# Karl Deisseroth: Bringing CLARITY to brain research

<https://www.youtube.com/watch?v=LJ4PA1Gkhkg>

Genome project

Human Genome Project

Human Neuron Project

Human Connectome Project

Map cells of neurodegenerative disease

<https://www.ted.com/talks/ed_boyden_a_light_switch_for_neurons?language=en#t-98641>

Blind Mice, No longer: <https://www.youtube.com/watch?v=jY5Aynh1-cU>

In French: <https://www.youtube.com/watch?v=iHP2s1WSNSs>

https://www.nytimes.com/2021/05/24/science/blindness-therapy-optogenetics.html

Map of the brain

Turn on:Figure out roles of each circuit, contribute to certain functions, initiate, sustain, go wrong in certain pathologies

Turn off: what there are necessary for

Cell overactive,

Equivalent of Xrays

How modify behaviors like appetite, learning, memorizing, addiction,

Find new targets fro drugs, for people with sever disabilities

PTSD treatments

Survey organisms in whole tree of life

Epilepsy if drug fails remove part of the brain, irreversible and can have side effects

Optical prosthetic: blindness

Side effects, immune system will react,

Optogenetics have delivered unprecedented results. The field has a long history going back to Francis Crick 1979, recently people like Georg Nagel, have made breakthrough innovations, starting with publications from Karl Deisseroth in 2004 showing light activation of neurons expressing a channelrhodopsin.

In 2011, Ed Boyden use optogenetics to cure mice of certain form of blindness, <https://www.youtube.com/watch?v=jY5Aynh1-cU>

Longer talk, about 18 mn video, <https://www.ted.com/talks/ed_boyden_a_light_switch_for_neurons?language=en#t-927907>

And in May 2021 a blind man’s sight is partially restored using optogenetic therapy:

<https://www.youtube.com/watch?v=iHP2s1WSNSs> (in French with subtitles)

<https://www.nytimes.com/2021/05/24/science/blindness-therapy-optogenetics.html>

In this case, it took 11 years to use optogenetics to prove itself in the clinics, describe potential applications of optogenetics, the limitations of the genetic therapy you are proposing could face and/or ways to address them.

Describe some concrete applications of optogenetics, and discuss its current limitations and potential venus to address them.