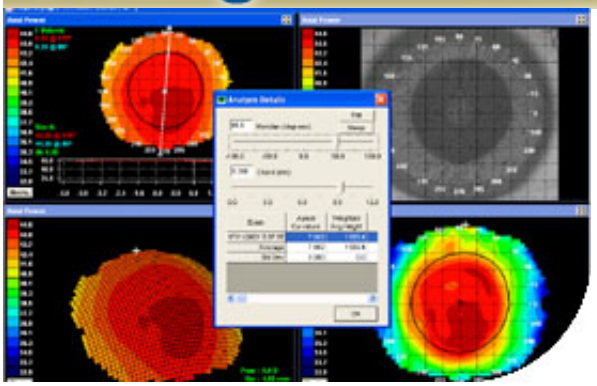
# Fitting



## *A Scientific Approach*

BE Retainer fitting begins with topographical data. First, a patient's potential for Optimal Orthokeratology therapy must be determined from the E-value, apical radius (Ro) and the required refractive change. A quick reference to e-value will determine whether a patient's cornea has the potential for change (see e-value and refractive change chart). The BE Retainer program determines the precise refractive potential of a specific cornea from the apical radius and sagittal height. This potential can be compared with the required refractive change to determine the potential success of Optimal Orthokeratology therapy for the patient.

**Over-night Trial**

After entering the patient's data into the BE program and determining the desired refractive change, the system will calculate both the patients required custom ordered BE Retainer and the closest diagnostic trial retainer in your standard BE Retainer set. You will always assume that your topographer has error, even if it is a Medmont. The trial BE Retainers exist for two reasons:

1. Determine the accuracy of your topographical data and therefore assure the first fit success of your custom ordered BE Retainer.
2. Provide the patient with a sample of BE Retainer Optimal Orthokeratology wear, comfort and refractive effects.

**Post Trial Fit Follow-up**

After inserting the trial BE Retainers before going to sleep, the patient will come into your office first thing in the morning for examination with BE Retainers in-situ. A slit lamp evaluation of the retainer fit and physiological response will be performed making special note of any staining that exists, the position of the retainer and any notable physiological response. After removing the retainers, a subjective over-refraction is done and the patient has topography maps taken.

Evaluating Topography Plots

There are three basic topographically measured responses to the BE Retainer Optimal Orthokeratology therapy:

Bulls-eye: The ideal corneal shape change for accurate refractive response.

Smiley Face: The negative corneal response to a flat fitting BE Retainer Optimal Orthokeratology retainer.

Central Island: The negative corneal response to a steep fitting BE Retainer Optimal Orthokeratology.

Other: Less common responses.

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**Bulls-eye**: When the ideal apical clearance exists between the BE Retainer and cornea, a large consistent spherical treatment zone will result. Ideally, this treatment zone will match the size of the pupil in dim illumination. This treatment zone will appear as a deep blue "pool" centered over the apex

on the axial curvature difference map.

After trial retainer wear, the patient may require additional correction to assist through the next 24 hours before the cornea returns to normal shape. A soft retainer is dispensed as a temporary “aid” for this period.

If a bulls-eye exists, the over or under-correction is keyed into the BE Retainer program and the final retainer parameters are determined and then ordered. The patient is then scheduled to pick up the custom ordered BE Retainer specific to their cornea and refractive requirements.

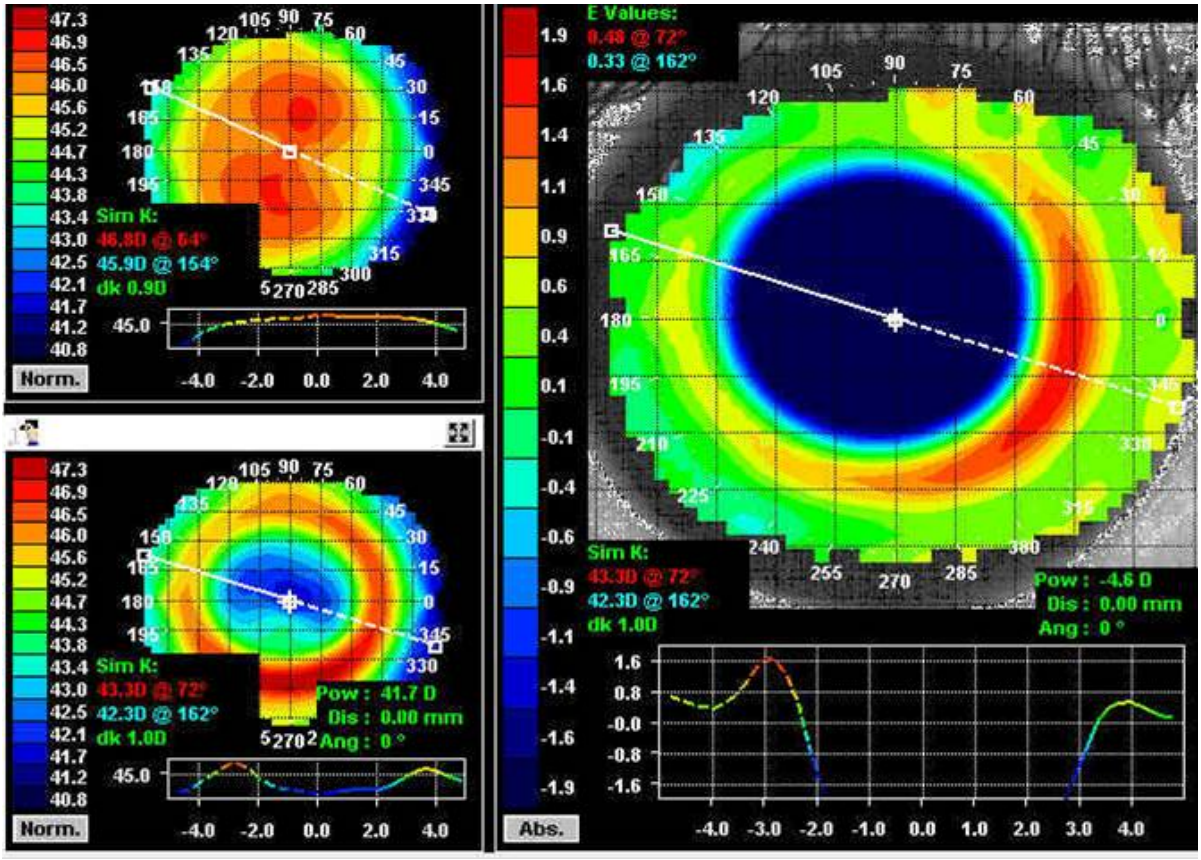


*Figure 2 – **Bulls-eye** plot of the ideal BE Retainer Optimal Orthokeratology response using a subtractive/difference map. Note the pre-therapy cornea (top left), the post therapy cornea (bottom left) and the difference between both (right). Also note the –4.6 Dp change over a large central area on this cornea.*

**Smiley Face:** When a BE Retainer fits flat, a smiley face appearance exists on the axial curvature difference map. A red/orange smile is evident below the pupil and generally near the inferior pupil margin where the epithelium is shifted up into the inferior reverse zone of the BE Retainer. The tangential curvature difference map will generally confirm a superior positioned over-night response. An inadequate or incomplete treatment zone may exist over the superior half of the pupil resulting in poor visual acuity. Staining can also be evident if the retainer is abraiding the central cornea. A retrial can be performed after the cornea returns to its normal curvature.

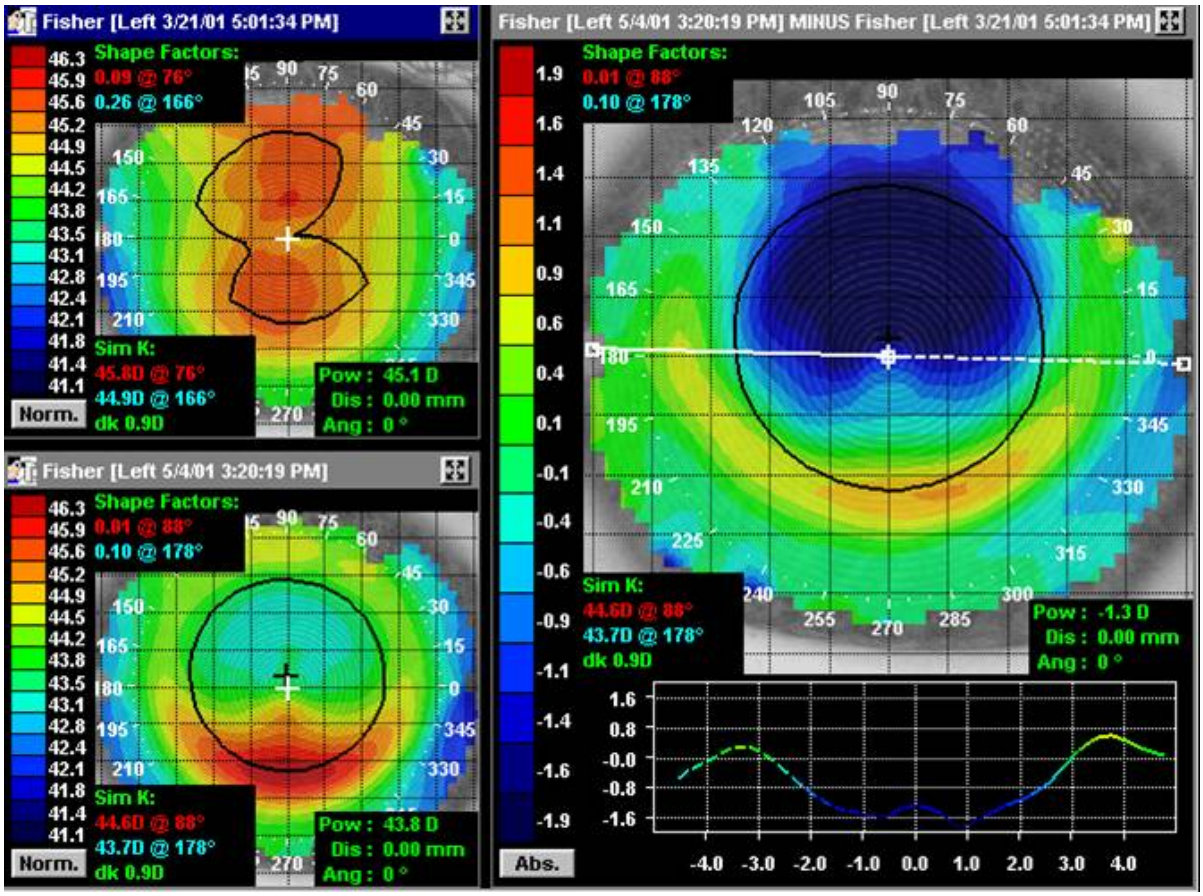


*Figure 3 – **Smiley Face** patterns result from a flat BE Retainer and is characterized by the orange/yellow smile infringing on the inferior pupil margin (black circle). Also note the superior displaced treatment zone that covers only approximately 60-70% of the pupil (flare/glare and/or halos would likely exist). The deep blue "plateau" of change is "compression" Orthokeratology and not squeeze film force dynamics.*

**Central Island:** If a BE Retainer is too steep and therefore, too far from the cornea, the epithelium will shift towards the apex. This negative response to BE Retainer Optimal Orthokeratology therapy results in an island appearance at the apex on the apical curvature subtractive map. A retrial can be performed after the cornea returns to its normal curvature.

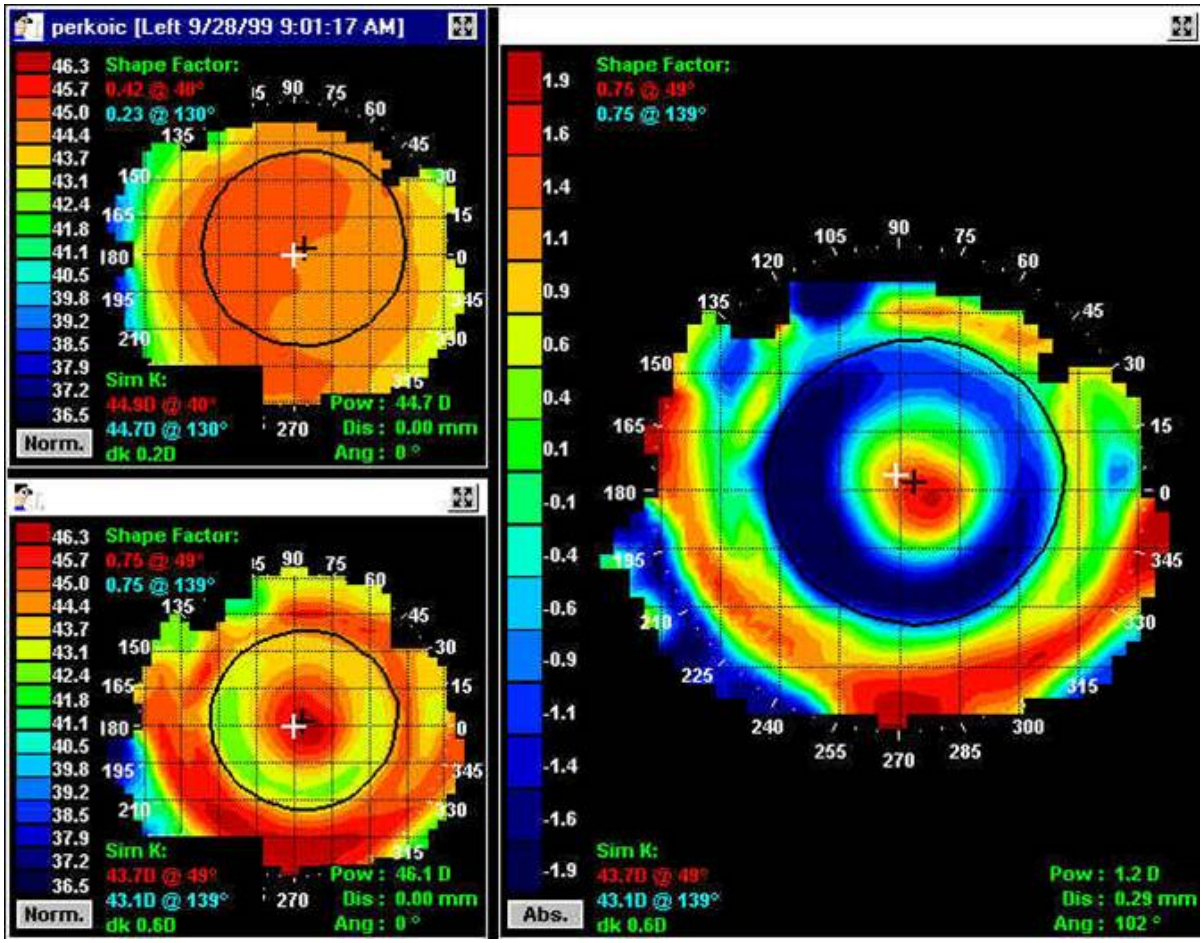


*Figure 4 – **Central Island** plots result from an excessively steep BE Retainer causing the cornea to shift centrally rather than para-centrally. Note the "island" of change at the apex (red/orange/yellow) and the compression para-centrally (blue).*

**Other:**Less common corneal responses to a BE Retainer trial are:

**Smiley Face with a fake Central Island:** When a BE Retainer is excessively flat and the BE Retainer comes in contact with the cornea, central SPK can result. The fake central island results from distortion of the placido rings over the SPK.

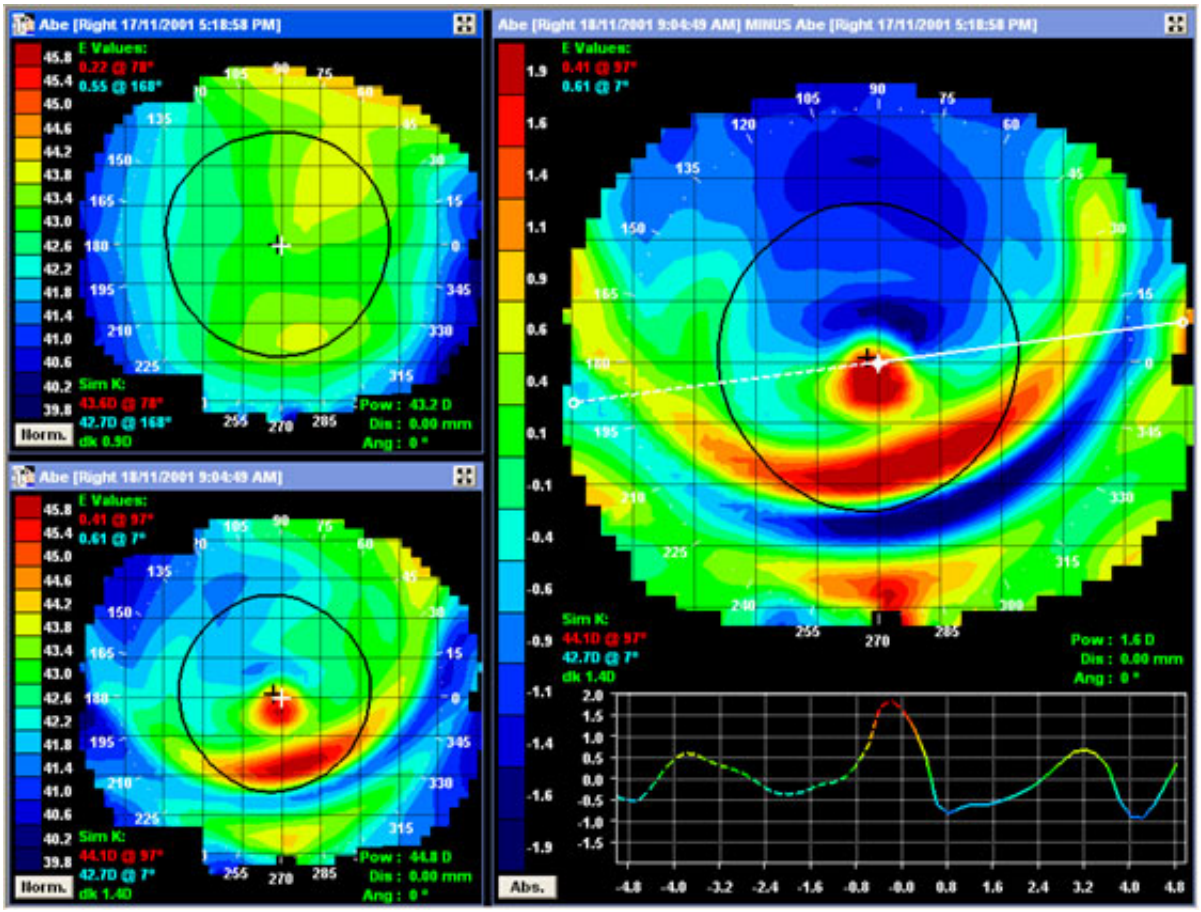


*Figure 5 –* ***Smiley Face with a fake Central Island:*** *Note the 'island' of steepening above the significantly high 'smile'. The high position of the smile indicates a retainer position too high (under-estimation in sag) along with a false island due to SPK and topographer error (ring jam).*

**Frowney Face:** The opposite to a Smiley Face, the Frowney Face appears as a superior red/orange frown and an inferior displaced BE Retainer position. This is the result of marginally steep BE Retainer associated with a BE Retainer diameter that is too small. A rarer cause is a trial BE Retainer cone angle much steeper than the calculated custom ordered BE Retainer.

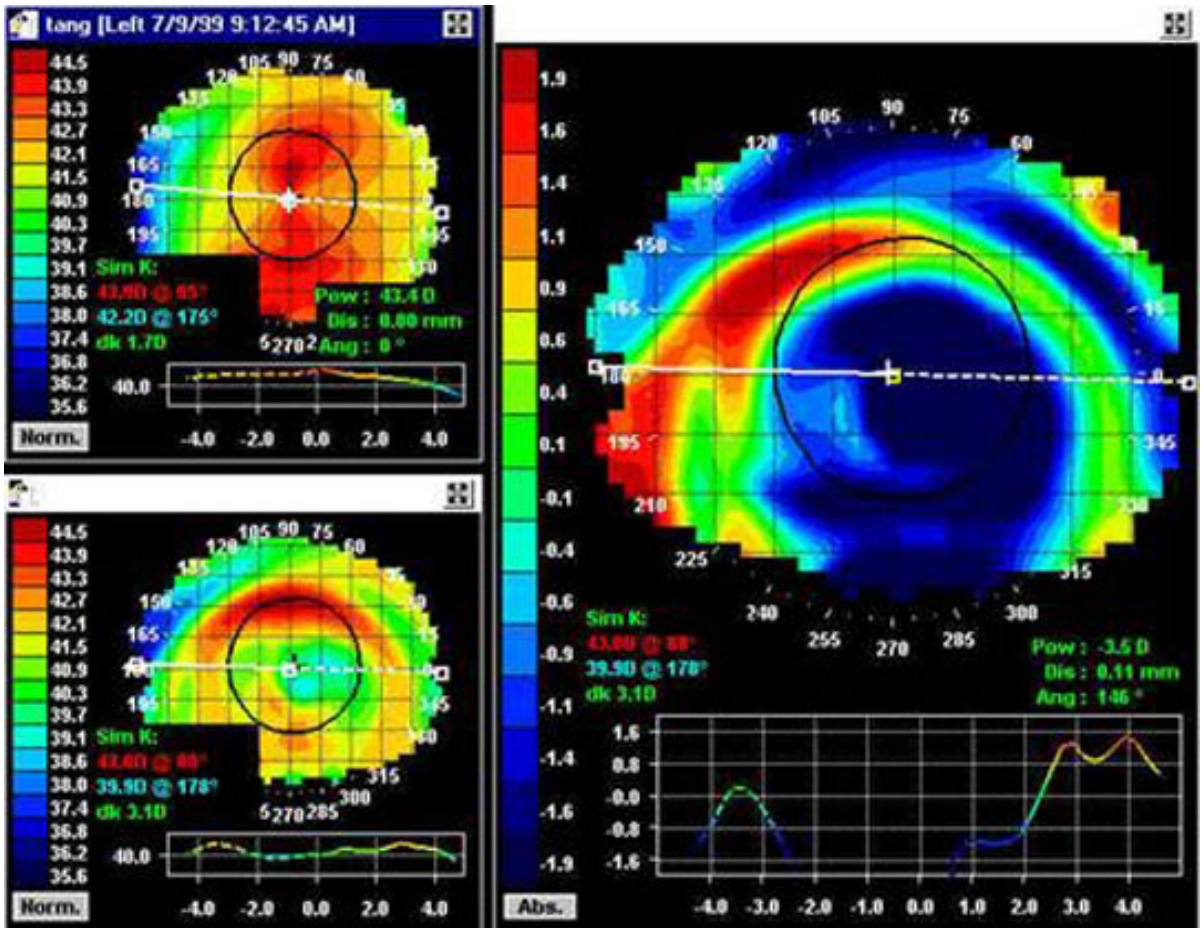


*Figure 6 –* ***Frowny Face:*** *Note the superior frown and the displaced inferior treatment zone. Frowney-faces are the opposite of Smiley-faces and considered to be mild over-estimations in sag*

**Central Divots:** When a BE Retainer is too flat, central epithelial distortion results in topographer capture error. The central divot is characterized by a small flat area of flattening on the axial curvature difference map and a huge refractive change on the axial power power difference map. Central divots are treated in the same way as Smiley Faces.

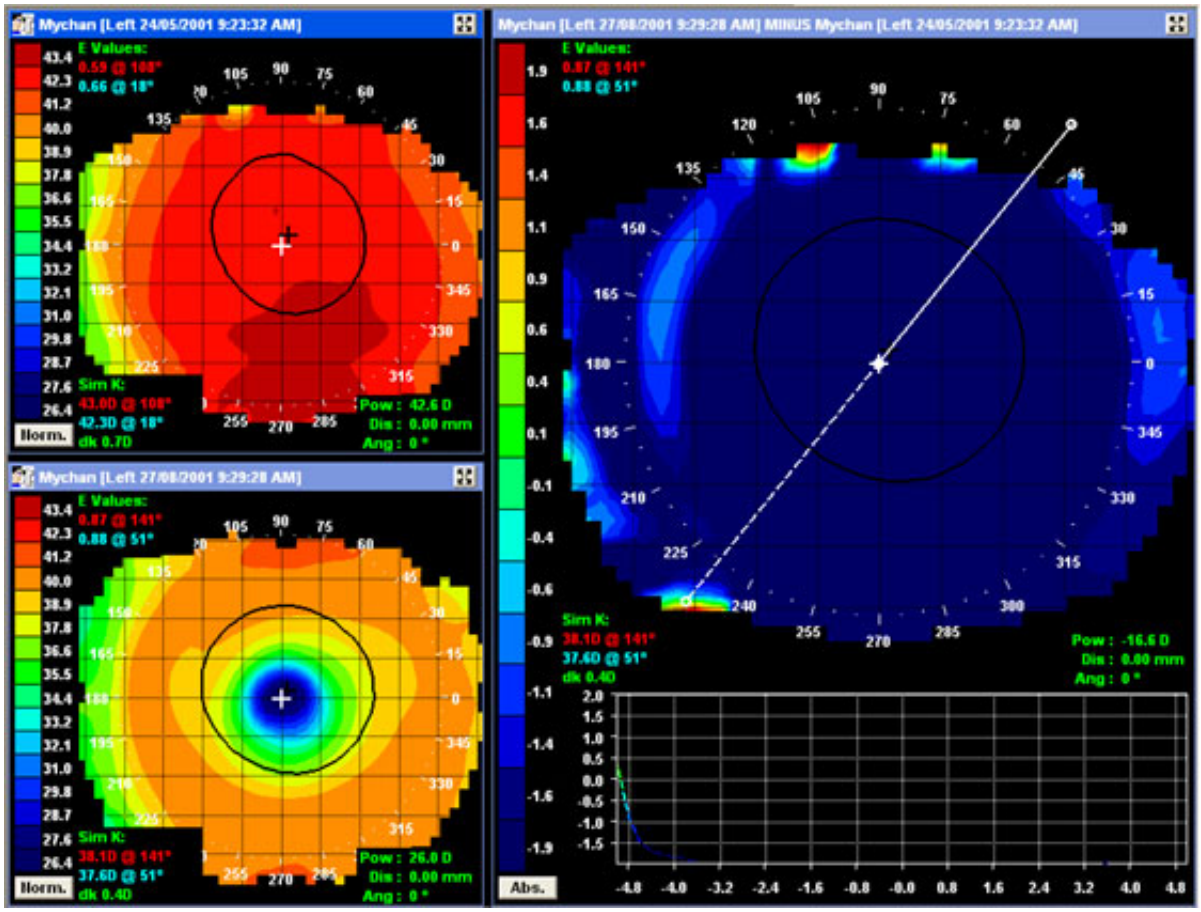


*Figure 7 – **Central Divots:** In some under-estimation cases, a disrupted epithelium results in ring jam error. A divot map is characterized by a high refractive change such as above (-16.60Dp) but is a false response caused by SPK and topographer error.*