

Minimally invasive treatments for glaucoma: Drops, laser & surgery

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Philip Bloom

Consultant Ophthalmic Surgeon

The Western Eye Hospital, London (Imperial College Healthcare NHS Trust)

Past Chairman, Glaucoma UK (Formerly IGA)

Charity Registered: in England & Wales No 274681; in Scotland No SC041550

Past President, United Kingdom & Ireland Society of Cataract & Refractive Surgeons (UKISCRS)

Charity Incorporated Organisation No. 1191256

Past Trustee & Council Member, Royal Society of Medicine (RSM)

Charity Registered in England & Wales No 206219

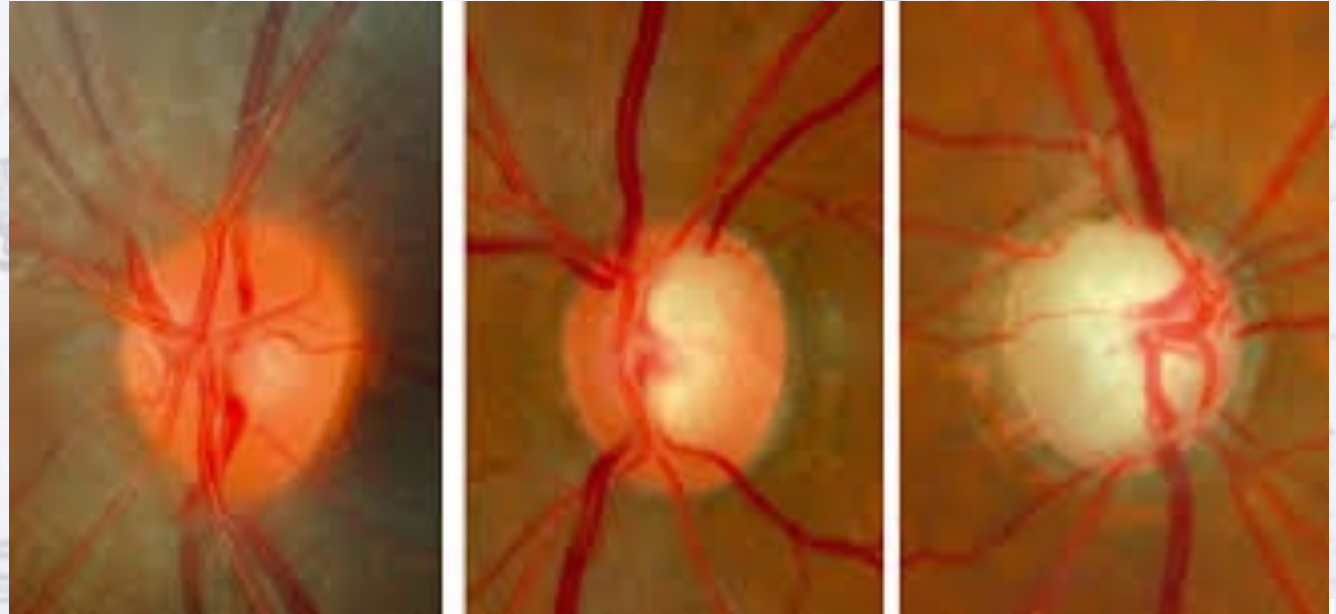
Honorary Senior Lecturer

Imperial College School of Medicine, London

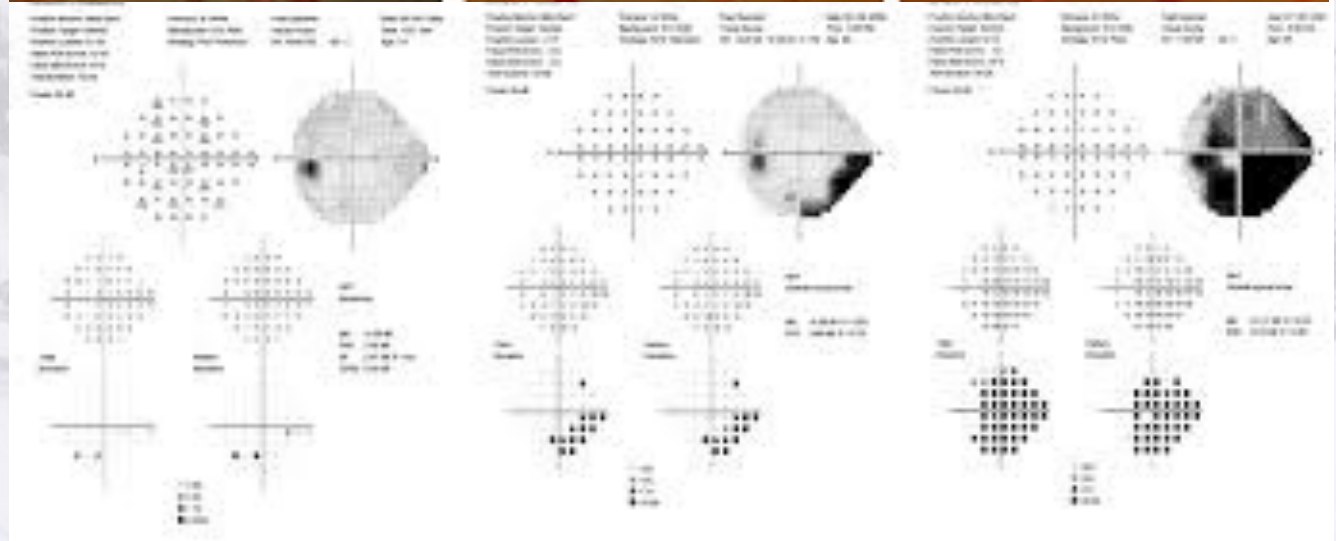


Glaucoma: stage of disease

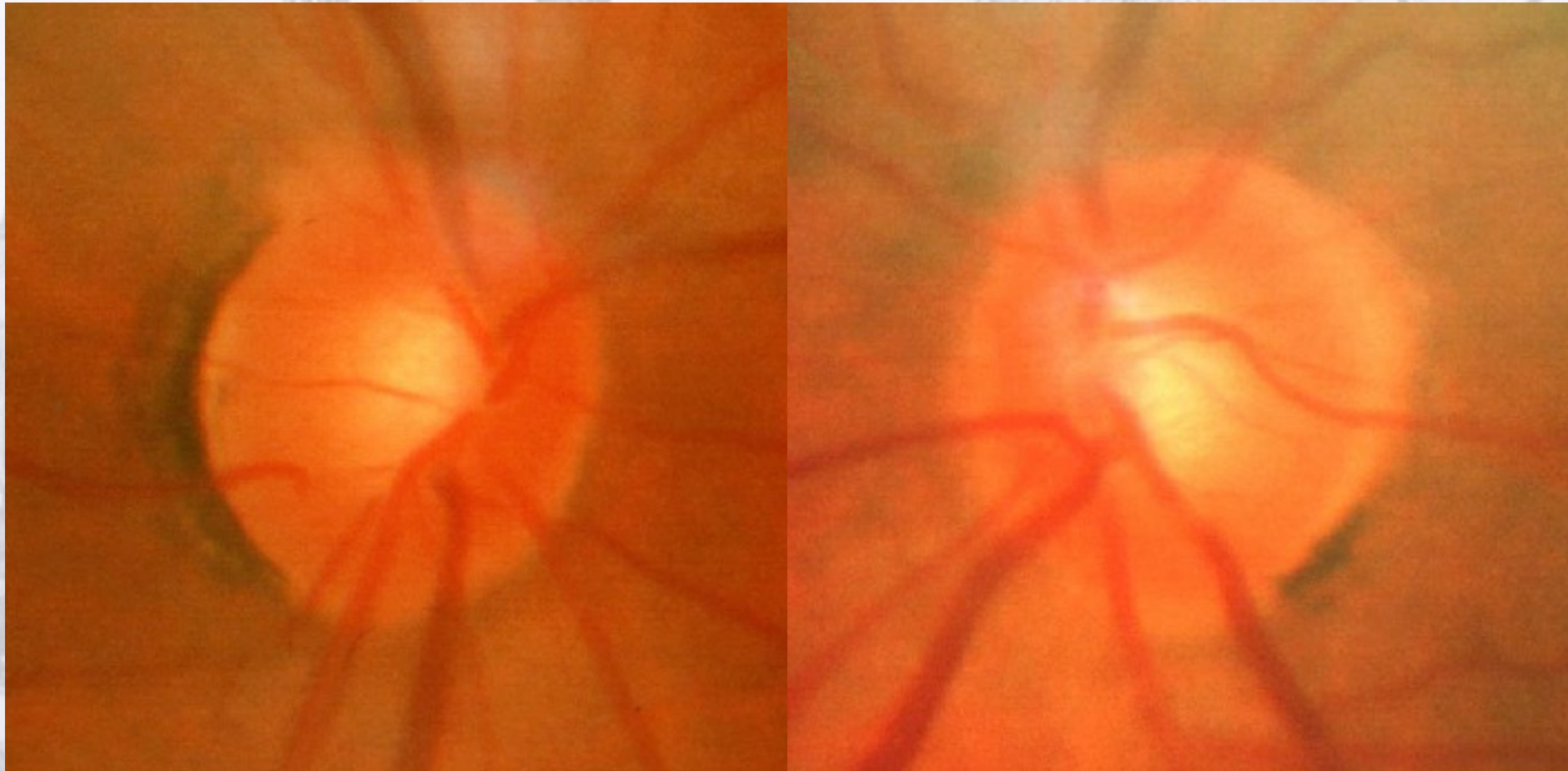
👁️ Optic nerve



👁️ Visual field



Glaucoma: rate of progression



Risk & benefit

- 👁️ 'Risk of doing something (surgery)'
 - Complications
 - Cost (?)

- 👁️ 'Risk of doing nothing (drops)'
 - Disease progression
 - More sight loss
 - Cost (?)



Glaucoma - treatment

👁 Medications

- Drops
- Tablets
- Neuroprotection (?)

👁 Laser

- Trabeculoplasty (SLT / ALT / MPDLT)
- Cyclo-photocoagulation (Cyclodiode / ECP)
- Cyclo-modulation (MicroPulse)
- Iridotomy (LPI)
- Iridoplasty (LI)

👁 Surgery

- Cataract surgery
- MIGS (with or without phaco surgery)
- MPGS (PreserFlo MicroShunt)
- Trabeculectomy ('Trab')
- Traditional Glaucoma drainage devices ('Tubes')



Glaucoma Treatment Paradigm

- MLS (since forever) v SLM (1994) v LMS (SLT) v LSM (MIGS)
- Modern Glaucoma management
 - Earlier diagnosis, lower threshold for surgical intervention
 - Highly safe, moderately effective options often tried before highly effective, moderately safe ones
- What has the MIGS revolution (ever) done for us?
 - New options / new steps in the paradigm for some patients
 - Treat 'glaucoma light' differently than 'proper glaucoma'
 - MIGS has not replaced drainage surgery, rather gives us earlier, intermediate steps
- Net result = more options, increased 'granularity'



Important knowledge for patients & Drs

- When to put drops in
- How to put drops in
- How to minimise side effects
- How to optimise compliance
- Regimes
- Strategies
- Nuances

- Communicate!
 - F2F v virtual ...
 - 'Tell me when you take your drops'
 - 'Show me how you take your drops'



Medical glaucoma treatment - plan

👁️ Drugs

- Combinations
- Formulations
- Therapeutic strategies
- Delivery routes

👁️ Compliance

- Minimising side effects
- Maximising efficacy




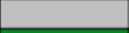






👁️ Support

- Glaucoma UK



Medical nuances

- SLT as initial treatment (NICE)
- Initial vs add on
- Single or dual agents
- Switch vs add
- Maximum tolerated medical therapy
 - Then and now
 - 1, 2, 3, 4 drops
 - 1, 2, 3 agents (bottles)
 - New agents add more options for combinations
- Treatment holiday
 - Diamox
 - SLT
- Increased clinic time ...

Class	Color of Bottle Cap	
Anti-infectives	Tan	
Anti-inflammatories/steroids	Pink	
Mydriatics and cycloplegics	Red	
Nonsteroidal anti-inflammatories	Gray	
Miotics	Dark Green	
Beta-blockers	Yellow	
Beta-blocker combinations	Dark Blue	
Adrenergic agonists	Purple	
Carbonic anhydrase inhibitors	Orange	
Prostaglandin analogues	Turquoise	

Other medical strategies

- 👁️ Neuroprotection
 - Nicotinamide
 - Gingko
 - Bilberry
 - CoQ (drops and oral)
- 👁️ Medical cannabis (unlicensed use...)
- 👁️ Smoking cessation
- 👁️ Exercise
- 👁️ Diet
- 👁️ Meditation
- 👁️ Breathing
- 👁️ Neckties
- 👁️ Yoga (headstands)



Minimising side effects

👁 Local v systemic side effects

👁 Obvious

- β -blockers
- PGA
 - Iris colour change
 - Peri-ocular skin pigmentation
 - Lash growth
- CAI
 - Topical plus systemic
- Dry eye
- α -agonists - allergy

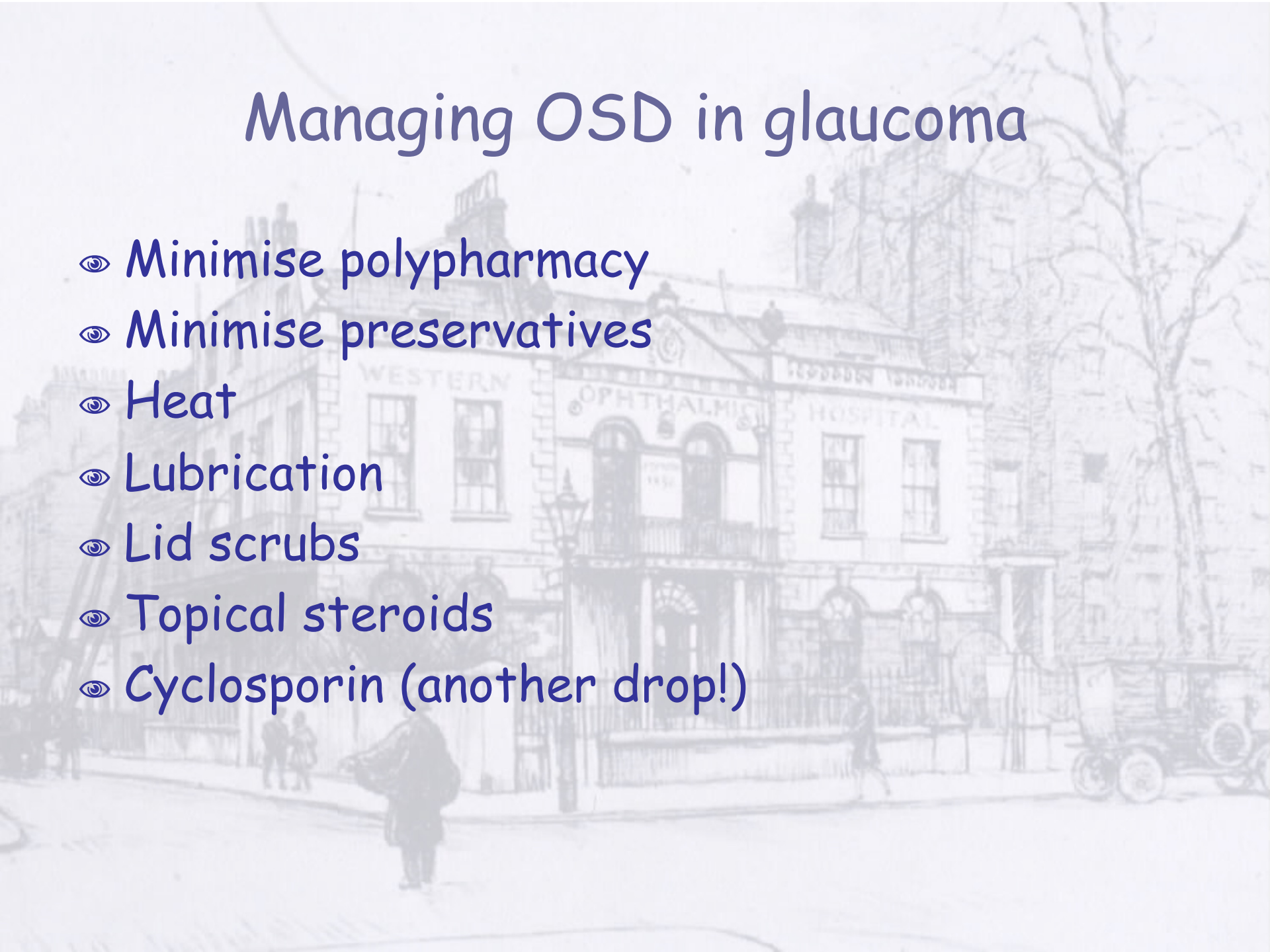
👁 Not so obvious

- Bronchospasm / fat atrophy / idiopathic CMO with PGAs
- Reduced exercise tolerance / bad dreams / erectile dysfunction with β -blockers
- Sleepiness: α -agonists in adults (contraindicated in children)



Managing OSD in glaucoma

- 👁️ Minimise polypharmacy
- 👁️ Minimise preservatives
- 👁️ Heat
- 👁️ Lubrication
- 👁️ Lid scrubs
- 👁️ Topical steroids
- 👁️ Cyclosporin (another drop!)



Compliance - adherence vs persistence

👁 Medication adherence (compliance)

- The extent to which a patient acts in accordance with the prescribed interval and dose of a dosing regimen (16-67%)
 - Measure metabolites
 - Direct observation
 - Self-reported
 - Weigh bottles
 - Electronic monitoring
- Evidence of the drug being dispensed (re-prescription rates) but not instilled
 - Proportion of days covered (PDC)

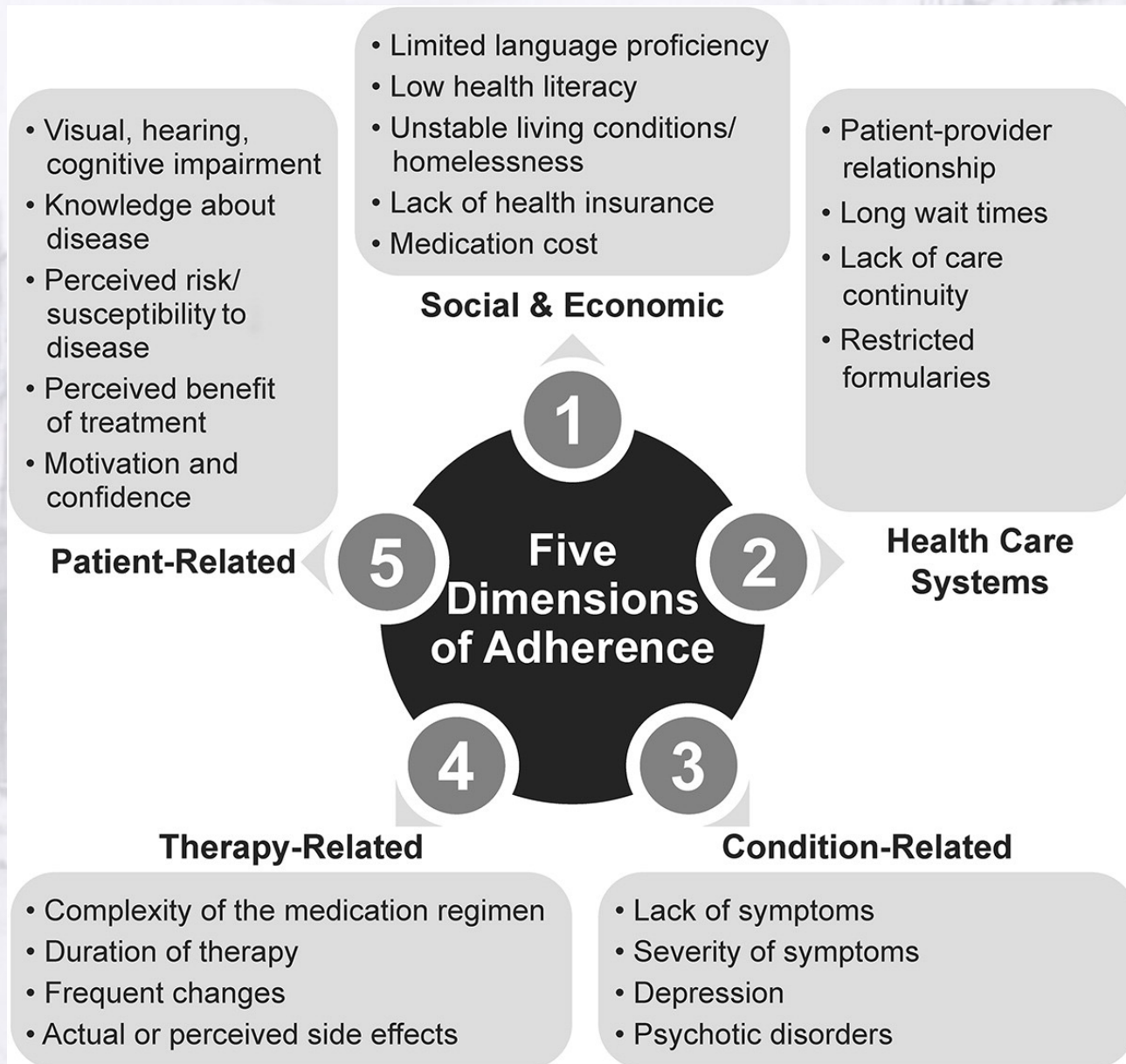
👁 Persistence

- The duration of time from initiation to discontinuation of therapy (retail pharmacy data)
 - 24-40% (Taiwan), 19-64% (USA), 69-84% (Europe)
- Medication possession ration (MPR)

👁 Consistently higher adherence & persistence with PGAs



Potential determinants of medication adherence



Compliance

- 👁 Teaching re drops
 - It is not a course of antibiotics
 - It is a long-term requirement
- 👁 Demonstration of techniques
- 👁 Discuss issues of compliance (adherence) / persistence
- 👁 Avoid unpleasant agents / regimes
 - Pilocarpine

**“Drugs don’t work if
people don’t take them”**

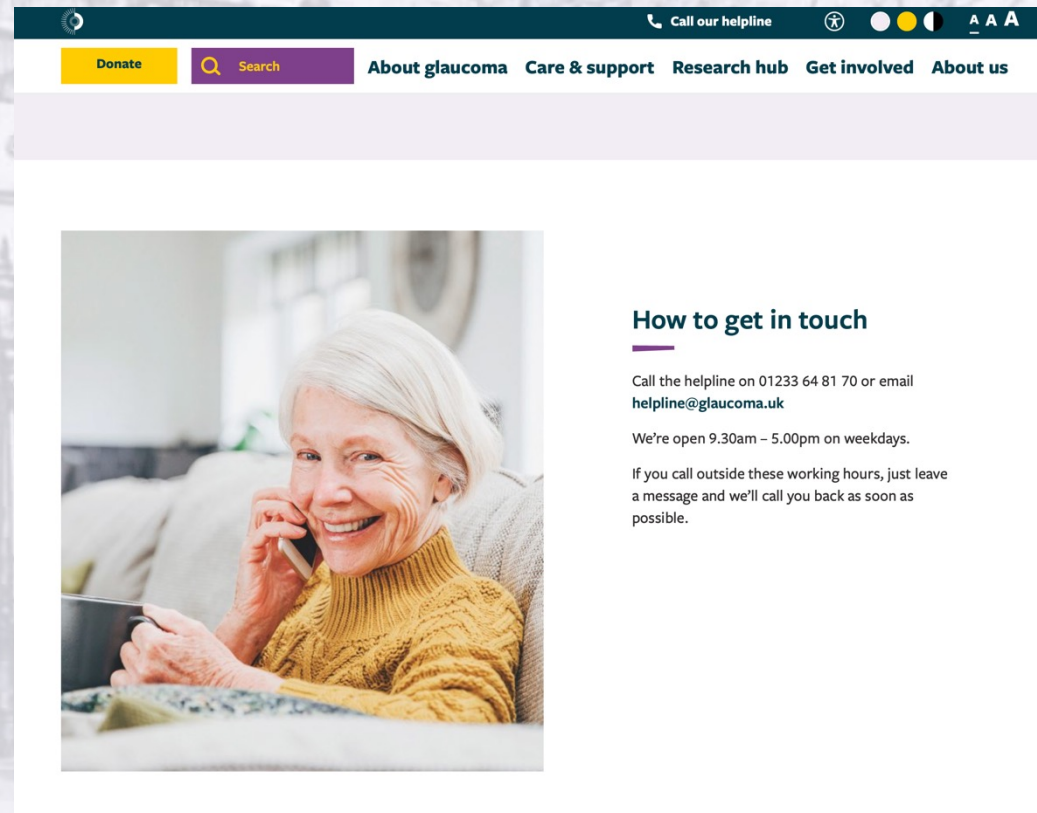


- C. Everett Coop
former US Surgeon General



Aiding compliance

- Simple, tolerable regimes
- Self-administered v family / partner / friends
- Information about the condition
- Devices
- Apps
- Compliance briefcase
- Glaucoma UK
 - (Formerly IGA)
 - Sightline



The screenshot shows the top navigation bar of the Glaucoma UK website. It includes a 'Call our helpline' button, a search bar, and links for 'About glaucoma', 'Care & support', 'Research hub', 'Get involved', and 'About us'. Below the navigation bar is a large image of an elderly woman with white hair, wearing a yellow sweater, smiling while talking on a mobile phone. To the right of the image is a section titled 'How to get in touch' with the following text:

How to get in touch

Call the helpline on 01233 64 81 70 or email helpline@glaucoma.uk

We're open 9.30am – 5.00pm on weekdays.

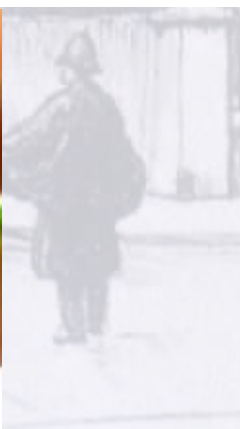
If you call outside these working hours, just leave a message and we'll call you back as soon as possible.

- <https://glaucoma.uk/care-support/helpline>

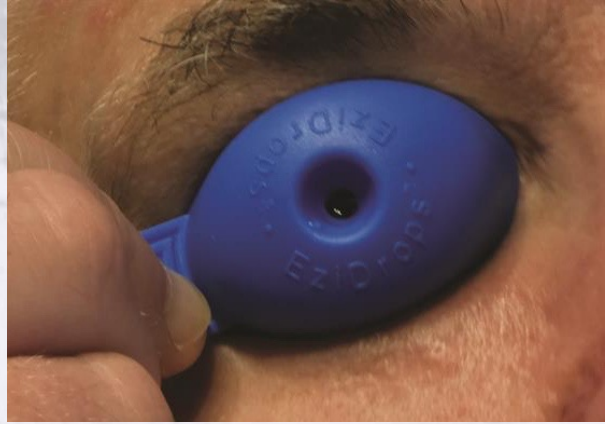
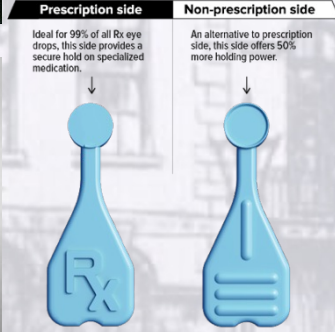
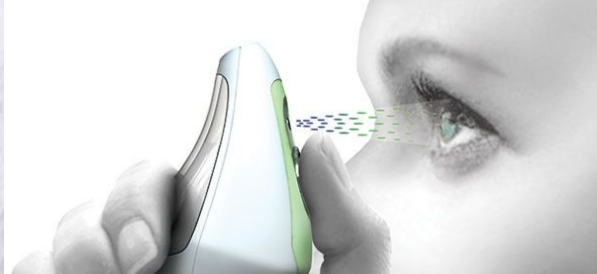
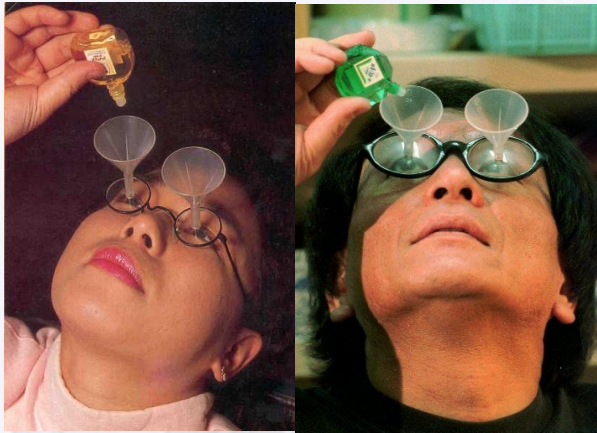


The IGA Compliance Briefcase.

Conventional compliance aids



Less conventional compliance aids



Application methods

- 👁️ Drops
 - Compliance aids
- 👁️ Tablets
 - Diamox
 - Betablockers for other conditions
- 👁️ Implants in development
 - Pellets (ocuserp pilo)
 - Mydriaserp
 - Rings
 - Plugs
 - Gels
 - Sprays
- 👁️ iDose



Avoid slavish adherence to failing treatment regimes

- More treatment options = more combinations
 - May worsen outcome by delaying more effective treatments (surgery)
 - Jay JL, Allan D. The benefit of early trabeculectomy versus conventional management in primary open angle glaucoma relative to severity of disease. Eye 1989;3: 528-35
 - The eyes which lost most visual field were those with least field loss at diagnosis and this paradox was attributed to a prolonged attempt at medical control in these eyes because they were thought to have a lower risk of visual field deterioration
- Optimise drops before drainage surgery
 - Steroids
- Diamox or SLT to spare drops
 - Treatment holiday
 - Prior to surgery



Glaucoma UK (formerly IGA): Aims



1. **Support research into detection and treatment** - via an annual grant making programme and through our support for the IGA Professor of Glaucoma at UCL
2. **Prevention of needless sight loss** - by running national campaigns to raise awareness and understanding of glaucoma, and reduce needless sight loss by encouraging people to take care of their eyes - especially those most at risk.
3. **Helping people live well with glaucoma** - by providing advice and information on managing the condition, via telephone helpline, online forum and local patient support groups around UK (BDMs such as Subhash Suthar - thanks for the eyedrop videos !)

Publishing and distributing a wide range of booklets and leaflets aimed at patients, carers and professionals

This information is regularly updated and approved by 'Clinical Advisory Panel', and is also available via our newly rebranded website

New treatment paradigms:

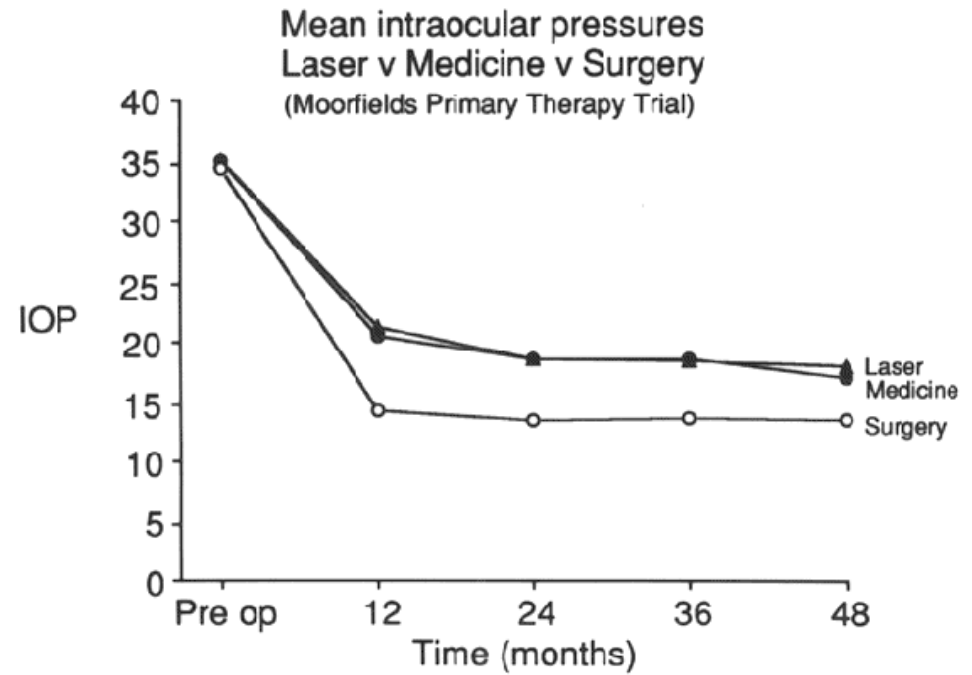
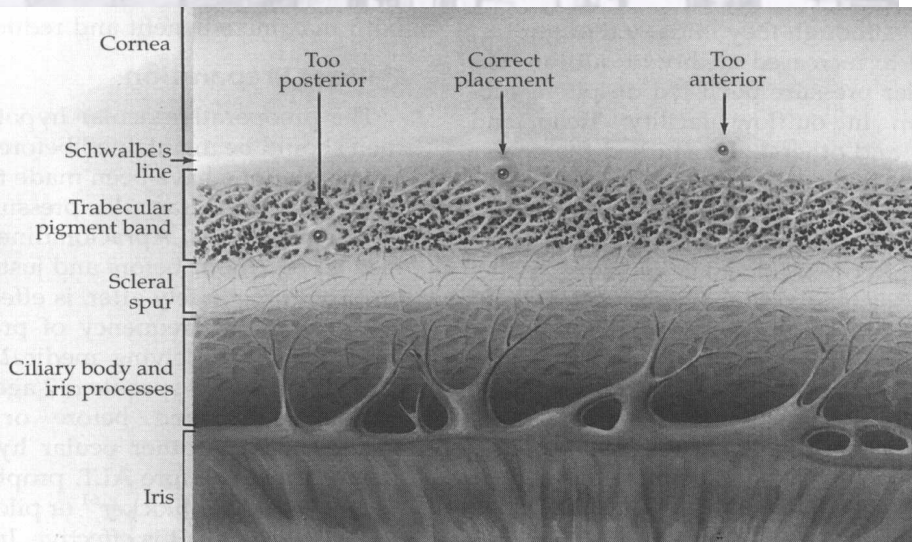
Wither (sic) MIGS? (after Gus Gazzard)

- Reduced dependence on topical medication
- Stepwise approach for mild to moderate disease
 - Early / primary selective laser trabeculoplasty
 - Preservative-free topical or injectable therapies
 - Ab interno MIGS procedures, with or without lens surgery
 - More invasive conjunctiva-involving stents for more severe disease and / or those who fail initial treatments
- Moderate to advanced disease / low target IOP
 - Traditional MMC or anti-VEGF augmented trabs
 - Tube surgery - complex, secondary glaucomas and/or failed previous surgery

Laser trabeculoplasty

Argon laser trabeculoplasty (ALT)

- Wise & Witter 1979



Migdal C, Gregory W, Hitchings R. Long term functional outcome after early surgery compared with laser and medicine in open-angle glaucoma. *Ophthalmology* 1994;101:1651-7

SLT v ALT Technique

- ALT endpoint
 - Blanching or production of a tiny bubble
- SLT various endpoints
 - Use microbubbles as guide
 - Aiming beam centered over (and straddles) TM

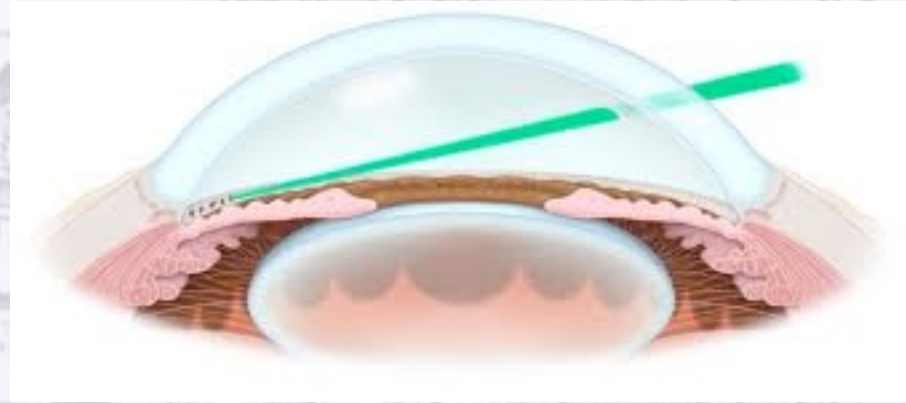


ALT

SLT

SLT

- 👁 Selective laser trabeculoplasty (SLT)
- 👁 Mark Latina 1995
- 👁 FDA approved 2001



Exp. Eye Res. (1995) 60, 359–372

Selective Targeting of Trabecular Meshwork Cells: In Vitro Studies of Pulsed and CW Laser Interactions

MARK A. LATINA* AND CARL PARK

*Wellman Laboratories, Massachusetts General Hospital, Boston and Schepens Eye Research Institute,
Boston, MA, U.S.A.*

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Wellman Laboratories, Massachusetts General Hospital, Boston and Schepens Eye Research Institute,

MARK A. LATINA, AND CARL PARK

Shedding some LiGHT



Selective laser trabeculoplasty versus eye drops for first-line treatment of ocular hypertension and glaucoma (LiGHT): a multicentre randomised controlled trial

*Gus Gazzard, Evgenia Konstantakopoulou, David Garway-Heath, Anurag Garg, Victoria Vickerstaff, Rachael Hunter, Gareth Ambler, Catey Bunce, Richard Wormald, Neil Nathwani, Keith Barton, Gary Rubin, Marta Buszewicz; on behalf of the LiGHT Trial Study Group**



LiGHT study

- 👁 SLT vs Drops
- 👁 Untreated OAG/OHT (previous phaco allowed)
- 👁 No change in EQ-5D
- 👁 74% drop free in 3 years
- 👁 2 month drop in IOP is predictive of success



SLT vs Medical Therapy Summary

- 360 SLT vs medical therapy
- 6-7 mmHg reduction
- Similar efficacy at 1 yr
- SLT more convenient, no risk of poor compliance



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