

# Relationship Between Scleral Lenses and Intraocular Pressure

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## Introduction

- Scleral contact lenses have been gaining popularity over the last ten years. There is evidence that wearing scleral contact lenses could alter intraocular pressure (IOP).
- Potential mechanisms for IOP change include displacing intraocular fluid, closing off of trabecular meshwork, and suction forces created by the lenses on eye.
- Intraocular pressure is difficult to measure with a scleral lens on the eye. IOP measurements must be completed immediately after lens removal.
- The relationship between IOP and scleral lens has implications on overall ocular health. Some patients are more susceptible to fluctuations in eye pressure. Additionally, scleral lenses tend to be worn by older patients who have more risk of ocular disease.
- This study will investigate the relationship of IOP before and after four hours of scleral contact lens wear using Goldmann applanation tonometry.

## Methods

- All participants of this study were students at the Michigan College of Optometry.
- Participants were ineligible if they had preexisting ocular conditions or if they had worn hard contact lenses within 24 hours.
- Keratometry values were taken manually and IOP measured with Goldmann Applanation Tonometry (GAT).
- Scleral contact lenses, 15.5mm in diameter, were selected from Art Optical's Ampleye lens set. Lenses were fit on one eye and the other was used as control. Participant's chose which eye to to be fit.
- The lenses were checked in the slit lamp for adequate fit. Initial vault was recorded. If adequate fit was achieved, the participants were instructed to return in four hours.
- At the return visit, the scleral lens was removed and IOP was immediately checked by GAT in both eyes.
- Pressures were checked again 30 minutes after lens removal using GAT. All IOPs and times were recorded.

## Results

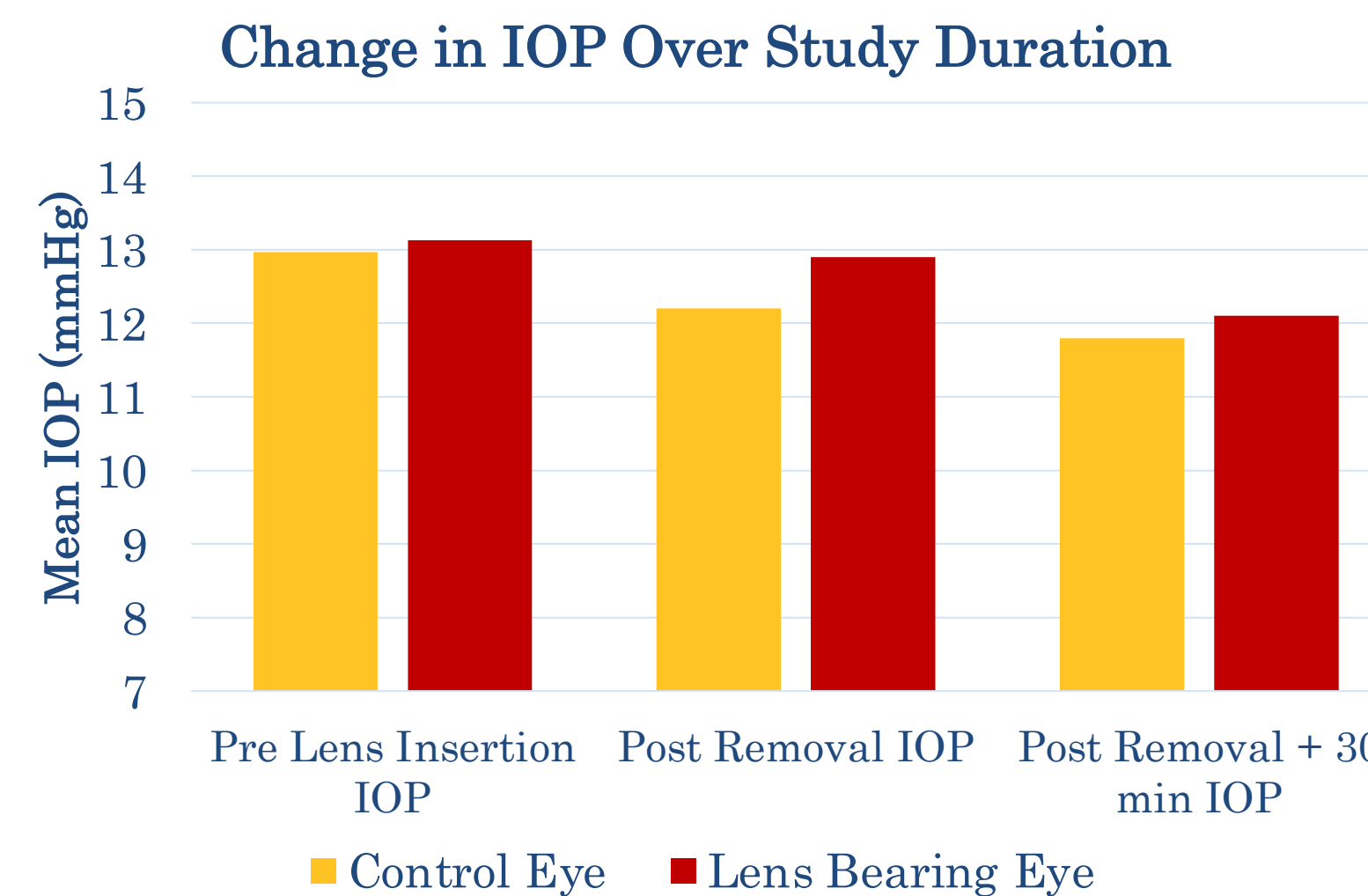


Table 1: Mean IOP for each data point. Before lens insertion, there was a clinically-insignificant difference in IOP between eyes. Immediately after lens removal, the IOP difference between eyes was increased. At 30 minutes post-lens removal, the IOP difference had lowered and became statistically insignificant.

- Data analysis revealed no statistical outliers, and that the data was of a non-normal distribution.
- Given the data's non-normal nature, a Wilcoxon Signed Rank Test was used to reveal a statistically significant difference between the control mean rank (9.94) and test eye mean rank (15.50) with a large effect size.
- The same test was utilized to analyze pre-lens insertion and post-lens removal plus 30 minutes, which found statistically insignificant differences.
- There was a downward trend in IOP for both eyes over the course of the study, but there was found to be no statistical significance between the eyes in this pattern.
- Unfortunately, due to the complexity of measuring IOP during lens removal, it is currently unknown the effect that lens removal itself may bear on change in IOP measured from pre-lens insertion to post-lens removal.

## Conclusions

- A statistically significant difference in IOP of 1mmHg was found between the scleral lens eye and the control eye after four hours of contact lens wear.
- The difference in IOP between the scleral lens eye and the control eye was absent 30 minutes post lens removal.
- A diurnal variation of around 5mmHg is considered normal, even in eyes that are considered high risk.
- Scleral contact lens wear may affect IOP, but it is likely not enough to cause any damage to internal structures in the eye.
- Further research needs to be done on IOP changes during scleral contact lens wear. This study could only approximate IOP based on before and after scleral lens wear.
- Future studies may also consider investigating scleral contact lenses and IOP on diseased eyes, since all the eyes in this study had unremarkable ocular health.

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