

Glaucoma treatment may be improved by nanodiamond technology in contact lens

By 2020, nearly 80 million people are expected to have glaucoma, a disorder of the eye that, if left untreated, can damage the optic nerve and eventually lead to blindness. The disease often causes pressure in the eye due to build-up of fluid and a breakdown of the tissue that is responsible for regulating fluid drainage. Doctors commonly treat glaucoma using eye drops that can help the eye drain or decrease fluid production. It has been seen that patients frequently have a hard time sticking to the dosing schedules prescribed by their doctors, and the medication - when administered through drops - can cause side effects in the eye and other parts of the body.

In what could be a significant step toward improving the management of glaucoma, researchers from UCLA have created a drug delivery system that may have less severe side effects than traditional

glaucoma medication. The scientists bound together glaucoma-fighting drugs with nanodiamonds and embedded

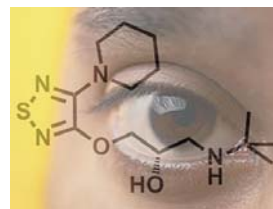
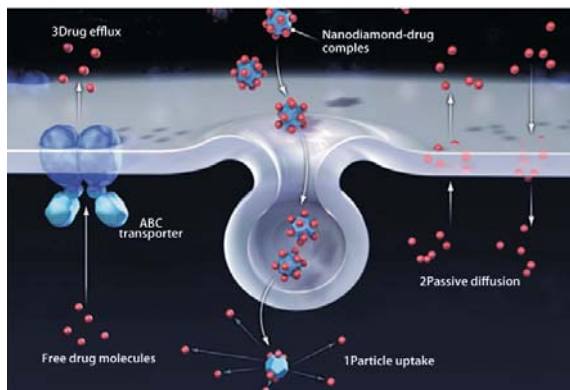
refining processes and are approximately five nanometers in diameter. Shaped like tiny soccer balls, they can be used to bind

One of the severe drawbacks of these drops is that as little as 5 percent of the drug actually reaches the intended site. Another disadvantage is burst release, where a majority of the drug is delivered too quickly, which can cause significant amounts of the drug to “leak” or spill out of the eye. This can also lead to serious complaints, like irregular heartbeat. Drops can

avoided the burst release effect. The activity of the released timolol was verified by a primary human cell study.

Experts agree that in addition to nanodiamonds' promise as triggered drug-delivery agents for eye diseases, they can also make the contact lenses more durable during the course of insertion, use and removal, and more comfortable to wear.

The study was led by **Dr. Dean Ho**, professor of Oral Biology and Medicine and co-director of the Jane and Jerry Weintraub Center for Reconstructive Biotechnology at the UCLA School of Dentistry. Dr. Ho is considered a visionary in his field and his advances continue to generate significant excitement regarding the use of nanodiamonds in biology and medicine.



them into contact lenses. The drugs are released into the eye when they interact with the patient's tears.

Nanodiamonds are the byproducts of conventional mining and

a wide spectrum of drug compounds and enable drugs to be released into the body over a long period of time.

Timolol maleate eye drops are generally prescribed in glaucoma.

be uncomfortable and difficult to administer which leads many patients to stop using their medication.

But the contact lenses developed by the UCLA team successfully

Post-menopausal Estrogen Tied to Lower Glaucoma Risk



“Women who take estrogen-only hormone-replacement therapy to relieve menopausal symptoms might also be reducing their risk of a common form of the eye disease, glaucoma”, according to new research conducted by **Dr. Joshua Stein**, an assistant professor of ophthalmology at the University of Michigan.

In his study, Dr. Stein looked at insurance claims data for

women aged 50 and older. He evaluated information on more than 152,000 women, about 60,000 of whom had at least one prescription for estrogen-only therapy from 2001 to 2009.

During the study period, about two percent of the women developed a common form of glaucoma known as primary open-angle glaucoma according to Dr. Stein. Glaucoma refers to a group of eye diseases that damage the optic nerve and can lead to blindness. Treatment can help preserve vision. Each month of estrogen use reduced the risk of glaucoma by 0.4 percent, and that risk reduction accumulates over time. After four years of continuous use,

the reduction in risk would be about 19 percent, Stein said. Estrogen might work by lowering the pressure or by protecting certain cells in the eye, the researchers said. The new study results do not suggest that reducing the risk of glaucoma is reason enough to take hormone replacement therapy. Experts agree that the findings are most helpful in guiding research in drug development for hormone-based therapies to be used as neuro-protective agents.

Stein said, “the goal would be to encourage drug companies to develop topical estrogen derivatives and study them as a glaucoma-preventive therapy.” However, this treatment is specific for women.

Video Screening for Diabetic Retinopathy

Like most conditions, diabetic retinopathy is best caught and addressed early in the disease. However, screening for diabetic retinopathy has traditionally required a skilled doctor to take and interpret retinal photographs, limiting the possibilities of early detection.

Recently, a group in Australia has been conducting studies on a new digital video technique they have developed for diabetic retinopathy screening. This has specificity and sensitivity equal to that achieved using the standard still-photo method, while being easier to do and providing a larger view of the retina. This method is less prone to technical failure and the simplicity of the process allows non-medical personnel to perform the test. It has been found that the files can be condensed to a small fraction of their original size and still produce accurate screening results. Therefore there is new hope for early prevention of diabetic retinopathy.



A patient is screened for diabetic retinopathy using the Eye Scan video system

Is glaucoma diabetes of the brain?

Path Breaking Discovery in the field of Glaucoma



Muneeb A. Faiq,
Researcher, Ambedkar Centre for
Biomedical Research, Delhi University

Researchers at All India Institute of Medical Sciences and Ambedkar Centre for Biomedical Research India, have proposed a new mechanism of glaucoma which suggests that diabetes can occur in the brain and may be the cause of many neurodegenerative disorders including glaucoma. Glaucoma is considered as one of the most complex human diseases. **Muneeb A. Faiq** and his coworkers have attempted to explain this disorder which may open door for a new era of research on this disease.

Glaucoma is an irreversibly blinding disorder with almost 65 million sufferers worldwide. There is no cure for glaucoma and the best that can be done is lowering of the intraocular pressure pharmacologically and/or surgically.

Many patients continue to progress to blindness despite an apparently controlled or low intraocular pressure. Proper understanding about the underlying etiopathogenic and mechanistic aspects of glaucoma is necessary to develop therapeutic regimens and management strategies of this disorder.

A recent paper published in Medical Hypotheses, is a thorough scientific insight into this disease. The investigators explore glaucoma and related neurodegenerative diseases from many perspectives and come up with a multifaceted and internally coherent concept of glaucoma being “the diabetes of the brain”. They have come to recognize that glaucoma is, in fact, a form of brain specific diabetes. Their study is likely to make a radical shift in the understanding of glaucoma and other neurodegenerative disorders like Alzheimer’s disease.

This finding might establish glaucoma as one more diabetes type and may possibly give birth to new concepts in glaucoma therapy and management. New treatment and therapeutic modalities are likely to see the light of day.

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Tips to Keep Your Eyes Healthy



EAT A HEALTHY DIET

The best foods for your eyes are foods which are rich in vitamins, minerals and antioxidants. Some of the most important vitamins for your eyes are vitamins A, C, and E. The antioxidants

which are most helpful to your eyes are lutein and zeaxanthin.

Carrots contain vitamin A; Pumpkin contains vitamin E; Broccoli and Lettuce contains both lutein and zeaxanthin. Eggs contain vitamin A, vitamin E and lutein; Almonds contain vitamin E; Spinach contains lutein and zeaxanthin; Peas contain high density of vitamin C. Oranges are rich with vitamin C.

AVOID SUN EXPOSURE

Sometimes nothing feels better on our skin than a little sunshine and warm air. Even though it feels good on your skin, sunlight can be dangerous to the health of your eyes. The UV rays from the sun can do permanent damage which results in eye problems such as cataracts, pterygium, and macular degeneration. Protect your eyes from sun damage with proper eyewear or carry an umbrella.



AVOID SMOKING

We all know that smoking is bad for the health. It can contribute to the development of optic neuropathy, dry eyes, cataracts, and to the development of age-related macular degeneration.



Since smoking is a choice, it is one of the most controllable risk factors that people can change.

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BOOK EXTRACT



This book is a short biography of Louis Braille (1809-1852), a French teacher who was blind from the age of three and was a talented organist. He created the Braille system for the blind. It is a masterpiece written in simple language which explains the origin of the Braille system – it is an alphabet made up entirely of six raised dots.

The Story of Louis Braille

Phil Shapiro

Louis Braille was born in 1809, in a small village near Paris. His father made harnesses and other leather goods to sell to the other villagers. One of the tools he used to make holes was a sharp awl. While playing with one of his father's awls, Louis' hand slipped and he accidentally poked one of his eyes. A few days later young Louis lost sight in both his eyes.

When he arrived at the special school for the blind, Louis found that the school did have books for the blind to read. These books had large letters that were raised up off the page. Since the letters were so big, the books themselves were large and bulky. More importantly, the books were expensive to buy.

One day chance walked in the door. Somebody at the school heard about an alphabet code that was being used by the French army. The messages could not

be written on paper because the soldier would have to strike a match to read it. The light from the match would give the enemy a target at which to shoot. The alphabet code was made up of small dots and dashes. These symbols were raised up off the paper so that soldiers could read them by running their fingers over them.

Louis sat down to think about how he could improve the system of dots and dashes. As he sat there in his father's leather shop, he picked up one of his father's blunt awls. The idea came to him in a flash. The very tool which had caused him to go blind could be used to make a raised dot alphabet that would enable him to read.

The next few days he spent working on an alphabet made up entirely of six dots. Louis used the blunt awl to punch out a sentence. He read it quickly from left to right. Everything made sense. It worked... (Abridged)



ICMR Award for work on congenital blindness

The Union Minister for Health and Family Welfare, Shri Ghulam Nabi Azad presented the ICMR Awards to 51 outstanding clinical and biomedical scientists for the years 2009 and 2010 for their work in communicable and non-communicable diseases, maternal and child health and various other medical and biomedical fields.

The ICMR Prize for “Biomedical Research conducted in underdeveloped areas” was presented to Dr. P. Sundaresan, Senior Scientist, Aravind Medical Research Foundation, for his research work.

Enhanced Technology for cataract surgery

Aravind introduced an advanced machine called Centurion Vision System aimed to enhance the efficiency and outcome of cataract surgery. After making an assessment of the advantages of using the machine on patients, Aravind Eye Care System has introduced it at its hospital branches in Madurai, Tirunelveli, Coimbatore and Puducherry.

Centurion Phaco System, the intelligent phaco-emulsification technology designed by Alcon Company, will be able to target intraocular pressure during surgery. It enables safe and fast surgery with advanced technology fluidics system.



Reaching out to the underprivileged

Since 2001, M.P Birla Eye Clinic has been organising Free Cataract Screening and Awareness camps on eye related diseases in and around West Bengal. The motto is simple: to reach out to those who cannot reach us and

The rest are either prescribed medicines or glasses.

Patients who need cataract or other surgery are brought to the Clinic by our transport and also returned to their respective

and give follow-up advice. Such camps and follow-up activities are held throughout the year as part of out-reach services. On an average 10,000 highly subsidised surgeries are undertaken per year.



prevent avoidable blindness.

The camps are usually organised with the help of local clubs or NGOs. Once the date is finalised, a team of paramedics and doctors go to the camp and examine the patients. Those with critical eye problems are referred to the Clinic for further treatment, while those who need cataract surgery are also counselled to go for surgery.

camp sites once the surgery or the treatment is over. Surgical patients are provided with free post-operative medicines and eye drops as instructed by the doctors. Those who are prescribed glasses can choose from subsidised spectacles provided by us.

After 20 days or so, a team of paramedics visits the same camp site to review the patients

The motto is simple: to reach out to those who cannot reach us and prevent avoidable blindness.

PBA Eye ties up with Aravind Library



PBA Eye has recently tied up with ARAVIND LIBRARY & INFORMATION CENTER (ALICE) to expand its knowledge base. The ALICE library gathers comprehensive information and provides resource facilities related to eye care to the staff and volunteers of Aravind Eye Care System. It offers an ideal ambience to satisfy intellectual curiosity and much needed information. The library is a fully automated one with traditional as well as modern digital resources. Its collection includes books, journals, resource materials, videos and DVDs on eye care resources.

PBA Eye starts new Fellowship Programme

PBA Eye has started a new fellowship programme from 2013. The first fellow to be appointed in the Cornea Department is Dr. Debapriya Chatterjee.



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A memorable case

Drastic damage averted by double eye surgery



Dr. Subhankarsri Paul
MBBS, MS, DNB in Ophthalmology
Retina Surgeon, PBA Eye Hospital

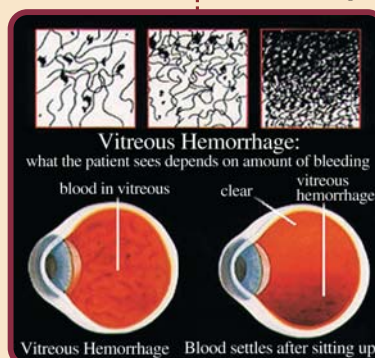
“Globe injury especially in a child is always a challenge as trauma can affect different parts of globe and sometimes it becomes difficult to salvage the globe...But when it is successful the satisfaction is even greater.”

It's a memorable journey of mine with a boy with open globe injury. This 17-year old illiterate boy with a slightly low IQ was from a remote village of Bihar. He had a history of blunt trauma with a wooden stick in his left eye and arrived at our Emergency with a ruptured globe. His vision was only perception of light and there was a large corneo-scleral tear. The anterior chamber had hyphaema and lens were also ruptured. Gentle ultra sound revealed dense vitreous haemorrhage and it was difficult to comment on retina status due to the collapsed globe. Poor visual prognosis was explained to the patient and his attendant. It was extremely difficult task to convince and counsel the parents as he was the only child.

We are blessed with a talented Cornea Surgeon who repaired the corneal tear and cleared the ruptured lens matter. I, being the Retina Surgeon, repaired the sclera tear. We were very lucky that sclera tear did not extend beyond muscle insertion. We could salvage the anatomical globe and his vision had retained perception of light. He was however left with dense vitreous haemorrhage. He was treated with high doses of systemic steroid intravenous followed by oral to reduce the inflammation. Subsequent follow-ups revealed vitreous haemorrhage was clearing and retina appeared to be attached.

His vision improved to 1/60.

But the story did not end there and it was not all smooth sailing. One month later, he came to us with decreased vision to hand movements close to his face. Clinical examination revealed vitreous haemorrhage with total retinal detachment. I took a deep breath and decided to go for vitrectomy with encirclage and silicon oil injection. His parents were very supportive and decided to go for the surgery without complaining about the outcome. The surgery successfully cleared the vitreous haemorrhage, separated the vitreous from retina and settled the retina. Now at the end of 6 months, he has a vision of 6/60. He is still phakic and has mild exotropia but his retina is well attached.



Open globe injury especially in the young is always a challenge as trauma can affect different parts of globe and sometimes it becomes difficult to salvage the globe. There is also a small risk of other eye getting affected which is known as sympathetic ophthalmia. Vitreo-retinal surgery is also a great challenge as there are high chances of vitreous incarceration. The retina is usually thin, fragile and contracted and it is difficult to relieve traction and flatten the retina. After doing a heroic surgery there might still be very poor vision. But when it is successful the satisfaction is even greater.



DOCTOR'S PROFILE

Dr. Archana Khetan

MBBS (Patna University), MS in Ophthalmology (Patna University)

Dr. Khetan is currently in the Cornea & Refractive department at Priyamvada Birla Aravind Eye Hospital. She has been associated with the organization for over nine years.

EYE DONATION: RAY OF HOPE IN THE DARKNESS

PARENT'S SPEAK

Our nine year old daughter is the apple of our eyes. She is a very active child. One day my wife called me up at office frantically to inform me that my daughter has had an accident while playing. She had pushed a sharpened pencil right in her left eye. When I rushed back home, I found her in shock and the pencil was still lodged in her eyes. We rushed her to the nearest eye hospital. They however referred us to the Priyamvada Birla Aravind Eye Hospital as they were the best care possible was here. She was admitted immediately. The Cornea Surgeon removed the pencil from her eye with utmost care. Some medicines were also prescribed. Although vastly relieved, we were still scared when her vision was not restored even after a month. We got a call from the doctors of Priyamvada Birla Aravind Eye Hospital, within a month, telling us that they had got a new eye from a donor. My daughter's eye was transplanted and very soon her vision was completely restored. Till date, I am extremely grateful to the doctors and the staff of the Hospital without whom all would surely have been lost. My gratitude also extends to the donor through whose eye my child still sees.

—Mr. Rakesh Sharma

DOCTOR'S SPEAK

The child came to us in an emergency situation. The pencil had pierced deep, damaging both the retina and the cornea. It had to be removed very carefully through an intricate surgery. Our primary aim was to repair the cornea and maintaining the structure of the globe. Then we did our utmost to repair the retinal and heal the corneal ulcer. However, heavy scarring resulted in corneal opacity. This condition prevents light rays from entering the eyes and can result from diminished vision to total loss of eyesight.

When the child was discharged, her sight was not completely restored and there were chances that she may not ever recover vision in her left eye. We were lucky that we got an eye donation within the next month. Our "eye retrieval network" hurried the process. We immediately informed her parents and they rushed to the Hospital.

We performed a second surgery on the child's left eye and transplanted the cornea. Our MP Birla Eye Bank and an anonymous but generous donor prevented a child's life from going dark. We are very lucky to have an eye bank of our own. The more people there are willing to donate their eyes, the more eyes can be saved.

—Dr. Archana Khetan

Till date, I am extremely grateful to the doctors and the staff of the Hospital without whom all would surely have been lost. My gratitude also extends to the donor through whose eye my child still sees.

IOL MASTER: Perfect 6X6 vision for cataract surgery

Effective cataract surgery requires much more than mere replacement of crystalline lens. As intraocular lenses (IOLs) become more sophisticated, accurate IOL power calculation is an absolute necessity to prevent refractive surprises.

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distance between the anterior surface of the cornea and the limiting membrane, the IOL Master measures the distance from the corneal vertex to the retinal pigment epithelium. This ensures exact power of the intraocular lens for optimum vision. The IOL Master is consistently accurate to within ± 0.02 mm or better.

The IOL Master's accurate biometry is particularly useful in conditions of nanophthalmia or extreme axial hyperopia, extreme axial myopia, prior retinal detachment with silicone oil, and pseudophakia, polypseudophakia, and phakic IOLs.



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