

Comparison of Three Types of Lasers in Laser Trabeculoplasty in Human Donor Eyes and Clinical Study

Purpose: To assess the effect on tissue, as well as depth of penetration in laser trabeculoplasty by three different types of lasers.

Methods: Laser trabeculoplasty was performed on three human donor eyes using three different laser techniques: Argon Laser Trabeculoplasty (ALT), Selective Laser Trabeculoplasty (SLT) and Titanium: Sapphire Laser Trabeculoplasty (TLT). Each eye was sectioned into thirds to allow for application of each laser treatment to each eye. ALT was performed using an argon laser with a wavelength of 488-514nm; for SLT, a frequency-doubled Q-switched Nd:YAG laser (532nm) was used; and, for TLT, a Titanium:Sapphire laser (790nm) was used. Three laser exposures of increasing energy and duration were used on each section. Following exposure, tissue samples were fixed and processed for histological analysis with light microscopy. In a separate study, a randomized group of 88 eyes of 88 patients with primary open-angle glaucoma (POAG) were enrolled for treatment. Patients were randomized to either undergo TLT or ALT.

Results: The clinical study on human eyes found an IOP reduction of 20 to 30% occurred following treatment with TLT or ALT, with few adverse events. In the laboratory study, the sectioned eye exposed to ALT showed the most damage, while the TLT and SLT sections showed little anatomical change. Areas of trabecular meshwork without pigmentation could be seen in the ALT and SLT sections, but not in the TLT section.

Conclusions: In the lab study, each laser showed effects in the trabecular meshwork that were unique and identifiable by light microscopy. In the clinical study, TLT successfully lowered IOP to clinically beneficial levels in patients with primary open-angle glaucoma. Further clinical studies are now underway in using the sapphire laser to titrate a gold micro-shunt.

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None

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