MAYO CLINIC

Mayo Foundation Chapter of Sigma Xi Public Lecture

Building the Bionic Man:
The Role of Biomedical Engineering in Regenerative Medicine

Lecturer: Raymond Iezzi, MD

Date: November 17, 2015

Time: 7:30 pm

Place: Phillips Hall, Siebens Building

Raymond Iezzi, MD, MS, is an Associate Professor of Ophthalmology at Mayo Clinic in Rochester, Minnesota. His biomedical engineering research began in 1984 while he was an undergraduate at Rutgers University, where he developed neural networks for visual biofeedback with the human brain. He earned his Master of Science in Biomedical Engineering from Rutgers University, concurrently with his medical school training at New York Medical College and his residency in ophthalmology at the New York Eye and Ear Infirmary. He trained as a vitreoretinal surgery fellow at the Kresge Eye Institute at Wayne State University from 1998 to 2000 and then joined the faculty as the Scientific Director of the Ligon Research Center of Vision, an endowed laboratory where several important retinal prosthesis designs have been developed. After 11 years at Wayne State University, Dr. Iezzi joined Mayo Clinic as a vitreoretinal surgeon specializing in complex diseases of the retina and vitreous. His research has included the development of sustained-release polymer and nanoparticle-enhanced drug-delivery systems. More recently, in collaboration with Mayo Clinic's Division of Engineering and the Center for Individualized Medicine, Dr. Iezzi has led teams in the development of nanocomposite biosensors for bedside diagnosis and guided treatment. For patients with central vision loss due to macular degeneration, Dr. Iezzi is developing methods for retinal transplantation to restore sight. Dr. Iezzi received the 2015 Rutgers University Distinguished Alumnus Award in Research and Education. He has received the Visionary Award from the Foundation Fighting Blindness, the Ronald G. Michels Fellowship, the Heed Ophthalmologic Fellowship, and the Knapp Memorial Ophthalmologic Fellowship.

For patients who have lost all sight from photoreceptor degeneration due to an inherited retinal degeneration such as retinitis pigmentosa, hope for vision restoration has come through advances in retinal prosthetic implants. These devices function as a bionic eye by stimulating the retina to provide a new sense, called prosthetic vision. For patients who have lost both eyes, cortical visual prostheses implanted within the visual cortex of the brain can also restore rudimentary sight.

Visual prosthetic devices, artificial limbs, and artificial organs have resulted from advances in biomedical engineering. In this multidisciplinary field, research teams of experts from many engineering disciplines and medicine are making medical advances in regenerative medicine and surgery that were once described only in science fiction. This lecture will describe the engineering design methods and team-science approach used in the development of visual prostheses for the blind and will relate these principles to other exciting advances in regenerative medicine and surgery.

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