

# CORNEAL AND ANTERIOR CHAMBER PARAMETERS IN KERATOCONUS: WHICH ARE THE BEST INDICATORS OF DISEASE PROGRESSION?

## Purpose

An observational, cross-sectional study was designed to determine the most reliable corneal and anterior chamber parameters in the assessment of eyes with keratoconus at different stages of evolution, as compared with normal eyes.

## Methods

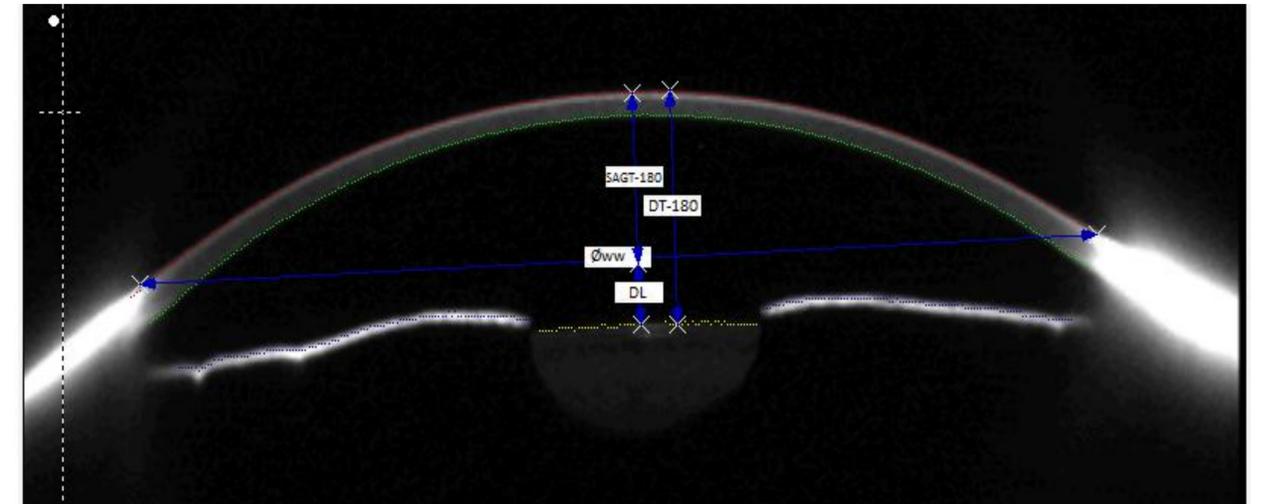
The study sample consisted of 72 eyes with keratoconus (age of patients:  $37.46 \pm 13.75$  years) and 60 healthy eyes (age:  $32.29 \pm 8.95$  years). Patients with late stage keratoconus, other corneal abnormalities, surgical treatments and unreliable topographies were excluded. Keratoconus patients were classified into 4 progression stages with the Amsler-Krumeich classification system, which is based on refraction, keratometric readings (K-values), corneal thickness and presence or absence of corneal scarring. Corneal and anterior chamber parameters were measured with Scheimpflug imaging (Oculus Pentcam HR®), whereupon statistical analysis was employed to determine the most relevant parameters to differentiate between normal and keratoconus eyes, as well as between progression stages.

## Results

Corneal parameters were found to be more sensitive to disease progression than anterior chamber parameters. However, whereas with all keratoconic eyes pooled together all corneal parameters were able to discriminate between normal and keratoconus eyes (all  $p < 0.01$ ), K-values were not useful to differentiate between normal and stage 1 keratoconus. Similarly, corneal thickness was not different between stages 3 and 4. Conversely, maximum dioptric power was found to be the most reliable parameter to detect differences between all adjacent stages, followed by elevation map irregularities and posterior elevation. The most sensitive anterior chamber parameters to distinguish between normal and keratoconic eyes, as well as between stages of disease progression, were anterior chamber depth and DL distance (distance between the anterior lens and the white-white chord).

## Conclusions

Corneal and anterior chamber parameters offer different reliability to discriminate between normal and keratoconic eyes and, particularly, among the various stages in the evolution of the condition.



Parameter	Normal	Stage 1 Keratoconus	Stage 2 Keratoconus	Stage 3 Keratoconus	Stage 4 Keratoconus
Ks_A (D)	42.81 ±1.49	43.08 ±2.06	46.02 ±2.66	49.13 ±2.33	54.97 ±7.57
Kf_A (D)	43.74 ±1.47	44.77 ±2.09	50.40 ±2.84	53.93 ±0.96	60.77 ±5.86
Ks_P (D)	-6.09 ±0.25	-6.06 ±0.43	-6.64 ±0.70	-7.25 ±0.58	-8.34 ±0.94
Kf_P (D)	-6.42 ±0.29	-6.52 ±0.47	-7.43 ±0.55	-8.25 ±0.50	-8.90 ±1.25
BFS (mm)	7.94 (7.34- 8.44)	7.84 (6.29- 8.37)	7.33 (6.60- 8.20)	7.14 (6.56- 7.59)	6.83 (5.89 - 7.44)
Ecc	0.45 ±0.15	0.38 ±0.35	0.65 ±0.27	1.06 ±0.29	1.00 ±0.36
Ct_Central (mm)	0.559 (0.509 -0.656)	0.519 (0.440 -0.592)	0.474 (0.436 -0.620)	0.441 (0.415 -0.496)	0.439 (0.370 -0.517)
Ct_min (mm)	0.557 (0.508 -0.652)	0.503 (0.407 -0.584)	0.462 (0.419 -0.596)	0.427 (0.399 -0.484)	0.434 (0.366 -0.460)
RP (D)	42.96 ±1.47	46.50 ±2.97	52.10 ±2.84	57.85 ±2.16	66.38 ±7.87
Elev_A (µm)	3.5 (0 -16)	20.5 (4 -53)	40 (15 -58)	39 (10 -75)	71 (15 -93)
Elev_P (µm)	6.82 ±4.11	45.82 ±17.79	65.91 ±18.50	71 ±35.25	106.84 ±37.63
ACD (mm)	3.65 ±0.33	3.76 ±0.48	3.68 ±0.42	3.86 ±0.36	4.09 ±0.34
DL distance (mm)	3.65 ±0.33	3.78 ±0.47	3.69 ±0.42	3.85 ±0.34	4.09 ±0.35

\*DL distance: distance between the anterior lens and the white-white chord; RP: corneal refractive power (n=1.3775)