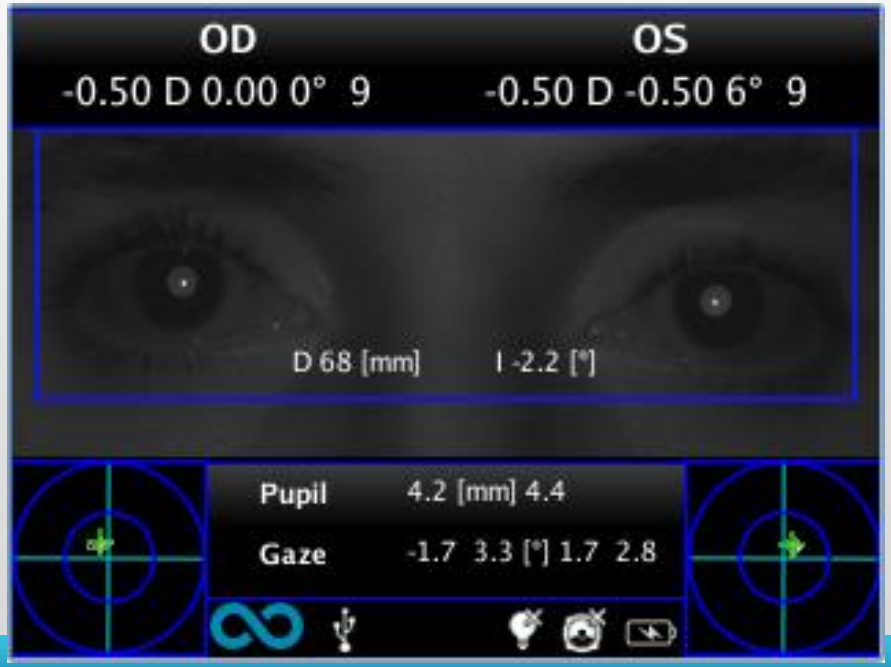
ADAPTICA

Template Base

From «RED REFLEX» TO VIDEOREFRACTION



Dr. Mario Angi
CBM Italy NGO

WEBINAR April 15, 2020

«Red Reflex» Test

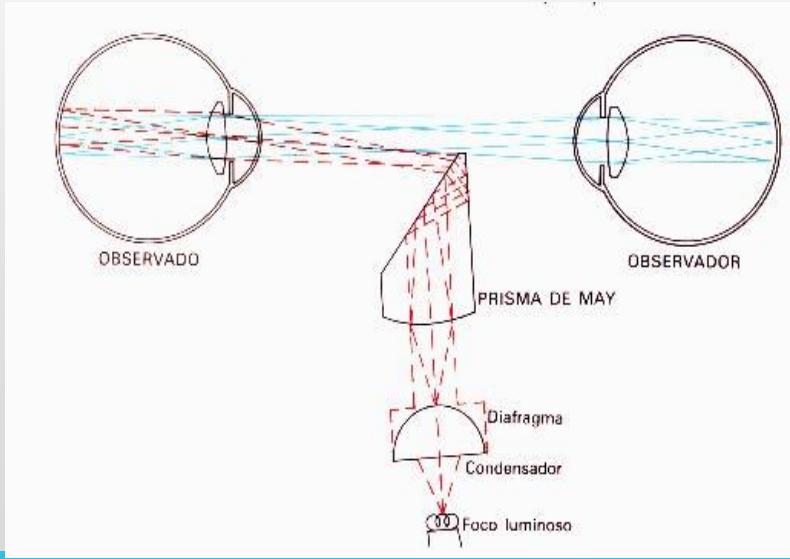
- Direct Ophthalmoscope

- Check the position and dimension of the **red reflex** within the pupils

How does it work?

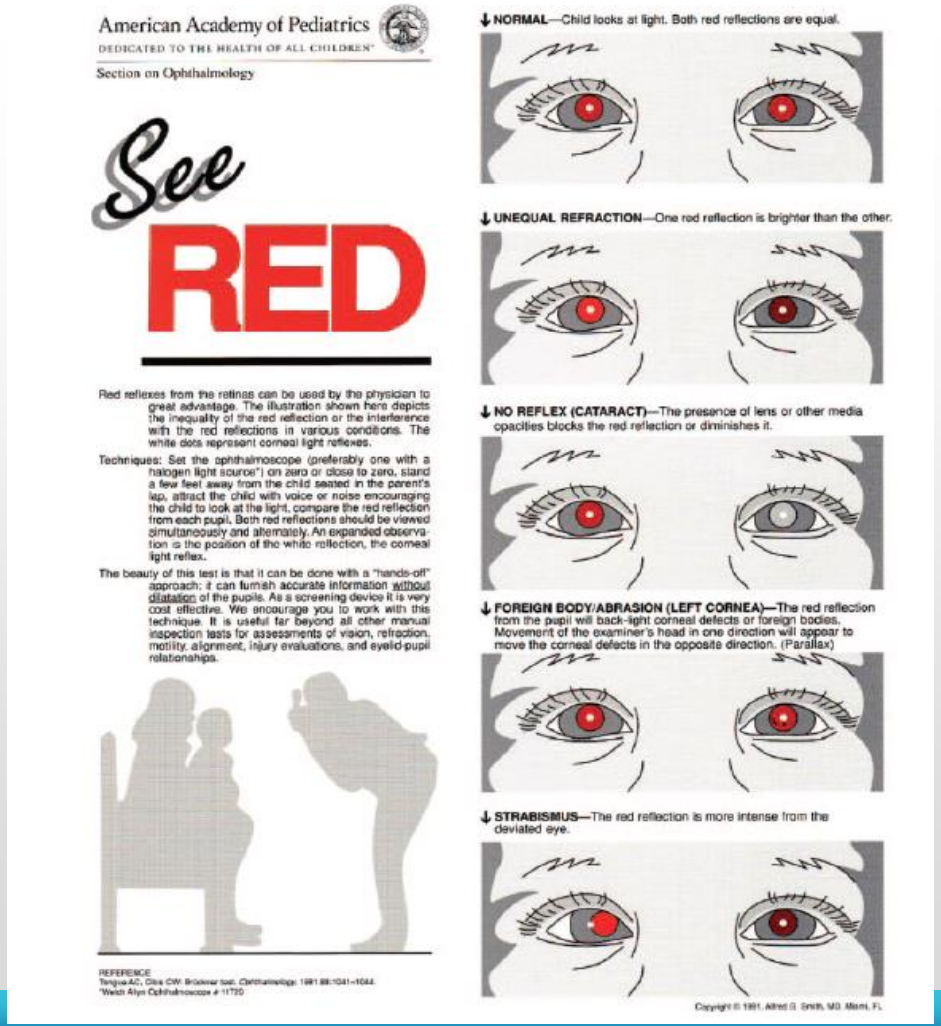
The light from the ophthalmoscope is reflected from the patient's retina and emerges from the pupil.

Optical / physical factors who modify the light path alter the homogeneous red reflex.



Red Reflex

American Academy of Pediatrics
Statements 1986 -2012



1929 „Red Reflex „ TEST

Benedetto Strampelli Italy

La schiascopia statica.

Prof. BENEDETTO STRAMPELLI

Libero docente nella R. Università

Hyperopia **Emmetropia** **Myopia**

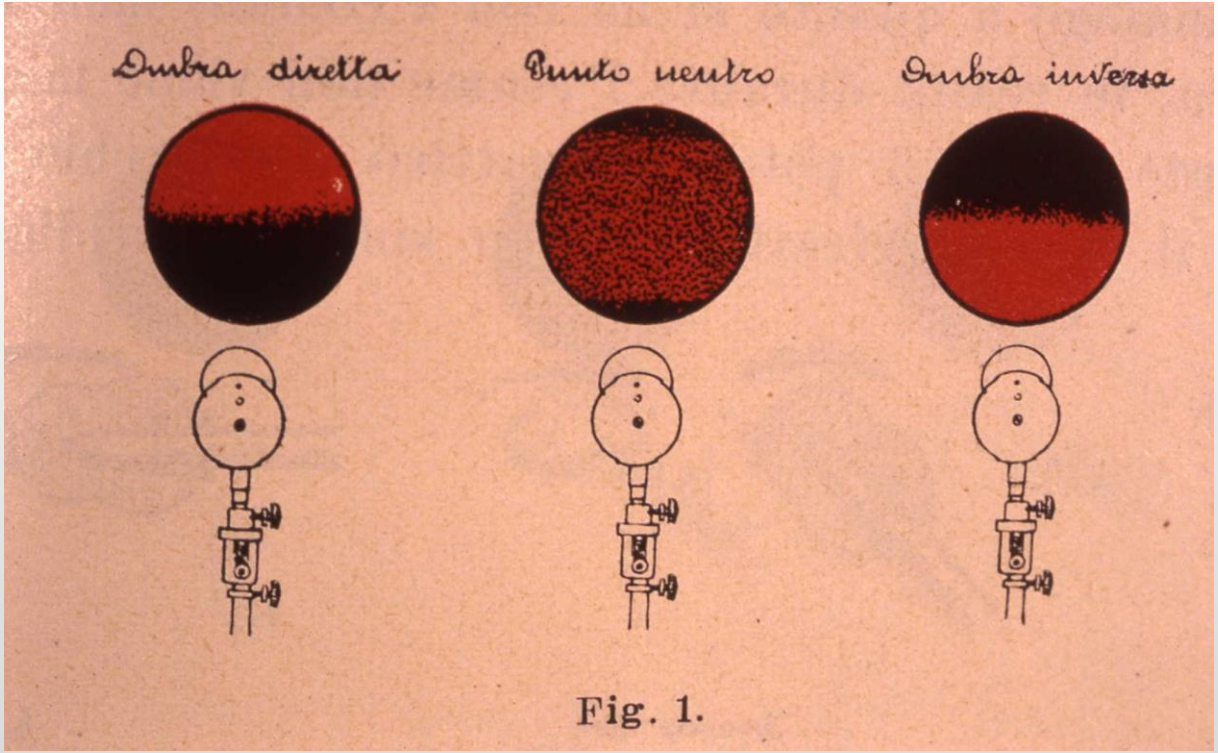
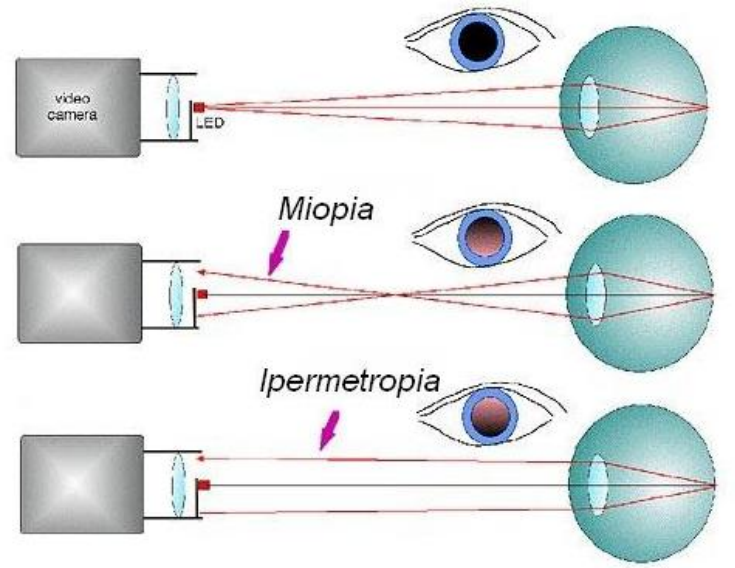


Fig. 1.

The presence and position of pupillary light crescent shows the refractive error



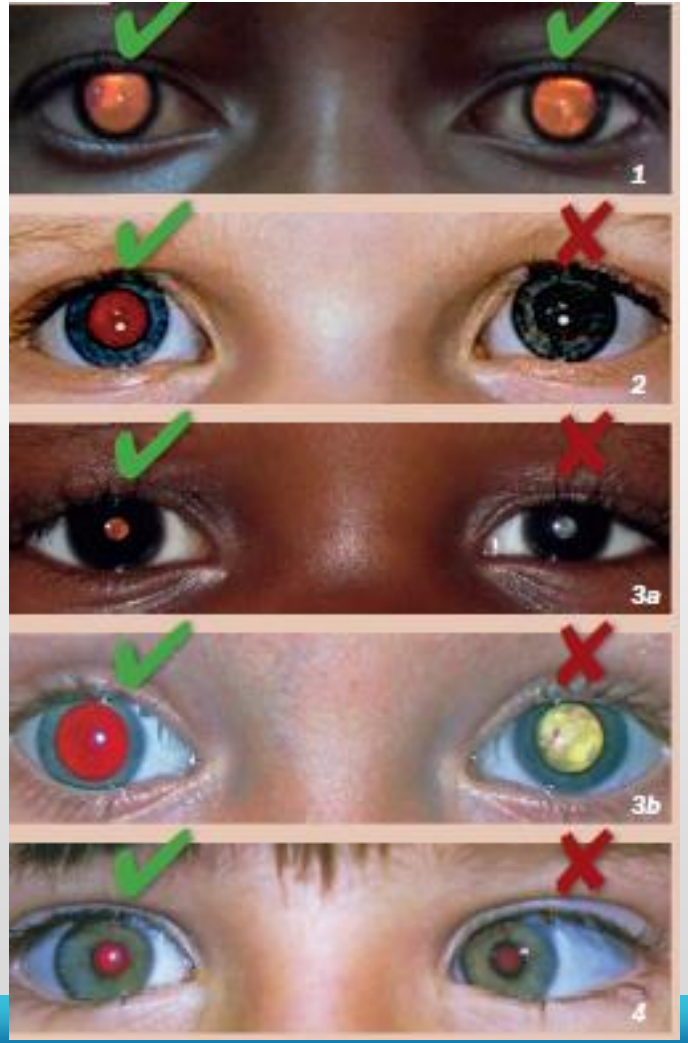
Emmetropia

Myopia

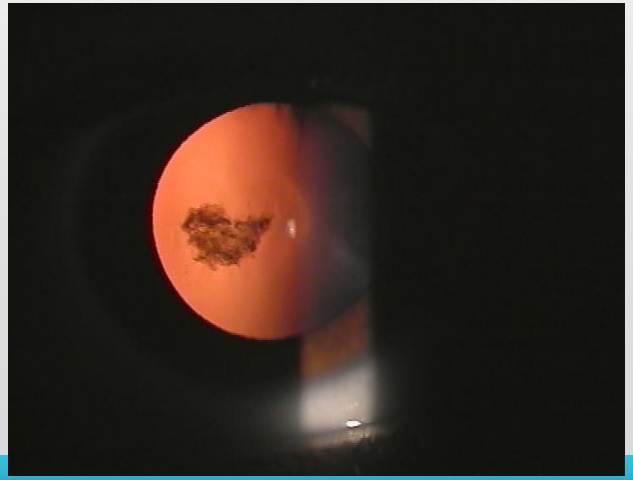
Hypermetropia

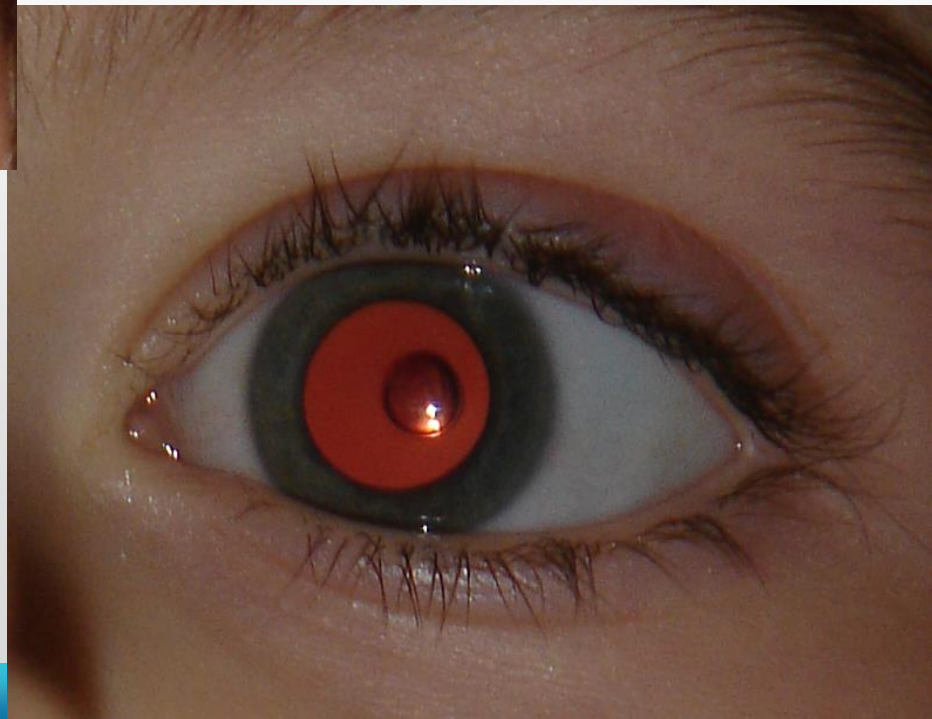
Red Reflex

American Academy of Pediatrics



Cataract





Retinoblastoma

Astigmatism

Vertical Meridian

Horizontal Meridian

Red Reflex Test
warnings

- Subjective
- !!! False negatives
- Needs pharmacologic mydriasis
- Difficult to interpret in dark eyes

Pupil

midriasis

miosis

Fixation error (false positive)

False negative: OS -12 D myopia

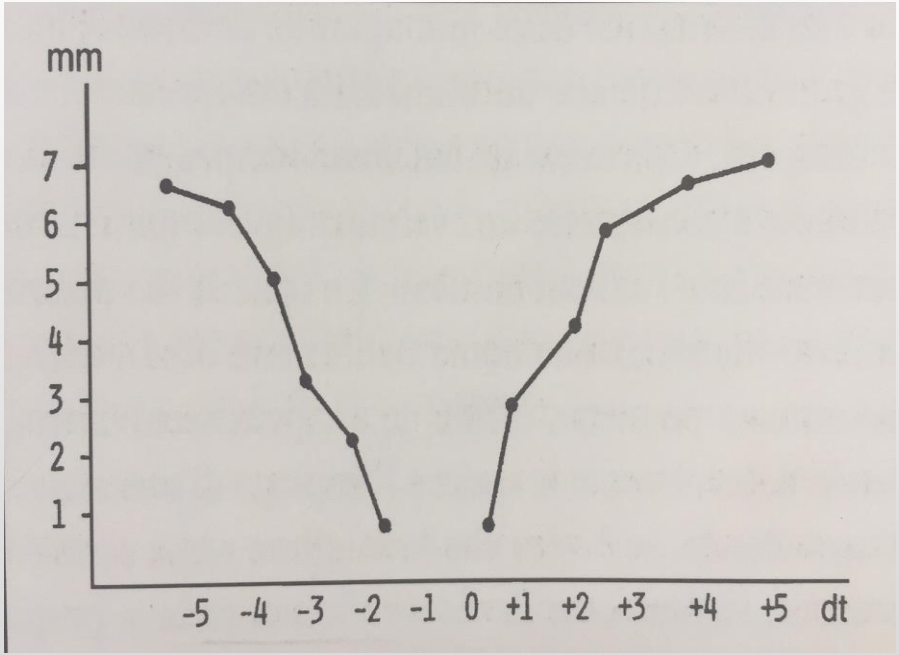
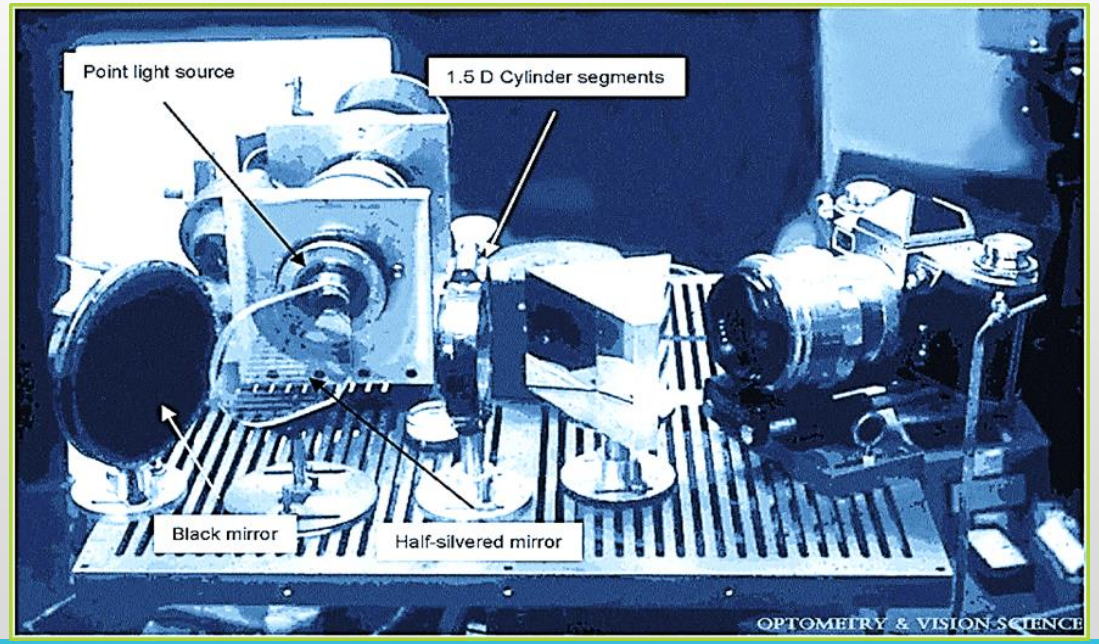


Photo - refraction

1975



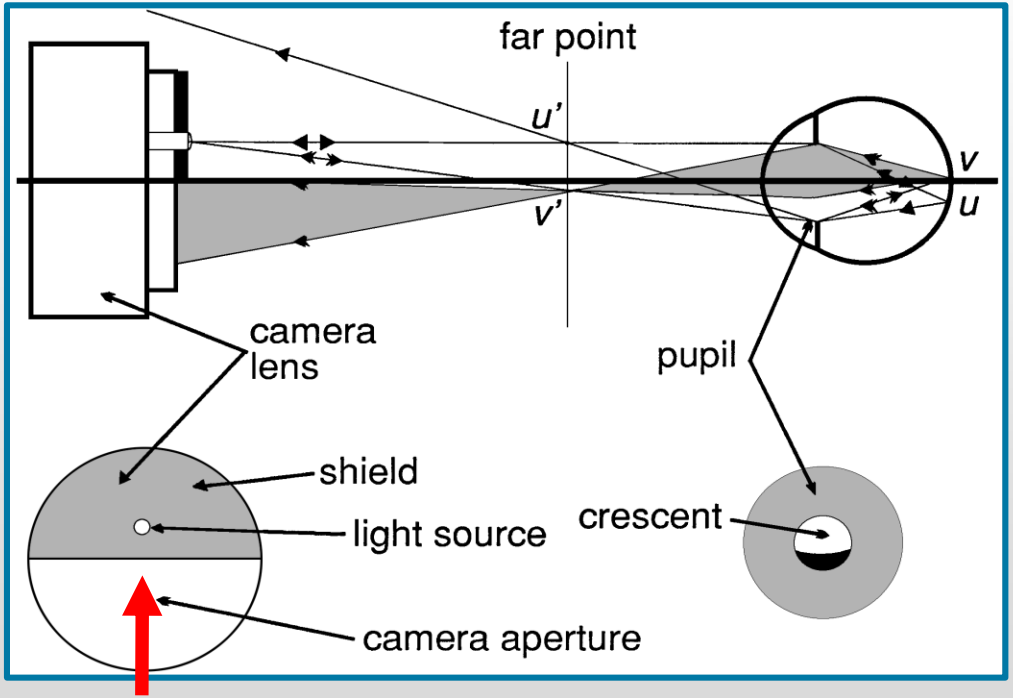
Methods

- **ORTHOGONAL** (H. Howland e B. Howland 1975)
- **ISOTROPIC** (J. Atkinson, o. Braddick 1983)
- **ECCENTRIC** (K. Kaakinen, 1979)

1985 from „Red Reflex“ to Photorefraction

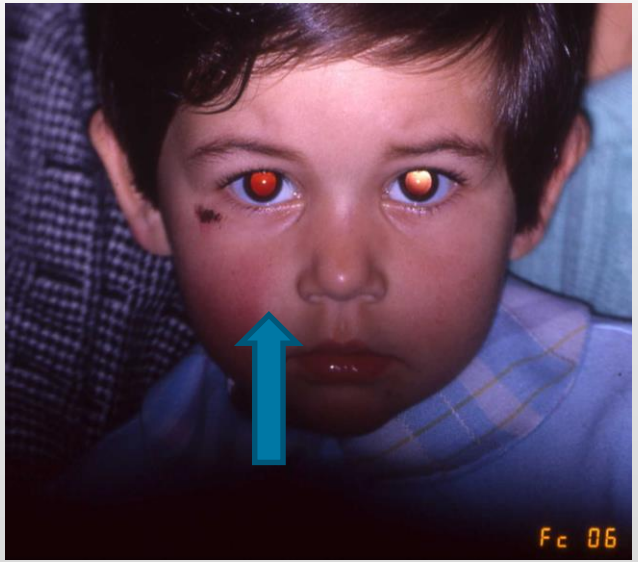
Eccentric Photorefraction

Symultaneous documentation of corneal reflex (1ª Purkynje's image) and retinal reflex generated by a flash Eccentric respect to the camera aperture.

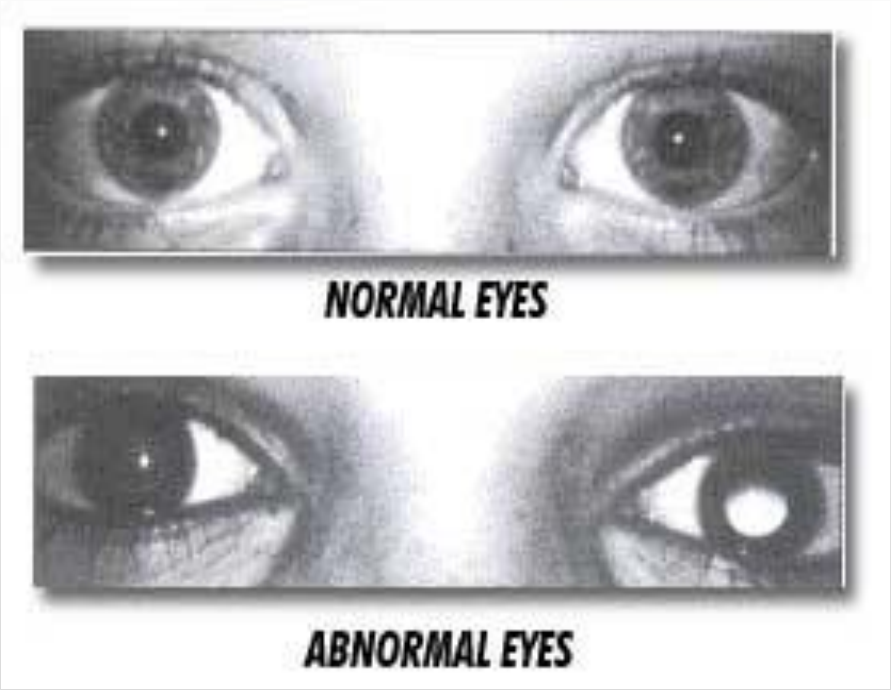


Results of photorefractometric screening for amblyogenic defects in children aged 20 months.

M.R. Angi , Pucci V., Forattini F., Formentin P.A. **Behavioural Brain Research 49: 91-97, 1992.**



1990 MTI Photo-screener Polaroid



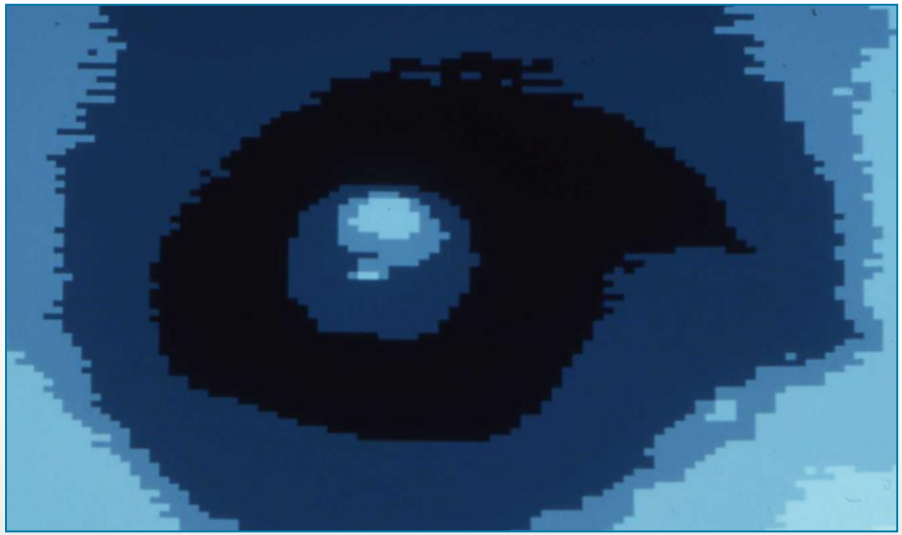
1992 Vi VA

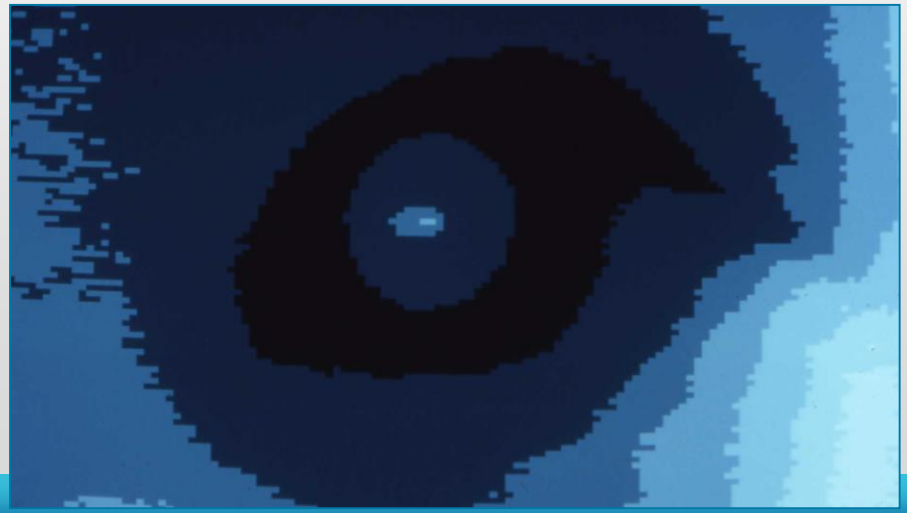
Infrared Vision Analyzer (Refraction + Strabismus + VA)

Binocular videorefractoscope for visual screening in infancy

M.R. Angi, L. Bergamo, C. Bisantis German Journal Ophthalmology 2: 182-188, 1993.

1992 ViVA





1996 European Concerted Action, Padova

Prototype PowerRefractor

Frank Schaeffel

Oliver Braddick

2000 PowerRefractor I

(PlusoptiX, Nuremburg, Germany)

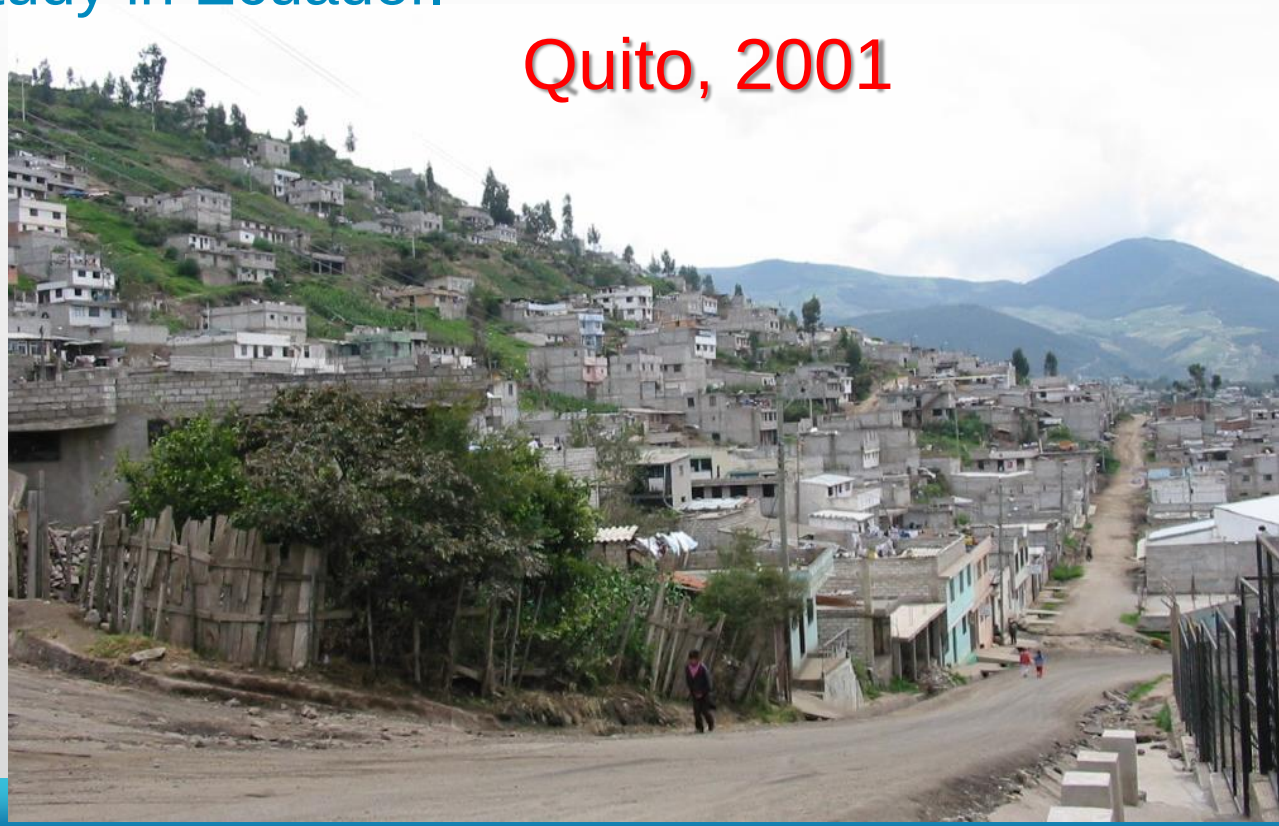
6 IR LED arrays (30°, 90°, 150° and the respective opposite orientations)

Real-time image acquisition, continue sequence (processing frequence 25 Hz)

Windows 95/98/NT

PowerRefractor versus Canon R-50 Autorefraction to assess refractive error in children: a community-based study in Ecuador.

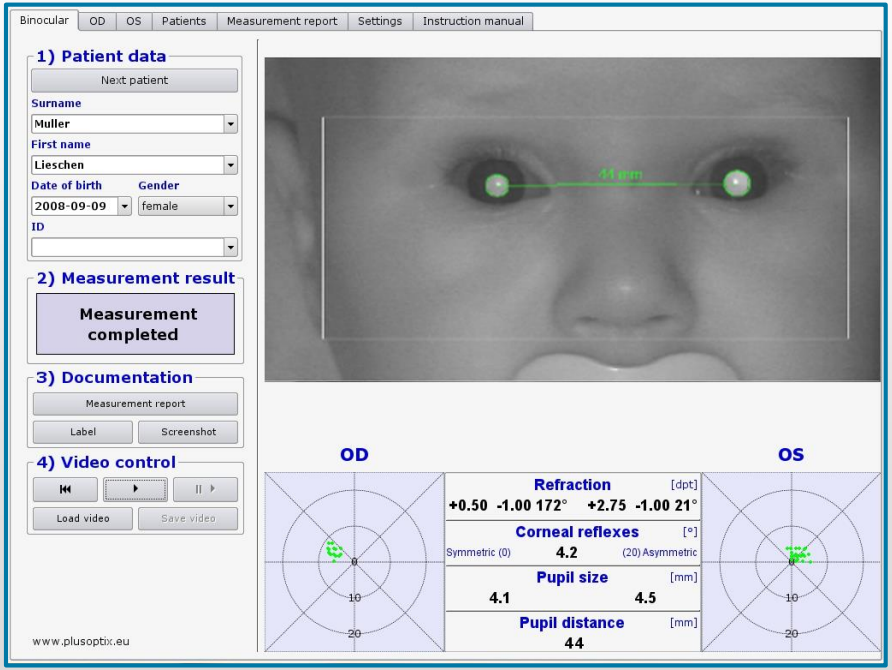
Virgili G, Angi M, Heede S, Rodriguez D, Bottega E, Molinari A.
Optom Vis Sci. 2007; 84:144–8.




he hi
cha chu
chalche
fa fe fi fo fu
ja je ji jo ju
ya ye yi yu
xa xe xi xo xu
za zu

2005 PlusOptix Vision Screener

(PlusoptiX, Nuremburg, Germany)

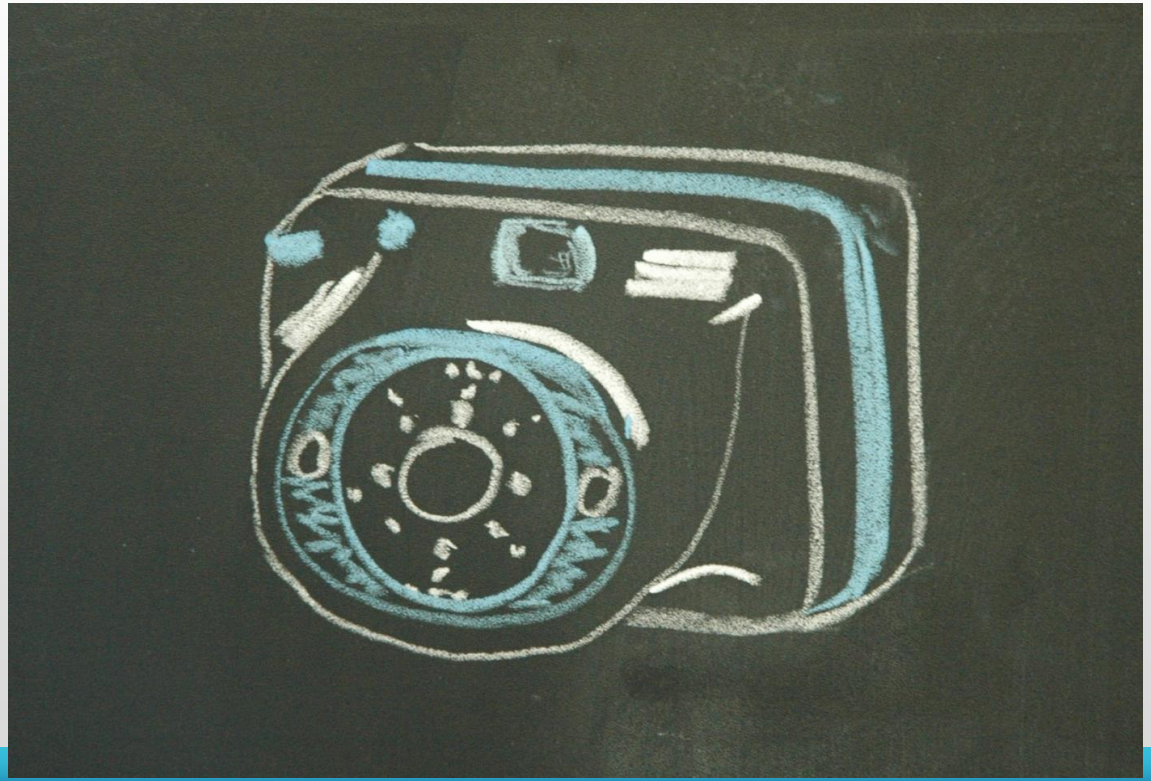


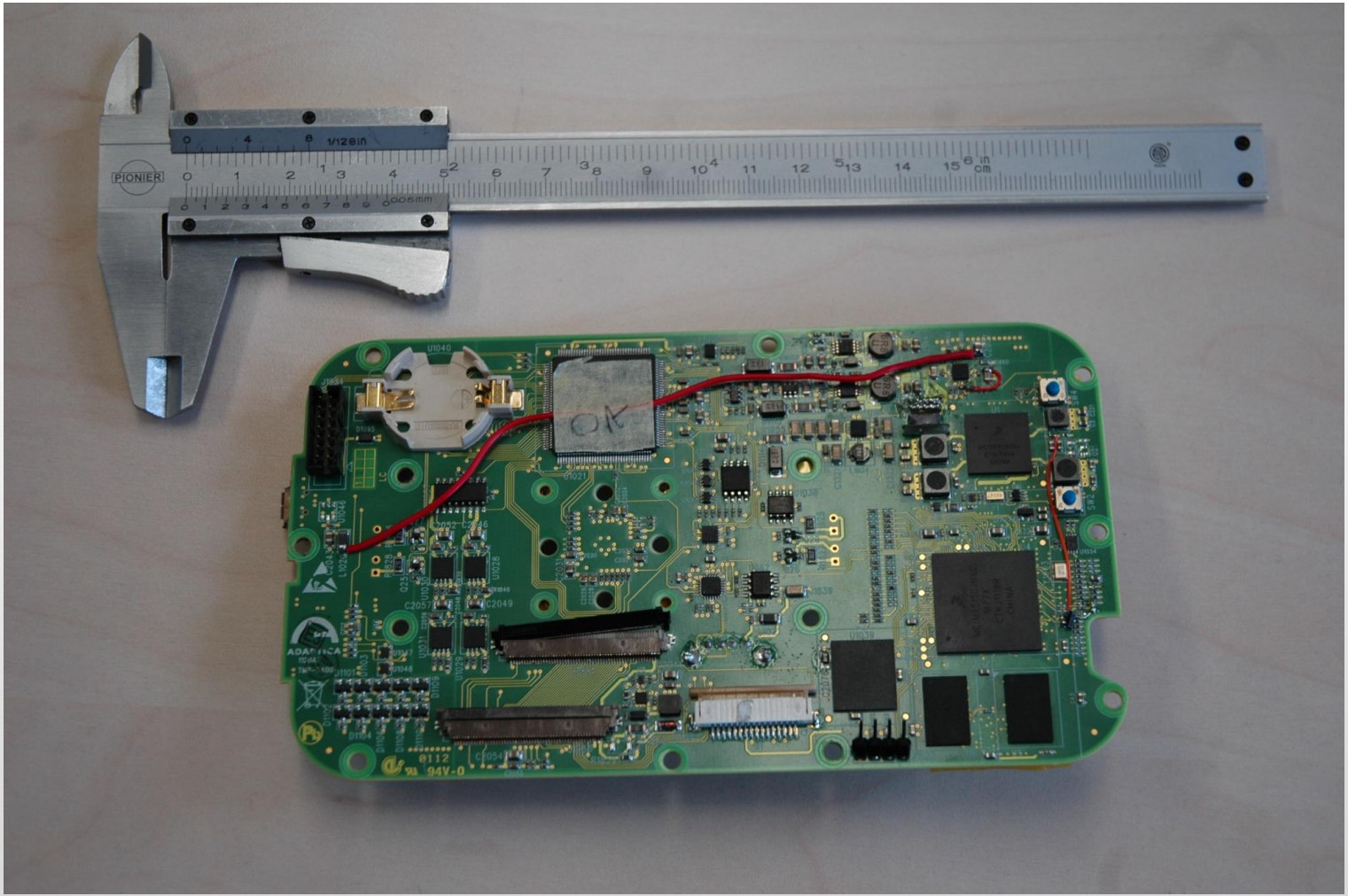
2008 PlusoptiX A09

(PlusoptiX, Nuremburg, Germany)

2010

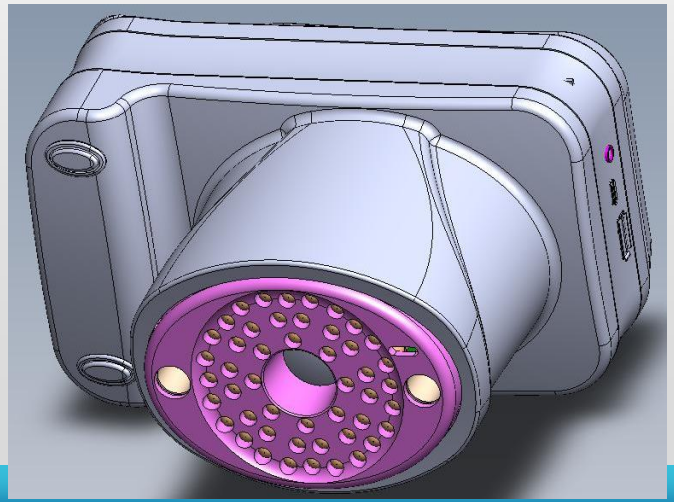
«Why not a portable videorefractor, like a camera ?»




PIONIER
1/128in
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 in
cm
OK

2000

2012



2012 2WIN Videorefractometer

(Adaptica, Padua, Italy)

PEDIATRICS®
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Instrument-based Pediatric Vision Screening Policy Statement

American Academy of Pediatrics

American Academy of Ophthalmology

29 October 2012

Policy Statement

Photoscreening and handheld autorefraction may be electively performed in children 6 months to 3 years of age, allowing earlier detection of conditions that may lead to amblyopia, as well as in older children who are unable or unwilling to cooperate with routine acuity screening.

2014 PlusoptiX S12 Mobile Screener

(PlusoptiX, Nuremburg, Germany

Vision Screening for Children 36 to < 72 Months: Recommended Practices

Cotter et al. Optom Vis Sci 2015;92:6Y16

Visual Acuity (HOTV – LEA)

Autorefractometer

Photo-screening

Photo- and Video- Refractometers

Arnold et al. (2002 - 2012)

2013 (Darwinian selection…)

AMBLYOPIA (LEFT EYE)

ADAPTICA

Sharp vision

Blurred vision

VISUAL SCREENING

ADAPTICA

AMBLYOPIA:

delayed development of visual system, due to an anomalous visual experience in early life

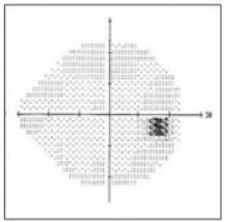
AMBLYOGENIC FACTORS

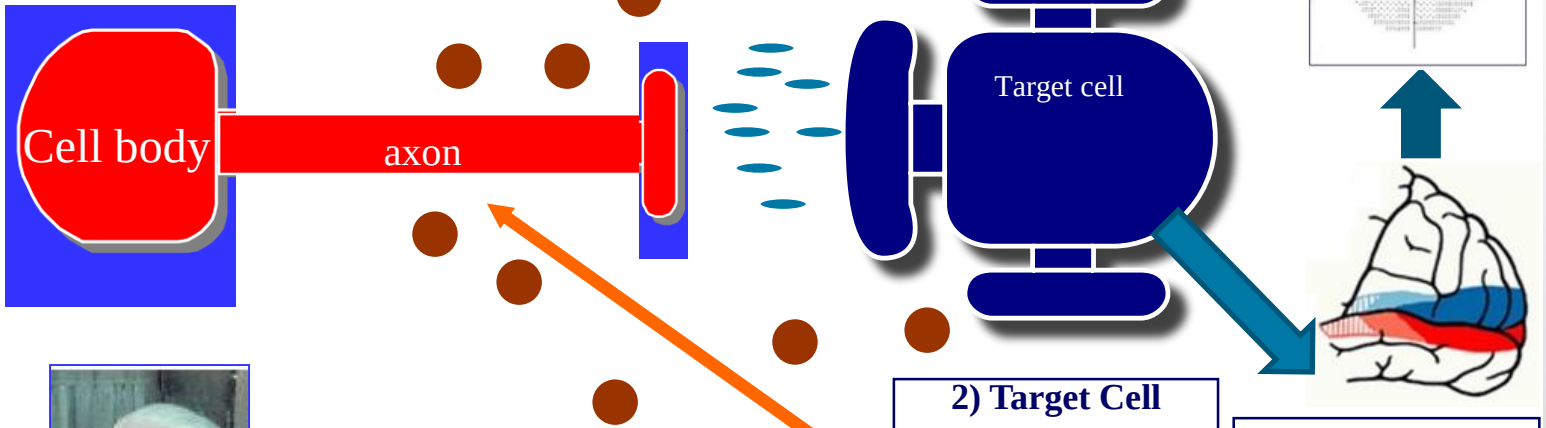
- Refractive errors: hyperopia, myopia, astigmatism
- Strabismus
- Anisometropia
- Media Opacities: cataract, leucoma, ptosis, retinoblastoma

Visual pathway

1) Release of neurotrasmitter

Normal visual perception



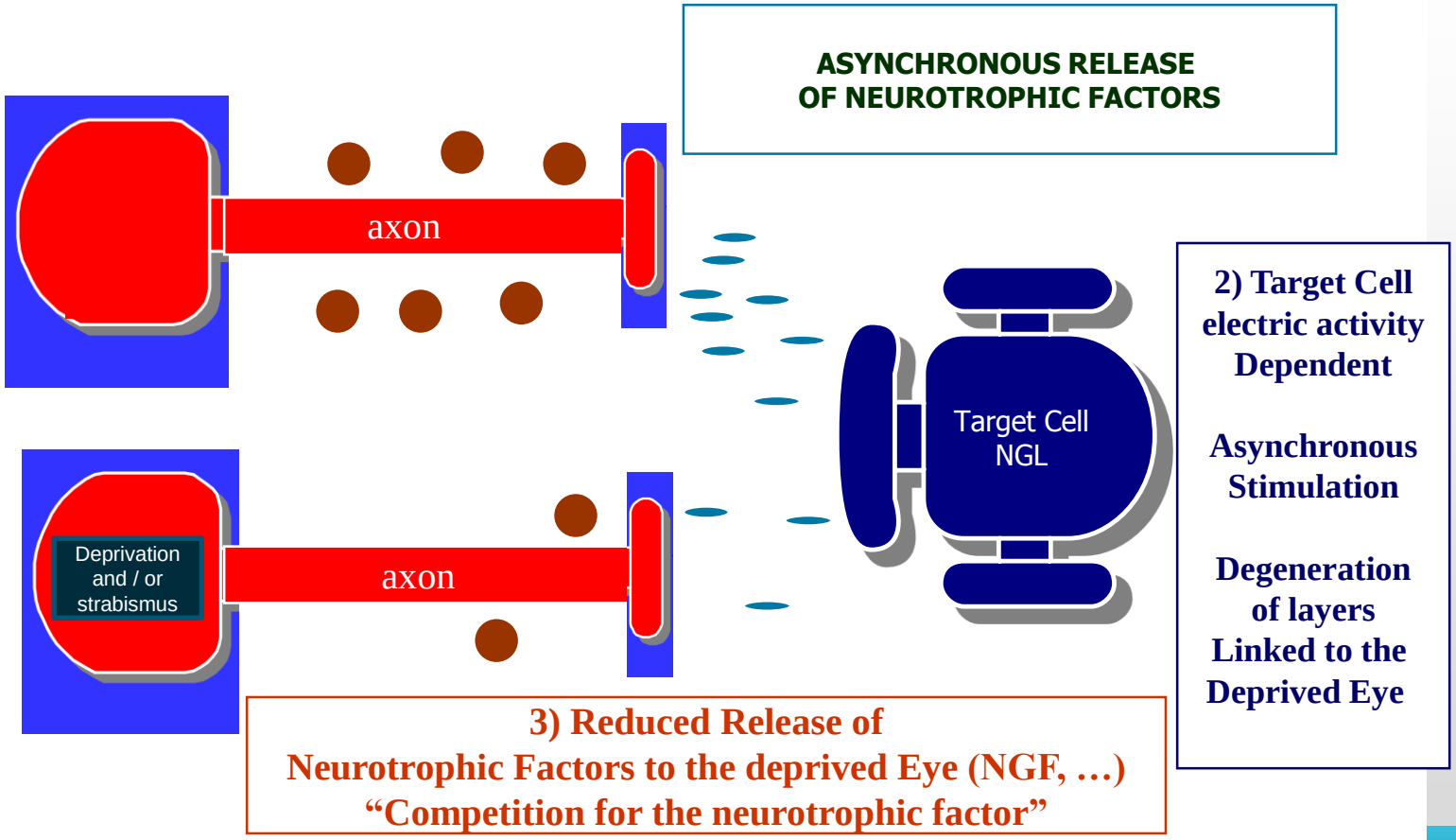


2) Target Cell Electric activity dependent

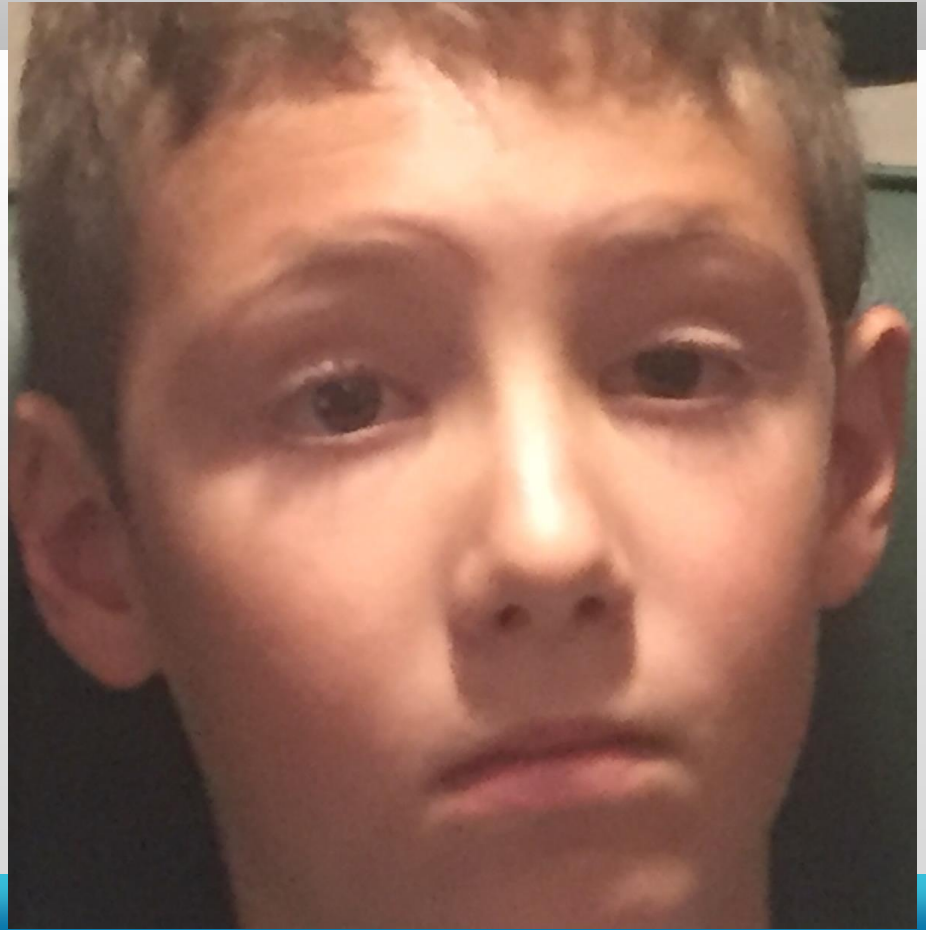
3) Bioelectric Input To visual Cortex

3) Release of Neurotrophic Factors (NGF, BDNF…)

Nucleo Genicolato laterale e deficit della visione binoculare



Aniso-hyperopia RE: +3 sf LE +0.75 sf



ADAPTICA

----------3577----------
4/SEP/2018 16:51
VD=12.00mm

	S	C	A	
<R>				
	+ 0.25	- 1.00	13	9
	+ 0.25	- 1.00	12	9
	+ 0.75	- 1.00	13	9
	+ 0.25	+ 0.75	103	9
	+ 0.75	+ 0.75	102	9
	+ 0.50	+ 0.75	102	9
	+ 1.00	+ 0.75	100	9
	<+ 0.25	+ 0.75	102>	
PS	4.7			
<L>	S	C	A	
	- 0.25	- 0.50	160	8
	+ 0.00	- 0.50	152	8
	+ 0.25	- 0.75	149	8
	+ 0.00	- 0.50	170	8
	+ 0.00	- 0.50	177	8
	<+ 0.00	- 0.50	160>	
PS	5.3			

PD 54

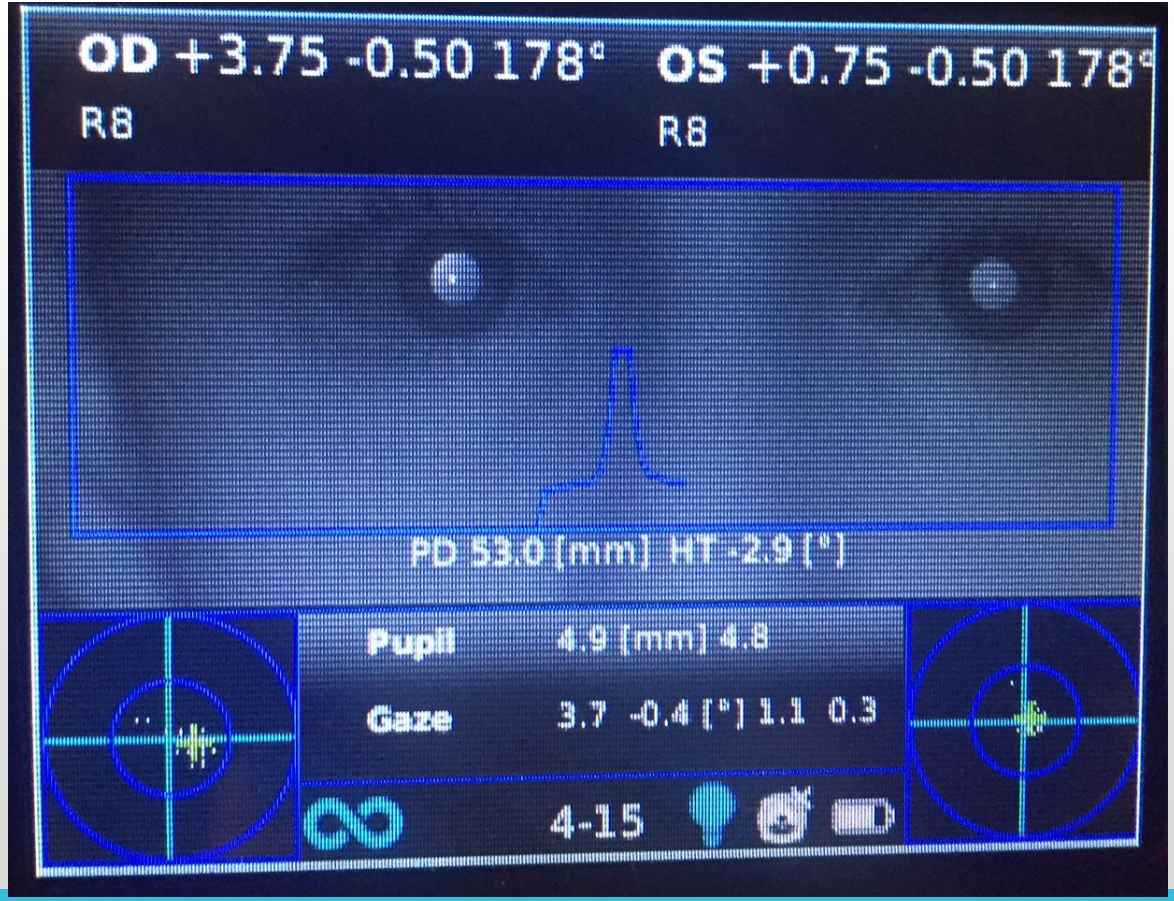
----------3577----------

4/SEP/2018 16:51

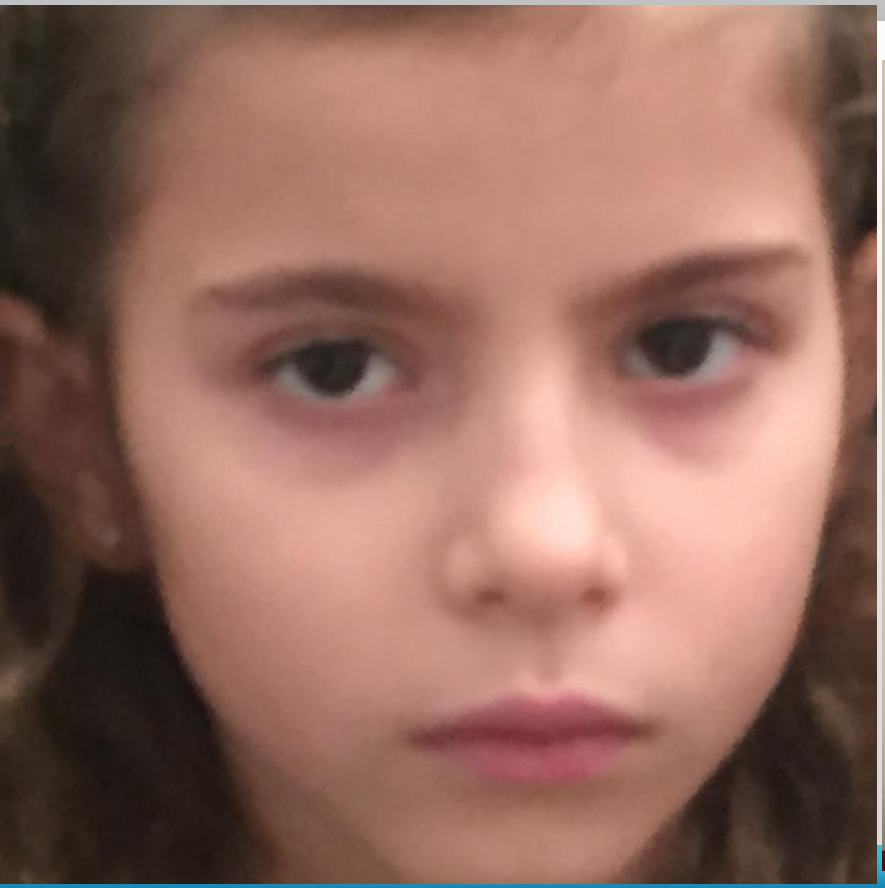
VD=12.00mm

	S	C	A	
<R>				
	+0.25	-1.00	13	9
	+0.25	-1.00	12	9
	+0.75	-1.00	13	9
	+0.25	+0.75	103	9
	+0.75	+0.75	102	9
	+0.50	+0.75	102	9
	+1.00	+0.75	100	9
	<+0.25	+0.75	102>	
PS	4.7			
<L>	S	C	A	
	-0.25	-0.50	160	8
	+0.00	-0.50	152	8
	+0.25	-0.75	149	8
	+0.00	-0.50	170	8
	+0.00	-0.50	177	8
	<+0.00	-0.50	160>	
PS	5.3			

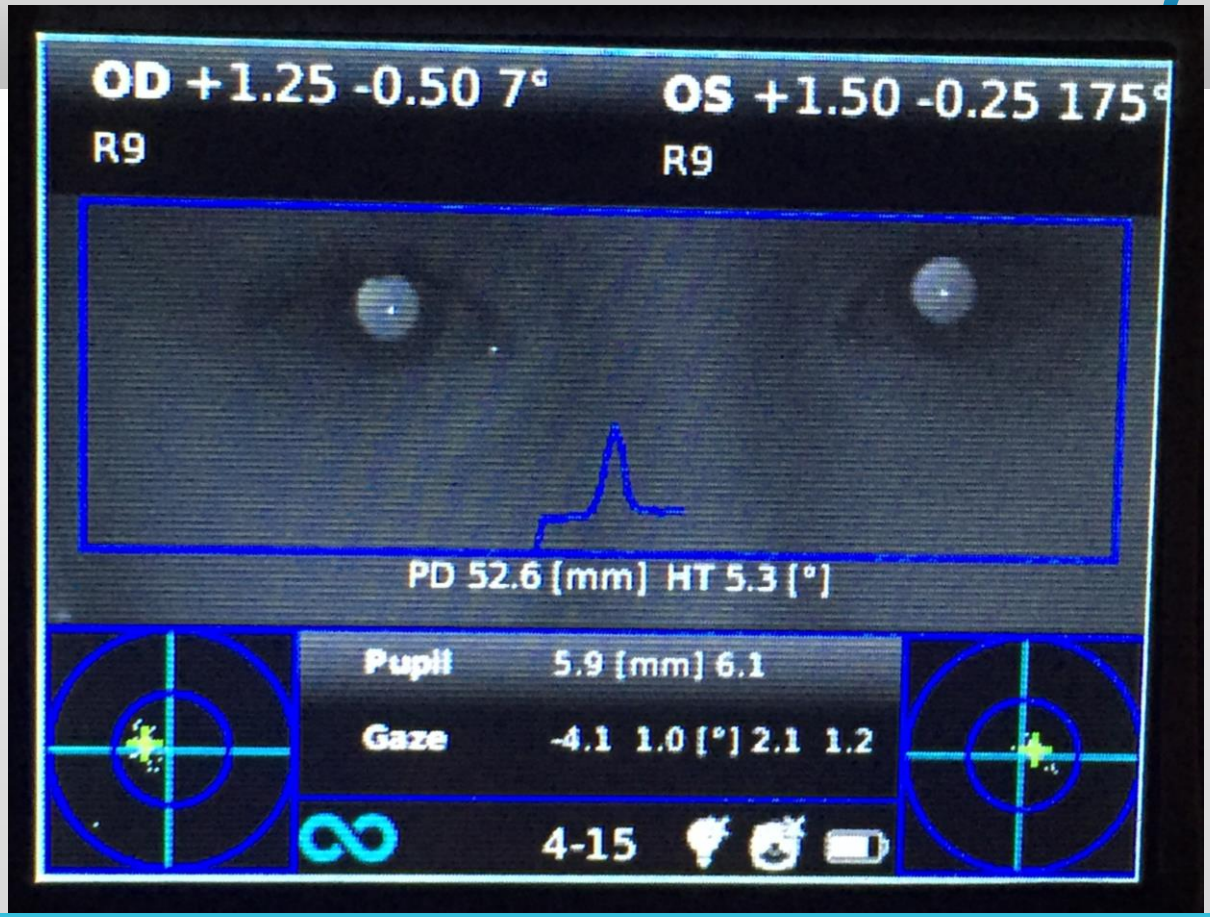
PD 54



Hyperopia




exo - ortho
----------6147----------
NAME M/F
8/JAN/2019 17:33
VD=12.00mm
<R> S C A
+ 0.50 + 0.25 118 9
+ 0.25 + 0.50 119 9
+ 0.50 + 0.25 118 9
+ 0.50 + 0.25 120 9
+ 0.50 + 0.25 119 9
<+ 0.50 + 0.25 119>
<L> S C A
+ 0.25 + 0.25 85 9
+ 0.25 + 0.25 82 9
+ 0.25 + 0.25 83 9
+ 0.25 + 0.50 84 9
+ 0.00 + 0.50 84 9
<+ 0.25 + 0.25 84>
PD 51
----------4202----------
8/JAN/2019 19:26
VD=12.00mm
<R> S C A
+ 1.50 + 0.25 110 9
+ 1.50 + 0.25 112 9
+ 1.50 + 0.25 109 9
+ 1.50 + 0.25 112 9
+ 1.50 + 0.25 108 9
<+ 1.50 + 0.25 110>
PS 7.0
<L> S C A
+ 1.00 + 0.50 83 9
+ 1.00 + 0.50 82 9
+ 1.00 + 0.50 83 9
+ 1.00 + 0.50 81 9
+ 1.00 + 0.50 82 9
<+ 1.00 + 0.50 82>
PS 7.1
PD 54
ortho


OD +1.25 -0.50 7°
R9
OS +1.50 -0.25 175°
R9
PD 52.6 [mm] HT 5.3 [°]
Pupil 5.9 [mm] 6.1
Gaze -4.1 1.0 [°] 2.1 1.2
4-15

Instrument myopia

----------4149----------
17/DEC/2018 18:06
VD=12.00mm

	S	C	A	
<R>				
	- 0.50	- 0.25	22	9
	- 0.75	+ 0.00	0	9
	- 1.50	- 0.25	35	9
	- 1.25	- 0.25	25	9
	- 1.25	- 0.25	34	8
	- 1.50	- 0.25	42	8
	<- 1.25	- 0.25	34>	
PS	6.0			
<L>	S	C	A	
	- 0.50	+ 0.00	0	9
	- 0.75	+ 0.00	0	9
	- 0.75	+ 0.00	0	9
	- 0.25	- 0.25	81	8
	- 0.75	+ 0.00	0	9
	<- 0.75	+ 0.00	0>	
PS	5.5			

PD 55

Prof. Mario R. Angi

Medico Chirurgo
Specialista in Oftalmologia

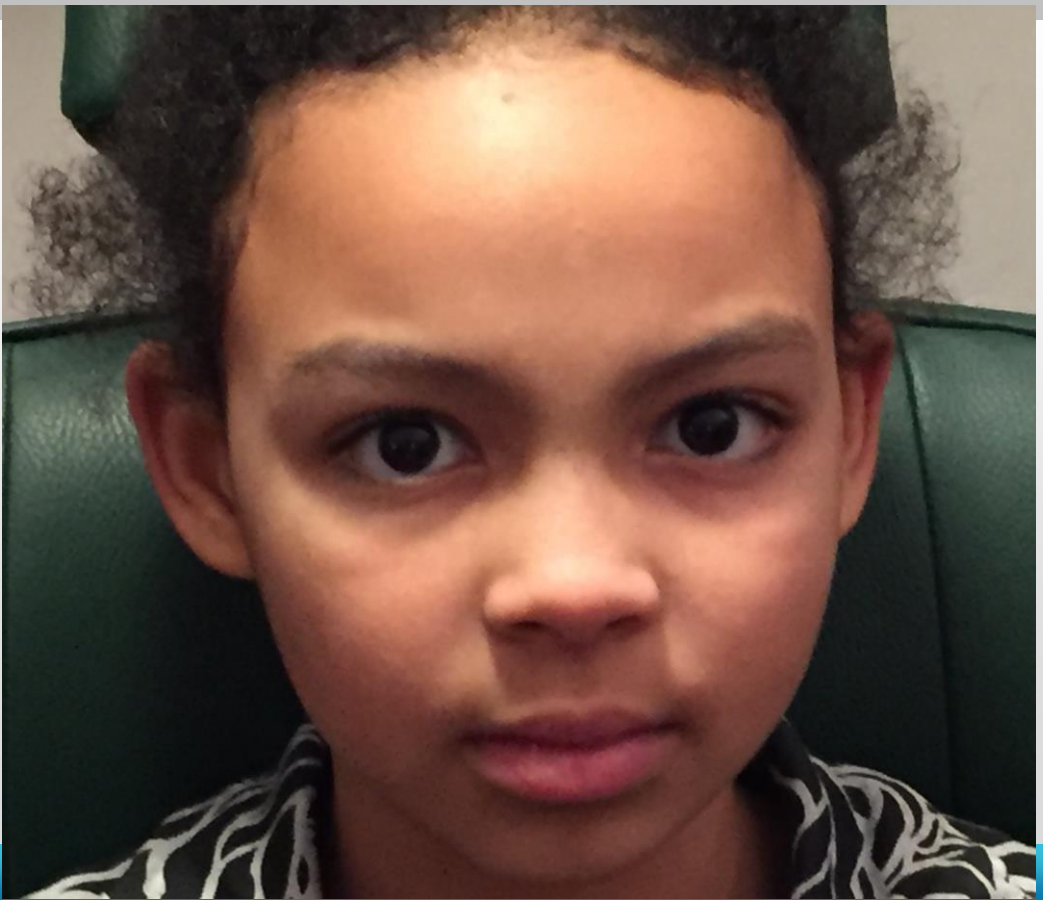
Scheda Clinica

(da riportare al controllo)

Giulia


OD +0.75 0.00 0°
R7
OS +1.25 0.00 0°
R8
PD n.a
HT 0.6 [°]
Pupil 5.4 [mm] 4.9
Gaze -6.5 -0.3 [°] 5.1 0.3
4-15

True myopia



----------4150----------
17/DEC/2018 18:24
VD=12.00mm

	S	C	A	
<R>				
	- 1.00	- 1.00	8	9
	- 1.00	- 1.00	10	9
	- 1.25	- 1.00	9	9
	- 1.25	- 0.75	10	9
	- 1.25	- 1.00	10	9
	<- 1.00	- 1.00	10>	
PS	7.3			
<L>				
	- 1.75	- 1.00	164	9
	- 1.75	- 1.00	166	9
	- 1.75	- 1.00	164	9
	- 1.75	- 1.00	163	9
	- 1.75	- 1.00	164	9
	<- 1.75	- 1.00	164>	
PS	7.5			

PD 62

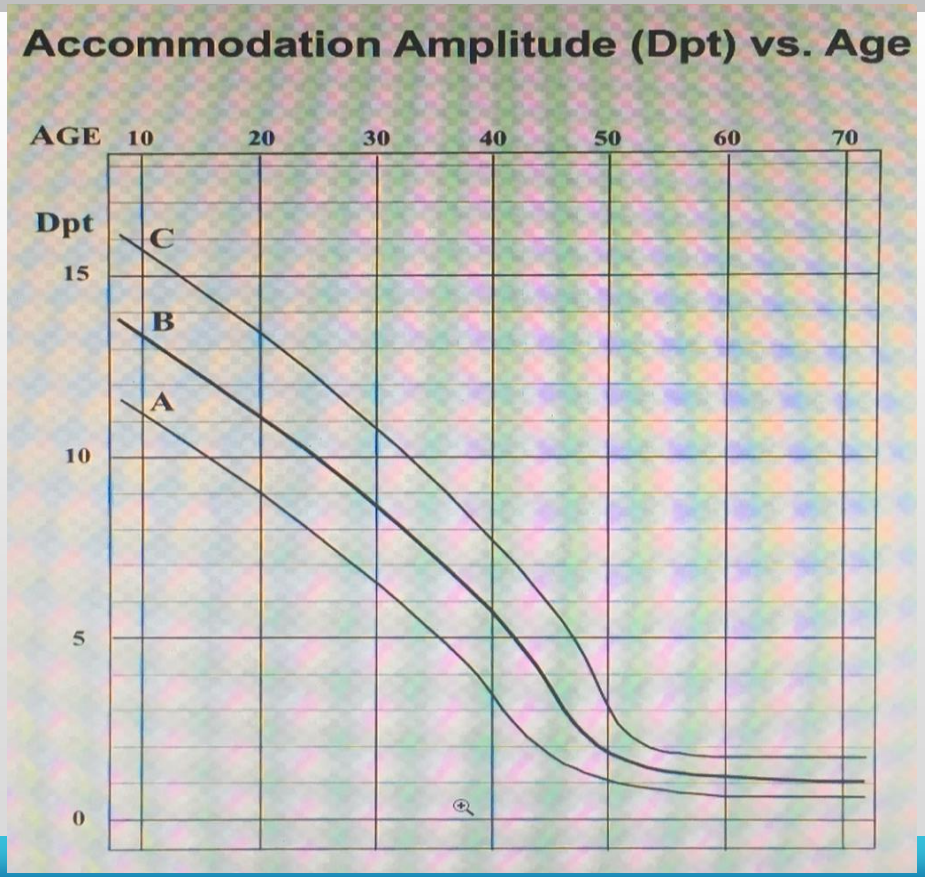

OD -0.75 -1.25 8°
R9
OS -2.00 -1.50 163°
R9
PD 58.7 [mm] HT 2.5 [°]
Pupil 7.2 [mm] 7.3
Gaze -2.1 2.0 [°] 3.2 1.4
4-15

ACCOMODATION

ADAPTICA

Accommodation is the process by which the vertebrate eye changes optical power to maintain a clear image or focus on an object as its distance varies.

Its amplitude is maximal at birth, and decreases steadily with age.




OD +4.25 +1.50 110° OS +4.50 +1.50 72°
R7 HIGH H
R7 HIGH H
PD 54.2 [mm] HT 0.1 [°]
Pupil 3.4 [mm] 3.6
Gaze -4.3 -0.6 [°] 3.7 -1.4
4-15

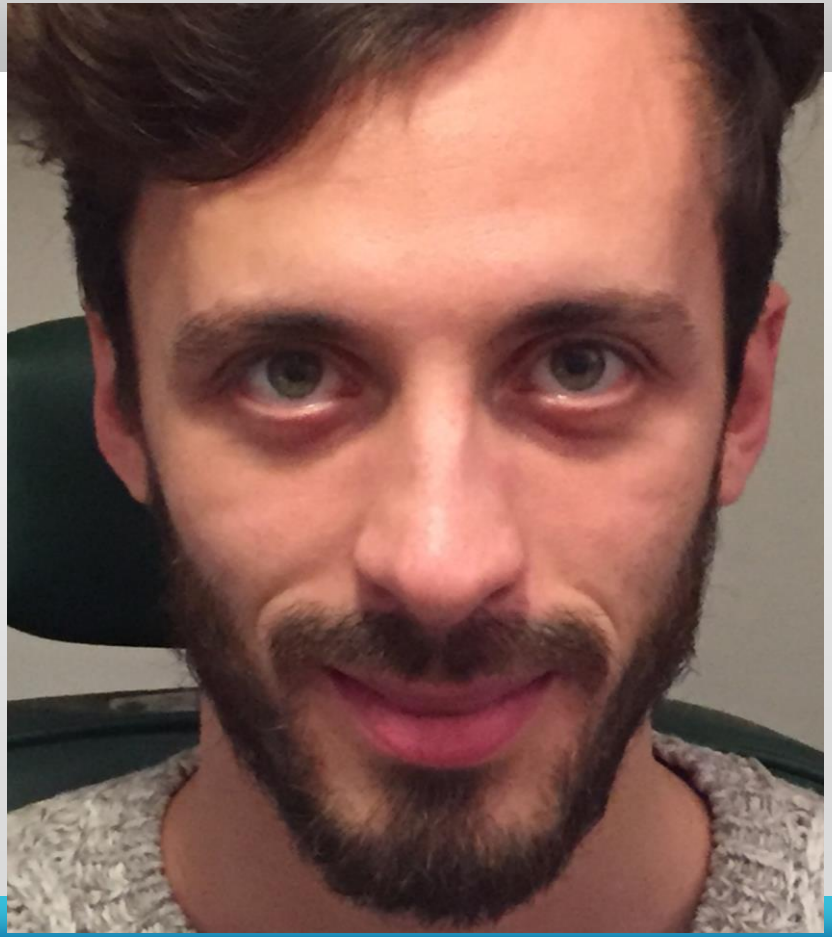

OD -0.25 +0.50 102°
OS +0.25 +0.50 120
R7
R8
PD n.a
HT 0.5 [°]
Pupil
5.7 [mm] 5.8
Gaze
-5.5 0.6 [°] 4.1 -0.7
4-15

High Myopia


OD -7.75 -0.75 116°
OS -8.00 -0.50 8°
R8 HIGH M
R9 HIGH M
PD 60.8 [mm] HT 2.9 [°]
Pupil 7.2 [mm] 7.0
Gaze -4.2 1.3 [°] 0.1 -0.4
15-50


8/JAN/2019 17:49
VD=12.00mm
<R> S C A
- 7.00 - 0.50 72 9
- 7.00 - 0.50 71 9
- 7.00 - 0.50 71 9
- 7.00 - 0.50 74 9
- 7.00 - 0.50 68 9
<- 7.00 - 0.50 71>
<L> S C A
- 8.25 + 0.00 0 9
- 8.25 + 0.00 0 9
- 8.25 + 0.00 0 9
- 8.25 + 0.00 0 9
- 8.25 + 0.00 0 9
<- 8.25 + 0.00 0>
PD 62
NIDEK AR-1

Emmetropia (computer work)



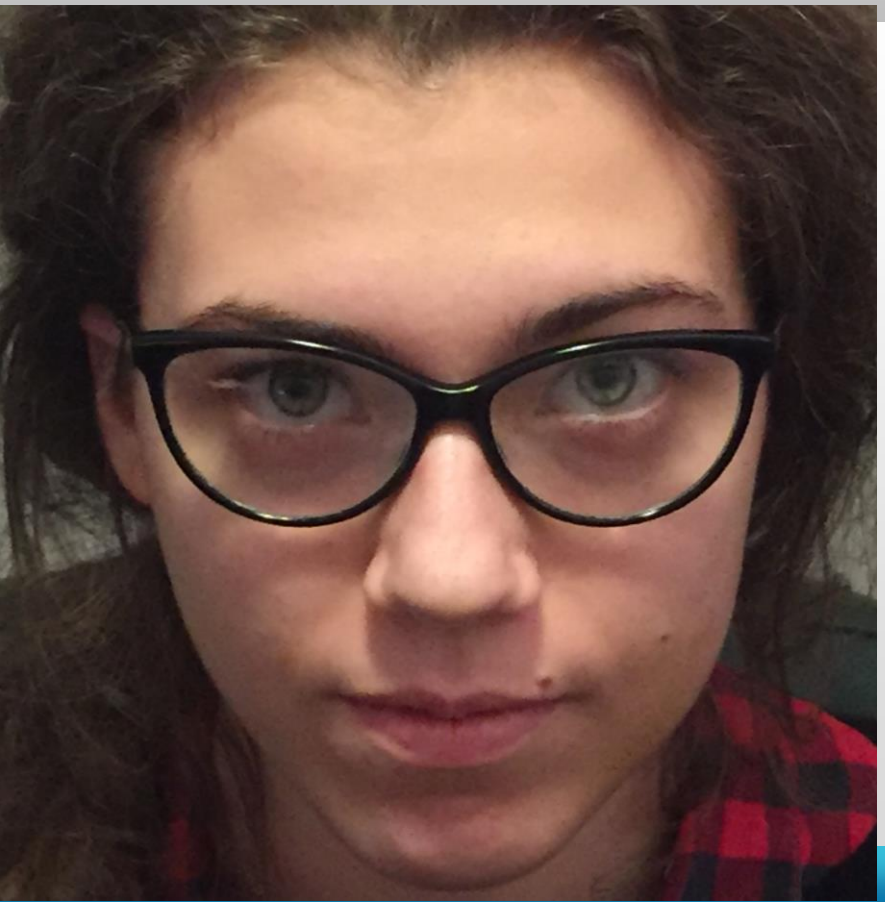
---------4183---------
20/DEC/2018 20:24
VD=12.00mm

		S		C	A	
		+ 0.25	+	0.25	15	9
		+ 0.00	+	0.25	20	9
		+ 0.00	+	0.25	15	9
		+ 0.00	+	0.25	13	9
		+ 0.00	+	0.25	10	9
	<+	0.00	+	0.25	15>	
PS		6.5				
<L>		S		C	A	
		+ 0.00	+	0.25	141	9
		- 0.25	-	0.25	55	9
		- 0.25	-	0.25	54	9
		- 1.00	-	0.50	49	7
		+ 0.00	-	0.25	75	9
		+ 0.25	+	0.25	171	9
		+ 0.25	+	0.25	174	8
	<+	0.00	-	0.25	55>	
PS		6.9				
PD		62				


OD -0.75 0.00 0°
R9
OS -0.50 0.00 0°
R9
PD 61.3 [mm] HT 3.1 [°]
Pupil 6.6 [mm] 6.5
Gaze -5.6 2.0 [°] 5.4 2.1
15-50


OD -0.25 -0.25 28°
R9
OS -0.25 -0.25 178°
R9
PD 61.3 [mm] HT 4.6 [°]
Pupil 7.0 [mm] 7.0
Gaze -4.7 2.2 [°] 4.8 2.0
15-50

Hyperopia: evaluation of the correction



NAME M/F
20/DEC/2018 17:18
VD=12.00mm

	S		C	A	
<R>					
	+ 0.50	+	0.75	15	9
	+ 0.50	+	0.75	15	9
	+ 0.50	+	0.75	15	9
	+ 0.50	+	1.00	13	9
	+ 1.50	+	0.75	10	9
	+ 1.50	+	0.75	19	9
	+ 1.50	+	0.75	17	9
	<+ 0.75	+	0.75	15>	
<L>	S		C	A	
	+ 1.25	+	0.75	119	9
	+ 1.25	+	0.75	121	9
	+ 1.50	+	0.75	119	9
	+ 2.00	+	0.75	117	9
	+ 2.25	+	0.75	116	9
	+ 2.25	+	0.75	116	9
	+ 2.25	+	0.75	118	9
	<+ 2.00	+	0.75	118>	

PD 61


OD -0.25 +0.50 88°
R9
OS +0.50 0.00 0°
R9
PD 60.4 [mm] HT 2.3 [°]
Pupil 5.2 [mm] 5.4
Gaze -5.3 2.0 [°] 2.5 -0.5
15-50


OD 2.50 -8.25 9°
R8 HIGH M
OS 1.75 -7.25 172°
R7 HIGH M
PD 56 [mm]
HT -5.3 [°]
Pupil 5.6 [mm] 5.8
Gaze -4.0 -1.0 [°] 5.4 -0.2
Q3-6y


COSMOS
PENSAMIENTO
CORDEPAZ
CORDEPAZ


cbm
insieme per fare di più

KALEIDOS

2019

Scotopic Mydriasis
Autofocus (1 meter)
User-friendly
Long-lasting battery


Interculturalidade

EVOLUTION - REVOLUTION

ADAPTICA

1929 Static Skiascopy Red Reflex
Photo Refraction 1975 Orthogonal
1979 Eccentric
1983 Isotropic
1992 **Video** Refraction ViVA
2000 Power Refractor – PlusoptiX
2013 Spot
2013 2Win Adaptica
2019 Kaleidos
2020 Kaleidos + Artificial Intelligence


That's all Folks!