

## Revolutionary Breakthrough in Cornea Transplant

A new synthetic cornea made from laboratory produced collagen restores partial vision to patients. The synthetic cornea has been developed by scientists in Sweden, Canada and the USA. When transplanted into a patient's eye, the synthetic cornea encourages damaged cells to regenerate and colonize the new tissue. After two years, a majority of patients with the artificial corneas had significantly improved vision. The results were published recently in Science Translational Medicine.

The human cornea is a thin, layered and clear tissue that covers parts of the eye such as the coloured iris and the pupil. When damaged, the cornea can lead to blurry vision or even complete blindness. Contact lenses can correct minor problems, but more serious problems require a full cornea transplant. Clouding of the cornea leads to most cases of blindness worldwide.

The scientists made their artificial cornea from collagen, a common connective tissue found in tendons, ligaments, the cornea itself and other parts of the body. Instead of using natural collagen from humans, however, the scientists created

synthetic collagen shaped like a human cornea. same as a human cornea transplant.



By using synthetic collagen, the researchers eliminated the need for donor corneas, which are often in short supply.

After removing diseased corneas from 10 patients, the scientists inserted the synthetic corneas in their place. The new synthetic corneas produced tears and responded to touch. Overall vision improved in six of the 10 patients to a level about the

All 10 patients had advanced keratoconus, or central corneal scarring, a disease that thins the cornea while giving the eye a more pointed, conical shape. A person suffering from advanced keratoconus sees multiple images and streaking, and is sensitive to light.

Most of the time a contact lens allows patients with keratoconus to function normally, but severe cases



require a full transplant. The exact cause of keratoconus is unknown, but studies have associated the condition with various environmental and genetic factors.

By integrating the cornea recipients' own cells into the synthetic cornea, the patients can fight off infections more easily, and be more comfortable.

For now, the synthetic corneas only work in people with advanced keratoconus, but doctors and scientists are expanding the use of synthetic corneas to other eye-related diseases.

New studies are being planned that will extend the use of the biosynthetic cornea to a wider range of sight-threatening conditions requiring transplantation.

**By using synthetic collagen, researchers eliminated the need for donor corneas, which are often in short supply**

### Omega - 3s No Help Against Age-related Eye Trouble

Adding omega-3 fatty acids and other nutrients to standard antioxidant vitamins does not give older people any added protection against age-related macular degeneration (AMD), a leading cause of blindness, a new study finds.

The study looked at AMD which afflicts millions of older people in the United States, according to background information outlined by researchers.



Previous research has shown that a blend of the antioxidant vitamins C, E, beta carotene and zinc could reduce the risk of progression to advanced AMD. Could adding more antioxidants boost that protection even higher?

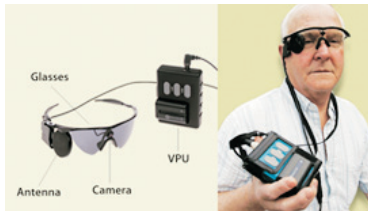
It will not, according to the findings published in the journal of the American Medical Association.

## Is Blindness Reversible?

**Retinal Prosthesis System Brings New Hope for Degenerative Eye Diseases**

The Argus II Retinal Prosthesis System can provide sight – the detection of light – to people who have gone blind from degenerative eye diseases like macular degeneration and retinitis pigmentosa. Both diseases damage the photoreceptors of eyes. Photoreceptors are the cells at the back of the retina that in normal eyes perceive light patterns and pass them on to the brain in the form of nerve impulses. In turn, the brain interprets these impulse patterns as images. The Argus II system takes the place of these

photoreceptors. The Argus II Retinal Prosthesis System (Second Sight Medical Products Inc.) has received approval from the US



Food and Drug Administration (FDA) for the treatment of Retinitis Pigmentosa (RP) according to a news release. The Argus II is



intended to induce visual perception in blind individuals with RP.

Many patients can use the retinal implant in their activities of daily living such as recognizing large letters, locating the position of objects and more.

### NEW EYE TEST MAY HELP PREDICT RISK OF GLAUCOMA



A study from Australia may offer a new way of identifying people at the risk of glaucoma years before vision loss happens.

In this study, researchers were able to predict who were at increased risk of developing the eye disease with some accuracy by measuring blood vessel thickness in the retinas of study participants using a computer-based imaging tool.

Those with the narrowest vessels at the beginning of the study were four times more likely to develop glaucoma a decade later.

# Indian Scientist Discovers New Layer in the Cornea



Scientists at the University of Nottingham have discovered a previously undetected layer in the cornea, the clear window at the front of the human eye.

The breakthrough, announced in a study published in the academic journal *Ophthalmology*, could help surgeons to dramatically improve outcomes for patients undergoing corneal grafts and transplants.

**The new layer has been dubbed the Dua's Layer after Professor Harminder Dua who discovered it.**

Prof. Dua, Professor of Ophthalmology and Visual Sciences, said: "This is a major discovery that will mean that ophthalmology textbooks will literally need to be re-written. Having identified this new and distinct layer deep in the tissue of the cornea, we can now exploit its presence to make operations much safer and simpler for patients.

From a clinical perspective, there are many diseases that affect the back of the cornea which clinicians across the world are already beginning to relate to the presence, absence or tear in this layer."

The human cornea is the clear protective lens on the front of the eye through which light enters the eye. Scientists previously believed the cornea to be comprised of five layers, from front to back, the corneal epithelium, Bowman's layer, the corneal stroma, Descemet's membrane and the corneal endothelium.

The new layer that has been discovered is located at the back of the cornea between the corneal stroma and Descemet's membrane. Although it is just 15 microns thick - the entire cornea is around 550 microns thick or 0.5mm - it is incredibly tough and is strong enough to be able to withstand one and a half to two bars of pressure.

The scientists proved the existence of the layer by simulating human corneal transplants and grafts on eyes donated for research purposes to eye banks located in Bristol and Manchester.

During this surgery, tiny bubbles of air were injected into the cornea to gently separate the different layers. The scientists then subjected the separated layers to electron microscopy, allowing them to study them at many thousand times their actual size.

Understanding the properties and location of the new Dua's layer could help surgeons to better identify where in the cornea these bubbles are occurring and take appropriate measures during the operation. If they are able to inject a bubble next to the Dua's layer, its strength means that it is less prone to tearing, meaning a better outcome for the patient.

The discovery will have an impact on advancing the understanding of a number of diseases of the cornea, including acute hydrops, Descematocele and pre-Descemet's dystrophies.

## Aspirin Linked to Blinding Eye Disease

Regular aspirin users are more likely to develop the wet form of Age-related Macular Degeneration (AMD) compared to people who rarely or never take the drug, a new study shows. Previous studies showed that the dry form of AMD is not statistically associated with aspirin use.

Macular degeneration is a leading cause of blindness in older adults, and it is on the rise. In wet macular degeneration, tiny new blood vessels grow under the retina, the light-sensing part of the eye. These blood vessels break open and leak, causing scar tissue to form. Over time, the scar tissue clouds central vision. It is not clear why this happens. Both kinds of macular degeneration become more common as people age. Beyond age, the only risk factor that is consistently linked to the condition is smoking.

According to the study, compared to people who never took aspirin, regular users were more than *twice* as likely to develop macular degeneration.



## Exposure to High Altitude May Affect Retinal Vessels

Retinal vessels may leak at high altitudes, even in healthy adults with no previous history of retinal problems, according to a new study published in JAMA.

Gabriel Willmann, MD, from the Center for Ophthalmology, University of Tübingen, Germany, and colleagues used fluorescein angiography with a confocal scanning laser to evaluate 14 unacclimatized volunteers at baseline (341 m), after ascent to 4559 m within 24 hours, and more than 14 days after return. Four ophthalmologists graded them for presence and location of leakage without being informed of the timing of the photographs.

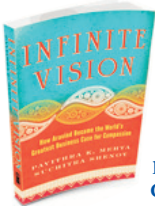
The researchers found that none of the volunteers demonstrated retinal abnormalities at baseline; however, at high altitude, 50% of participants had marked bilateral peripheral retinal vessel leakage. However, no leakage was noted in the central retina, and all changes reversed after descent.

## OUR COLLABORATOR: ARAVIND EYE CARE SYSTEM

[www.aravind.org](http://www.aravind.org)

### BOOK EXTRACT

## *A Visionary Life*



**INFINITE VISION** is based on the life of **Dr. Govindappa Venkataswamy**, the founder of the Aravind Eye Care System. This extract traces the beginnings.

The 'impossible' rarely deterred Dr. Govindappa Venkataswamy. As a young surgeon, he watched a crippling disease permanently freeze and twist his fingers out of shape.



These fingers went on to perform 100,000 sight-restoring surgeries, but Dr. V, as he came to be known, would not stop there. In 1976, he founded Aravind, an eye clinic operating out of a family home in South India. He was 58 years old. Aravind was his post retirement project, created with no money, business plan, or safety net. What it did have was 11 beds- and an oversized mission. Its mission was to eliminate curable blindness.

At Aravind, if you could not pay for surgery, you did not have to. If you could not reach the clinic, its doctors would come to you. At first glance, it seemed a venture far too quixotic to be effective. But when intuitive goodness is pitted against unthinkable odds, it stirs

the imagination and awakens possibility. Dr. V integrated a heart of service and deep spiritual aspiration with the best practices of business. In this way, he forged a high-volume, high-quality, and affordable approach to service delivery that would expand to put a serious dent in a problem of global proportions. Today, the Aravind Eye Care System is the largest and most productive blindness-prevention organization on the planet. During the last 35 years, its network of eye

hospitals in South India has treated more than 32 million patients and performed more than 4 million surgeries, the majority either subsidized or free.

Think David and Goliath: a man stands up in all his devastating frailty, fights the good fight, and wins a victory for humanity. Aravind is a luminous proof of what is possible in our world.

**At Aravind, if you could not pay for surgery, you did not have to. If you could not reach the clinic, its doctors would come to you.**



### Dr. P. Namperumalsamy wins AAO Award

Dr. P. Namperumalsamy received the Outstanding Humanitarian Service Award by the American Academy of Ophthalmology. The award was presented at the Annual Congress of the Academy at Chicago in November 2012.

### Rotary & Lions Awards for Dr. G. Natchiar

Dr. G. Natchiar was awarded the 'For the Sake of Honour Award' by the Rotary Club of Pondicherry Mid Town on April 7, 2013 for her meritorious service in the field of ophthalmology. She also received the 'Lifetime Achievement Award' of the Lions Clubs International District 324 A3 at a function on April 20 in Pondicherry in recognition of her illustrious contribution to the field of eye care.

### Aravind 2020: The way forward

A three-day retreat of the Aravind Group was held at Hotel Fortune Pandiyan, Madurai, in January this year to reflect on the past developments and more importantly, to plan for the next 8 years of growth of the organization. Senior members from all the centres of Aravind Hospitals, Aurolab and AMRF were present.

# PBA Eye to Lead East in National ROP Project

PBA Eye Hospital has been selected as one of the eight collaboration centres of India for the National Retinopathy of Prematurity (ROP) Project. Initiated by the World Health Organisation, the Project is being implemented in India by the All India Institute of Medical Sciences (AIIMS) in association with Sightsavers International.

Retinopathy of Prematurity (ROP) is a disease of the eye affecting prematurely-born babies. It is caused by abnormal growth of retinal blood vessels which may result in scarring, retinal detachment and eventual blindness in serious cases. All babies born within 34 weeks of gestation or below 1750 gm of birth weight are at greater risk. Other risk factors include sepsis, multiple blood transfusion and respiratory distress syndrome. Very sick newborns are generally at increased risk of this disease.

The most effective proven treatment for ROP is Laser therapy, which destroys the peripheral areas of the retina, slowing or reversing the abnormal growth of blood vessels. However, treatment is essential within a few weeks of

children with the potential to develop ROP are diagnosed early and provided timely treatment to prevent getting visually impaired. At the first phase this is being done through awareness programs

and workshops in major cities across India. Training is conducted primarily by three National ROP Training centres, which includes Aravind Eye Hospital, Coimbatore.

P B A E Y E

Hospital has been selected as the sole collaboration and training centre in West Bengal for this prestigious project in view of the fact that it is one of the few hospitals in the region with full-fledged paediatric facilities in its Retina Department, as well as a Paediatric Ophthalmology Department. Till date over 1000 babies have been screened at the hospital to detect ROP.

**“Get your premature baby screened within the first 30 days of birth. Join the war to prevent blindness”**

Dr. Abhijit Chattopadhyay  
(MBBS, MS, Ex-Fellow & Consultant-  
Vitreous & Retina, AEH)

Chief of the Department of Retina,  
Vitreous & Uvea Clinic at PBA Eye  
Hospital and collaborator of the National  
ROP Project



birth, and lack of awareness about ROP among ophthalmologists and paediatricians is one of the key factors causing many premature babies to develop severe ROP, leading to blindness. There is, therefore, an urgent need to spread awareness about ROP and develop new screening programs in India to combat ROP related childhood blindness. The National ROP Project aims to ensure that all



**Website Re-launched:** PBA Eye Hospital recently re-launched their website ([www.birlaeye.org](http://www.birlaeye.org)) with a fresh look. The website lists information relating to the hospital including details of the departments, facilities and treatments provided as well as patient information including admission details.



## Outpatients

Open from Monday to Saturday  
between 8.30 a.m. and 5.30 p.m.

## SPECIALITY CLINICS

- Cataract
- Glaucoma
- Retina - Vitreous and Uvea Services
- Cornea & Refractive Services
- Orbit & Oculoplasty

## PAEDIATRIC CLINIC

Thursdays & Saturdays



## Eye Camps

PBA Eye, under the banner of M. P. Birla Eye Clinic, organizes eye camps for the underprivileged on a regular basis. This includes fixed camps as follows:

**Doyen Dishari, Bansberia**  
1st Thursday of every month

**Emami Foundation, Haripur**  
2nd Thursday of every month

**Birla Jute Mills, Birlapur**  
3rd Thursday of every month

**AMOH, Shyamnagar**  
2nd Sunday of every month

**Emami Foundation, Picnic Garden**  
3rd Sunday of every month

For more details, call: 84 2000 8000

## My Most Memorable Case

### Rare Malignant Glaucoma Treated with Nd: YAG Laser

When Mr. Jyotirmoy Banerjee first visited Priyamvada Birla Aravind Eye Hospital in January 2011, he told doctors that he was losing his vision very rapidly. Upon examination, the doctors found that his left eye was practically blind and the vision in his right eye was deteriorating very fast. The vision tests revealed that the vision with glass in the RE was 6/6 P. The intraocular pressure in the right eye was as high as 36 mm of mercury.

Also the patient had already undergone combined cataract and glaucoma surgery in both eyes. Dr. Surojit Chakrabarti took up the case.

#### Deceptive Appearances

Upon inspection, we detected that the right eye had a very shallow anterior chamber depth, which was acting as a barrier to drain the aqueous humour. We also spotted aqueous misdirection syndrome where the aqueous humour flows into the chamber behind the lens that is filled with vitreous humour. We realized that this is malignant glaucoma that progresses very fast and can cause permanent blindness. The aqueous humour had to be drained from behind the lens immediately.

One way to achieve this was to conduct vitrectomy which requires making incision in the sclera or the white exterior of the eye. This was an interventional process and involved risks. Instead, we decided to apply Nd: YAG Laser to create a hole in the anterior hyaloid face (which is a thin layer that lies behind the

lens) and drain the aqueous humour. We drained some of the humour through this procedure. However, the lens was acting as a barrier to drain all the aqueous humour gathered behind.

So we identified the peripheral iridectomy that was done during the previous glaucoma surgery. Because of that, some part of the iris had already been removed to create a channel between the anterior chamber and the posterior chamber. We applied the laser through this channel so that the intraocular lens did not cause an obstruction.

#### Another Challenge

There was yet another challenge left. As we began draining the aqueous humour, some vitreous humour also started to flow out and block the small hole created by the laser. As a result, the intraocular pressure increased rapidly. We anticipated this problem and administered atropine to enlarge the pupil so that the fluid came out properly.

The laser treatment took around 5 minutes and we eventually succeeded. The intraocular pressure came down to 20 mm of Hg in the right eye. It averted the complicated vitrectomy surgery that would take at least 45 minutes and could lead to various post-surgery complications.

The vision was restored and threats of malignant glaucoma were averted.



**Dr. Surojit Chakrabarti**  
MBBS, MS,  
Fellow (Ant. Segment), AEH

“  
We realized that this is malignant glaucoma that progresses very fast and can cause permanent blindness  
”

## Doctor's Profile

**Dr. Jayangshu Sengupta**

MBBS, MS, Fellow (LV Prasad Eye Institute, Hyderabad)

Dr. Sengupta is known for his speciality in Cornea and Refractive Surgery. He is currently the Medical Director at MP Birla Eye Bank, unit of MP Birla Netralaya, and Chief Medical Officer at Priyamvada Birla Aravind Eye Hospital, with which he has been associated for 12 years. His articles have been published in international peer reviewed journals like Cornea, Eye, Archives of Ophthalmology, Indian Journal of Ophthalmology, etc.



## THE WAVELIGHT EXCIMER Highest Frequency Laser



PBA Eye uses a Wavelight Excimer Laser 500 Hz Eye Surgery Technology for high frequency LASIK procedures. The German technology enables application of tiny laser pulses to the cornea to correct refractive errors with utmost accuracy to emphasize quality, safety and precision of result.

## PENTACAM: Cutting Edge Technology



The Pentacam imaging system is a technique to map the curved surface of the cornea. This can help measure the curvature of the cornea as well as assist in LASIK surgery, phakic IOLs and the fitting of contact lenses. This procedure is non-invasive and painless to the patient.

## LASIK Surgery: Two views

### Patient's Story

“ I had come to Dr. Sengupta for a laser surgery as I wanted to get rid of my glasses. My glass power had just changed and he told me to come back after about 6 months. When I came back, my power was checked. Thankfully there was no increase. I never imagined the procedure would be over so soon. I had to lie down under a very futuristic looking machine for just a few minutes. It was absolutely painless. I am delighted with the brand new me! Just imagine – no glasses, no contact lenses. I feel so much more confident. And I would like to thank Dr. Sengupta heartily for giving me a new persona and a new life. ”

Ms. Salonee Mukherjee

### Doctor's Speak

“ The LASIK procedure involves using the Excimer laser to reshape the surface of the eye so as to change the focusing power of the cornea. We use an instrument called a microkeratome, or an IntraLase laser to create a LASIK flap. That is lifted off from the surface of the eye. The change in shape is then imposed by the laser and you put the flap back down. Salonee had a LASIK procedure where the LASIK flap was created with the Moria SBK Microkeratome which basically makes the thinnest flap, and then a Wavefront treatment was applied. In the majority of corrections that we do, the laser treatment component lasts less than a minute. ”

*I never imagined the procedure would be over so soon. I had to lie down under a very futuristic looking machine for just a few minutes. It was absolutely painless.*

Dr. Jayangshu Sengupta



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