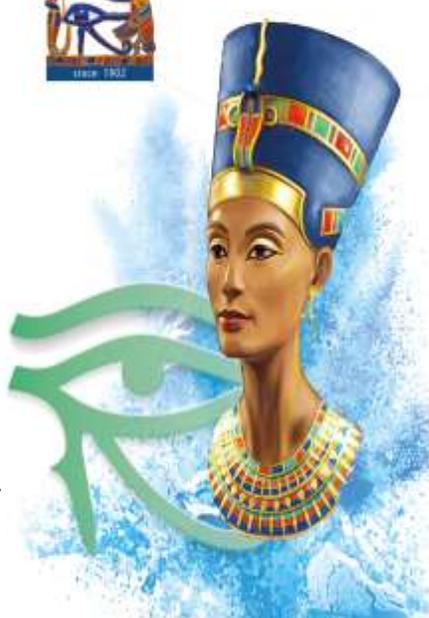


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**Effect of Intravitreal
Injection of Ranibizumab
(Lucentis) on
Corneal Biomechanics**

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- Corneal biomechanics is a branch of science that studies deformation and equilibrium of corneal tissue under the application of any force.
- corneal properties such as elastic, viscous, or viscoelastic response, hysteresis, and stiffness are important to understand the Biomechanical measurements of the cornea.



Elasticity



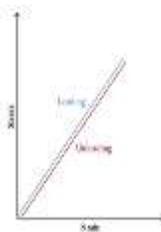
Viscosity



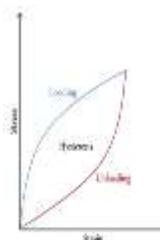
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- The description of biomechanical properties typically centers on Young's modulus, a representation of tissue elasticity that relates the force (stress) required to generate a certain fractional deformation (strain). It is expressed mathematically as a slope fit to the relevant portion of a stress-strain curve for a given material, with higher modulus values indicating a stiffer material (i.e., not easy to bend)



Stress-strain response diagrams of different materials showing elastic (a), and viscoelastic behaviour (b) can be quantified in terms of hysteresis



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- Corneal biomechanics play an important role in the diagnosis and characterization of ocular diseases such as corneal ectasia, evaluation for corneal laser refractive surgery candidacy, and post refractive surgery monitoring.
- It is also important in glaucoma management, particularly in normal tension glaucoma



- Intravitreal anti VEGF treatment causes decrease of VEGF levels and shift of CTGF /VEGF balance in favor of CTGF and cause angiofibrotic switch.
- CTGF has been reported to be present in many tissues such as the cornea and the sclera. Increased proportional levels of CTGF stimulates matrix contraction by fibroblast proliferation in the cornea during wound healing .
- The same effect has been found in unwounded normal cornea which may result in change in corneal stiffness and biomechanics



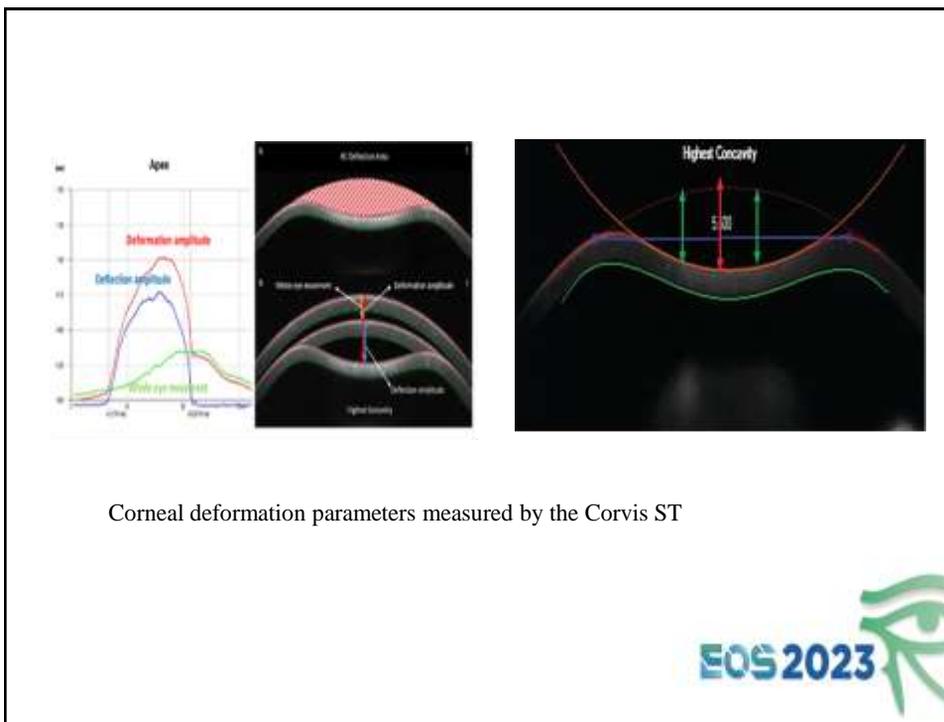
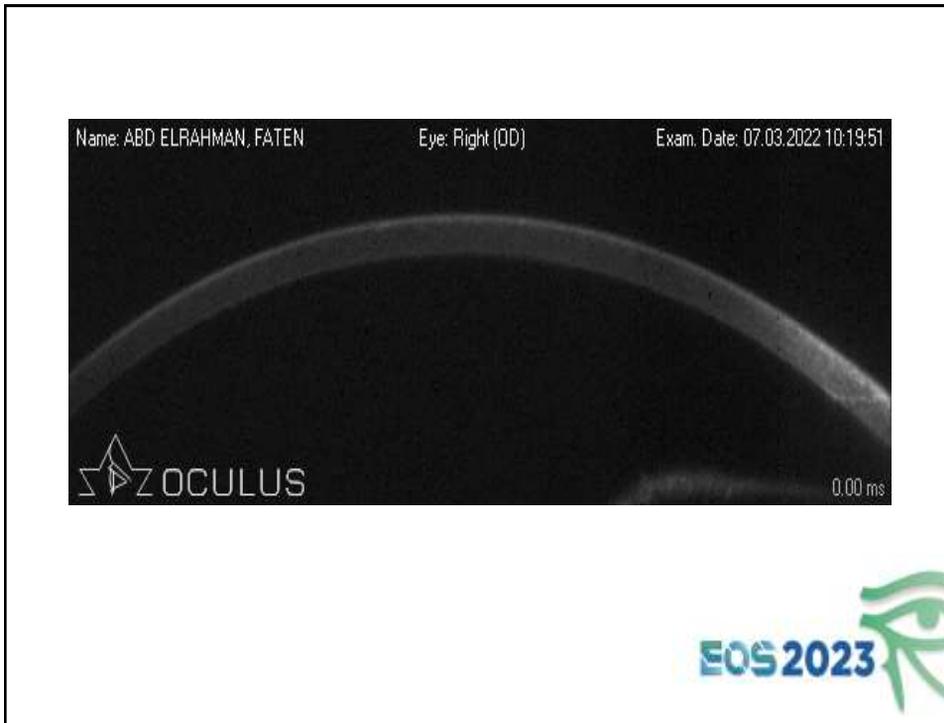
- A commercially available clinical instrument called the Ocular Response Analyzer (ORA; Reichert Ophthalmic Instruments, Buffalo, NY) has been proposed to characterize corneal biomechanical responses using the noncontact tonometry (NCT) process in

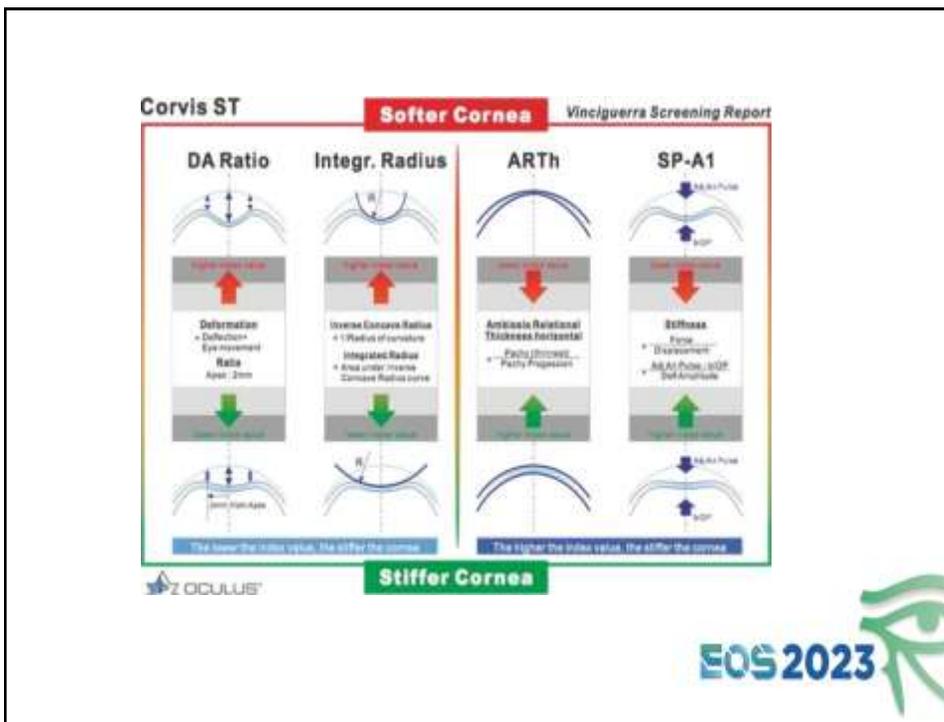
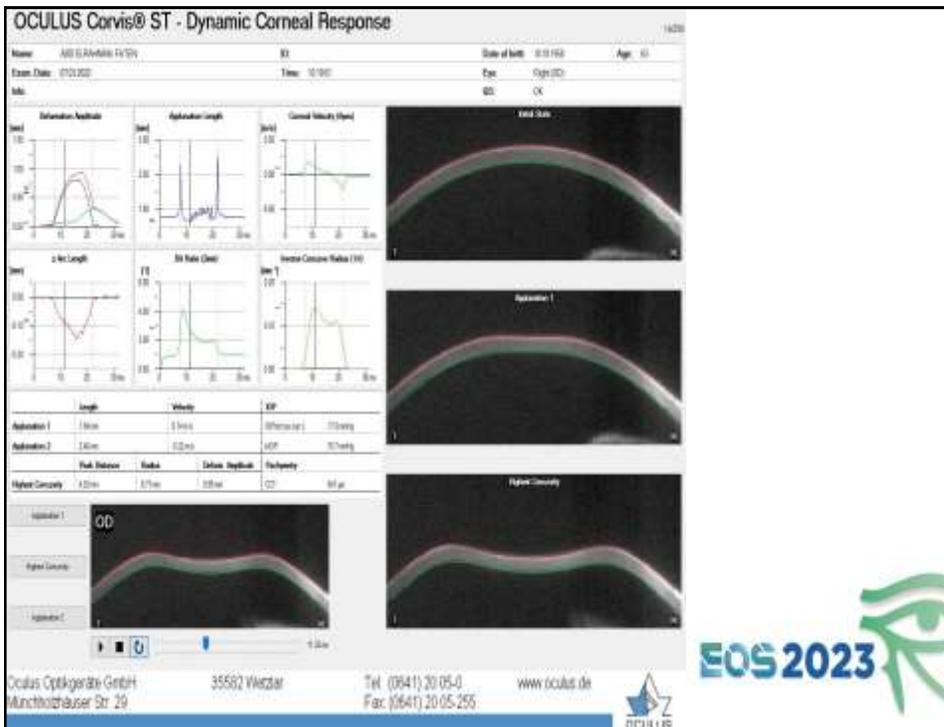


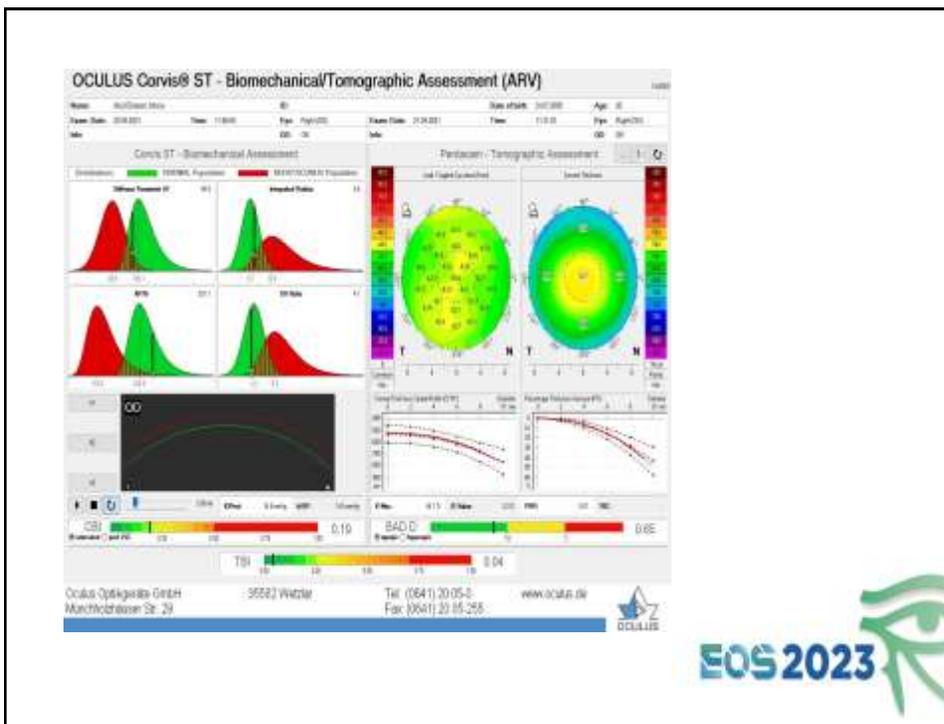
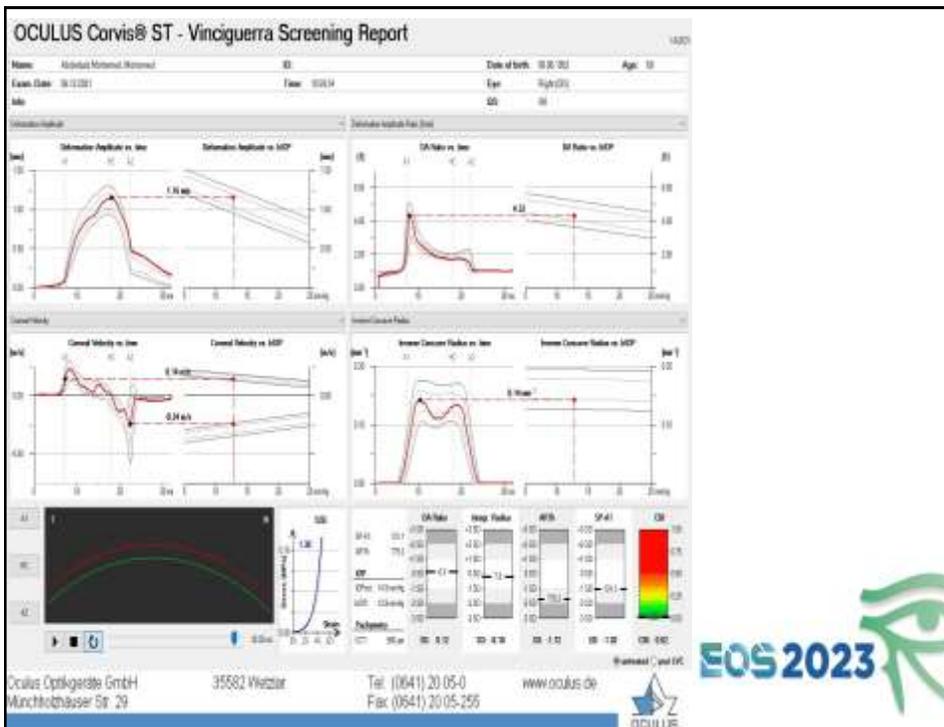
- In 2013, there was a second commercially available device called Corvis ST (OCULUS, Wetzlar, Germany)
- It is a noncontact tonometer that uses a high-speed Scheimpflug camera to investigate the biomechanical properties of the human cornea in vivo.

It uses an ultra-high-speed Scheimpflug camera that takes 140 horizontal 8mm frames over a period of 33ms (4330 frames/s).









- **Aim of the study:**

To assess the effect of intravitreal injection of ranbizumab (Lucentis) on corneal biomechanics by using the Corneal Visualization Scheimpflug Technology (Corvis ST).



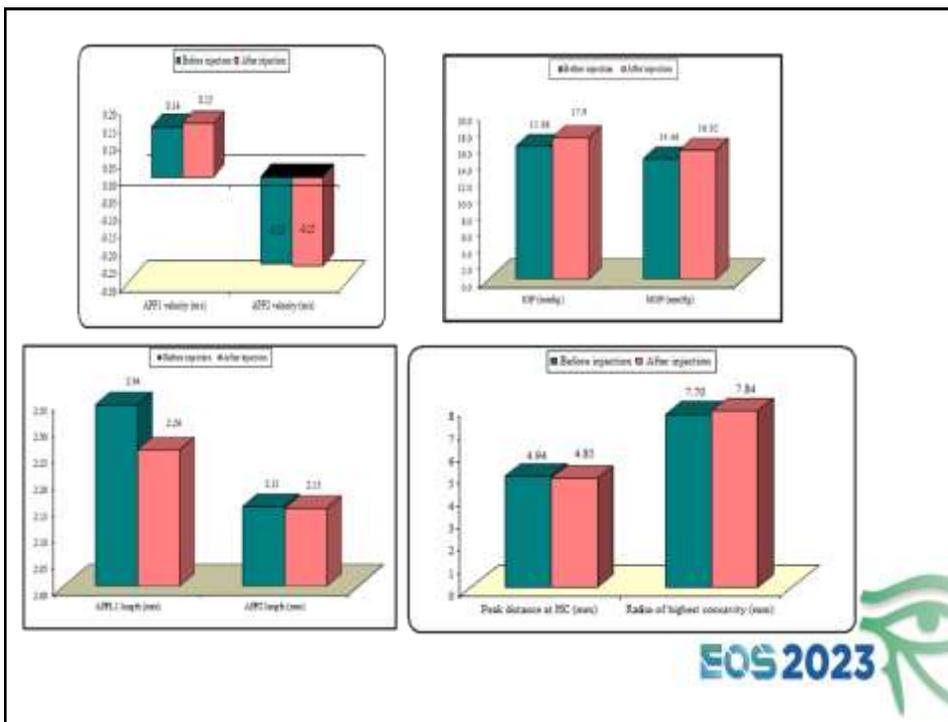
- **Patients and Methods:**

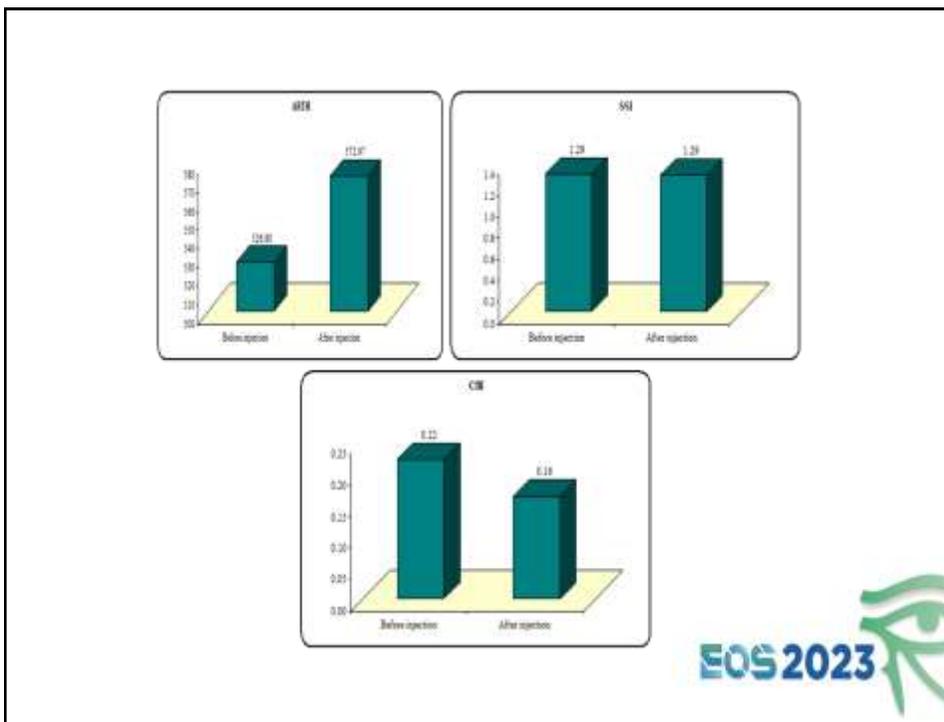
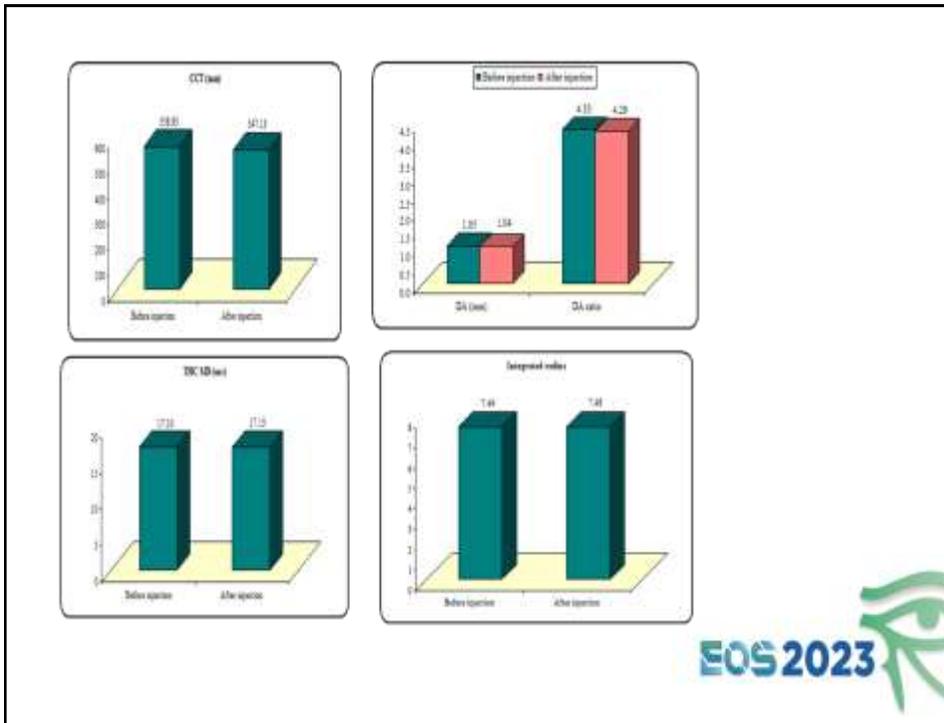
This prospective, interventional and non-randomized study included 30 eyes of 30 patients. Corvis ST parameters were recorded before and one month after a three-months course of IVI OF Ranibizumab . It was carried out between June 2021 and August 2022 at Al-Zahraa University Hospital, National Eye Center, Rod Elfarag and the Research institute of Ophthalmology.



• Results:

Results of the study showed a significant increase in IOP and bIOP after injection (P- value 0.03 and 0.04 respectively). A significant decrease of CCT after injection was found (P value 0.044). There was a significant increase in ARTh which correlates with the significant decrease in CBI after injection, which means better corneal biomechanical response (P values were 0.003, 0.014 respectively).





- **Conclusion:**

In this study, intravitreal ranibizumab injection could change some Corvis ST parameters as (IOP, bIOP, CCT, ARTh and CBI) and other parameters are non statistically different. This suggests assessment of corneal biomechanics using Corvis ST on a wide scale.

