

Background

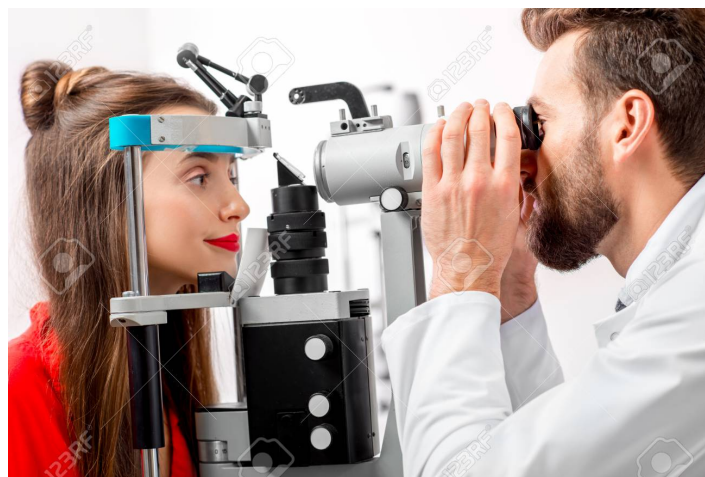
National Eye Institute (NEI) of National Institutes of Health (NIH) defines Retinitis Pigmentosa (RP) to be a class of rare genetic disorder leading to cellular apoptosis – photoreceptor “suicide” – in the retina.

Low-level light therapy consists of lasers or light emitting diodes at near-infrared wavelengths. At the status quo, LLLT devices are marketed as skin wound therapy, hair growth, and pain relief devices. It emits near-infrared light around 780nm near the surface of a skin where mitochondrial chromophores absorb photons. This causes a chain reaction of electron transport and ATP nitric oxide release, leading to signaling pathways. Ultimately signaling pathways activate stem cells leading to tissue repair and prevention of cell suicide.

Objective

The objective of the first project is to develop a working LLLT device with 1) Control Device, 2) Eye tracking mechanism for the safeguard of the cornea, 3) Overall mechanical design including housing of the laser, control, head placement, and microscope for the doctors.

The process of administering this device is as follows: Patient will place their forehead and chin on the guard and open one of their eyes. The doctor will use the microscope and the control to administer the laser treatment. The eye tracking mechanism will be active so that when the patient moves his/her pupil towards the laser, the laser will halt the procedure. This is to prevent damage to cornea, lens, and the fovea. Below is what the procedure may look like:



Currently, research on the prototype with basic laser functioning is being tested at Wilmer Eye Institute on C57 wild type and rd10 mice to see the effectiveness on retinal degeneration.

This device will be developed to serve as a treatment option for Retinitis Pigmentosa and it is our job to bring this medical device into market. Concurrent research with animals along with human clinical studies are planned throughout 2019.

The second round of objectives will begin with clinical studies, making adjustments to our design based on patients' and doctors' feedback. This round will also serve to perfect the mechanical and software maneuvers along with mending the safety procedures to pass FDA approval.