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Should You Optimize *Your A-Constant?*

Arguments for and against A-constant optimization.

BY FLORIAN T.A. KRETZ, MD, FEBO

One of the most crucial factors in IOL power calculation is the A-constant. This estimate of effective lens position (ELP) is based on several factors, including surgical technique and the IOL material and design. The more optical features an IOL has, the more precise the ELP must be to achieve the desired refractive outcome after cataract surgery.

Every IOL calculation formula has different factors that should be optimized to achieve an accurate ELP. For example, Haigis has three different constants whereas SRK/T has only one. The Barrett Universal formula uses both a lens factor and a design factor. Most modern formulas, however, use multivariable factors to predict the outcome more accurately. When an IOL comes to market, the manufacturer usually provides a predicted value for the A-constant. Some surgeons then refine these A-constants by collecting their outcomes data (ie, postoperative refractions and measurements) and comparing them to established standards. There are arguments for and against A-constant optimization.

ARGUMENTS FOR A-CONSTANT OPTIMIZATION

▸ **No. 1.** The biggest argument for optimizing your A-constant is the potential to improve refractive outcomes with a more accurate IOL power calculation.

▸ **No. 2.** A-constant optimization can improve your confidence with certain IOLs, especially premium lens technologies that require precise positioning inside the eye. Some surgeons continue to optimize their A-constants as they gain more experience with an IOL.

▸ **No. 3.** Modern biometers and advanced IOL power formulas support customized A-constants, allowing you to minimize errors and optimize postoperative outcomes.

"The more complex an IOL optic is, the more important it becomes to correct astigmatism. Determine your typical amount of surgically induced astigmatism by calculating the change in astigmatism from pre- to postoperatively and account for it in your calculations. Surgically induced astigmatism is probably the main cause of error during A-constant optimization."

ARGUMENTS AGAINST A-CONSTANT OPTIMIZATION

▸ **No. 1.** There are easier approaches. Large international databases that collect pre- and postoperative biometry data, such as IOL Con (Steinbeis Vision Research), provide A-constant averages based on different patient characteristics including age, corneal steepness, and history of refractive surgery. You can use these averages—much as you would your optimized A-constant—to reduce the occurrence of outliers.

Another approach that is easier than A-constant optimization is to consider the average postoperative refraction you achieve. If you target plano but generally land on 0.50 D, for example, you could simply change your target to -0.50 D.

▸ **No. 2.** A-constant optimization complicates the comparison of results from different surgeons and settings. This may become a bigger issue with wider use of AI-based IOL power calculations.

▸ **No. 3.** Overoptimization could occur if individual patient characteristics such as visual preference, age, and ocular comorbidities are not considered. Relying solely on the optimized A-constant could increase the risk of adverse events, including dysphotopsias, glare, and halos.

▸ **No. 4.** There must be a reason to optimize your A-constant. The A-constants provided by manufacturers are usually so accurate that there is little need for you to optimize them. Additionally, optimization does not protect against refractive error because no A-constant works perfectly, especially in difficult eyes.

▸ **No. 5.** Many modern IOL calculation formulas use estimated values for posterior corneal astigmatism. If a surgeon still uses measured anterior and posterior surfaces and optimizes the constants in that way, it leads to wrong constants that no one else can use. It also might change their outcome if another formula is used.

MY APPROACH AND TIPS ON GETTING STARTED

No single approach to A-constants is ideal, but I can share what has worked for me.

When I start using a new IOL, I find it beneficial at the outset to use the A-constant provided by the manufacturer. Three months after surgery, I check the patient's refraction and repeat biometry measurements. Once I have a sample size of roughly 20 eyes, I may consider fine-tuning the A-constant if results are not within ±0.50 D of the intended correction. If I have a large deviation from my target refraction in the first five cases, however, then I look to optimize my A-constant immediately. At this early stage, however, I use only one modern biometry formula and optimize my constants for it.

If you are ready to optimize your A-constant for the first time, I recommend starting with a standard monofocal IOL. The more complex an IOL optic is, the more important it becomes to correct astigmatism. Determine your typical amount of surgically induced astigmatism by calculating the change in astigmatism from pre- to postoperatively and account for it in your calculations. Surgically induced astigmatism is probably the main cause of error during A-constant optimization. (For more on surgically induced astigmatism, see the article on pg 26.)

Rule out all other possible errors in refraction before you optimize your A-constant. Once you optimize your A-constant, stick to one formula such as Barrett, Kane, or Emmetropia Verifying Optical. IOL power formulas are multifactorial, and A-constants do not work interchangeably between them. Most importantly, high-quality postoperative biometry values and a stable refraction are required. Optimization can't be achieved with bad data.

CONCLUSION

A-constant optimization is discussed regularly by colleagues and at major ophthalmology conferences. The technique has the potential to improve refractive outcomes and enhance patient satisfaction after cataract surgery. As manufacturer-provided A-constants improve and standardized A-constants from large IOL databases become available, however, there is less reason to engage in your own optimization process. ■