

Agreement of IOL power calculation in SS-OCT based biometers

Biometer A

IOLMaster 700, software v. 1.88, Carl Zeiss AG

Biometer B

Anterior, software v. 1.1, Heidelberg Engineering GmbH

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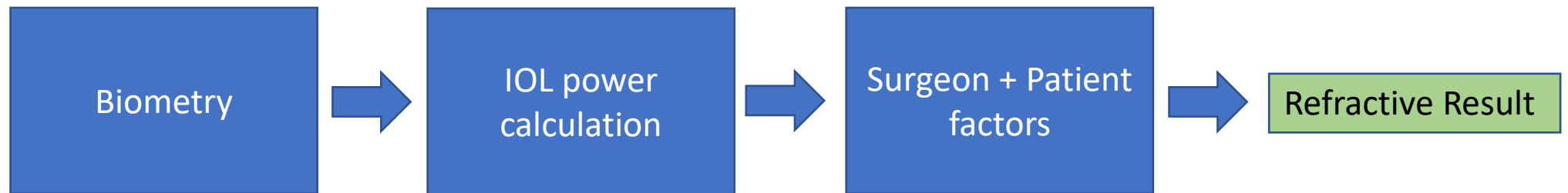
[J Cataract Refract Surg. 2022 May 1;48\(5\):535-541.](#)

Disclosures

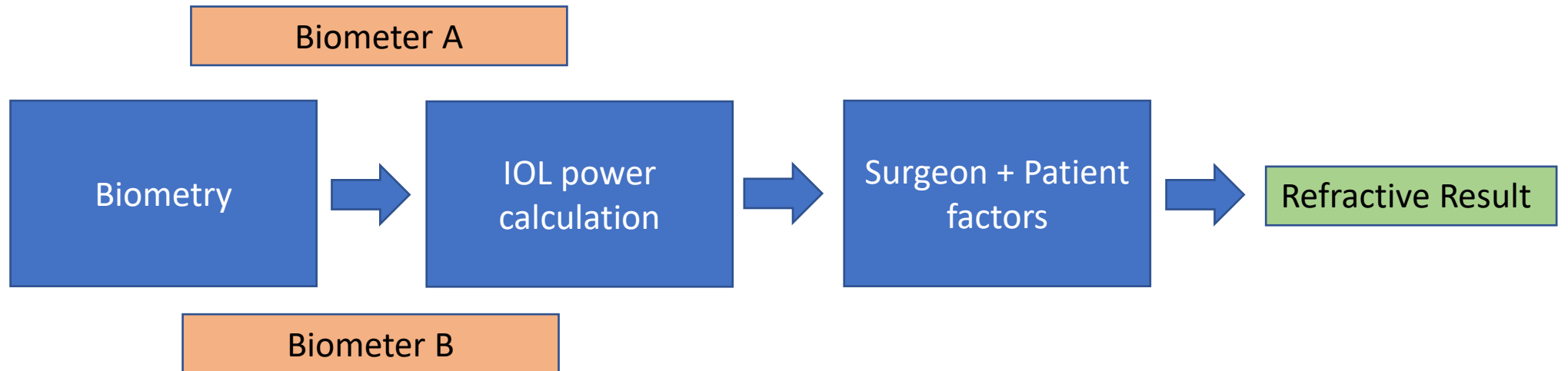
- O. Pfaeffli has no financial interests
- G. Savini is a consultant to Costruzione Strumenti Oftalmici and has received speaker honoraria from Alcon Laboratories, Inc., Johnson & Johnson Vision, Oculus Surgical, Inc., and Carl Zeiss Meditec AG.
- K.J. Hoffer receives royalties for the commercial use of the trademark Hoffer for the correct programming of his formulas in all optical and ultrasound biometers to assure that they are programmed correctly for patient safety.
- No conflicting relationship exists for any other author.

What to compare?

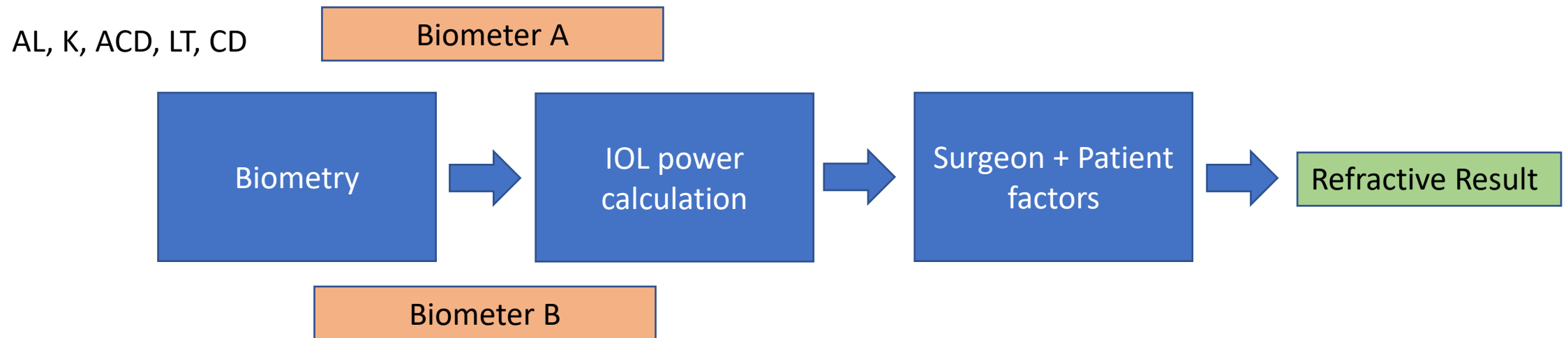
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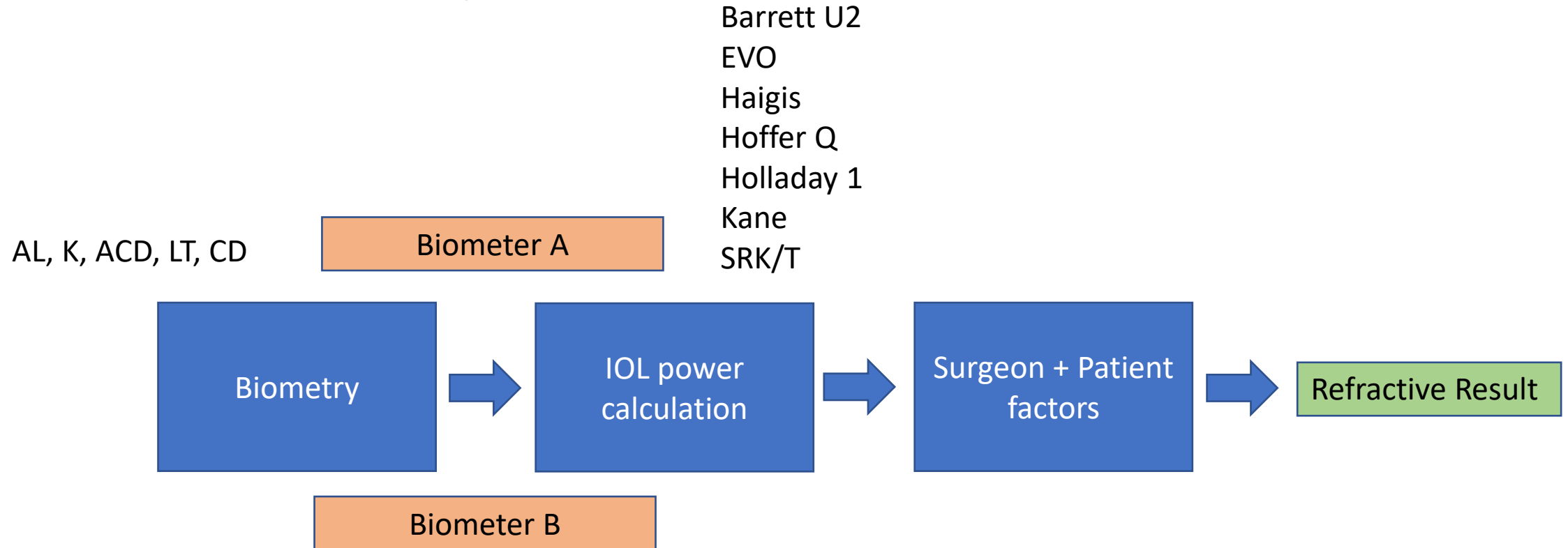
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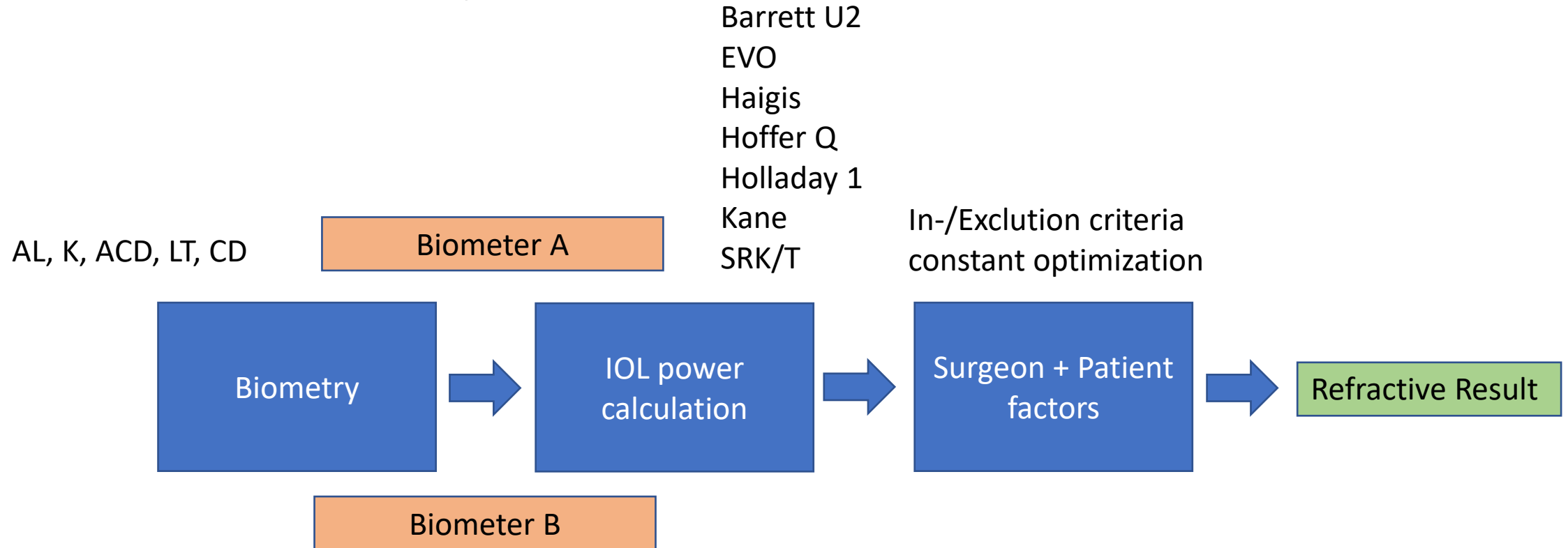
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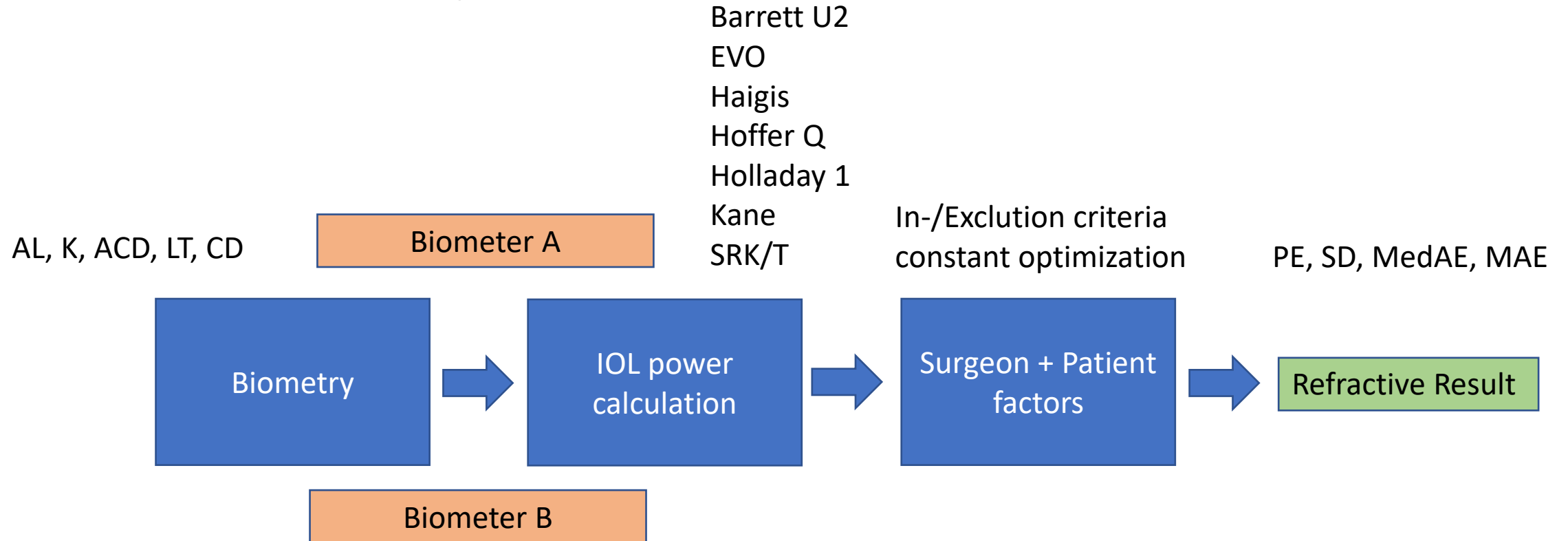
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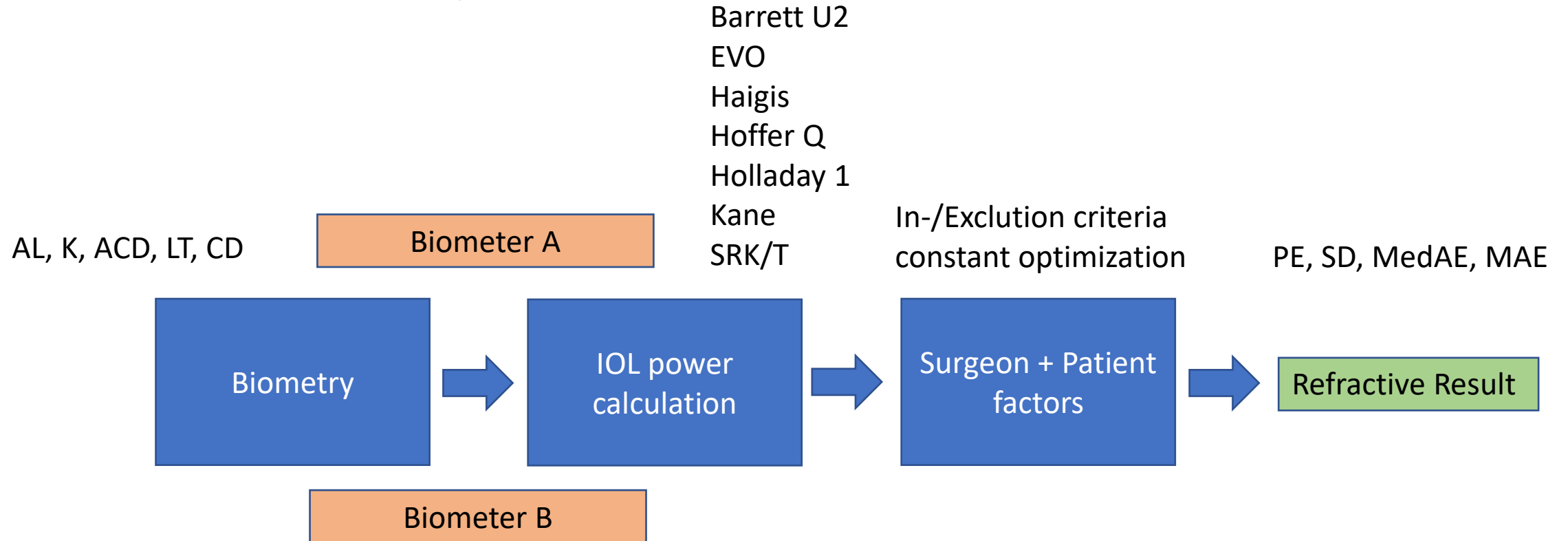
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Study population: 78eyes of 78patients. Mean preop CDVA 0.62. Mean postop CDVA 0.99. AL 22-26mm.

How to compare?

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1) Exploration analysis

2) Similarity evaluation

3) Agreement evaluation

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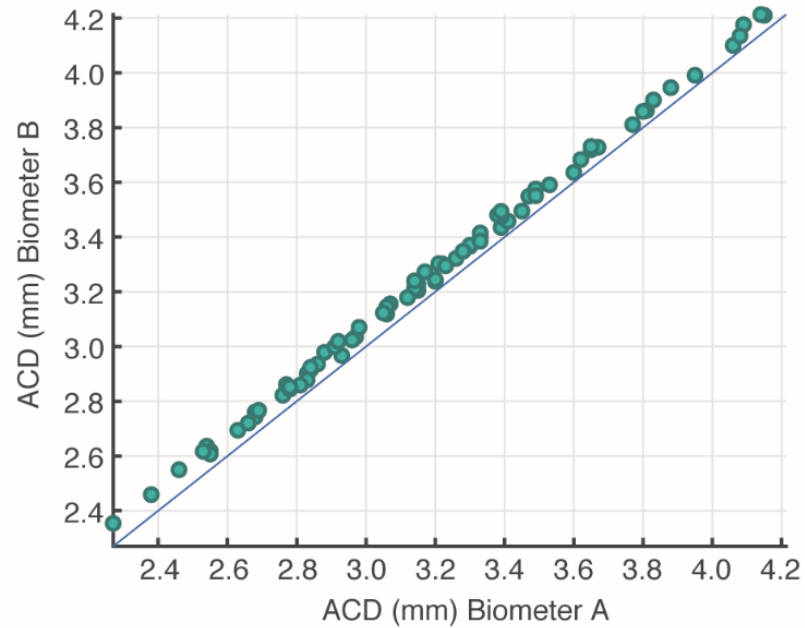
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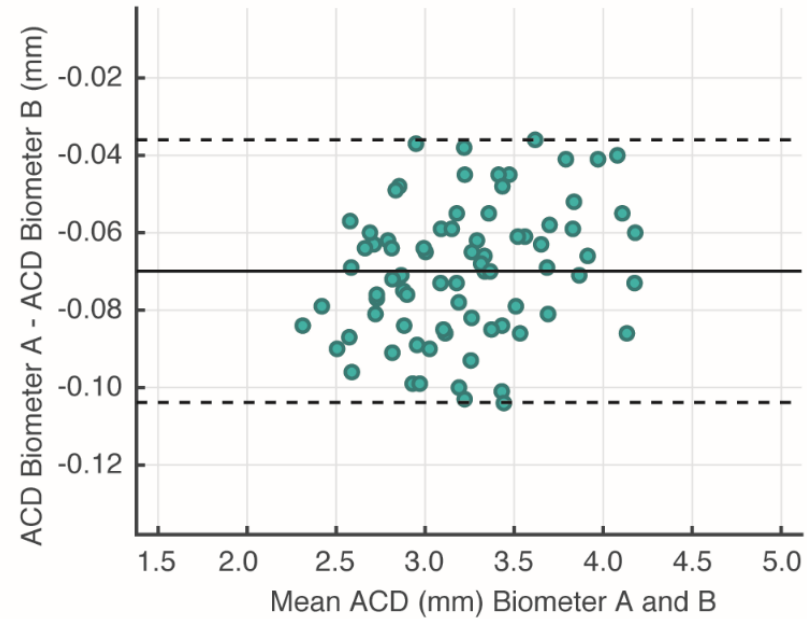
2) Similarity evaluation

3) Agreement evaluation

Scatter plot



Bland-Altman plot



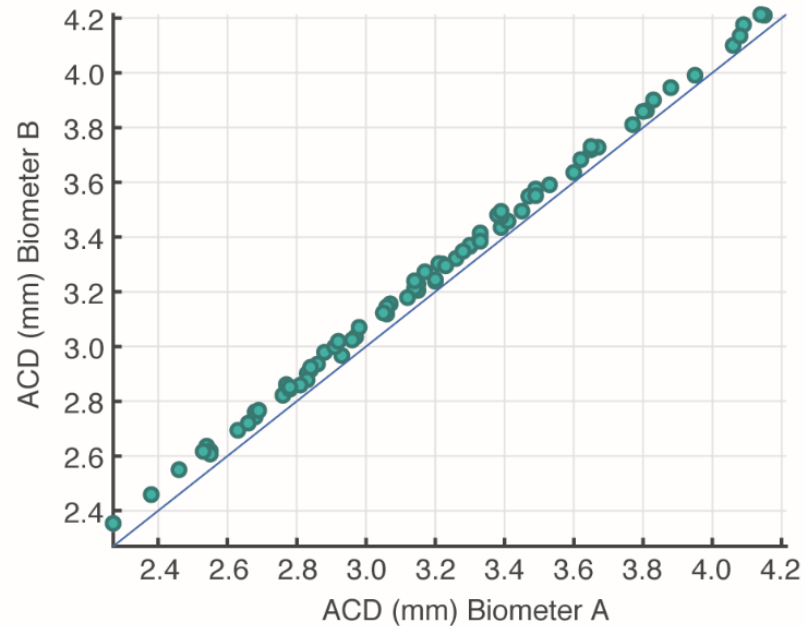
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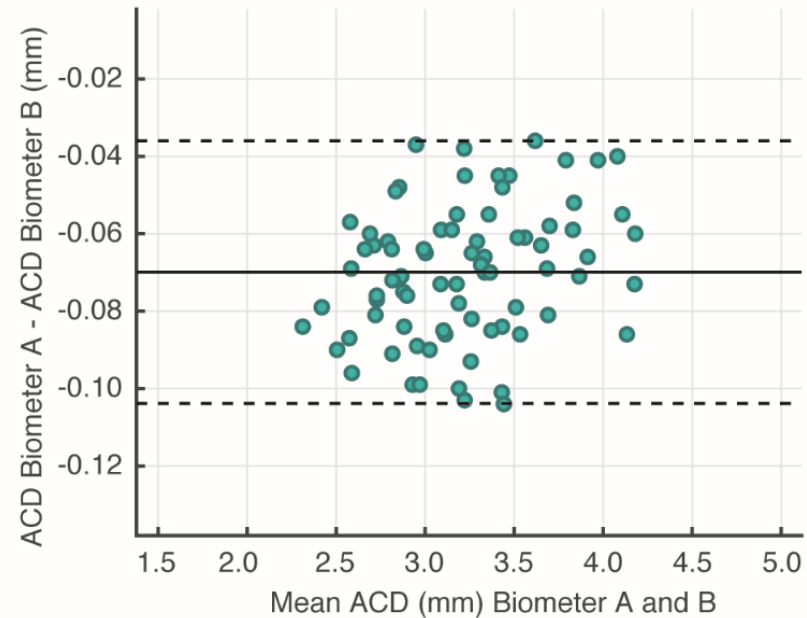
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Bland-Altman plot



Equal scales. High correlation. Constant offset.

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Biometry Values for Biometers A and B.				
Parameter	Biometer A	Biometer B	Mean difference	P value
	Mean \pm SD	Mean \pm SD		
K flat (D)	43.31 \pm 1.45	43.38 \pm 1.46	0.07	.01
K steep (D)	44.12 \pm 1.58	44.15 \pm 1.58	0.03	.26
AL (mm)	23.68 \pm 1.12	23.67 \pm 1.12	-0.01	<.001
ACD (mm)	3.18 \pm 0.45	3.25 \pm 0.45	0.07	<.001
CD (mm)	12.07 \pm 0.40	11.86 \pm 0.44	-0.22	<.001
LT (mm)	4.61 \pm 0.43	4.68 \pm 0.43	0.07	<.001

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Parameter	Rho	LoA lower	LoA higher	CCC
K flat (D)	0.987	-0.53	0.39	0.986
K steep (D)	0.989	-0.48	0.42	0.989
Axial length (mm)	1.000	-0.02	0.04	1.000
ACD (mm)	0.999	-0.10	-0.04	0.987
LT (mm)	0.993	-0.17	0.03	0.979
CD (mm)	0.923	-0.10	0.55	0.803

How to compare?

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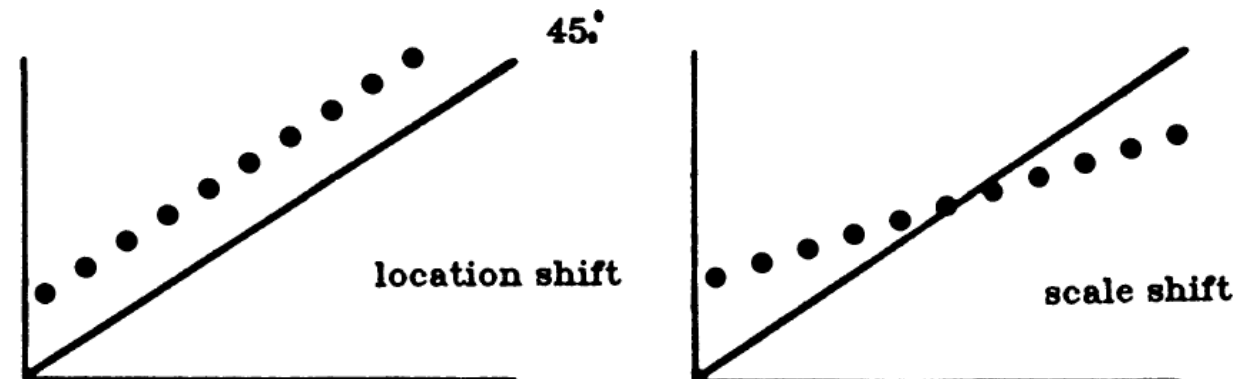
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Lin's Concordance correlation coefficient (CCC)

$$CCC = \text{Rho} * C_{\text{bias}}$$



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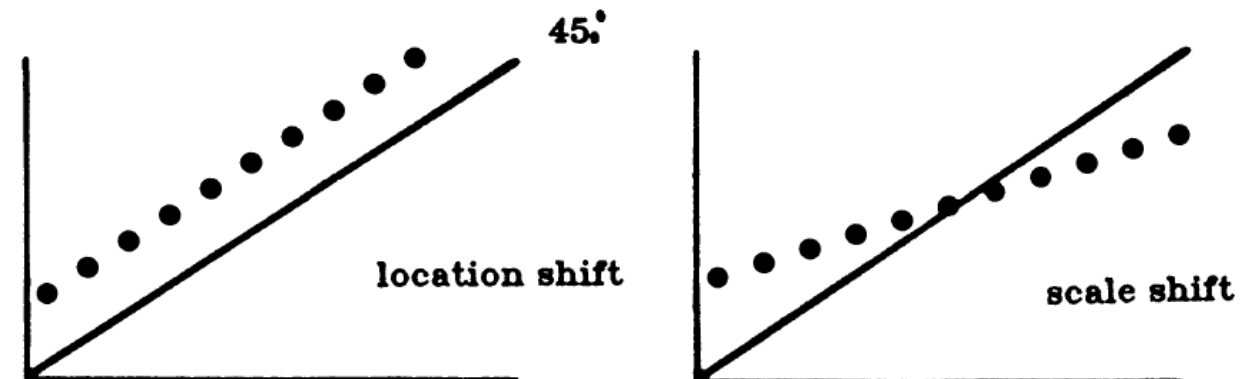
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Refractive results

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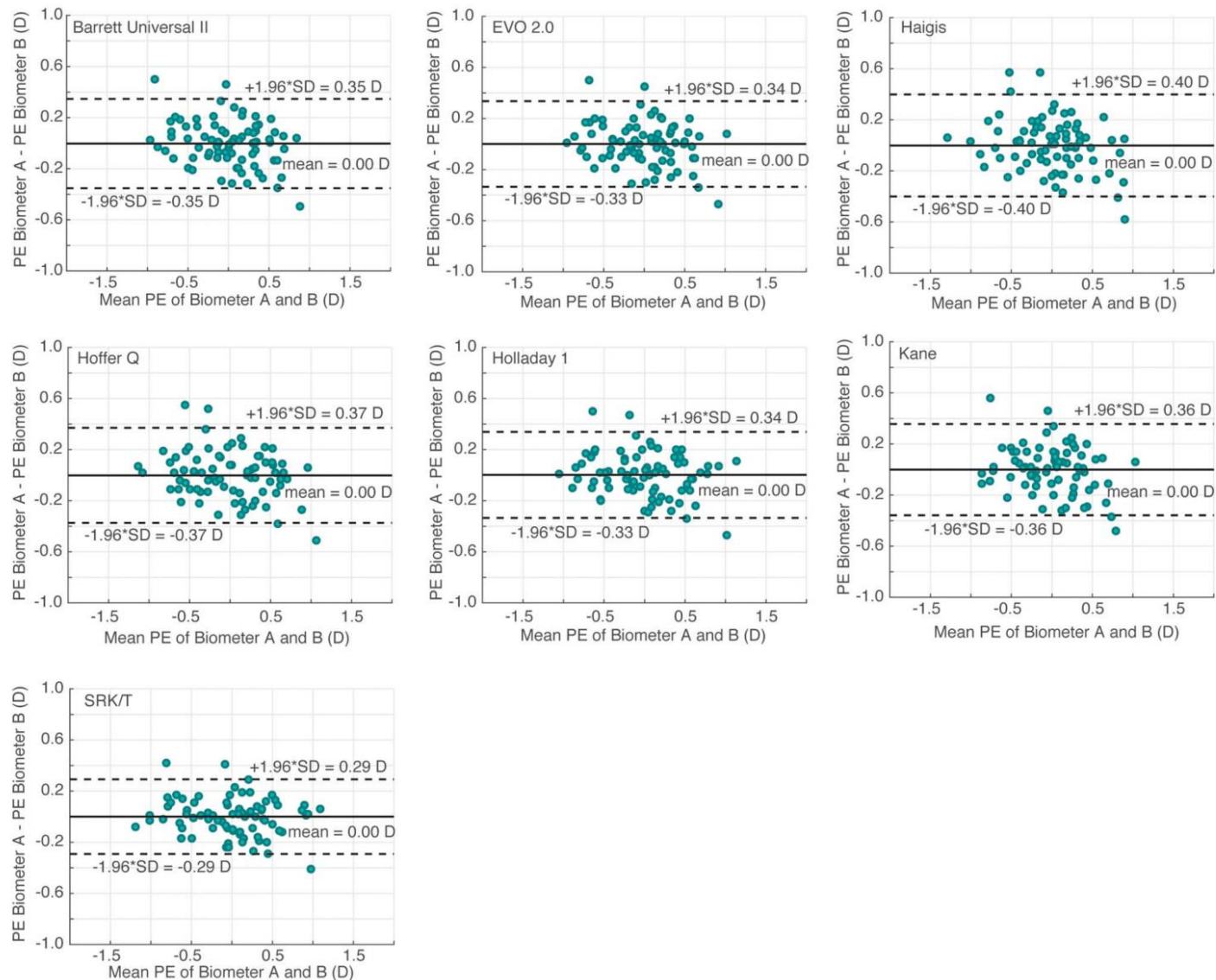
Table 2. Refractive PE of Established IOL Power Calculation Formulas Implemented With Biometers A and B and Arranged Alphabetically.

Formula	Optimized constant		Mean PE \pm SD		MAE		MedAE		IQR		PE within ± 0.5 D (%)	
	BM A	BM B	BM A	BM B	BM A	BM B	BM A	BM B	BM A	BM B	BM A	BM B
Barrett	119.43	119.44	0.004 \pm 0.421	0.007 \pm 0.469	0.34	0.38	0.30	0.31	0.58	0.61	73.1	71.8
EVO 2.0	119.31	119.31	-0.002 \pm 0.428	-0.003 \pm 0.465	0.35	0.37	0.31	0.28	0.63	0.57	75.6	71.8
Haigis	-1.278	-1.772	-0.008 \pm 0.443	-0.006 \pm 0.498	0.34	0.39	0.28	0.29	0.52	0.59	76.9	73.1
	0.278	0.253										
	0.240	0.265										
Hoffer Q	5.80	5.82	0.002 \pm 0.475	0.001 \pm 0.520	0.39	0.43	0.35	0.39	0.69	0.83	66.7	61.5
Holladay 1	2.04	2.05	-0.001 \pm 0.474	-0.002 \pm 0.508	0.38	0.41	0.29	0.37	0.59	0.75	66.7	65.4
Kane	119.26	119.20	-0.003 \pm 0.398	-0.003 \pm 0.443	0.33	0.35	0.28	0.31	0.57	0.60	79.5	74.4
SRK/T	119.35	119.37	0.000 \pm 0.507	0.000 \pm 0.528	0.41	0.42	0.34	0.40	0.68	0.79	64.1	64.1

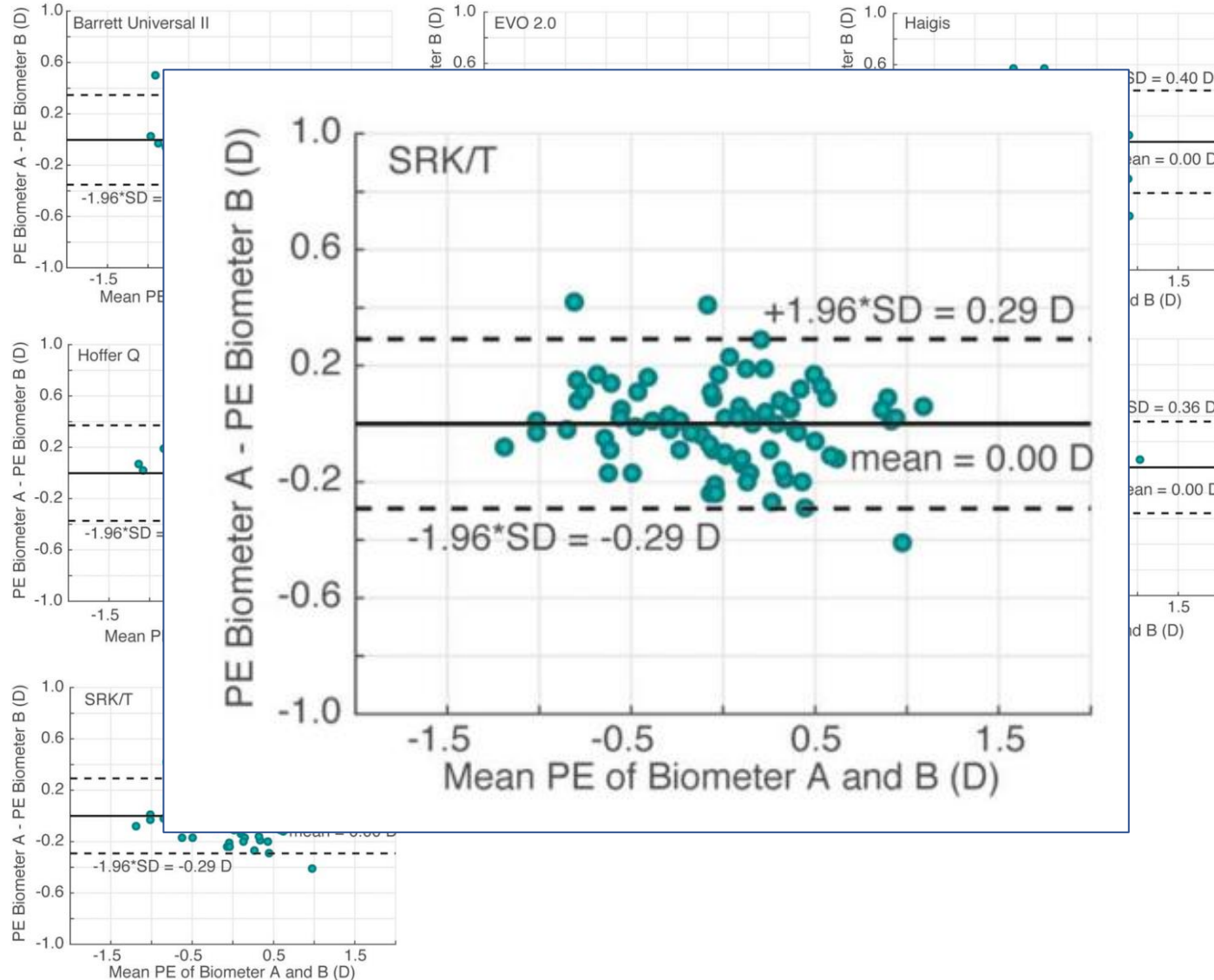
Barrett = Barrett Universal II formula; BM = biometer; EVO = Emmetropia Verifying Optical formula; MAE = mean absolute prediction error; MedAE = median absolute prediction error; IQR = interquartile range; PE = prediction error

All values are expressed in diopters

Bland-Altman of prediction error (PE)



Bland-Altman of prediction error (PE)



Take home

- Additive offset in ACD, LT and CD
- Agreement clinically acceptable in regard to MedAE
- Limitation: Eyes with normal AL

Thank you for the attention



17th IPC Meeting Stresa, Italy