

**ACMIT**

**Austrian Center for Medical Innovation and Technology**

Programme: COMET – Competence Centers for Excellent Technologies

Programme line: K1 COMET-Centre

Type of project: MF2.2 - Applied Optics, 04/2017 – 03/2021, multi-firm



## INTRAOCCULAR LENS SIMULATION DEVICE FOR OPTIMIZED PATIENT SATISFACTION

### SUMMARY

DEVELOPMENTS FOR AN IOL SIMULATION DEVICE CONTRIBUTE TO INDIVIDUALLY IMPROVED QUALITY OF VISION FOR CATARACT PATIENTS AND SUPPORTS THE INDUSTRIAL DEVELOPMENT PROCESS

#### Background

The clouding of the natural lens in the human eye with increasing age, commonly known as grey star or cataract in medical terms, is a typical indication in aging societies and is treated by removing the opaque lens and subsequent implantation of an artificial intraocular lens (IOL) implant. Thus, an undisturbed vision is restored, and this procedure has become worldwide one of the most frequently performed surgical interventions over past decades. Additionally, patient expectations regarding the outcome of vision quality after surgery have continuously increased and are further accompanied by the wish for spectacle independence. This has triggered developments for various optical IOL

designs and IOL products on the market, whose differences and consequences for daily needs and routine can hardly be captured by patients without extended knowledge in optics.

A second issue which is tackled by the research of this success story is related to the IOL product development process itself. Commonly, IOLs are designed in the lab based on quantitative optical parameters and only shortly before product-launch they are being evaluated in clinical implantation studies. Contrary, the developed simulation device allows for an evaluation of the subjective acceptance and performance of prototype lenses already during early stages of development without the need for implantation.

## SUCCESS STORY

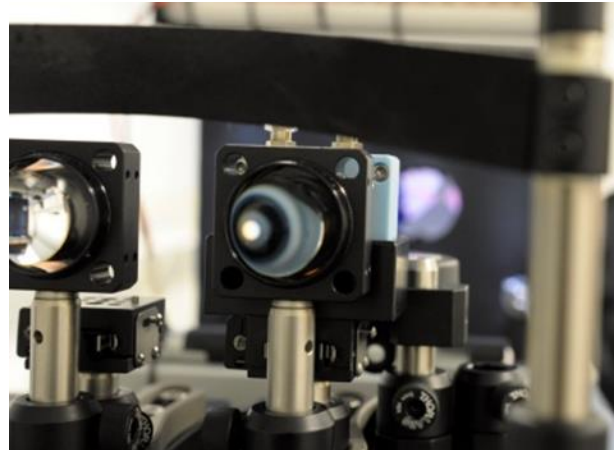
### Research and technical achievements

The basic idea for the IOL simulation device has already started in the beginnings of the ACMIT competence center. First setups were tested in clinical trials and could be continuously refined by the obtained results. Current main achievements affect the optical part of the system, which was completely redesigned to allow for white light assessment instead of monochromatic green light conditions, and second, to perform binocular tests compared to the previous monocular setup. The figure shows one of the lab-prototypes of this IOL simulation device. It is used in the way, that healthy test-persons rate their perception of specially designed test charts by looking through the optical setup containing the IOL prototype under investigation.

### Impact and effects

It is known that for instance the patient's activity profile and personal visual preferences impact subjective post-operative outcomes. Therefore, one and the same lens design is usually not the most appropriate for everyone and the question comes up, how surgeons can provide patients with an optimum choice out of the above-mentioned variety of different lens designs. At this point the IOL simulation device can significantly contribute to provide patients with an optimum vision quality according to their

personal and subjective requirements by enlightening relationships between quantitative optical bench parameters and the individual perception of vision quality. The simulation device has also been presented and discussed with international experts at the DOG congress, September 2019 in Berlin.



IOL simulation device, ACMIT copyright.

On the other hand, there also are significant impacts for the industry as costly failures can be avoided already at early stages of development in case that a new design concept would show any deficiencies in terms of patient related outcomes. Furthermore, ethically questionable implantation trials at new prototype designs can be reduced by the application of the IOL simulation setup.

### Project coordination (Story)

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### Project partners

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This success story was provided by the consortium leader/centre management and by the mentioned project partners for the purpose of being published on the FFG website. ACMIT is a COMET Centre within the COMET – Competence Centers for Excellent Technologies Programme and funded by BMK, BMDW, and the governments of Lower Austria and Tyrol. The COMET Programme is managed by FFG. Further information on COMET: [www.ffg.at/comet](http://www.ffg.at/comet)