All patients are not created equal and should not be treated the same, which can happen when using outdated technology. A perfect example of this is the Amsler-Krumeich grading system for keratoconus, which is over 70 years old and, in my experience, no longer has clinical validity.

We need a new classification system because the Amsler-Krumeich grading system has limitations. Its staging system may be confusing and does not convey useful clinical information. Its stage 1 is a meaningless term, because half of the world’s population has stage 1 “disease.” The system predates topography/tomography, relies on apical thickness, and does not take posterior surface into account.

The global consensus on keratoconus and ectatic diseases published last year in Cornea concluded that we do not have an effective way to classify or stage keratoconus and document progression. Surgeons need a new system that recognizes full anatomic changes, including those in anterior cornea and posterior cornea as well as corneal thickness. The new system should have simple parameters, be platform independent so that it can be used with any tomographic device, and make it easy to convey information. The new classification system should allow surgeons to effectively evaluate different treatment modalities—cross-linking, intracorneal rings, deep anterior lamellar keratoplasty, penetrating keratoplasty, or rigid gas permeable contact lenses—so that they can determine the most effective treatment for their patients.

The Pentacam (Oculus) has the ability to identify ectatic disease earlier than previously possible and can create a baseline to track progression using the Belin ABCD classification system. and the cornea’s thinnest point and thinnest displacement.

BAD III has a new regression analysis with new parameters, including elevation at the cornea’s thinnest point, maximum keratometry, and Ambrosio Relational Thickness (ARTmax). It displays hyperopic data, has the option to turn off yellow/red for small d, and has improved AUROC. In the BAD display, the individual values are reported as standard deviation (SD) from the mean and will change color to yellow at 1.6 SD from the norm and red at 2.6 SD from the norm. In the improved BAD display, the final D is an overall reading of all the parameters based on a regression analysis. The individual D values have different weighting.

In summary, the Pentacam can screen for and detect keratoconus or corneal ectasia much earlier than previously possible.

The Pentacam-AXL (Oculus) does everything the original Pentacam does with a couple of added features: it measures the axial length and accurately calculates IOL power, which is like having two units in one.

The Pentacam-AXL delivers precise AXL and keratometry (K) readings for accurate IOL power calculation (Shammas et al, unpublished data, 2016). In addition, the IOL calculation software takes the conditions of the patient’s eye—ie, posterior corneal astigmatism and prior refractive surgery—into account, and it uses customized formulas to calculate IOL power for post-radial keratotomy and post-LASIK eyes.

The Fast Screening Report alerts the surgeon about possible abnormalities in the patient’s eye such as keratoconus, corneal opacities, and anterior chamber changes. It does this by comparing the patient’s data to normative data from confirmed scientific studies. Patient data are presented all on one screen, making it easier to review.

Toric IOL calculations with the Pentacam-AXL, in my experience, are easier and more accurate, and are performed automatically without the need for additional calculators. An added benefit is the overview image and K overlay. The Pentacam-AXL allows K reading measurement to be taken from three different maps: sagittal (axial) power map, true net power map, and total corneal refractive power map (Figure). These K readings can be measured at the 2-, 3-, 4-, and 5-mm rings or at the 2-, 3-, 4-, and 5-mm zones.

The Pentacam-AXL provides precise astigmatism calculations, which are critical to meet the high expectations of patients who pay out of pocket for procedures. All keratometers, including the IOLMaster (Zeiss) and the Lenstar (Haag-Streit), measure the K readings only from the anterior corneal surface. They do not take into account the astigmatism produced by the posterior corneal surface. The Pentacam-AXL calculates the total corneal astigmatism. The best way to measure total corneal astigmatism is through ray tracing, given by the total corneal refractive map (Figure). These K readings can be measured at the 2-, 3-, 4-, and 5-mm rings or at the 2-, 3-, 4-, and 5-mm zones.

In summary, the Pentacam-AXL offers all the advantages of the original Pentacam plus axial length measurement and a built-in IOL calculator.