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PIBIC Last Name - Yanai First Name - Douglas Middle - Camilo

Service (sector) Retina and Vitreous N° CEP

Visual performance in computer controlled tests using a retinal prosthesis in three subjects with photoreceptor loss

Douglas Yanai^{1,2}, James D Weiland², Manjunatha Mahadevappa², Gildo Y. Fujii², Michel E. Farah¹, Mark S. Humayun²

1 – Department of Ophthalmology – UNIFESP/EPM 2 – Doheny Eye Institute/USC

Purpose: To measure the accuracy with which test subjects implanted with an epiretinal prosthesis can perform simple visual tasks simulated with a computer. Methods: The FDA and USC-IRB approved the study protocol. Once the subjects met the qualifications in electrophysiological and psychophysical tests, a Second Sight epiretinal prosthesis model 1 was implanted in the worse eye. The intraocular component consists of 16 electrodes in a 4x4 distribution. Electrical stimulation was started between 7 and 15 days post-operative. Computer controlled tests (stimulus/patterns generated by computer) were performed. Using the computer interface different situations were simulated as: movements (activating a pair of electrodes in sequence), orientation lines of electrodes (horizontal or vertical) and position (up vs. down; left vs. right) of the perceptions. Results: sequential activation (4 alternative forced choice (AFC)) 70%; orientation of lines of electrodes (2 AFC) 78%; spatial location (2 AFC) 80%

Conclusions: The results were significantly better than by chance. Test subjects with no better than light perception vision can perform simulated simple visual tasks using an epiretinal prosthesis.