LENS IMPLANT Technology for Macular Degeneration

Part 1.

Here is an article by my colleague, surgeon Dr. Amar Aggarwal of Chennai, India who is implanting a new lens implant for those with cataract and age-related macular degeneration. The lens was designed by Isaac Lipschitz of Israel.

The implant below is the latest such lens implant available anywhere. It is not available in the United States at this time.

*Figures 1- The new mirror telescopic IOL -LMI (Lipschitz macular implant) (US patents filed). Illustration depicts how the IOL magnifies the central image on the retina.*

A new solution for the optical rehabilitation of patients with age-related macular degeneration and other macular pathologies.
Macular pathologies cause a great amount of morbidity and mortality world wide and have significant impact on community health. Age-related macular degeneration (AMD) is the leading cause of legal blindness in the industrial world. To help solve this problem, a new IOL, designed by Issac Lipschitz from Israel, magnifies the image on the retina based on mirror telescope: the LMI-Lipshitz Macular implant. This is not the same as the AMD prosthetic device, Implantable Miniature Telescope (IMT), also developed by Dr. Isaac Lipshitz. Among the first cases using the LMI were performed in India.

LMI mirror telescopic IOL

The LMI is a regular IOL that incorporates two miniature mirrors in Cassagrain telescopic configuration. These mirrors act by modifying the reflected image on the retina. (Figure 1) The IOL has a dual optical system which ensures that light passing through the center of the optic is magnified by the Cassagrain telescope whereas the light passing through the periphery passes through the normal IOL configuration. Overall diameter of the IOL is 13mm while the size of the optic is 6.5mm. The anterior, central mirror size is 1.4mm. The posterior mirror is doughnut shaped and 2.8mm in diameter with a central hole of 1.4 mm diameter. The peripheral zone of the optic is similar to a normal IOL for undisturbed peripheral vision. The reflecting surfaces of the LMI are coated with multiple layers of TiO2 & SiO2 (dielectric coatings) thus creating the mirror effect. The thickness of these mirrors is only 1-2 microns. The entire IOL is also coated with Parylene C (poly-para-xylylenes) for the reasons of biocompatibility. This LMI was designed to have 2.5X magnification, i.e. magnifying the central image on the retina 2.5 times. The subject thus sees a magnified central image through the mirror telescope and a normal non-magnified image through the periphery of the IOL thus increasing the magnified central vision while maintaining the orientation in space due to normal peripheral vision.
Lipschitz Macular Implant Allows Bilateral Magnification of Vision

On June 17, 2009, OptoLight Vision Technology announced that it received a CE mark for its Lipshitz Macular Implant (LMI), named for its inventor, Isaac Lipshitz. This will allow OptoLight to immediately begin marketing the implant in Europe and other markets outside of the United States.

On December 28, 2007, Optolight Vision Technology announced success from implantation of the LMI, which is a second generation of the implantable miniature telescope (IMT).

Researchers at Dr. Agarwal's Eye Hospital and Eye Research Centre, Chennai, India, investigated visual and surgical outcomes of the intraocular mirror telescopic intraocular lens implanted in patients with bilateral macular pathology and visual acuity worse than 20/200 in whom vision improved with a X2.5 external telescope preoperatively. They reported that the LMI may be an effective solution for optical rehabilitation of patients with ARMD or other macular pathology by increasing the central image on the retina while preserving peripheral vision. This preservation of the peripheral field is the main difference between the LMI and the IMT, allowing it to be implanted in both eyes. The abstract of this research was published online at www.sciencedirect.com.

Part 2. What is available in the United States at this time is below. It is Dr. Lipschitz’s first lens implant for macular degeneration, and it has achieved U.S. FDA approval.

http://www.visioncareinc.net/technology
The Implantable Telescope Technology platform is based on wide-angle micro-optics that, in combination with the optics of the cornea, create a telephoto system that magnifies objects in view. VisionCare's third-generation telescope implant (Implantable Miniature Telescope by Dr. Isaac Liphitz), has received FDA approval. The company also holds a CE mark and Israel Ministry of Health approval for distribution and sale of the device. The telescope implant is surgically placed in the capsular bag after removal of the eye's lens. Implantation inside the eye allows the patient to see using natural eye movements in both stationary and dynamic environments.

**Implantable Telescope Technology**

The Implantable Telescope Technology platform incorporates wide-angle micro-optical lenses in a Galilean telescope design. Based on this proprietary technology, VisionCare's lead product (Implantable Miniature Telescope by Dr. Isaac Liphitz), along with the cornea, enlarges images in front of the eye approximately 2.2 or 2.7 times their normal size (depending on the model used). The magnification allows central images to be projected onto healthy perimacular areas of the retina instead of the macula alone, where breakdown of photoreceptors and loss of vision has occurred. This helps reduce the 'blind spot' and allows the patient to distinguish and discern images that may have been unrecognizable or difficult to see.

**Telescope Implant Construction**

The telescope is about the size of a pea (3.6 mm diameter; 4.4 mm length) and is surgically placed inside the eye