Presentation Abstract

Program#/Poster#: 20.1
Title: A retinal prosthetic strategy with the capacity to restore normal vision
Location: Room 5B
Presentation Time: Saturday, Nov 13, 2010, 1:00 PM - 1:15 PM
Authors: *S. Nirenberg, C. Pandarinath; Dept Physiol & Biophys, Weill Med. Col. Cornell Univ., NEW YORK, NY
Abstract: Retinal prosthetics offer hope for patients with retinal degenerative diseases. There are currently 25 million people worldwide, who are blind or facing blindness due to these diseases, and there are few treatment options. Alternate therapies, such as drug and gene transfer approaches, are able to help some subpopulations - they can slow the degeneration down - but for the large majority of patients, their best hope is through prosthetic devices (reviewed in Chader et al., 2009). Current prosthetics, though, aren’t yet able to restore normal vision: for example, they allow for perception of spots and edges, but not yet natural scenes. Efforts to improve prosthetic capabilities have been focusing largely on increasing the resolution of the device’s stimulators (either electrodes or optogenetic transducers). Here, we show that a second factor is also critical: driving the stimulators with the retina’s neural code. Using the mouse as a model system, we generated a prosthetic system that incorporates the code - this dramatically increased the system’s capabilities, well beyond what could be achieved just by increasing resolution. Further, the results show, using 6000 optogenetically stimulated mouse ganglion cell responses, that the combined effect of using the code and a high-resolution stimulator is able to bring prosthetic capabilities out of the realm of simple image detection into the realm of natural sight.

Disclosures: S. Nirenberg: Other; Patent pending. C. Pandarinath: None.
Keyword(s): Channelrhodopsin
Neural Coding
Neuroprosthetic
Support: NIH Grant EY012978

2010 Copyright by the Society for Neuroscience all rights reserved. Permission to republish any abstract or part of any abstract in any form must be obtained in writing by SfN office prior to publication.