# ORA vs GAT - Devices under pressure

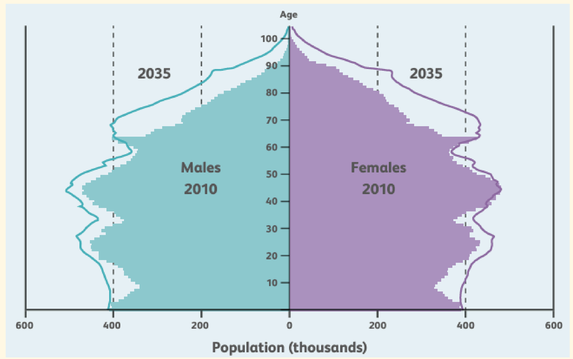
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## Background

- *"A perfect storm of increased demand, caused by more eye disease in an ageing population requiring long term care"* - Prof Carrie MacEwen, chair of RCOphth, 2016.
- Glaucoma cases predicted to rise by 44% over the next 20 years.
- Since the COVID-19 pandemic, there has been increasing backlog of patients. Of the increase in ophthalmology backlogs, outpatient backlog have seen a disproportionate increase of 59% from 2019-2022 compared to 14% for surgical backlogs.
- Consultant-led glaucoma clinics are exceeding capacity
- Widespread adoption of virtual glaucoma clinics (VGC), led by allied health professionals.
- Aims to see patients with low risk/ stable glaucoma and ocular hypertension.
- This effectively reduces time spent in clinics and maximizes appointment capacity.
- Goldmann Applanation Tonometry (GAT) is the gold standard for IOP measurement. However, these devices are not technician friendly to be used in VGCs...




**Estimated and projected age structure of the UK population mid-2010 and mid-2035**

## Ocular Response Analyzer

- The Ocular Response Analyzer (ORA) is a bi-directional noncontact applanation pneumotonometry
- Threefold benefits:-

### Measures Corneal Hysteresis

- Predicts susceptibility for glaucoma progression
- Adjunct to diagnosis
- Monitor response to glaucoma therapy



*Reichert Ocular Response Analyzer G3*

### Technician Friendly

- Facilitates IOP measurement in VGCs

### Objective measure of IOP

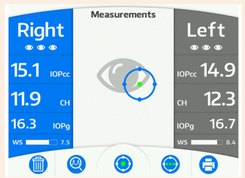
- No intra-observer variability
- Reliability index

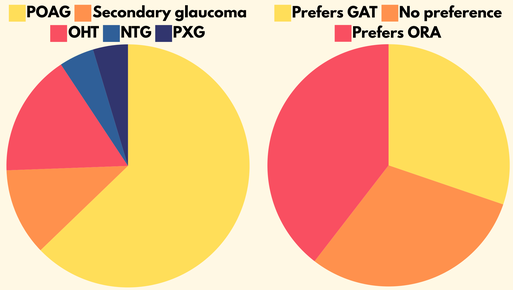
## Aim of the study

1. **How comparable is IOP measurements of the Ocular Response Analyzer (ORA) to the Goldmann Applanation Tonometer (GAT)?**
2. **Patients' preferences and perception**

## Method

- Prospective study involving 50 patients with glaucoma, ocular hypertension, and suspected glaucoma attending glaucoma clinics at Ninewells Hospital.
- IOP measured in both eyes
  - ORA operated by one medical student
  - GAT operated by ophthalmologists
- 2 IOP readings obtained from the ORA -
  - IOPcc (corneal compensated IOP)
  - IOPg (goldmann corelated IOP)
- Compared both ORA IOP readings to IOP reading from GAT
- Patients' preference and perfection evaluation by question: "which method did you prefer, and why?"



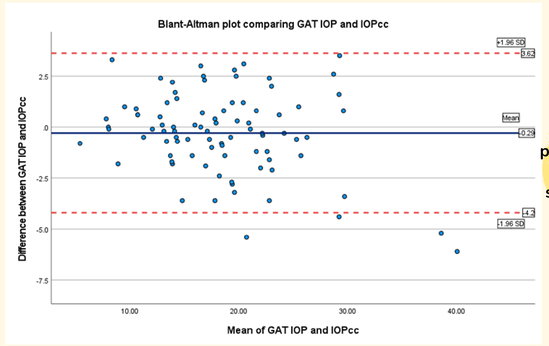





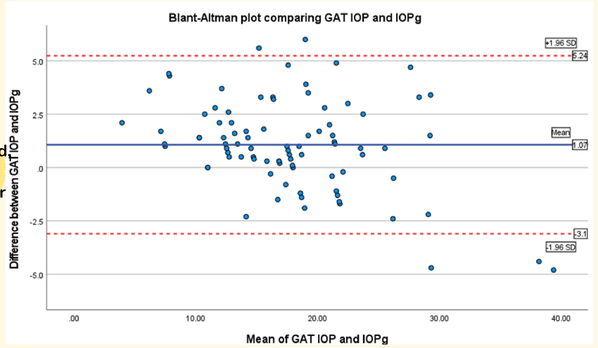


| | Mean | SD | 95% CI of the difference | | P value |
|---|---|---|---|---|---|
| | | | Lower | Upper | |
| Difference between GAT IOP and IOPcc | -0.287 | 1.994 | -0.712 | 0.138 | 0.182 |
| Difference between GAT IOP and IOPg | 1.072 | 2.125 | 0.619 | 1.525 | <0.001 |

| | IOPcc | IOPg |
|---|---|---|
| Absolute difference between GAT and ORA <2mmHg | 86.2% | 71.3% |




**Looking at pattern of spread differences smaller at lower IOP readings!**




## Exclusion criteria

- During early stages of data analysis, we found IOP measurements varied greatly in patients with PACG, creating significant outliers
- Novel and interesting finding!
- Association needs to be studied with a larger sample size and different study design.

## Results

- 87 eyes included after applying exclusion criteria
- Mean age of 70.0 ± 14.6 years (range 34-88 years)
- No statistically significant difference between GAT IOP and IOPcc
  - Mean difference -0.3 (95% CI 0.7 to +0.1); 95% LOA -4.2 to +3.6
- Statistically significant differences between GAT IOP and IOPg
  - Mean difference +1.1 (95% CI +0.6 to +1.5); 95% LOA -3.1 to +5.2
- Bland-Altman plot charted below. **Readings closely associated**, with smaller differences at lower IOP readings.
- Low proportion of clinically significant differences, especially in **low pressure group**
  - 86% IOPcc measurements within 2mmHg with GAT IOP
  - 71% IOPg measurements within 2mmHg with GAT IOP
- More patients prefer ORA over GAT
  - 39.5% prefers ORA; 30.2% prefers GAT; 30.2% has no preference

## Conclusion

- ORA IOPcc showed great agreement with GAT IOP measurements with low proportion of clinically significant differences. especially in the lower IOP groups
- Marginally more patients prefer ORA over GAT
- ORA proves to be a great tool for IOP measurements in VGCs, where majority patients seen are of stable glaucoma
- Added benefit of providing corneal hysteresis to predict susceptibility for glaucoma progression, adjunct to diagnosis, and monitor response to glaucoma therapy
- Association between ORA IOP measurements and GAT IOP measurements in PACG needs to be studied in a different study design

**References**
1) The Royal College of Ophthalmologists. The Way Forward - Glaucoma. 2021.
2) Wells AP et al. Corneal hysteresis but not corneal thickness correlates with optic nerve surface compliance in glaucoma patients. Invest Ophthalmol Vis Sci. Aug 2008
3) *McCann et al. Comparison of Goldmann applanation and Ocular Response Analyser tonometry: intraocular pressure agreement and patient preference. Eye (Lond). Mar 2020*