Eesti Optometristide Selts

Nicola Rizzieri
OPTOMETRISTA - CONTATTOLOGO
MYOPIA SPECIALIST

Myopia Management in a real-world practice

Training for Estonian Association of Optometrists

Dr. **NICOLA RIZZIERI**, BSc, MSc Clinical Optometry, IACMM Myopia Specialist, MEUROK, MEAOO

PhD candidate in Medical Physics – Optometry and Vision Science

Latvijas Universitāte

09 October 2026

Conflict of Interest

NICOLA RIZZIERI, has no conflict of interest

References

INTERNATIONAL MYOPIA INSTITUTE

THE COLLEGE OF OPTOMETRISTS

AMERICAN OPTOMETRIC ASSOCIATION

Brien Holden VISION INSTITUTE

Optometry AUSTRALIA

WORLD COUNCIL OF OPTOMETRY

MANAGING MYOPIA
ONE CHILD AT A TIME
Langis Michaud OD M.Sc.
Remy Marcotte-Collard OD M.Sc.
Patrick Simard OD M.Sc.
Mhamed Ouzzani Ph.D.

WSPOS
World Society of Pediatric Ophthalmology and Strabismus

MyopiaProfile™

My Central Message



Created with A.I.

"There is no universally best myopia treatment"

"There is a best clinical decision for a particular patient at a particular point in time"

Know the patient, not the treatment

- Age
- Lifestyle
- Risk Factors









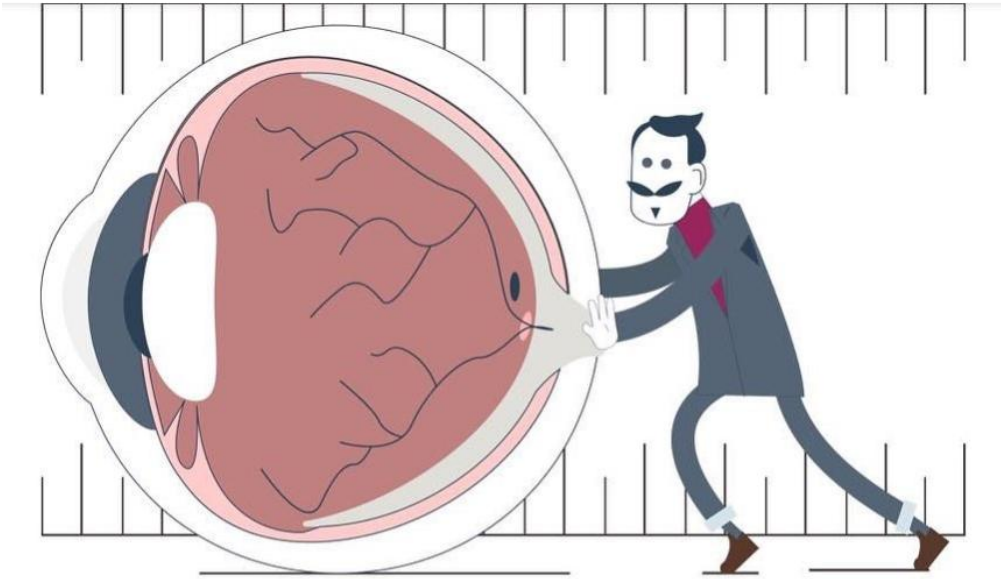
Act earlier, every 1 D matters

- 1 D less myopic, -40% risk of myopic maculopathy
- 1 D less myopic, -20% risk of glaucoma and cataract

→ **LESS DEPENDENCY FROM SPECS OR CONTACTS**

→ **MORE ACTIVE LIFE FOR CHILDREN**

Courtesy of Dr Brian Tompkins



"I don't treat the refraction. I treat the trajectory"

Axial Length matters, not only Rx

- Hyperopic reserve (the Pre-Myopia)
- Corneal Curvature (and Lens)
- Axial Length: - actual measure and percentile
  - growth rate (mm per year)

Hyperopic reserve and Pre-Myopia

- Definition:

"a refractive state of the eye in children (between ≤ +0.75 D and > -0.50 D) where a combination of age, baseline vision measurement, and risk factors indicates a high likelihood of developing myopia in the future"

Age	6	7-8	9-10	11
REFRACTIVE ERROR (SER)	< +0.75 D	≤ +0.50 D	≤ +0.25 D	≤ +0.00 D

Hyperopic reserve and Pre-Myopia

Article | Open access | Published: 16 September 2020

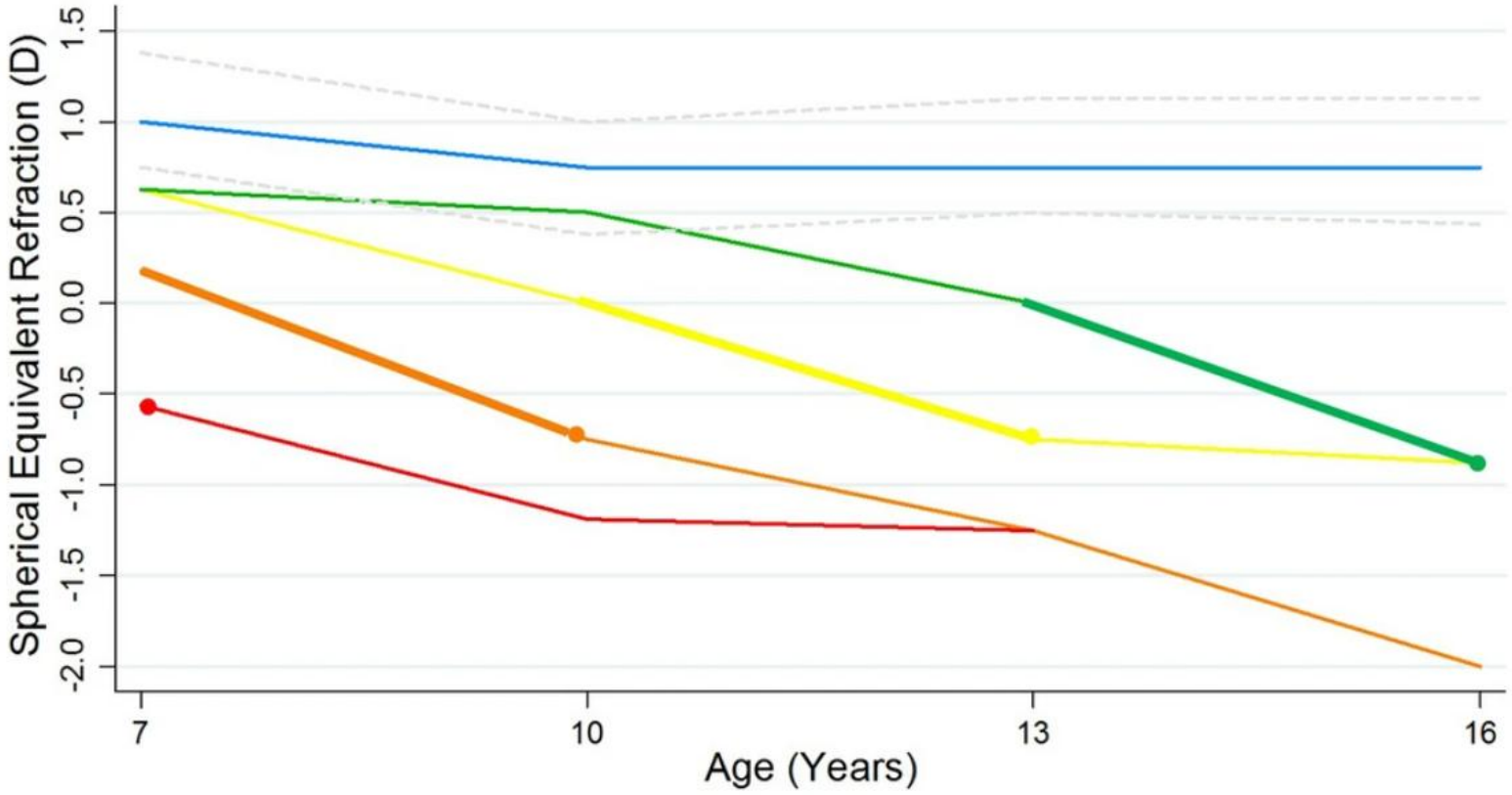
Axial growth and refractive change in white European children and young adults: predictive factors for myopia

Sara McCullough, Gary Adamson, Karen M. M. Breslin, Julie F. McClelland, Lesley Doyle & Kathryn J. Saunders

Scientific Reports **10**, Article number: 15189 (2020) | Cite this article

AGE	PRE-MYOPIA
6 anni	SER < +0.75 D
7-8 anni	SER ≤ +0.50 D
9-10 anni	SER ≤ +0.25 D
11 anni	emmetropia

SER threshold is < +0.63 D at 6-7 years old



Nicola Rizzieri
OPTOMETRISTA - CONTATTOLOGO
MYOPIA SPECIALIST

Cycloplegia vs Non-Cycloplegia



Created with A.I.

Best Practice

✓ Wet Retinoscopy

✓ Wet Autorefraction

Cyclopentolate 1% or Tropicamide 1%

"Cycloplegic refraction is recommended at least once a year, or as indicated by the eye specialist"

"Preferred in uncooperative children, or in the presence of latent hyperopia and anisometropia"



Special Issue

IMI – Defining and Classifying Myopia: A Proposed Set of Standards for Clinical and Epidemiologic Studies

Daniel Ian Flitcroft,[1] Mingguang He,[2] Jost B. Jonas,[3] Monica Jong,[4] Kovin Naidoo,[4] Kyoko Ohno-Matsui,[5] Jugnoo Rahi,[6] Serge Resnikoff,[4] Susan Vitale,[7] and Lawrence Yannuzzi[8]

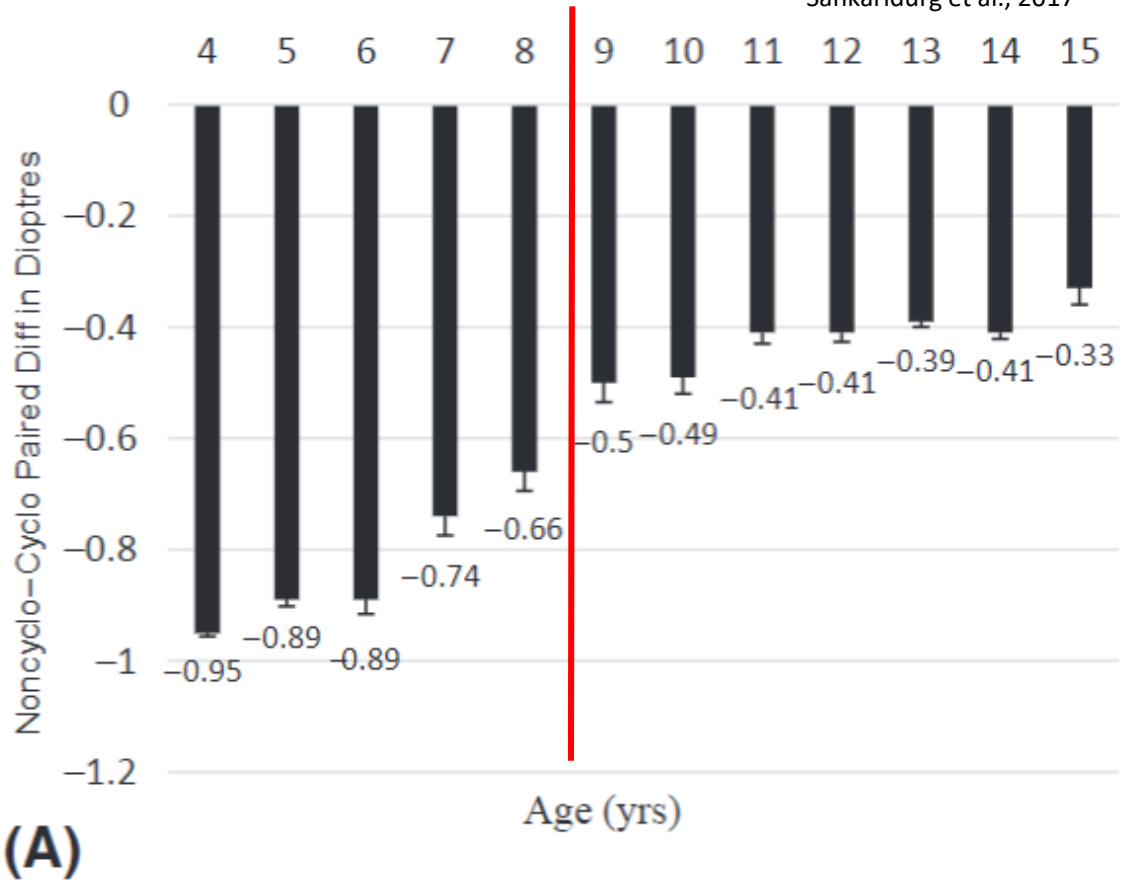
What to do?

1. When should we recommend cycloplegia?

2. How can we avoid prescribing too much negative power (over-minus)?

- The difference in diopters is greater when the subject is younger;
- Before age 9, the difference is greater than -0.75D.

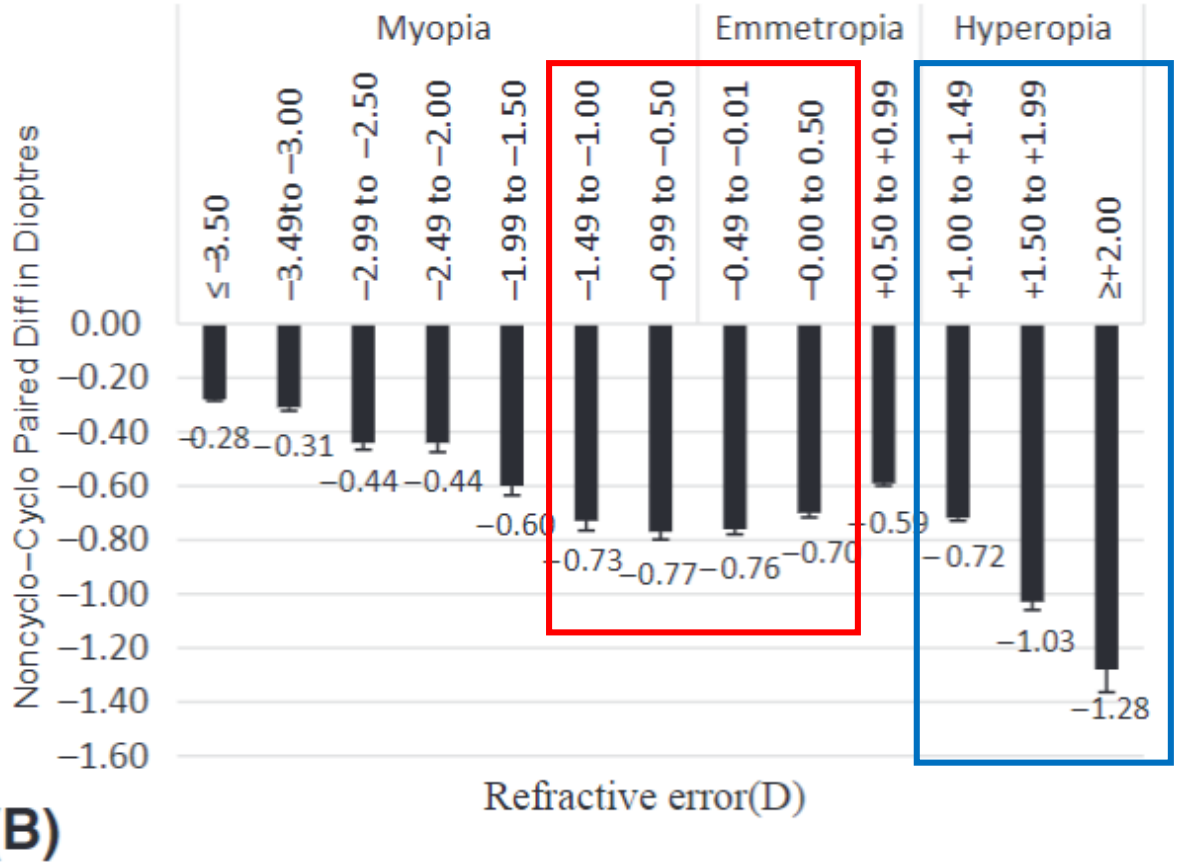
Sankaridurg et al., 2017



✓ Make sure younger children have had at least one cycloplegic refraction, or encourage them to do so as soon as possible.

- Emmetropia and low myopia are conditions that are easily overcorrected;
- For myopia from -1.50D, the error progressively decreases.

Sankaridurg et al., 2017



✓ Caution in case of latent hyperopia or low myopia, and in those subjects with doubtful visual acuity.

- Measure unaided visual acuity;
- Perform Static Retinoscopy with contralateral fogging (+2.00D);


Original Articles

Cycloplegic refraction and non-cycloplegic refraction using contralateral fogging: a comparative study

Nisha S. Yeotikar, Ravi Chandra Bakaraju, P.S. Roopa Reddy & Kalyani Prasad

- Do the “plus lens test” OU VA +1.50D and VA +3.00D;
- Perform Relative Negative Accommodation test (Borish delayed subj. ref.)
- Check VA BINOCULARLY

Eye biometry

Ophthalmic Physiol Opt. 2021 May;41(3):532-540. doi: 10.1111/opo.12817. Epub 2021 Apr 1.

Longitudinal analysis of axial length growth in a German cohort of healthy children and adolescents

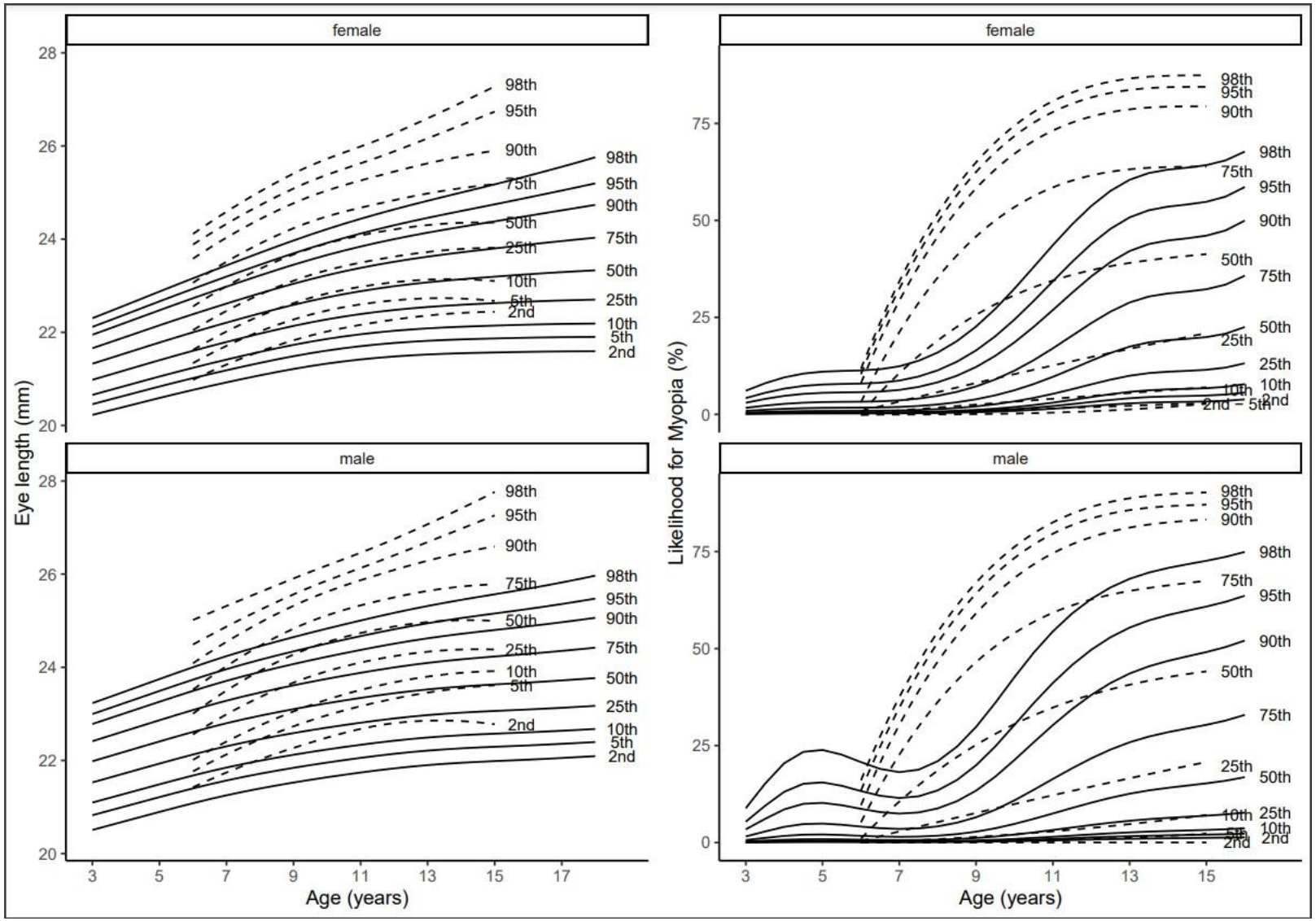
Carolin Truckenbrod [1], Christof Meigen [1], Manuela Brandt [1], Mandy Vogel [1], Pablo Sanz Diez [2 3], Siegfried Wahl [2 3], Anne Jurkutat [1], Wieland Kiess [1 4 5]

Affiliations + expand

PMID: 33792977 DOI: 10.1111/opo.12817

New Standard

- Myopia Prediction
- Monitoring Progression
- Treatment efficacy



Eye biometry

- Corneal Curvature (CC) and Axial Length

The power of the cornea may mask an increased axial length by flattening its curvature;

The power of the cornea may determine refractive myopia in a short, hyperopic eye by steepening its curvature;

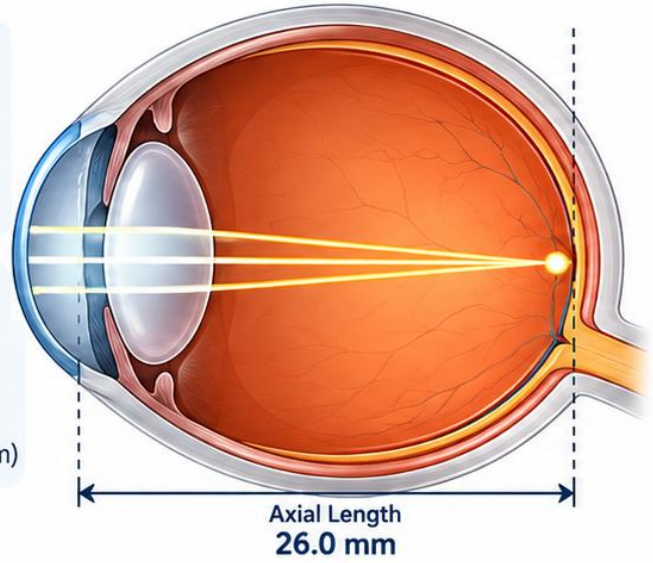
Eye biometry

LONG EYE WITH FLAT CORNEA

Axial elongation hidden by low corneal power

FLAT CORNEA
Lower corneal power
e.g. 40.0 D
(instead of ~43.0 D)

LONG AXIAL LENGTH
Axial myopia
e.g. 26.0 mm
(instead of ~23.5 mm)



RESULT

Axial component		Corneal component		Total ocular power
Myopic (long eye)	+	**Hyperopic** (flat cornea, low power)	=	**Emmetropic** (appears normal)

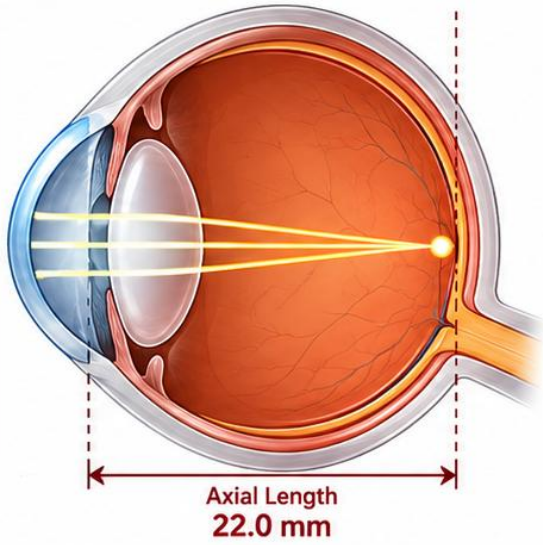
The long axial length is masked by the flat cornea.

SHORT EYE WITH STEEP CORNEA

Axial shortness masked by high corneal power

STEEP CORNEA
Higher corneal power
e.g. 46.0 D
(instead of ~43.0 D)

SHORT AXIAL LENGTH
Axial hyperopia
e.g. 22.0 mm
(instead of ~23.5 mm)



RESULT

Axial component		Corneal component		Total ocular power
Hyperopic (short eye)	+	**Myopic** (steep cornea, high power)	=	**Myopic** (appears myopic)

The short axial length is masked by the steep cornea.

Created with A.I.

Eye biometry

- Axial Length

Compare the actual measure with percentile norms;

Look at the annual growth rate;

Compare the growth rate before and after a treatment;

Axial Length

myopiaprofile.com

AXIAL LENGTH (AXL)	EMMETROPIC (Caucasian)	MYOPIC (Caucasian)
Before 10 years old	0.10-0.20 mm/year	0.30 mm/year (from 0.17 to 0.53 mm)
After 10 years old	0.10 mm/year	0.20 mm/year
AXL normalization	14 to 16 years <0.10 mm/year	<16.3 years>

- Growth of more than 0.20 mm/year may indicate pre-myopia (in emmetropic subjects) and/or rapid progression in myopes
- A myopic patient with AXL variation similar to that of an emmetropic patient of the same age has good control of myopic progression

Axial Length/Corneal Curvature ratio

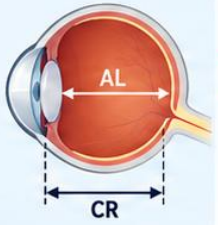
The Evolution of the AL/CR Ratio: From Ocular Development to Adult Stability

Based on longitudinal data from the NICER (Northern Ireland Childhood Errors of Refraction) study, this graph illustrates the physiological progression of the AL/CR ratio in a Caucasian population. The ratio is a key indicator of refractive status and myopia risk.



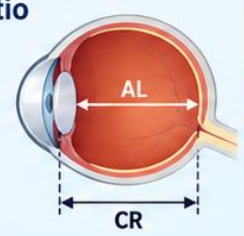
1 Growth & Development (Age 7–13)

Baseline at 7 years: **2.89**
Starting point during early school years.



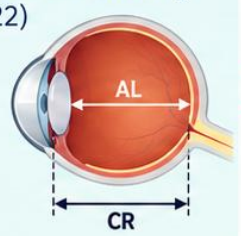
2 Progressive Increase in the Ratio

Between 7 and 13 years (2.98), the eye undergoes substantial axial elongation.



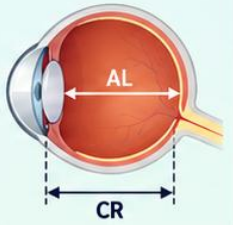
3 Stabilization & Maturity (Age 16–22)

At 16 years, the ratio reaches the critical 3.00 threshold.



4 Adult Plateau

By around 22 years (3.01), the value remains essentially **stable**, indicating the end of primary ocular growth.



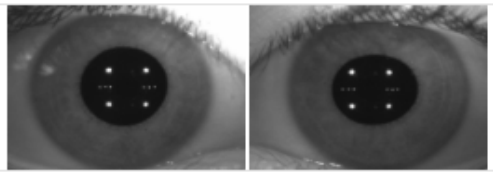
Created with A.I.

Let’s consider two **6.8 years old** Italian girls. Same life style and risk factors.

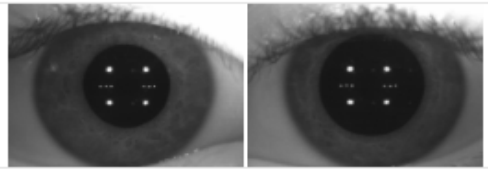
UCVA 10/10 OU

Rx OU Sf +0,75D

Arianna

Objective refraction	Measured with cyclo	
Sfera	-0.25 D	-0.50 D
Cilindro	0.00 D	-0.25 D
Asse	26°	59°
SEQ	-0.25 D	-0.50 D
Measurement quality	9 / 9	8 / 9
Subjective refraction	**Measured with cyclo**	
Cheratometria		
Mean keratometric radius	7.60 mm	7.61 mm
Astigmatismo	0.2 D	0.1 D
Immagine Iride		
Horizontal Raggio	7.61 mm @ 176°	7.62 mm @ 137°
Vertical Raggio	7.58 mm @ 86°	7.59 mm @ 47°
HWTW	11.9 mm	11.8 mm

Ilaria

Objective refraction	Measured with cyclo	
Sfera	0.00 D	0.25 D
Cilindro	-0.25 D	-0.50 D
Asse	21°	16°
SEQ	0.00 D	0.00 D
Measurement quality	8 / 9	7 / 9
Subjective refraction	**Measured with cyclo**	
Cheratometria		
Mean keratometric radius	7.59 mm	7.62 mm
Astigmatismo	0.4 D	0.7 D
Immagine Iride		
Horizontal Raggio	7.63 mm @ 7°	7.67 mm @ 177°
Vertical Raggio	7.56 mm @ 97°	7.56 mm @ 87°
HWTW	11.9 mm	12 mm

Nicola Rizzieri
OPTOMETRISTA - CONTATTOLOGO
MYOPIA SPECIALIST

6.8 yo girls

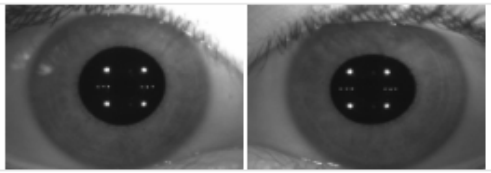
UCVA 10/10 OU

Rx OU Sf +0,75D

Lungh. Assiale	Arianna	
	22.01 mm	22.00 mm

Objective refraction	Measured with cyclo	
Sfera	-0.25 D	-0.50 D
Cilindro	0.00 D	-0.25 D
Asse	26°	59°
SEQ	-0.25 D	-0.50 D
Measurement quality	9 / 9	8 / 9

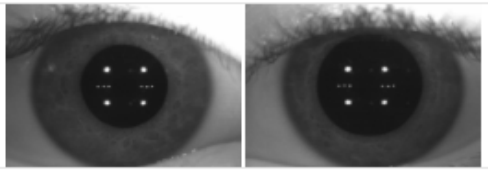
Subjective refraction	Measured with cyclo	

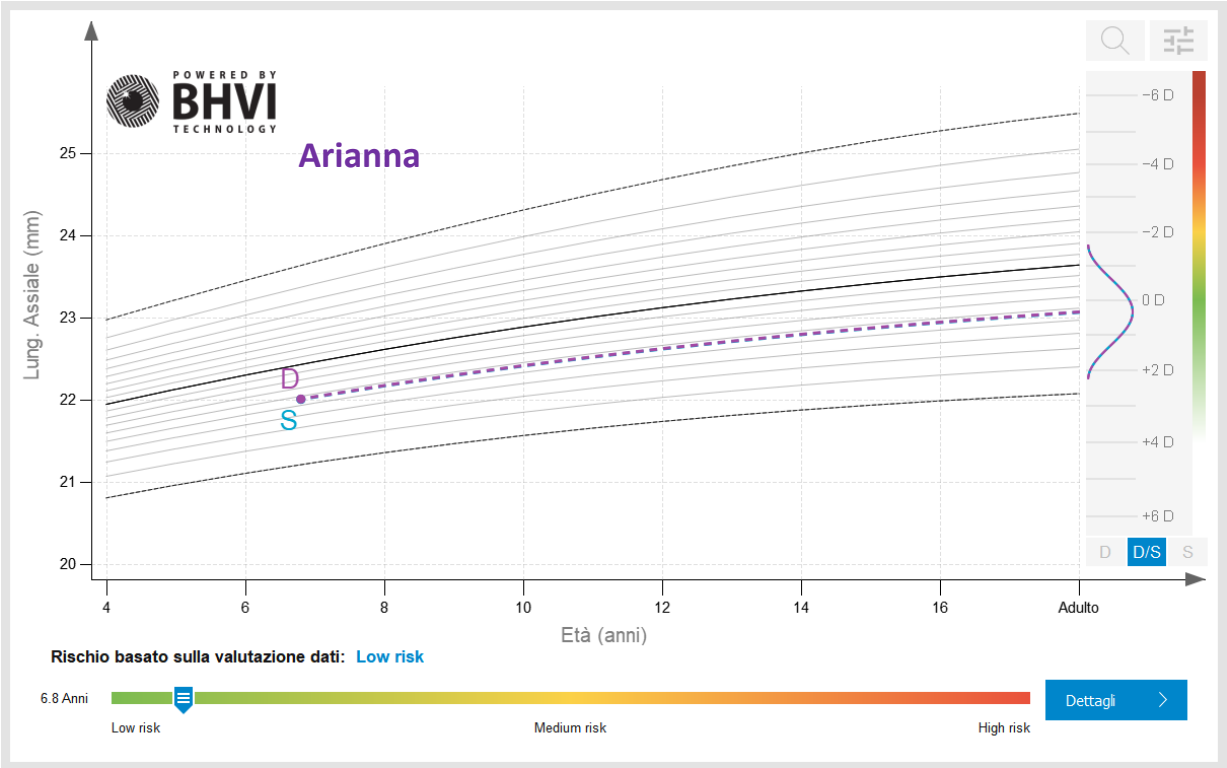
Cheratometria		
Mean keratometric radius	7.60 mm	7.61 mm
Astigmatismo	0.2 D	0.1 D
Immagine Iride		
Horizontal Raggio	7.61 mm @ 176°	7.62 mm @ 137°
Vertical Raggio	7.58 mm @ 86°	7.59 mm @ 47°
HWTW	11.9 mm	11.8 mm

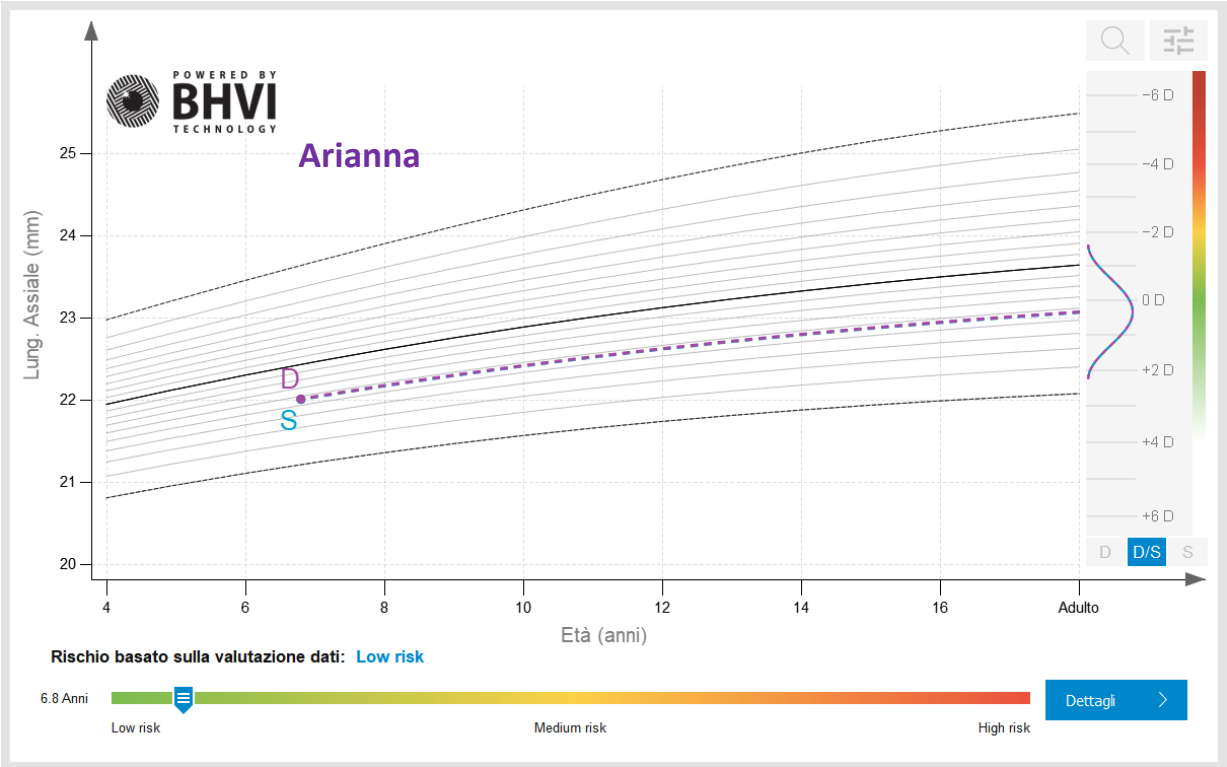
Lungh. Assiale	Ilaria	
	23.07 mm	23.12 mm

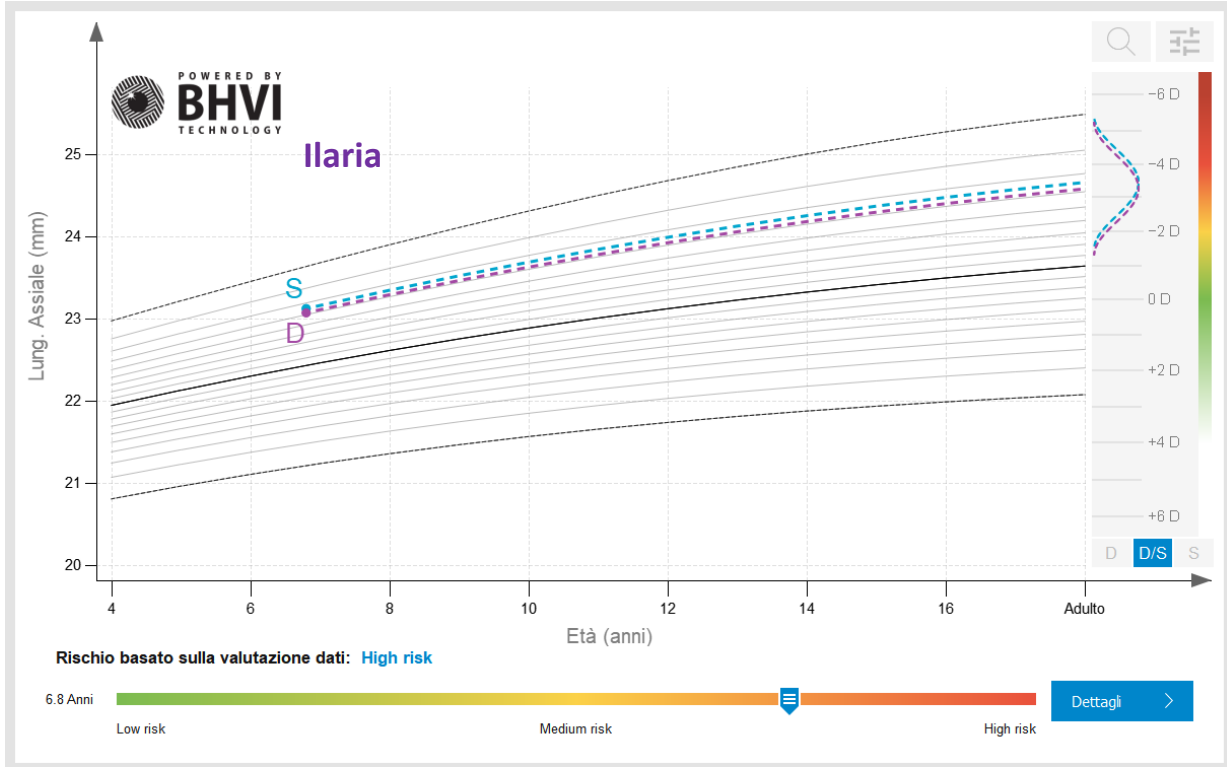
Objective refraction	Measured with cyclo	
Sfera	0.00 D	0.25 D
Cilindro	-0.25 D	-0.50 D
Asse	21°	16°
SEQ	0.00 D	0.00 D
Measurement quality	8 / 9	7 / 9

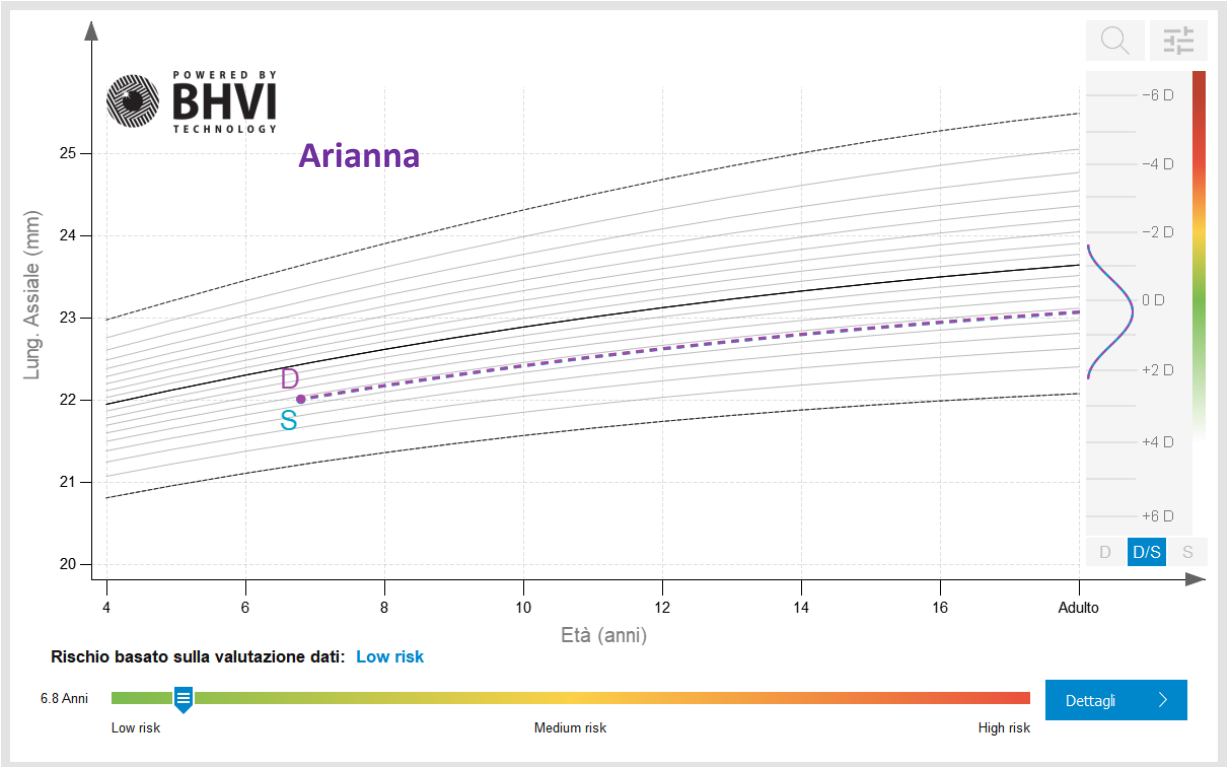
Subjective refraction	Measured with cyclo	

Cheratometria		
Mean keratometric radius	7.59 mm	7.62 mm
Astigmatismo	0.4 D	0.7 D
Immagine Iride		
Horizontal Raggio	7.63 mm @ 7°	7.67 mm @ 177°
Vertical Raggio	7.56 mm @ 97°	7.56 mm @ 87°
HWTW	11.9 mm	12 mm

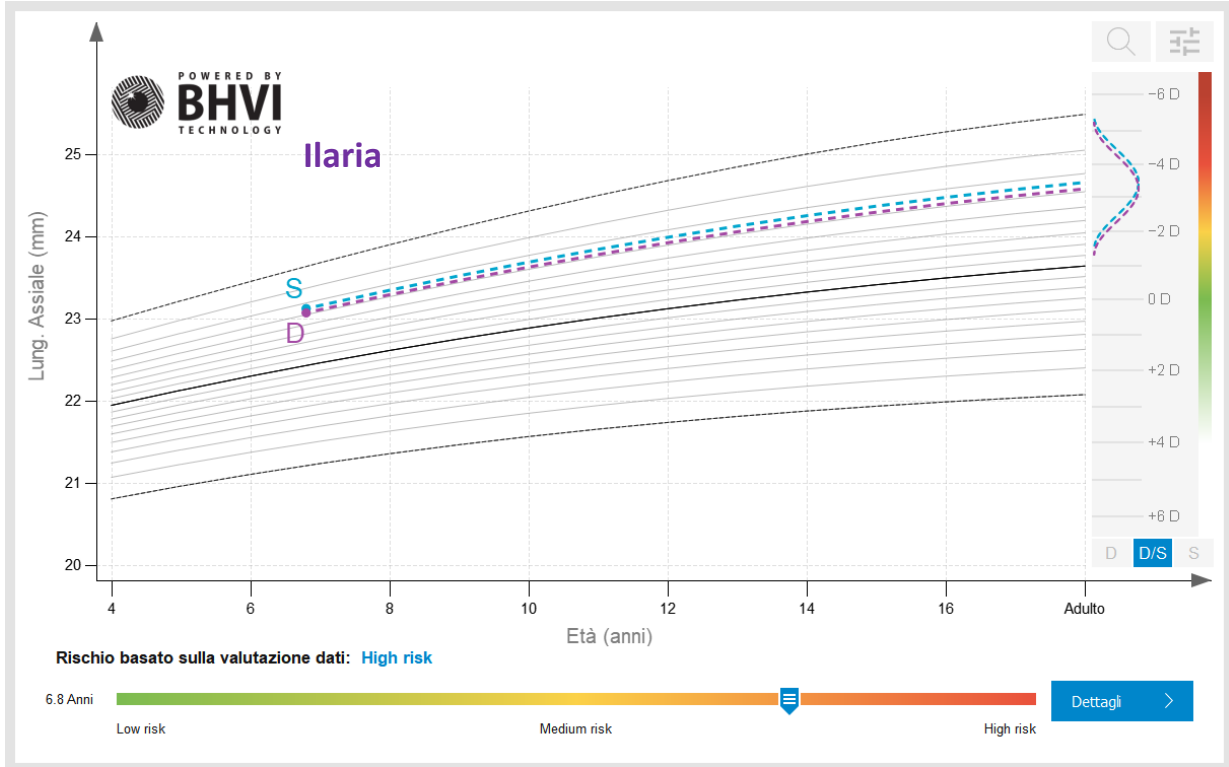

POWERED BY
BHVI
TECHNOLOGY
Arianna
Lung. Assiale (mm)
25
24
23
22
21
20
D
S
4
6
8
10
12
14
16
Adulto
Età (anni)
−6 D
−4 D
−2 D
0 D
+2 D
+4 D
+6 D
D
D/S
S
Rischio basato sulla valutazione dati: Low risk
6.8 Anni
Low risk
Medium risk
High risk
Dettagli


POWERED BY
BHVI
TECHNOLOGY
Arianna
Lung. Assiale (mm)
25
24
23
22
21
20
D
S
−6 D
−4 D
−2 D
0 D
+2 D
+4 D
+6 D
D
D/S
S
4
6
8
10
12
14
16
Adulto
Età (anni)
Rischio basato sulla valutazione dati: Low risk
6.8 Anni
Low risk
Medium risk
High risk
Dettagli


POWERED BY
BHVI
TECHNOLOGY
Ilaria
Lung. Assiale (mm)
25
24
23
22
21
20
S
D
−6 D
−4 D
−2 D
0 D
+2 D
+4 D
+6 D
D
D/S
S
4
6
8
10
12
14
16
Adulto
Età (anni)
Rischio basato sulla valutazione dati: High risk
6.8 Anni
Low risk
Medium risk
High risk
Dettagli



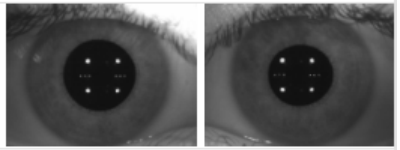
< 50° percentile
AL/CC 2.90

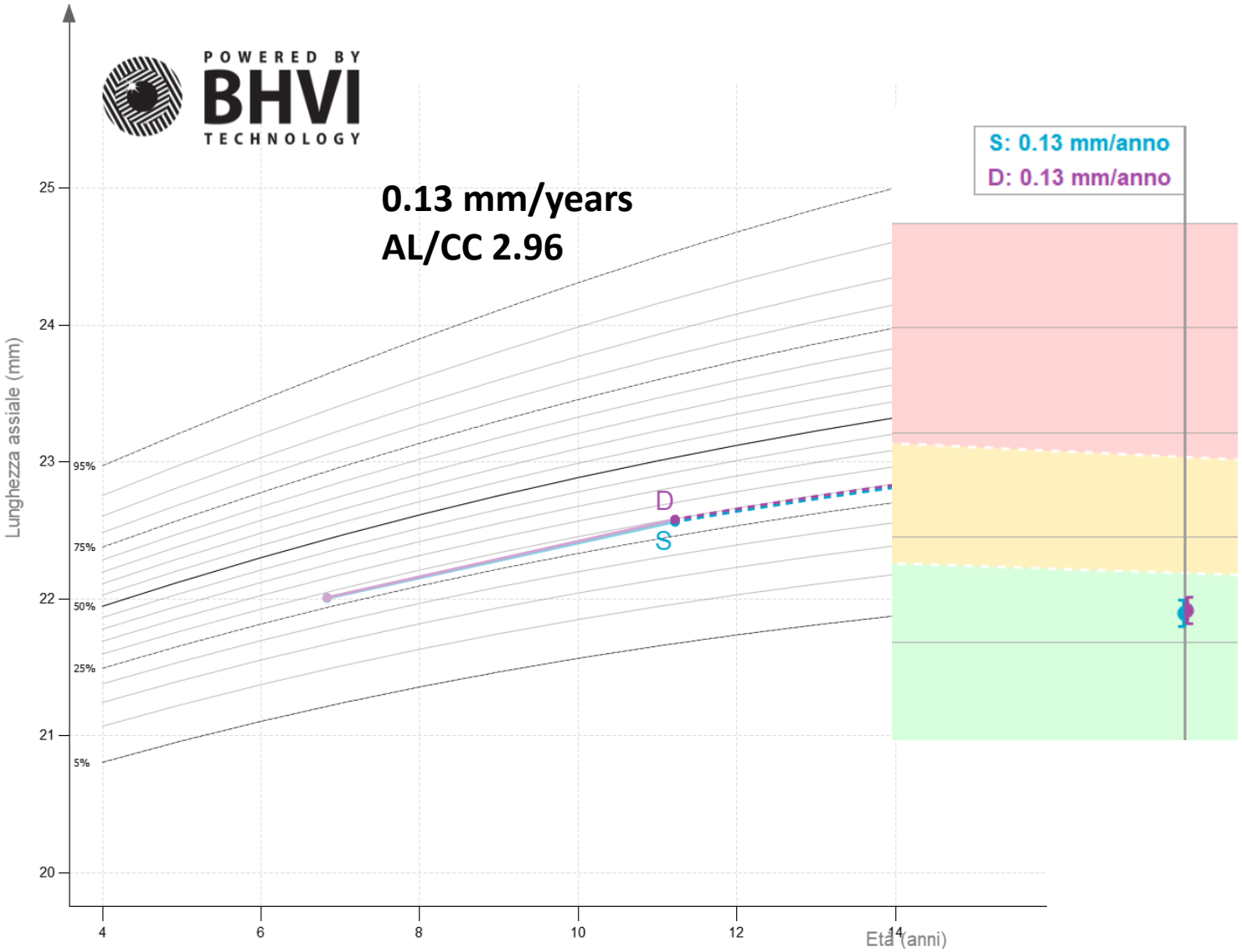


> 75° percentile
AL/CC 3.04

26.02.2026

Arianna, 4 years later

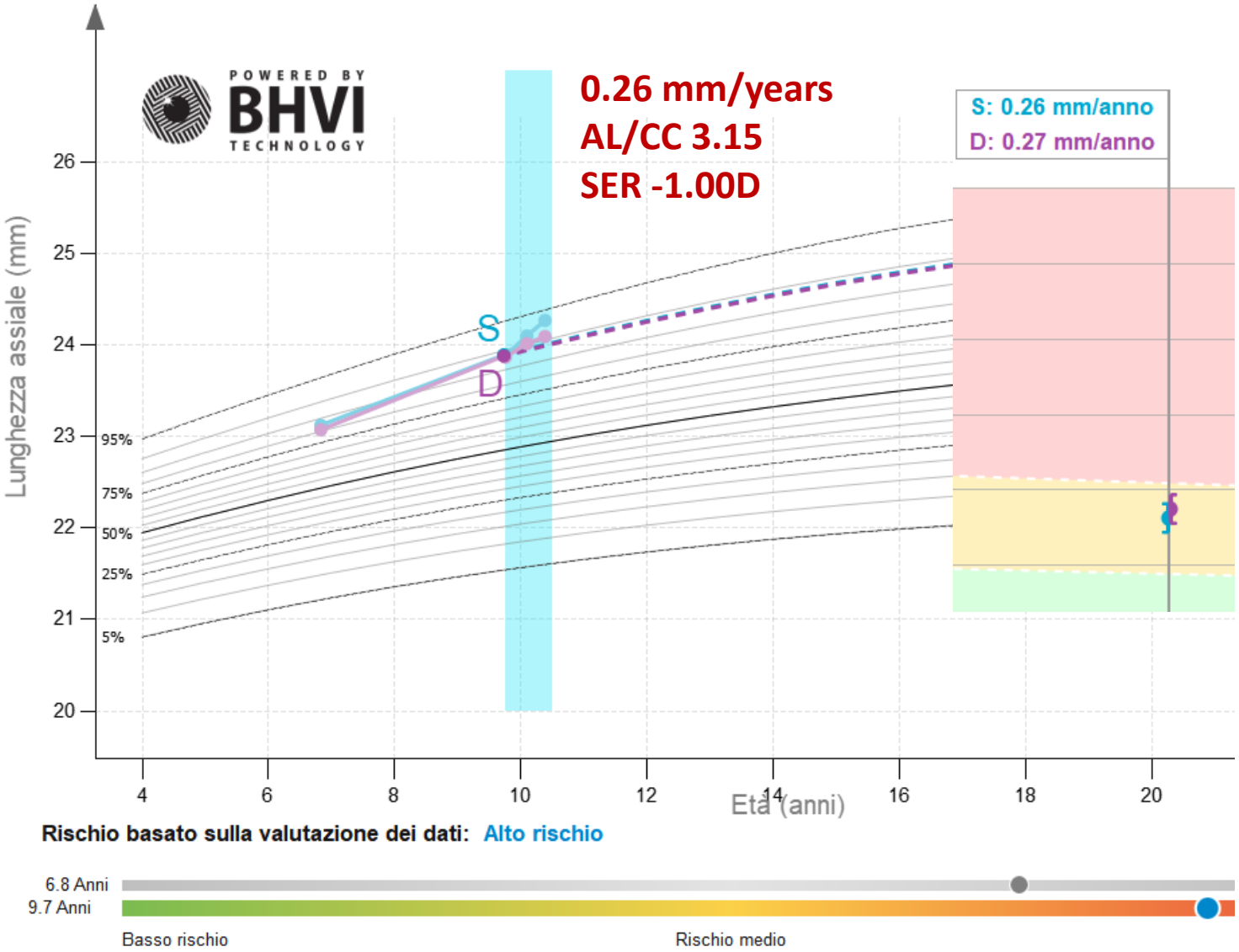
Lunghezza assiale	15:29:13	15:29:51
Lunghezza assiale	22.58 mm	22.56 mm
Rapporto segnale-rumore	7.6	19.3
Rifrazione soggettiva		
Cheratometria	15:29:13	15:29:51
Raggio cheratometrico medio	7.64 mm	7.63 mm
Astigmatismo	0.30 D	0.30 D
Immagine dell'iride		
Orizzontale raggio	7.67 mm @ 20°	7.65 mm @ 161°
Verticale raggio	7.62 mm @ 110°	7.61 mm @ 71°
HWTW	11.80 mm	11.80 mm
Diametro pupilla	5.80 mm	4.80 mm



10.09.2024

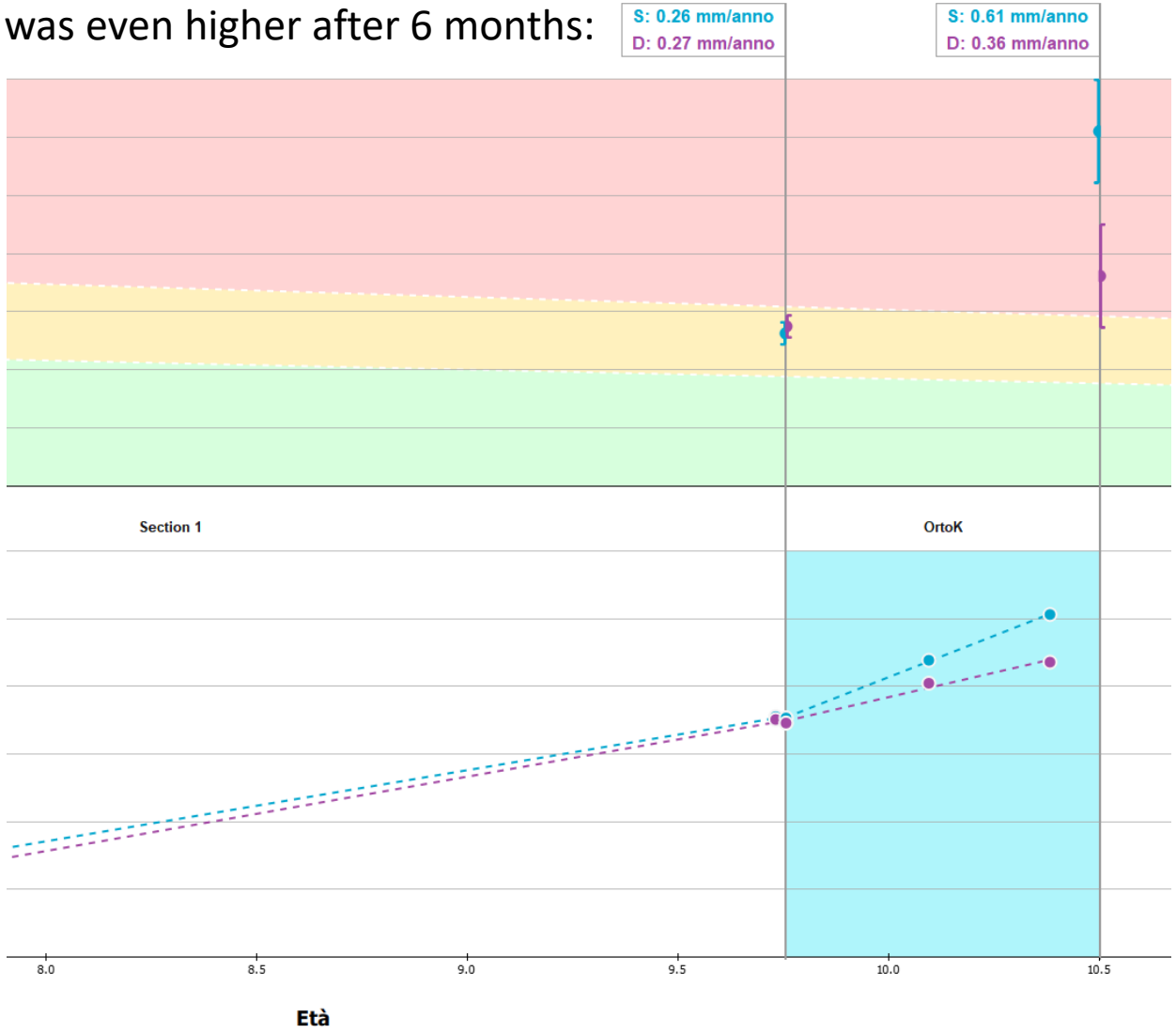
Ilaria, 2 years later

Lunghezza assiale	18:04:20	18:05:05
Lunghezza assiale	23.88 mm	23.89 mm
Rapporto segnale-rumore	11.5	8.4
Rifrazione oggettiva	**18:04:20**	**18:05:05**
Misurato con ciclo	☐	☐
Sfera	-1.50 D	-1.25 D
Cilindro	0.00 D	-0.25 D
Asse	73°	61°
SEQ	-1.50 D	-1.25 D
Qualità della misurazione	8 / 9	8 / 9
Rifrazione soggettiva		
Misurato con ciclo	☐	☐
Sfera	-1.00	-1.00
Cilindro		
Asse		
SEQ	-1.00 D	-1.00 D
Acuità visiva	1,00	1,00



10.09.2024

Ilaria started **ORTHO-K**, but the axial growth was even higher after 6 months:



UCVA was 10/10 in OU

Subjectively satisfied

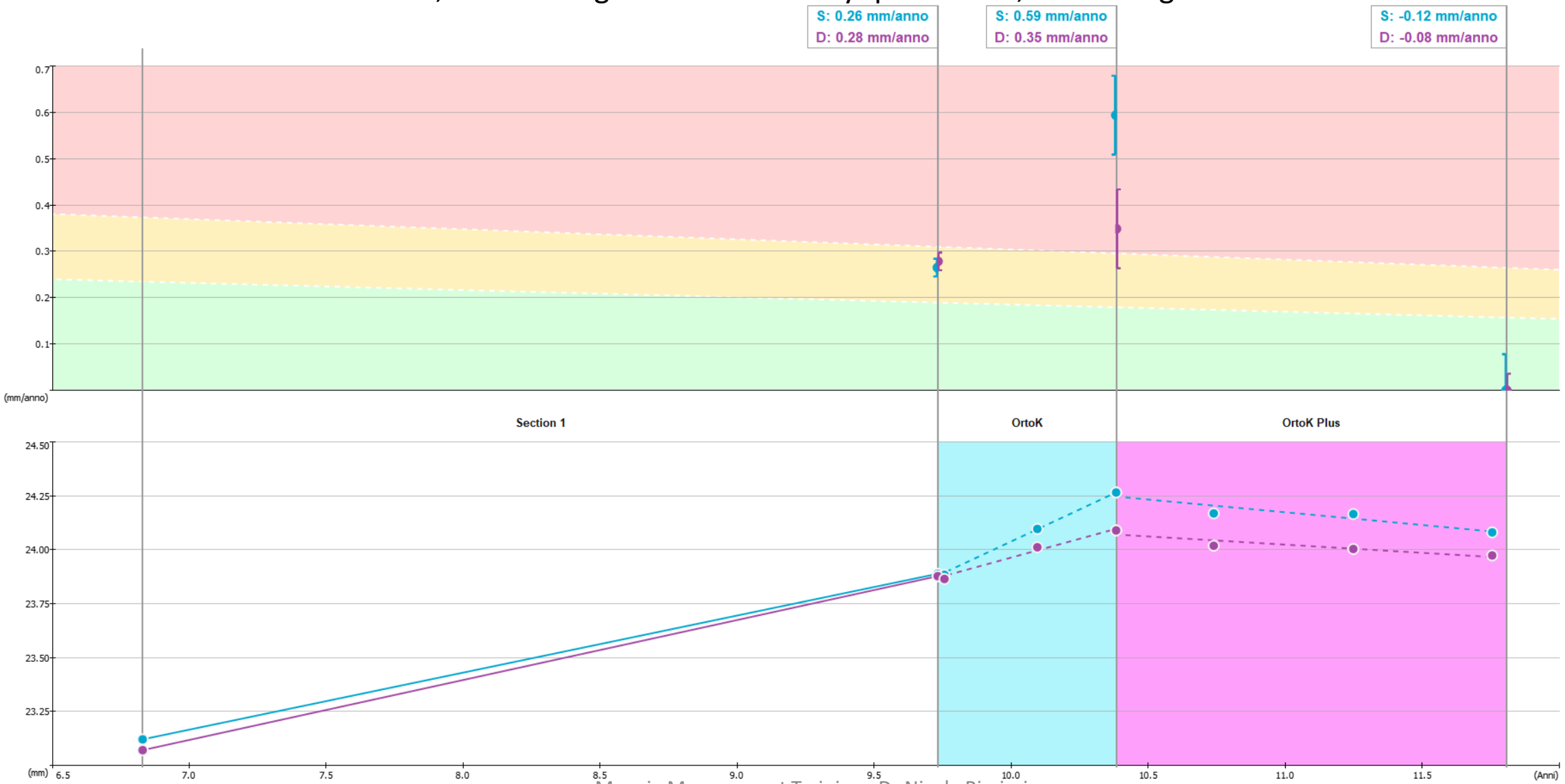
What to do?

- Change strategy?

- Combination therapy?

04.09.2026

Ilaria moved to **ORTHO-K PLUS**, a new design for increased myopia control, and axial growth started to normalize



Erminia, 7.5 y.o. in 2021

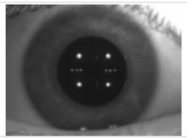
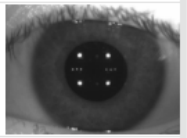
OD Sf -2,50 Cil -0,50 Ax 90° ***visus 10/10*** ***axl 25,02 mm***

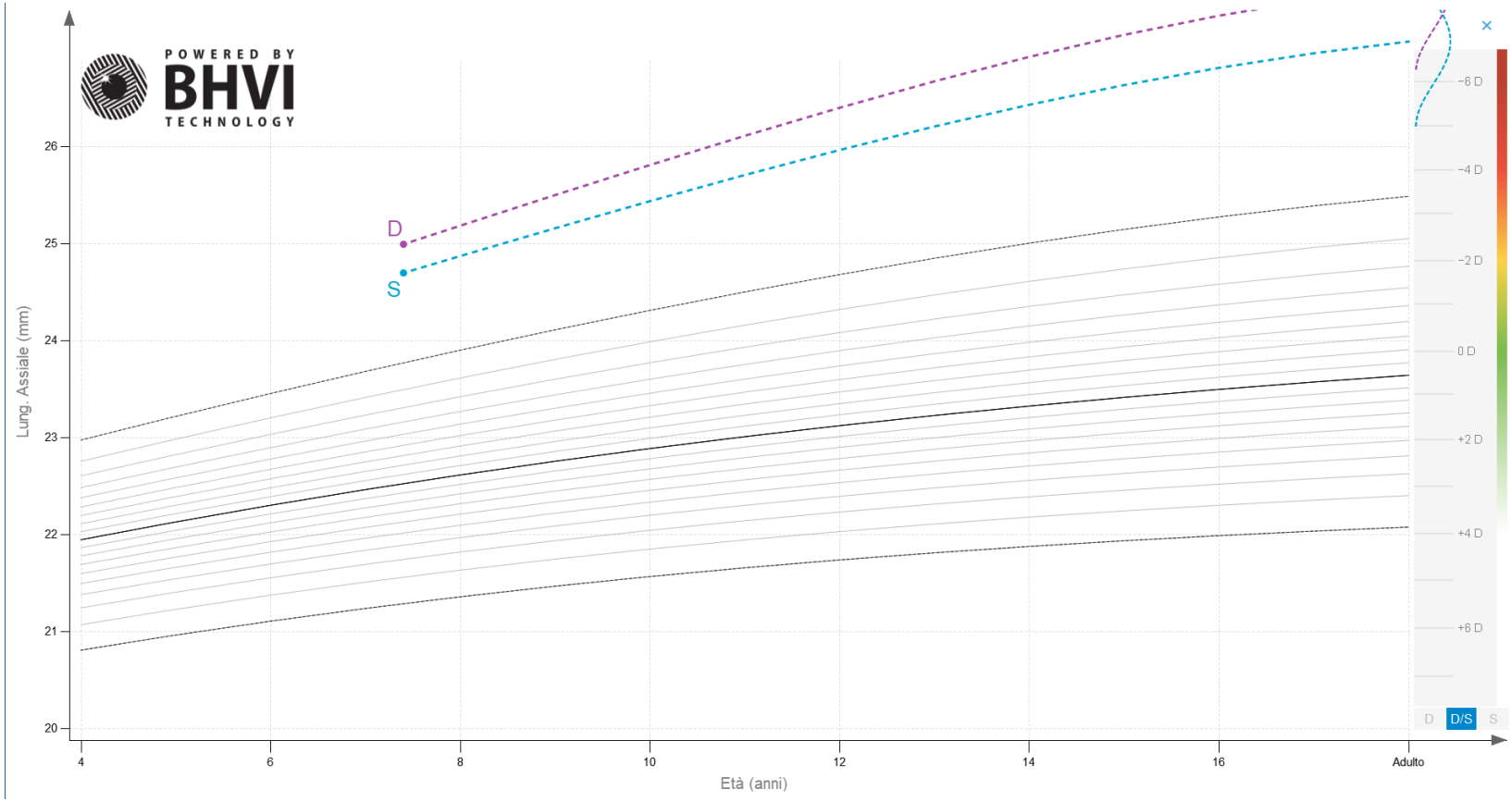
OS Sf -2,75 Cil -0,50 Ax 90°tb ***visus 10/10*** ***axl 24,94 mm***

<u>fam. H. glaucoma and diabetes</u>

RX ophthalmologist

Nicola Rizzieri
OPTOMETRISTA - CONTATTOLOGO
MYOPIA SPECIALIST

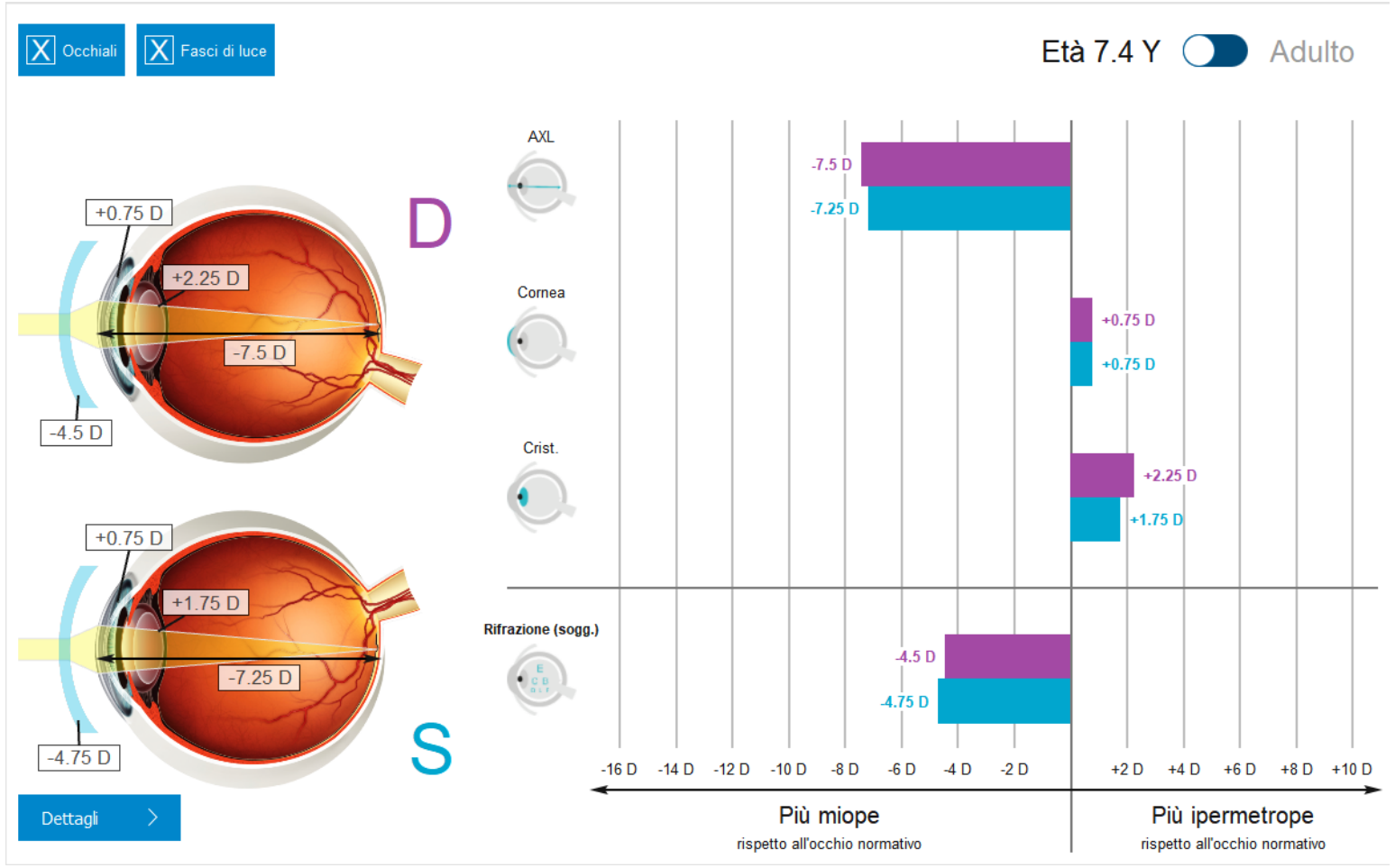
Lunghezza assiale	11:35:41	11:36:38
Lunghezza assiale	25.02 mm	24.94 mm
Rapporto segnale-rumore	37.2	15.8
Rifrazione oggettiva	**11:35:41**	**11:36:38**
Misurato con ciclo	☐	☐
Sfera	-3.25 D	-3.25 D
Cilindro	-0.25 D	-0.50 D
Asse	179°	15°
SEQ	-3.25 D	-3.50 D
Qualità della misurazione	8 / 9	8 / 9
Rifrazione soggettiva		
Cheratometria	**11:35:41**	**11:36:38**
Raggio cheratometrico medio	7.93 mm	7.95 mm
Astigmatismo	0.4 D	0.7 D
Immagine dell'iride		
Orizzontale raggio	7.97 mm @ 166°	8.01 mm @ 179°
Verticale raggio	7.89 mm @ 76°	7.89 mm @ 89°
HWTW	12 mm	12 mm
Diametro pupilla	6 mm	5.3 mm



After consultation, the family is NOT interested in Myopia Management…

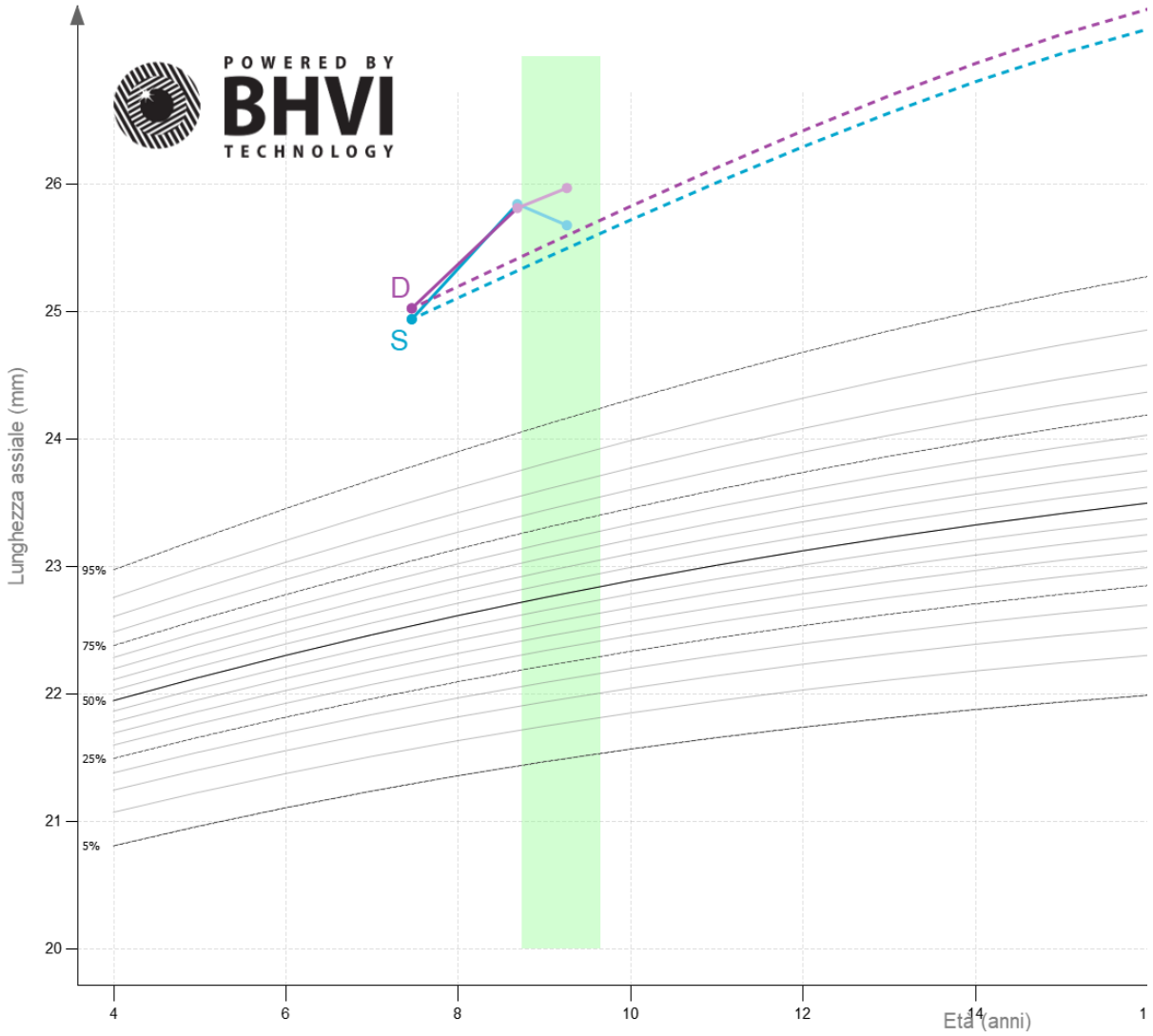
“the ophthalmologist did not mention about possible solutions to reduce the risk of myopia progression”

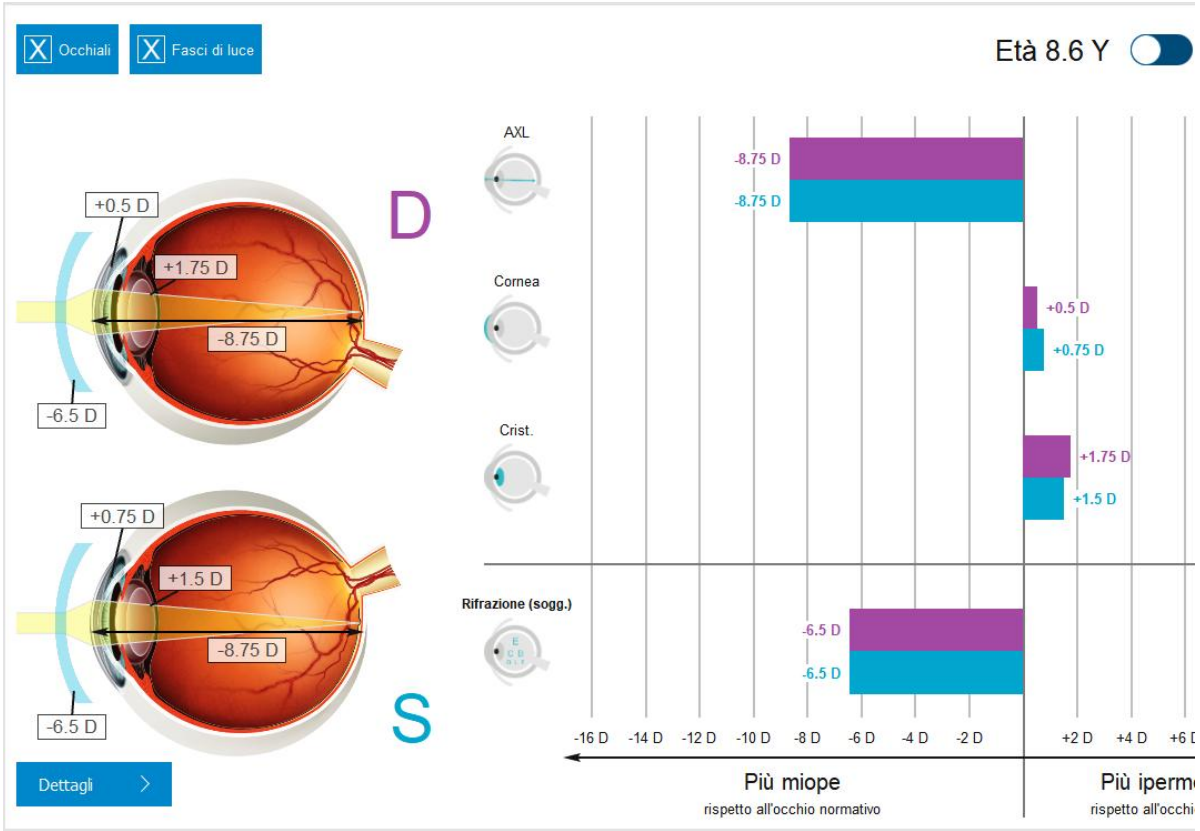
I suggested a new eye exam in no more than 6 months.

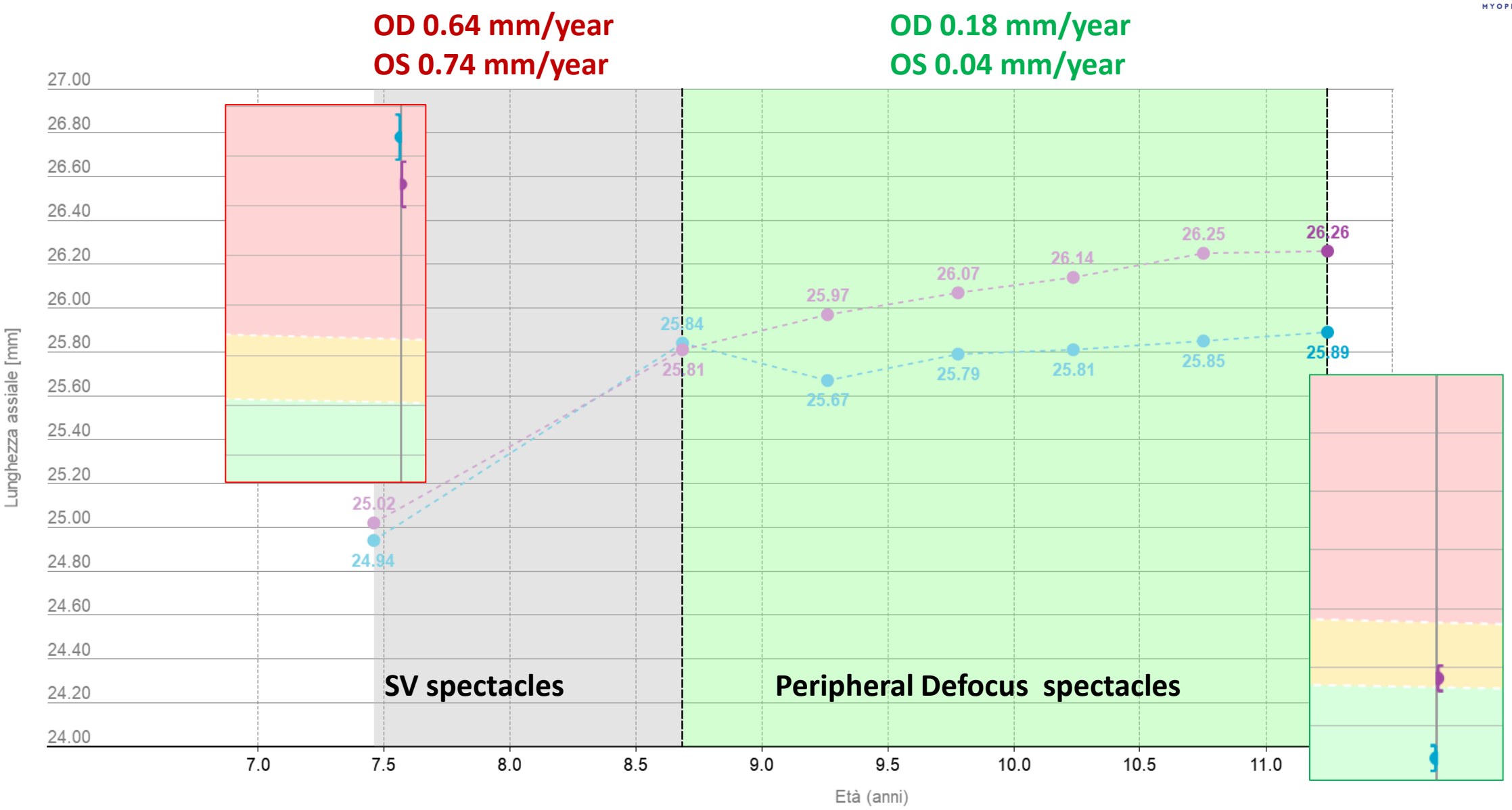


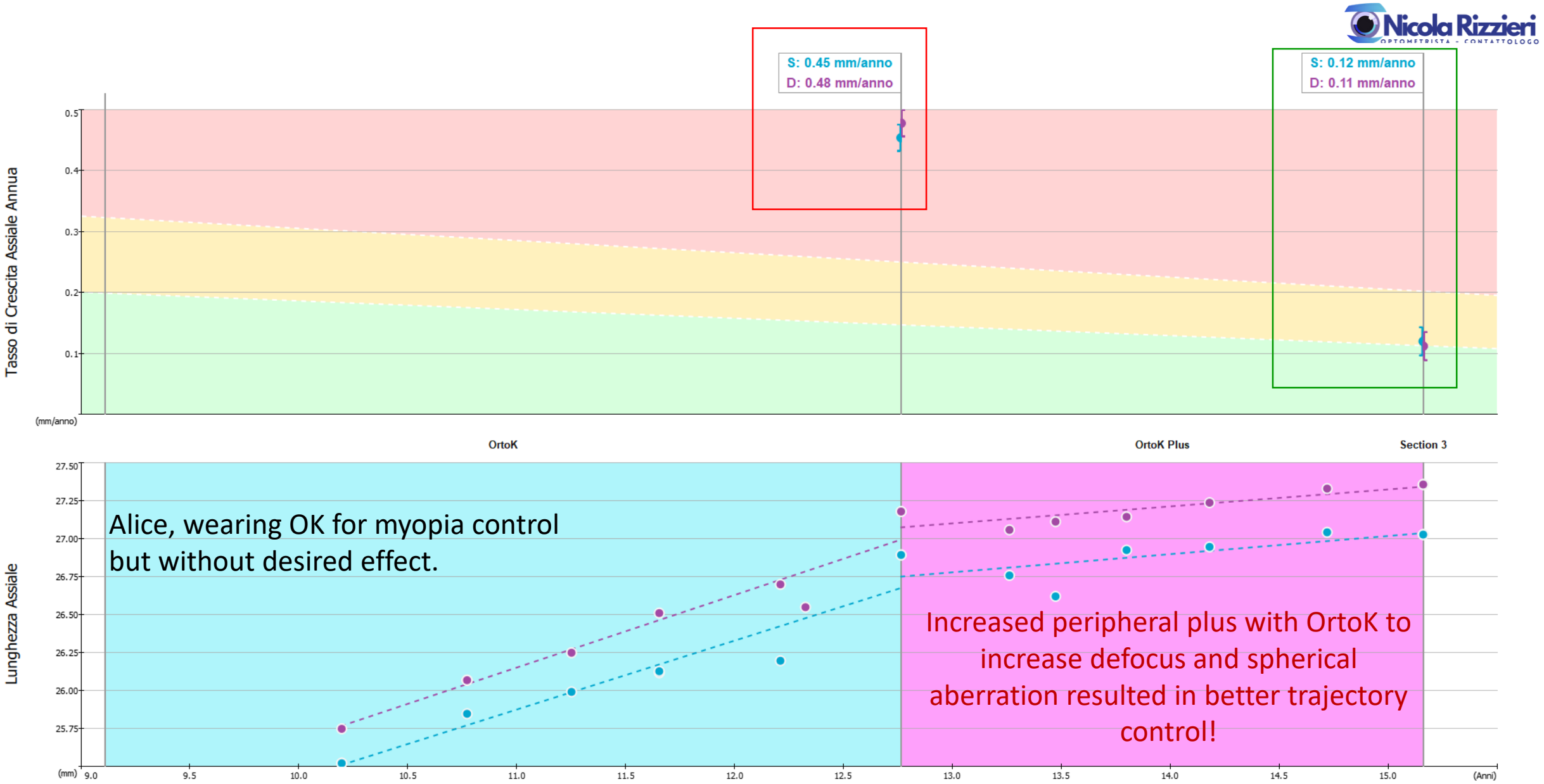
Erminia, 8.5 in 2022

OD Sf -4,75	***visus 10/10***	***axl 25,81 mm***	***(0,79 mm)***
OS Sf -4,75 Cil -0,25 Ax 175°tb	***visus 10/10***	***axl 25,84 mm***	***(0,90 mm)***

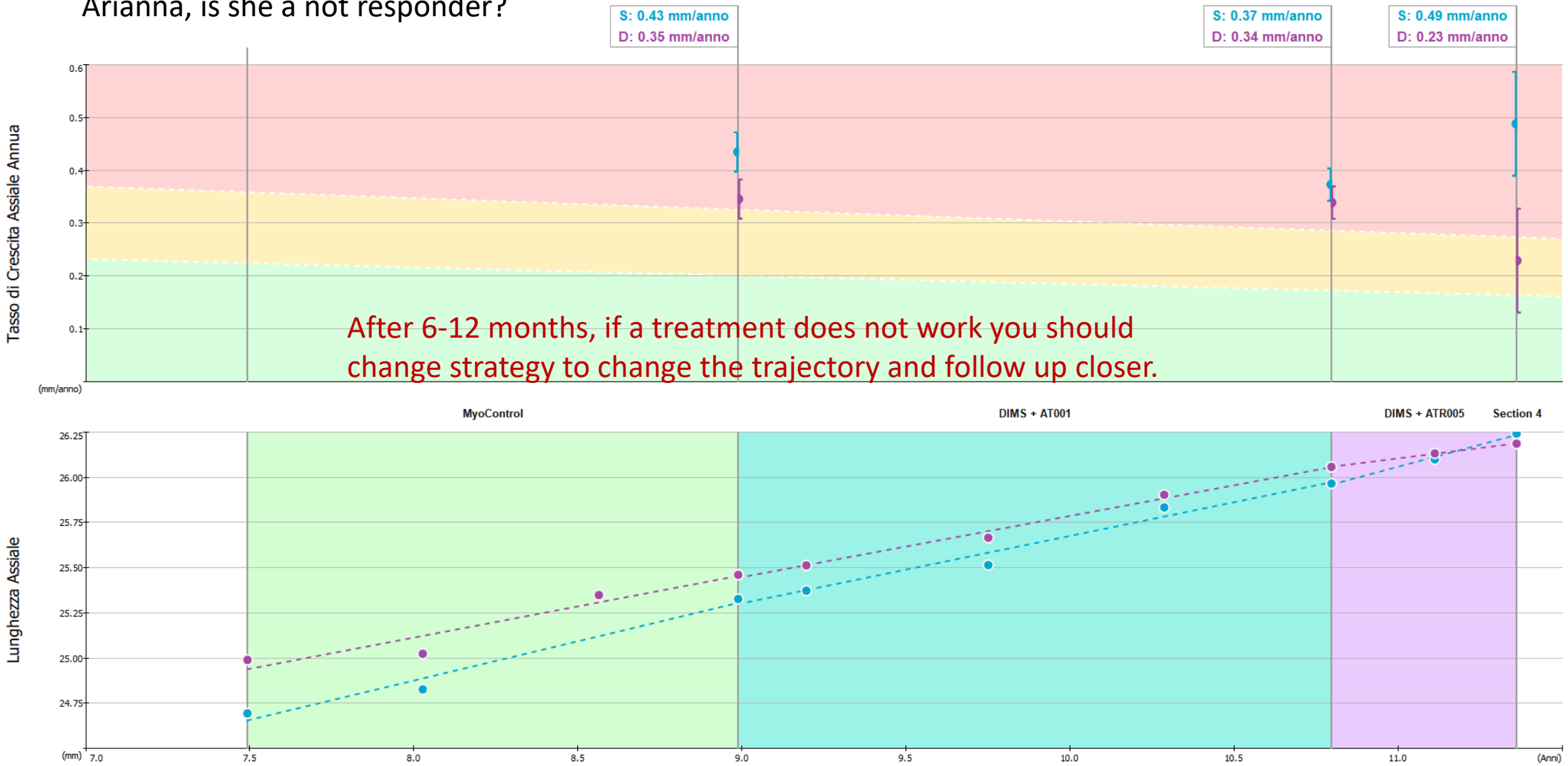




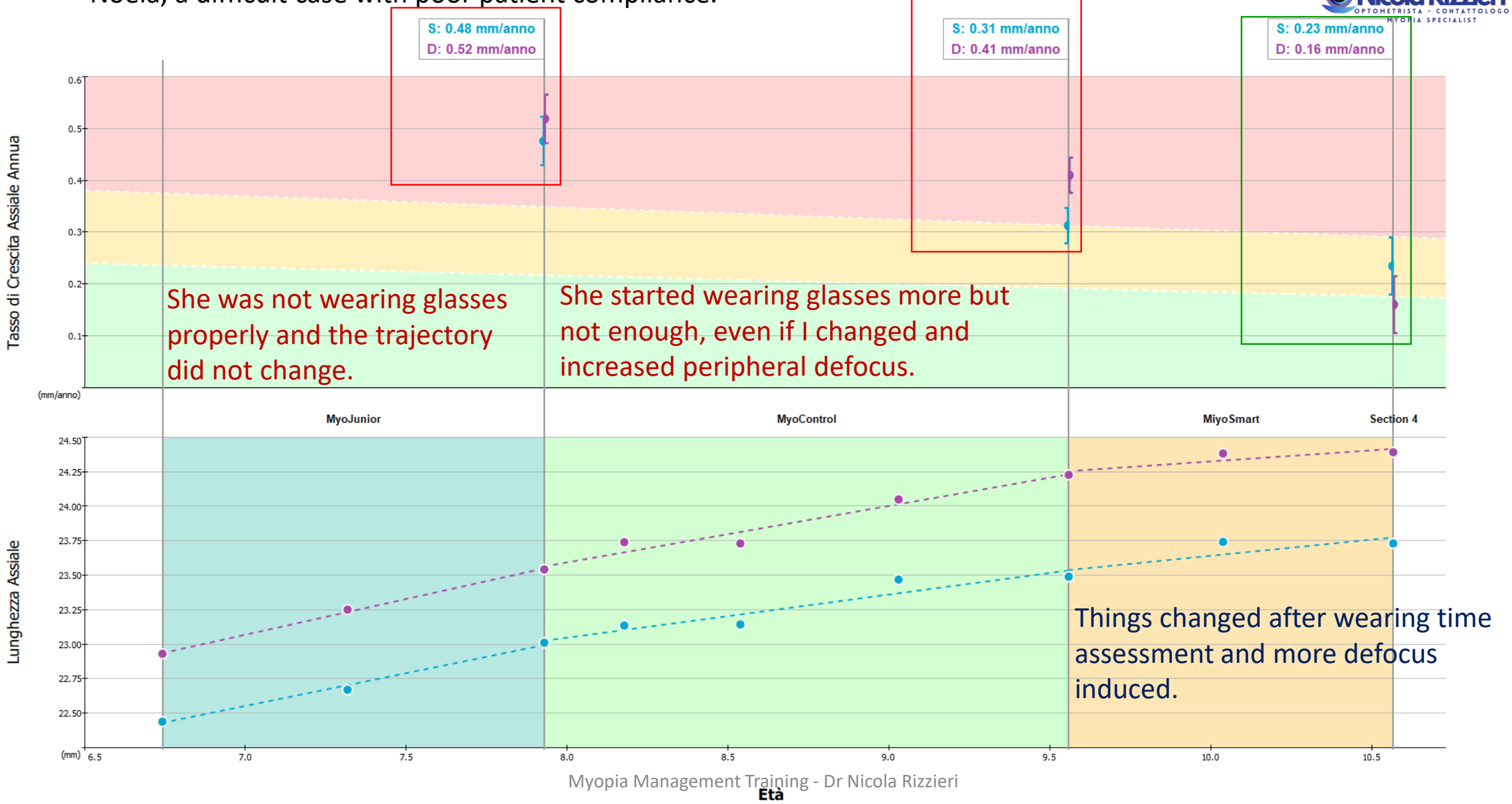

OD 0.64 mm/year
OS 0.74 mm/year
OD 0.18 mm/year
OS 0.04 mm/year
Lunghezza assiale [mm]
27.00
26.80
26.60
26.40
26.20
26.00
25.80
25.60
25.40
25.20
25.00
24.80
24.60
24.40
24.20
24.00
25.02
24.94
25.84
25.81
25.97
25.67
26.07
25.79
26.14
25.81
26.25
25.85
26.26
25.89
SV spectacles
Peripheral Defocus spectacles
7.0
7.5
8.0
8.5
9.0
9.5
10.0
10.5
11.0
Età (anni)


S: 0.45 mm/anno
D: 0.48 mm/anno
S: 0.12 mm/anno
D: 0.11 mm/anno
Tasso di Crescita Assiale Annua
0.5
0.4
0.3
0.2
0.1
(mm/anno)
OrtoK
OrtoK Plus
Section 3
Alice, wearing OK for myopia control
but without desired effect.
Increased peripheral plus with OrtoK to
increase defocus and spherical
aberration resulted in better trajectory
control!
Lunghezza Assiale
27.50
27.25
27.00
26.75
26.50
26.25
26.00
25.75
(mm)
9.0
9.5
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
14.5
15.0
(Anni)
Età

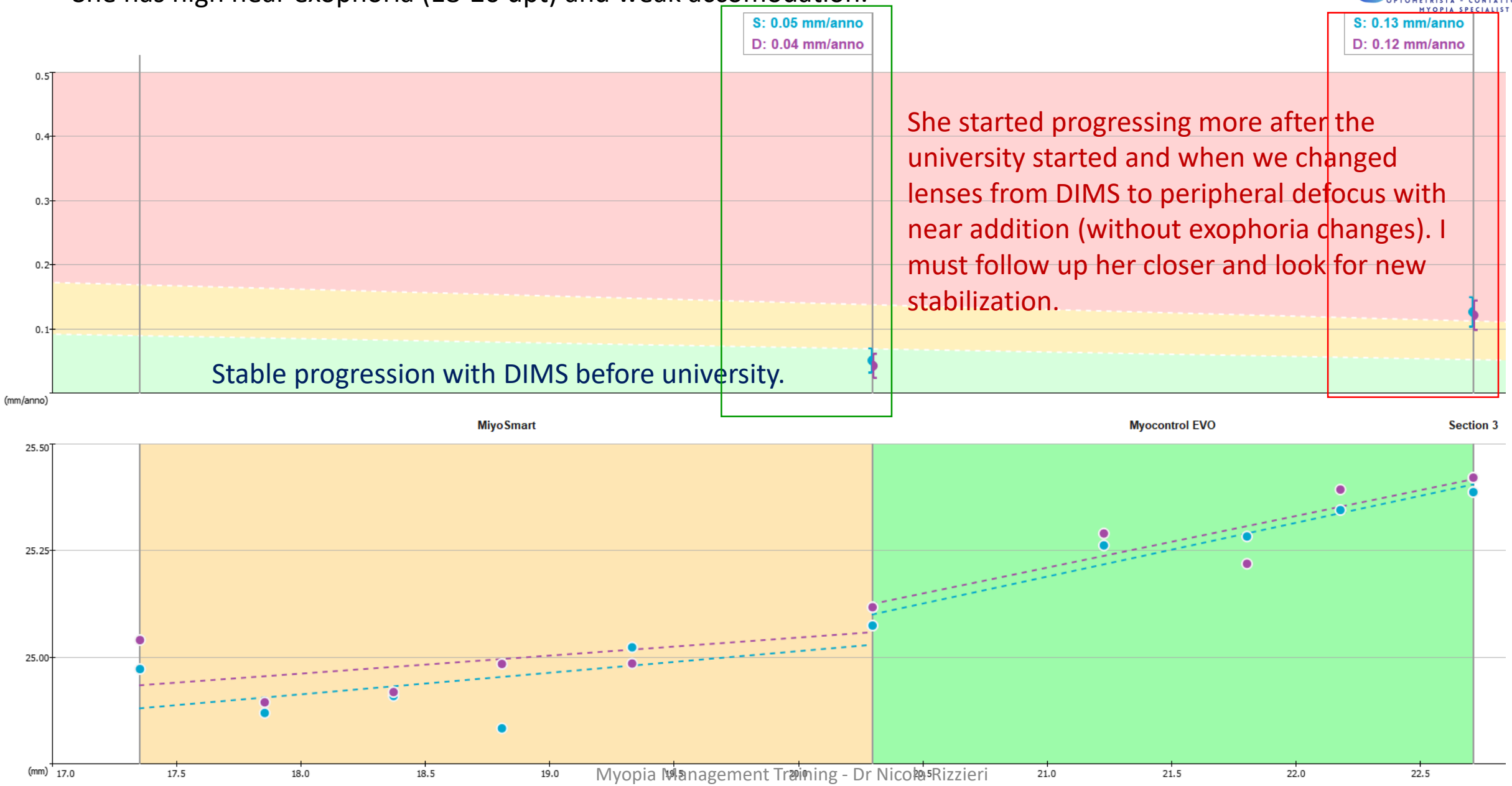
Arianna, is she a not responder?



Noela, a difficult case with poor patient compliance.



Lavinia, a young lady with stable progression with DIMS before university.
She has high near exophoria (18-20 dpt) and weak accomodation.



What I do differently today?

FIVE YEARS AGO		TODAY
Which treatment?	→	Which patient?
Is myopia progressing?	→	What is the axial trajectory?
Is treatment working?	→	How much did I change AXL growth rate?

Five things I would tell my younger self

1. START EARLY	Treat the trajectory, not just the refraction
2. MEASURE AXL	Longitudinal changes shape the decisions
3. SELECT THE PATIENT	Technology follows the phenotype
4. INVESTIGATE FAILURE	Understand why and then adapt
5. ADAPT	Better AXL growth rate can still be clinically meaningful

The five questions I ask at every visit

1. Is the patient progressing?
2. How fast?
3. Is the current treatment being implemented correctly?
4. Is the response good enough for this patients risk?
5. Should I continue, change or combine?

TAKE HOME MESSAGE

MYOPIA MANAGEMENT IS A LONGITUDINAL CLINICAL STRATEGY

The goal is not to choose the strongest treatment.

The goal is to make the right decision, at the right time, for the right patient.

THANK YOU.

Nicola Rizzieri
nirizzieri@gmail.com