

Introduction

Previous topographical studies related to scleral shape, have been limited to measurements along the horizontal and vertical meridians. The purpose of this study was to provide a more complete picture of scleral shape through measurements acquired in each of the 8 primary meridians of the sclera. Three anterior segment instruments were used throughout this study: the Zeiss Visante OCT, the Eaglet Eye Surface Profiler and the Precision Ocular Metrology sMap3D (Figures 1,2 and 3).

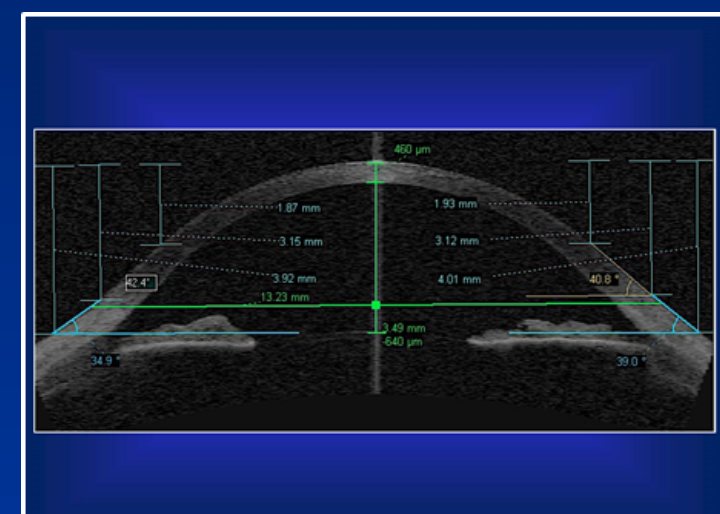


Figure 1. 360 degree sectional views taken with the Zeiss Visante OCT

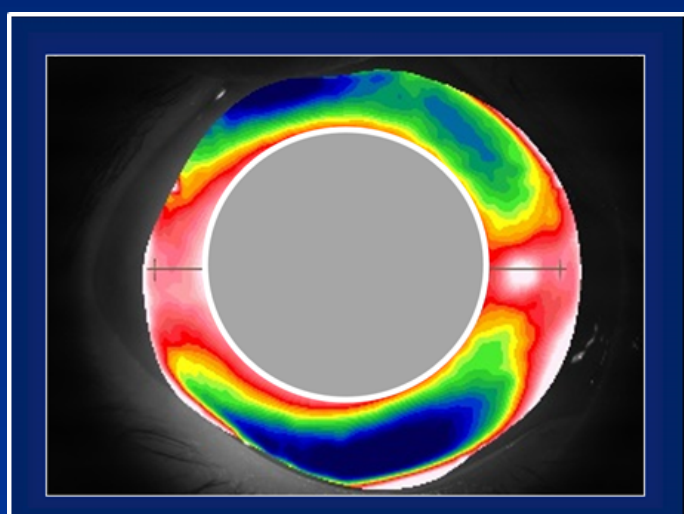


Figure 2. Scleral elevation display from the Eaglet ESP out to a chord of 20 mm

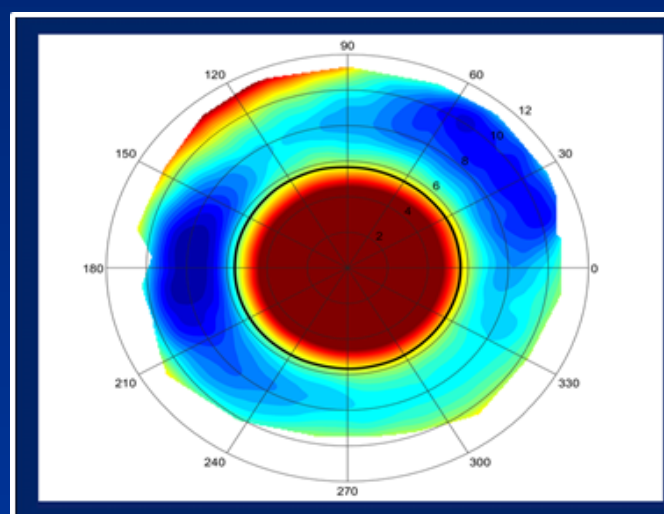


Figure 3. Scleral elevation display of the sMap3D out to a chord of 22 mm.

Materials and Methods

Fifteen subjects (30 normal eyes) participated in this study. The inclusion criteria required that each subject be free of any corneal and/or conjunctival pathology. The 30 eyes were imaged with the Visante, Eaglet and sMap3D instruments. Sagittal height measurements were taken in the 8 primary meridians at chords of 12.8, and 15.0 mm. Additional sagittal height measurements were taken with the Eaglet ESP and sMap3D at a chord of 17.0 mm.

Results

Figures 4-7 are the mean sagittal height results of the OCT, Eaglet and sMap3D in the 8 primary meridians: nasal, superior-nasal, superior, superior-temporal, temporal, inferior-temporal, inferior and inferior-nasal of both right and left eyes at chords of 12.8 and 15.0 mm. Figures 8-9 are the Eaglet and sMap3D at 17.0 mm.

Right Eye 12.8 mm Chord

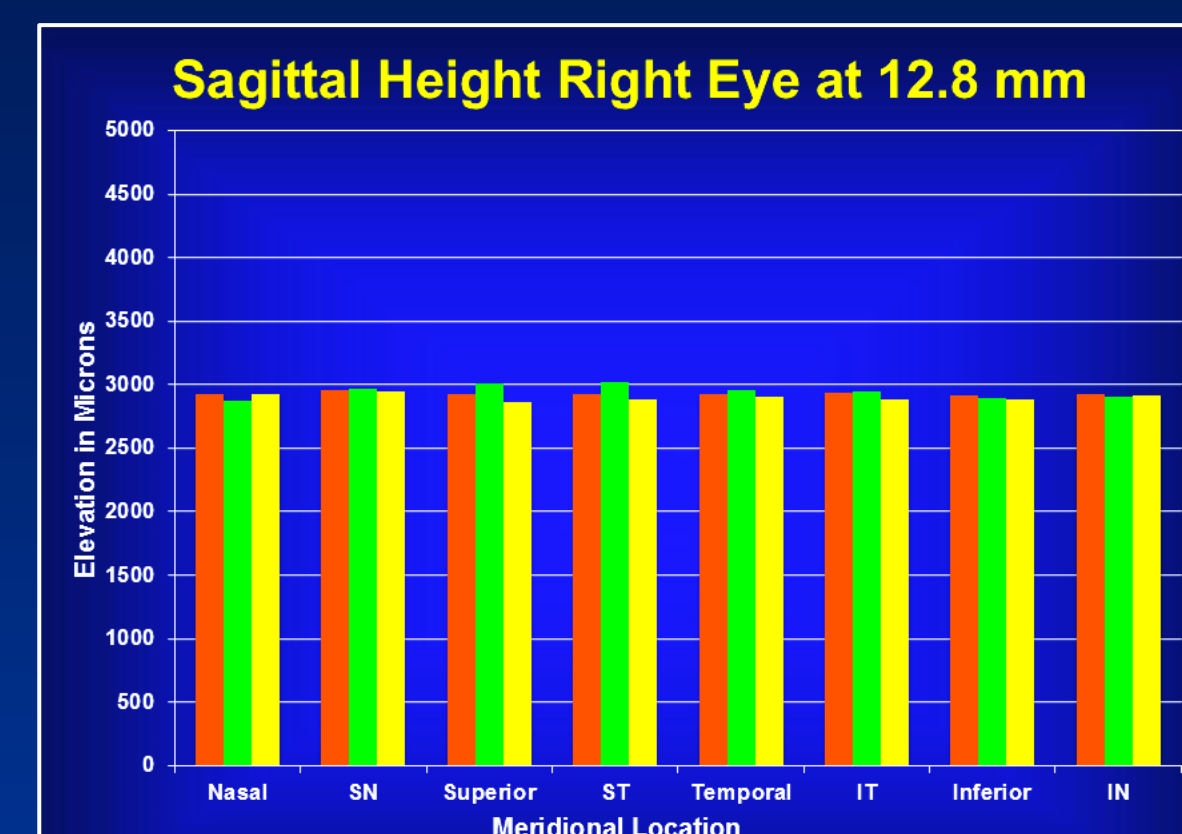


Figure 4 ■ Visante OCT ■ Eaglet ■ sMap3D

Right Eye 15.0 mm Chord

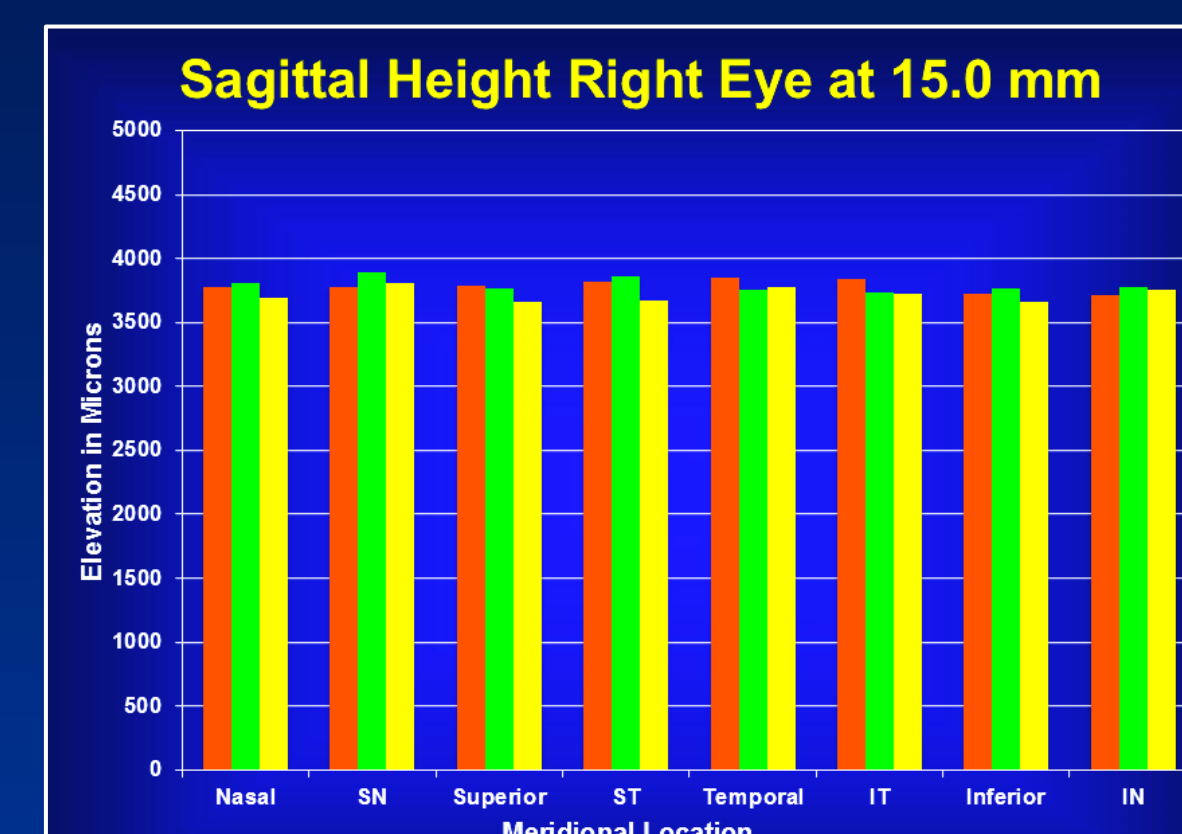


Figure 6 ■ Visante OCT ■ Eaglet ■ sMap3D

Right Eye 17.0 mm Chord

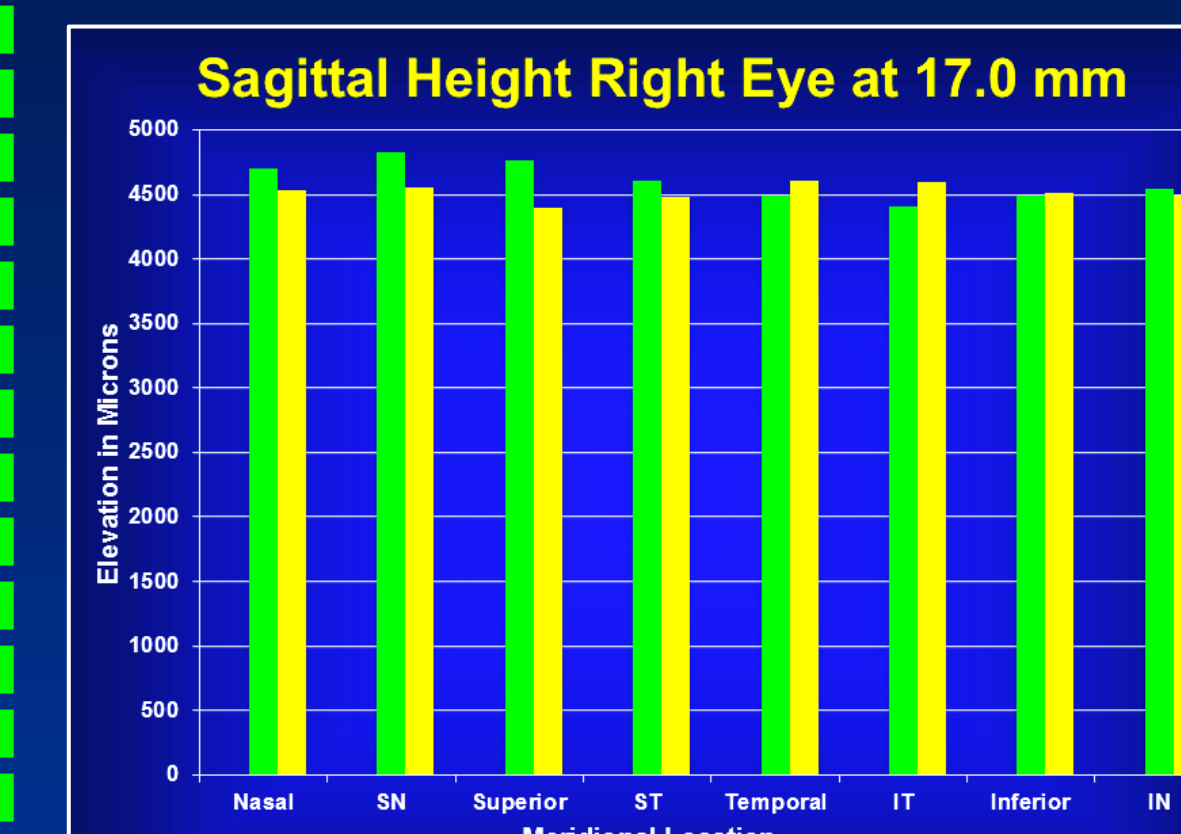


Figure 8

Left Eye 12.8 mm Chord

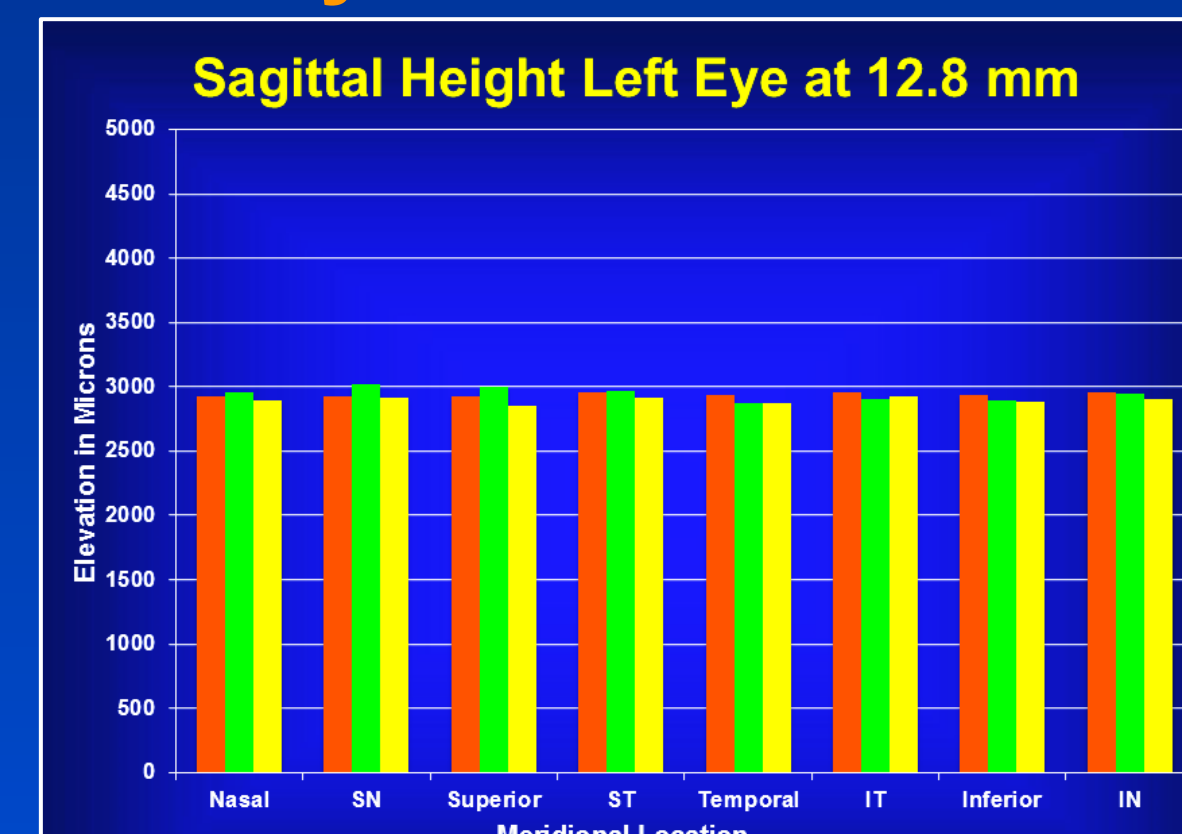


Figure 5 ■ Visante OCT ■ Eaglet ■ sMap3D

Left Eye 15.0 mm Chord

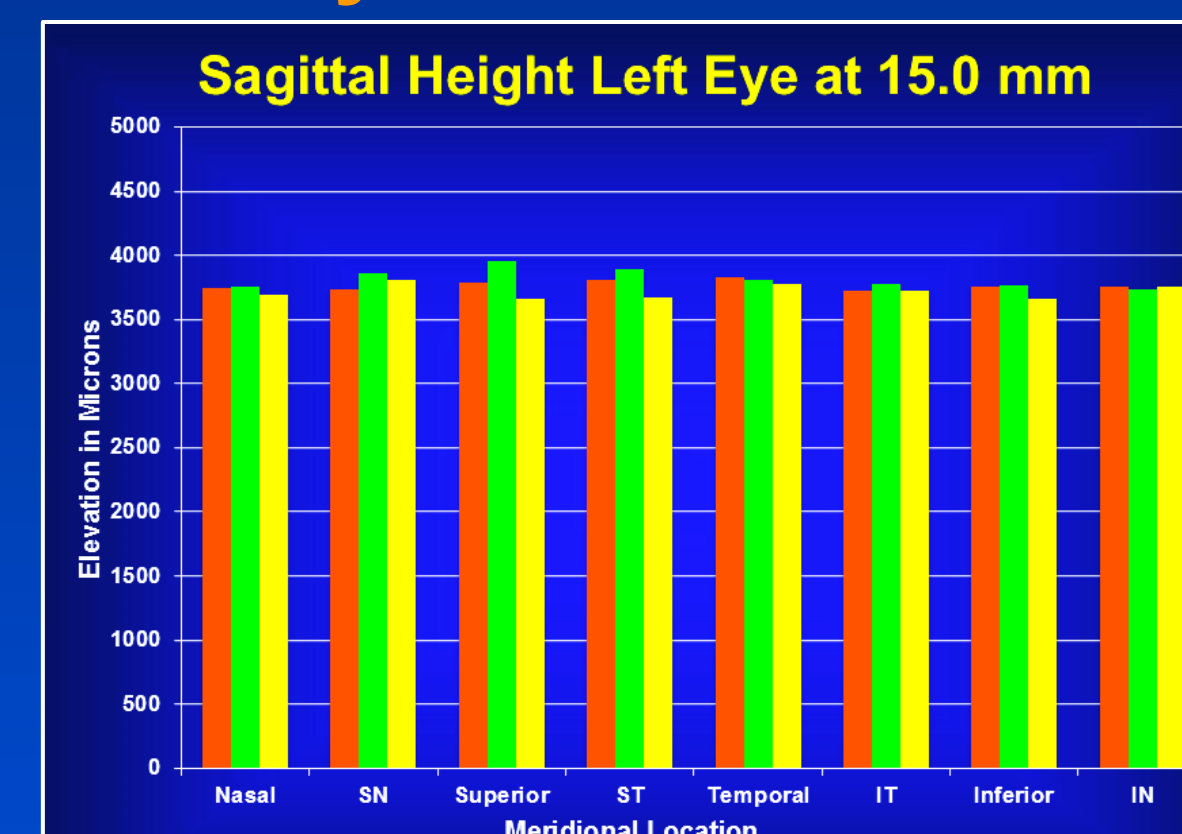


Figure 7 ■ Visante OCT ■ Eaglet ■ sMap3D

Left Eye 17.0 mm Chord

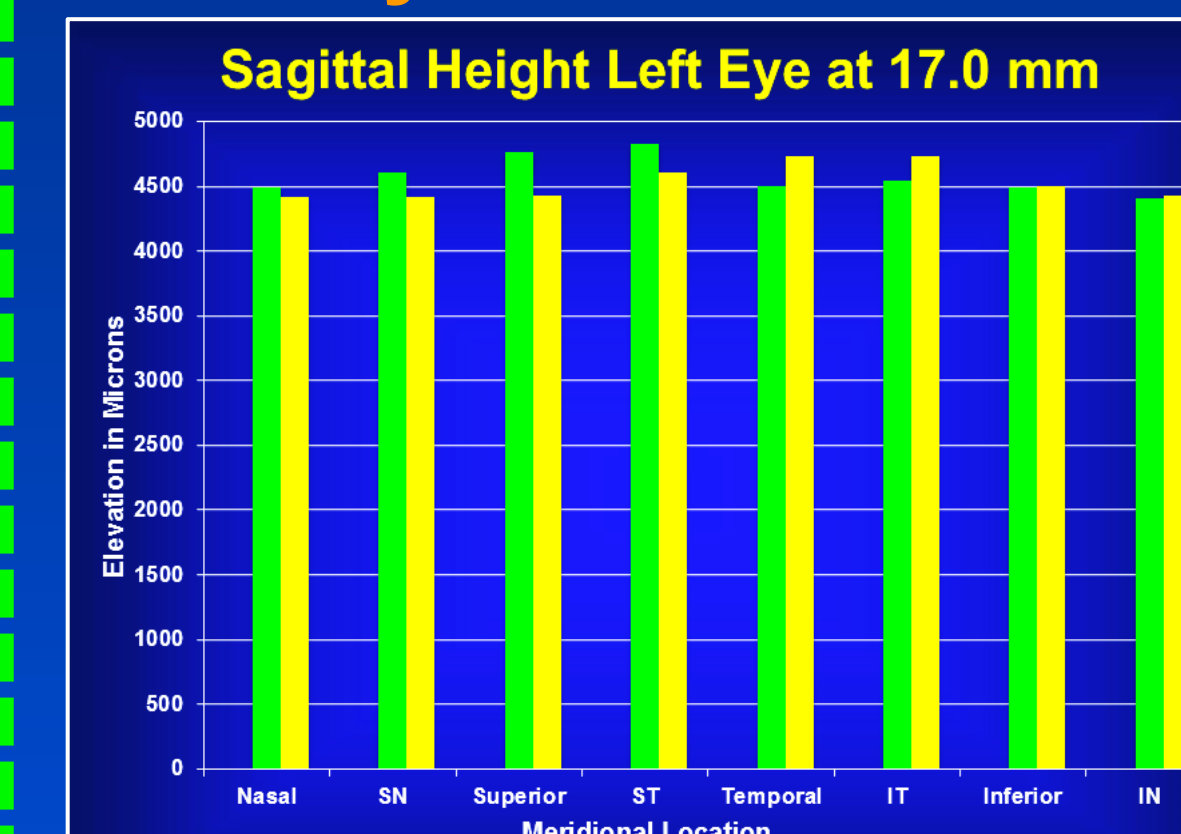


Figure 9

Scleral Asymmetry

The figures below describe the scleral height differential at 15.0 mm between the flattest and steepest scleral meridians for OCT (Figure 10) and the sMap3D (Figure 11).

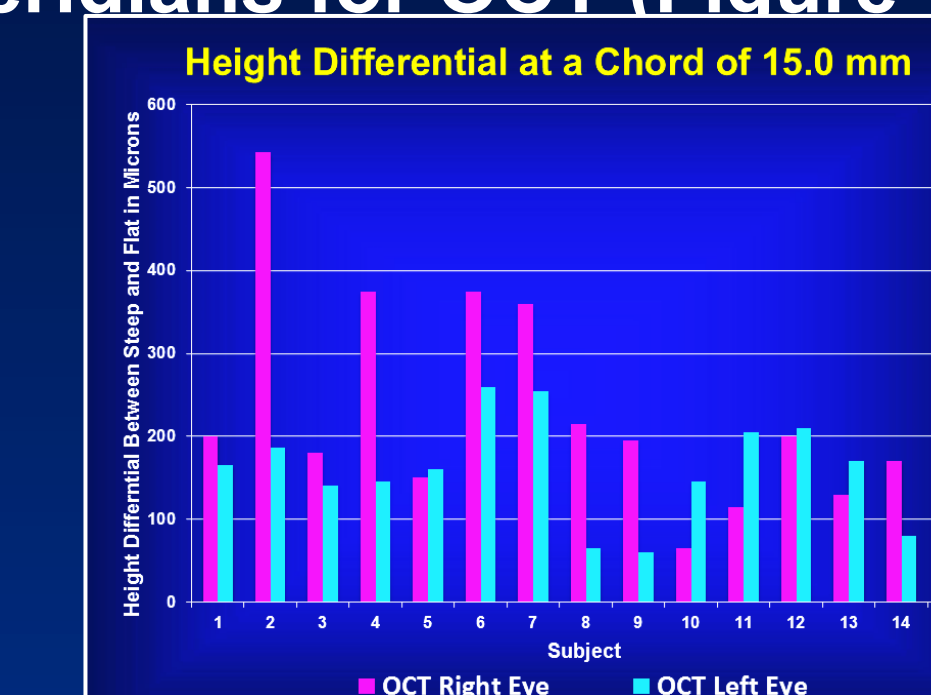
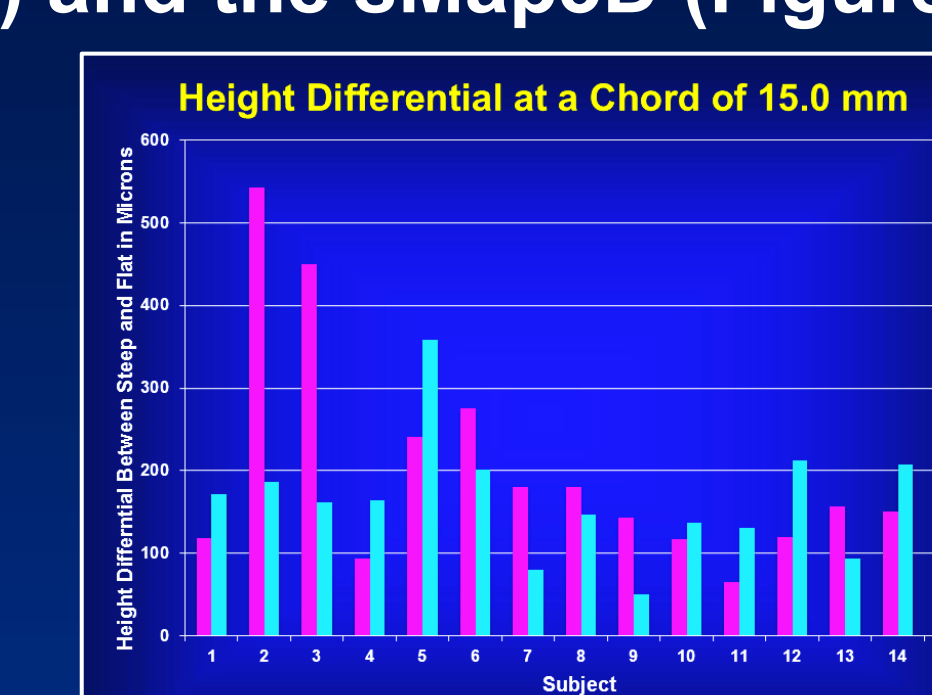


Figure 10



Figure

The average height differential at the 15.0 mm chord was:

- **Right Eye** Visante OCT = 225 um, Range 65 to 544 um
- **Left Eye** Visante OCT = 161 um, Range 60 to 255 um
- **Right Eye** sMap3D = 195 um, Range 94 to 544 um
- **Left Eye** sMap3D = 165 um, Range 50 to 213 um

Conclusions

The results of this 30 normal eye study show:

1. A consistency between the data from all three measurement techniques at all three chords.
2. Differences were noted between right and left eyes.
3. The average scleral asymmetry measured by the OCT and sMap3D was slightly greater in right eyes 210 μm (~8.50 D.) than left eyes 163 μm (~6.50 D.).