First in New York: Bionic technology aims to give sight to woman blinded beginning at age 13

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A 50-year-old New York woman who was diagnosed with a progressive blinding disease at age 13 was implanted with an experimental electronic eye implant that has partially restored her vision. A team led by Dr. Lucian V. Del Priore at NewYork-Presbyterian Hospital/Columbia University Medical Center performed the June 26 surgery -- the first case of its kind in New York.

The first treatment aimed at restoring limited sight in people blinded by retinal disease, it is currently available as part of a multicenter clinical trial.

The implant -- a component of the Argus II Retinal Stimulation System by Second Sight Medical Products Inc., of Sylmar, Calif. -- is designed to stimulate retinal cells directly. In a healthy eye, photoreceptor cells of the retina receive light and translate it into signals that are sent to the brain via the optic nerve. But in patients with a genetic, blinding disease called retinitis pigmentosa (RP), these light-processing cells gradually degenerate, leading to severe vision loss or total blindness.

"With this system, people who are functionally blind might begin to distinguish light from dark, recognize visual patterns, make out figures, see food on a plate and navigate in unfamiliar surroundings," says Dr. Del Priore, site principal investigator, professor in the Department of Ophthalmology at Columbia University College of Physicians and

Surgeons, and an ophthalmologist at NewYork-Presbyterian Hospital/Columbia University Medical Center. "In its current form, the device won't restore full visual function -- but if it dramatically reduces a patient's disability, that is a major advance."

Retinitis pigmentosa only affects the outer layer of retinal cells, leaving the inner layers healthy and capable of conducting electricity, Dr. Del Priore explains. Therefore, people with glaucoma, diabetic retinopathy, optic nerve disease, or a history of retinal detachment have been excluded from the study, as their level of retinal impairment is likely to be more severe and more generalized. At this point, the device is being tested exclusively in people with RP as part of a clinical trial offered at six sites across the country.

From Video Images to Sight

Argus II and its predecessor, Argus I, have already been implanted to reduce some aspects of vision loss in about 20 patients with RP in the United States. Dr. Del Priore and his surgical team are optimistic about the newest patient's prospects, based on positive results in others who have participated in studies of the system thus far. The device was developed by Second Sight under the lead of Dr. Mark Humayun, who is currently at the University of Southern California. NewYork-Presbyterian/Columbia's study coordinator, Elona Gavazi, was instrumental in screening and recruiting patients for the current study.

Argus II comprises three components: the implanted part, which is placed inside the patient's eye; a tiny camera and transmitter, mounted on a pair of sunglasses; and a wireless microprocessor and battery pack, to be worn on a belt. The implant itself contains 60 tiny electrodes that are attached to the retina via a micro-wire roughly the width of a human hair. These administer electrical impulses to retinal cells, allowing the brain to perceive light.

Learning to See Again

Argus II is an innovative technology, Dr. Del Priore continues, but it is the rehabilitation process that will ensure a patient's ability to benefit from the procedure. In fact, without visual training, the patient may not learn to use or accept the images being received.

The intensive phase of rehab takes about six months, he says, but the process can continue for a year or more. Rehabilitation, device training, along with functional assessment of the patient's vision, will take place at Lighthouse International, a leading international non-profit vision rehabilitation and research organization, which is a collaborating institution with NewYork-Presbyterian/Columbia in the clinical trial.

At the Arlene R. Gordon Research Institute of Lighthouse International, senior fellow in vision science Aries Arditi, Ph.D., principal investigator of the Lighthouse site, will conduct psychophysical testing of the patient with and without the device to assess her performance of specific visual tasks, such as pattern recognition, aiming the device's camera with head movements, and using the system for orientation and navigation. Dr. Arditi will also help determine which training procedures will allow the patient to make the most of her newly restored, if limited, vision -- insights that can be carried forward for the benefit of future device recipients.

"We are very pleased to be a part of this groundbreaking and exciting research and to be working with such outstanding partners. Our collective work could have a profound effect on the estimated 400,000 Americans with retinitis pigmentosa and other retinal diseases," states Dr. Arditi.

Source: Columbia University Medical Center (news : web)