

SLT Symposium, Denmark, March 2010

Selective Laser Trabeculoplasty as Adjunctive Therapy

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Selective Laser Trabeculoplasty

- Is a new method for IOP reduction
- Is a milder alternative compared to Argon Laser Trabeculoplasty (ALT)

SLT versus ALT

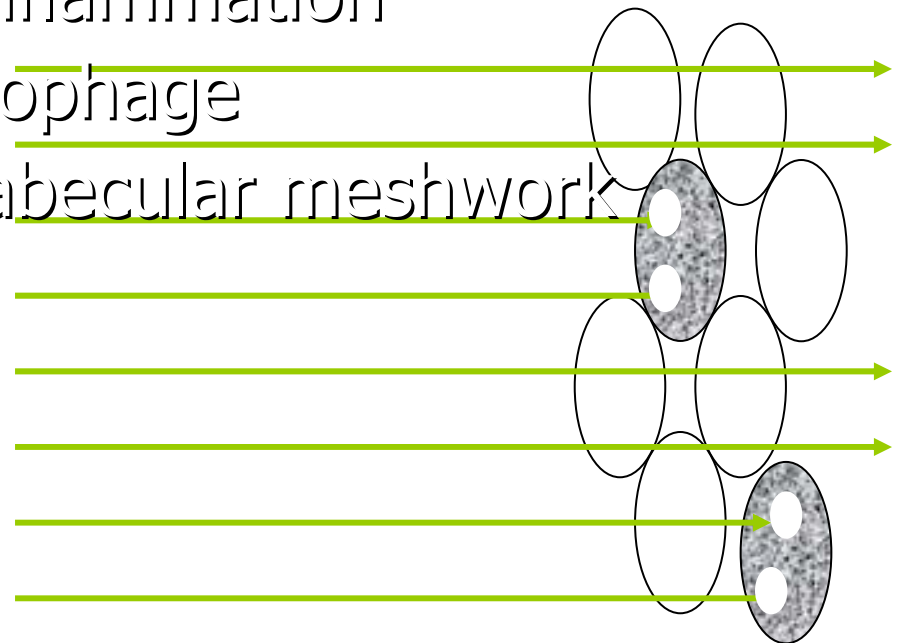
	SLT	ALT	Ratio
Wavelength	532 nm	514 nm	
Φ of spot	400 μm	50 μm	
Energy	0.6-1.2 mJ	400-600 mW	1:60
Duration	3 n second	0.1 second	
Fluence (mJ/mm ²)	8	25000	1:3000

SLT: Mechanism

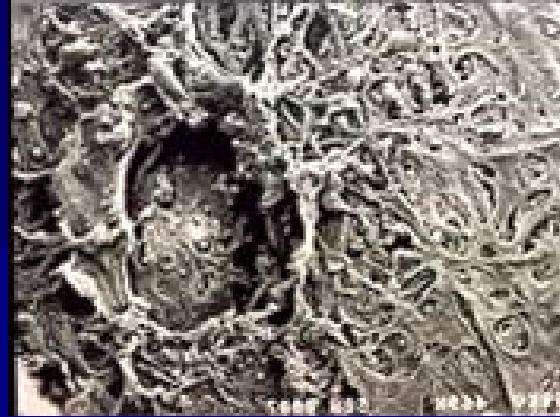
- The extremely short duration of light exposure confines the thermal effect
- Photon energy selectively absorbed by pigment particles in the cell

SLT: Mechanism

- The extremely short duration of light exposure confines the thermal effect
- Photon energy selectively absorbed by pigment particles in the cell
- → Low grade inflammation
- → Attract macrophage
- → Clean the trabecular meshwork
- → Lower IOP



ALT



- Coagulative damage in the trabecular meshwork
- Peripheral anterior synechia → continuous elevation of IOP

SLT



- Less morphological change in trabecular meshwork
- Better patient comfort
- Less post-operative complications

SLT

Indication:

- Open angle > Grade 2
- Primary treatment
- Adjunctive treatment
 - High IOP despite medical therapy
 - Intolerance of local treatment
 - Poor compliance

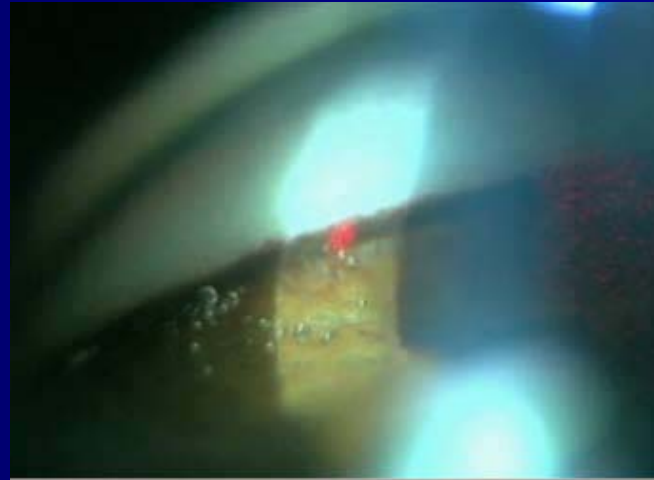
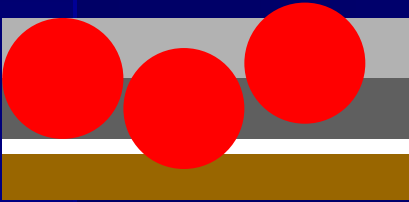
SLT

- Q-switched frequency doubled (532nm) nd:YAG laser
- Fix parameter: 400 μm , 3 ns
- Energy level: 0.6-1.2 mJ
- 50 effects on 180° (or 25 effects on 90°) of trabecular meshwork

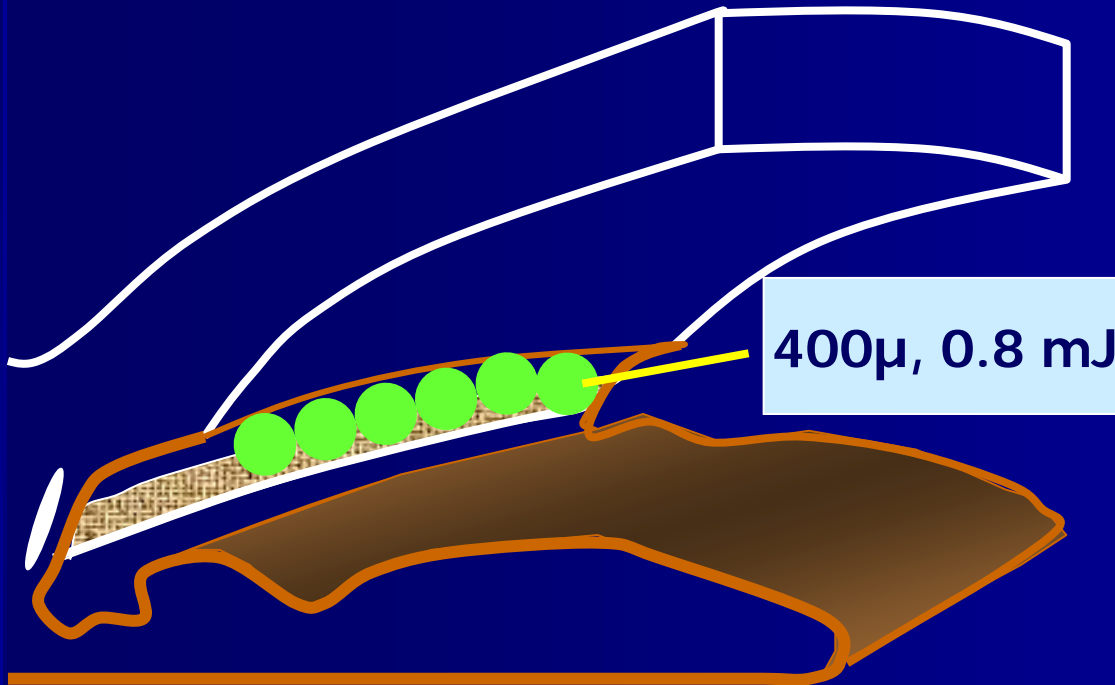


Optimal Goniolens for SLT

- No magnification (x1)
- Mineral glass
 - Excellent optical quality
 - Low color distortion
 - High resistance to surface scratching
- Anti-reflective coating



SLT



Post SLT Treatment

- (Iopidine x 1)
- Continue with same pressure lowering treatment until one month after SLT
- IOP control: 1, 3, 7 months post SLT

Predictive Factors

What Factors Affect the Result of SLT?

- Pre-laser IOP is main factor determining the extent of IOP reduction by SLT (220 patients). The higher the initial pressure, the greater the reduction
- Other factors, such as angle pigmentation, were not found to influence the results.

Effect of Prostaglandin

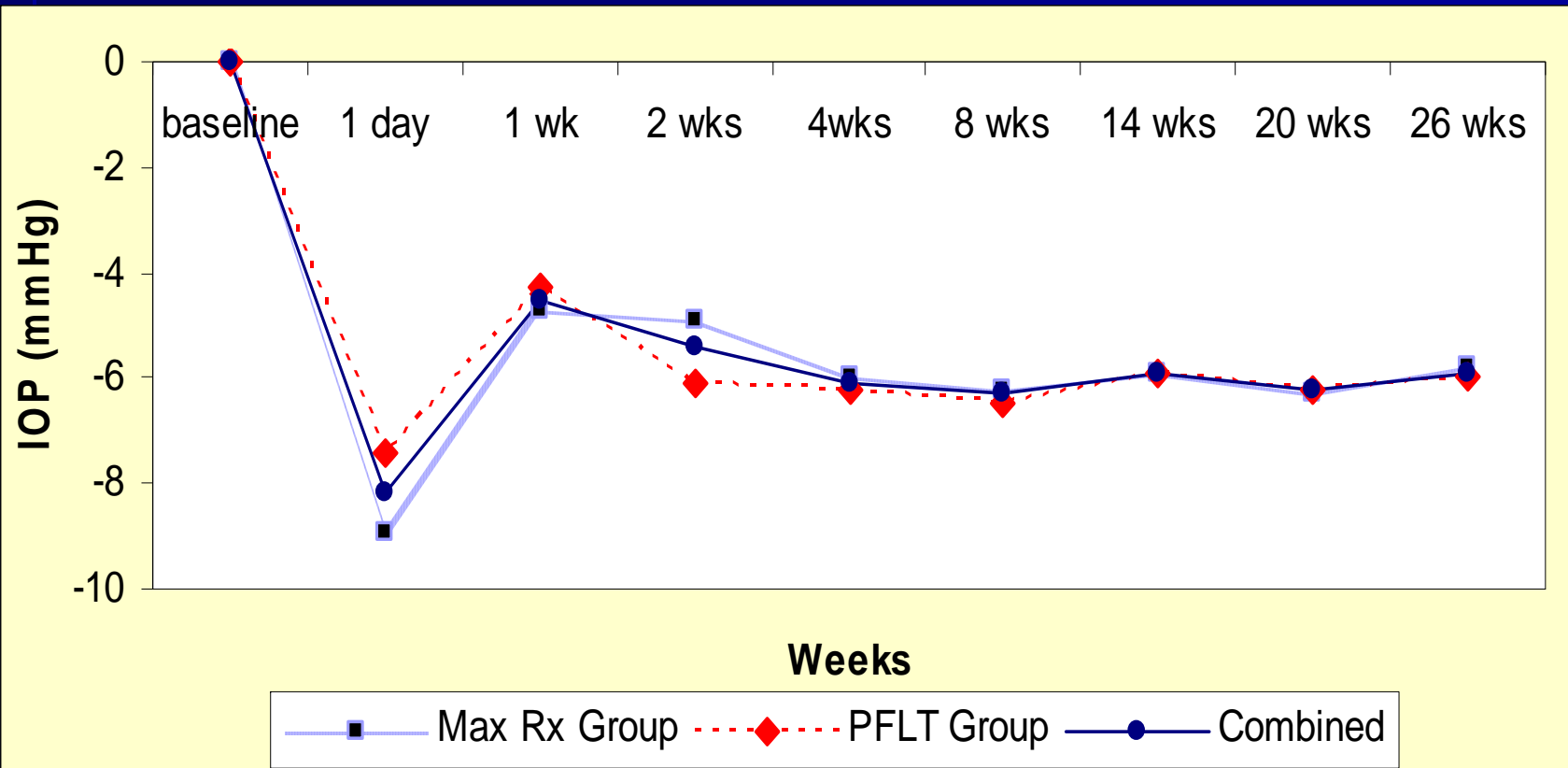
- A positive PGA response predicts both a successful SLT outcome and the magnitude of the decrease in IOP after SLT
- SLT and PGA share a common mechanism of action?

Effect of Anti-inflammatory Therapy

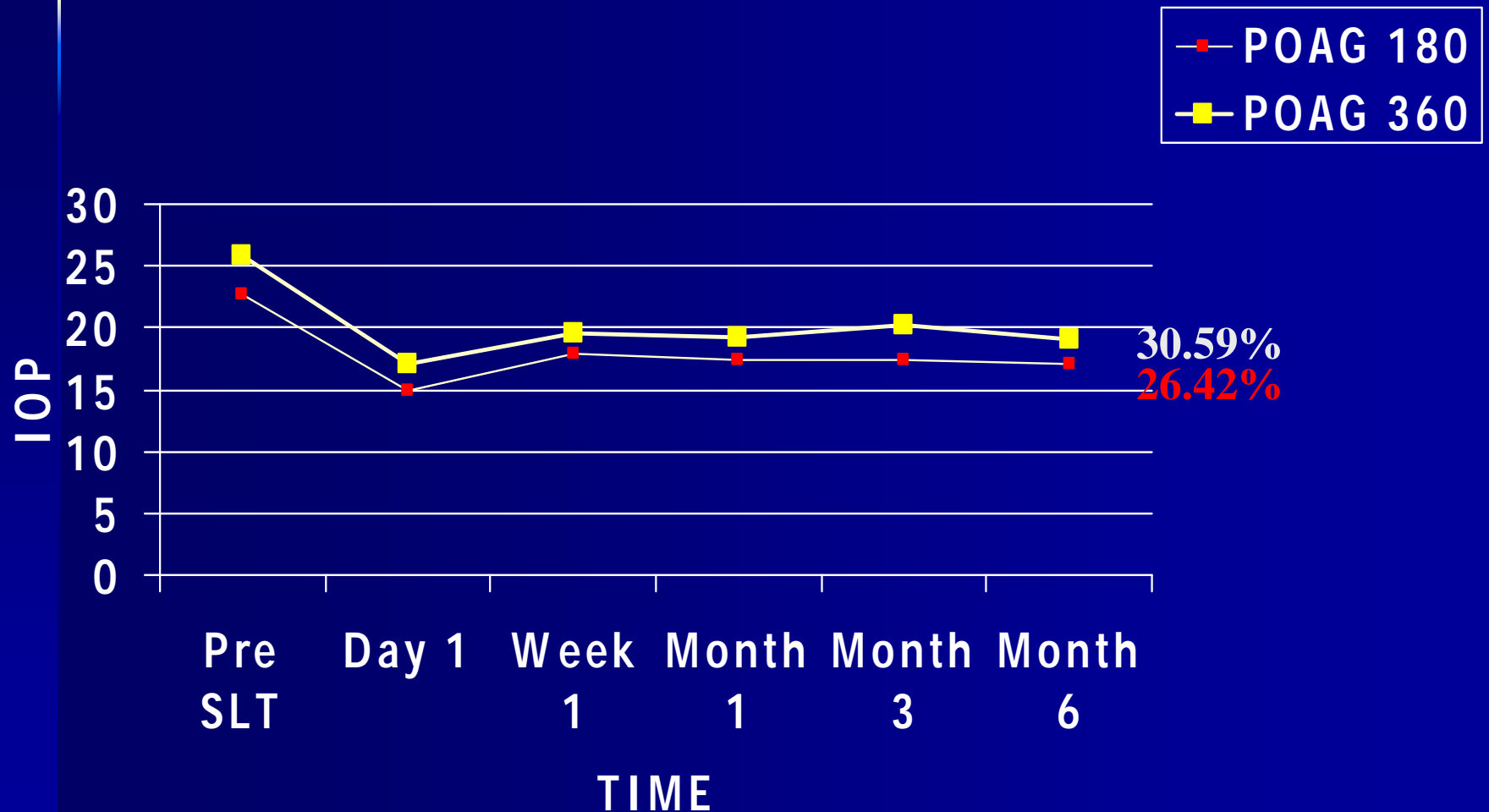
- 25 patients, 360 degrees SLT
- One eye prednisolon eye drops qid, 1w
- IOP reduction at 1w, 1m, 3m are similar

SLT

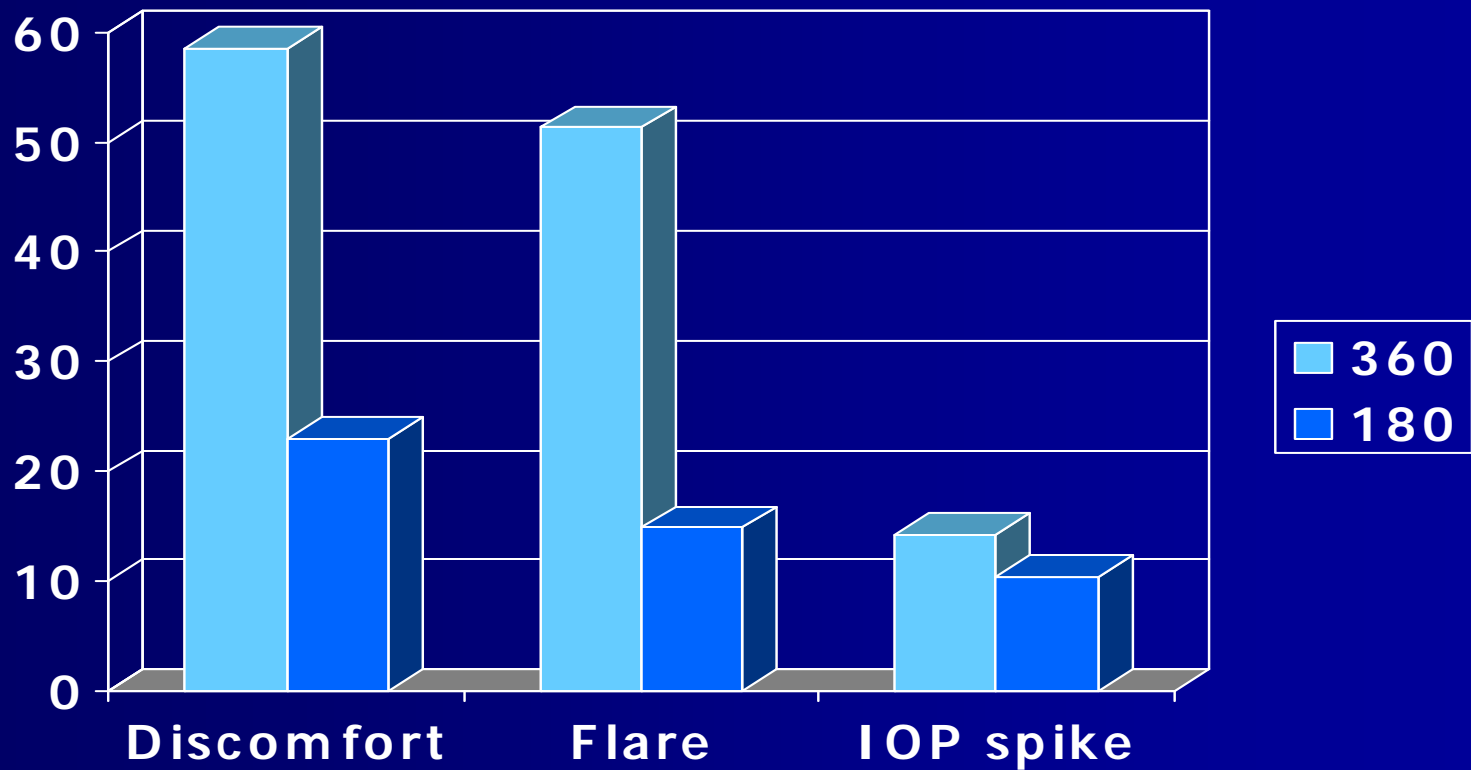
U.S. Clinical Trial Results



SLT: 360° versus 180° Treatment



360° versus 180°: Adverse Events (%)



SLT – Adverse Events?

Table 1 Percentage of eyes with transient adverse events reported during the first week after treatment

Adverse event	Latanoprost	90° SLT	180° SLT	360° SLT
Discomfort/pain	0%	6%	20%	39%
Uveitis	0%	31%	41%	50%
IOP spike	0%	11%	16%	27%

Nagar BJO 2005

■ 90° SLT vs. 180° SLT Treatment

Patients & Methods

Glaucoma or OHT

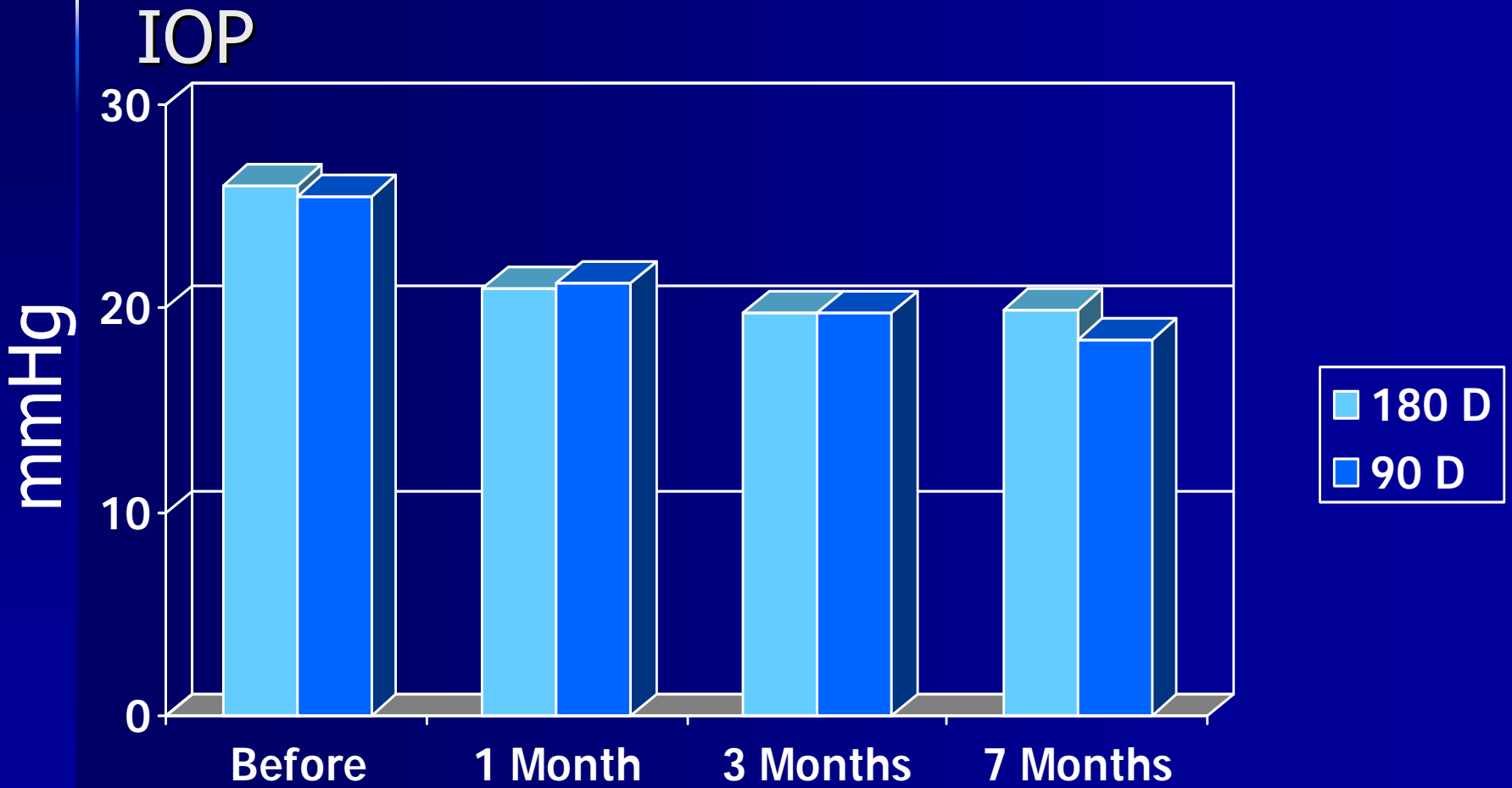
- Unsatisfactory pressure control in spite of medical treatment
- Intolerance to the medical treatment
- Poor compliance

Patients & Methods

- 32 patients 25 laser spots on 90° of trabecular meshwork (90° group)
- 32 patients 50 laser spots on 180° of trabecular meshwork (180° group)

90° SLT vs. 180° SLT

	N0.	M-F	Age	Pre-SLT IOP	Exfol	Pigment	Chamber Angle	Prev ALT
90	32	10-22	76.0 (42-94)	25.4±1.4	16	1	3 (2-4)	11
180	32	13-19	76.5 (58-84)	26,1±1.7	15	1	3 (2-4)	13



90 degrees SLT as Adjunctive Therapy in a Three-year Period

90 degrees SLT as Adjunctive Therapy in a Three-year Period

- 76 eyes / 76 patients
 - 74 unsatisfactory IOP regulation in spite of medical treatment
 - 2 intolerance of medical treatment
- Mean age 79 yrs
- Pre-SLT IOP 25.4 ± 5.5 mmHg

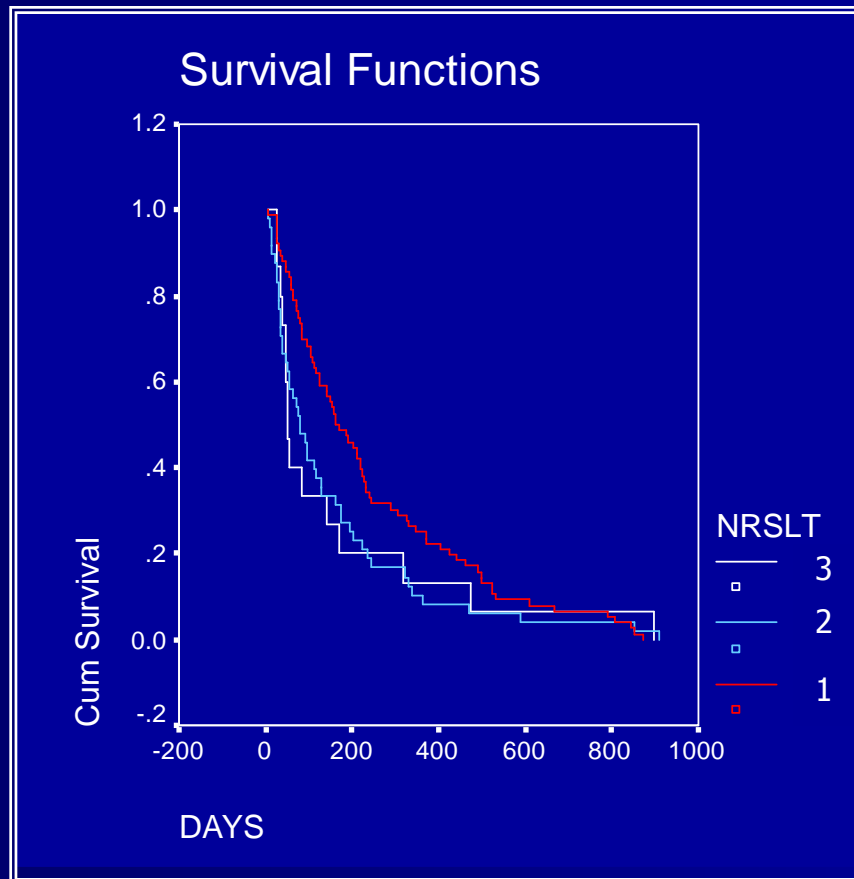
90 degrees SLT as Adjunctive Therapy in a Three-year Period

- 33 eyes with exfoliation
- 25 eyes with previous ALT
- 25 effects on 90° of trabecular meshwork

90 degrees SLT as Adjunctive Therapy in a Three-year Period

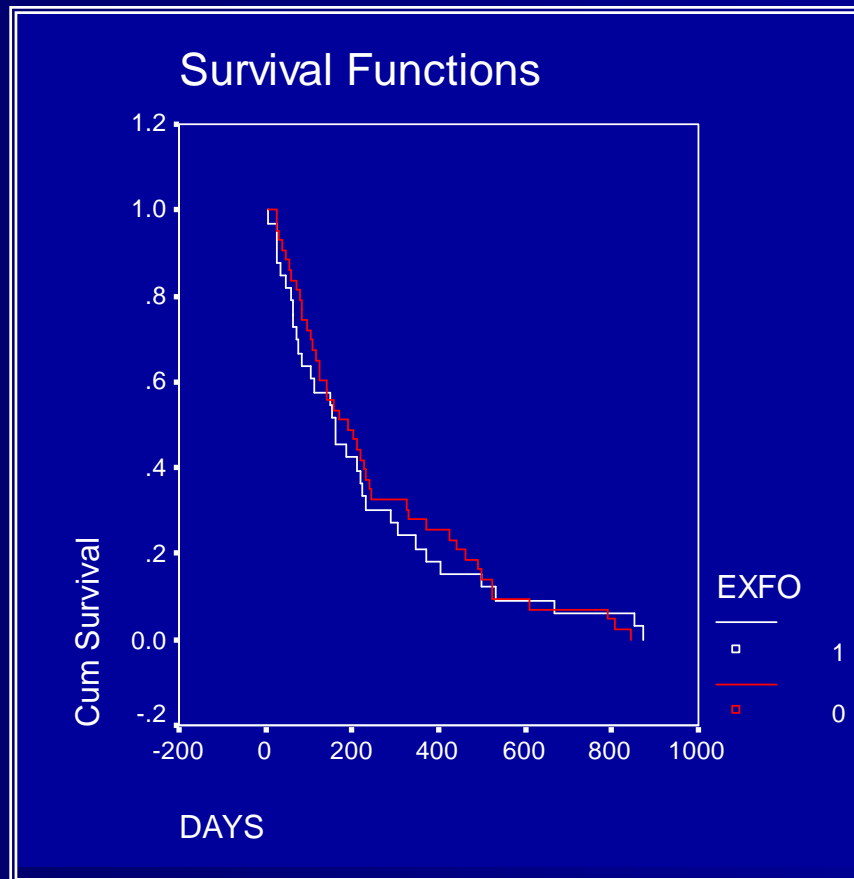
- SLT was performed twice in 48 eyes, and triple in 21 eyes
- Treatment failure: <20% IOP reduction
- Kaplan-Meier survival analysis

Effect of SLT No. 1, 2, 3



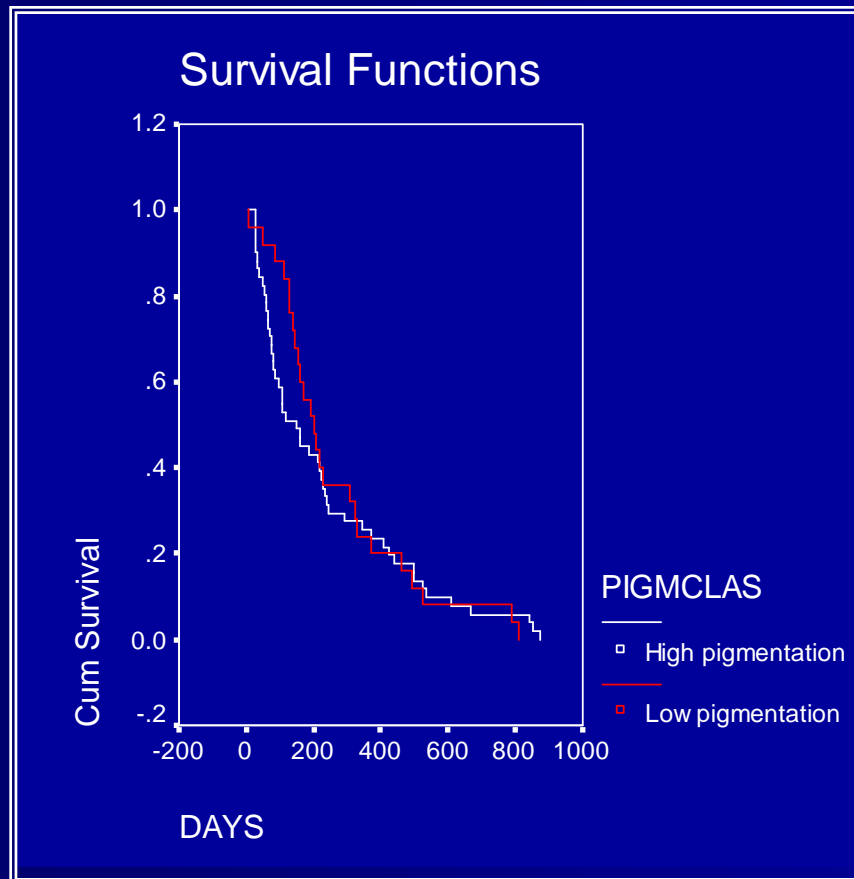
P = 0.095

Effect of Exfoliation



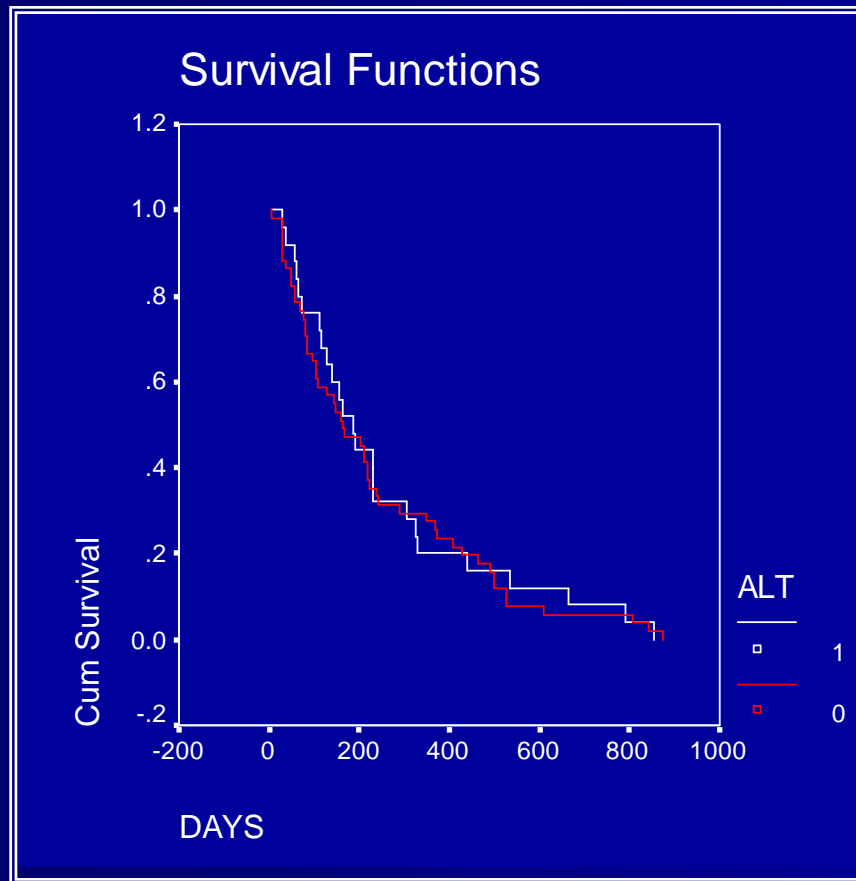
P = 0.874

Effect of Pigmentation



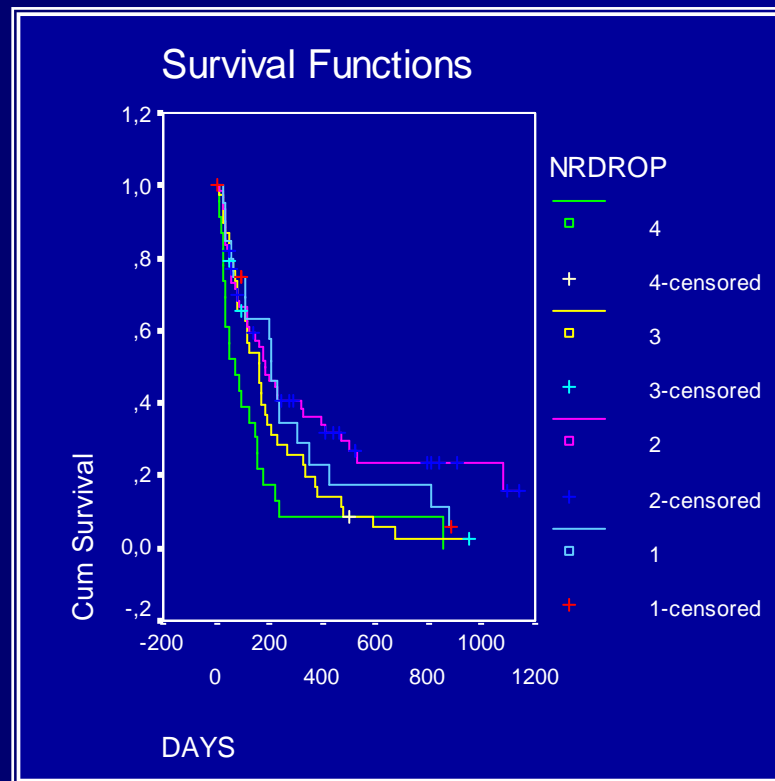
$P = 0.751$

Effect of Previous ALT



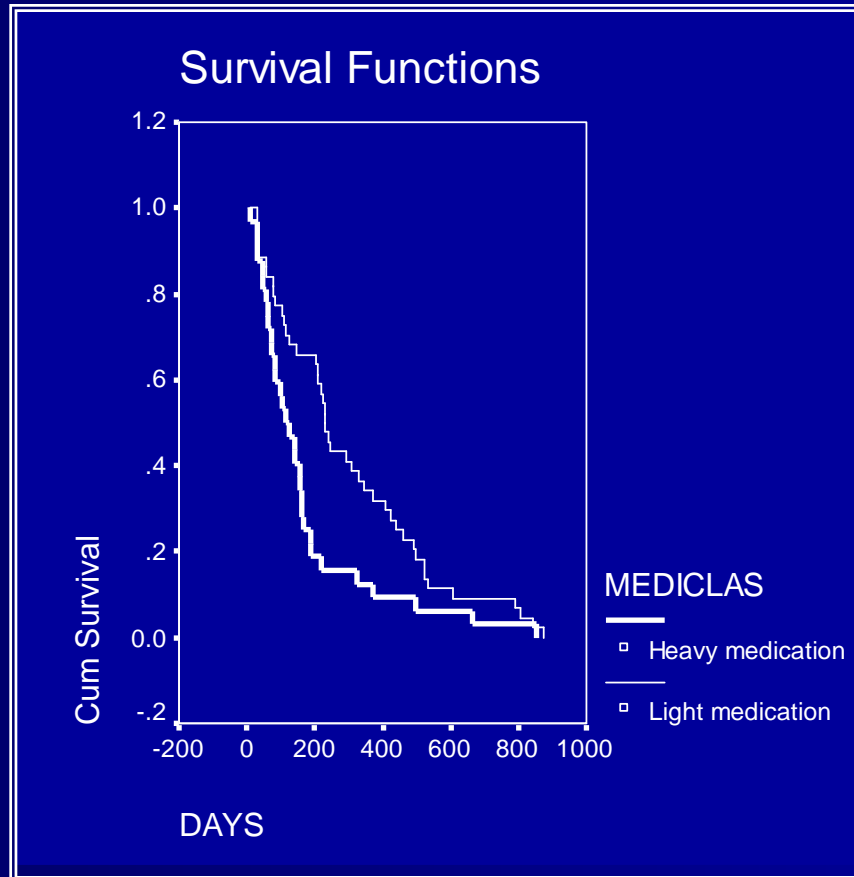
P = 0.805

Number of Hypotensives



P = 0.004

Effect of Hypotensives



P = 0.009

90 Degrees SLT as Adjunctive Therapy in a Three-year Period

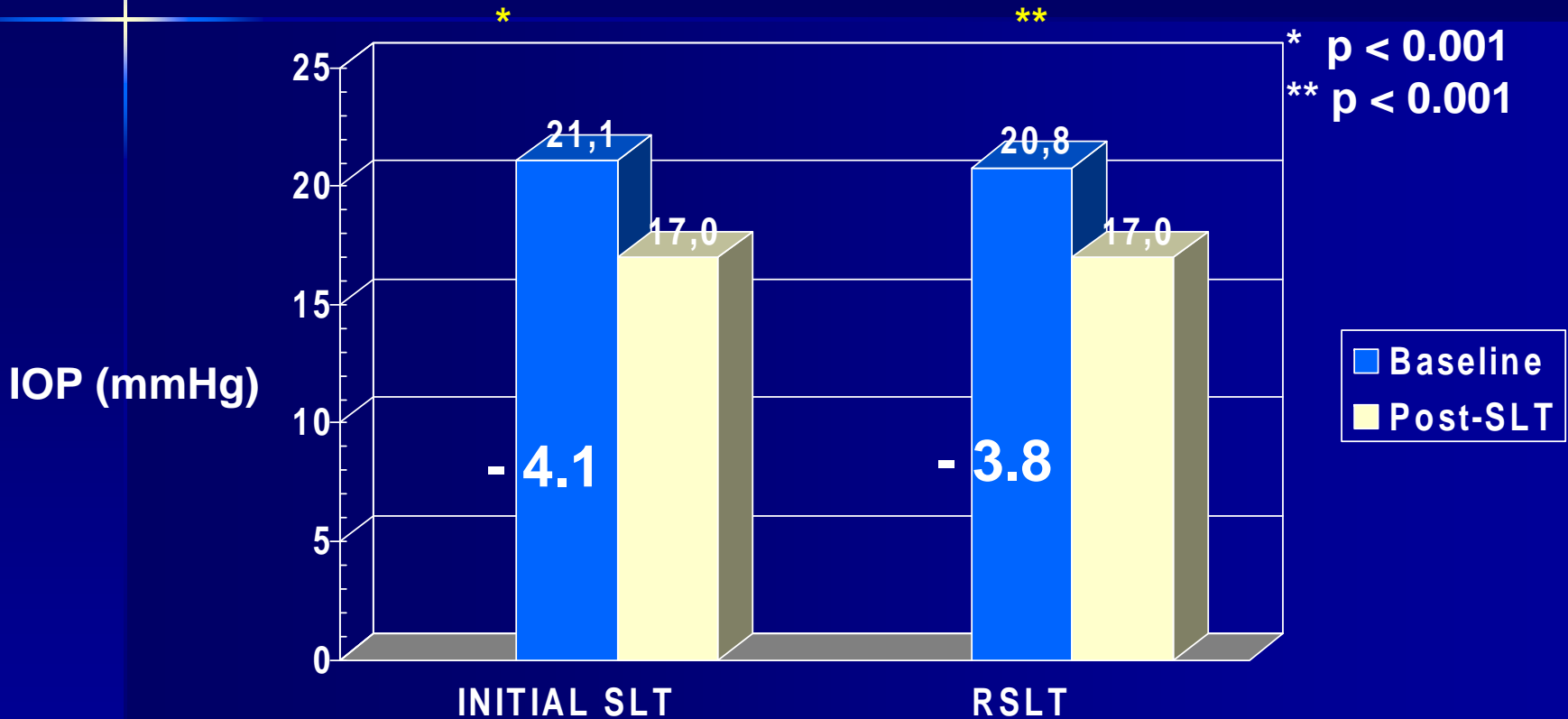
- The 95% confidence interval of the duration was 228 to 364 days with a mean of 296 days
- SLT No. 2 and 3 had similar duration of IOP regulation as the first-time SLT
- The first time SLT was more effective in patients with equal or less than two topical medications

SLT – Long-term IOP Reduction

Study	N (eyes)	FU YEARS	IOP↓mmHg	IOP↓%
Gracner 06	90	2	5.8	25.5
		4	5.2	23.1
		6	5.4	22.8
Weinand 06	52	3	5.5	24.5
		4	6.3	29.3
Lai 04	58	5	8.6	32.1
Juzych 04	41	5	5.9	21.2

Is SLT Repeatable?

N = 52, FU 1 year



Success of repeat SLT: **90%**

[IOP ↓ \geq 3 mmHg & IOP < 21 mmHg]

Bournias et al 2006

Is SLT Repeatable?

- 44 eyes of 35 patients
- 360 degree SLT x2
- SLT No. 2 within 1 yr after SLT No. 1
- Successful treatment: $\geq 20\%$ IOP lowering
- No difference between SLT No. 1 and No. 2

Is SLT as Efficacious as ALT in IOP Reduction?

- Retrospective
- ALT and SLT with 180 degrees treatment
- 154 eyes ALT and 41 eyes with SLT
- 5 years F/U
- 3mm and 20% IOP lowering
- SLT as effective as ALT

Further Research Required

- Comparison among different laser technologies and treatment modalities
- Laser vs medication
- Laser vs operation
- Laser in different racial groups, exfoliation and pigment glaucoma
- Laser in different stages of glaucoma
- Cost effectiveness of SLT

Thank You