

## **PULSED MID-IR LASER TRABECULOPLASTY VERSUS ALT IN CATS**

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**PURPOSE:** To comparatively assess the safety of two pulsed near IR lasers: Titanium Sapphire (Ti:Al<sub>2</sub>O<sub>3</sub>) and Alexandrite (BeAl<sub>2</sub>O<sub>4</sub>:Cr<sup>3+</sup>), 10μs pulse, λ ~790nm, versus conventional blue-green (λ = 488 + 514.5nm) Argon (Ar<sup>+</sup>) laser trabeculoplasty (ALT) in an animal model.

**METHODS:** The left eyes of 14 cats received a conventional 40 to 60 spots 180° treatment (right eye = control). The IR lasers pulse energy was varied over a broad range to study laser-tissue effects. 6 cats were treated with Titanium Sapphire (8 to 74 mJ/pulse, 175 μm spot), 3 with Alexandrite (11 to 53mJ/pulse, 200 μm spot), and 5 with Argon (400-1000mW @ 0.1 sec pulse duration, 50 μm spot). All animals received an extensive ocular examination (bilateral pachymetry & tonometry (Tonopen & pneumotonometer), slit-lamp & gonioscopy) 1hr postoperatively, at POD 1, 7 and weekly thereafter for 3 months. Scanning electron microscopy (SEM) was performed in selected eyes to evaluate potential alterations in the trabecular meshwork structure.

**RESULTS:** With all 3 lasers, the degree of depigmentation was a function of the pulse energy. Titanium Sapphire treated eyes that received high energy levels (>60mJ) displayed a slight inflammatory reaction, resolving within 24 hours. Eyes treated with the Argon presented a slight anterior chamber inflammation at 1 hr. The Alexandrite treated eyes showed moderate signs of inflammation with focal blood staining in the angle in 2 of the 3 cats, resolving within 1 week. IOP measurements using pneumotonometry under anesthesia resulted in more consistent readings compared to Tonopen. IOP at 1hr, 1 day and 7 day was remarkably lower in all animals, irrespective of the laser source used. Argon laser treated eyes returned to baseline IOP after 1 week, whereas after Alexandrite laser treatment decrease in IOP lasted for at least 2 weeks and after Titanium Sapphire laser treatment for at least 3 weeks. With time, Titanium Sapphire treated eyes revealed depigmentation that increased in size, some reaching confluence; with the alexandrite, depigmentation was much stronger whereas with the Argon the depigmentation regressed. On SEM no physical damage of the trabecular meshwork could be found in Titanium Sapphire treated eyes.

**CONCLUSIONS:** Titanium Sapphire laser trabeculoplasty selectively altered cells at energies ~ 10mJ per shot and was found safe to eye structures. All three lasers used in this animal model were effective at initially lowering the IOP.

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