# THE INNOVATION OF SIMPLICITY

## *Vision-AR-IOL Simulator, augmented reality for a better-informed choice of the best IOL*

*Interview with Dr.* **Luca Vigo,** *Advalia Vision, Milan*

Sometimes a brand-new idea comes in the shape of a very intuitive app. So simple, that it sounds obvious in hindsight. A 'why has nobody thought of it before?' kind of idea. It is pure simplicity as a key to success, a concept that in a blink of an eye, could become a part of everyday clinical practice as a true helping hand.

The latest advancements in software technology in recent years have surely expanded everyone's perspective – particularly in specialised fields like ophthalmology – opening up new and uncharted paths for physicians, patients, and sector companies. Along this path came the idea for a new software, the Vision-AR-IOL Simulator created by Luca Vigo, MD, from the Advalia Clinic in Milan. This is a software that can be used with an iPad Pro, using augmented reality (AR) to simulate the result of different intraocular lenses before implantation. Dr. Vigo explained how the Vision-AR-IOL Simulator app works, what its potential is, and how this can affect physicians, patients, and companies, in the hope that one day we will see this software becoming a standard issue for clinical practice.

Dr. Luca Vigo

### THE EASIER, THE BETTER

*"Vision-AR-IOL IOL Simulator is an app I created in collaboration with the Italian medical developers of SBM Sistemi"*, Vigo explained. *"It can be easily downloaded and installed on an iPad, and it simulates the visual result of an IOL implantation based on the patient's parameters"*.

Thus, it is an easy-going app, created by Dr. Vigo and inspired by some of the technology that was presented in different congresses of ophthalmology in recent years. *"My idea came during the AECOS congress in Antwerp, where I saw a head-mounted device for IOL simulation that gave the patient an idea of the visual results of a cataract surgery using AR and preloaded photo imagery"*, he explained

While being fascinated by this technology, Dr. Vigo soon realised how expensive and complicated this was. *"I was looking for something more user friendly, obtainable, and with no preloaded images. My aim was to give our patients the idea of different visual outcomes at different distances, while focusing on the screen of a portable device with the camera turned on"*.

The idea was to use an iPad Pro powerful enough to run the application, with an advanced, high-tech camera capable of focusing on any distance. *"The engineers who worked on the app added some very useful expedients to enhance quality of vision and depth of focus"*, he added.

Easier and better, to really meet the needs of patients and physicians. *"As ocular surgeons, we seldom use Premium IOLs, not because we are not capable, but because we have difficulty in finding ways of recommending suitable lenses to our patients"*, Vigo explained. *"We know a lot about our Premium lenses' strengths and weaknesses and their side effects, but we don't want to be bogged down in post-operative predicaments. Instead, having an app that can help the physician*

by Laura Gaspari

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*Luca Vigo*


Simulator: Home screen of the Vision-AR-IOL Simulator application

*to guide and inform a patient and help him find the perfect solution, is basically what I had in mind".*

## INTUITIVE

According to Luca Vigo, this IOL Simulator is a very user friendly and intuitive software. All a physician has to do is to set the parameters based on the patient's refractive data, such as astigmatism, myopia, presbyopia, stage of cataract. The iPad will then be handed to the patient, and he or she can scroll between different kinds of lenses to see what the outcome could be. The patient can choose between the four classic lenses, both premium and standard, such as monofocal standard, for far, intermediate or near vision; the EDOF monofocals, with a good depth of focus from 1 meter; multifocal EDOF with a depth of focus starting from 50-60 centimeters; and finally, quadrifocal or diffractive trifocals with a depth of focus starting from 30-35 cm. *"This is a simulation, of course. We want to show our patients how, with different solutions, their postoperative visual acuity could change"*, Vigo said. *"The app will also simulate possible halo and glares depending on the type of lens, such as multifocal and multifocal EDOF. So, by using the Vision-AR-IOL Simulator we can effectively show how a lens might behave in low light or other different conditions".*

All the physician has to do is to purchase and download the app (cost, 2500€) on an iPad that can be used in many ways in a clinic. *"The cost of both the app and the iPad can be covered with just a couple of surgeries performed"*, Vigo observed.

## VISION-AR-IOL SIMULATOR, PROS AND CONS

Vision-AR-IOL Simulator can benefit a patient undergoing a crystalline lens exchange, sometimes during the early onset of cataract, and for the correction of ametropia.

*"By looking at the screen of the device, a patient can immediately understand if he or she can feel comfortable with one kind of lens or another. This can be done easily in the office, and without using any preloaded picture,"* Vigo said. *"They can be aware of the side effects of one lens compared to another, how the lens can behave in different scenarios like how a simple driving experience could be. Sometimes patients are unaware of what the result can be, and they could feel disappointed by the wrong choice of a lens, especially if the patient has previously suffered from myopia and astigmatism. With this app the patient can have all the necessary information and choose wisely, knowing that a new lens could probably be for life"*, Vigo said. *"We are all well aware that a lens can be changed in the first months after the implantation, but there are very few surgeons who would go for a fibrotic lens in the bag".*

Thanks to this device, a patient can

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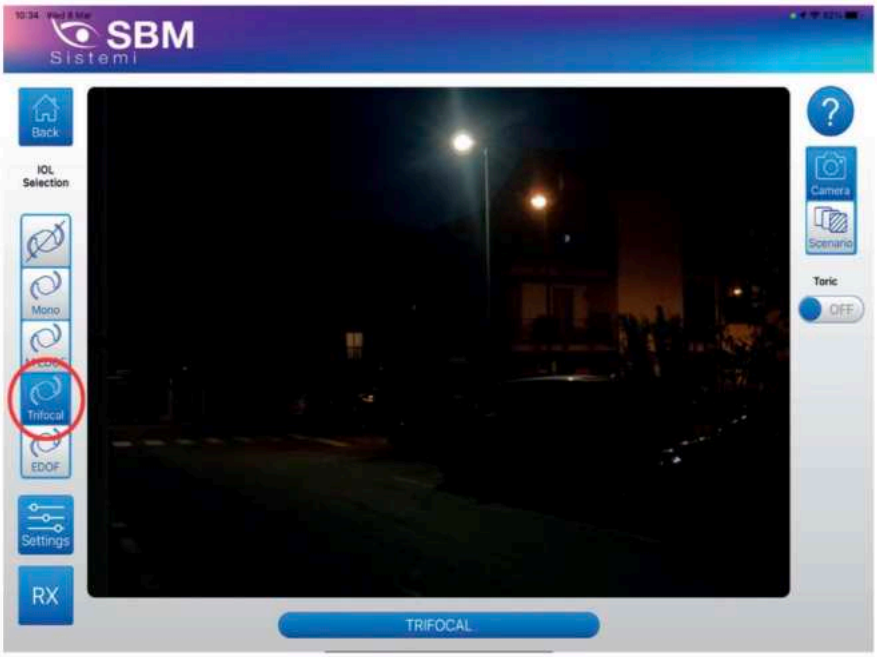


Example of what the patient sees using the Vision-AR-IOL Simulator

be well informed of all the available options and be guided towards a conscious lens choice, facing the upcoming surgery with confidence and with less risk of post-op disappointment. *"With Vision-AR-IOL Simulator we can show an early onset cataract patient how their crystalline opacification may affect their visual acuity in the future"*, Vigo said.
A great boon for the physician as well. *"Many are the benefits for our clinical practice: we can use the device for ourselves or with our orthoptist and make it more time-efficient to help our patient choose the right lens"*.
A great support, also from a legal point of view. *"A patient who is more in control of their choices is going to more greatly value the informed consent he or she is going to sign immediately before surgery"*, Vigo explained. Surely, nothing is perfect. *"This is a simulation, so it is not going to be 100% identical to the postoperative result, but I can assure that every patient that used it said that it was very close to the real outcome. We still have the final word on what is the best lens for our patient, and not the opposite"*, he remarked.
Another 'con' however, could be the slight difference between every patient interfacing with the device, especially in some specific conditions. *"Every patient has some variables that can slightly affect the performance. This app is ideally set for a patient with a healthy eye, retina, and optic nerve, but with a cataract that is not in a too-advanced stage. Some patients may also have different and non-optimal pupillary dynamics, and the lens can be affected differently because of that"*, he explained. *"Same if we have to deal with a very advanced cataract; a patient with an impaired visual acuity would simply not be able to have a clear idea of what the simulation could provide"*.

## A VALID DEVICE FOR CLINICAL PRACTICE

Despite some few limitations to its use, there is a lot of potential in the Vision-AR-IOL Simulator. *"I would really like to see it widespread, because I think this could become an essential device in the future"*, Vigo explained. A useful device for colleagues and patients, and of course for IOL manufacturers. *"A company can purchase and brand this software and add their lens"*, Vigo suggested, *"and give it to their key opinion leaders for educational and informative purposes."* The educational aspect is fundamentally important to the aim that Luca Vigo has for this instrument. *"I think that this software has a much more important role than what we can envisage now. It can be very useful for gathering statistical data, thanks to the implementation of customised surveys aiming to improve the software, as well as some feedback on the use of intraocular lens"*, he explained.
Luca Vigo suggests that colleagues should try Vision-AR-IOL Simulator to better realise all the potential of this app. *"It is essential to have a direct experience of this app to fully understand how good it is. I am also looking forward to hearing from colleagues if there are things to modify or add to improve this software. All ideas and suggestions are welcome, because we can all benefit from this"*, he concluded.