

Laser Treatment for Choroidal Neovascularization

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Diabetes is a disease that affects millions of Americans. It results in many permanent and debilitating conditions, one of which is choroidal neovascularization (CNV). This important blinding disease can also be caused by macular degeneration due to old age and Inactive Cytomegalovirus (CMV) Retinitis of HIV-infected individuals. CNV prevents the retina from acquiring essential blood due to fragile and leaky blood vessels. In turn, deeply affecting the central area of acute vision by causing distortion, blind spots and blurring of the central vision. The best way to save the central vision of the eye is to burn the abnormal blood vessels through the use of lasers.

Although the laser treatment of CNV has proven to be superior compared to other procedures, each treatment has a 50% failure rate. Also, the laser shots result in scar tissue which cause a permanent blind spot in that area. Laser treatments are necessary not to regain lost vision, but to prevent further damage to the retina.

For the procedure, the doctor may or may not inject the patient with IndoCyanine Green dye. If the dye is used, the retina images will have bright blood vessels relative to a dark background versus dark blood vessels relative to a bright background (normal contrast). Then, a fundus camera is used to photograph the retina. These images are used to identify damaged blood vessels as well as the locations of the sensitive parts of the eye. The eye is then anesthetized and a special contact lens is placed on the eye. In order for the laser treatment of CNV to be successful, the

doctor must correctly aim thousands of laser shots. Much time is taken in order to avoid the crucial macula, optic disc and blood vessel tree. After the procedure, the dye is injected to determine if the blood vessels have closed completely. If not, a consecutive treatment must be performed.

Due to the complexity of the procedure, it is not surprising that laser treatment requires several visits to the physician. Along with the aforementioned failure rate of 50% for each visit, it is necessary that a faster and more accurate laser procedure is necessary.

An automated, guided laser system has been proposed in order for the procedure to be completed in only one session. Compared to the current laser treatment, it also implements a fundus camera for the retina images and uses the same method for the detection of blood vessel boundaries. On the other hand, the proposed technique uses a 1-dimensional Gaussian filter versus the current 2-dimensional Gaussian filter. Also, faster algorithms are used for segmentation and derivation of sensitive areas.

<http://bri.wustl.edu/brochure.html>
www.retroconference.org/2002/Abstract/13155.htm
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