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The "Death of Kmax!"

Patients don't usually come into our office saying, "Please help me Doc, I'm having trouble with my Kmax!" They want help for their blurry vision, especially at night with glare, multiple images and ghosting.

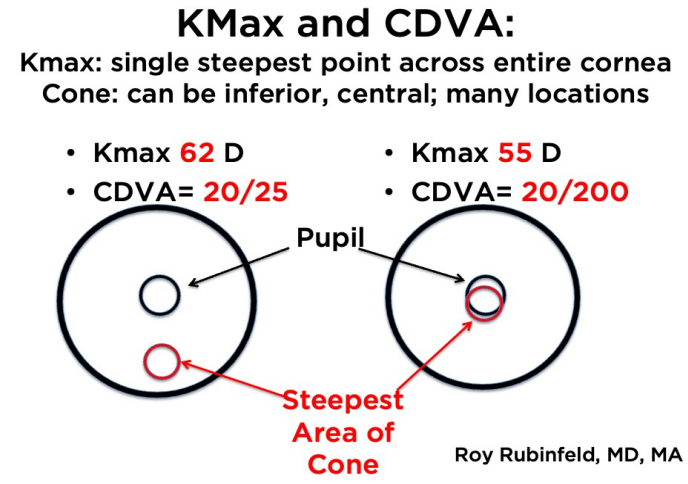
Multiple Images Glare and Ghosting Glare and Starbursts

Photo credit: McCain and Spinello Photo Credit: Health and Medicine Photo Credit: Health and Medicine

In early keratoconus/ectasia, some patients can even read the 20/20 line but can worry about the poor quality of their vision. It's well known that keratoconus/ectasia causes unpredictable, often rapid vision loss but most don't know it's not a rare condition and is found in 1 in 84 people; a 1.2% prevalence. It's critical to detect this common condition as early as possible (optimally before any vision or quality of vision is lost) and refer them for advanced diagnostic testing and treatment. Keep in mind that "time lost is vision lost" just like with glaucoma.

By worldwide consensus, before vision loss, the first diagnostic sign of KCN/ectasia is abnormality in the shape of the back surface of the cornea, detectable long before signs appear on the front surface and vision is lost. So, how did front surface corneal measurements (Kmax and topography) become common measures of diagnosis and effectiveness of treatment?

The reason is back surface corneal scanners like the Pentacam were not in use during CXL's development in the 1990s and we now know that Kmax is a very poor measure, **not** well correlated with **vision**. Here's why:



This has been demonstrated in our published seminal paper. The treated eyes with **worse** Kmax values **saw better**!

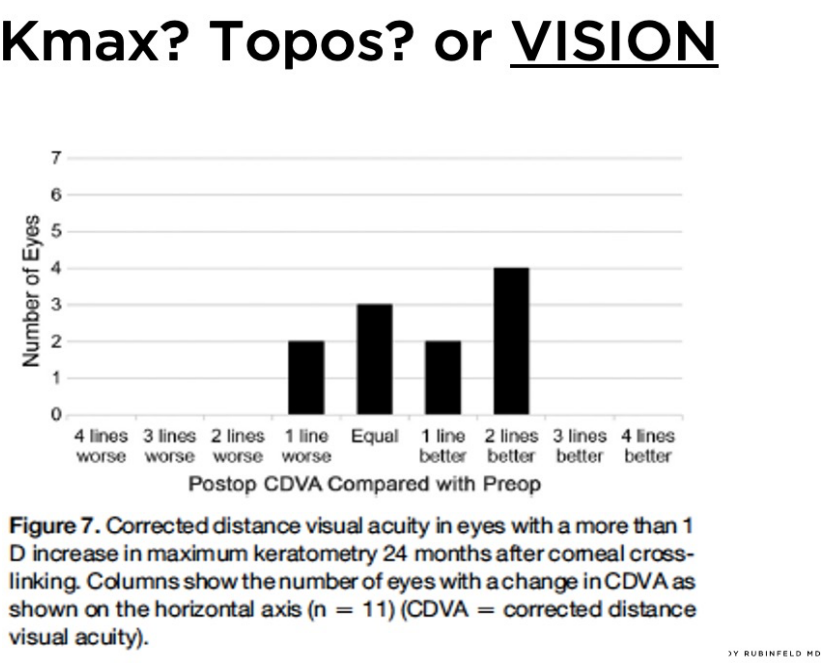
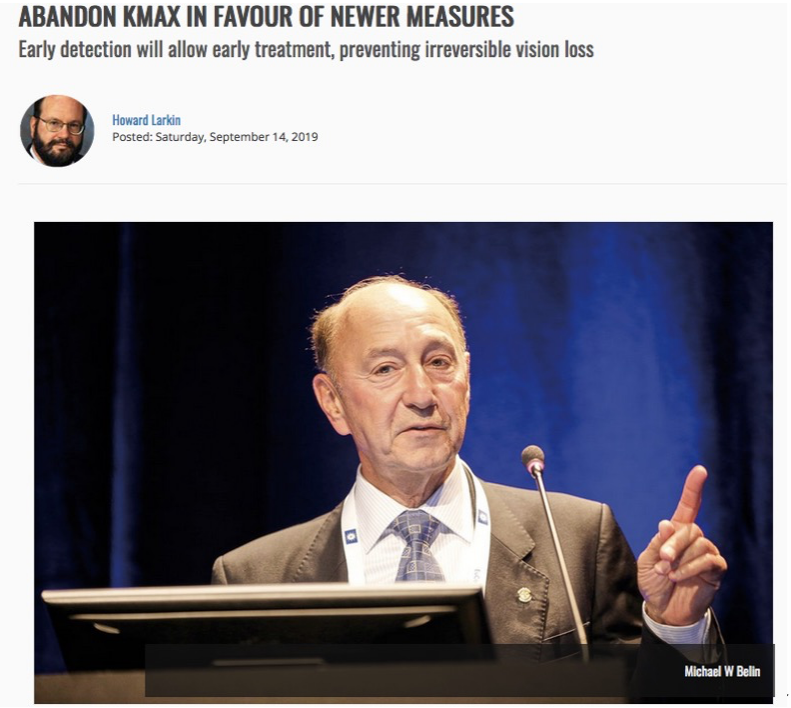


Figure 7. Corrected distance visual acuity in eyes with a more than 1 D increase in maximum keratometry 24 months after corneal cross-linking. Columns show the number of eyes with a change in CDVA as shown on the horizontal axis (n = 11) (CDVA = corrected distance visual acuity).

And we're not alone. The developer of the Pentacam, Galileo and other worldwide gold-standard software for advanced corneal analyzers and the world's leading expert in corneal scanning gave this lecture years ago.



Since Kmax and other front surface metrics are unreliable measures, and variable (with a 2.4 D shift in Kmax over 5 mins [in the same eye](#)),

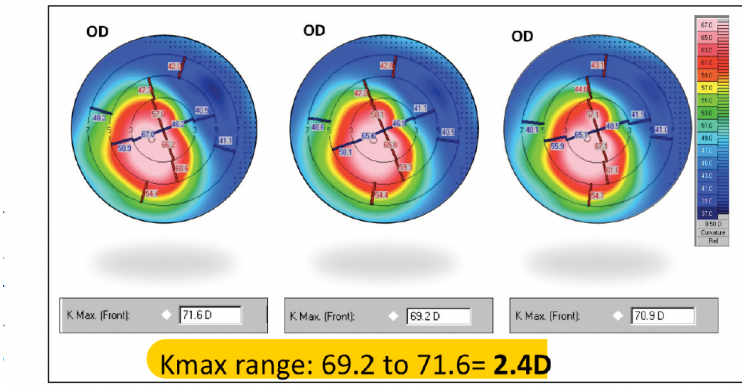


Figure 1. Kmax reproducibility with Pentacam HR (Oculus Optikgeräte GmbH, Wetzlar, Germany) for three scans of one eye at the same sitting

we updated our clinical research trials years ago to use <u>vision</u> to measure <u>vision</u> loss or improvement in evaluating the results of our investigational CXL treatments. This was the world's largest CXL trial to date with [592 treated eyes](#).

In 2023 we published an even larger study with similar results and safety in the prestigious journal *Cornea* in [2,228 subjects.](#)

This Report Describes Treatments That Are Not FDA-Approved