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Newer Techniques ocular drug delivery system

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ABSTRACT :
Various approaches that have been attempted to extent bioavaiablity and the duration of therapeutic action of ocular drug are often divided into two categories. The primary is predicted on controlled and continues delivery of ophthalmic drugs . The second involves, maximizing corneal drug absorption and minimizing precorneal drug loss. The everyday pulse entry type drug release behaiviour observed with ocular aqueous solutions (eye drop) suspensions, ointments can be replaced by a more controlled sustained and continues drug delivery, using a controlled release ocular drug delivery system. These system are able to do therapeutic action with smaller dose and fewer systemic and ocular side effects .

I. INTRODUCTION;

The eye may be a unique and extremely sensitive organ in our body. We will enjoy it and appearance at the globebody. Hence for eyes the ophthalmic drug delivery system are Available. The eye is very sensitive organ of our body also.They are classified as old and new drug development. [1]
Structure of eye

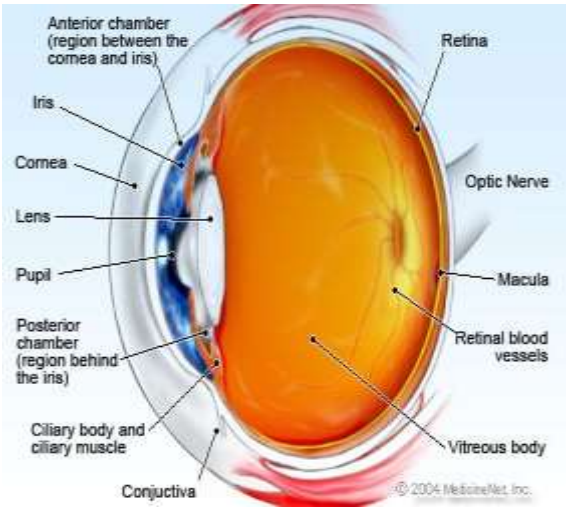

Figure No 1: ANATOMICAL STRUCTURE OF HUMAN EYE [44]

The eye has three layers or coats ,three compartments and three fluids. The three coats of the eye are;1)outer fibrous layer,2)Middle vascular layer,3)Inner nervous layer.

The outer carries with it,the cornea is transparent, whereas the sclera,which is continuous within it, is white. The junction of cornea and sclrea is termed as limbus. The center layer consisit of iris, Ciliary body-consisting of the parts of the plicata and pars plana, Choroids. The inner layer of eye has pigment epithelium of the retina, retinal photoreceptors, retinal neurons.

Blood supply-The blood supply of the world springs from three sources:the central retinal arteries, the anterior ciliary arteries and therefore the posterior ciliary arteries.All these are derived

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from the ophthalmic artery ,which is a branch of internal carotid.The major Lacrimal gland occupies the superior temporal anterior portion of the orbit.Tears collect at the medial part of the palperal fissure and pass through the pucta and canaliculi into the lacrimal sac.

The barriers of eye include a 1) anatomical barriers 2)physiological barriers 3)blood brain barriers. Mainly anatomical barriers is when a dosage form is topically administered there are two routes of entry either through the cornea or via the noncorneal route. A cornea is a very tight multilayerd tissue that is consist of epithelium, bowmans membrane, stroma ,descemet's membrane and endothelium.non corneal route by passes the cornea and involves movements across conjunctiva and sclera .physiological barriers includes tear film ,lacrimal fluid hence bioavailability of topically administerd drugs is further,reduced by precorneal factors such as solution drainage,tear dilution, tear turnover,and increased lacrimation.the average tear volume is 7-9 μL with a turnover rate of 16%per minute.blood ocular barriers includes blood aqueous barrier and blood retinal barrier .blood aqueous barrier is it formed by non pigmented ciliary epithelial cells of ciliary body and endothelial cells of blood vessels in iris.blood retinal barrier include non -fenestrated capillaries of the retinal circulation and tight -juntions between retinal epithelial from chorio-cappilaris into the retina.

The retina consist of two types of photoreceptor cells,rods ,and cones.Rods are abundant in the periphery of the retina whereas cones square measure found more additionally within the central areas. Every eye contains ≈120 million rod shaped photoreceptors that are adapted for a occasionally light weight threshold (high sensitivity)they produce low resolution black and white pictures .a loss of rods with age makes it difficult to drive at night cone shaped photoreceptors functionin bright lightweight to provide high resolution color picture like red ,green or blue.

Old techniques;

In ocular drug delivery the old techniques are used for diagnosis and treatment of disease like eye drops,lenses,lacrisert.

1] EYE DROPS:

The eye drops formulation possess a variety of factors that into a wide-prescribed form.they are very safeand Easy to applied.It is Isotonic ,has PH around 7.4 for patient compliance.In consequences ,to expand the time of contact of the drug,capacity of permeation and critical bioavailability of the desired molecules several molecules are powerful enough to be operated in eye drops formulation, such as cyclodextrins ,enhancers of viscosity and of permeability.The development of other compounds improved properties of and without harmful effects.[25,26,32,33]

Polymers are frequently added to ophthalmic solution and suspension in order to increase the viscosity of the vehicle ,that prolongs activity of cornea ,so that enhancing bioavailability.generally the high molecular weight hydrophilic polymers those are unlikely to cross the biological membrane.they include polyvinyl chloride, dextran, gellan, methylcellulose, hydroxymethylcellulose.[30,31]

2] LENCES:

Lenses can absorb water soluble drugs when soaked in drugs solutions. These saturated drugs in lenses are placed in eye for releasing drug for long period of your time. The hydrophilic contact lenses will be accustomed prolong the ocular continuance of the drugs. In human, the bionite lens which was made of hydrophilic polymer (2-hydroxy ethyl methacrylate) has been shown to provide a greater penetration of fluorescein. [17]

Imporal parameters within the lens design are polymer type,lens thickness central posterior curve, lense diameter and water content.additionally contact lenses are found to change tear physiology likewise because the tear PH.although more durable,hard lenses tend to be less well tolerated and need longer adaptation period.hard and soft hydrophobic lenses require a comparatively thick film between a their posterior surface and cornea of eye.with all types of contact lenses,the cornea surface must be wet and oxygenated the least bit time to stay transparent and healthy.thus with any form of lence, interference of the oxygen supply to the cornea surface must be minimized by oxygen permeation through the lens or by both. Besides intrinsic polymer characteristics , another significant factor is water content. since water molecule are the medium of oxygen flux in an exceedingly hydrogel lens the greater the oxygen permeability.Essential Determinantes Of Lenses movement are base curve or a bigger diameter will reduce the movement of lence.[12,13,14]

3] LACRISERT;

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Lacrisert are hydroxyl propyl cellulose rod shaped, they lack pf preservative useful for dry eye syndrome. It weighs 5mg and measures 12.7 mmin diameter with a length of 3.5mm.These is useful in treatment of Keratitis whose symptoms are difficult to treat with artificial tear alone. It is inserted into cul-de-sac cavity where it absorbs water form conjunctiva and cornea, it forms a hydrophilic film which stabilizes tear film for hydration and lubrication of cornea. It dissolves in 24 hours.

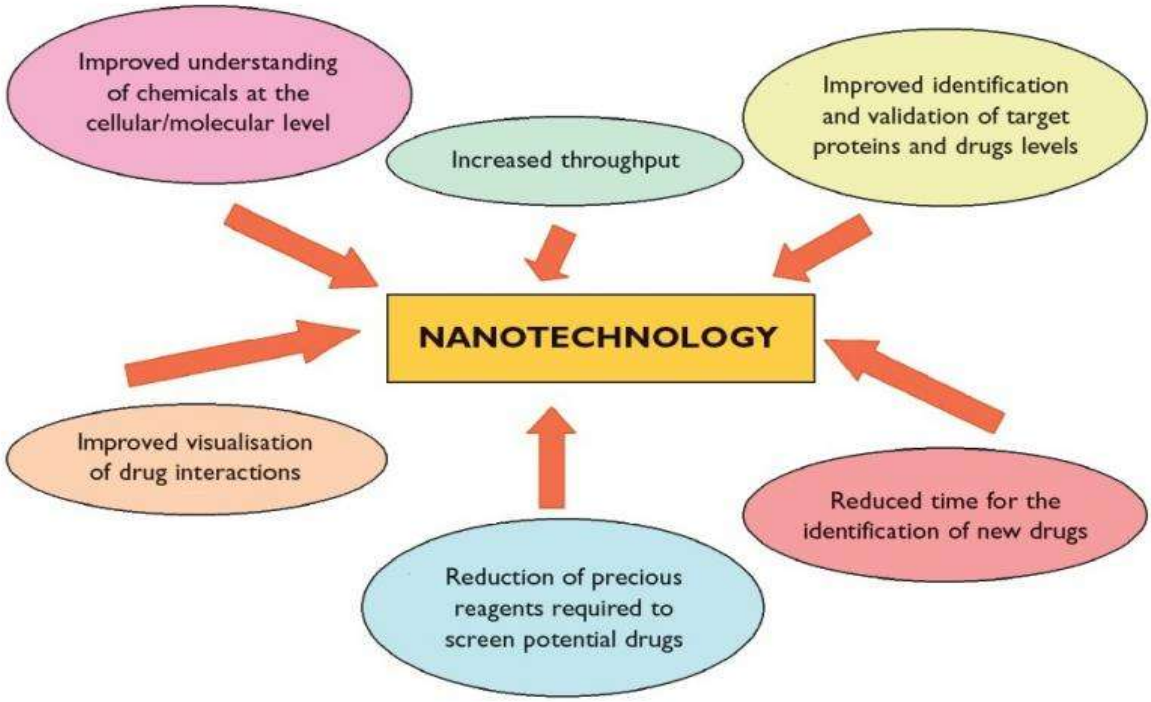
New Techniques;

The New techniques used square measure higher than recent one they are terribly effective have greater bioavailability. they straightforward and extremely convenient to use for patient.It has progressed from the refinement of easily available natural products to a more target based approach driven by information about the physiological and pathophysiological pathway in the disease process. most of drug currently used in ophthalmology have already been approved to be used in different malady within the body and thus required research and drug development. The ophthalmology continues to grow technologies with aimed at the health of eye.High -tech innovation and advanced surgical techniques have transformed the field of ophthalmology with new treatment choices like nanotechnology, In situ hydrogel and ocular tablet.

1] Nanotechnology;

Nanotechnology involves the creation and use of materials and device at the size scale of intracellular structures and molecules and involves systems and construct in order of <100 nm. The various approaches employed for clinical ocular disease diagnosis, like optical coherence tomography(OCT),fluorescein angiography, positron emission tomography (PET) magnetic resonance imaging (MRI) etc. nanopartical are colloidal carrier system that can improve efficacy of drug delivery by overcoming diffusion barrier, permitting reduced dosing as well as allowing sustained delivery.

With the proper fine-tuning, the nanoparticulated systems may assure reduced side effects with augmented bioavailability and better capacity of absorption. Several examples are used in nowadays practice being nanocarriers: Dendrimers, liposomes, nanoparticles, nanosuspensions, and nanomicelles are just a few cases of the available arsenal for ocular treatment of pathological issues with many of these materials demonstrating auspicious outcomes.[18,19]



FigureNo2: NANOTECHNOLOGY APPLIACATION[44]

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2] In situ Hydrogel

Hydrogels can be defined as polymers chains that present the ability to swell in water or aqueous system, without system. Hydrogels are three-diamentional hydrophilic network. Once the polymers chains are covalently linked to each other, hydrogels can not be reshaped once set,being also called thermoset hydrogels.The hydrogels have high biocompatibility results form their high water content and soft-surfaces properties.

Hydrogels areversatile materials because they can be tailored-made to posses various properties by manipulating the synthesis orprocessing methods. Hydrogels can be made to respond to environmental stimuli, such as temperature, PH, light and specific molecules. Hydrogels are a variety of biomedical applications, including the area of tissue engineering, e.g. the artificial cornea and to produced controlled the drug delivery systems. The hydrogels are used as drug delivery systems, several methods for controlled release can be used, such as diffusion, dissolution, osmosis and ion exchange.the main advantage by hydrogels applications includes the possibility for sustained release,which result in high local concentrationof the active pharmaceutical ingredients over a long period of time.[39,42,43]

Mucoadhesive polymer;

3]ocular tablet

Minitablet are biodegradable, solid medicament forms that,have application like conjunctival sac,passage into gel,which extends,the period of contact between active component and the eyeballexterior, which in turn increases the active component bioavailability. The development of minitablet normally involve a polymers, like hydroxypropyl methyl cellulose [HPLC], hydroxy ethyl cellulose [HEC], acrylates, Carbopol or carbomer etc. minitablets are developed by the method of direct compaction or circuitous compaction or indirect compression or indirect method, the after involving tableting the anteriority obtained granules. Active components fromwhich the tablet were developed include piroxicam, timolol, ciprofloxacin, gentamicin, acyclovir.

II. CONCLUSION;

In this review summarized a few new products that are invented as a result into ophthalmic drug delivery.the performance and effectiveness of these new product is very appreciable.in addition this new system was comfortable and easy use. hydrogel is used as a sustained release drug delivery system.the keratitis sicca disease was treated by lacrisert. The different advanced systems were well characterized and they showed potentialities to open a new direction to improve therapeutic activity of drugs for ophthalmic applications.

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