

Manipulating the Brain

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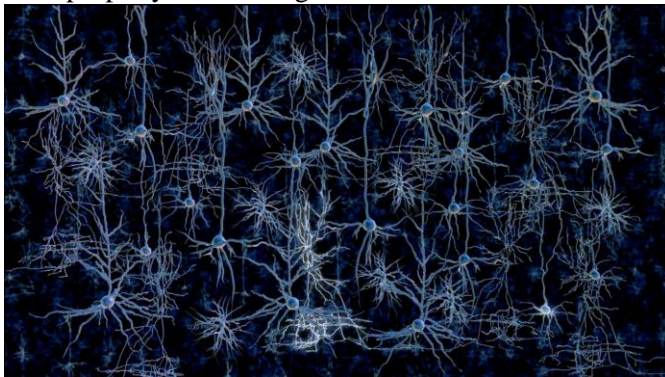
Using gene therapy to alter specific types of cells in the brain allows for precise control over neural reactions, making treatments more effective and causing fewer side effects.

I. INTRODUCTION

SCIENCE has long been trying to understand the human brain and mind, and in recent years great strides have been made toward achieving this goal. Specifically, researchers such as Ed Boyden have been able to control neurons such as with an on/off switch by splicing photoreceptors into specific neurons then shining light on them to attain the desired effect.

II. METHODS

Typical treatments for brain disorders, mostly medicine or surgery, are both less effective than desirable and have the potential for serious side-effects. Chemicals wash over all of the cells in the brain and it is practically impossible to make a chemical which would target *only* the desired areas. Likewise, surgery like that which is performed for patients with seizures in extreme cases removes entire sections of the brain, which can permanently debilitate the patient. In contrast, it is becoming possible to harvest the DNA coding for structures like photoreceptors from bacteria and fungi and, using a harmless virus to transport the genetic code, splice the structures into specific types of neurons. From there, the neurons can then be either stimulated or deactivated in the presence of light, allowing for a temporary, precise shutoff or turning on of improperly functioning cells.



III. RESULTS

Though the technology has not yet been implemented in humans, tests with mice have been shown to be able to, among other things, stimulate the reward center of the brain, overcome fear response to stimulus, and even help to restore vision by essentially turning the still-functioning cells in the eye into miniature cameras. Further research into the field could allow for a revolution in the treatment of mental illnesses and disorders and even restore functionality of lost senses.

IV. DISCUSSION

Gene therapy in relation to the brain could enable scientists to gain a previously unparalleled understanding of the function of the brain itself; by being able to target and manipulate specific cells within the brain's structure, we can test and discover the purpose each plays. From there, we can begin to understand how the human mind works at its most basic level and provide better treatment to people suffering from neural disorders. So far, there have been no serious reactions or signs of rejection to the spliced-in genetic code, meaning this field shows great promise for the future.

REFERENCES

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