MediWorks

AL550

Optical Biometer

Accurate Biometric Measurement
for Cataract Surgery

Optical Biometer AL550

Do you know the causes of blindness and moderate to severe visual impairment in people aged 50 and above?

- With the global aging population, **cataract, uncorrected refractive error, glaucoma, age-related macular degeneration and diabetic retinopathy** have become the main causes of blindness and moderate to severe visual impairment (MSVI) in people aged 50 and above.

- **Cataract remains the 1st or 2nd leading cause of blindness and MSVI** in all world regions so far. However, the World Health Assembly (WHA) defines cataract as one of the avoidable causes of vision impairment because it is so effectively treated with surgery.

	Cataract	Undercorrected refractive error	Glaucoma	Age-related macular degeneration	Diabetic retinopathy	Residual causes of vision loss
Blindness						
Global	**45.4% (41.7–49.0)**	6·6% (5.6–7.8)	11% (9.3–12.8)	5.6% (4.3–6.7)	2.5% (1.7–3.7)	28.9% (26.5–31.5)
Central Europe, eastern Europe, and central Asia	**22.4% (19.1–25.9)**	1.4% (1.2–1.8)	14.8% (12.3–17.3)	5.2% (3.8–6.7)	1.0% (0.7–1.5)	55.1% (51.0–59.6)
High income	**17.5% (14.9–20.5)**	2.1% (1.7–2.5)	28.2% (24.0–32.3)	21.6% (17.5–26.1)	6.2% (4.2–8.8)	24.5% (21.6–27.8)
Latin America and Caribbean	**35.4% (31.4–39.8)**	4.3% (3.6–5.0)	11.8% (9.7–13.9)	2.5% (1.8–3.2)	6.8% (4.5–9.6)	39.2% (35.5–43.4)
North Africa and Middle East	**33.6% (29.4–38.0)**	3.3% (2.7–3.8)	21.1% (17.7–24.5)	8.3% (6.2–10.5)	2.3% (1.5–3.6)	31.5% (27.8–36.0)
South Asia	**63.1% (59.4–66.8)**	9.4% (7.9–10.9)	6.4% (5.2–7.7)	3.0% (2.1–4.0)	1.4% (0.9–2.1)	16.8% (15.0–18.8)
Southeast Asia, east Asia, and Oceania	**48.3% (44.5–52.1)**	7.3% (6.2–8.5)	6.7% (5.5–7.9)	4.2% (3.0–5.4)	2.0% (1.3–3.0)	31.6% (29.0–34.3)
Sub-Saharan Africa	**39.8% (35.9–43.9)**	3.1% (2.6–3.6)	17.8% (15.1–20.6)	4.0% (3.0–5.1)	0.9% (0.6–1.4)	34.4% (31.4–37.7)
Moderate and severe vision impairment						
Global	**38.9% (35.6–42.4)**	41% (38.0–44.1)	2.1% (1.7–2.5)	3.0% (2.5–3.5)	1.4% (1.0–2.0)	13.6% (12.3–15.2)
Central Europe, eastern Europe, and central Asia	**21.4% (18.8–24.2)**	45.3% (42.0–48.6)	1.5% (1.2–1.8)	1.6% (1.3–1.9)	1.0% (0.7–1.3)	29.3% (26.2–32.5)
High income	**33.5% (29.8–37.2)**	44.5% (41.1–48.0)	2.5% (2.0–3.1)	3.2% (2.7–3.8)	1.9% (1.3–2.5)	14.5% (12.7–16.8)
Latin America and Caribbean	**31.8% (28.4–35.3)**	40.2% (37.1–43.4)	3.6% (3.0–4.4)	2.4% (2.0–2.8)	2.8% (2.0–3.8)	19.2% (17.0–21.8)
North Africa and Middle East	**44.6% (40.6–48.8)**	36.3% (32.7–39.8)	2.9% (2.3–3.6)	4.2% (3.5–5.0)	3.2% (2.3–4.3)	8.9% (7.6–10.6)
South Asia	**41.3% (37.8–45)**	44.9% (41.3–48.1)	1.5% (1.2–1.8)	1.8% (1.5–2.2)	0.6% (0.4–0.8)	10% (8.9–11.2)
Southeast Asia, east Asia, and Oceania	**43.8% (40.4–47.2)**	36.6% (33.7–39.7)	1.9% (1.5–2.3)	4.3% (3.6–5.0)	1.7% (1.2–2.3)	11.8% (10.8–13.0)
Sub-Saharan Africa	**43.3% (39.8–46.8)**	26.7% (24.4–29.0)	3.9% (3.2–4.8)	4.2% (3.5–4.9)	1.2% (0.9–1.6)	20.8% (18.7–23.0)

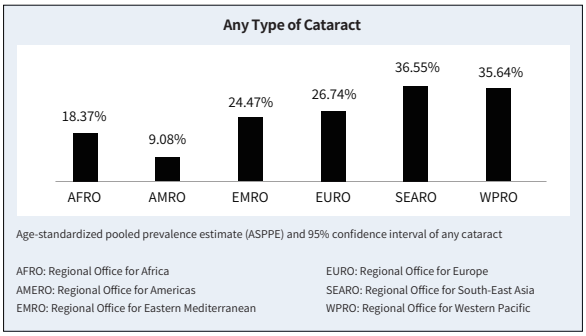
Data in parentheses are 95% uncertainty intervals.

Relative percentage contribution of each cause to age-standardised prevalence of blindness and moderate and severe vision impairment by superregion in 2020 in adults aged 50 years and older

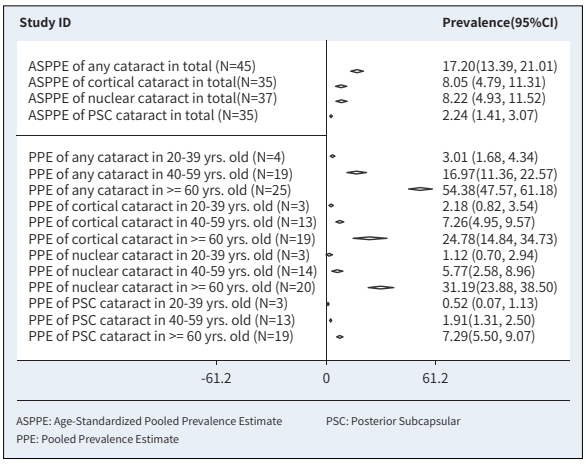
Data source: GBD 2019 Blindness and Vision Impairment Collaborators.Causes of blindness and vision impairment in 2020 and trends over 30 years, and prevalence of avoidable blindness in relation to VISION 2020: the Right to Sight: an analysis for the Global Burden of Disease Study. Lancet Glob Health 2021; 9: e144–60.

What's the prevalence of cataract?

- A systematic review and meta-analysis demonstrated the Age-standardized Pooled Prevalence Estimate (ASPPE) of cataract was 17.20%, but it was significantly different in the six geographical regions. The highest prevalence was 36.55% in the SEARO region and the lowest prevalence was 9.08% in the AMRO region.



- It also showed the Pooled Prevalence Estimate (PPE) of any cataract in the 20-39-year, 40-59-year, and over-60-year age groups was 3.01 (95% CI: 1.68–4.34), 16.97% (95% CI: 11.36–22.57), and 54.38% (95% CI: 47.57–61.18), respectively.



- It' s crucial to note that due to the global trend of population aging, the ASPPE of cataract is anticipated to increase in the future. Although effective surgical interventions are available, cataract - being the first leading cause of blindness worldwide - warrants heightened attention from eye-care professionals.

Data source: Hassan Hashemi, et al. Eye (Lond). Global and regional prevalence of age-related cataract: a comprehensive systematic review and meta-analysis. 2020 Aug; 34(8): 1357-1370.

How can AL550 Optical Biometer help you on the cataract surgery for your patients?

Achieve High Success Measurement Rate in Cataract patients:

- The wavelength of AL550 features high penetrability through ocular tissues, thereby improving the measurement success rate in cataract patients.

- AL550 offers multiple clinical applications, such as **cataract surgery, keratoconus screening, wavefront aberration analysis**, providing a comprehensive basis for perioperative eye health evaluation in cataract patients.

Enable Precise Prediction of IOL Power:

- AL550 provides accurate biometric measurements, such as **axial length, corneal curvature** and **anterior chamber depth**, thereby reducing errors in calculating IOL power for cataract patients.

- AL550 offers multiple new-generation IOL calculation formulas, including **Pearl-DGS** and **Jin**, whose accuracy has been validated to be comparable to Barrett Universal II.

Provide an Easy-to-operate and Patient-friendly Examination Process:

- AL550, with selectable fully automatic or manual operation, voice prompt and rapid capture, makes it easier for eye-care professionals to examine cataract patients.

- AL550 provides elderly patients an excellent feeling of comfort during the examination, enabling them to cooperate with the measurement at ease.

Measurement Principle of AL550

OLCR (Optical Low-Coherence Reflectometry) Measurement Technology

- The higher resolution makes the measurement more precise compared with ultrasonic measurement.
- The longer wavelength provides greater penetration of eye tissue than other optical biometers, enabling precise measurement data.

Placido Disc

- The 50-ring design Placido disc can provide more accurate analysis results.
- The large cone design covers more than 9.8mm diameter of central cornea so as to obtain more precise measurement data.

Key Highlights of AL550

Efficiency and Versatility

- Binocular biometry and topography examination **in 40 seconds** and binocular biometry examination **in 25 seconds**
- **Up to 23 parameters** can be obtained **in 1 measurement**
- Enables multi-scenario clinical applications

Precision and Reliability

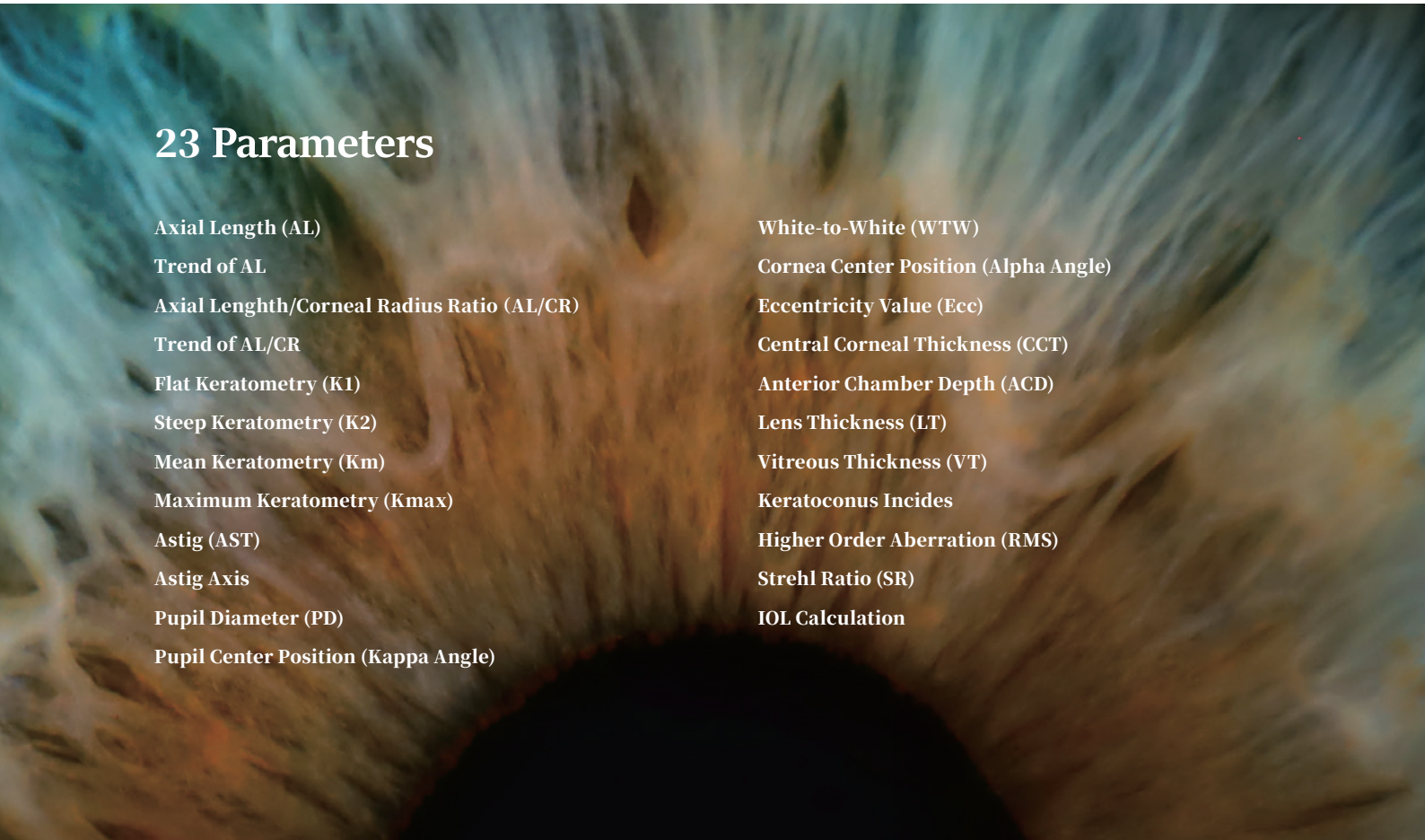
- **1,060nm wavelength** light source with strong penetrating power for accurate biometry measurement
- **125,600 data analysis points** for accurate anterior corneal surface measurement

Compact Design and Ease of Operation

- **Space-saving design** for operation even in tight space
- **Selectable operation mode** and **rapid capture** for easier measurement process

Safety and Comfort

- **Non-contact measurement** avoids the risk of cross-infection and corneal damage
- Topical anesthesia and pupil dilation are not required
- Under the guidance of **voice prompt**, patients are able to cooperate more smoothly and experience greater comfort



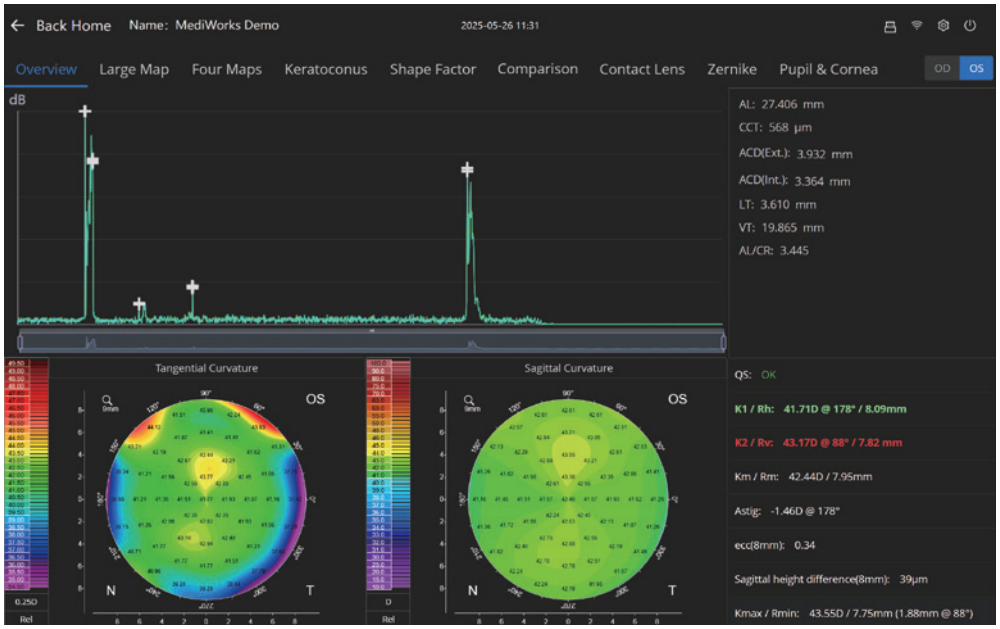
23 Parameters

Axial Length (AL)
Trend of AL
Axial Lenghth/Corneal Radius Ratio (AL/CR)
Trend of AL/CR
Flat Keratometry (K1)
Steep Keratometry (K2)
Mean Keratometry (Km)
Maximum Keratometry (Kmax)
Astig (AST)
Astig Axis
Pupil Diameter (PD)
Pupil Center Position (Kappa Angle)
White-to-White (WTW)
Cornea Center Position (Alpha Angle)
Eccentricity Value (Ecc)
Central Corneal Thickness (CCT)
Anterior Chamber Depth (ACD)
Lens Thickness (LT)
Vitreous Thickness (VT)
Keratoconus Incides
Higher Order Aberration (RMS)
Strehl Ratio (SR)
IOL Calculation

Clinical Application in Cataract Surgery

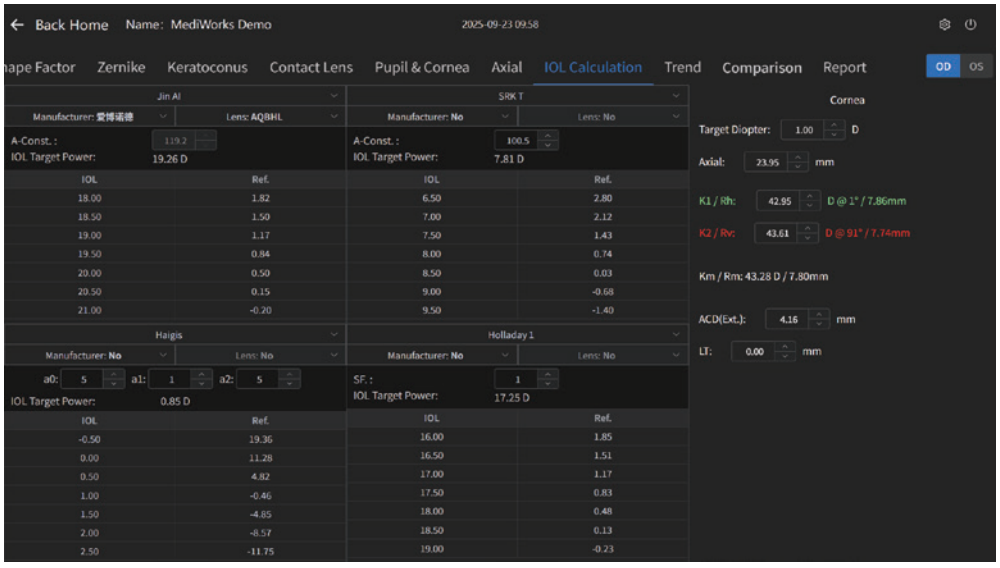
Measurement of Axial Length, Corneal Curvature and Anterior Chamber Depth

AL551 provides accurate measurements such as axis length, corneal curvature and anterior chamber depth, which are crucial for the precise prediction of IOL power.



IOL Calculation

AL550 integrates multiple IOL calculation formulas, including Pearl-DGS, Jin, SRK-T, Holladay 1, Hoffer Q and Haigis, enabling rapid calculation of IOL power for cataract patients. Moreover, a study found the Pearl-DGS and Jin formulas demonstrate prediction accuracy similar to that of the Barrett Universal II.

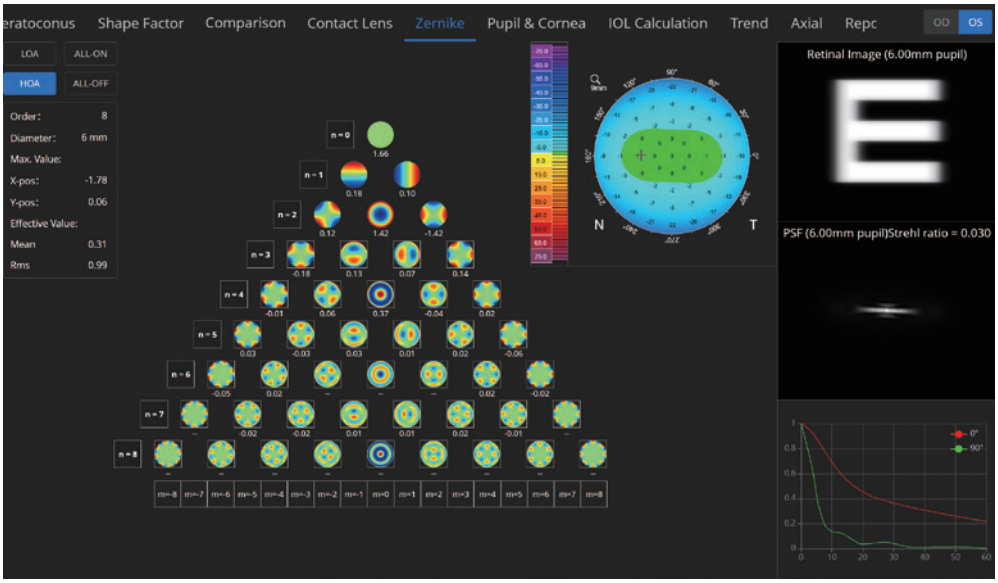


Keratoconus Screening

AL550 provides the maps of anterior corneal sagittal curvature and elevation, and a variety of keratoconus indices, enabling eye-care professionals to intuitively and quickly understand the patient's corneal morphology and assisting in the early screening of diseases such as keratoconus and marginal corneal degeneration.

Wavefront Aberration Analysis & Visual Quality Analysis

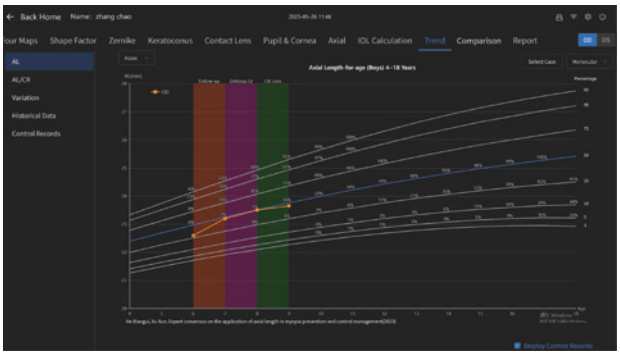
AL550 provides Zernike wavefront aberration data of the corneal anterior surface with up to 8th order and a maximum diameter of 12mm. Meanwhile, it can also simulate the visual quality image through more intuitive ways such as Retina Imaging, Point Spread Function (PSF, including Strehl ratio), and Modulation Transfer Function (MTF), helping improve the efficiency of eye-care professional-to-patient communication.



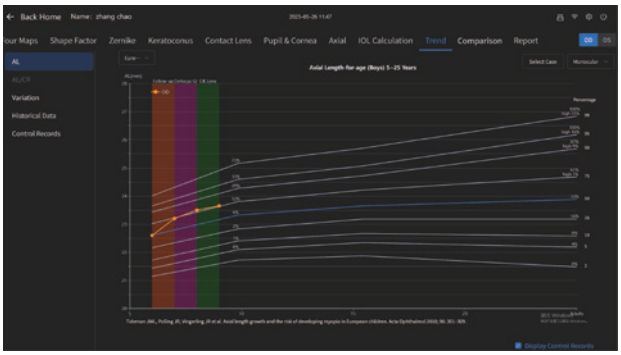
Additional Clinical Applications

Myopia Progression Monitoring

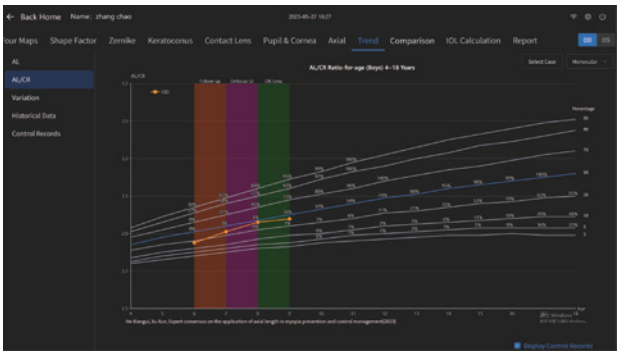
AL550 provides the trend curves of axial length, axial length/corneal radius ratio, axial length variation over time, and myopia & high myopia probability in the European and Asian population, and allows eye-care professionals to record myopia interventions so as to provide important evidence for monitoring myopia progression in children and adolescents, evaluating the effectiveness of current myopia interventions and predicting future myopia and high myopia risk.



Trend Curve of AL, Myopia & High Myopia Probability in the European Population [1]



Trend Curve of AL & Myopia Probability in the Asian Population [2]

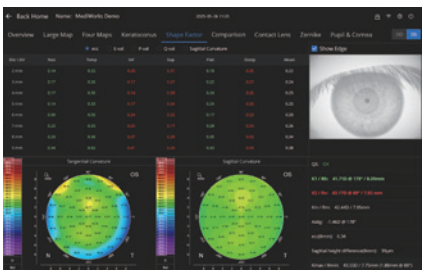


Trend Curve of AL/CR & Myopia Probability in the Asian Population [2]

Axial Length Variation over Time [2]

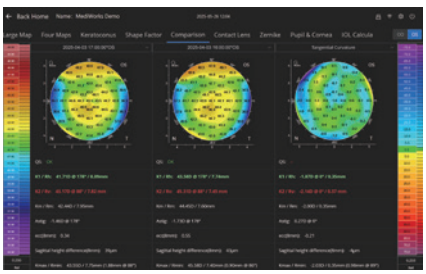
Orthokeratology Lens Fitting

AL550 provides comprehensive orthokeratology lens fitting parameters (including flat K, steep K, astigmatism, flat eccentricity, steep eccentricity, and corneal sagittal height difference) for trial lens selection. It also offers the lens simulated fitting function to improve fitting efficiency and reduce patient discomfort, while generating tangential curvature difference map before and after lens wearing for effect evaluation.



Selection of Orthokeratology Trial Lens

Orthokeratology Lens Simulated Fitting



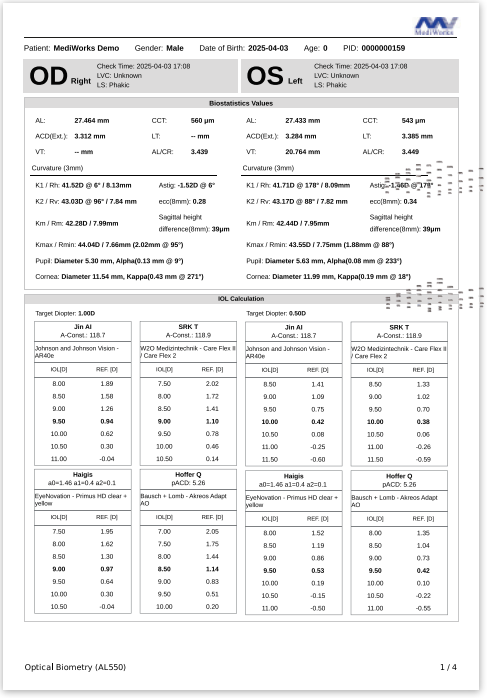
Evaluation of Orthokeratology Lens Wearing Effect

[1] Jan Willem Lodewijk Tideman, et al. Axial length growth and the risk of developing myopia in European children. ActaOphthalmol. 2018:96:301–309.

[2] He X, Sankaridurg P, Naduvilath T, et al. Normative data and percentile curves for axial length and axial length/corneal curvature in Chinese children and adolescents aged 4–18 years. Br J Ophthalmol. 2023;107:167–175.


AL 550

Comprehensive and Easy-to-access Digital Report


Patient: MediWorks Demo Gender: Male Date of Birth: 2025-04-03 Age: 0 PID: 0000000159

OD Right — Check Time: 2025-04-03 17:08 — LVC: Unknown — LS: Phakic

OS Left — Check Time: 2025-04-03 17:08 — LVC: Unknown — LS: Phakic

Biostatistics Values

OD				OS			
AL:	27.464 mm	CCT:	560 µm	AL:	27.433 mm	CCT:	543 µm
ACD(Ext.):	3.312 mm	LT:	-- mm	ACD(Ext.):	3.284 mm	LT:	3.385 mm
VT:	-- mm	AL/CR:	3.439	VT:	20.764 mm	AL/CR:	3.449

Curvature (3mm)

OD		OS	
K1 / Rh: 41.52D @ 6° / 8.13mm	Astig: -1.52D @ 6°	K1 / Rh: 41.71D @ 178° / 8.09mm	Astig: -1.46D @ 178°
K2 / Rv: 43.03D @ 96° / 7.84 mm	ecc(8mm): 0.28	K2 / Rv: 43.17D @ 88° / 7.82 mm	ecc(8mm): 0.34
Km / Rm: 42.28D / 7.99mm	Sagittal height difference(8mm): 39µm	Km / Rm: 42.44D / 7.95mm	Sagittal height difference(8mm): 39µm
Kmax / Rmin: 44.04D / 7.66mm (2.02mm @ 95°)		Kmax / Rmin: 43.55D / 7.75mm (1.88mm @ 88°)	
Pupil: Diameter 5.30 mm, Alpha(0.13 mm @ 9°)		Pupil: Diameter 5.63 mm, Alpha(0.08 mm @ 233°)	
Cornea: Diameter 11.54 mm, Kappa(0.43 mm @ 271°)		Cornea: Diameter 11.99 mm, Kappa(0.19 mm @ 18°)	

IOL Calculation

Target Diopter: 1.00D

Jin AI — A-Const.: 118.7 — Johnson and Johnson Vision - AR40e		SRK T — A-Const.: 118.9 — WZO Medizintechnik - Care Flex II / Care Flex 2	
KN,[D]	REF. [D]	IOL[D]	REF. [D]
8.00	1.89	7.50	2.02
8.50	1.58	8.00	1.72
9.00	1.26	8.50	1.41
9.50	**0.94**	**9.00**	**1.10**
10.00	0.62	9.50	0.78
10.50	0.30	10.00	0.46
11.00	-0.04	10.50	0.14

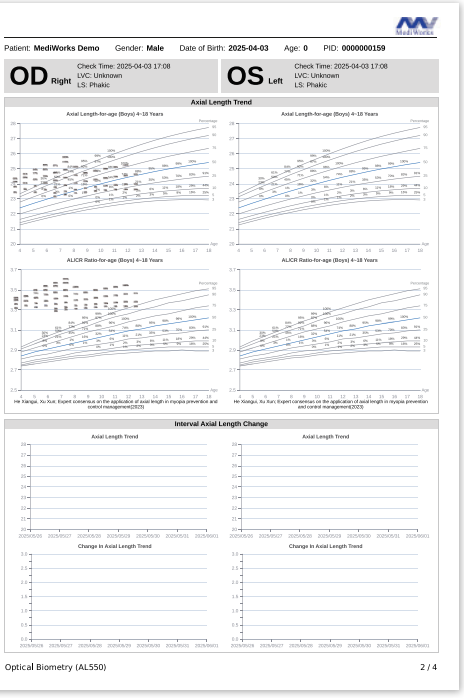
Haigis — a0=1.46 a1=0.4 a2=0.1 — EyeNovation - Primus HD clear + yellow		Hoffer Q — pACD: 5.26 — Bausch + Lomb - Akreos Adapt AO	
KN,[D]	REF. [D]	IOL[D]	REF. [D]
7.50	1.95	7.00	2.05
8.00	1.62	7.50	1.75
8.50	1.30	8.00	1.44
9.00	**0.97**	**8.50**	**1.14**
9.50	0.64	9.00	0.83
10.00	0.30	9.50	0.51
10.50	-0.04	10.00	0.20

Target Diopter: 0.50D

Jin AI — A-Const.: 118.7 — Johnson and Johnson Vision - AR40e		SRK T — A-Const.: 118.9 — WZO Medizintechnik - Care Flex II / Care Flex 2	
KN,[D]	REF. [D]	IOL[D]	REF. [D]
8.50	1.41	8.50	1.33
9.00	1.09	9.00	1.02
9.50	0.75	9.50	0.70
10.00	**0.42**	**10.00**	**0.38**
10.50	0.08	10.50	0.06
11.00	-0.25	11.00	-0.26
11.50	-0.60	11.50	-0.59

Haigis — a0=1.46 a1=0.4 a2=0.1 — EyeNovation - Primus HD clear + yellow		Hoffer Q — pACD: 5.26 — Bausch + Lomb - Akreos Adapt AO	
KN,[D]	REF. [D]	IOL[D]	REF. [D]
8.00	1.52	8.00	1.35
8.50	1.19	8.50	1.04
9.00	0.86	9.00	0.73
9.50	**0.53**	**9.50**	**0.42**
10.00	0.19	10.00	0.10
10.50	-0.15	10.50	-0.22
11.00	-0.50	11.00	-0.55

Optical Biometry (AL550) 1 / 4


Patient: MediWorks Demo Gender: Male Date of Birth: 2025-04-03 Age: 0 PID: 0000000159

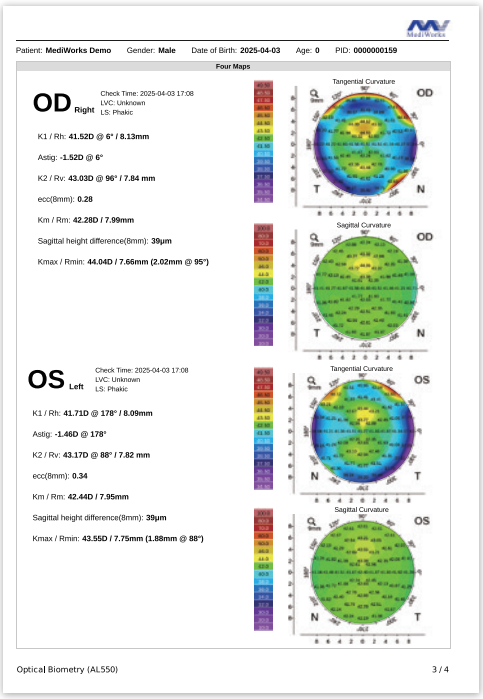
OD Right — Check Time: 2025-04-03 17:08 — LVC: Unknown — LS: Phakic

OS Left — Check Time: 2025-04-03 17:08 — LVC: Unknown — LS: Phakic

Axial Length Trend

Interval Axial Length Change

Optical Biometry (AL550) 2 / 4


Patient: MediWorks Demo Gender: Male Date of Birth: 2025-04-03 Age: 0 PID: 0000000159

Four Maps

OD Right — Check Time: 2025-04-03 17:08 — LVC: Unknown — LS: Phakic

K1 / Rh: 41.52D @ 6° / 8.13mm

Astig: -1.52D @ 6°

K2 / Rv: 43.03D @ 96° / 7.84 mm

ecc(8mm): 0.28

Km / Rm: 42.28D / 7.99mm

Sagittal height difference(8mm): 39µm

Kmax / Rmin: 44.04D / 7.66mm (2.02mm @ 95°)

OS Left — Check Time: 2025-04-03 17:08 — LVC: Unknown — LS: Phakic

K1 / Rh: 41.71D @ 178° / 8.09mm

Astig: -1.46D @ 178°

K2 / Rv: 43.17D @ 88° / 7.82 mm

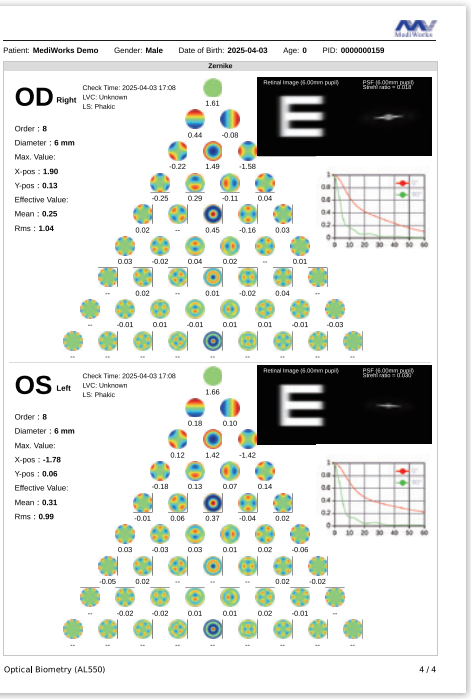
ecc(8mm): 0.34

Km / Rm: 42.44D / 7.95mm

Sagittal height difference(8mm): 39µm

Kmax / Rmin: 43.55D / 7.75mm (1.88mm @ 88°)

Optical Biometry (AL550) 3 / 4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Zernike

OD Right — Check Time: 2025-04-03 17:08 — LVC: Unknown — LS: Phakic

Order : 8
Diameter : 6 mm
Max. Value:
X-pos : 1.90
Y-pos : 0.13
Effective Value:
Mean : 0.25
Rms : 1.04

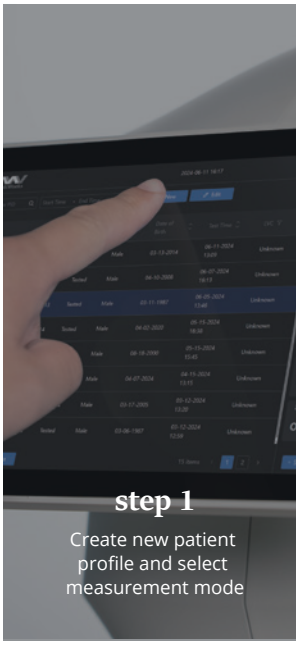
OS Left — Check Time: 2025-04-03 17:08 — LVC: Unknown — LS: Phakic

Order : 8
Diameter : 6 mm
Max. Value:
X-pos : -1.78
Y-pos : 0.06
Effective Value:
Mean : 0.31
Rms : 0.99

Optical Biometry (AL550) 4 / 4

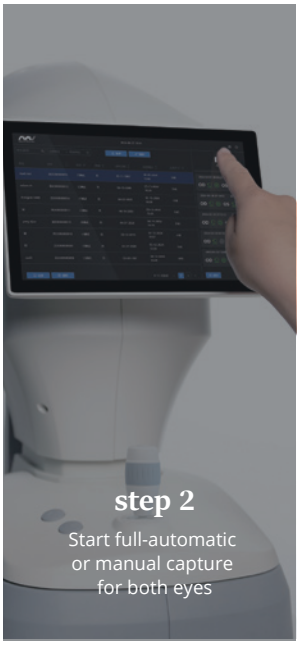
A comprehensive report with rich information on ocular biometric data, IOL calculations, corneal topographic maps and wave front aberrations of anterior corneal surface can help eye-care professionals scientifically evaluate patients' eye health status, so as to better guide their daily practices on cataract surgery.

Ease of Operation



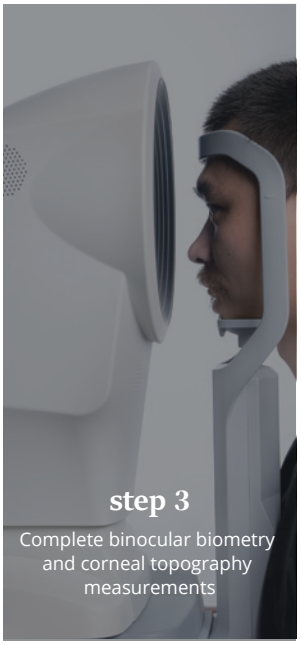
step 1

Create new patient profile and select measurement mode



step 2

Start full-automatic or manual capture for both eyes



step 3

Complete binocular biometry and corneal topography measurements

step 4

Get a binocular measurement report

User-friendly operation and fast image capture realizes a super fast examination process.

Integrated Compact Design

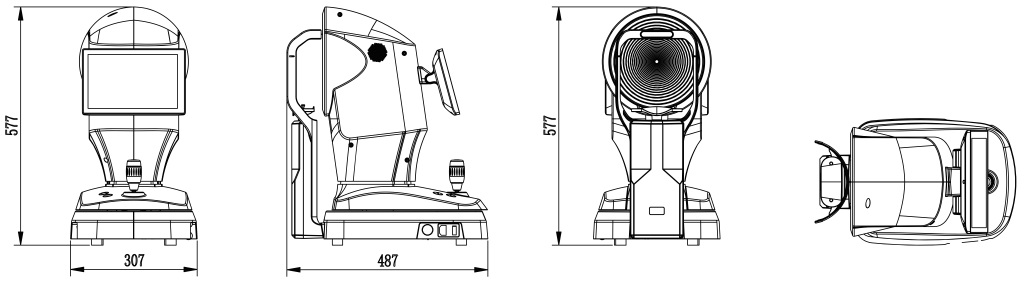
The integrated design of high-definition touch LCD screen and measuring device greatly saves the occupied space of diagnosis room.

Specifications

FEATURE	SPECIFICATION
Keratoscopic cone	50-ring Placido
Analyzed points	125,600
Measured points	18,000
Corneal coverage	9.8mm
Diopter power range	32.14 ~ 61.36D (±0.1D)
Axial Biometry	Optical Low-coherence Reflectometry (1,060nm)
Focus mode	One-touch,XYZ axes autofocus tracking measurement
OS/OD Recognition	Automatic
Monitor	10.1" touchscreen
Illumination	Red, Infrared
Database	Internal
Working environment	+5°C~+40°C, Relative humidity ≤80% (no condensing),
	Atmospheric pressure 800 – 1,060 hPa
Power supply	~100 - 240 VAC, 50/60 HZ
Power consumption	100 VA
Dimensions	307 mm (W) × 487 mm (L) × 577 mm (H)
Weight	21kg
Printing options	USB printer, Network printer, PDF on network shared folder,
	PDF on USB PDF or Image on network folder or on USB
Operating System	Linux
Hard Disk	1TB

INFORMATION ON MEASUREMENTS

MEASUREMENT	Measuring Range	Tolerance Value	Display Resolution
Axlal Length	0 - 40 mm	±10 μm	1 μm
Corneal Thickness	0.2 - 1.2 mm	±10 μm	1 μm
Anterior Chamber Depth	0.7 - 8 mm	±10 μm	1 μm
Lens Thickness	1.5 - 6.5 mm	±10 μm	1 μm
White-to-White	8 - 16 mm	±0.1 mm	
Pupil Diameter	1 - 13 mm		
Projection ring diameter	> 9.8 mm		
Corneal Radius of Curvature	5.5 - 10.5 mm (Accuracy ± 0.02 mm)		
Axis	0 ~ 180°		



CE NMPA FDA MDSAP ISO 13485

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Details Make the **Difference**