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

In 2011, Ed Boyden used 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>

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

In the case above, it took about 10 years to use optogenetics to prove itself in the clinics, discuss some potential applications of optogenetics, the limitations of the genetic therapy you will describe to make it as human therapy, and/or ways to address them.

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