

# SLT: on the Glaucoma front

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## No Financial disclosures



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## Selective Laser Trabeculoplasty (SLT)

- Historically, SLT was recommended for Glaucoma patients with progression, not meeting target IOP, or on max therapy.
- SHOULD be considered for 1<sup>st</sup> line of tx.
  - Compliance
  - Cost
  - Quality of life
  - Side Effects of drops

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## SLT


- Frequency doubled Q-switch YAG (cold laser) 532nm
- Selectively absorbed by pigmented cells in TM
- Spares adjacent cells and TM from thermal injury
- Stimulates increased monocytes and macrophages in TM
- IOP reduction 20-30% (similar to prostaglandin)

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## SLT

- Gonioscopy- very important
  - Must be able to visualize the TM on gonio
  - Patient must be able to tolerate procedure
- Instill Iopidine prior to SLT
- Proparacaine OU prevents blinking
- Diamox

- Pre-Op



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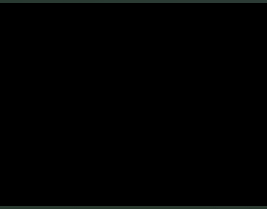
## SLT VS ALT

<ul style="list-style-type: none"> <li>▪ Argon Laser Trabeculoplasty                             <ul style="list-style-type: none"> <li>▪ 514 nm argon laser</li> <li>▪ lens placed to control the direction of the laser beam</li> <li>▪ Laser burns small area of TM</li> <li>▪ ~50 spots in 180 degrees of TM per tx.</li> <li>▪ Not repeatable, causes scarring of TM</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Selective Laser Trabeculoplasty                             <ul style="list-style-type: none"> <li>▪ Solid state laser 532nm Nd:YAG laser</li> <li>▪ Pulse energy is ~100x lower than ALT</li> <li>▪ Only targets pigmented cells TM. Can be done 360/tx.</li> <li>▪ Repeatable</li> </ul> </li> </ul>
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## SLT: Procedure

- Fire contiguous He-ne (helium-neon) beam spots on the TM
- Must see bubbles/tissue response evanescence through the TM.
  - Champagne bubbles, some blanching
  - Large bubbles reduce energy
  - No bubbles- energy needs to be adjusted higher.
  - ~25-40 spots/quadrant
  - ~120-150 spots 360 degree



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## SLT: Procedure

- 400 um spot size
- 0.4 – 1.5 mJoules (increased pigment may decrease power)
- 30 ns
- Treat 180 degrees ( now 360)
- 100 spots
- BCSC. Vol 10 Glaucoma. 2016-2017. p 188-189.

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**SLT: Procedure**

- 0.8-1.0mJ per shot energy
- More pigment = more effective
- Lower energy in higher pigmented TM and vice versa
  - low ~0.5 to 0.7mJ/shot
  - High ~1.1 to 1.3mJ/shot
- SLT lens
  - Prefer to start inferiorly, rotate clockwise. I→T→S→N
  - Start spots in middle and go each side.
  - Rotate 360 degrees


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**SLT : Post Op**

- Post op:
  - Short term NSAID
  - Acular LS 0.4% QIDx5 days (CES)
- Can help with pain
- Blunt inflammatory response but NOT completely.
- Inflammation is necessary
- Break up cellular debris, body sees that as foreign, develops inflammatory response
- A reaction that cleans out the drain and that's why we can see contralateral affects from a unilateral SLT.
- 6-12 weeks to see full effect of SLT.

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- Indications:
  - POAG
  - NTG
  - OHTN
  - PXF Glc
  - PDS Glc
- Contraindications:
  - Inflammatory glaucoma
  - Angle closure glaucoma
  - NVG



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**SLT - Indications**

- POAG
- Prostaglandin trial
- Try drop for 1 month. If IOP lower then SLT will work
- If on drop stop for 1 month. If IOP higher then SLT will work.
- May be less effective in pseudophakes



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### SLT - Indications

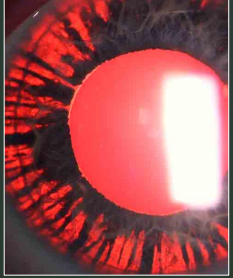
- NTG
- Expect 14-16% reduction
- Reduces diurnal variation



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### SLT - Indications

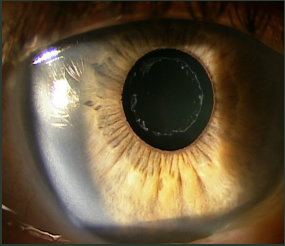
- Pigmentary Glaucoma
- Works very well (pigment)
- May have severe post Tx IOP spike



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### SLT - Indications

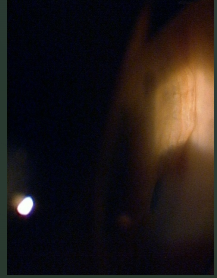
- Pseudoexfoliative Glaucoma
- Good response to SLT
- Reduces IOP spikes



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### SLT - Contraindications

- NAG
- Synechial angle closure
- NVG
- Uveitic
- Trauma with angle recession (+/-)
- ICE / Developmental
- Failure to work in fellow eye



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## SLT - Complications

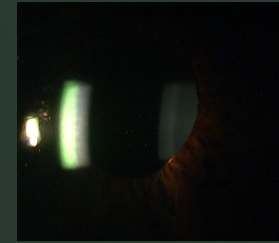
- Most common is IOP spike
- Transient
- Noted at 1 hour post-op
- Pre-op Apraclonidine or Iopidine, beta blocker, CAI
- We use Diamox 500 mg



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## SLT - Complications

- Low grade uveitis
- That's how it works so want some
- Topical NSAIDs q.i.d. x 4-7 days



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## SLT - Complications

- Peripheral anterior synechiae



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## SLT - Complications

- Hyphema

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## SLT - Complications

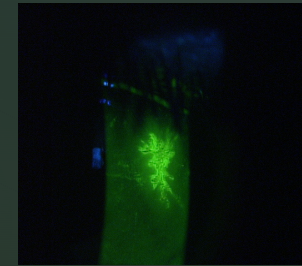
- Corneal inflammation and edema
- Similar in appearance to DLK



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## SLT - Complications

- Reactivate HSK



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## SLT - Complications

- Continued elevated IOP
- Persistent elevated IOP
- May need incisional surgery

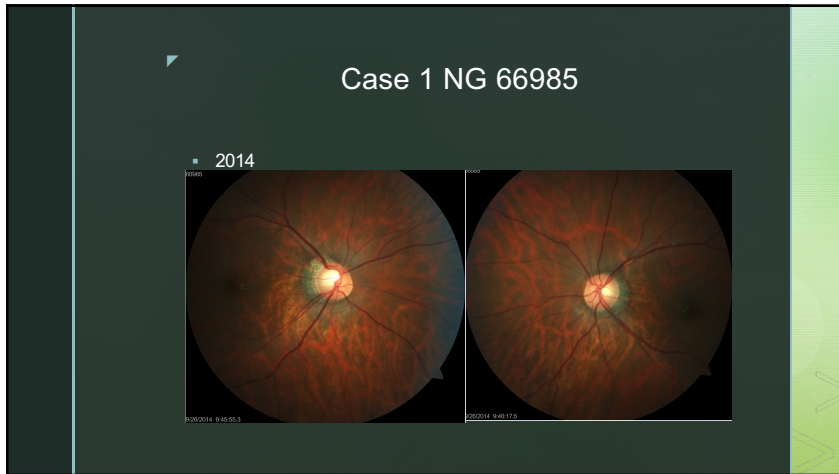


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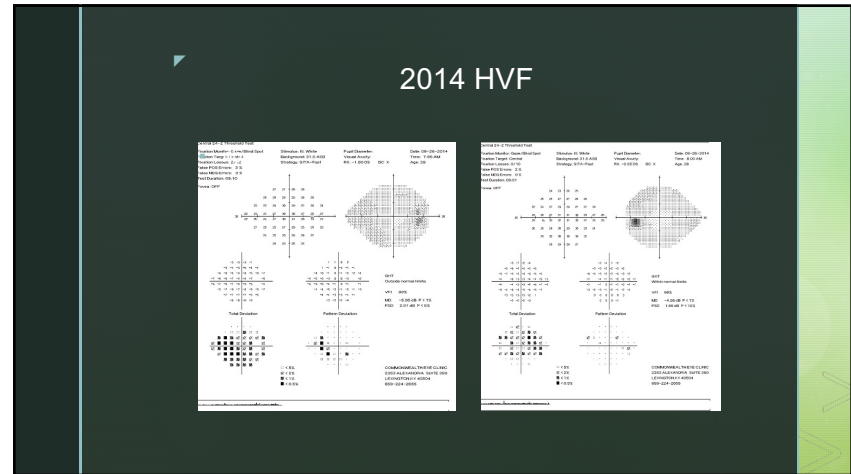
## Case 1 NG 66985

- 28 yo Indian female
- Referred for a glaucoma eval
- **2014**- first time at CES
- Hx of s/p myopic LASIK sx in 2005
- VA: 20/20 OD and OS
- CVF: FTFC OD and OS
- PERRL, No APD
- IOP 14/14
- LASIK flap intact OD and OS\*\*
- Color vision: 14/14 OD and OS
- Pachys: 429/406\*\*
- Gonio: OD: CBB 1+pigment, OS: CBB 1+pigment
- CD: OD: 0.6/0.6v no drance heme
  - OS: 0.4/0.40, no drance heme

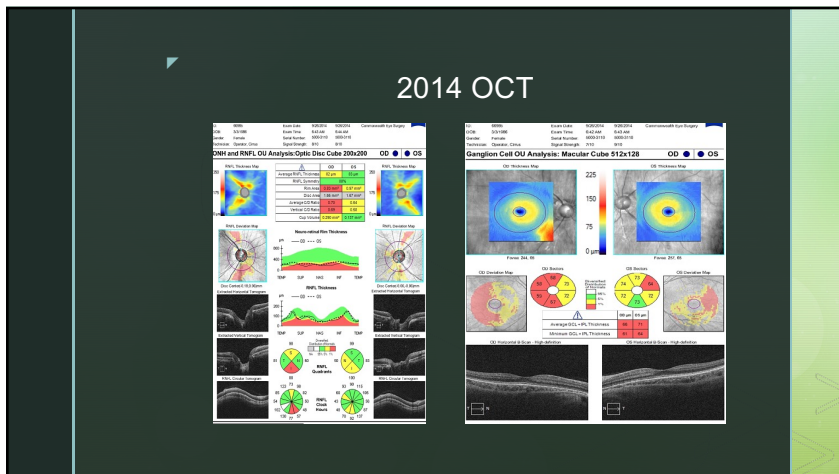
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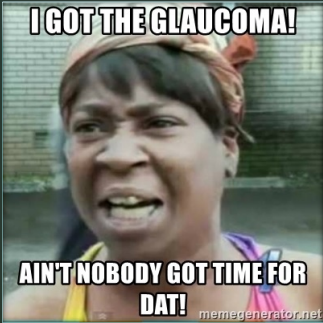
### 2014 Management

- Assessment :
  - Glaucoma suspect, low risk OU
    - Thin pachs (s/p LASIK)
    - ? Beginning nasal step OD
    - No family hx
    - normal range IOP OU
- Plan:
  - Continue monitoring. RTC **6m** for IOP check and OCT.

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### 2017 Return

- Pt returns in **2017**
- IOP: 17/14
- ONH: OD: 0.70
- OS: 0.50



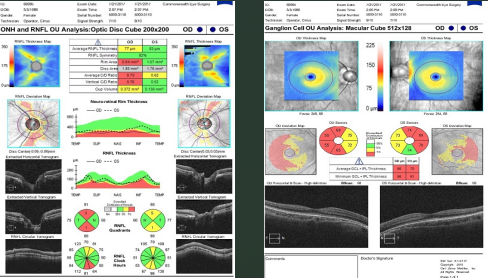
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### 2017 Discs



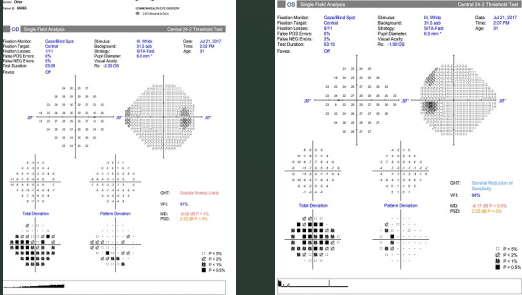
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### 2017 OCT



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### 2017 HVF



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### 2017 Management

- Assessment: Glaucoma, Open angle mild stage OD.
- Superior and inferior thinning on RNFL compared to 2014. GCC shows thinning OD and OS. ONH asymmetry OD>>OS.
- Plan: Discussed SLT vs gtts.
- Pt prefers drops for now. Start Lumigan qhs OD(sample given).
- RTC 1m for IOP check.
- IOP at 1m follow up: 9/12 mmHg

Change in insurance, needs to transfer care to UK.

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### Case 1 NG 66985 2018

Back at CES end of 2018

Pt is pregnant and does not want to use drops in OS.

Continue Lumigan qhs OD during pregnancy.

2019: After pregnancy. Using Lumigan qhs OU every 2-3 nights. Last used 2 days ago.

- Discussed SLT due to poor compliance. She prefers drops.
- IOP is up to 18/16 mmHg. Discussed compliance.

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### 2019 - 2020

- 06/2019: First time seen by TP
- 06/2019: Using drops every other day, hasn't used in 1 week b/c using allergy drops.
  - IOP 20/20 mmHg
  - Highest IOP since 2014 at CES. Discussed benefits of SLT. Pt agrees to SLT.
- Plan: SLT OD then OS.
- Continue Lumigan qhs OU for now.
- 7/2019: SLT OD

SLT Parameters:	
SLT with Magnaview Gonioscens 3 no. 400 micron spot size	
Takes	103
Milipules	1.0

- IOP 30 mins post SLT OD: 12mmHg
- Use Acular LS QID x 3 days OD
- 08/05/2020: 1 year post SLT OD
  - IOP:10/9mmHg

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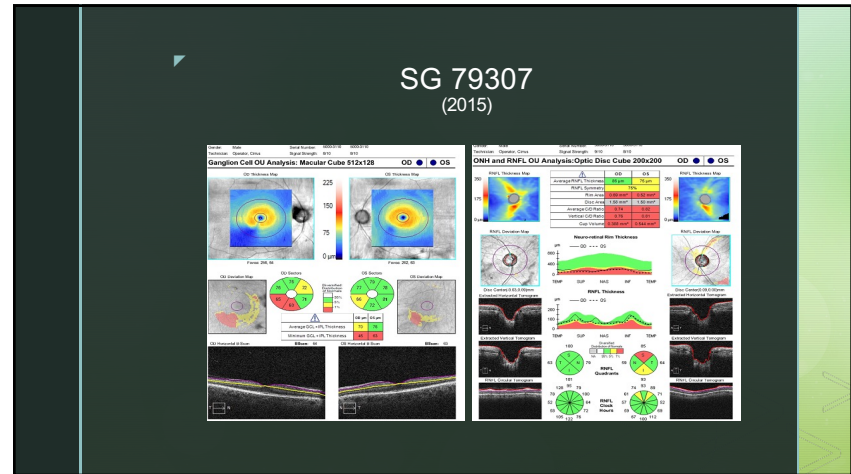
### Case 2 SG 79307

- CC: 59 yo wm, referred for glaucoma eval. Wears monovision CL (2015). Primary OD was monitoring but has noticed some worsening.
- VA CC: OD: J1+ and OS: 20/25+1
- CVF: FTFC OD and OS
- PERRL, no APD OU
- SL exam: 1+NS, AC: D&Q
- IOP: 19/18 mmHg
- Pachs: 576 / 576
- ONH:
  - OD:0.70 no Drance heme
  - OS:0.70 no Drance heme
  - Note disc size
  - Choroidal nevus, OS

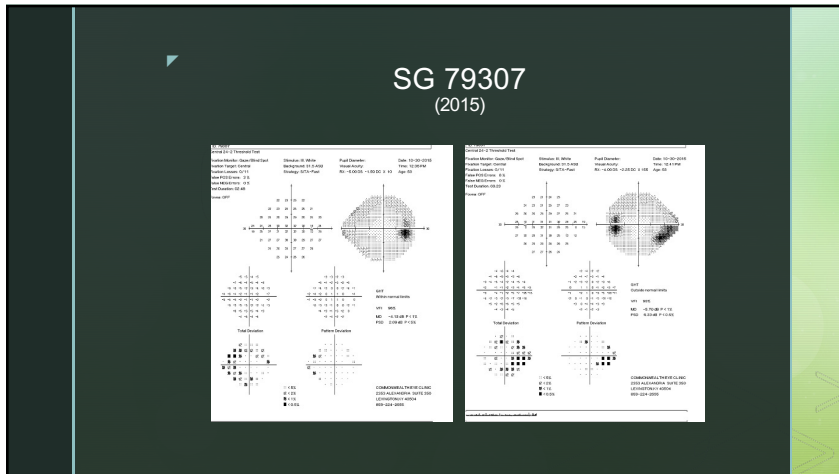
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SG 79307 (2015)

- Assessment:
  - Glaucoma suspect, Open angle OS-OD. High risk
  - No definite VF defect OD, possible inferior nasal step OS (first HVF)
  - Normal range IOP without drops.
- Plan:
  - RTC **2 weeks** for IOP check and Gonioscopy.
  - Will consider initiating tx at the follow up.

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### SG 79307 (2021)

- Primary OD calls on 1/21 and would like the patient to be seen ASAP.
- Referring OD knows that the patient is bad at keeping appts but wants us to schedule him for GLC work up **ASAP**. IF we can get him to come in.

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### SG 79307 (2021)

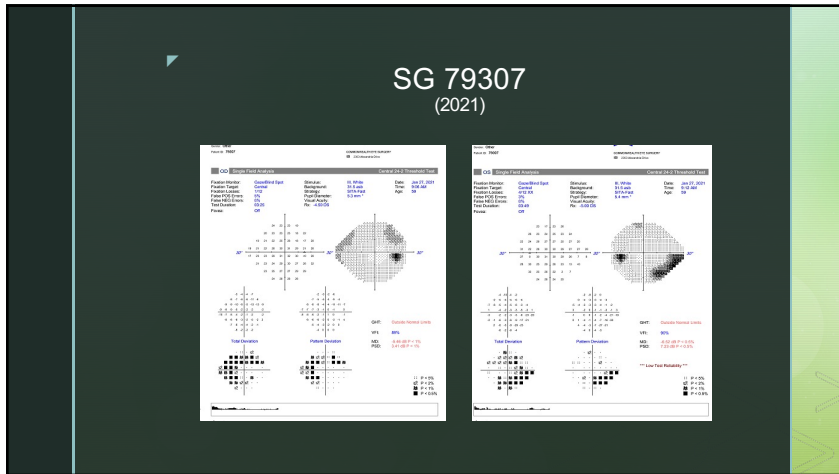
- VA CC:
  - OD: 20/30-2
  - OS: 20/25-3
- (-)fam hx for ocular dx.
- HVF: FTFC OD and OS
- PERRL, no APD OD and OS
- SL: trace-1+ NS OD and OS
- IOP: 20/19 mmHg
- CV: 14/14
- Gonio: TM visible OD and OS.
- Pachs: 591/593
- ONH:
  - OD: 0.80/0.85v, no drance heme
  - OS: 0.80/0.85v, no drance heme

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### SG 79307 (2021)

A collection of ophthalmology diagnostic images for patient SG 79307. The images are arranged in a grid. On the left, there are OCT scans showing retinal thickness and cross-sections of the retina. In the center, there are fundus photographs showing the optic disc and macula. On the right, there are visual field tests showing the patient's field of vision. The images are labeled with 'OD' (right eye) and 'OS' (left eye). The overall layout is professional and organized, typical of a medical report.

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### SG 79307 (2021)

- Assessment:
  - POAG OU
  - HVF defect OD and OS that correlates to ONH and OCT.
  - Discussed compliance, SLT vs drops.
- Plan:
  - SLT OD then OS
  - Start Lumigan qhs OU. D/C after SLT depending on IOP control.

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### SG 79307 (2021)

- SLT OD
- Use Acular LS 0.4% QID x 3 days
- 30 mins post SLT IOP:
  - OD: 13 mmHg

SLT Medications Pre Op	
	Time 1/initials
Proparacaine 0.5% 2 gtt	1106 cm
lopidine 0.5% 1 gtt	1106 cm
SYSTANE® Gel Drop 2ggt	
Diamox (Acetazolamide) 500 mg po	1106 cm

SLT Parameters:	
Takes	SLT with Magnaview Goniolens 3 mc 400 micron spot size 88
Millijoules	73

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### SG 79307 (2021)

- 3 weeks s/p SLT OD
- SL: unremarkable
- IOP: 11/10 mmHg
- D/C Lumigan QHS OD, Continue in OS
- Plan: SLT OS today, RTC 1m for IOP check.

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### SG 79307 (2021)

- SLT OS
  - Use Acular LS 04% QID x 5 days
  - 30 mins post SLT IOP:
    - OS: 10 mmHg

SLT Medications Pre Op	
	Time I/initials
Proparacaine 0.5% 2 gtt	8:55 km
lopidine 0.5% 1 gtt	8:55 km
SYSTANE® Gel Drop 2ggt	
Diamox (Acetazolamide) 500 mg po	8:50 km

SLT Parameters:	
Takes	SLT with Magniview GonioLens 3 mg; 400 micron spot size
107/1.0	
Millijoules	102

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### SG 79307 (2021)

- Follow up
  - 2m s/p SLT OD, no drops
  - 1m s/p SLT OS, still on Lumigan QHS.
  - IOP: 13/12 mmHg
- Plan:
  - Discontinue Lumigan OS. RTC 1m for IOP check. (4/21/21)

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### SLT for NTG BMC ophthalmology

- Efficacy of a single SLT in NTG: decrease in IOP and meds at 1 year
- Inclusion criteria: NTG pts on glc meds
- Exclusion criteria: previous glc sx, SLT or intraocular sx.
- All underwent 1m washout.
- Target: 30% reduction in IOP.
- 1 session of SLT 360 degrees
- Meds restarted at 1 month post SLT
- IOP checked at 3,6, and 12m.

https://orpha.ophthnet.com/medication/11188/147-245-51

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### SLT for NTG BMC ophthalmology

- Results:
  - 41 eyes
  - Mean pre op IOP 14.3 ± 3.4 mmHg while on 1.5 ± 0.8 eye drops
  - post-washout IOP was 16.2 ± 2.2 mmHG
  - Mean IOP at 12m: 12.2 ± 2.2 mmHg while on 1.1 ± 0.9 drops
- Statistically significant decrease in # of meds following ST (P < 0.0001)
- A single session of SLT for NTG achieved an additional 15% IOP reduction while using 27% less medication at 1 year compared to pre-study levels

https://orpha.ophthnet.com/medication/11188/147-245-51

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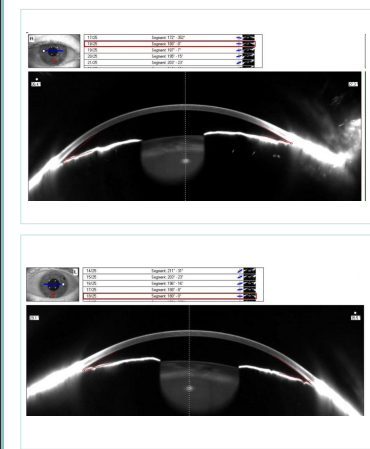
### SLT vs medical therapy

- Compared SLT vs drug therapy for OAG and OHTN.
- 127 eyes
- Randomized to SLT or medical therapy (PGA) group
- Primary outcome: IOP reduction.
- Baseline IOP: 24.5Hg SLT group and 24.7mmHg for med group.
- Results: IOP post tx
  - 12m follow up
  - SLT: 18.2mmHg and Medical tx: 17.7mmHg
- No Statistically significant difference b/w the two groups
- More additional tx was necessary in med group than SLT to maintain IOP.
- Safe and effective initial tx for OAG/OHTN

https://pubmed.ncbi.nlm.nih.gov/3292882

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### OHTN



- D.B 61 yo wf
- Ocular hx:
  - Narrow angles, s/p LPI OU
  - OHTN OS>>OD.
- Fam Hx: father- glc
- Uses "unknown" drop qhs OU for high IOP, **forgot** to use drop last night.
- CC VA: OD: 20/25; OS:20/25-

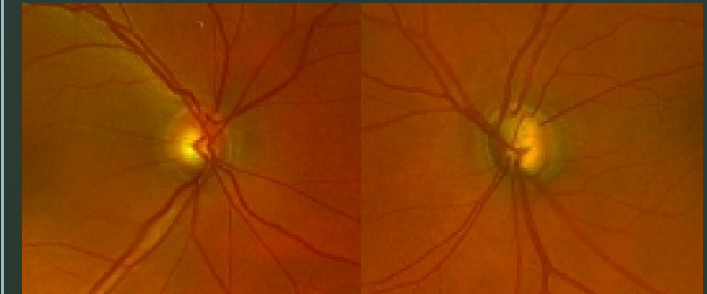
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### OHTN

- CVF:
  - FTFC OD, constricted OS
- APD OS
- SL exam:
  - Vortex keratopathy OU
  - Shallow and quiet AC OU
  - PI patent OU
  - 1+ NS OU
- IOP: 20/35mmHg
- Gonio: Some ATM visible inferior, bowing anteriorly OU
- CD: 0.65 OD; 0.90 mostly cupped out OS, no drance heme OU

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### Fundus photos



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## OHTN/CACG

- Assessment:
  - OHTN OS
  - Narrow angles OU
    - s/p LPI OU
  - Cataracts: Not visually significant.
- Plan:
  - SLT OS
  - Start Combigan BID OS.
- 2m follow up s/p SLT OS
  - No longer in Combigan
- IOP: 21/18 mmHg
- Plan: Primary OD will continue monitoring.

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## The Laser in Glaucoma and OHTN (LiGHT) trial

- Compare if SLT or medical tx is superior in OHTN and POAG.
- Prospective, multicenter, pragmatic, randomized controlled trial.
- 718 untreated patients
- Method: randomized SLT vs medical therapy group. Followed for 3 years.



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## The Laser in Glaucoma and OHTN (LiGHT) trial

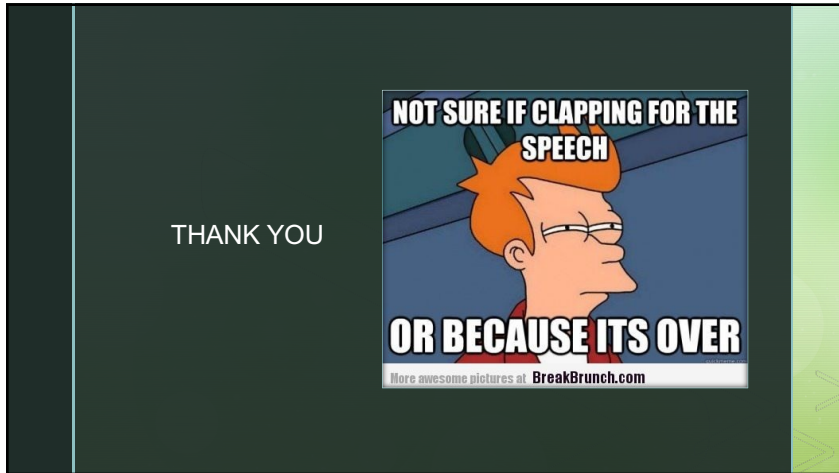
- Outcomes based of several criteria: quality of life, efficacy, cost, and safety (EQ-5D-5L).
- Results: 555 POAG, 163 OHTN
  - 70% Caucasians
  - Median IOP pre tx: OHTN: 26mmHg, POAG: 23mmHg
  - Median baseline VF deviation: OHTN: -0.81dB, POAG: -2.82dB
  - Cost of SLT £205 vs over the 36 months of the trial, drops for OAG and ocular hypertension cost an additional £465
  - SLT as first line tx reduced costs and has similar or better IOP lowering compared to medical therapy.

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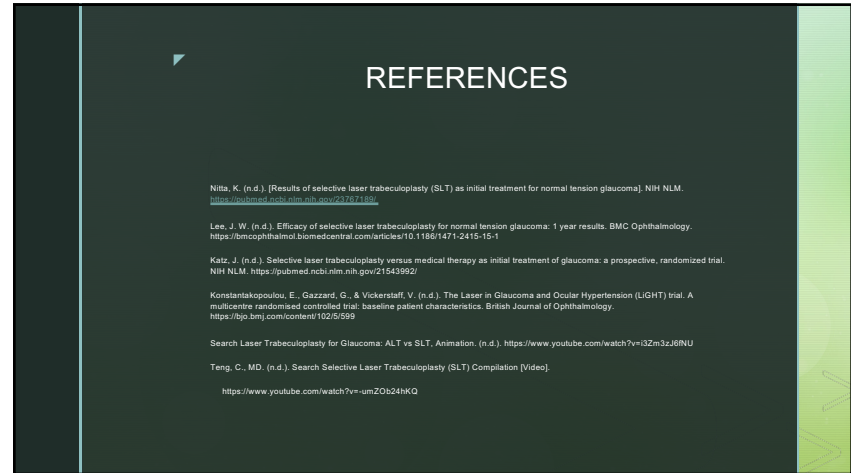
## The Laser in Glaucoma and OHTN (LiGHT) trial

- Conclusion:
  - SLT provides better IOP stability to drops with lower costs.
  - ~75% of the patients had good IOP control at 36 months without drops.
  - Medical tx group had slightly higher rate of VF progression.

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