trypan blue is a capsule stainer which reduces the risk of complication due to unrecognised radial capsule by facilitating the performance of the capsulorhexis in the absence of red fundus reflex specially in cases of matured cataract. Special feature of Trypan blue is that it stain the anterior capsule without affecting the corneal endothelium. So blue stained capsule can be easily identified from the underlying unstained lenticular tissue.

It is available as 1 ml ampoule commercially. Each ml contains 0.6 mg Trypan blue, 1.9 mg of sodium mono-hydrogen orthophosphate, 0.3 mg of sodium dihydrogen ortho phosphate, 8.2 mg of sodium chloride and sodium hydroxide for adjusting the pH and water for injection.

Visudyne

Visudyne (verteporfin) is a photosensitive second generation porphyrin (benzoporphyrin) monoacid derivatives which has been recently approved by FDA (Food and Drug Administration), USA for the Photodynamic Therapy (PDT)—the drug/light combination for the treatment of wet age-related macular degeneration (ARMD). It requires a special diode laser for activation.

It has been launched commercially recently.
Dosage range is 6 mg/m^2
Fluence range - 50 J/cm^2 and irradiation time is 15 min.

CONTACT LENS CARE PRODUCTS

1. **Storage/soaking solutions**
   Solution containing Polyvinyl alcohol with 0.01% benzalkonium chloride and 0.2% EDTA.
2. **Wetting solution**
   Solution containing Hydroxy propyl methylcellulose, polyvinyl alcohol, 0.004% benzalkonium chloride and 0.01% EDTA
3. **Cleaning/soaking/wetting solution**
   Solution containing Hydroxy propyl methylcellulose, boric acid, non-oxynol 15, 0.01% benzalkonium chloride and 0.01% EDTA.
4. **Rewetting solutions**
   Solution containing Povidone, water soluble polymers with 0.004% thimerosal and 0.1% EDTA.

5. **Cleaning solutions and gel**
   Isotonic solution polymeric cleaning agent, hydroxy ethyl cellulose, polysorbate 21, 0.1% EDTA and 0.01% poly quaternium-1.

Rigid Gas Permeable Contact Lens Products

1. **Disinfecting/wetting/soaking solution**
   Isotonic solution with polyvinyl alcohol, 0.003% Chlorhexidine gluconate and 0.002% EDTA.
2. **Cleaning/soaking solutions**
   - Solution containing hydrophillic polyelectrolyte, polyvinyl alcohol, hydroxy ethyl cellulose with chlorhexidine gluconate and EDTA.
   - Tablet containing papain, NaCl, sodium carbonate, sodium borate and EDTA.

Soft (Hydrogel) Contact Lens Products

1. **Rinsing/storage solutions**
   Isotonic buffered solution of NaCl, sodium hexa metaphosphate, sodium borate, boric acid with 0.1% sorbic acid.
2. **Surfactant cleaning solutions**
   - Isotonic polymeric cleaning agent, hydroxy ethyl cellulose, polysorbate 21, 0.1% EDTA and 0.01% polyquaternium 1.
   - Solution with 20% isopropyl alcohol, poloxamer 407 and amphoteric 10.
3. **Enzymatic cleaners**
   Tablet containing papain, NaCl, sodium carbonate, sodium borate and EDTA.

4. Rewetting solutions

- Isotonic solution with polyhexamethylene biguanide 0.001%, Tromethamine 12 mg/ml, tyloxapol and disodium edetate.
- Isotonic solution with polyvinyl alcohol and 0.002% thimerosal and 0.01% EDTA.

5. Chemical disinfection systems

- Solution containing 0.013% tris tallow ammonium chloride, 0.002% thimerosal, bis tallow ammonium chloride, sodium bicarbonate, sodium phosphate, propylene glycol, polysorbate 80 and special soluble polyhema.
- Multiaction disinfecting solution containing isotonic solution with NaCl, sodium borate, boric acid, poloxamine, 0.0005% poly amino Propyl biguanide and EDTA.

6. Topical comfort/complete eyedrops is isotonic polymeric aqueous solution consisting of EDTA, sodium chloride, potasium chloride with sorbic acid and boric acid.

These topical eye drops are used to relieve minor irritation, discomfort and blurring during soft, semisoft or hard contact lenses wear.

RECENT MULTIPURPOSE SOFT CONTACT LENS CARE SYSTEMS

1. Multipurpose solution (ReNu) containing sterile isotonic solution with boric acid, disodium edetate, sodium borate and sodium chloride. Active ingredients

are dymed 0.001% and hydranate 0.03%, poloxamine 1%.

This MP solution is used for cleaning, rinsing, disinfecting, lubricating and storing the soft contact lens. It cleans, disinfects and removes protein every day due to hydranate a unique agent.

2. Multipurpose solution containing (complete)
   - Polyhexamethylene Biguanide (PHMB) - 0.001%
   - Tyloxapol - 0.025%
   - Tromethamine - 1.2%
   - Edetate sodium - 0.05%

This MP solution does not contain chlorhexidine, thimerosal or other mercury containing ingredients. In this MP solution PHMB acts as disinfectant. Tyloxapol acts as surfactant and lubricant. While Tromethamine is biological buffer. This MP solution can be used for cleaning, rinsing, disinfecting, lubricating, storing and rewetting the soft contact lenses.

ANTI-RETROVIRAL DRUGS IN OPHTHALMIC INFECTIONS

The currently approved anti-retroviral drugs fall into following categories:

I. Nucleoside Reverse Transcriptase Inhibitors (NRTIs)

Drugs of NRTI group are-
- Zidovudine
- Didanosine
- Lamivudine

- Stavudine
- Zalcitabine

II. Non-nucleoside Reverse Transcriptase Inhibitors (NNRTIs)

Drugs of NNRTIs group are –

- Nevirapine
- Delavirdine

III. Protease Inhibitors

Drugs of this group are –

- Saquinavir
- Indinavir
- Ritonavir

IV. Antiviral Metabolites

- Ganciclovir
- Foscarnet
- Cidofovir/Zidofovir (HPMPC)

Drug selection, administration and dosage in individual ocular infection in AIDS patients is described as follows-

Cytomegalovirus Infection

Retinitis is the most common manifestation of CMV infection in AIDS patients. Drugs of choice are –

Ganciclovir

It can be given by intravenous injection form, oral, intravitreal and ganciclovir implant forms.

- *Intravenous dosage:* Loading dose of 5 mg/kg every 12 hourly IV for 14-21 days then reduce to maintenance

dose of 6 mg/kg OD 5 days a week. Dose is given slow IV (over on hour in 100 mg of 0.9% normal saline).

- *Oral dosage:* Ideal for maintenance therapy and primary prophylaxis of CMV end organ disease at a dose of 1 gm (three times a day).
- *Intravitreal injection*: It is given to those patients who are intolerant of systemic therapy.
  Dosage: 200-400 ug/dose given 1-2 times per week.
- Liposome encapsulated ganciclovir intravitreal high dose injection (once a week, 2000 ug/dose) are commercially available.
- Ganciclovir implant (intravitreal devices). It has advantage of sustained intraocular release of ganciclovir obviating the need for repeated intravitreal injections.
- It consists of central pellet of ganciclovir 4.5 mg encased in the polyvinyl alcohol (PVA) polymer (water permeable). PVA is surrounded by impermeable ethylene vinyl acetate polymer. Finally the implant has a coating of PVA. It is surgically implanted in the vitreous cavity by making 5 mm incision in pars plana positioned 4 mm posterior to the limbus. The implant slowly release the drug at a rate of about 1.4-1.9 ug per hour over an 8 months period.

During Ganciclovir therapy, following investigations are mandatory

- Complete haemogram (twice a week)
- Liver function tests/renal function tests (twice a week)
- Dilated fundoscopy (at 2 weeks interval).

Foscarnet

Dosage: Induction dose is 90 mg/kg IV 12 hourly for 14-21 days followed by daily maintenance dose of 90 mg/kg IVOD. Intravitreal dosage is 2.4 mg every week. Foscarnet is given over 2 hours with 100 ml of normal saline as hydration fluid (use 5% dextrose if Na^+ levels are high).

Cidofovir (HPMPC)

It can be administered by IV or intravitreal injection.

Dosage: IV treatment dose is 5 mg/kg per week for first two weeks followed by injection of 5 mg/kg alternate weeks as maintenance therapy along with probenecid (to decrease nephrotoxicity). Standard Intravitreal dosage is 20 ug injected every 6 weeks.

New investigational compounds on trial for CMV retinitis are –

- Protease inhibitor
- Lobucavir
- Anti-CMV monoclonal antibody MSL-109
- Halogenated benzamidozole 20 times more potent than ganciclovir.

Toxoplasma Infection

Toxoplasma gondii, retino-choroiditis in AIDS is common in this group of infection.

First choice of treatment is Sulphadiazine + pyrimethamine and folinic acid.

Second choice of treatment is Clindamycin + pyrimethamine + folinic acid.

Third choice of treatment is Atvaquone + pyrimethamine + Folinic acid.

Dosage:

i. **Sulphadiazine**
   For treatment – 2 gm tds PO/IV and
   for Maintenance – 1 gm tds PO

ii. **Pyrimethamine**
   For treatment 200 mg PO on day-1 in divided doses and then 50 mg OD.

iii. **Clindamycin**
   For treatment 600 mg PO/IV 8 hourly and for maintenance 450 mg PO/IV 8 hourly.

iv. Folinic acid is given to decrease risk of myelosuppression. Dosage is 15 mg PO daily.

v. **Atovaquone**
   For treatment 750 mg 4 times a day (to be given with food). Sulphadiazine and clindamycin, when given IV, have to be diluted in normal saline, 5% dextrose and to be given in 30 minutes – 1 hour duration

Close monitoring for haemogram, urinary and serum electrolytes and LFT are requied during treatment period.

Herpes Zoster Ophthalmicus

- Treatment of choice is Acyclovir.

Dosage: Start with IV 10 mg/kg or 500 mg/sqm 8 hourly for 7-10 days.

It is given slowly over a duration of 1 hour with normal saline.

After that switch to oral therapy 800 mg 5 times daily.

During treatment period monitor haemogram once weekly and electrolytes (twice a week).

Topical 1% foscarnet sodium solution 5 times/day or Topical 1% trifluoridine solution 5 times/day can also be given.

Mycobacterium Tuberculosis

First choice of treatment is

Rifampicin + INH + pyrazinamide

Dosage:

- Rifampicin : 600 mg PO (> 50 kg body weight) daily
  450 mg PO (< 50 kg body wt)
- INH : 300 mg PO daily
- Pyridoxine : 10 mg PO daily
- Pyrazinamide : 2 gm PO daily (> 50 kg body wt)
  1.5 g PO daily (< 50 kg body wt)

- Ethambutol : 15 mg/kg PO daily

During treatment period monitor haemogram, LFT, renal tests and ocular fundus examination (specially with ethambutol).

Ocular Syphilis

Treat it as neurosyphilis and usually higher doses are recommended.

Dosage: 10-24 million IU of Aqueous Pencillin IV daily for 10-14 days + Probenecid 50 mg PO daily.

Acute Retinal Necrosis

Varicella zoster virus (VZV) is causative organism of acute and progressive retinal necrosis.

Drug and dosage: Start with Acyclovir 7.5-10 mg/kg IV daily for 10-14 days.

i. Maintenance therapy with oral Acyclovir 500 mg PO 5 times daily for several months.
ii. Intravenous Foscarnet 40-60 mg/kg three times a day. In severe cases intravitreal Ganciclovir and Foscarnet can be given.

Fungal Infections

Candidiasis

It is extremely common in AIDS patients.

Treatment: Clotrimazole or Nystatin 500,000 units for 7-14 days in divided doses. Usual therapy is Fluconazole 200 mg on first day followed by 100 mg once daily for 7-14 days.

Alternatively Itraconazole 100 mg/day for 7-14 days can be given.

Cryptococcosis

It is second most common fungal infection in AIDS patients.

Treatment: Induction treatment is with Amphotericin B 0.7 mg/kg/day IV and Flucytosine 25 mg/kg four times a day for 8 weeks. Fluconazole is preferred choice for oral therapy with a dosage of 200 mg/day.

Pneumocystis carinii choroiditis

Trimethoprim-Sulphamethoxazole (DS) orally is best treatment of choice.

Dosage: Two tablets given 8 hourly and to be continued for at least 2-3 weeks.

Recent Advances in Anti-retroviral Drug Therapy

Fomivirsen Sodium (Vitravene)

It is indicated for cytomegalovirus retinitis and is given intravitreally for ophthalmic use.

Dosage: Induction dose is 0.05 ml (330 mcg) as a single intravitreal injection on alternate week for 2 doses followed by maintenance dose of 330 mcg (0.05 ml) once every 4 weeks. It is given using 30 gauge needle or a low volume syringe.

Post-injection monitoring include light perception and optic nerve head perfusion. Store Fomivirsen between 2-25°C.

OCULAR THERAPEUTICS IN REFRACTIVE SURGERY

Photorefractive Keratectomy (PRK)

Preoperative Ocular Therapeutics

Patients undergoing Excimer PRK are given preoperatively a combination of topical antibiotics (Lomefloxacin or Sparfloxacin 0.3%) and NSAID diclofenac sodium (1%) drops. 24 hours prior to procedure. This combination is

given at 4 hourly interval. A mild oral sedation (diazepam 5-15 mg) is also given to the patient to overcome anxiety due to the procedure.

PRK surgery is performed under Topical anaesthesia. Following topical anaesthetic agents can be used –

- Proparacaine HCl - 0.5%
- Benoxinate HCl - 0.4%
- Tetracaine HCl - 0.5%

However, Proparacaine (0.5%) is most commonly used topical anaesthetic agent. It is given 2-5 minutes before operation. Dosage is 2 drops in each eye 2-3 times repeated at the interval of 1 minute. Onset of anaesthetic action starts within 15-20 seconds and effect lasts for 15-20 minutes enough for completion of PRK surgery.

Postprocedure Ocular Therapeutic Module

Following PRK corneal sensation returns to baseline within 12 weeks. The various modalities for the management of pain are –

- Oral analgesic (preferably NSAID oral diclofenac or nimesulide for 5 days. Tab diclofenac sustained released 75 mg BD or nimsulide tablet 100 mg BD for 5 days continuously relieves the PRK pain to great extent.
- Topical non-steroidal anti-inflammatory drugs are also given locally. These drugs can be –
  - Topical diclofenac 1% drops 4 times a day or
  - Topical ketorolac 0.5% 4 times a day or
  - Topical piroxicam 1% 4 times a day help in reducing the pain.

- Topical lubricant eye drops 4-5 times a day gives the patient a soothing sensation. Polyvinyl alcohol liquifilm tear drops and sustained release special gel ointment help in post-PRK pain.

In Excessive pain condition, topical anaesthetics like proparacaine 0.5% drops 3-4 times a day helps the patient to overcome the pain.

Lasik Surgery

Preprocedure Therapeutic Medications

Preoperatively patient undergoing Elective Lasik Surgery, is given broad range topical antibiotic eye drops (preferably quinolones like Topical Sparfloxacin (0.3%) or lomefloxacin (0.3%) at 4 hourly interval starting 24 hours prior to surgery.

A mild oral sedation (Diazepam 2-10 mg) is generally given to relieve the anxiety of the patient.

Lasik surgery is performed under topical anaesthesia because of rapid onset of action and lesser irritation to the patient. Topical anaesthetic agents used are –

- Proparacaine HCl - 0.5%
- Benoxinate HCl - 0.4%
- Tetracaine HCl - 0.5%

Proparacaine (0.5%) is the most commonly used topical anaesthetic agent. Its action starts within 15-20 seconds and effect last for 15-20 minutes, sufficient for completion of Lasik Surgery.

Postprocedure Therapeutic Modulation

During the initial active postoperative phase, refractive surgeons prefer to give:

i. Oral antibiotics, preferably ciprofloxacin 500 mg BD for 5 days.
ii. Topical fluorometholone (0.1%) drops 4 times a day for two weeks.
iii. Topical lubricant like polyvinyl alcohol Liquifilm tear drops 4 times a day for 2 weeks.
iv. Topical antibiotic (Sparfloxacin 0.3%) 4 times a day for a week.
v. Oral analgesic, preferably NSAID like tab. diclofenac 75 mg SR BD for three days.

Recent Update in Post-PRK/Lasik Surgery Therapeutic Module

Several new topical agents have been advised in an attempt to modify the stromal wound healing following PRK/Lasik Surgery:

i. Topical ADL-2 or Rofecoxib (0.3%) reduces the accumulation of prostaglandin E and inflammatory cells in the corneal stroma.
ii. The combination of mitomycin C with topical steroids like fluorometholone (0.1%) or rimexolone (0.1%) decreases the subepithelial fibrosis.
iii. Application of cytokines has been shown to reduce corneal haze and scarring recently.
iv. Topical interferon eye drops 4 times a day for 4-5 weeks reduces the corneal haze remarkably.

Table 2.1: Recommended non-toxic doses of antimicrobial infusion fluids for vitrectomy

Agent	*Dose (mg/ml)*
Aminoglycosides	
Gentamicin	0.008
Tobramycin	0.010
Amikacin	0.010
Penicillins	
Penicillin G	0.010
Methicillin	0.020
Oxacillin	0.010
Dicloxacillin	0.010
Clindamycin	0.009
Chloramphenicol	0.010
Lincomycin	0.010
Imipenem	0.010
Ciprofloxacin	0.010
Ofloxacin	0.010
Pefloxacin	0.010
Lomefloxacin	0.010
Sparfloxacin	0.010
Gatifloxacin	0.010
Levofloxacin	0.010
Moxifloxacin	0.010
Ceftazidine	0.040
Vancomycin	0.030

Table 2.2: Recommended doses of intravitreal antimicrobial agents

Agent	*Dose (mg/0.1ml)*
a. **Aminoglycosides**	
Gentamicin	0.10
Tobramicin	0.10
Amikacin	0.40
Netilmicin	0.10
Kanamycin	0.40
b. **Cephalosporins**	
Cefazolin	2.25
Cephalothin	2.0
Cephaloridine	0.25
c. **Penicillins**	
Methicillin	2.0
Oxacillin	0.50
Carbnecillin	2.0
Ampicillin	5.0
d. **Fluoroquinolones**	
Norfloxacin	0.10
Ciprofloxacin	0.10
Ofloxacin	0.10
Pefloxacin	0.10
Lomefloxacin	0.10
Sparfloxacin	0.10
Levofloxacin	0.10
Gatifloxacin	0.10
Moxifloxacin	0.10
Vancomycin	1.0
Clindamycin	0.45-1.0
Erythromycin	0.50
Roxithromycin	0.50
Clarithromycin	0.50
Chloramphenicol	2.0
Lincomycin	1.5
Imipenem	0.50

Table 2.3: Preparation of intravitreal antibiotic injections

Drug	*Vial size (Commercial)*	*Amount of initial diluent (ml)*	*Initial conc (per ml)*	*Aliquot (ml)*	*Vol Nos. (ml)*	*Final conc (per ml)*	*Final I.vitreal dose in (0.1 ml)*
Amikacin	500 mg/2 ml	-	250 mg	0.1	6.15	4 mg	400 ug
Ampicillin	1 g	3.4	250 mg	0.3	1.2	50 mg	5 mg
Cefazolin	500 mg	2.0	225 mg	0.1	0.9	22.5 mg	2.25 mg
Chloramphenicol	1 g	10.0	100 mg	0.1	0.4	20 mg	2 mg
Clindamycin	300 mg/2 ml	-	150 mg	0.1	1.4	10 mg	1 mg
Gentamicin	80 mg/2 ml	-	40 mg	0.1	1.9	2 mg	200 ug
Kanamycin	500 mg/2 ml	-	250 mg	0.1	4.9	50 mg	5 mg
Vancomycin	500 mg	10.0	50 mg	0.2	0.8	10 mg	1 mg
Tobramycin	80 mg/2 ml	-	40 mg/ml	0.5 1	0.5 1	2 mg/ml	0.2 mg/ 0.1 ml

Table 2.4: Various topical antibiotic preparations (Fortified and Commercial with Dosages)

Antibiotic preparation	*Commercial drops*	*Fortified drops*	*Self life*	*Subconjunctival (Final dosage).*
Chloramphenicol	0.4-1.0%	5-10 mg/ml	15 days	100 mg
Penicillin	100000 units/ml	0.15-0.30 lac IU/ml	24 hours	1 million units/ml
Framycetin	0.5%	N.E	N.E.	-
Gentamicin	0.3%	20 mg/ml	30 days (RT)	20-40 mg
Tobramicin	0.3%	20 mg/ml	30 days (RT)	20-40 mg
Amikacin	03%	10-20 mg/ml	30 days (RT)	25-50 mg
Sisomicin	0.3%	20 mg/ml	30 days (RT)	20-40 mg
Neomycin	0.17%	30-40 mg/ml	7 days ®	250-500 mg
Netilmycin	N.E.	15-20 mg/ml	7 days ®	-
Kanamycin	N.E.	10 mg/ml	7 days ®	-
Tetracycline	1.0	N.E.	N.E.	-
Polymixin B	0.5-1.0%	1-2 mg/ml	1 week ®	10000 units/ml
Bacitracin	N.E.	10000 units/ml	7 days ®	5000 units
Erythromycin	N.E.	5 mg/ml	14 days (RT)	100 mg/ml
Roxithromycin	N.E.	5 mg/ml	14 days (RT)	100 mg/ml
Clarithromycin	N.E.	5 mg/ml	14 days (RT)	100 mg/ml
Norfloxacin	0.3%	20 mg/ml	14 days ®	20-40 mg/ml
Ciprofloxacin	0.3%	20 mg/ml	14 days ®	20-40 mg/ml
Oxfloxacin	0.3%	20 mg/ml	14 days ®	20-40 mg/ml
Pefloxacin	0.3 %	20 mg/ml	14 days ®	20-40 mg/ml
Lomefloxacin	0.3%	20 mg/ml	14 days ®	20-40 mg/ml
Sparfloxacin	0.3%	20 mg/ml	14 days ®	20-40 mg/ml
Gatifloxacin	0.3%	20 mg/ml	14 days ®	20-40 mg/ml
Levofloxacin	0.3%	20 mg/ml	14 days ®	20-40 mg/ml
Moxifloxacin	0.3%	20 mg/ml	14 days ®	20-40 mg/ml
Cephaloridine	N.E.	50 mg/ml	7 days ®	100 mg/ml
Cephamandole	N.E.	50 mg/ml	7 days ®	100 mg
Cephazolin	N.E.	50 mg/ml	7 days ®	100 mg
Cefoperazone	N.E.	40-50 mg/ml	7 days ®	100 mg
Cefadroxyl	N.E.	40-50 mg/ml	7 days ®	100 mg
Ceftriaxone	N.E.	130 mg/ml	10 days ®	100 mg
Ampicillin	N.E.	10 mg/ml	7 days ®	-
Penicillin G	N.E.	100000 units/ml	24 hours ®	1 million units/ml
Methicillin	N.E.	4 mg/ml	7 days ®	-
Carbenicillin	N.E.	4 mg/ml	7 days ®	100 mg
Vancomycin	N.A.	20 mg/ml	1 week ®	25 mg
Clindamycin	N.A.	10 mg/ml	7 days ®	-
Ticarcillin	N.A.	6 mg/ml	7 days ®	-

® - Refrigeration (at 4ºC)
RT - Room temperature
NE - Not established
N.A.- Not available

For fortified drops use BSS or isotonic saline (for 5% fortified drops, 50 mg/ml, dissolve 500 mg of salt in 10 C.C. of BSS).

Table 2.5: Initial topical antibiotic therapy choice for external ocular infections based on Gram's stain findings

Bacteria type	*Drugs of choice (fortified)*	*Alternative drug (Fortified and Non-fortified)*
1. Gram-positive cocci	Cefazolin 100 mg/ml	Vancomycin 25 mg/ml Bacitracin 10000 units/ml Ciprofloxacin, Lomefloxacin, Gatifloxacin 20 mg/ml
2. Gram-positive bacilli	Penicillin G 100000 units/ml	Vancomycin - 25-50 mg/ml Bacitracin - 1000 units/ml
3. Gram-positive rods	Gentamicin 14 mg/ml	Tobramycin - 14 mg/ml
4. Gram-negative cocci	Ceftriaxone 50 mg/ml	Ofloxacin, Lomefloxacin, Sparfloxacin, Levofloxacin 20 mg/ml Chloramphencol - 5 mg/ml
5. Gram-negative bacilli	Tobramycin 14 mg/ml Amikacin 10 mg/ml Ticarcillin - 6 mg/ml	Gentamicin - 14 mg/ml Polymixin B-50000 units/ml Ciprofloxacin, Ofloxacin, Lomefloxacin, Moxifloxacin 20 mg/ml
6. Bacteria suspected (No organism seen)	Cefazolin 100 mg/ml and Tobramycin 14 mg/ml	Gentamicin - 14 mg/ml or Amikacin - 10 mg/ml plus Vancomycin - 25 mg/ml or Lomefloxacin, Sparfloxacin, Gatifloxacin 20 mg/ml

Table 2.6: Topical antibiotic therapy for culture specific bacterial ulcers

Organism	*Topical (Fortified or non-fortified)*	*Subconjunctival*
1. *Pseudomonas*	Tobramycin 14 mg/ml or Amikacin 10 mg/ml Lomefloxacin Sparfloxacin } 20 mg/ml Gatifloxacin	Tobramycin 40 mg (1 ml) Amikacin 25 mg
2. *Staphylococcus*	Cefazolin 100 mg/ml Vancomycin 25-50 mg/ml or Bacitracin 10000 units/ml	Cefazolin - 100 mg Vancomycin - 25 mg Oxaciilin -100 mg
3. *Proteus*	Gentamicin 14 mg/ml Tobramycin 14 mg/ml Amikacin 10 mg/ml Ceftriaxone 50 mg/ml	Gentamicin - 20-40 mg Amikacin - 25 mg Carbenicillin - 100 mg
4. Enterobacter *E. coli* *Klebsiella* *Acinetobacter*	Tobramycin 14 mg/ml Amikacin 10 mg/ml Pefloxacin Sparfloxacin } 20-40 mg Lomefloxacin Moxifloxacin	Tobramycin - 40 mg Amikacin - 25 mg Pefloxacin Sparfloxacin Lomefloxacin Levofloxacin

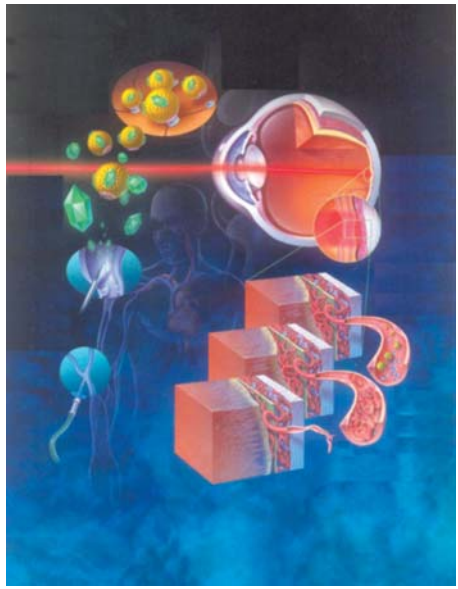
Table 2.7: Specific antibiotics therapy for the treatment of bacterial endophthalmitis

Microorganisms	*Intravitreal injection*	*Systemic therapy*	*Topical/subconjunctival*
Staphylococcus	Vancomycin/Cefazolin	Cefazolin	Cefazolin/vancomycin
Streptococcus	Vancomycin/Cefazolin	Cefazolin and Ampicillin	Cefazolin/vancomycin
Haemophilus	Chloramphenicol	Ceftazidine/ Ciprofloxacin Gatifloxacin	Lomefloxacin/ Ciprofloxacin Gatifloxacin
Propionibacterium	Vancomycin	Penicillin/ Erythromycin Cloxithromycin	Vancomycin/ Penicillin Cefazolin
Corynebacterium	Vancomycin and Cefazolin	Cefazolin	Cefazolin
Bacillus	Clindamycin and Amikacin/ Vancomycin	Clindamycin and Gentamicin Ciprofloxacin Moxifloxacin	Clindamycin and Gentamicin/ Cipro/Sparfloxacin Moxifloxacin
Listeria	Ampicillin & Vancomycin	Ampicillin	Vancomycin
Clostridium	Clindamycin/Penicillin	Clindamycin/ Penicillin	Clindamycin/ Penicillin
Nocardia	Amikacin	Cotrimoxazole	Amikacin
Pseudomonas	Amikacin/Ceftazidime	Sparfloxacin/ Ceftazidime	Sparfloxacin/ Gentamicin/ Lomefloxacin
Enterobacter	Amikacin	Amikacin	Amikacin
Proteus	Sisomycin and Cefazolin	Cefazolin and Ofloxacin	Gentamicin Ofloxacin
Serratia	Amikacin	Gentamicin/ Lomefloxacin Levofloxacin	Gentamicin/ Lomefloxacin Levofloxacin
Klebsiella	Amikacin	Cefazolin/ Gentamicin	Cefazolin/ Gentamicin

v. Topical dexamethasone (0.1%) in combination with Interferon α_2 produce less haze.
vi. Topical bFGF treatment given 4 times a day until complete epithelial wound healing occurs sharply reduces corneal haze.
vii. Application of topical anti TGF-B_1 antibody reduces corneal fibrosis remarkably.
viii. Application of Topical Synthetic MMP inhibitor has been shown to reduce intrastromal epithelial migration after laser ablations.

Chapter Three

Quick Look Complete Ocular Therapeutics Information



ANTIBACTERIALS

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Aminoglycosides		
Gentamicin Sulfate	Solution 0.3% (3 mg/ml)	5 and 10 ml dropper vials
	Ointment 3 mg/g	3.5 and 5 gm tubes
Tobramycin	Solution 0.3% (3 mg/ml)	3 and 5 ml dropper vials
	Ointment 3 mg/g	3 and 5 gm tubes
Sisomicin	Solution 0.3%	3 and 5 ml dropper vials
	Ointment 3 mg/g	3 and 5 gm tubes
Neomycin	Solution 0.17%	5 and 10 ml dropper vials
	Ointment 5 mg/gm	3 and 5 gm tubes
Framycetin	Solution 0.5 %	5 and 10 ml dropper vials
	Ointment 0.5% and 1%	3 and 5 gm tubes
Amikacin	Solution 1%	5 ml dropper vial
Tetracycline	Solution 1%	5 ml dropper vial
	Ointment 1%	3 and 5 gm tubes
Oxytetracycline	Ointment 1%	3 and 5 gm tubes
Sulphacetamide	Solution 10%, 20%, 30%	5 and 10 ml dropper vial
	Ointment 10% and 30%	3 and 5 gm tubes
Sulfasoxazole Diolamine	Solution 4%	10 and 15 ml dropper vial
Chloramphenicol	Solution 0.4-1%	3, 5 and 10 ml dropper vial
	Ointment 5 mg/g and 10 mg/g	3 and 5 gm tubes
	Powder for solution/ Injection 25 mg/vial	Preservative free 15 ml pack with diluent
Microlides		
Erythromycin	Ointment 0.5% (5 mg/g)	3 and 5 gm tubes
Roxithromycin	Ointment 0.5%	3 and 5 gm tubes
Polypeptides		
Polymixin B	Solution 0.5-1%	5 and 10 ml dropper vial
	Ointment 1-1.5 mg/gm	3 and 5 gm tubes
	Powder for solution 500,000 units	20 ml dropper vial
Bacitracin	Ointment 500 units/g and 10000 units/gm	Preservative free in 3 and 5 gm tubes

Contd...

Contd...

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Fluoroquinolones		
Norfloxacin	Solution 0.3%	5 and 10 ml dropper vials
	Ointment 3 mg/g (0.3%)	3 and 5 gm tubes
Ciprofloxacin	Solution 0.3%	5 and 10 ml dropper vials
	Ointment 3 mg/g	3 and 5 gm tubes
Ofloxacin	Solution 0.3%	5 and 10 ml dropper vials
	Ointment 3 mg/g	3 and 5 gm tubes
Pefloxacin	Solution 0.3%	5 ml dropper vials
Lomefloxacin	Solution 0.3%	5 ml dropper vials
	Ointment 3 mg/g	3 and 5 gm tubes
Sparfloxacin	Solution 0.3%	5 ml dropper vials
	Ointment 3 mg/g	3 gm tubes
Levofloxacin	Solution 0.5% and 1.5%	5 ml dropper vials
Gatifloxacin	Solution 0.3%	5 ml dropper vials
Moxifloxacin	Solution 0.5%	5 ml dropper vials
Under Clinical Trials (Phase-III)		
Grepafloxacin	Solution 0.3%	
Gemifloxacin	Solution 0.3%	
Trovafloxacin	Solution 0.3%	
Clinafloxacin	Solution 0.3%	

COMBINATION ANTIBIOTICS

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Bacitracin, Neomycin and Polymixin B	Combination solution/ Ointment containing Polymixin B Sulfate 10,000 units/g Neomycin Sulfate 3.5 mg/g Bacitracin 400 units/g	5 and 10 dropper vials In 5 mg tube
Neomycin sulfate	Combination solution/ointment	5 and 10 ml dropper vials
Polymixin B sulfate Gramicidin	Containing Polymixin B Sulfate 10,000 units/g, Neomycin sulfate 1.75 mg/g Gramicidin 0.025 mg/ml	3 and 5 gm tubes

Contd...

Contd...

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Bacitracin Zinc and Polymixin B Sulfate	Combination solution/ointment Polymixin B sulfate 10,000 units/g Bacitracin Zinc 500 units/g	5 and 10 ml dropper vials 5 gm tube
Polymixin B Sulfate and Oxytetracycline	Ointment containing Polymixin B Sulfate 10,000 units/g and Oxytetracycline HCl 5 mg/g	3 and 5 gm tubes
Trimethoprim Sulfate and Polymixin B	Combination solution containing Polymixing B Sulfate 10,000 units/g Trimethoprim: 1 mg/ml	5 and 10 ml dropper vials
Sodium Sulphacetamide and Phenylephrine	Combination solution containing Sulphacetamide 15% Phenylephrine HCl 0.125%	5 and 15 ml dropper vials
Gentamicin and Vancomycin	Combination solution containing Gentamicin 8 ug/ml Vancomycin 20 ug/ml	5 ml dropper vials

ANTIINFLAMMATORY DRUGS

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Topical Steroidal Agents		
Hydrocortisone	as Acetate solution 2% Acetate suspension 0.5-2.5% Acetate ointment 1.5%	 3 and 5 ml dropper vials 3 and 5 ml dropper vials 3 and 5 gm tubes
Prednisolone	as Acetate suspension 0.12%, 0.25% and 1% Sodium Phosphate solution 0.12%, 0.5% and 1.0% Phosphate Ointment 0.25%	 5 ml dropper vials 5 ml dropper vials 3 and 5 gm tubes

Contd...

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Dexamethasone	as Sodium Phosphate Solution 0.1%, 0.05% and 0.01%	5 ml dropper vial
	Suspension 0.1%, Sodium Phosphate	5 ml dropper vial
	Ointment 0.05%	3 and 5 gm tubes
Betamethasone	Sodium Phosphate Solution 0.1%	5 and 10 ml dropper vial
	Sodium Phosphate Ointment 0.1%	3 and 5 gm tubes
Triamcinolone acetonide	Suspension 0.1%	5 ml dropper vials
	Ointment 0.1%	3 and 5 gm tubes
Medrysone	Suspension 1%	5 and 10 ml dropper vials
Fluorometholone	Suspension 0.1%, 0.25%	5, 10 and 15 ml dropper vials
	Ointment 0.1%	3 and 5 gm tubes
Rimexolone	Suspension 0.1%	5 ml and 10 ml dropper vials
Loteprednol etabonate	Solution 0.2% and 0.5%	2.5, 5 and 10 ml dropper vials
Non-steroidal Anti-inflammatory Drugs (NSAIDs)		
Flurbiprofen	Solution 0.03%	2.5, 5 and 10 ml dropper vials
Ketorolac tromethamine	Solution 0.5% and 0.4%	5 ml dropper vial and single use 0.4 ml unims
Suprofen	Solution 1%	2.5 and 5 ml dropper vials
Diclofenac sodium	Solution 0.1%	2.5 and 5 ml dropper vials
Indomethacin	Suspension 1%	3 and 5 ml dropper vials
	Solution 0.1%	

Contd...

Contd...

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Aspirin	Solution 1%	5 ml dropper vial
Fenoprofen	Solution 0.3%	5 ml dropper vial
Ibuprofen	Solution 0.5%	5 ml dropper vial
Ketoprofen	Solution 1.0%	5 ml dropper vial
Naproxen	Solution 0.5%	5 ml dropper vial
Piroxicam	Solution 1%	5 ml dropper vial
Diflunisol	Solution 0.03%	5 ml dropper vial
Phenyl butazone	Ointment 10%	3 and 5 gm tubes
Oxyphenbutazone	Ointment 10%	3 and 5 gm tubes

TOPICAL STEROID—ANTIBIOTIC COMBINATIONS

Drug name (Generic)	*Steroid per 2/ml*	*Antibiotic per 2/ml*	*Commercial packing*
Dexamethasone Sodium Phosphate and Neomycin Sulfate	Soln. 0.1%	0.5%	5 ml dropper vial
	Oint. 0.1%	0.5%	3 and 5 gm tubes
Dexamethasone Sodium Phosphate Neomycin Sulfate and Polymixin B	Susp. 0.1%	0.35 (Neomycin) 10,000 units/ml Polymixin B	5 ml dropper vial
	Oint. 0.1%	0.35 (Neomycin) 10,000 units/ ml Polymixin B	3 and 5 gm tubes
Dexamethasone Sodium Phosphate and Chloramphenicol	Soln. 0.1%	0.5-1%	5 ml dropper vial
Dexamethasone Sodium Phosphate and Framycetin	Susp. 0.1%	0.3%	5 ml dropper vial
Dexamethasone Sodium Phosphate and Tobramycin	Susp. 0.1%	0.3%	5 ml dropper vial
	Oint. 0.1%	0.3%	3 and 5 gm tubes

Contd...

Contd...

Drug name (Generic)	*Steroid per 2/ml*	*Antibiotic per 2/ml*	*Commercial packing*
Dexamethasone Sodium Phosphate, Chloramphenicol and Polymixin B Sulfate	Soln. 0.1% 5,000 IU Ointment 0.1 5,000 IU	1% Chloram-phenicol Polymixin-B 1% Chloram-phenicol Polymixin-B	5 ml dropper vial 3 and 5 gm tubes
Dexamethasone Sodium Phosphate and Gentamycin	Soln. 0.1%	0.3%	5 ml dropper vial
Dexamethasone Sodium Phosphate and Ciprofloxacin	Soln. 0.1% Oint. 0.1%	0.3% 0.3%	5 ml dropper vial 3 and 5 gm tubes
Dexamethasone Sodium Phosphate and Ofloxacin	Soln. 0.1%	0.3%	5 ml dropper vial
Dexamethasone Sodium Phosphate and Lomefloxacin	Soln. 0.1%	0.3%	5 ml dropper vial
Dexamethasone Sodium Phosphate and Sparfloxacin	Soln. 0.1%	0.3%	5 ml dropper vial
Dexamethasone Sodium Phosphate and Gatifloxacin	Soln. 0.1%	0.3%	5 ml dropper vial
Dexamethasone Sodium Phosphate and Moxifloxacin	Soln. 0.1%	0.5%	5 ml dropper vial
Dexamethasone Sodium Phosphate and Levofloxacin	Soln. 0.1%	0.5%	5 ml dropper vial
Betamethasone with Neomycin	Soln. 0.1%	0.5%	5 ml dropper vial
Betamethasone with Chloramphenicol	Soln. 0.1% Oint. 0.1%	0.5% 0.5%	5 ml dropper vial 3 and 5 gm tubes
Betamethasone and Gentamicin	Soln. 0.1%	0.3%	5 ml droper vial
Hydrocortisone and Neomycin	Soln. 0.5% 1.5% Oint. 0.5-1.5%	0.5% 0.5% 0.5%	5 ml dropper vial 3 and 5 gm tubes
Hydrocortisone, Polymixin B, Bacitracin and Neomycin	Soln. 10 mg/g 400 units/g 5 mg/g	0.5 mg/g Polymixin Bacitracin Neomycin	5 ml dropper vial

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Drug name (Generic)	*Steroid per 2/ml*	*Antibiotic per 2/ml*	*Commercial packing*
	Oint.10 mg/g 400 units/g 5 mg/g	0.5 mg/g Polymixin Bacitracin Neomycin	5 gm tube
Hydrocortisone and Gentamicin	Susp. 1%	0.3%	5 ml dropper vial
Hydrocortisone and Chloramphenicol	Soln. 0.5% Oint. 0.5%	1% 1%	5 ml dropper vial 5 g tube
Hydrocortisone and Oxytetracycline	Susp. 1.5% Oint. 1.5%	0.5% 0.5%	5 ml dropper vial 3 and 5 gm tube
Prednisolone and Gentamicin	Susp. 1%	0.3%	5 ml dropper vial
Prednisolone and Ofloxacin	Susp. 1%	0.3%	5 ml dropper vial
Prednisolone and Levofloxacin	Susp. 1%	0.5%	5 ml dropper vial
Prednisolone and sulphacetamide	Soln. 0.2% to 0.5% Oint. 0.5%	10% (Sulpha) 10% (Sulpha)	5 ml dropper vial 3 and 5 g tubes
Prednisolone, Neomycin and Polymixin B	Susp. 0.5%	0.35% (Neomycin) 10,000 units (Polymixin)	5 and 10 ml dropper vials
Fluorometholone and Neomycin	Soln. 0.1%	0.35%	5 ml dropper vial
Fluorometholone and Gentamicin	Soln. 0.1%	0.9%	5 ml dropper vial
Fluorometholone and Gatifloxacin	Soln. 0.1%	0.3%	5 ml dropper vial
Fluorometholone and Levofloxacin	Soln. 0.1%	0.5%	5 ml dropper vial
Flurometholone and Tobramycin	Soln. 0.1%	0.3%	5 ml dropper vial
Fluorometholone and Sodium Sulfacetamide	Susp. 0.1%	1%	5 and 10 ml dropper vials
Loteprednol etabonate and Tobramycin	Soln 0.5% dropper vials	0.3%	5 ml

ANTIVIRAL THERAPY

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
First Generation Drugs		
Indoxuridine (IDU)	Solution 0.1% Ointment 0.5%	5 ml dropper vial 3 and 5 gm tubes
Vidarabine (Are-A)	Ointment 0.3% Intravenous infusion 200 mg/ml	5 gm tubes 250 ml bottle
Trifluridine (TFT)	Solution 1%	5 ml and 10 ml dropper vials
Cytarabine	Ointment 1% Injection form -100 mg, 500 mg and 1000 mg/ml	5 gm tube 1 ml and 2 ml ampoules and vials
Second Generation Drugs		
Acyclovir	Ointment 3% Oral tablet 200 mg, 400 mg and 800 mg Powder 250 mg	5 gm tube Tablets in a pack of 50/100 In pack of 100g/ 200 g/500g
Bromo-vinyl deoxyuridine (BVDU)	Solution 0.1%	5 ml dropper vial
Interferons	Parenteral 30-400 Million/ml	2 and 5 ml vials
Zidovudine (AZT)	100 mg capsule	Pack of 50/100 Cap.
Famiciclovir	100 and 200 mg tab.	In a pack of 50/100 tab
Ganciclovir (DHPG)	Oral 250 mg capsule Powder for injection Lyophilized 500 mg/vial Ganciclovir sodium Intravitreal implant Minimum 4.5 mg	100 cap pack 10 ml vial In individual unit boxes in a sterile types package
Foscarnet sodium	Injection 24 mg/ml	250 and 500 ml bottles
Fomivirsen	Injection 6.6 mg/ml	in 0.25 ml single use vial
Cidofovir (HPMPC)	Injection 75 mg/ml	5 ml ampoule
Lobucavir	Oral 100 and 200 mg tab.	Box of 100 tablets
Indinavir	Oral 100 and 200 mg tab.	Box of 100 tablets
Ritonavir	Oral 100 and 200 mg tab.	Box of 100 tablets
Saquinavir	Oral 100 and 200 mg tab.	Box of 100 tablets
Nelfinavir	Oral 100 and 200 mg tab.	Box of 100 tablets
Valaciclovir	Oral 100 and 200 mg tab.	Box of 100 tablets

ANTIFUNGAL THERAPY

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Polyenes		
- Nystatin	Ointment containing 100,000 IU of Nystatin	3 and 5 gm tubes
-Amphotericin B	Soln. 0.75 – 3%	5 and 10 ml vials
-Natamycin	Suspension 5%	5, 10 and 15 ml dropper vials
Imidazole Derivatives		
-Clotrimazole	Solution 1%	5 ml dropper vials
-Miconazole	Solution 1%	5 ml dropper vials
	Applicaps 1%	In a pack of 30 applicaps
-Econazole	Solution 1%	5 ml dropper vials
	Ointment 1%	3 and 5 gm tubes
-Ketconazole	Oral tab. 200 and 400 mg	In a pack of 100 tab.
	Fresh solution 1-5%	5 ml dropper vial
-Fluconazole	Solution 0.3%	5 ml Dropper vial
	Oral tab. 100 and 200 mg	Pack of 100 tablets
-Itraconazole	Oral tablet 200 mg	Pack of 100 tablets
Fluorinated Pyrimidines		
- Flucytosine	Oral as 250 and 500 mg Capsules	Pack of 100 cap.
	Solution 1%	5 ml dropper vials
Silver Sulphadiazine	Solution 1%	5 ml dropper vials
	Applicaps 1%	A pack of 30 applicaps
Terbinafine	Oral tablet of 125 mg and 250 mg	A pack of 100 tabs.

ANTI-ALLERGY THERAPY

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Mast Cell Inhibitors		
Cromolyn Sodium	Solution 2% and 4%	2, 5 and 10 ml dropper vials
Disodium Cromoglycate (DSCG)	Solution 2%	5 and 10 ml dropper vials
Lodoxamide	Solution 1%	5 and 10 ml
Tromethamine	Suspension	dropper vials
Nedocromil	Solution 1%	5 ml dropper vials
Olopatadine HCl	Solution 0.05% and 1%	5 ml dropper vials
Azelastine HCl	Solution 0.05%	5 ml dropper vials
Ketotifen fumarate	Solution 0.025% (0.25 mg/ml)	5 ml and 7 ml dropper vials

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Pemirolast Potassium	Solution 0.1%	10 ml controlled dropper tip vials
Antihistamines		
Levocarbastine HCl	Suspension 0.05%	2.5, 5 and 10 ml dropper vials
Emedastine Difumarate	Suspension 0.05%	5 ml opaque plastic vials
Pheniramine maleate	Solution 0.3%	5 ml and 10 ml dropper vials
Epinastine HCl	Solution 0.05%	5 ml dropper vials
Decongestants		
I. Phenyleprine HCl	Solution 0.125-0.12%	5, 10 and 15 ml dropper vials
II. Imidazole derivatives		
Naphazoline HCl	Solution 0.012-0.1%	5, 10 and 15 ml dropper vials
Tetrahydrozoline	Solution 0.05%	5, 10, 15 and 20 ml dropper vials
Oxymetazoline HCl	Solution 0.025%	10, 15 and 30 ml dropper vials
Ephedrine	Solution 0.05%	5 and 10 ml dropper vials
Rose petal aqueous infusion	Solution (Aqueous infusion in 7.5 ml with 0.1% thimerosal)	5 and 10 ml dropper vials

Decongestants and Anti-histamines Combination

	Antihistamine	*Decongestant*	
• Pheniramine maleate and Naphazoline HCl	0.3% (Pheni)	0.025% (Napha)	5, 10 and 15 ml dropper vials
• Pheniramine maleate and Phenylephrine	0.5%	0.125%	5, 10 and 15 ml dropper vials
• Pyrilamine maleate, Phenylephrine HCl and Antipyrine	Pyrilamine 0.1% and Antipyrine (0.1%)	Phenylephrine 0.12%	5, 10 and 15 ml dropper vials
• Antazoline Phosphate and Naphazoline HCl	0.5% (Anta)	0.05% (Napha)	10 and 15 ml dropper vials
• Tetrahydrozoline and Zinc Sulphate	0.25% (Zinc)	0.05% (Tetrahydrozoline)	10 and 15 ml dropper vials

Topical NSAIDs and Topical steroids – See Anti-inflammatory Tables

Topical Immunosuppressors		
Cyclosporine	Solution 2%	5 ml dropper vials

ANTIGLAUCOMA THERAPY

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Miotics		
Cholinergic Agents		
Acetyl choline chloride	Fresh solution (1 : 100) Acetyl choline when reconstituted and sterile water	2 ml dual chamber univial alongwith diluent
Pilocarpine HCl	Solution 0.25%, 0.50%, 1%, 2%, 3%, 4%, 6%, 8% and 10%	2, 5, 10 and 15 ml dropper vials
Pilocarpine Nitrate	Solution 1%, 2% and 4%	5, 10 and 15 ml dropper vials
Pilocarpine HCl	Gel 4%	3 and 5 gm tubes
Pilocarpine Ocular Therapeutic system (Ocusert)	Ocusert Pilo-20 releases 20 mcg pilocarpine per hour for one week system Ocusert Pilo-40 releases 40 mcg pilocarpine per hour for one week system	In a pack of 8 individual sterile In a pack of 8 individual sterile
Pilocarpine Combinations		
Pilocarpine HCl and Epinephrine	Solution containing Pilocarpine 1-6% and Epinephrine (1%) (Epilo 1 – Epilo 6)	5 and 10 ml dropper vials
Pilocarpine HCl and Physostigmine	Solution having Pilocarpine (2%) and Physostigmine 0.25%	5 ml dropper vials
Pilocarpine nitrate and clonidine	Solution having Pilocarpine nitrate (1%) and clonidine (0.125%)	5 ml dropper vials
Carbachol	Solution 0.75%, 1.5%, 2.25% and 3%	5, 10 and 15 ml drop tainers
	Intraocular solution 0.01%	In 1.5 ml ampoules/ vials
Anticholinesterase Agents		
Physostigmine sulfate	Solution 0.25% and 0.5% Ointment 0.25%	5 ml dropper vials 3.5 gm tube
Demecarium bromide	Solution 0.125% and 0.25%	5 ml dropper vials
Echothiophate	As powder for reconstitution 1.5 mg to make solution 0.03% other strengths are 0.06%, 0.125% and 0.25%	Powder pack with 5 ml diluent
Isofluorophate	Ointment 0.025% in poly ethylene mineral oil gel	3 and 5 gm tubes
Alpha Adrenergic Agonists		
Apraclonidine	Solution 0.5% and 1%	5 and 10 ml dropper vials
Clonidine	Solution 0.125%, 0.25% and 0.5%	5 ml dropper vials

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Brimonidine tartrate (Alphagan)	Solution 0.2%	5 and 10 ml dropper vials
Brimonidine tartrate and Timolol maleate	Solution having 0.2% Brimonidine and 0.5% Timolol maleate	5 ml dropper vials
Dapiprazole HCl	Powder Lyophilized 25 mg (0.5%) solution when reconstituted	In vial with 5 ml diluent and dropper
Sympathomimetics		
Epinephrine	Solution 0.5%-2% available as epinephrine hydrochloride, borate and bitartate	2, 7.5 and 10 ml dropper vials
Dipivefrin HCl	Solution 0.1%	2, 5, 10 and 15 ml dropper vials
Beta Blockers		
Betaxolol HCl	Solution 0.25% and 0.50%	2.5, 5, 10 and 15 ml dropper vials
Carteolol HCl	Solution 1%	5 and 10 ml dropper vials
Levobunolol	Solution 0.25% and 0.50%	5, 10 and 15 ml dropper vials
Metipranolol HCl	Solution 0.1%, 0.3% and 0.6%	5 ml and 10 ml dropper vials
Timolol maleate	Solution 0.25% and 0.5% Gel 0.25% and 0.5% (GFS)	5, 10 and 15 ml dropper vials 5 gm tube
Timolol Hemihydrate	Solution 0.25% and 0.50%	In 2.5, 5, 10 and 15 ml polyvials
Carbonic Anhydrase Inhibitors		
Acetazolamide	Solution 5% Tablet 125 mg, 250 mg and sustained release (500 mg) capsule Powder for injection Lyophilized 500 mg	5 ml dropper vial In a pack of 100 tab. 30 and 100 cap. packing in vials
Dichlorphenamide	Tablet 50 mg	Pack of 100 tab.
Methazolamide	Tablet as 25 mg and 50 mg	Pack of 100 tab.
Dorzolamide	Solution 2%	5 and 10 ml dropper vials
Dorzolamide and Timolol	Solution having 2% Dorzolamide and 0.5% Timolol	5 and 10 ml dropper vials
Brinzolamide	Suspension 1%	2.5, 5, 10 and 15 ml dropper vials
Ethoxazolamide	Oral 125 mg tab.	Pack of 100 tab.

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Prostaglandins		
Latanoprost	Solution 0.005%	2.5 ml plastic bottle with dropper tip
Latanoprost and Timolol	Solution having 0.005% Latanoprost and 0.5% Timolol	3 ml plastic bottle with dropper vials
Unoprostone	Solution 0.15%	3 ml polypack With dropper tip
Bimatoprost	Solution 0.03%	3 ml polypack with dropper tip
Travoprost	Solution 0.004%	3 ml polypack with dropper tip
Hyperosmotic Agents		
Glycerine	Oral solution as 50% and 70%	7.5 ml and 15 ml pack
	Ointment 40%	3.5 gm tube
Isosorbide	Oral solution as 45% (10 gm per 220 ml)	220 ml pack
Mannitol	As Injection solution 5-25%	50, 250, 500 and 1000 ml bottles
Urea powder	As 30% solution	100 ml bottle
Ocular Hypotensive Lipid (OHL)	Solution 0.01%	5 ml and 10 ml dropper vials
Antimetabolites		
5-Fluorouracil (5FU)	As powder and reconstituted solution (0.5 c.c. of solution contain 5 mgm of 5 FU)	Available as 50 mg/ml to 10 mg/ml in physiological saline
Mitomycin C	3 x 2 mm cellular sponge moistened with 0.02-0.04 mg/ml of Mitomycin C	Powder with diluent
Daunorubicin	4 x 4 mm cellulose sponge soaked in daunorubicin (0.2 mg/ml)	Powder with diluent

LOCAL ANESTHETIC AGENTS

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Injectable Agents		
Esters		
Procaine	Solution 1%	2 ml ampoules
Chloroprocaine	Solution 0.5-2%	2 ml ampoule
Tetracaine	Solution 0.25%-2%	30 ml vials
(Amides)		
Lidocaine HCl	Injection 0.5-4%	5 ml prefilled syringe and 30 ml pack
	Ointment 5%	35 gm tube
	Ampoule 1% (Preservative free) for intra cameral use.	2 ml ampoule
Lidocaine with Epinephrine	Combination solution having 0.5-2% Lidocaine and 1:100000/vials 200000 epinephrine	10 ml ampoule and 20, 30 and 50 ml vials
Lidocaine with Dextrose	Combination solution containing 1.5-5% Lidocaine and 7.5% Dextrose	2 ml ampoule
Prilocaine	Solution 0.5-3%	2 ml ampoule and 30 ml vials
Mepivacaine	Injectable solution 1-2%	30 and 50 ml vials
Bupivacaine	Injectable solution 0.25-0.75%	30 ml vials
Bupivacaine and Epinephrine	Solution having 0.75% (Bupi) and 1:200000 Epinephrine solution	2 ml ampoules and 30 ml vials
Etidocaine	As 0.5-1%	30 ml vials
Etidocaine and Epinephrine	Solution having 1.0-1.5% Etidocaine and 1:200000 Epinephrine	30 ml vials
Centbucridine	Injectable solution 0.5%	30 ml vials
Topical Anesthetic Agents		
Benoxinate HCl	Topical solution 0.4%	5 and 15 ml dropper vials
Proparacaine HCl	Solution 0.5% and 0.75%	10 and 15 ml dropper vials
Tetracaine HCl	Solution 0.5% and 1%	10 and 15 ml dropper vials
Lidocaine HCl	Solution 4%	10 and 30 ml dropper vials
Centbucridine HCl	Solution 1%	10 ml and 15 ml dropper vials
Coccaine	Solution 2%	10 and 15 ml dropper vials
Phenocaine	Solution 1%	10 and 15 ml dropper vials
Dimethocaine	Solution 2.5%	10 ml dropper vials
Piperocaine	Solution 2%	10 ml dropper vials

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Dibucaine	Solution 0.1%	5 and 10 ml dropper vials
Naepaine	Solution 2-4%	10 ml dropper vials
Butacaine	Soluiton 2%	10 ml dropper vials
LOCAL ANAESTHETIC COMBINATIONS		
Proparacaine and Fluorescein sodium	Combination solution having 0.5% proparacaine and 0.25% fluorescein sodium	5 ml dropper vials
Benoxinate and Fluorescein sodium	Combi solution having 0.4% benoxinate and 0.25% fluorescein sodium	5 ml dropper vials

MYDRIATICS AND CYCLOPLEGICS

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Mydriatic adrenergic agents		
Adrenaline (Epinephrine)	Solution 1:1000	2 ml ampoule and 5 ml vials
Coccaine HCl	Solution 2% and 4%	5 ml and 10 ml dropper vials
Phenylephrine	Solution 2.5% and 10%	2, 5 and 15 ml dropper vials
Hydroxy amphetamine	Solution 1%	5 ml vial
Cholinergic Antagonist as Cycloplegic Mydriatics		
Atropine sulphate	Solution 0.5%, 1%, 2% and 3% Ointment 0.5% and 1%	2, 5 and 10 ml vials 3.5 and 5 gm tubes
Homatropine	Solution 2% and 5%	2, 5, 10 and 15 ml dropper vials
Scopolamine	Solution 0.25%	5 and 15 ml dropper vials
Cyclopentolate HCl	Solution 0.05%, 1% and 2%	2, 5, 10 and 15 ml dropper vials
Tropicamide	Solution 0.5%, 1%	3, 5 and 10 ml dropper vials
Mydriatic Combinations		
Phenylephrine HCl and Cyclopentolate HCl	Combination solution having 0.2%-1% Cyclopentolate 1%-5% phenylephrine	2 and 5 ml dropper vials 2 and 5 ml dropper vials
Scopolamine HBr and Phenylephrine HCl	Combination solution having 0.3% scopolamine and 10% Phenylephrine	5 ml dropper vials

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Tropicamide and Hydroxyamphetamine HBr.	Combination solution containing 1% hydroxyamphetamine and 0.25% tropicamide	5 and 15 ml dropper vials
Phenylephrine HCl and Tropicamide	Combi solution having Phenylephrine 5% and Tropicamide 0.8%	5 and 10 ml dropper vials
Cyclopentolate HCl and Dexamethasone Sodium phosphate	Combi solution having 1% cyclopentolate and and 0.1% Dexamethasone	5 and 10 ml dropper vials

OPHTHALMIC VISCOSURGICAL DEVICES (OVDs) and SURGICAL ADJUNCTS

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Viscoelastic Substances (OVD)		
Sodium Hyaluronate	Injection 10 mg/ml, 12 mg/ml, 14 mg/ml, 16 mg/ml and 30 mg/ml	0.4, 0.55, 0.85 and 2 ml preloaded disp. syringes with 27 gm or 30 G cannula
	Highly viscous 1% Solution of sodium Hyaluronate of lower Molecular weight	2 ml preloaded disposable syringe
Sodium Hyaluronate and Chondrotin sulfate	Injection solution containing (3.1 mixture) 3% sodium hyaluronate, 4% chondrotin sulfate with 0.45 mg sodium dihydrogen phosphate hydrate and 4.3 mg NaCl per ml	0.5 ml in preloaded disposable syringe
Sodium Hyaluronate and Fluorescein Sodium	Solution containing 10 mg sodium hyaluronate, 0.005 mg Fluorescein Sodium per ml	0.55 or 0.85 ml preloaded disposable syringe cannula
Chondrotin Sulfate	Injection solution 20%	2 ml vial with 30 gm cannula.
Poly acrylamide (oscolon)	Injection solution 4.5 mg/ml	2 ml vial with 27 gm cannula

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Hydroxy propyl methyl Cellulose (HPMC)	Injection solution 2% and 2.5%	2 ml or 15 ml vial or 2 ml pre-filled sterile disposable syringe with 27 gm cannula
Poly TEGMA (Triethylenglycol monomethacrylate)	Injection solution as 40%	2 ml prefilled disposable syringe with cannula.
Collagan	Injection solution 1.4% collagen type IV	2 ml disposable syringe with cannula
Irrigating Solutions		
Intraocular Irrigating Solutions		
BSS (Balanced Salt solution)	Solution containing 0.64 NaCl, 0.75% KCl, 0.3% magnesium chloride, 0.43% calcium chloride, 0.39% sodium acetate 0.17% sodium citrate and Sodium hydroxide	15, 30, 300 and 500 ml sterile packs
BSS plus (Mix aseptically just before use)	Solution **Part-I** (480 ml) containing 7.44 mg NaCl, 0.395 mg KCl, 0.433 mg sodium phosphate, 2.19 mg sodium bicarbonate hydrochloric acid or sodium bicarbonate hydrochloric acid or sodium hydroxide/ml **Part II** (20 ml) containing 3.85 mg Calcium Chloride dehydrate, 5 mg magnesium chloride hexahydrate, 23 mg dextrose and 4.6 mg glutathione disulfide/ml	Preservative free in 10 ml, 30, 50 and 500 ml packs.
Extraocular Irrigating Solutions (EIS)		
EIS Type I	Solution containing 0.49% NaCl, 0.075% KCl 0.048% CaCl, 0.03% MgCl 0.39% sodium acetate, 0.17% sodium citrate and 0.013% benzalkonium chloride	15, 30 and 120 ml packs
EIS Type II	Solution containing Boric acid, sodium borate with 0.004% phenyl mercuric nitrate or 0.002% Thimerosal	15, 30, 120 and 180 ml packs

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
EIS Type III	Solution containing 1.2% Boric acid, 0.38% KCl, 0.014% sodium carbonate anhydrous, 0.05% EDTA and 0.01% benzalkonium chloride	30 ml and 120 ml packs
EIS Type IV	Solution containing 0.05% tetrahydrozoline HCl with NaCl, sodium borate, boric acid, 0.01% benzalkonium chloride and 0.1% EDTA	15 ml pack
EIS Type V	Solution containing NaCl, sodium proprionate, sodium borate, boric acid, glycerin, rose water, camphor, extract of witch hazel, berbrine bisulfate and benzalkonium chloride	60 and 180 ml packs
EIS Type VI	Solution having 0.49 NaCl, 0.4% sodium biphosphate, 0.45% sodium phosphate with 0.005% benzalkonium chloride	180 ml pack
Eye Wash	Solution containing NaCl, mono or dibasic sodium phosphate, benzalkonium chloride and EDTA.	120 ml pack with eye cup
Surgical Enzymes		
Alpha Chymotrypsin	Available as powder containing 150 units or 300 units of alpha chymotrypsin with 2 ml sodium chloride diluent per dual chamber univial	As powder pack of 750 units per vial with 9 ml BSS diluent
Urokinase	As powder 5,000 units of Urokinase are dissolved in 2 ml normal saline	Powder pack with 9 ml BSS diluent
Hyaluronidase	Fluffy powder, containing 300 units of activity/mg	Ampoule containing 1500 IU

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Chelating Agents and Mycolytics		
Sodium EDTA	Solution containing 0.01% sodium EDTA	5 ml and 10 ml dropper vials
Calcium EDTA	Solution containing 0.2% calcium EDTA	5 ml and 10 ml dropper vials
Acetyl cysteine	As solution in conc. of 5%, 10% and 20% can be diluted in artificial tears or Physiological saline.	10 and 15 ml dropper vials
Laevo cysteine	Solution in conc. of 0.1-0.2 molar of Laevocysteine	10 and 15 ml vials
Caustic Preparations		
Pure Alcohol	Solution as 100% Alcohol	60 and 120 ml pack
Hydrogen peroxide	Solution as 2%	30 and 60 ml pack
Cyanoacrylate Tissue Adhesive	As liquid tissue adhesive	15 and 30 gm tubes
Surgical Adjuncts		
Fractionated Purified Silicone Oil	Injection Silicone Oil	10 ml vial with special flip off seal in a sterile pouch (single use)
Polydimethyl Siloxane (Silicone Oil)	Injection (Poly dimethyl Siloxane Oil)	In sterile single use 10 and 15 ml vials
Botulinum Toxin Type A	Powder for injection (Lyphilized) 100 units of Lyophilized *Clostridium botulinum* Toxin Type A	Preservative free powder in vial along with 0.05 mg albumin and 0.9 mg sodium chloride in vials
Ovine Hyaluronidase (Vitrase)	Injection form containing 55 IU or 75 IU OH	For Vitreous Haemorrhage.
Anecortane Acetate (Angiostatic cortisine)	3 mg and 15 mg Tablets	For ARMD
Povidone Iodine	Solution containing 5% povidone iodine.	15 and 50 ml packs
Absorbable gelatin film sterile	Sterile film in sizes of 100 mm x 125 mm and 25 mm x 50 mm	Single sterile pack and pack of 6 sterile films

OPHTHALMIC DYES

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Fluorescein sodium	(i) Topical solution 2% Contains 0.25% fluorescein sodium 0.1% proparacaine HCl or 0.4% benoxinate HCl 0.01% thimerosal preservative	5 ml pack
	(ii) Topical solution 2% Fluorescein sodium plain	1, 2 and 15 ml packs
	(iii) Topical solution containing 0.25% Fluorescein sodium, 0.05% Proparacaine HCl, 0.01% Thimerosal with povidone, boric acid and polysorbate 80	5 ml pack
	(iv) Injection 10% and 25% Fluorescein sodium	1, 2, 5, 10 and 15 ml packs
	v) Fluorescein strips as 0.6 mg, 1 mg and 9 mg strips(with boric acid, polysorbate 80 and 0.5% chlorbutanol) and high molecular	Pack containing 100 or 300 strips
	Fluorescein (Higlo) strips for soft contact lenses	Pack of 100 strips
Fluorexon	Solution as 0.35%	0.5 ml pipette (12N)
Rose Bengal	Topical solution 1%, containing 1% Rose Bengal with povidone, Sodium borate PEG10 and 0.01% thimerosal as 1.3 mg strip.	5 ml dropper vial Pack of 100 strips
Lissamine Green	Solution 0.1%, 0.5% and 1%	5 ml dropper vial
	Sterile Strips containing 15 mg of Lissamine green.	Pack of 100 strips
Indocyanine Green	Powder for injection as 25 mg and 50 mg	Powder pack with 10 ml ampoule of aqueous solvent
Trypan Blue	Solution containing 0.6 mg Trypan Blue, 1.9 mg of Sodium mono hydrogen orthophosphate, 0.3 mg of sodium dihydrogen ortho phosphate, 8.2 mg sodium chloride and sodium hydroxide	1 ml ampoule (Pack of 10 ampoules)
Verteporfin (Visudyne)	As sterile lipid based freeze dried powder requires reconstitution with sterile water and dilution with 5% dextrose before infusion.	As single use 15 mg vial with sterile water and ampoules

LUBRICANTS AND ARTIFICIAL TEAR SOLUTIONS

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Methylcellulose and Ethylcellulose Base		
Hydroxy propyl methyl Cellulose (HPMC)	(i) Solution containing 0.5 or 1% HPMC and 0.01% benzalkonium chloride.	10, 15 ml dropper vials
	(ii) Solution containing 0.5%, HPMC, Gelatin A, Chlorbutanol 0.5%, NaCl and polysorbate 80	10, 15 and 30 ml vials
	(iii) Solution containing 0.5% HPMC, boric acid, NaCl, KCl, Phosphoric acid and sodium perborate	15 ml vials
	(iv) Solution containing 0.5% HPMC, Dextran 40 (0.1%). 0.01% benzalkonium Cl EDTA, NaCl and boric acid solution	10 and 15 ml vials
	(v) 0.5% HPMC, Dextran 70 (0.1%) benzalkonium Chloride (0.01%) and EDTA	15 ml vials
	(vi) Solution: HPMC 1%, Propyleneglycol, NaCl, Boric acid and paraben	10 and 15 ml vials
	(vii) Solution 0.8% HPMC, 0.1% Dextran 70, Sodium Phosphate, KCl, NaCl, Dextrose	Preservative free in 0.5 ml single dose containers (28s)
	(viii) Solution: 0.3% HPMC 2910, 0.1% Dextran 70, NaCl, KCl Sodium Bicarbonate	Preservative free in single use 0.45 ml packs (28s)
	(ix) Solution: 0.4% HPMC 2910, Diabasic phosphate, potassium chloride, NaCl and 0.01% Benzalkonium Cl.	15 ml dropper vials
	(x) Solution: 0.3% HPMC 2910, 0.1% Dextran, 0.01% polyquarterrnium-1 NaCl, KCl, sodium borate.	15 and 30 ml dropper vials
Hydroxy ethyl cellulose (HEC)	(i) Solution containing 0.5% hydroxy ethyl cellulose (HEC), 1.67%	10 and 15 ml vials

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	povidone with water soluble polymers, Thimerosal 0.004% and EDTA (1%).	
	(ii) Solution: 0.5% HEC, polyvinyl alcohol 1% and 0.01% benzalkonium chloride, EDTA and NaCl	15 ml vials
	(iii) Solution: 0.5% HEC in a hypertonic base, 0.25% sorbic acid 0.01% EDTA.	10 and 15 ml vials
	(iv) Solution: 0.5% HEC 0.44% NaCl.	10 and 15 ml vials
Carboxy methylcellulose (CMC)	(i) Solution containing 1% CMC, NaCl, KCl and sodium lactate	Preservative free in 0.3 ml units (30 single dose pack)
	(ii) Solution: 0.25% sodium carboxymethyl-cellulose, NaCl, KCl and sodium phosphate	Preservative free in 0.6 ml single dose containers
	(iii) Solution: 0.5% CMC, KCl, NaCl	Preservative free in 0.3 ml single use containers
	(iv) Solution: 0.5% CMC, boric acid, CaCl, KCl, NaCl and magnesium chloride	15 ml vial
Polyvinyl Alcohol Base Solutions		
	(i) Solution containing 1.4% polyvinyl alcohol (PVA) and 0.6% povidine, 0.5% chlorbutanol and NaCl.	15 ml vials
	(ii) Solution: 1.4%, 0.6% povidone, retinyl palmitate, boric acid, 0.09% EDTA, 0.001% WSCP, NaCl, KCl.	15 ml dropper vials
	(iii) Solution: 1% PVA, PEG-400, 1% Dextrose, 0.01% benzalkonium, EDTA	15 and 30 ml vials
	(iv) Solution: 1.4% PVA, 0.5% Chlorbutanol, NaCl	15 x 30 ml vials
	(v) Solution: 0.5% PVA, 0.6% povidone, benzalkonium Cl, Dextrose, EDTA, NaCl, sodium bicarbonate and sodium phosphate.	15 and 30 ml vials

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	(vi) Solution: 1.4% PVA, 0.6% povidone and NaCl	Preservative free in 0.3 ml single dose containers (30 and 50 UD)
	(vii) Solution: 3% PVA, 0.002% Thimerosal, NaCl and EDTA.	15 ml vial
Miscellaneous Artificial Tear Solutions		
	(i) Solution: Polysorbate 80, sodium chloride, EDTA, retinyl palmitate, mannitol, sodium citrate and pyruvate.	Preservative free in 10 and 15 ml packs
	(ii) Solution: 0.3% Glycerin, NaCl, KCl, sodium citrate and sodium phosphate	Preservative free in 0.3 ml (UD 32s)
	(iii) Solution: 0.25% glycerin, EDTA, sodium chloride and benzalkonium Cl.	15 ml vial
	(iv) Adsorbonac NaCl 2% or 5% solution	5 and 10 ml vials
Ointments		
	(i) Ointment containing petrolatum (55.5%) Lanolin (2%) and mineral Oil (42.5%)	Preservative free in 3.5 and 5 gm tubes
	(ii) Ointment: 2% HPMC, NaCl, KCl, CaCl, MgCl, sodium acetate and sodium citrate	Preservative free in 3.5 and 5 gm tubes
	(iii) Lubricant gel Carbopal 980 (poly acryclic acid) which transforms from gel to liquid in contact with ocular tissue.	5 gm tube
	(iv) Gel: 0.3% HPMC	10 ml pack
	(v) Ointment: 56.8% white petrolatum, 42.5% mineral oil, Chlorobutanol, Lanolin alcohols.	3.5 and 7 gm tubes

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	(vi) Ointment: White petrolatum	Preservative free in 0.5 gm pack
	(vii) Ointment: 55% white petrolatum, 32% mineral oil, boric acid, stearic acid and wheat germ oil	In 3.5 gm tube
Ocular Inserts		
Lacriset	Polymeric insert having 5 mg of HPMC	Preservative free in 60s with applicator
Punctal Plugs		
Collagen implant	Intra-canalicular collagan implant consists of 0.2, 0.3, 0.4, 0.5 and 0.6 mm diameter inserts packed at the edge of a foam strip.	Pack of 10 or 72 plugs with inserter tool.
Silicone plugs	Punctum silicone plug in 1.6, 2 and 2.8 mm sizes	Pack of 2 or 10 plugs with inserter tool
Lubricant for Artificial eyes	Solution containing 0.25% tyloxapol and 0.02% benzalkonium chloride	15 ml dropper vials
	Solution containing 2.5% HPMC with 0.004 thimerosal and 0.1% EDTA	15 ml dropper vials for gonioscopic exam.
Cyclosporine	Emulsion 0.05% (Preservative free)	5 ml poly vials
Diquafosol	Phase-III Clinical Trials	Lubricant
Topical Immune Therapy		
Aspac (Topical)	Ophthalmic solution containing 0.1% each of IgA, IgG and IgM in fixed concentrations	Preservative free In 5 and 10 ml dropper vial with controlled tip
Topical Hyperosmotic Agents		
Sodium Chloride (Hypertonic)	(i) Solution as 2% or 5% NaCl with 0.004% water soluble polymer thimerosal and 0.1% EDTA.	10 and 15 ml dropper vials
	(ii) Topical NaCl solution 2% or 5% with HPMC and parabens.	10 and 15 ml dropper vials

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	(iii) Topical 5% NaCl solution with propylene glycol, sodium borate and boric acid	10 ml dropper vials
	(iv) Ointment containing 6% NaCl gel with petrolatum and lanolin.	3.5 and 5 gm tubes
Glycerine	(i) Topical solution as 50% (0.6 gm glycerine/ml) with 0.55% chlorobutanol	7.5 ml vial
	(ii) Ointment as 40% with petrolatum and lanolin parabens	
Contact Lens Care Products		
Hard Lenses		
Cleaning/Soaking/Wetting Solutions for Hard Lenses (Complete)		
Total solution	Containing buffered Isotonic polyvinyl alcohol, benzalkonium chloride, EDTA	60 and 120 ml packs
Wetting Solutions (Hard Lenses)		
	(i) Solution containing 0.004% benzalkonium Cl, EDTA, HPMC, NaCl, KCl and polyvinyl alcohol	60 ml pack
	(ii) Solution: Buffered 0.1% EDTA, 0.01% benzalkonium Cl	60 and 120 ml packs
Wetting/Soaking Solutions (Hard Lenses)		
	(i) Solution containing buffered isotonic 0.1% EDTA and 0.05% benzalkonium Cl	120 ml pack
	(ii) Solution: Buffered isotonic 0.003% benzalkonium chloride, polyvinyl alcohol and EDTA	120 and 180 ml pack
Rewetting Solutions (Hard Lenses)		
	(i) Solution containing povidone, water soluble polymers, sorbic acid and EDTA (Isotonic).	15 ml pack

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	(ii) Solution: (Isotonic) hydroxyethyl cellulose sorbic acid, poloxamer 407, 0.1% EDTA, NaCl, KCl, sodium borate, boric acid	5, 15 and 30 ml packs
	(iii) Solution: Isotonic 0.04%, thimerosal, 0.1% EDTA, povidone and polyoxyethylene	15 ml packs
	(iv) Solution: Isotonic 0.1% EDTA, 0.001% polyquaternium-1, Dextran, NaCl, KCl, and HPMC	Thimerosal free in 15 ml pack
	(v) Solution: Buffered, isotonic NaCl, Carbamide, poloxamer 407, 0.2% EDTA, 0.15% Sorbic acid.	15 ml pack
	(vi) Buffered solution with polyoxyl 40 stearate PEG 300 and 0.5% chlorobutanol	15 ml pack
Cleaning Solutions (Hard Lenses)		
	(i) Solution with anionic sulfate surfactant, friction enhancing Agents and NaCl	15 and 60 ml pack
	(ii) Solution: 15.7% isopropyl alcohol, poloxamer 407 and amphoteric 10	Preservative free in 12 ml
	(iii) Solution: Buffered isotonic Tween 21, Polymeric cleaners, 0.1% EDTA and 0.001% poly quaternium-1.	Thimerosal free in 12 and 20 ml packs
	(iv) Buffered solution: Cocoampho carboxy glycinate, sodium lauryl sulfate, hexylene glycol, alkyl ether sulfate, fatty acid amide surfactants	Preservative free in 30 ml pack
	(v) Solution: Cocoampho diacetate, glycol, 0.1%	60 ml pack

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	EDTA and 0.01% benzalkonium Cl.	
	(vi) Solution with poloxamer 188, 0.01% Benzalkonium chloride and 0.2% EDTA	15 and 30 ml
	(vii) Solution with hydrophilic polyelectrolyte, poly vinyl alcohol, hydroxy ethyl cellulose, chlorhexidine gluconate and EDTA.	15 and 30 ml packs
Cleaning and Soaking Solution (Hard Lenses)		
	(i) Solution Buffered surfactant cleaning agent with 0.004% Phenylmercuric nitrate	120 ml pack
Rigid Gas Permeable Lenses (RGP) Wetting/Soaking Solutions (RGP Lenses)		
	(i) Buffered solution: Containing 0.0015% polyaminopropyl biguanide 0.05% EDTA, Cationic cellular Derivative polymer	120 ml pack
	(ii) Buffered solution: Low viscosity, 0.5% EDTA, 0.006% chlorhexidine gluconate, cationic cellulose derivative polymer as wetting agent	120 ml pack
	(iii) Solution having EDTA and chlorhexidine	120 ml pack
	(iv) Solution: Isotonic Hydroxyethyl cellulose, 0.006% polixetonium chloride	Thimerosal free in 120 ml pack
	(v) Buffered solution: 0.005% chlorhexidine gluconate, 0.02% EDTA Octylphenoxy, ethanol, Povidone, polyvinyl Alcohol, propylene glycol and HEC, NaCl.	120 and 240 ml packs

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	(vi) Buffered Solution: sodium and potassium chloride, PVA, PVP, HEC, sodium bisulfite, 0.02%, Benzyl alcohol 0.1%, sorbic acid 0.05% and disodium edetate 0.1%	120 ml pack
	(vii) Buffered isotonic, 0.003% benzalkonium chloride, polyvinyl alcohol, EDTA	120 and 180 ml packs
Disinfecting/Cleaning Solutions (RGP Lenses)		
	(i) Buffered isotonic sterile saline solution having sodium edetate with biguanide copolymer 0.0031%	In 350 ml pack
	(ii) Solution: Lauryl sulfate salt of imidazoline octylphenoxy, 0.3% benzyl alcohol and 0.5% trisodium EDTA	Thimerosal free in 120 ml pack
	(iii) Solution: Lauryl sulfate salt, benzyl alcohol 0.1% and disodium edetate 0.5%	120 ml pack
	(iv) Buffered solution; sorbitan monolaurate, betaine surfactant, silicone glycol, polyethylene glycol, 0.003% chlorhexidine gluconate, 0.005% polyamino propyl biguanide and 0.05% edetate disodium	120 ml pack
Surfactant Cleaning Solutions (RGP Lenses)		
	(i) Solution: Concentrated homogenous surfactant, alkyl ether sulfate, ethoxylated alkylphenol, cocoa based phospholipid silica gel	30 ml pack
	(ii) Surfactant solution with alkyl ether sulfate silica gel	30 ml pack

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	(iii) Buffered isotonic solution: 0.004% thimerosal 0.1% EDTA, Tween 21, Hydroxyethyl cellulose and polymeric cleaners.	12 and 20 ml pack
	(iv) Solution: Edetate disodium 0.1%, polyquad packs 0.001%, Tween 21, Polymeric cleaning agents	12 and 118 ml pack
	(v) Buffered isotonic solution 0.1%, EDTA, 0.001% polyquaternium-1, Polymeric cleaners, Tween-21.	Thimerosal free in 12 and 20 ml packs
Enzymatic Cleaners (RGP Lenses)		
	(i) Liquid containing subtilism and glycerol	Preservative free in 1 ml pack
	(ii) Tablets: Highly purified post-pancreatin	Pack of 24 and 36 tablets
	(iii) Tablet: Papain, NaCl, Sodium carbonate, Sodium borate and EDTA	Pack of 16 and 24 tablets
	(iv) Liquid: Preservative free containing propylene glycol sodium borate and pancreatin	
Rewetting Solutions (RGP Lenses)		
	(i) Solution containing Polyquad 0.1%, edetate Disodium, citrate buffer Dextran NaCl, KCl.	15 ml pack
	(ii) Solution: Sorbic acid 0.1%, edetate disodium 0.2%, HEC, Sodium borate, boric acid and NaCl.	15 ml pack
	(iii) Solution: Buffered, hypertonic 0.006%, chlorhexidine gluconate, 0.05% EDTA, cationic cellulose derivative polymer as-wetting agent.	10 ml pack

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Soft Lenses (Hydrogel)		
Disinfection Non-hydrogen Peroxide Soft Lenses		
	(i) Buffered solution containing NaCl, 0.0001% poly-hexamethylene biguanide, trome-thamine, tyloxapol and EDTA	Thimerosal free 120 and 360 ml packs
	(ii) Buffered isotonic solution: 0.005% chlorhe-xidine 0.1% EDTA, 0.001% thimerosal, NaCl, sodium borate and boric acid.	360 ml pack
	(iii) Buffered isotonic solution 0.05% EDTA, 0.001% polyquaternium-1 sodium citrate and NaCl	120 ml pack
	(iv) Solution: Isotonic 0.00005% polyamino propyl biguanide, 0.01% EDTA, NaCl sodium borate, boric acid and poloxamine	120 and 355 ml pack
Disinfection Hydrogen Peroxide Soft Lenses		
	(i) Disinfectant/soaking Solution 3% hydrogen Peroxide, 0.85% stabli-zed with Phosphonic acid, phosphate buffer and	120, 240 and 360 ml pack
	(ii) Cleaner/Rinser isotonic boric acid, sodium borate sodium perborate, 0.006% hydrogen peroxide.	12 ml pack
Saline Solutions (Preserved) Soft Lenses		
	(i) Solution, buffered isotonic, 0.01% EDTA, 0.001% thimerosal, NaCl, sodium hexameta phosphate, boric acid and sodium borate	240 and 360 ml packs
	(ii) Solution: Isotonic 0.1% EDTA, 0.001% poly quaternium-1, NaCl, borate	Thimerosal free in 360 ml pack

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	(iii) Solution, buffered isotonic 0.1% sorbic acid, 0.025% EDTA, NaCl, boric acid, Sodium borate.	Thimerosal free in 120, 240 and 360 ml packs
	(iv) Buffer solution 0.1% sorbic acid, boric buffer, EDTA, NaCl.	60 and 360 ml packs
	(v) Isotonic solution: NaCl, boric acid, sodium borate, sodium perborate, hydrogen peroxide, phosphoric acid	120, 240 and 360 ml packs
Preservative Free Saline Solutions (Soft Lenses)		
	(i) Buffer solution containing NaCl, boric acid and sodium borate	120, 240 and 360 ml packs
	(ii) Buffered isotonic solution: NaCl, catalytic neutralizing agent, EDTA, mono and dibasic sodium phosphates	15 ml single use containers
Rinsing/Storage Solutions (Soft Lenses)		
	(i) Solution containing NaCl, sodium hexameta phosphate, sodium hydroxide, boric acid, sodium borate 0.001% EDTA and 0.001% thimerosal	120 and 240 ml packs
	(ii) Isotonic buffered solution of NaCl, boric acid, 0.0003% polyaminopropyl biguanide and EDTA	In 120 and 340 ml pack
	(iii) Isotonic solution with 0.9% NaCl	Preservative free 120 and 240 ml packs
	(iv) Buffered isotonic with NaCl and EDTA or NaCl with boric acid and sodium borate	Preservative free 120 and 240 ml packs
Surfactant Cleaning Solutions (Soft Lenses)		
	(i) Solution containing 0.001% thimerosal, EDTA.	15 and 60 ml pack

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	(ii) Buffered isotonic solution NaCl, sodium phosphate, tyloxapol, hydroxyl ethyl cellulose, poly vinyl alcohol, EDTA, sorbic acid	30 ml pack
	(iii) Solution with Coco-amphor carboxy glycinate, sodium lauryl sulfate, hexylene glycol, 0.1% sorbic acid, 0.2% EDTA	15 ml pack
	(iv) Solution: 15.7% isopropyl alcohol, poloxamer 407, amphoteric 10.	Thimerosal free in 15 and 30 ml packs
	(v) Solution: Buffered isotonic: 0.15% sorbic acid, 0.1% EDTA, boric acid, poloxamine, sodium borate, NaCl	240 ml pack
	(vi) Solution: Propylene glycol, sodium borate, highly purified porcine pancreatin enzymes	Preservative free in 5 ml and 10 ml packs
	(vii) Solution: 0.25% sorbic acid, 0.5% EDTA NaCl, KCl, poloxamer 407	25 ml pack
Enzymatic Cleaners (Soft Lenses)		
	(i) Tablet containing Papain, NaCl, sodium Carbonate, sodium Borate, EDTA	Pack of 12, 24 36 and 48 tablets
	(ii) Tablet containing subtilisin A, polyeth-ylene glycol, sodium carbonate, NaCl and Tartaric acid	Pack of 8 tablets
	(iii) Tablets: Effervescing buffering and tableting agents subtilisin A. To make solution for soaking dilute in 3% hydrogen peroxide solution	Pack of 5, 10, 15 and 20 tablets

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Disinfecting/Wetting/Soaking Solution (Soft Lenses)		
ReNu Multiplus	(i) Solution containing hydranate, boric acid edetate sodium, sodium borate, NaCl, dymed (polyamino-propyl biguanide) 0.001% and 1% poloxamine	120, 240 and 360 ml packs
	(ii) Solution: 0.001% poly hexamethylene biguanide (PHMB), 0.025% tyloxapol, 1.2% tromethamine and 0.05% edetate disodium	120, 240 and 360 ml packs
IX. Rewetting Solutions (Soft Lenses)		
	(i) Isotonic solution containing 0.25% sorbic acid, 0.1% EDTA, borate buffer, NaCl, HPMC and glycerin	Thimerosal free. 15 ml pack
	(ii) Isotonic solution NaCl, KCl, hydroxyethyl cellulose, poloxamer 407, sodium borate, boric acid, sorbic acid and EDTA	Thimerosal free in 5, 15 and 30 ml packs
	(iii) Buffered isotonic solution NaCl, 0.0001% polyhexamethylene biguanide, trometha-mine, tyloxapol, EDTA	15 ml pack
	(iv) Solution: Sorbic acid, 0.15% and edetate disodium 0.2%	15 ml pack
	(v) Buffered isotonic NaCl, boric acid	Preservative 0.035 ml pack
	(vi) Isotonic solution: Citrate buffer, NaCl, 0.05% EDTA, 0.001% poly quaternium-1	10 and 20 ml packs
	(vii) Solution: Sorbic acid 0.1% and edetate disodium	15 ml pack
	(viii) Isotonic solution with NaCl, 0.13% potass-ium sorbate and 0.025% EDTA	Thimerosal free 15 ml pack

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
Non-surgical Adjuncts		
Lid Scrubs	(i) Solution containing PET-200 glyceryl tallowate, disodium Laureth sulfosucinate cocoamido propyl amine oxide, PEG-78 glyceryl cocoate, benzyl alcohol and EDTA	Pack of 30/60 pads and solution (120 ml)
	(ii) Solution: PEG 80 sorbitan laurate, sodium trideceth sulfate, PEG-150 distearate, cocoamido propyl hydroxy sutlaine, lauroamphacarboxy-glycinate, sodium laureth 13 carboxylate PEG-15 tallow polyamine, quaternium-15	Alcohol free 30, 120 and 240 ml pack compliance kit (120 ml and 100 pads)
Tear Test Strips		
Schirmer Test Strip	Sterile Test Strips	Pack of 250 strips
Snostrips	Sterile Tear Flow test strips	Pack of 100 strips
Zone Quick	Phenol red threads (PRT)	50 aluminium packing sets (100 threads)
Hamameli's Water	Solution containing aqueous and glycerin solution of senecio compositae, Hamameli's water and boric acid	7 ml vial
Boric Acid	As powder powder	Pack of 15 gm
Astringent Ophthalmic Solution		
	(i) Zinc Sulphate 0.12% Boric acid 1.25% naphazoline HCl 0.056% and chlorpheniramine maleate 0.01%	5 and 10 ml dropper vials
	(ii) Zinc Sulphate 0.25% Tetrahydrozoline 0.05% EDTA and benzalkonium Cl. (0.004%)	10 and 15 ml dropper vials

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	(iii) Zinc Sulphate 0.1% Bolax 0.05%, Boric acid 1.9%, sodium chloride 0.45%, Kcl 0.45, HPMC 0.7%	10 ml dropper vial and 120 ml bottle
Vitamin and Antioxidants		
Vitamin A palmitate	Tablets/cap. containing 5000 IU/10000 IU/ 15000 IU/ 25000 IU vitamin-A	Pack of 100/ 250 tab./cap.
Antioxidants	(i) Capsule containing vitamin A 6000 IU, zinc 30 mg, copper 1.5 mg, selenium 60 mcg, manganese 5 mg, vitamin B_{12} 20 mg vitamin C 200 mg and vitamin E 60 IU	Pack of 100 capsules.
	(ii) Mixcarotin cap. containing 15.44 mg of mixed carotenoids in oily suspension (Alpha carotene, beta carotene, lutein, cryptoxanthin and zeaxanthine) equivalent to 25000 IU of vitamin A.	Soft gel capsules (pack of 100 capsules)
	(iii) Tablets containing 5000 IU beta carotene, 150 IU E, 20 mg B_1, B_2, B_6 each, 10 mcg B_{12}, 15 mg elemental Zn, 50 mcg, selenium, 20 mg calcium pantothenate, 40 mg glutathion 40 mg B_3 100 mg C, 75 mg L-cysteine	Pack of 100/250 tablets
	(iv) Capsule: 5000 IU vitamin A, 400 mg C, 200 IU E, 40 mg Zn, 5 mg L-glutathione, 3 mg sodium pyruvate, 2 mg copper and 40 mcg selenium.	Pack of 60 cap.
	(v) Capsules soft gel: vitamin A 5000 IU, 200 IU vitamin E, 200 mg vitamin C, 7.5 mg zinc, 1 mg copper, 15 mcg selenium and 1.5 mg Mn.	Pack of 50 cap.

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
	(vi) Tablets: 5000 vitamin A, 30 IU Vitamin E, 60 mg Vitamin C, 40 mg Zinc, 2 mg copper and 40 mcg selenium	Film coated tab. in a pack of 60.
Topical Anticataract Therapy		
• Catalin	Solution containing pyridophenoxazine (catalin) in concentration of 0.75 mg/15 ml solvent	Pack of Tablet along with 15 ml solvent
• Cineraria	Solution containing large quantity of organic potassium	15 ml dropper vial
• Anti-cataract solution	Solution containing 3.3% potassium iodide, 0.83% NaCl and 1.0% calcium chloride	10 ml dropper vial
• Aspirin	Topical solution as 1%	15 ml dropper vial
• Vitamin E Therapy	Capsule containing 100/200 mg of vitamin E (alpha tocopherol)	Pack of 100 capsules
Medical Therapy for Diabetic Retinopathy		
• D400	Tablet: Herbomineral preparation	Pack of 100 tablets
• Calcium debesilate	Capsule (500 mg)	Pack of 50 capsules
• Aspirin	Tablet (325 mg)	Pack of 100 tab.
• Dipyridamol	Tablet (225 mg)	Pack of 60 tablets
• Ticlopidine	Tablet (500 mg)	Pack of 100 tablets
• Cyclandelate	Capsule (400 mg)	Pack of 100 capsules
• Ponalrestat	Tablet (600 mg)	Pack of 50 tablets
• Sulindac	Tablet (250 mg)	Pack of 100 tablets

DISINFECTIVE AND ANTISEPTIC AGENTS IN OPHTHALMOLOGY

Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
• **Formaldehyde (Formalin)**	(i) as 10% aqueous soln	60 ml, 400 ml 1 litre and 5 litre packings.
	(ii) as 10% tablets	Pack of 60/100 tablets
• **Ethylene oxide**	As 3% colorless liquid	400 ml and 1 litre packing
• **Glutaraldehyde**	2% solution	As 60 ml, 400 ml and 1 litre packings
• **Sodium hypochlorite**	As 1% solution	60 ml and 400 ml and 1 litre packings
• **Isopropyl alcohol**	As 70% isopropyl alcohol	Pre-sterilized individual swabs (A pack of 100 swabs)
• **Biguanides**		
(i) Polyhexanide (PHMB)	As stock 20% solution For ocular conditions diluted solution (1:1000) as 0.02% is prepared	60 ml, 100 ml and 400 ml packings
(ii) Chlorhexidine	As 5% stock solution 0.2% diluted solution is prepared in isotonic saline for ophthalmic use	100 ml, 400 ml and 1 litre packings
• **Povidone Iodine (Halogens)**	5% sterile prep. solution	5 ml, 15 ml dropper vials
• **Acetone**	As 58.8% solution	60 ml, 100 ml, 400 ml and 1 litre packings
• **Cetrimide**	10% solution	400 ml and 1 litre packings
• **Beta propiolactone (BPL)**	0.2% solution/ condensed product of Ketone and Formaldehyde	On 100 ml, 400 ml and 1 litre packings
• **Alcoholic rub-in-hand disinfectant (Sterillium)**	As solution containing 2-propranolal 45.0 gm 1-propranolal 30.0 gm 100 ml Ethyl hexadecyl -2 gm dimethyl ammonium ethyl sulfate	100 ml pack
• **Cutasept (Antiseptic)** 2-propranolal -63 gm Benzalko- 10 gm nium Cl-0.025 gm	As solution containing pack	100 ml and 500 ml

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Drug name (Generic)	*Dosage form/strength*	*Commercial packing*
• **Korsolex disinfectant**	As solution containing (each 100 gm contains) glutaraldehydre 7.0 gm Formaldehyde 8.2 gm Polymethylol urea derivative	As 500 ml pack 17.6 gm
• **Bacillol disinfectant**	As solution (each 100 gm contains) ethanol-10 gm 2-Propanol-9 gm 1-Propanol-6 gm	As 200 ml pack with spray
• **Baktolin (Antiseptic)**	As solution (each 100 gm contains) Propylene glycol 0.52% Sodium salicylate 0.46% Sodium Lauryl Sulphate 4.08%, Sodium Benzoate 5.9% with Coco Glucoside, PEG 120, Glycerine, Glycol stearate and sodium citrate	As 500 ml pack with dispenser
• **HIV disinfectant**	Solution containing 45 gm 2-Propanol, 30 gm 1-Propanol, 0.2 gm mecetronium ethyl sulfate (INN)	500 ml and 1 litre packs
• **Hydrogen peroxide**	As stock solution (6%) For ophthalmic use can be diluted to 3%.	100 ml, 500 ml packs

Chapter Four

Future Drugs in Ophthalmology

In this chapter I shall describe Experimental New Drugs (ENDs), future drugs which are of great interest to ophthalmologists world wide. These ENDs are in the final stages of various clinical trials and shall shortly be approved by Food and Drug Administration FDA (USA) for the commercial use in the ophthalmology.

The Experimental New Drug (END) has to pass the following phases of trials before FDA approve it for commercial use.

These stages are –

a. **Pre-Clinical Trials**

In this stage initial drug research and development, and animal testing takes place.

b. **END Filing**

Human testing and interstate transport of END is allowed in this phase.

c. **Clinical Trials**

It has three phases

Phase-I: In this phase drug safety and tolerance is evaluated. Pharmacokinetics are tested in 20-100 normal adults males.

Phase-II: In this crucial phase END is evaluated in 100-200 concerned disease patients to determine effectiveness and dose response.

Phase-III: In this final phase END efficacy and safety is determined in 800-1000 concerned disease patients. Drugs interactions are also recorded in this phase.

d. **NDA Review**

New Drugs Analysis (NDA) is submitted to FDA for approval of END marketing.

e. Post-Market Surveillance

This is a ongoing process and in this phase adverse reactions reporting, survey, sampling and inspections are carried out.

Various Experimental New Drugs (ENDs) which are under various phases of clinical trials and shall be of great use in ophthalmology in near future are tabulated in Table 4.1.

Table 4.1: Experimental drugs (Topical ophthalmic formulations)

S.No.	*Drug name (Generic)*	*Indications for use*	*Category*
I.	Trovafloxacin (0.3%)	For treatment of ophthalmic infective conditions	Anti-bacterial
II.	Grepafloxacin (0.5%)	For treatment of ophthalmic infective conditions	Anti-bacterial
III.	Gemifloxacin (0.3%)	For treatment of ophthalmic infective conditions	Anti-bacterial
IV.	ADL2-1294	For treatment of ocular inflammatory pain	Anti-inflammatory
V.	Alpha-I Anti-chymotrypsin	Inflammatory diseases of the eye	NSAID
VI.	Piroxicam	Inflammatory diseases of the eye	NSAID
VII.	Nimesulide	Inflammatory disease of the eye	NSAID
VIII.	Rofecoxib	Inflammatory disease of the eye	NSAID
IX.	Tenoxicam	Inflammatory disease of the eye	NSAID
X.	Celecoxib	Inflammatory disease of the eye	NSAID
XI.	Iso-Prostaglandins	0.1% 9-iso Pg E_2	Anti-glaucoma
XII.	Mitomycin C	To treat Refractory Glaucoma	Anti-glaucoma
XIII.	Adaprolol maleate	Site active targeted delivery system for Glaucoma	Anti-glaucoma
XIV.	AGN-192151	Hypotensive lipid (OHL) for glaucoma	Anti-glaucoma
XV.	AGA	Sitespecific formulation for Glaucoma	Anti-glaucoma
XVI.	Brimonidinex	Alpha-2 agonist (neuroprotective for optic nerve in glaucoma)	Anti-glaucoma
XVII.	Collagenase	Purified collagenase for Glaucoma treatment	Anti-glaucoma
XVIII.	Dexanabinol (HU-211)	Treatment of Glaucoma and optic neuropathies	Anti-glaucoma

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S.No.	*Drug name (Generic)*	*Indications for use*	*Category*
XIX.	Dronabinol	Treatment of Glaucoma	Anti-glaucoma
XX.	Fibroblast growth factor	Topical Glaucoma therapy	Anti-glaucoma
XXI.	Glutamate ion channel blockers	Combination blockers for glaucoma	Anti-glaucoma
XXII.	Memantine	Neuroprotective in glaucoma	Anti-glaucoma
XXIII.	Pilocarpine	Treatment of glaucoma using submicron emulsion (SME) delivery system and Durasite sustained release delivery system	Anti-glaucoma
XXIV.	Neurotrophins	Neuroprotective in glaucoma	Anti-glaucoma
XXV.	Auto-immune modulators	Neuroprotective in glaucoma	Anti-glaucoma
XXVI.	Myocillin	Neuroprotective in glaucoma	Anti-glaucoma
XXVII.	Apoptosis Inhibitors	Neuroprotective in glaucoma	Anti-glaucoma
XXVIII.	Verapamil HCl	Treatment of glaucoma	Anti-glaucoma
XXIX.	Bromhexine	Mild to moderate kerato-conjunctivitis sicca	Ocular lubricant
XXX.	Cyclosporine Ophthalmic	Treatment of severe keratoconjunctivitis in Sjogren's syndrome	Ocular lubricant
XXXI.	Dehydrax	Recurrent corneal erosions and dry eye	Ocular lubricant
XXXII.	INS 365	Ocular surface diseases as dry eye	Ocular lubricant
XXXIII.	N. Acetyl cysteine (NAC)	Severe dry Eye syndrome	Ocular lubricant
XXXIV.	OcuNex	Dry Eye syndrome	Ocular lubricant
XXXV.	Acid Implant (Intravitreal)	Cytomegalovirus retinitis	Anti-retroviral drug
XXXVI.	Filgrastim	CMV retinitis	Anti-retroviral drug
XXXVII.	Monoclonal antibody to Cytomegalovirus	CMV retinitis	Anti-retroviral drug
XXXVIII.	Curdlan Sulfate	CMV infections	Anti-retroviral drug
XXXIX.	Fomivirsen	CMV retinitis	Anti-retroviral drug
XXXX.	GEM-132	CMV retinitis	Anti-retroviral drug
XXXXI.	Aromatic polycyclic dione (APD-1)	CMV retinitis	Anti-retroviral drug
XXXXII.	ISIS-13312	CMV retinitis	Anti-retroviral drug
XXXXIII.	Sevirumab	CMV retinitis	Anti-retroviral drug
XXXXIV.	Valganciclovir	CMV retinitis	Anti-retroviral drug
XXXXV.	Topical clemastine	Seasonal allergic conjunctivitis	Anti-Allergic
XXXXVI.	Cyproheptadine	Seasonal allergic conjunctivitis	Anti-Allergic
XXXXVII.	Embramine	Seasonal allergic conjunctivitis	Anti-Allergic
XXXXVIII.	Methdilazine	Seasonal allergic conjunctivitis	Anti-Allergic

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S.No.	Drug name (Generic)	Indications for use	Category
XXXXIX.	Picumast	Seasonal allergic conjunctivitis	Anti-Allergic
L.	Nicotinamide	Seasonal allergic conjunctivitis	Anti-Allergic
LI.	Calmodulin	Seasonal allergic conjunctivitis	Anti-Allergic
LII.	Lexipafant	Allergic conjunctivitis using Durasite delivery	Anti-Allergic
LIII.	Procaterol	Allergic conjunctivitis	Anti-Allergic
LIV.	Tryptase Inhibitor (Second generation)	Allergic conjunctivitis	Anti-Allergic
LV.	Amino caproic acid	Topical treatment of traumatic hyphema of the eye	Anti-haemorrhagic
LVI.	Clostridium botulinum toxin type A	Treatment of ocular muscle disorders (Blepharospasm)	Anti-haemorrhagic
LVII.	Clostridium botulinum toxin type F	Treatment of ocular muscle disorders (Blepharospasm)	Anti-haemorrhagic
LVIII.	Chlorhexidine 0.02%	Treatment of Acanthamoeba Keratitis	Anti-infective
LIX.	Propamidine isethionate	Treatment of Acanthamoeba Keratitis	Anti-infective
LX.	Chondroitinase	Treating patients undergoing Vitrectomy	Surgical Adjunct
LXI.	Fibroblast growth factor	To prevent lens clouding following ECCE/Phaco	Surgical Adjunct
LXII.	HylanA	Ophthalmic visco surgery	Surgical Adjunct
LXIII.	Vitrase	Treatment of vitreous haemorrhage	Surgical Adjunct
LXIV.	Epidermal growth factor	Treatment of recurrent corneal erosions	Anti-infective
LXV.	Fibronectin	Treatment of non healing corneal ulcers	Anti-infective
LXVI.	Matrix metalloproteinase	Treatment of non-healing corneal ulcers	Anti-infective
LXVII.	Urogastrone	Acceleration of corneal epithelial regeneration	Anti-infective
LXVIII.	Permeability increasing protein	Treatment of corneal ulcers	Anti-infective
LXIX.	Batimastat	Prevention of post-surgical recurrence of Pterygium	Anti-infective
LXX.	Cell Adhesion molecule inhibitors	Treatment of ophthalmic infectious diseases	Anti-infective
LXXI.	Dehydrex	Treatment of recurrent corneal erosions	Anti-infective
LXXII.	Enzyme based Iodine preparation	Treatment of infective eye diseases	Anti-infective

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S.No.	*Drug name (Generic)*	*Indications for use*	*Category*
LXXIII.	GM6001	Treatment of infective eye diseases	Anti-infective
LXXIV.	Insulin like growth factor	Treatment of infective eye diseases	Anti-infective
LXXV.	Povidine Iodine (2.5%)	Treatment of infective eye diseases	Anti-infective
LXXVI.	XMP 200	Bactericidal	Anti-infective
LXXVII.	Ciliary Neuro-trophic factor	Treatment of macular degeneration and retinitis pigmentosa	Retinal adjunct
LXXVIII.	CNS-1237	Protection for retinal degeneration	Retinal adjunct
LXXIX.	CNS-5065	Protection for retinal degeneration	Retinal adjunct
LXXX.	Tyrosin Kinase antagonist	Treatment of ARMD and diabetic retinopathy	Retinal adjunct
LXXXI.	FIK-I RTK antagonist	Treatment of ARMD and diabetic retinopathy	Retinal adjunct
LXXXII.	Gene therapy	For Traction retinal detachment	Retinal adjunct
LXXXIII.	Hormone growth receptor antagonist	Diabetic retinopathy	Retinal adjunct
LXXXIV.	Lisinopril	Diabetic retinopathy	Retinal adjunct
LXXXV.	LGD-1550	Retinal degenerative conditions	Retinal adjunct
LXXXVI.	Neurotrophic factors	Neuro degenerative conditions of the eye	Retinal adjunct
LXXXVII.	NRT technology	Neuro degenerative conditions of the eye	Retinal adjunct
LXXXVIII.	Oligo nucleotide antisense compounds	To treat vascular endothelial growth factor (VEGF) in various retinopathies	Retinal adjunct
LXXXIX.	Retinal pigment cells	Treatment of ARMD	Retinal adjunct
LXXXX.	Tazarotene	Receptor selective retinoid	Retinal adjunct
LXXXXI.	Tin ethyl etio-purpurin	Photodynamic therapy for ARMD	Retinal adjunct
LXXXXII.	Zopolrestat	Treatment of retinopathies	Retinal adjunct
LXXXXIII.	Zenarestat	Treatment of diabetic cataract	Anti-cataract
LXXXIV.	Cysteamine hydrochloride	Treatment of corneal cystine crystal accumulation in cystinosis	MIscellaneous
LXXXXV.	SU-101	Treatment of malignant glioma	Anti-cancer in ophthalmology
LXXXXVI.	Corneaplasty	Refractive correction	Miscellaneous
LXXXXVII.	Rostaporfin	Treatment of ARMD	Retinal adjunct

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