Long Term Results with Selective Laser Trabeculoplasty as Primary and Secondary Therapy, with Particular Reference to Hispanic Eyes

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Introduction

Selective Laser Trabeculoplasty (SLT) uses a Q-Switched frequency-doubled (532 nm) Nd:YAG laser which selectively targets melanocytes in the pigmented trabecular meshwork with 1/6000th flux density of ALT

1. Latina MA, et al. Selective targeting of trabecular meshwork cells: in vitro studies of pulsed and CW laser interactions. *Exp Eye Res*. 1995;60:359-372.

2. Latina MA, et al. Q-switched 532-nm Nd:YAG laser trabeculoplasty (selective laser trabeculoplasty): a multicenter, pilot, clinical study. *Ophthalmology*. 1998;105:2082-2090.

Introduction

A biologic response is induced, which involves release of cytokines and triggers macrophage recruitment, leading to an ultimate reduction in intraocular pressure

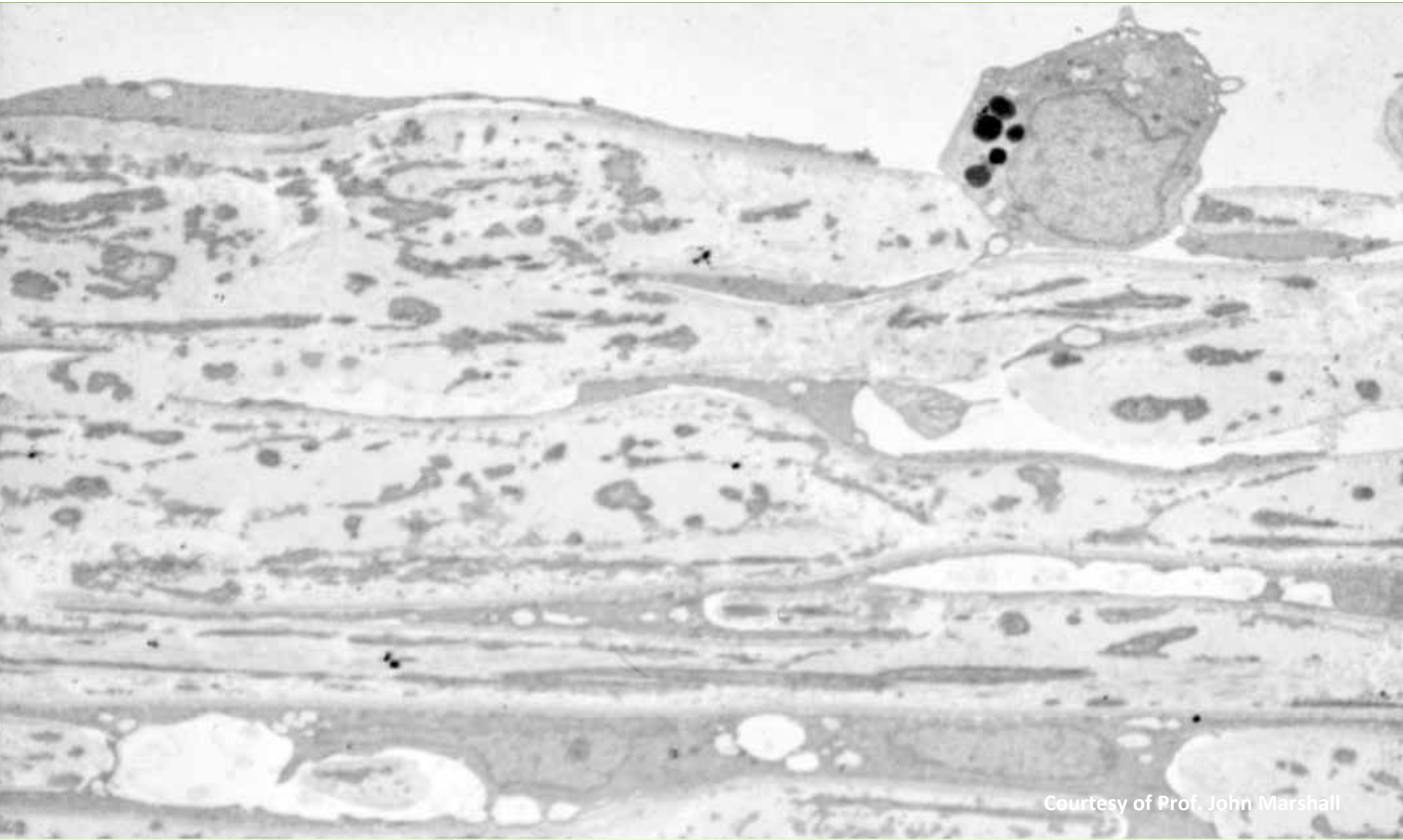
1. Latina MA, et al. Selective targeting of trabecular meshwork cells: in vitro studies of pulsed and CW laser interactions. *Exp Eye Res*. 1995;60:359-372.
2. Latina MA, et al. Q-switched 532-nm Nd:YAG laser trabeculoplasty (selective laser trabeculoplasty): a multicenter, pilot, clinical study. *Ophthalmology*. 1998;105:2082-2090.

Introduction

The method of action is thought to be selective photothermolysis - only pigmented cells are targeted (minimal risk of PAS) - there is no thermal nor coagulative damage to surrounding tissue.

1. Latina MA, et al. Selective targeting of trabecular meshwork cells: in vitro studies of pulsed and CW laser interactions. *Exp Eye Res*. 1995;60:359-372.
2. Latina MA, et al. Q-switched 532-nm Nd:YAG laser trabeculoplasty (selective laser trabeculoplasty): a multicenter, pilot, clinical study. *Ophthalmology*. 1998;105:2082-2090.

SLT Method of Action



Courtesy of Prof. John Marshall

Background

The Glaucoma Laser Trial

Established efficacy of laser trabeculoplasty, in lowering IOP in patients with previously untreated primary open-angle glaucoma

Arch Ophthalmol. 1989;107:1135-1142.

1. The GLT Research Group. GLT. *Ophthalmology*. 1990;97:1403-1413.

Background

The Ocular Hypertensive Treatment Study

- Treated patients had half the risk of developing early glaucoma
- Early treatment prevents/delays onset of glaucoma
- Established efficacy of early treatment to preserve long term vision in glaucoma patients
- *Arch Opthalmol*. 2002;120:701-713.

1. Kass MA, et al. OHTS. *Arch Ophthalmol*. 2002;120:701-713.

Background

The Early Manifest Glaucoma Trial

- Treatment reduced risk of developing significant glaucoma
- Lowering IOP in newly diagnosed glaucoma patients slows progression of visual field loss
- Established efficacy of effective treatment to preserve long term vision in glaucoma patients
- *Arch Opthalmol.* 2002;120:1268-1279.

1. Heijl A, et al. EMGT. *Arch Ophthalmol*. 2002;120:1268-1279.

Background

- There does not seem to be any remaining question nor doubt that early treatment is beneficial
- Almost every long-term study shows a measurable and definable benefit to effective treatment
- There is a now a Paradigm shift amongst glaucoma specialists to: Diagnose early, Treat effectively, and Preserve vision in patients with glaucoma.

- ***Int Gl Rev.*** **10-2 September 2008**

Initial Use

Why to start to use Selective Laser Trabeculoplasty
– The Glaucoma Laser Trial / Side effects of meds

Why continue to use Selective Laser Trabeculoplasty
– OHTS/ EMGTS and favorable SLT results

Recommended first steps: **SLT is NOT ALT lite**

- First, use SLT as Primary (Initial) therapy
- Then, use SLT as Secondary (Adjunctive) therapy

Taper / Remove meds slowly

Technique

Energy:	0.8 – 1.6 milliJoules
Spot size:	400 micrometers
Total spots:	90 – 110 spots
Angle area:	2–10 o’ clock (240 deg)
Endpoint:	*Champagne bubbles*

Technique

Energy:	0.8 – 1.6 milliJoules
Spot size:	400 micrometers
Total spots:	90 – 110 spots
Angle area:	2–10 o’ clock (240 deg)
Endpoint:	*Champagne bubbles*

Technique

PreSLT: Brimonidine and Bromfenac

1x at 10 minutes before procedure

PostSLT: Bromfenac

1x / day for 3 days after initial

1x / day for 5 days after repeat

Technique

Titrate energy and TM pigment

Black:	0.8 – 1.0 milliJoules
Brown:	1.0 – 1.2 milliJoules
Green:	1.2 – 1.4 milliJoules
Blue:	1.4 – 1.6 milliJoules

Protocol

Treatment protocol – how it started

- Minimal energy to avoid IOP spikes

Treatment protocol – how it evolved

- Focus of spot not critical; must visualize TM
- Treatment end point is *Champagne* bubbles
- Titrate energy with pigment - usually 1.0 – 1.8 mJ
- Treatment spots at least 120 spots (total)
- Treatment area at least 240 -360 degrees
- Post-op NSAIDs QD for 3 days (No steroids)
- Taper meds slowly, remove PGs first

Treatment Video

Courtesy of Prof. Philippe Denis

Pitfalls

Do not undertreat

- Blue eye patients need more energy
- Titrate energy until bubbles are seen

Do not overtreat

- Brown eye patients need less energy
- Pigmentary glaucoma be careful with energy

Post-op treatment

- NSAIDs important for patient comfort
- Taper meds slowly to avoid IOP rebound

Patient Selection

Primary treatment

- Almost all glaucoma patients will benefit
- Yes: Primary Open, Pigmentary, Exfoliative
- No: Uveitic, Inflammatory, Neovascular

Secondary treatment

- IOP not at goal
- Local / systemic side effects
- Compliance / usage issues

SLT is an "outflow drug"

- If you would use PG drops then you can use SLT

Patient Recruitment

Primary treatment

- GLT – LTP effective to lower IOP in untreated patients
- OHTS / EMGT – treatment minimizes vision loss
- Avoid compliance / usage issues
- Able to repeat if not at goal IOP

Secondary treatment

- Improve IOP to goal level
- Reduce local / systemic side effects
- Minimize compliance / usage issues
- Able to repeat to improve IOP / reduce meds

Purpose: Primary

Purpose:

To evaluate SLT as primary therapy, to decrease IOP, in patients with glaucoma.

Methods: Primary

Methods:

Retrospective chart review was performed on 1393 eyes from a consecutive case series of 3034 eyes treated with SLT over 7.5 years.

Two-tailed paired t-test was used to compare maximum pre- and average post-procedure IOP.

Results: Primary

Results:

Mean follow-up was 757 days.

Mean IOP decreased 31% from mean of 18.9 mmHg to 13.0 mmHg.

Results were significant with $p < 0.01$.

Purpose: Secondary

Purpose:

To evaluate SLT as secondary therapy, to decrease IOP and reduce medications used, in patients with glaucoma.

Methods: Secondary

Methods:

Retrospective chart review was performed on 1016 eyes from a consecutive case series of 3034 eyes treated with SLT over 7.5 years.

Two-tailed paired t-test was used to compare maximum pre- and average post-procedure IOP and number of meds.

Results: Secondary

Results:

Mean follow-up was 520 days.

Mean IOP decreased 22% from mean of 19.8 mmHg to 15.5 mmHg.

Mean meds decreased by 57% from a mean of 2.3 to 1.0 meds.

Results were significant with $p < 0.01$.

Purpose: Repeat

Purpose:

To evaluate SLT as repeat therapy, to decrease IOP and reduce medications used, in patients with glaucoma.

Methods: Repeat

Methods:

Retrospective chart review was performed on 626 of 2408 uniquely treated eyes, from a consecutive case series of 3034 eyes treated with SLT over 7.5 years.

Two-tailed paired t-test was used to compare maximum pre- and average post-procedure IOP and number of meds.

Results: Repeat

Results:

Mean follow-up was 601 days.

Mean IOP decreased 23% from mean of 20.5 mmHg to 15.8 mmHg.

Mean meds were unchanged from a mean of 1.0 to 1.0 meds.

26% of eyes treated with SLT over seven years received repeat therapy.

Results were significant with $p < 0.01$.

Purpose: Hispanic

Purpose:

To evaluate SLT as primary or secondary therapy, to decrease IOP and reduce meds, in Hispanic patients with glaucoma.

Methods: Hispanic

Methods:

Retrospective chart review was performed on 88 eyes from a consecutive case series of 3034 eyes treated with SLT over 9 years.

Two-tailed paired t-test was used to compare maximum pre- and average post-procedure IOP and number of meds.

Results: Hispanic

Results (Primary):

Mean follow-up was 720 days.

Mean IOP decreased 30% from mean of 18.8 mmHg to 13.2 mmHg.

Results were significant with $p < 0.01$.

Results: Hispanic

Results (Secondary):

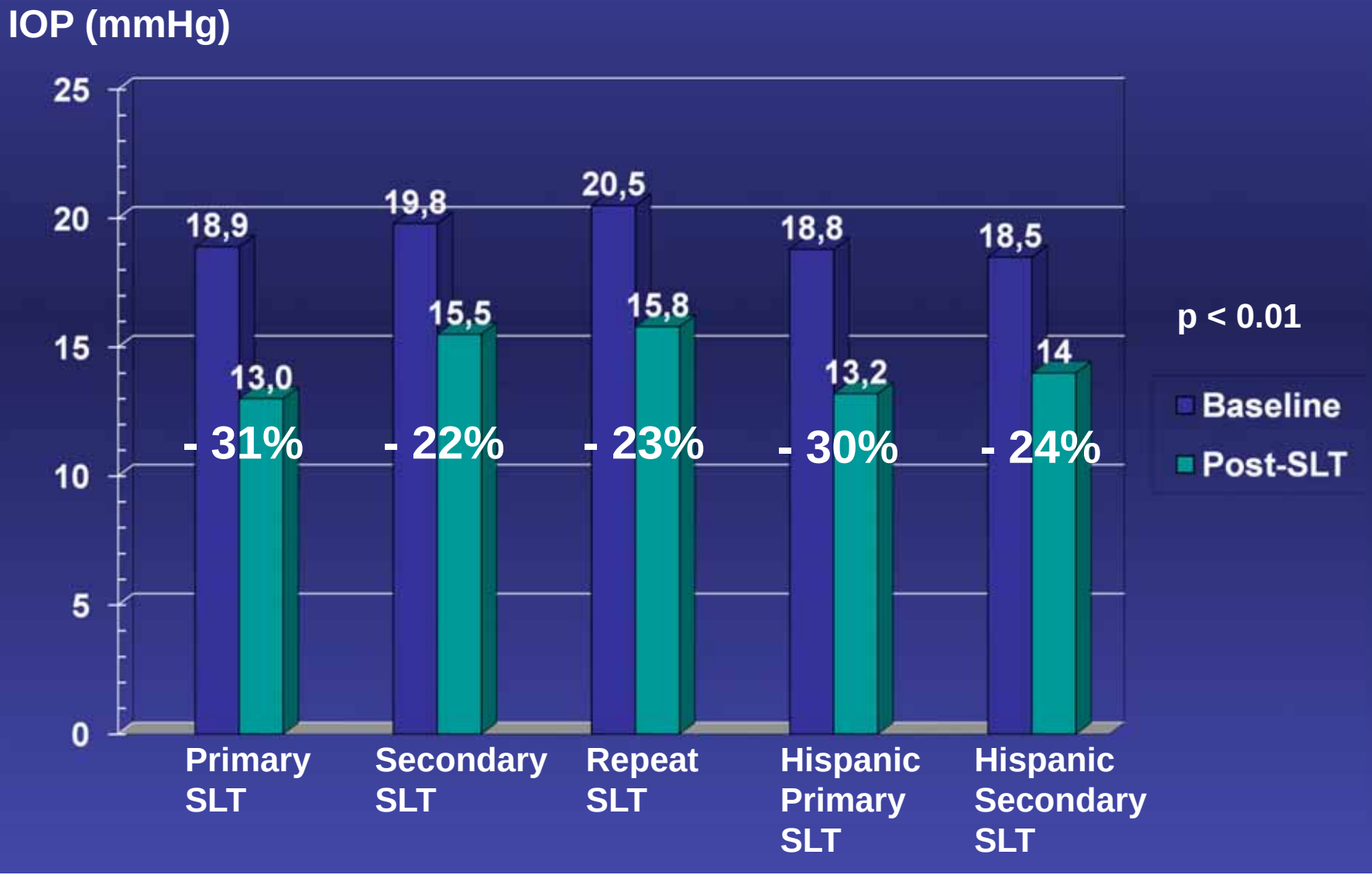
Mean follow-up was 690 days.

Mean IOP decreased 24% from mean of 18.5 mmHg to 14.0 mmHg.

Mean meds decreased by 72% from a mean of 2.5 to 0.7 meds.

Results were significant with $p < 0.01$.

Results: Comparative Chart



Side Effects

Respond well to Post-op NSAIDs QD for 3 days
- Conjunctival injection
- Photophobia
- Tenderness

Pressure spike
- very uncommon with Primary
- may be seen with Secondary on multi meds
- taper meds slowly, remove PGs first

Caveats

SLT is an "outflow drug" but is not ALT lite

Focus of spot not critical – must visualize TM

Treatment end point is *Champagne* bubbles

Do not undertreat blue eyes with XFG

Do not overtreat brown eyes with PGS

Treat 120 spots over 240 -360 degrees

Post-op NSAIDs QD for 3 days (No steroids)

Taper meds slowly, remove PGs first

Be aware of late responders (3 months)

Conclusion

Selective Laser Trabeculoplasty may someday be recognized as the single greatest step forward for the treatment of glaucoma, as were Ridley's intraocular lens and Kelman's phacoemulsification for the treatment of cataracts.