Med Sales Academy

BIOMETRY COURSE

2. Biometry Measurements

Welcome to Biometry

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- Emma Deighan
- Trainer in Ophthalmology for 20 Years
- Please ask questions!
- Email emma@medsalesacademy.co.uk

Today we will learn

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- How to measure Biometry
- What measurements are needed
- How we see
- How to read the measurements and apply to patients
- Understanding the Biometry Report

Biometry

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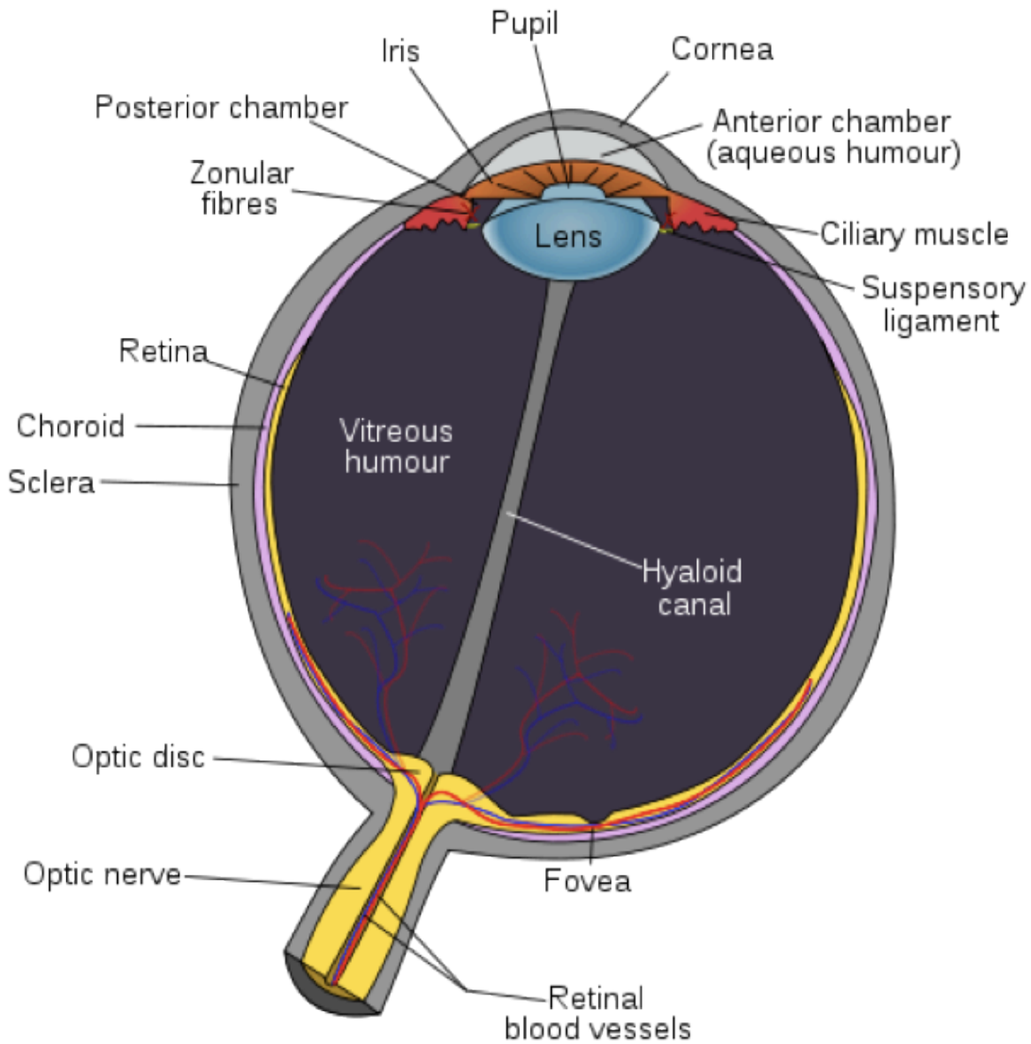
Relates to Measurements required for calculation

- Axial Length
- K reading
- Anterior Chamber Depth
- White to White
- Lens thickness
- Central Corneal Thickness



Ways to Measure

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Axial Length

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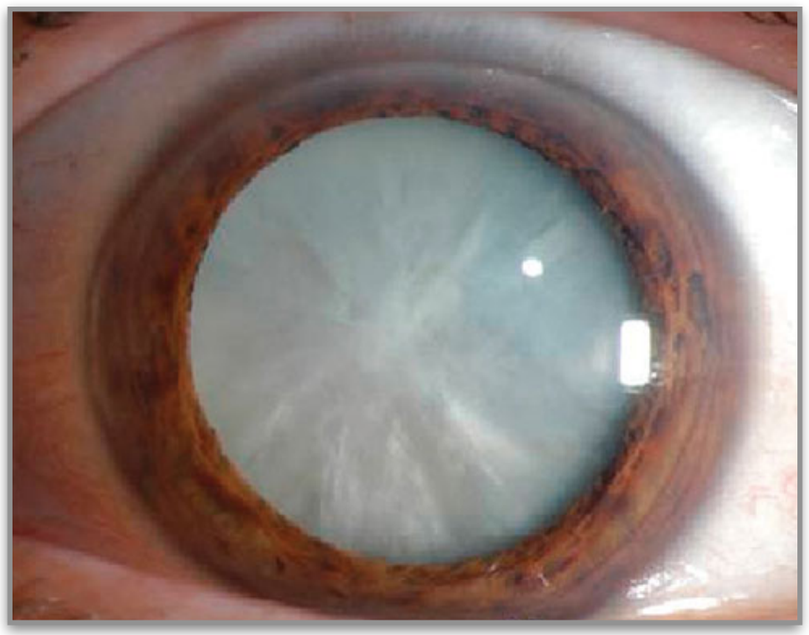
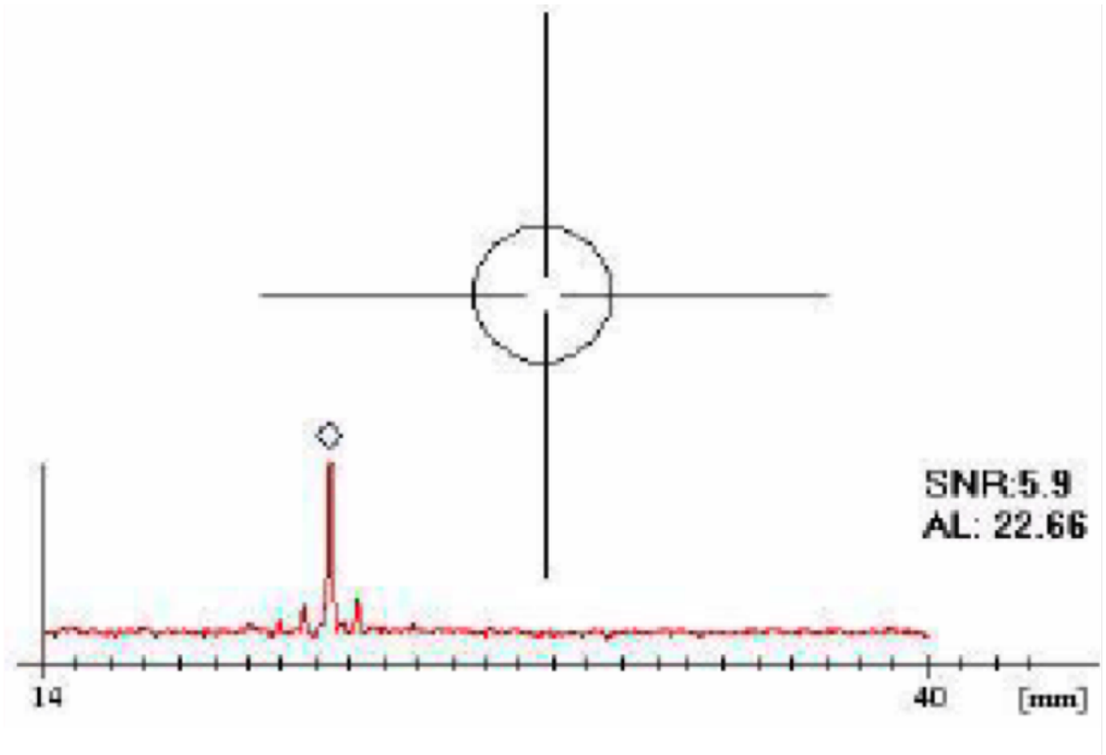


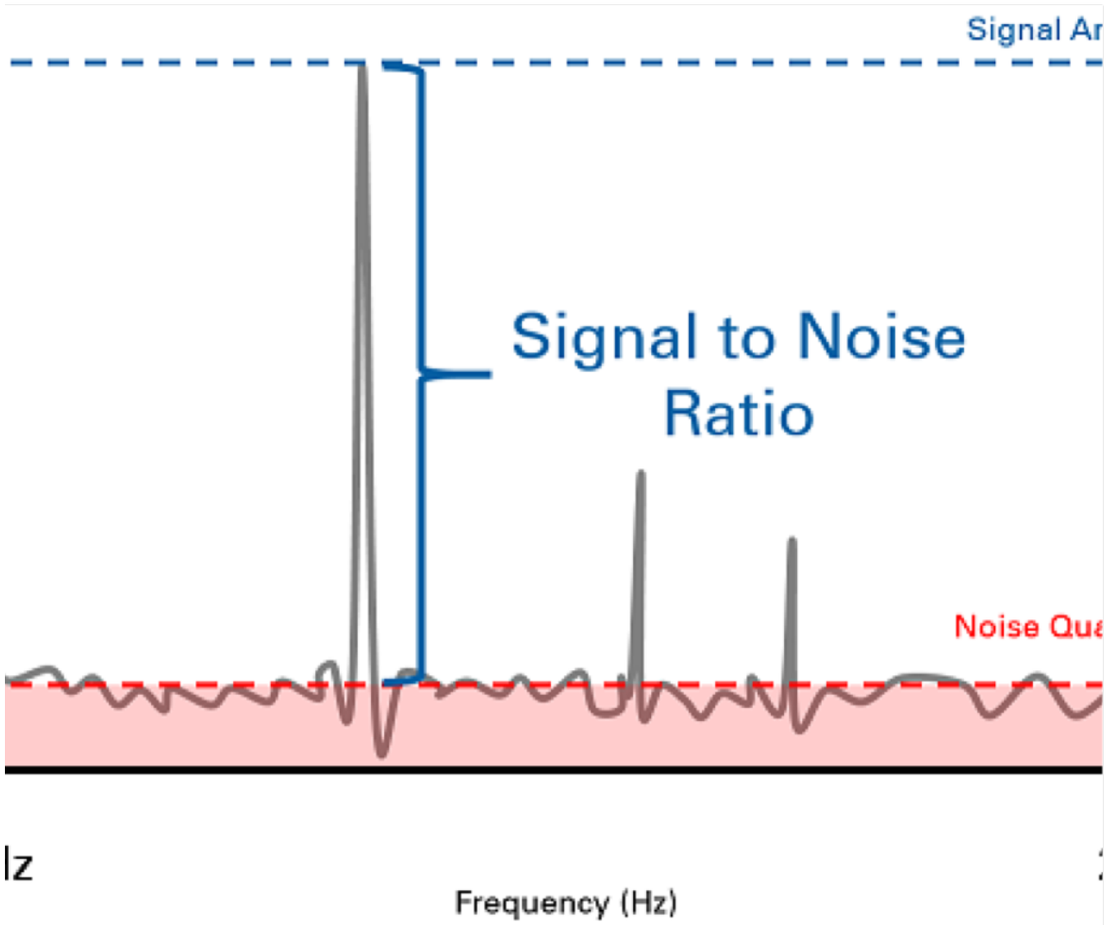
- Optical or Ultrasound?
- Most biometry is done on an optical system
- If the cataract is too dense you may need to use Ultrasound

Optical Biometry



- Optical
- Uses light to bounce off the retina
- Problems with fixation
- Have you measured RPE or ILM
- Modern Biometers use composite measure

Signal to Noise Ratio



- Measure of clarity of the medium measurement is taken through
- The higher the noise the more difficult it is to take and accuracy of measure decreases
- However Good SNR does not always equal accurate measurement.
- Check other eye

Tips

- Make sure patient is comfortable and straight in the chin rest
- For Axial Length, you can move the image around to try and find a way through a cataract
- Like trying to peak through a dirty window

Moving the spot

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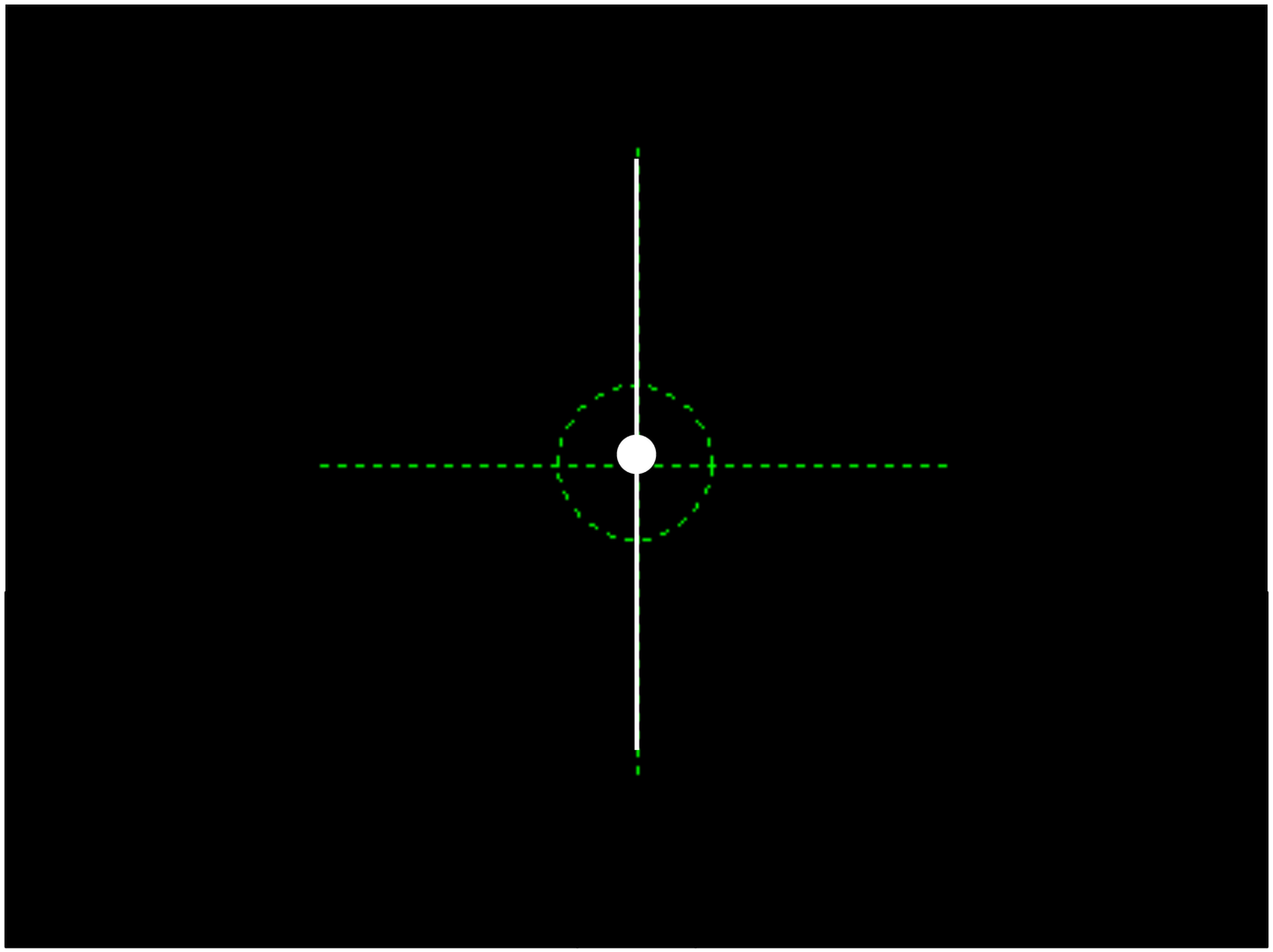

Moving the spot

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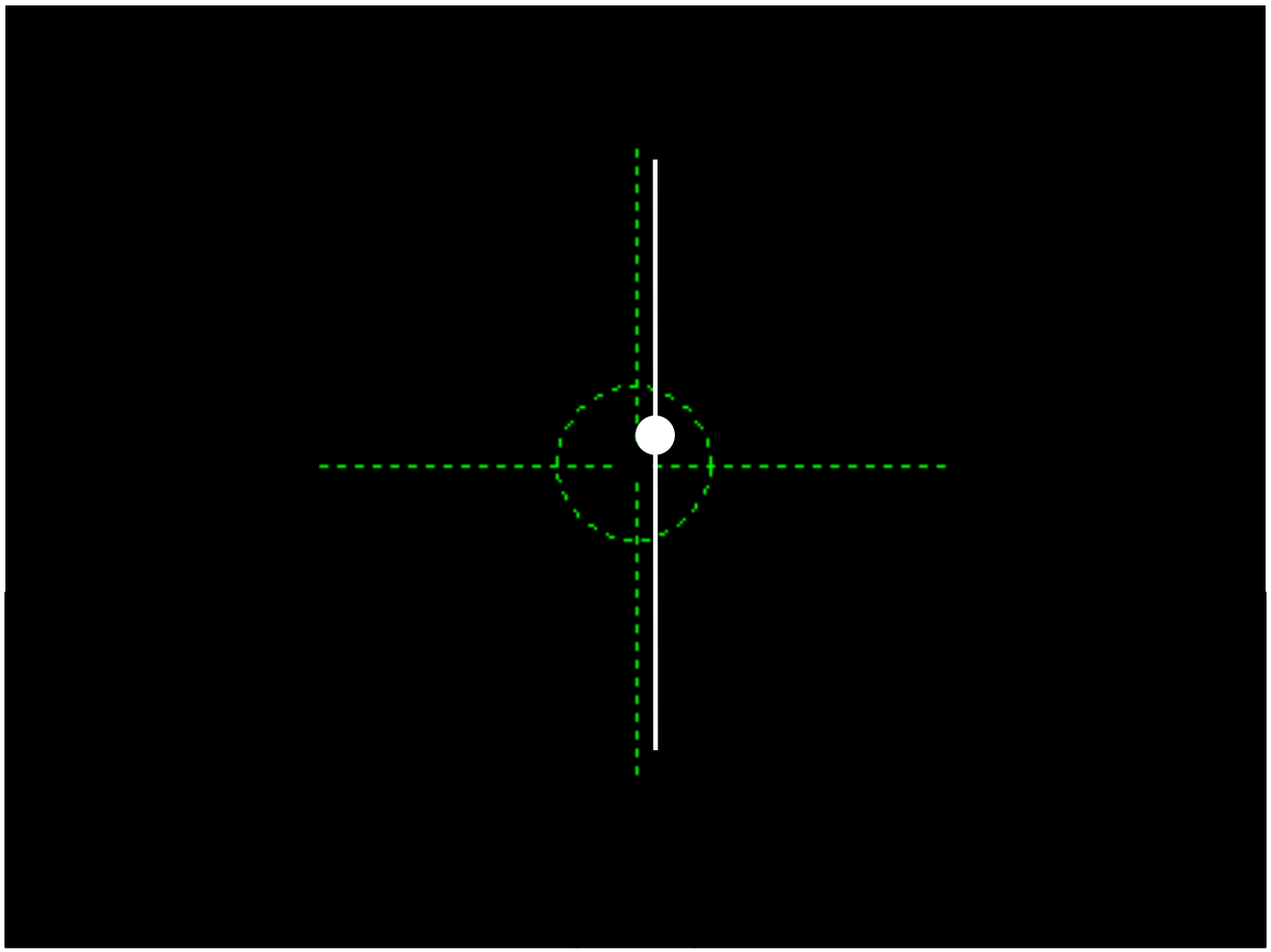
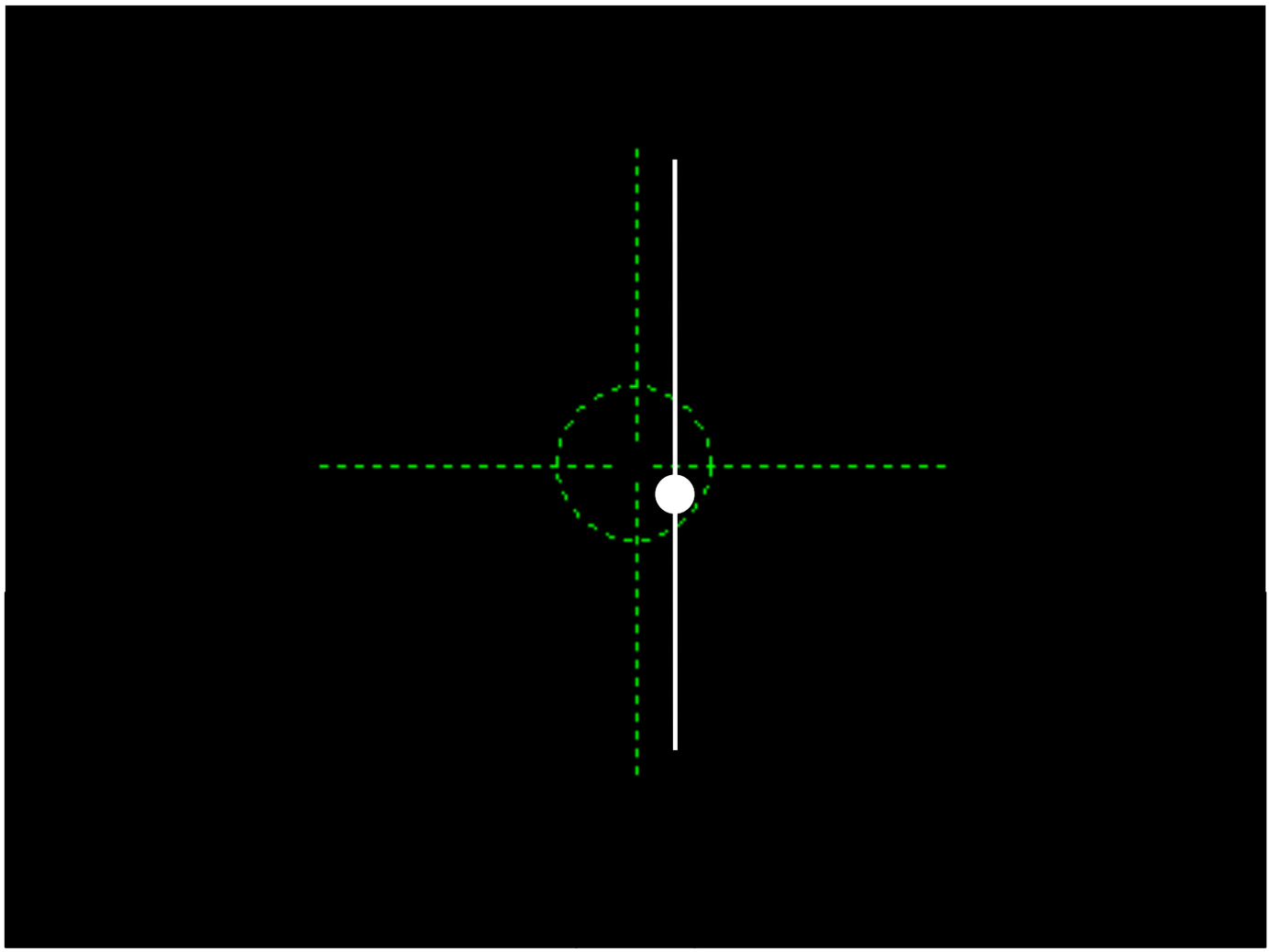


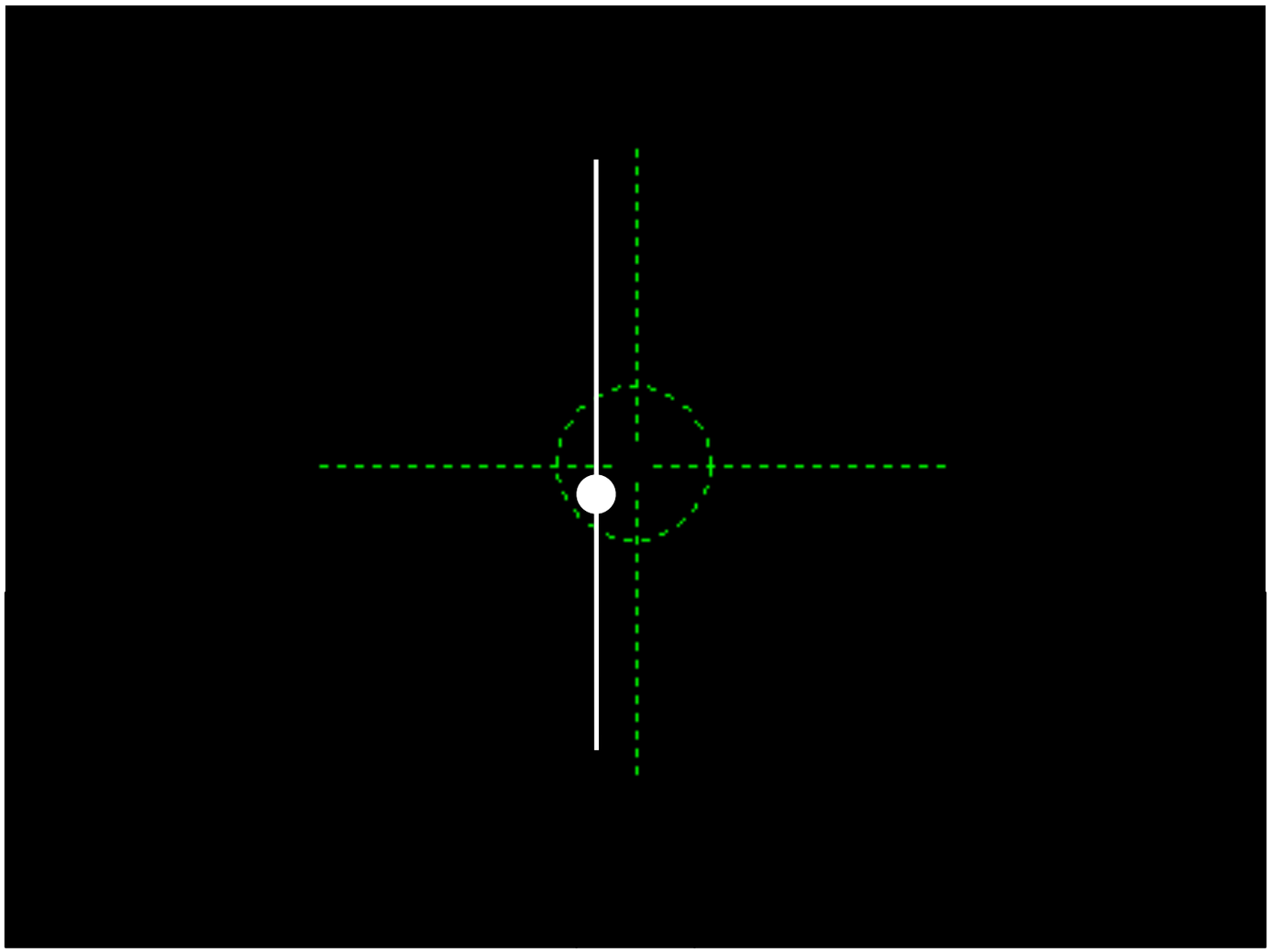
Moving the spot

Med Sales Academy



Moving the spot

Med Sales Academy



Moving the spot

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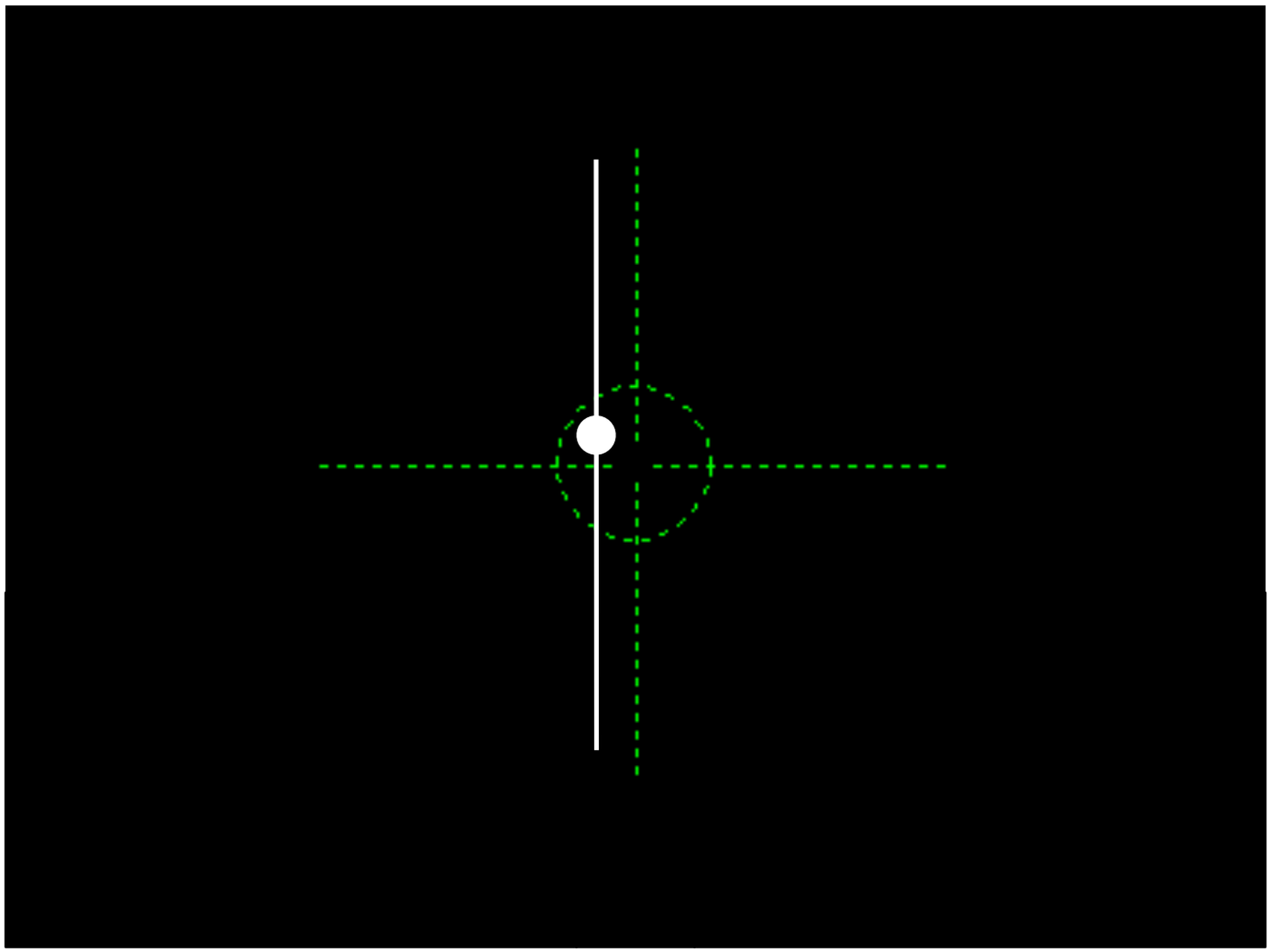

Moving the spot

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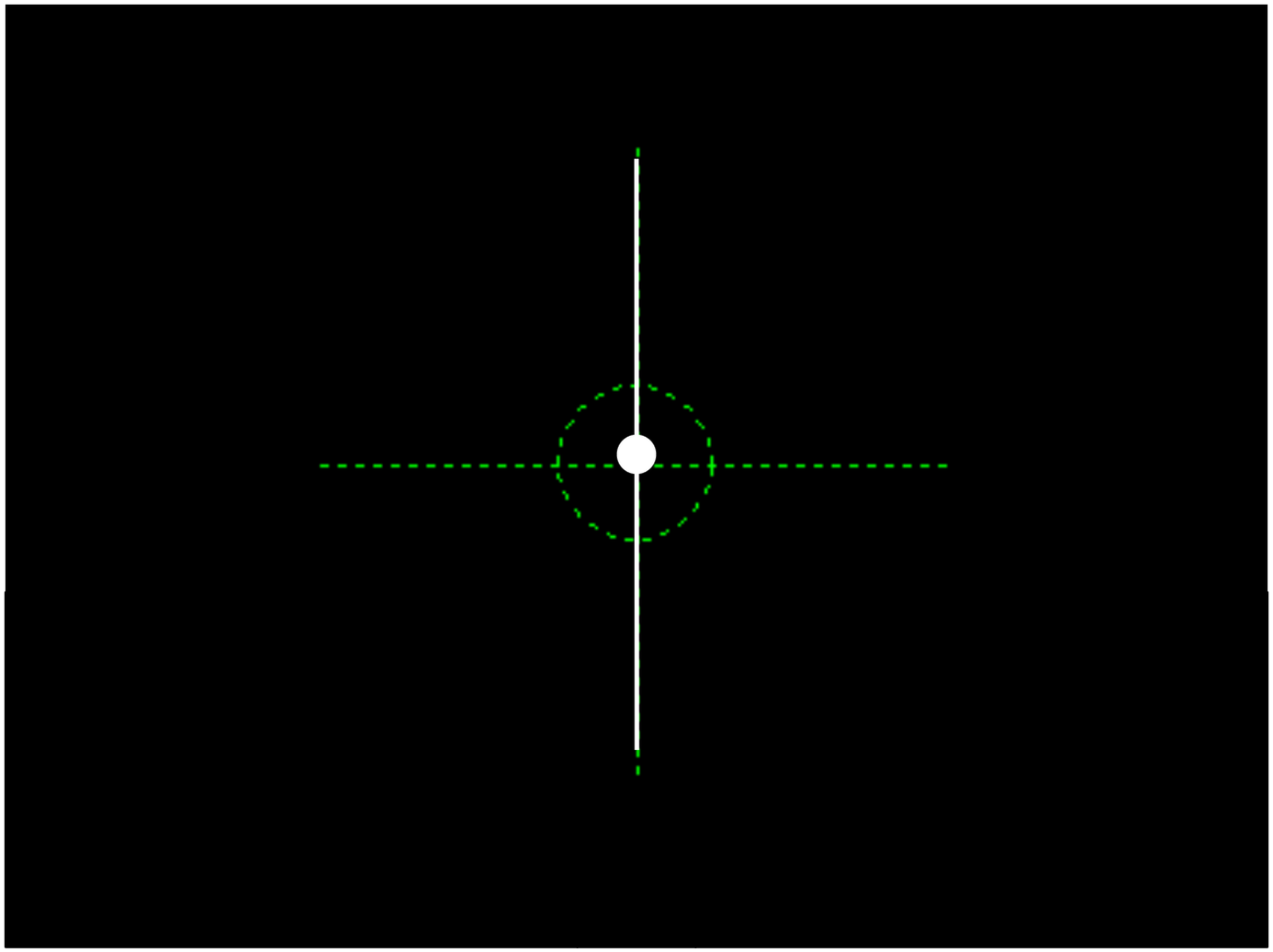

Changing Spot size

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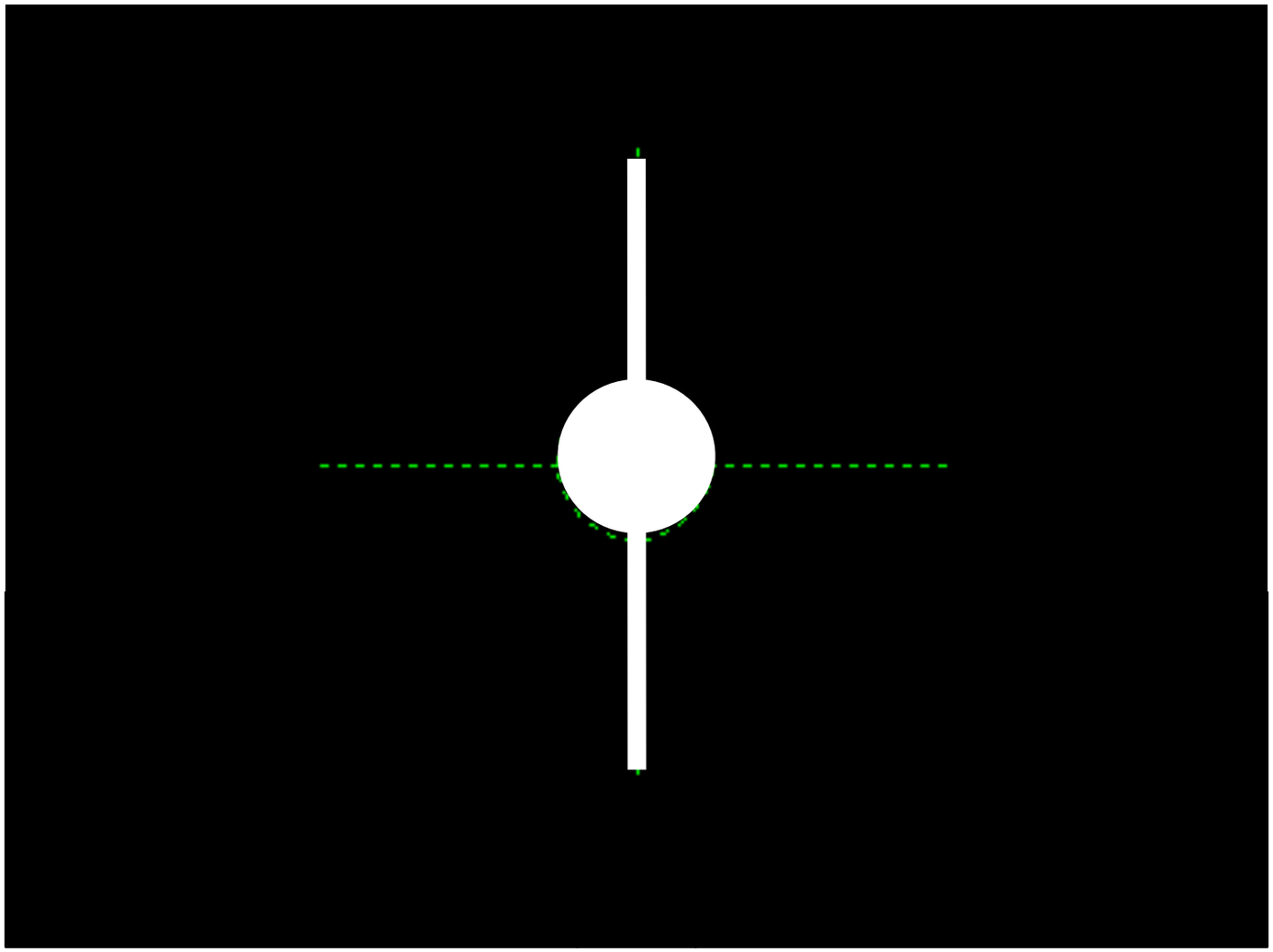

Ultrasound

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- Only used if
- Cataract Dense (A scan)
- Macular issue or further investigation needed (B-Scan)
- Some biometrists feel immersion biometry is the most accurate

Ultrasound Tips

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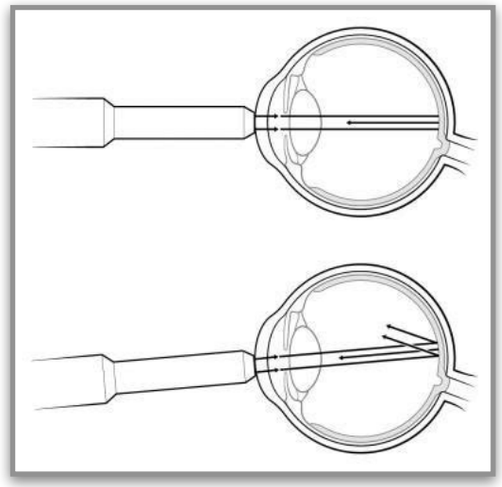

- Use anaesthetic
- Align probe perpendicular to cornea
- Don’t indent

Question Time

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Keratometry

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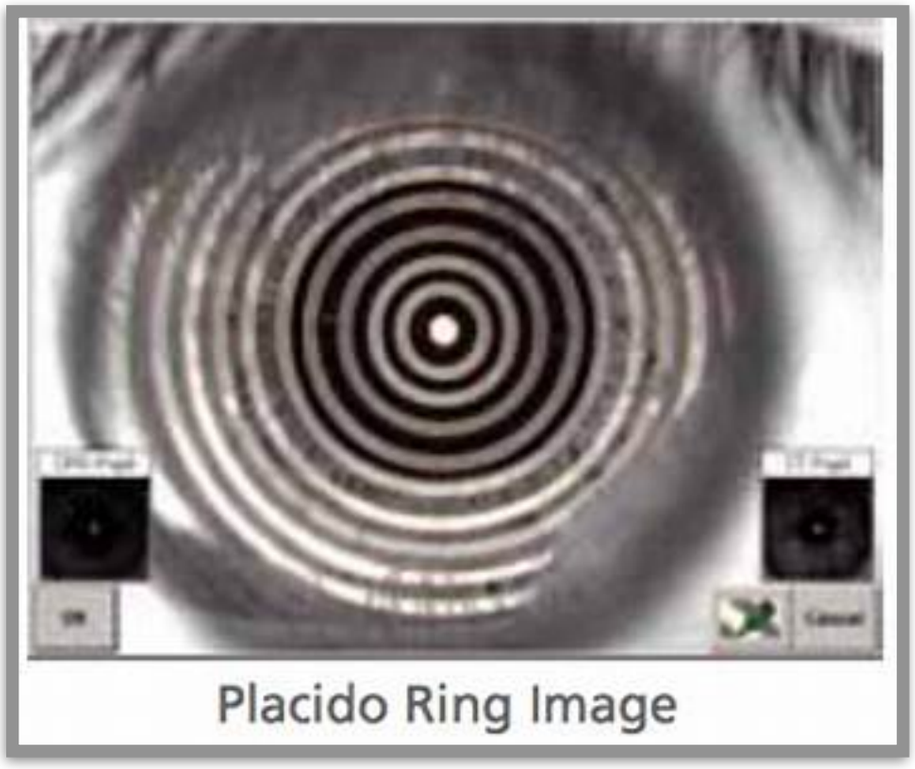
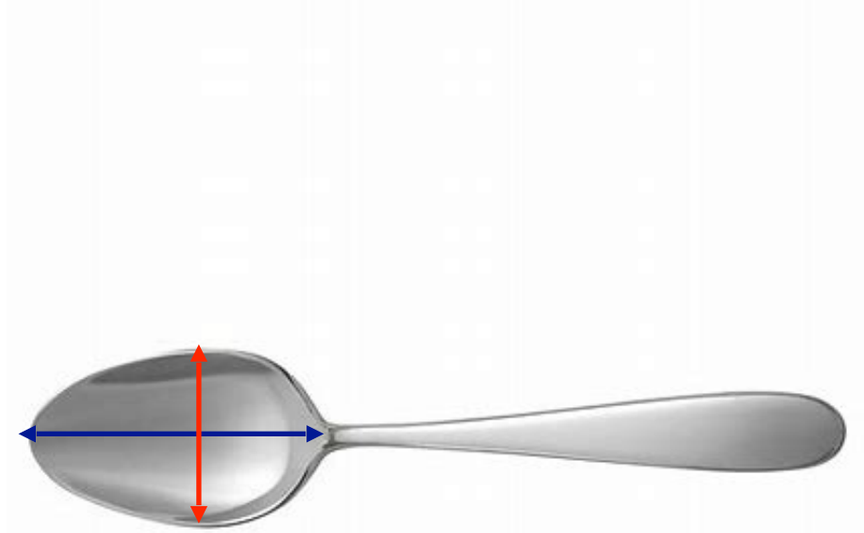
- Shape of cornea
- K1 & K2
- Irregular readings??



Placido Ring Image

K-Readings



- Imagine a Teaspoon
- One curve is flatter (K1)
- One curve is steeper (K2)
- The Handle is the flat axis
- Difference between K1 and K2 is corneal astigmatism

K-Readings

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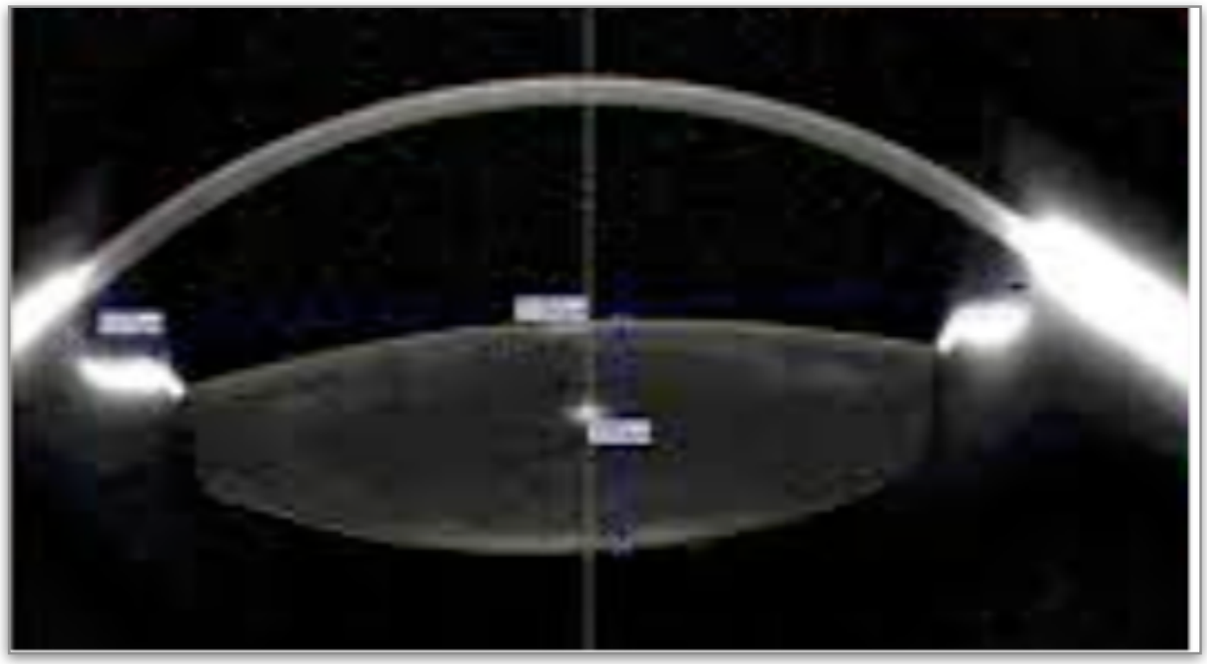
MV: 40.54/42.35 D	SD: 0.00 mm	
K1: 40.54 D x 179° K2: 42.35 D x 89° ΔK: -1.81 D x 179°	8.19 mm 7.84 mm	
K1: 40.54 D x 179° K2: 42.29 D x 89° ΔK: -1.75 D x 179°	8.19 mm 7.85 mm	
K1: 40.54 D x 178° K2: 42.35 D x 88° ΔK: -1.81 D x 178°	8.19 mm 7.84 mm	

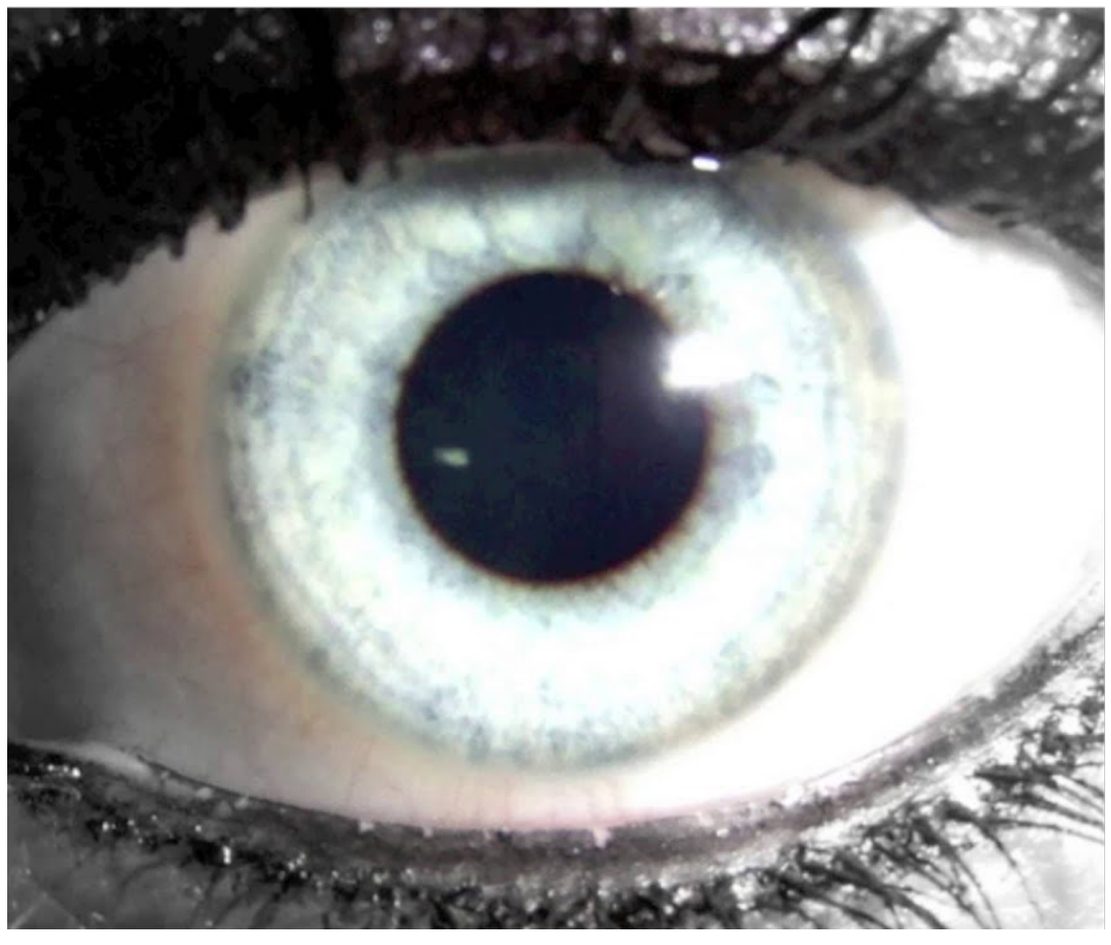
- K1 Flat
- K2 Steep
- Some corneas are irregular and K reading vary across the surface.

ACD

- Can be measured
- Anterior epithelium
- Or Posterior Endothelium



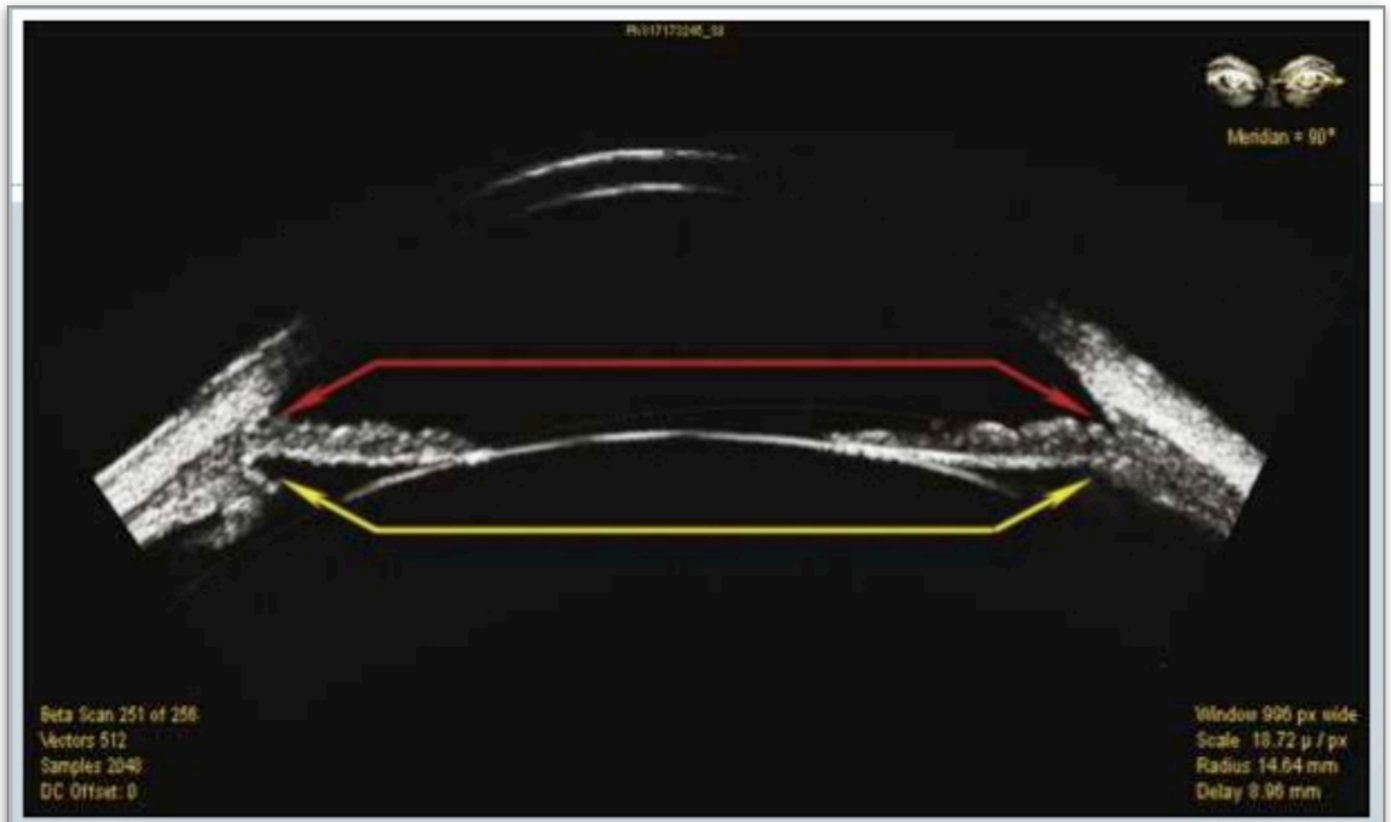
White to White



- Can measure with a ruler, calliper, biometer, topographer
- Check for error messages, normally need to be able to see at least 70% limbus for auto measurement
- Why are you measuring WtoW?
- What type of lens implanting? AC Lens, PIOL?
- Should you be measuring at sulcus or angle?

White to White

- White to White
- Angle to Angle
- Sulcus to Sulcus



Artemis high-frequency (50 MHz) 3D-digital ultrasound imaging of the anterior segment. Red arrows indicate angle-to-angle distance; yellow arrows indicate sulcus-to-sulcus distance.

Question Time

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Average Dimensions

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Measurement	Average	Normal Range
K Reading	43 Ds	40-47 Ds
Axial Length	23.5mm	22-26mm
Pupil Size	5.5mm	3-9mm
White to White	11.5mm	10-13mm
CCT	555µm	500-600µm
ACD	3.25mm	3.00-3.75mm

Average Dimensions

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Measurement	Average	Normal Range
IOP	15-16 mmhg	10-20 mmhg
Lens Thickness	4mm	Thickens with age
Retinal Thickness	300 microns	
Anterior Chamber Angle	Varies	$20\text{-}35^0$

Myope

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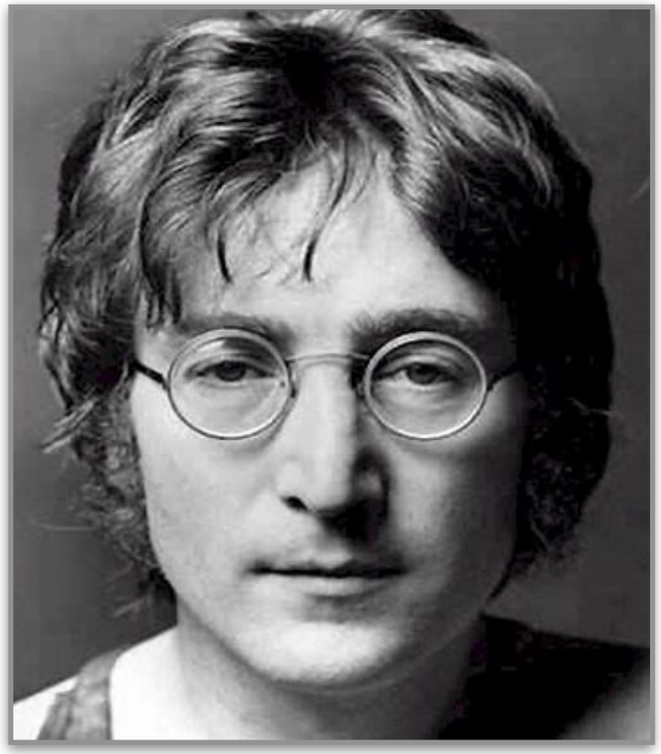

- What is the Axial Length ?
  - Over 23 Under 23
- K Reading?
  - Over 42 under 43
- ACD
  - Over 3.25 under 3.25
- White to White
  - Over 11.5 under 11.5

Hyperope

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- What is the Axial Length ?
  - Over 23 Under 23
- K Reading?
  - Over 42 under 43
- ACD
  - Over 3.25 under 3.25
- White to White
  - Over 11.5 under 11.5

What is the IOL Power

- Myopes
- Over or under 23

- Hyperopes
- Over or under 23

Biometry Printout

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Axial length values

OD right		OS left
Phakic		Phakic
Comp. AL: 22.99 mm (SNR = 340.9)		Comp. AL: 23.25 mm (SNR = 109.2)
AL / SNR / AL / SNR		AL / SNR / AL / SNR
22.99 mm 11.6		23.34 mm! 1.6
23.00 mm 14.9		23.24 mm 5.1
23.00 mm 15.6		23.30 mm 5.2
23.02 mm 7.9		23.24 mm 4.4
23.00 mm 11.1		23.26 mm 4.9

Keratometer values

OD right			OS left		
MV: 41.72/42.51 D	SD: 0.00 mm		MV: 41.01/42.29 D	SD: 0.00 mm	
K1: 41.77 D x 70°	8.08 mm		K1: 41.01 D x 94°	8.23 mm	○ ○
K2: 42.51 D x 160°	7.94 mm		K2: 42.24 D x 4°	7.99 mm	○ ○
ΔK: -0.74 D x 70°			ΔK: -1.23 D x 94°		○ ×
K1: 41.72 D x 67°	8.09 mm		K1: 40.96 D x 98°	8.24 mm	
K2: 42.51 D x 157°	7.94 mm		K2: 42.35 D x 8°	7.97 mm	
ΔK: -0.79 D x 67°			ΔK: -1.39 D x 98°		
K1: 41.72 D x 68°	8.09 mm		K1: 41.01 D x 100°	8.23 mm	
K2: 42.45 D x 158°	7.95 mm		K2: 42.24 D x 10°	7.99 mm	
ΔK: -0.73 D x 68°			ΔK: -1.23 D x 100°		

Anterior chamber depth values

ACD: 2.91 mm					ACD: 2.96 mm				
2.93 mm	2.90 mm	2.90 mm	2.90 mm	---	2.97 mm	2.97 mm	2.99 mm	2.97 mm	2.88 mm

White-to-white values

WTW : 12.1 mm Ix:+0.5mm Iy:+0.2mm	Pup: 5.5 mm Px:+0.4mm Py:+0.1mm	WTW : 12.3 mm Ix:-0.3mm Iy:+0.2mm	Pup: 5.7 mm Px:-0.2mm Py:+0.1mm

OD right		OS left
AL: 25.55 mm (SNR = 420.6)		AL: 25.64 mm (SNR = 78.0)
K1: 43.21 D / 7.81 mm @ 12°		K1: 42.94 D / 7.86 mm @ 163°
K2: 45.06 D / 7.49 mm @ 102°		K2: 45.18 D / 7.47 mm @ 73°
R / SE: 7.65 mm / 44.14 D		R / SE: 7.67 mm / 44.06 D
Cyl.: -1.85 D @ 12°		Cyl.: -2.24 D @ 163°
ACD: 2.71 mm		ACD: 2.71 mm
Status: Phakic		Status: Phakic

Physiol Slimflex/Yellowflex

OD right		OS left	
A const: 118.9		A const: 118.9	
IOL (D)	REF (D)	IOL (D)	REF (D)
15.5	-0.95	15.5	-1.07
15.0	-0.63	15.0	-0.74
14.5	-0.30	14.5	-0.42
14.0	**0.02**	**14.0**	**-0.10**
13.5	0.33	13.5	0.22
13.0	0.64	13.0	0.54
12.5	0.95	12.5	0.85
Emme. IOL: 14.02		Emme. IOL: 13.85	

Crystalens AO

OD right		OS left	
A const: 119.1		A const: 119.1	
IOL (D)	REF (D)	IOL (D)	REF (D)
15.5	-0.84	15.5	-0.96
15.0	-0.52	15.0	-0.63
14.5	-0.20	14.5	-0.31
14.0	**0.12**	**14.0**	**0.01**
13.5	0.43	13.5	0.32
13.0	0.74	13.0	0.63
12.5	1.04	12.5	0.94
Emme. IOL: 14.19		Emme. IOL: 14.01	

enVista

OD right		OS left	
A const: 119.1		A const: 119.1	
IOL (D)	REF (D)	IOL (D)	REF (D)
15.5	-0.84	15.5	-0.96
15.0	-0.52	15.0	-0.63
14.5	-0.20	14.5	-0.31
14.0	**0.12**	**14.0**	**0.01**
13.5	0.43	13.5	0.32
13.0	0.74	13.0	0.63
12.5	1.04	12.5	0.94
Emme. IOL: 14.19		Emme. IOL: 14.01	

MLentis

OD right		OS left	
A const: 118.1		A const: 118.1	
IOL (D)	REF (D)	IOL (D)	REF (D)
15.0	-1.08	14.5	-0.85
14.5	-0.74	14.0	-0.51
14.0	-0.40	13.5	-0.18
13.5	**-0.07**	**13.0**	**0.16**
13.0	0.26	12.5	0.48
12.5	0.59	12.0	0.81
12.0	0.91	11.5	1.13
Emme. IOL: 13.40		Emme. IOL: 13.23	

(* = value has been edited, ! = borderline value)

Lenstar Printout

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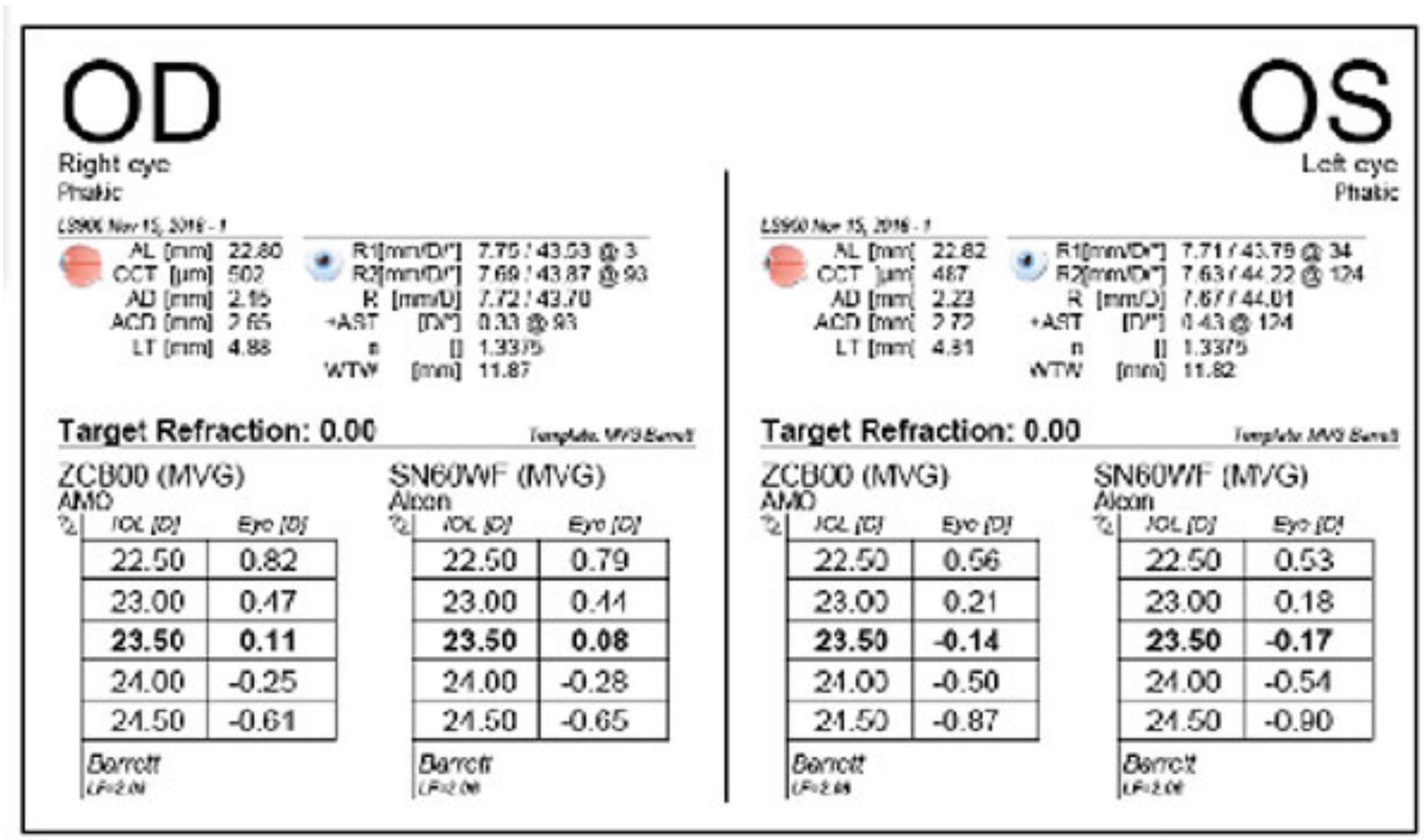

OD

Right eye
Phakic

LS900 Nov 15, 2016 - 1

AL	[mm]	22.80	R1	[mm/D*]	7.75 / 43.53 @ 3
CCT	[µm]	502	R2	[mm/D*]	7.69 / 43.87 @ 93
AD	[mm]	2.15	R	[mm/D]	7.72 / 43.70
ACD	[mm]	2.65	+AST	[D*]	0.33 @ 93
LT	[mm]	4.88	n	[]	1.3375
			WTW	[mm]	11.87

Target Refraction: 0.00 Template: MVG Barrett

ZCB00 (MVG)
AMO

IOL [D]	Eye [D]
22.50	0.82
23.00	0.47
23.50	**0.11**
24.00	-0.25
24.50	-0.61

Barrett
LF=2.00

SN60WF (MVG)
Alcon

IOL [D]	Eye [D]
22.50	0.79
23.00	0.44
23.50	**0.08**
24.00	-0.28
24.50	-0.65

Barrett
LF=2.00

OS

Left eye
Phakic

LS900 Nov 15, 2016 - 1

AL	[mm]	22.82	R1	[mm/D*]	7.71 / 43.79 @ 34
CCT	[µm]	487	R2	[mm/D*]	7.63 / 44.22 @ 124
AD	[mm]	2.23	R	[mm/D]	7.67 / 44.01
ACD	[mm]	2.72	+AST	[D*]	0.43 @ 124
LT	[mm]	4.81	n	[]	1.3375
			WTW	[mm]	11.82

Target Refraction: 0.00 Template: MVG Barrett

ZCB00 (MVG)
AMO

IOL [D]	Eye [D]
22.50	0.56
23.00	0.21
23.50	**-0.14**
24.00	-0.50
24.50	-0.87

Barrett
LF=2.00

SN60WF (MVG)
Alcon

IOL [D]	Eye [D]
22.50	0.53
23.00	0.18
23.50	**-0.17**
24.00	-0.54
24.50	-0.90

Barrett
LF=2.00

Question Time

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Review the Printout

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- We will go through the IOL Master Printout so you can understand where the figures come from.
- Please do this with biometry reports you find at work
- I'll happily go through them with you.
- Remember to hide the patient's details

Measurement

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Axial length values

OD right		OS left
Phakic		Phakic
Comp. AL: 24.63 mm (SNR = 119.0)		Comp. AL: 23.50 mm (SNR = 122.2)
AL / SNR	AL / SNR	AL / SNR
24.65 mm 6.5		23.52 mm 5.7
24.63 mm 3.3		23.50 mm 11.2
24.62 mm 5.7		23.53 mm 7.6
24.65 mm 5.3		23.50 mm 10.1
24.64 mm 10.8		23.50 mm 14.0
24.65 mm 8.1		23.52 mm 7.4
24.62 mm 6.7		23.52 mm 6.6
24.64 mm 7.0		23.50 mm 10.1

Keratometer values

MV: 41.51 D	SD: 0.00 mm		MV: 41.62/41.98 D	SD: 0.01 mm	
K: 41.51 D	8.13 mm		K1: 41.62 D x 39° K2: 42.03 D x 129° ΔK: -0.41 D x 39°	8.11 mm 8.03 mm	
K: 41.51 D	8.13 mm		K1: 41.56 D x 33° K2: 41.98 D x 123° ΔK: -0.42 D x 33°	8.12 mm 8.04 mm	
K: 41.51 D	8.13 mm		K1: 41.67 D x 41° K2: 41.98 D x 131° ΔK: -0.31 D x 41°	8.10 mm 8.04 mm	

Anterior chamber depth values

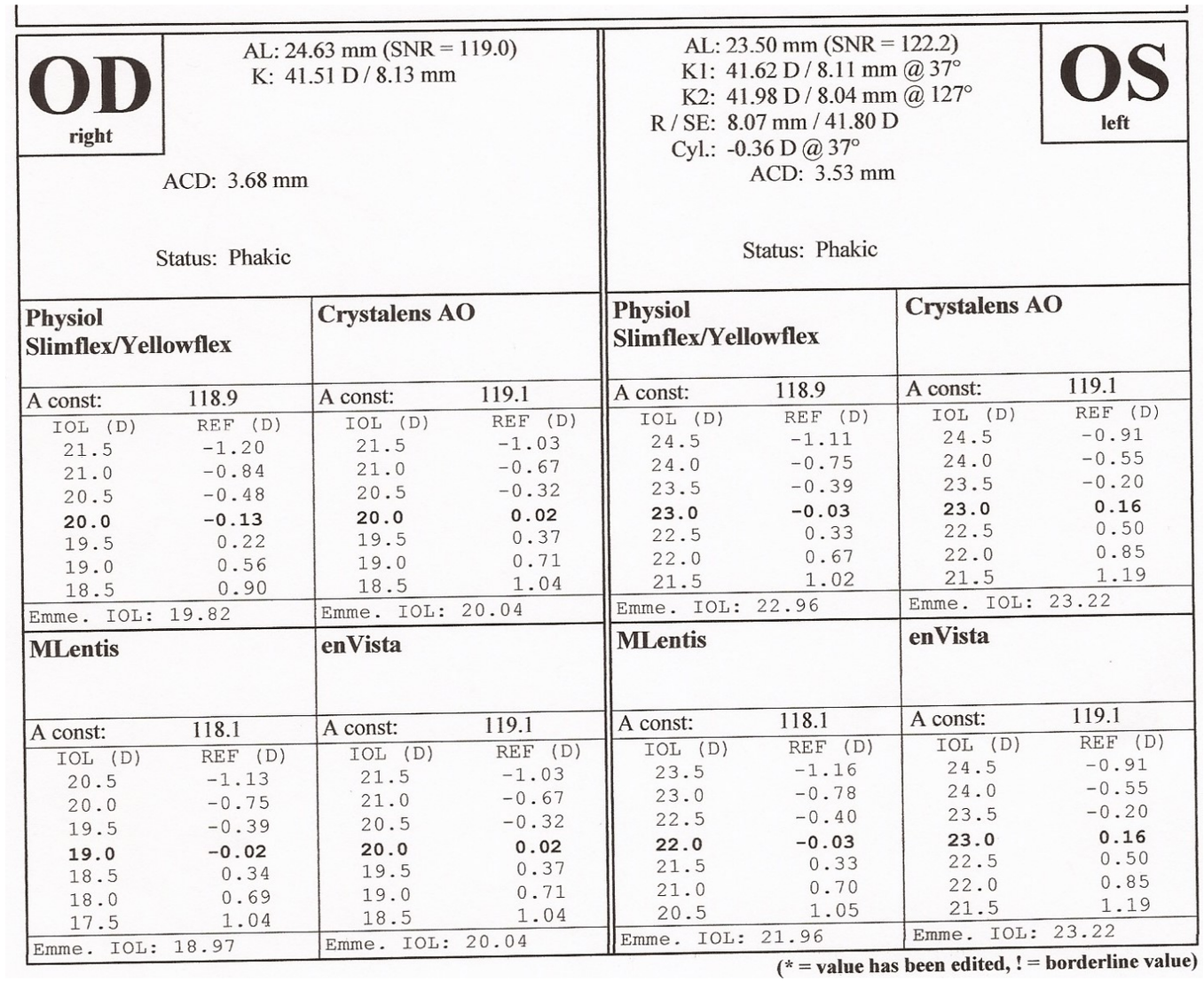
ACD: 3.68 mm					ACD: 3.53 mm				
3.68 mm	3.68 mm	3.68 mm	3.68 mm	3.68 mm	3.53 mm	3.51 mm	3.51 mm	3.53 mm	3.55 mm

White-to-white values

WTW : 12.9 mm Ix:+0.3mm Iy:+0.3mm	Pup: 4.3 mm Px:+0.3mm Py:+0.3mm	WTW : 12.9 mm Ix:-0.5mm Iy:+0.1mm	Pup: 3.5 mm Px:-0.3mm Py:+0.2mm

(* = value has been edited, ! = borderline value)

Calculation



OD right

AL: 24.63 mm (SNR = 119.0)
K: 41.51 D / 8.13 mm
ACD: 3.68 mm
Status: Phakic

OS left

AL: 23.50 mm (SNR = 122.2)
K1: 41.62 D / 8.11 mm @ 37°
K2: 41.98 D / 8.04 mm @ 127°
R / SE: 8.07 mm / 41.80 D
Cyl.: -0.36 D @ 37°
ACD: 3.53 mm
Status: Phakic

Physiol Slimflex/Yellowflex

A const:	118.9
IOL (D)	REF (D)
21.5	-1.20
21.0	-0.84
20.5	-0.48
20.0	**-0.13**
19.5	0.22
19.0	0.56
18.5	0.90

Emme. IOL: 19.82

Crystalens AO

A const:	119.1
IOL (D)	REF (D)
21.5	-1.03
21.0	-0.67
20.5	-0.32
20.0	**0.02**
19.5	0.37
19.0	0.71
18.5	1.04

Emme. IOL: 20.04

MLentis

A const:	118.1
IOL (D)	REF (D)
20.5	-1.13
20.0	-0.75
19.5	-0.39
19.0	**-0.02**
18.5	0.34
18.0	0.69
17.5	1.04

Emme. IOL: 18.97

enVista

A const:	119.1
IOL (D)	REF (D)
21.5	-1.03
21.0	-0.67
20.5	-0.32
20.0	**0.02**
19.5	0.37
19.0	0.71
18.5	1.04

Emme. IOL: 20.04

Physiol Slimflex/Yellowflex

A const:	118.9
IOL (D)	REF (D)
24.5	-1.11
24.0	-0.75
23.5	-0.39
23.0	**-0.03**
22.5	0.33
22.0	0.67
21.5	1.02

Emme. IOL: 22.96

Crystalens AO

A const:	119.1
IOL (D)	REF (D)
24.5	-0.91
24.0	-0.55
23.5	-0.20
23.0	**0.16**
22.5	0.50
22.0	0.85
21.5	1.19

Emme. IOL: 23.22

MLentis

A const:	118.1
IOL (D)	REF (D)
23.5	-1.16
23.0	-0.78
22.5	-0.40
22.0	**-0.03**
21.5	0.33
21.0	0.70
20.5	1.05

Emme. IOL: 21.96

enVista

A const:	119.1
IOL (D)	REF (D)
24.5	-0.91
24.0	-0.55
23.5	-0.20
23.0	**0.16**
22.5	0.50
22.0	0.85
21.5	1.19

Emme. IOL: 23.22

(* = value has been edited, ! = borderline value)

Today we have learnt

Med Sales Academy

- How to measure Biometry
- What measurements are needed
- How we see
- How to read the measurements and apply to patients
- Understanding the Biometry Report

Thank you

- For more information see www.nice.org.uk/guidance/ng77
- We hope this session was useful
- Please send us your questions
- emma@medsalesacademy.co.uk
- See you on the next module
  - **Diagnostic Devices**