

# Does a little light go a long way to treat glaucoma?

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## Introduction and Aims

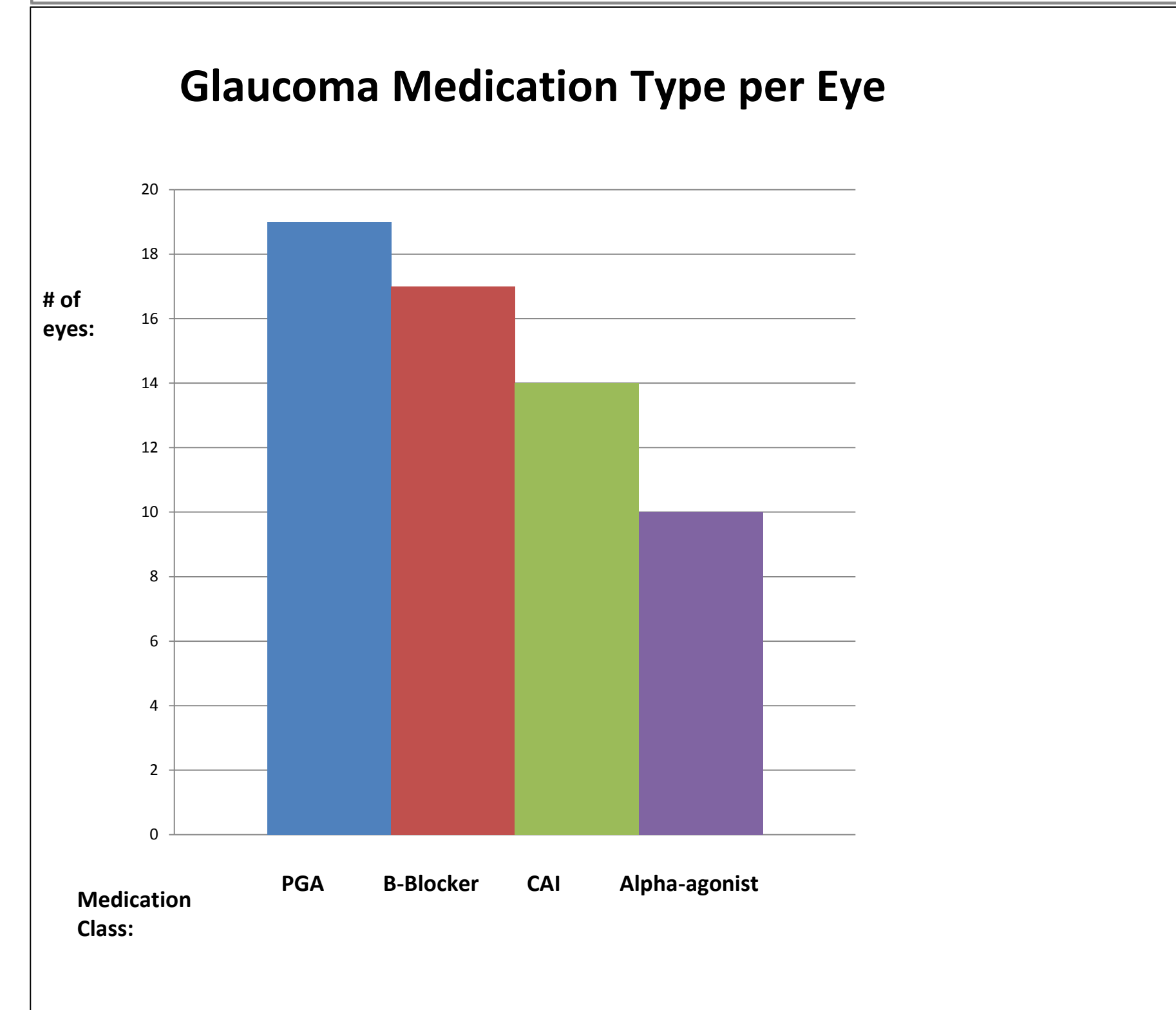
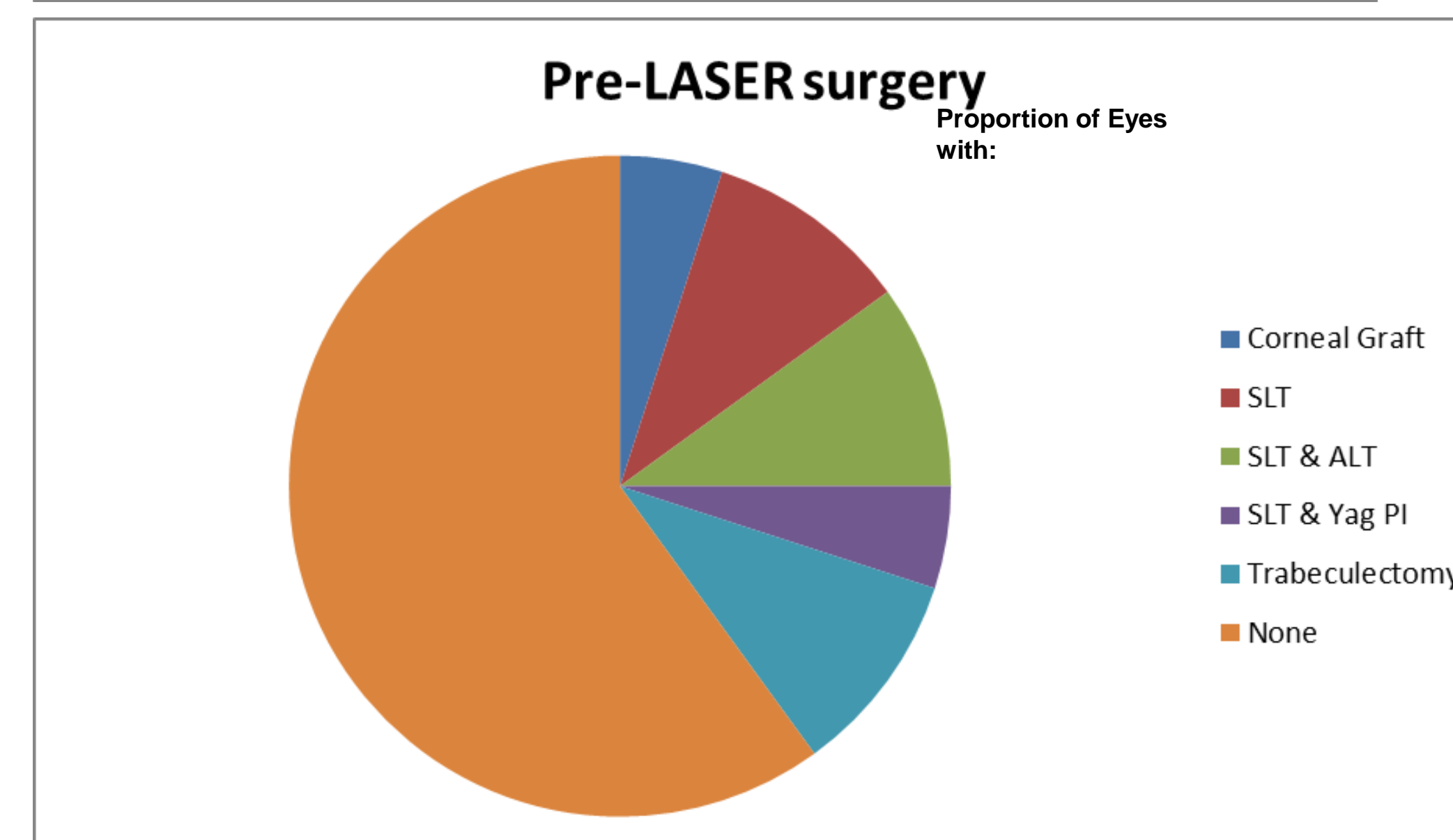
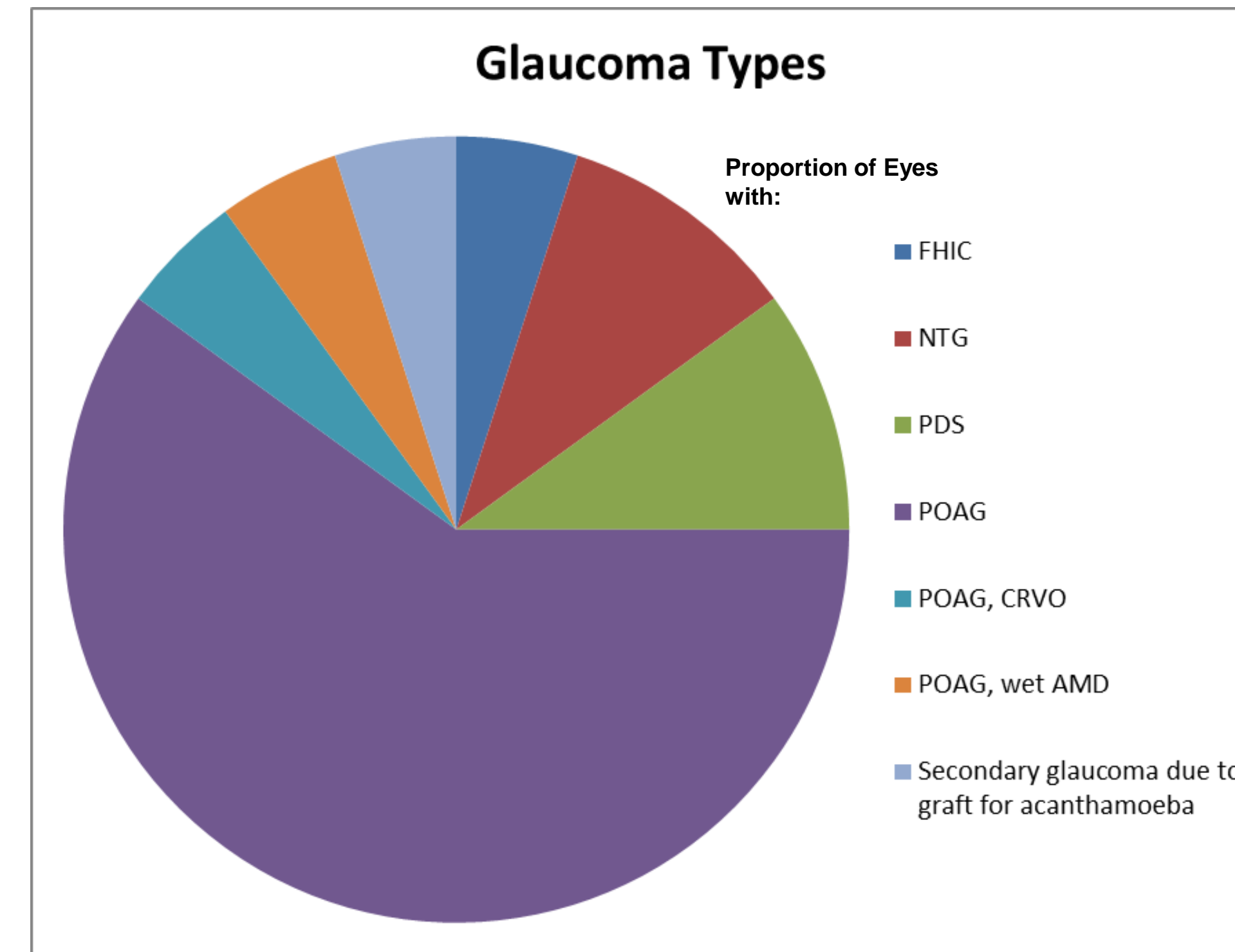
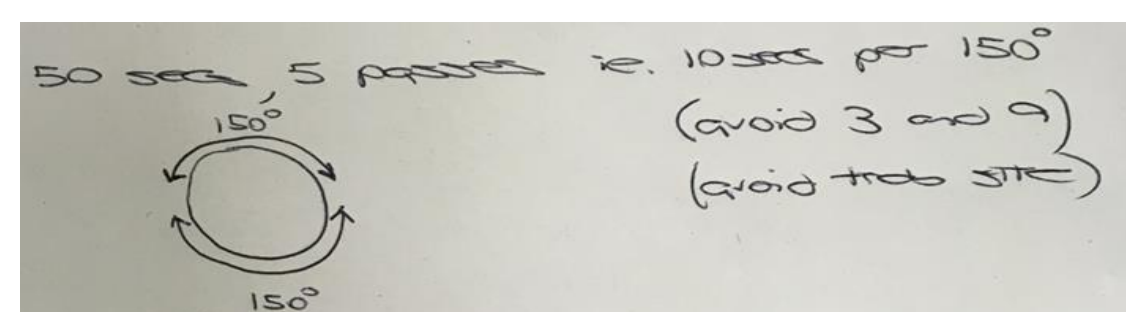
Limited theatre time during COVID required temporary changes to departmental glaucoma practice. As a trabeculectomy (60+ minutes procedure) alternative in a cohort of patients, we performed MicroPulse® LASER (15 minute procedure) which chops a continuous wavelength cyclodiode LASER into shorter pulses thus reducing heat spread to other tissues and is repeatable<sup>1-3</sup>. No clear guidelines exist regarding optimal MicroPulse® settings or number of treatments required for glaucoma control<sup>1</sup>. In April 2021, NICE guidance<sup>4</sup> changed limiting MicroPulse® to experimental use due to paucity of literature regarding long-term efficacy. Our study reviews the effectiveness and safety of MicroPulse® in this patient cohort.

## Methods

From October-December, 2020: 20 eyes in 18 patients with intraocular pressure (IOP) above target level and glaucoma progression were treated with Cyclo G6® Glaucoma Laser System with MicroPulse P3® Glaucoma Device by Iridex in Raigmore Eye Theatre by 2 ophthalmology consultants and their 2 trainees using sub-Tenon's anaesthetic. Ocucoat was used as a coupling agent between the MicroPulse® probe and eye. The probe was carefully aligned with the limbus and "painted" in 10 second sweeps inferiorly and posteriorly (avoiding 3 and 9 o'clock areas) for a total of 50 seconds each for two arcs of 150 degrees superiorly and inferiorly. In advanced glaucoma patients, we applied 40s of MicroPulse® superiorly over 120 degrees thus leaving a central 30 degrees untreated for future trabeculectomy. All patients with trabeculectomy blebs only had MicroPulse® inferiorly. MicroPulse® LASER delivery was standardized: 2500 mW with 31.3% Duty Cycle (0.5 milliseconds on and 1.1 milliseconds off) for all eyes utilizing manufacturer guidelines<sup>3</sup>. All eyes were given 1 mL of subconjunctival dexamethasone, gCyclopentolate 1%, and oc chloramphenicol immediately after treatment. Dexamethasone 0.1% and Chloramphenicol drops were given QDS for 2 weeks. IOP was measured via Goldmann applanation tonometry and MicroPulse® repeated if IOP inadequately reduced.

We analysed IOP measurements taken during: preoperative listing, 2 weeks post-op, and at 6 months. Data regarding visual acuity at each of these visits was recorded along with any retreatment, other glaucoma interventions, and any complications. Statistical analyses of IOP changes before and after treatment were conducted to detect significance at level of  $p < 0.05$  using the non-parametric Friedman test for repeated measures using a calculator from <https://www.socscistatistics.com/tests/friedman/default.aspx>.

### MicroPulse® Probe<sup>1</sup> and Treatment Diagram



## Results

| Eye     | Listing IOP | 2 week post-op IOP | IOP at 6 months | Repeat micropulse LASER | Change in IOP at 6 months from listing | Percent change in IOP |
|---------|-------------|--------------------|-----------------|-------------------------|--|-----------------------|
| 1       | 28          | 19                 | 27              | No                      | -1                                     | -3.6                  |
| 2       | 26          | 15                 | 27              | No                      | 1                                      | 3.8                   |
| 3       | 23          | 28                 | 25              | No                      | 2                                      | 8.7                   |
| 4       | 10          | 12                 | 9               | No                      | -1                                     | -10.0                 |
| 5       | 25          | 14                 | 22              | No                      | -3                                     | -12.0                 |
| 6       | 26          | 28                 | 20              | No                      | -6                                     | -23.1                 |
| 7       | 14          | 11                 | 12              | Yes                     | -2                                     | -14.3                 |
| 8       | 25          | 10                 | 18              | Yes                     | -7                                     | -28.0                 |
| 9       | 20          | 18                 | 18              | No                      | -2                                     | -10.0                 |
| 10      | 24          | 30                 | 21              | Yes                     | -3                                     | -12.5                 |
| 11      | 30          | 15                 | 23              | Yes                     | -7                                     | -23.3                 |
| 12      | 18          | 16                 | 16              | No                      | -2                                     | -11.1                 |
| 13      | 30          | 22                 | 21              | No                      | -9                                     | -30.0                 |
| 14      | 17          | 14                 | 13              | Yes                     | -4                                     | -23.5                 |
| 15      | 21          | 21                 | 20              | Yes                     | -1                                     | -4.8                  |
| 16      | 18          | 11                 | 17              | Yes                     | -1                                     | -5.6                  |
| 17      | 20          | 17                 | 17              | No                      | -3                                     | -15.0                 |
| 18      | 30          | 16                 | 14              | Yes                     | -16                                    | -53.3                 |
| 19      | 25          | DNA                | 15              | No                      | -10                                    | -40.0                 |
| 20      | 23          | 14                 | 14              | No                      | -9                                     | -39.1                 |
| Avg     | 22.7        | 17.4               | 18.5            |                         | -4.2                                   | -17.3                 |
| Min     | 10.0        | 10.0               | 9.0             |                         | -16.0                                  | -53.3                 |
| Max     | 30.0        | 30.0               | 27.0            |                         | 2.0                                    | 8.7                   |
| Std. De | 5.4         | 5.9                | 4.9             |                         | 4.4                                    | 15.4                  |

### Best Corrected Visual Acuity (VA) Over Time

| Eye | Preop VA | Post op VA | VA 6 months | Comment   |
|-----|----------|------------|-------------|---|
| 1   | 6/9+4    | 6/6        | 6/12        |   |
| 2   | 6/6      | 6/6-2      | 6/9         |   |
| 3   | 3/60     | HM         | 6/60        | Macular Disciform Scar                                |
| 4   | 6/24+1   | 6/24       | 6/24        | Advanced Glaucoma                                     |
| 5   | 6/9      | 6/12       | 6/18+1      | Cataract and previous Graft for Acanthamoeba          |
| 6   | 6/60     | 6/60       | CF          | Old Central Retinal Vein Occlusion And Macular Oedema |
| 7   | 6/6      | 6/6        | 6/6         |   |
| 8   | 6/5-1    | 6/9        | 6/9+2       |   |
| 9   | HM       | HM         | HM          | Advanced Glaucoma                                     |
| 10  | CF       | CF         | CF          | Cataract  |
| 11  | 6/9-2    | 6/9        | 6/12        |   |
| 12  | 6/9-1    | 6/6-3      | 6/9-1       |   |
| 13  | 6/9+1    | 6/12+1     | 6/18        | Posterior Capsule Opacification                       |
| 14  | 6/6      | 6/6-1      | 6/6-3       |   |
| 15  | 6/5-1    | 6/6-1      | 6/6-1       |   |
| 16  | 6/5-1    | 6/5        | 6/6         |   |
| 17  | 6/12     | 6/6-3      | 6/12        |   |
| 18  | 6/9      | 6/18       | 6/18        | Refractive Error                                      |
| 19  | 6/5      | 6/9        | 6/5-1       |   |
| 20  | 6/9      | 6/9        | 6/9-1       |   |

## Conclusion

IOP widely fluctuated 2 weeks post-op possibly reflecting steroid response. 6 months post-op: 16 eyes had IOP reductions of 3.6 % to 53.3% whilst 2 eyes had IOP 1-2 mmHg higher than pre-treatment. 8 eyes had >20% IOP lowering. 8 eyes required MicroPulse® retreatment giving lower IOP at 6 months: 1 eye required 2 retreatments and 2 had retreatment sweeps increased from 50 to 80 seconds. IOP changes were statistically significant with p-value: 0.00178.

A machine error meant 1 eye was not initially treated requiring retreatment. 1 eye had anterior chamber uveitis thus retreatment changed to SLT to minimise inflammation. 1 eye had an IOP spike that settled medically with overnight inpatient post-op admission. 1 eye lost vision from NA-ION and worsening cataract whilst another 4 eyes developed reduced vision due to cataract. 2 eyes required glaucoma filtration surgery (both tubes).

As no eyes were treatment naïve, we were unable to fully separate MicroPulse® effects from confounders e.g. increased glaucoma medication compliance pre-/post-op, however most eyes experienced decreased IOP and maintained vision suggesting MicroPulse® may be a safe temporizing treatment in a pressurized glaucoma service.

## References:

1. Sanchez FG, Peirano-Bonomi JC, Grippo TM. Micropulse Transscleral Cyclophotocoagulation: A Hypothesis for the Ideal Parameters. *Med Hypothesis Discov Innov Ophthalmol*. 2018;7(3):94-100.
2. Nguyen AT, Maslin J, Noecker RJ. Early results of micropulse transscleral cyclophotocoagulation for the treatment of glaucoma. *European Journal of Ophthalmology*. 2020;30(4):700-705.
3. <https://www.iridex.com/Products/GlaucomaDevices/CYCLOG6-MicroPulseP3.aspx>
4. <https://www.nice.org.uk/guidance/ipg692>