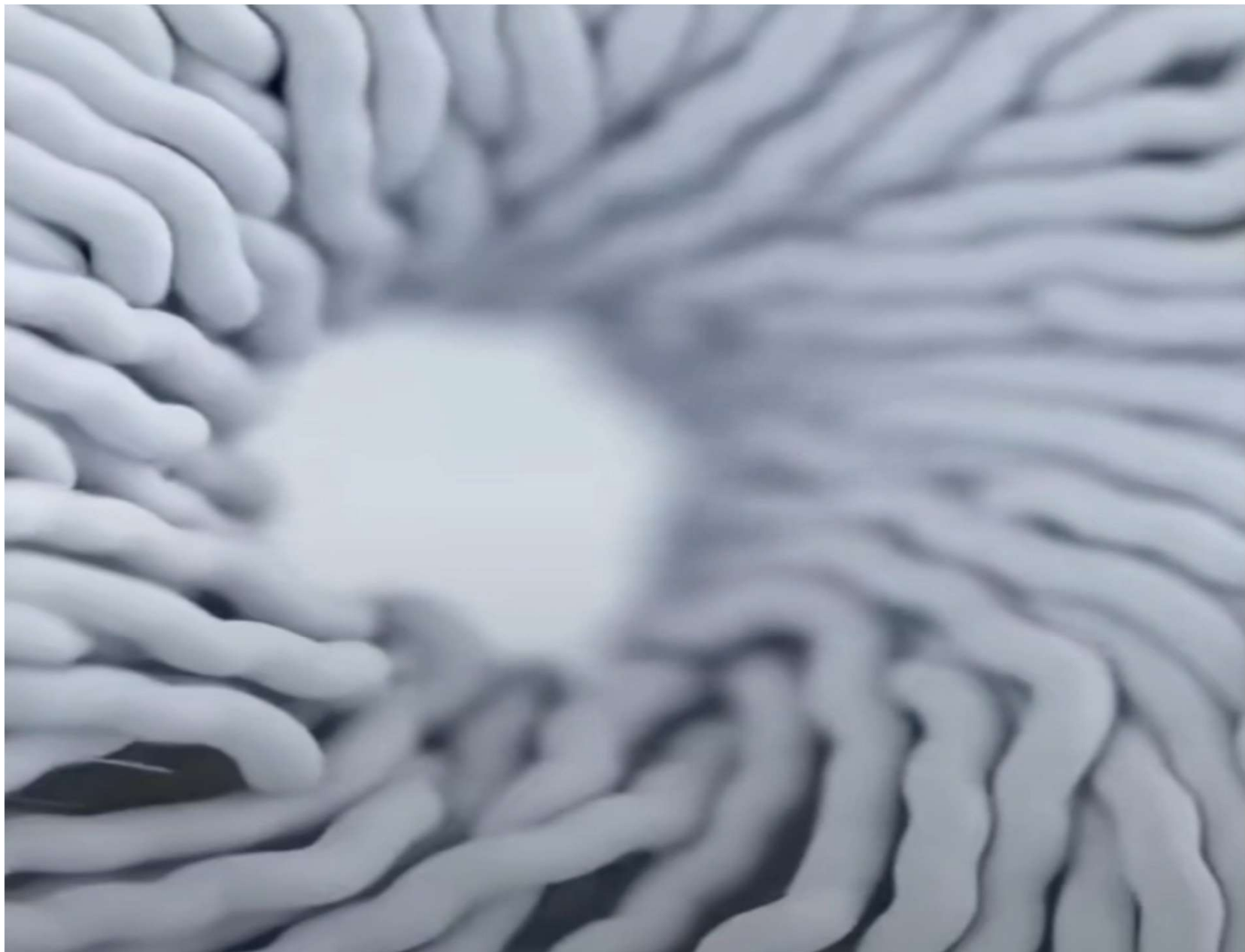




New Retinopathy of prematurity guidelines

By Dr Zola Ncube

- Definition of retinopathy of prematurity
- Physiology & pathophysiology
- ROP screening program and recent updates
- Classification of retinopathy of prematurity
- Screening procedure
- Summary and conclusion



Outline of the talk

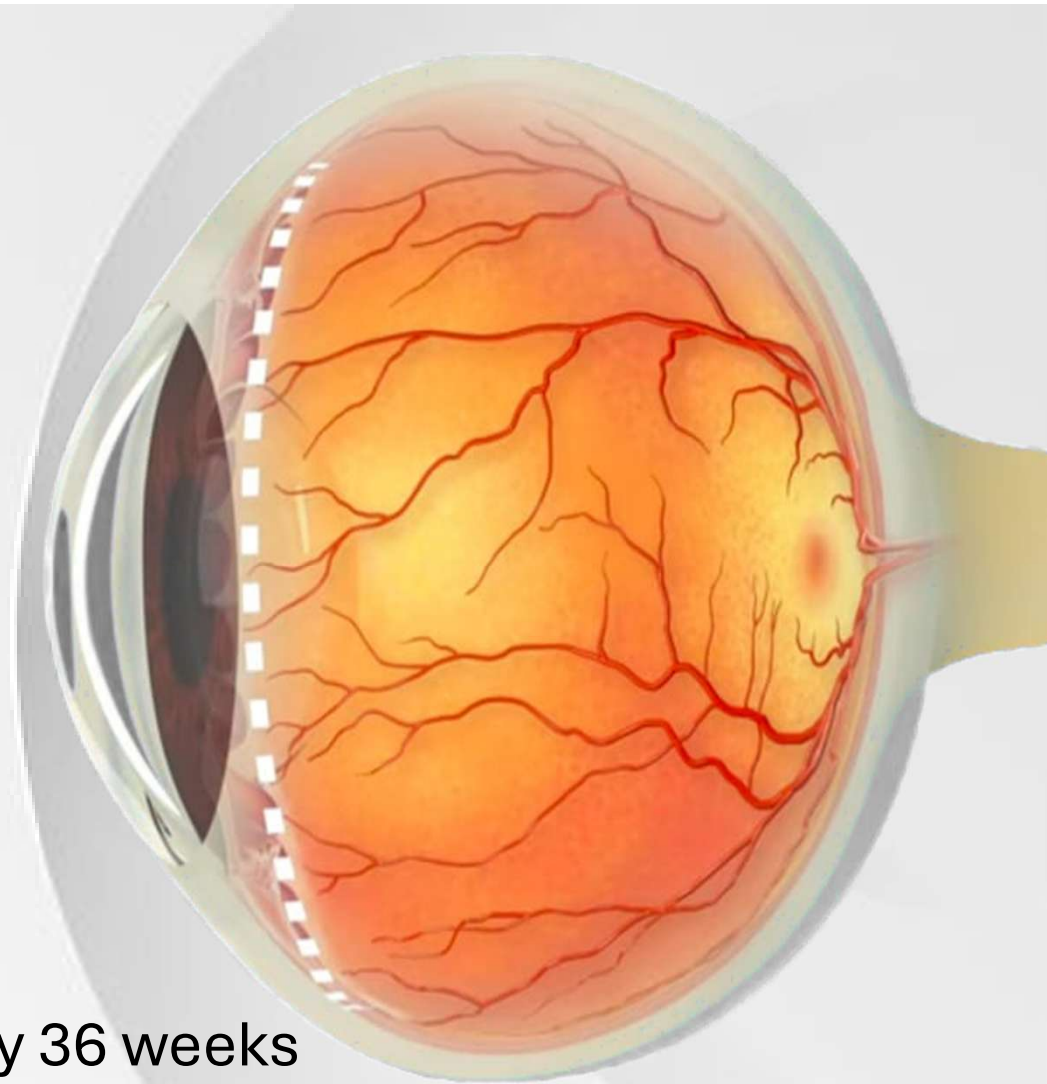
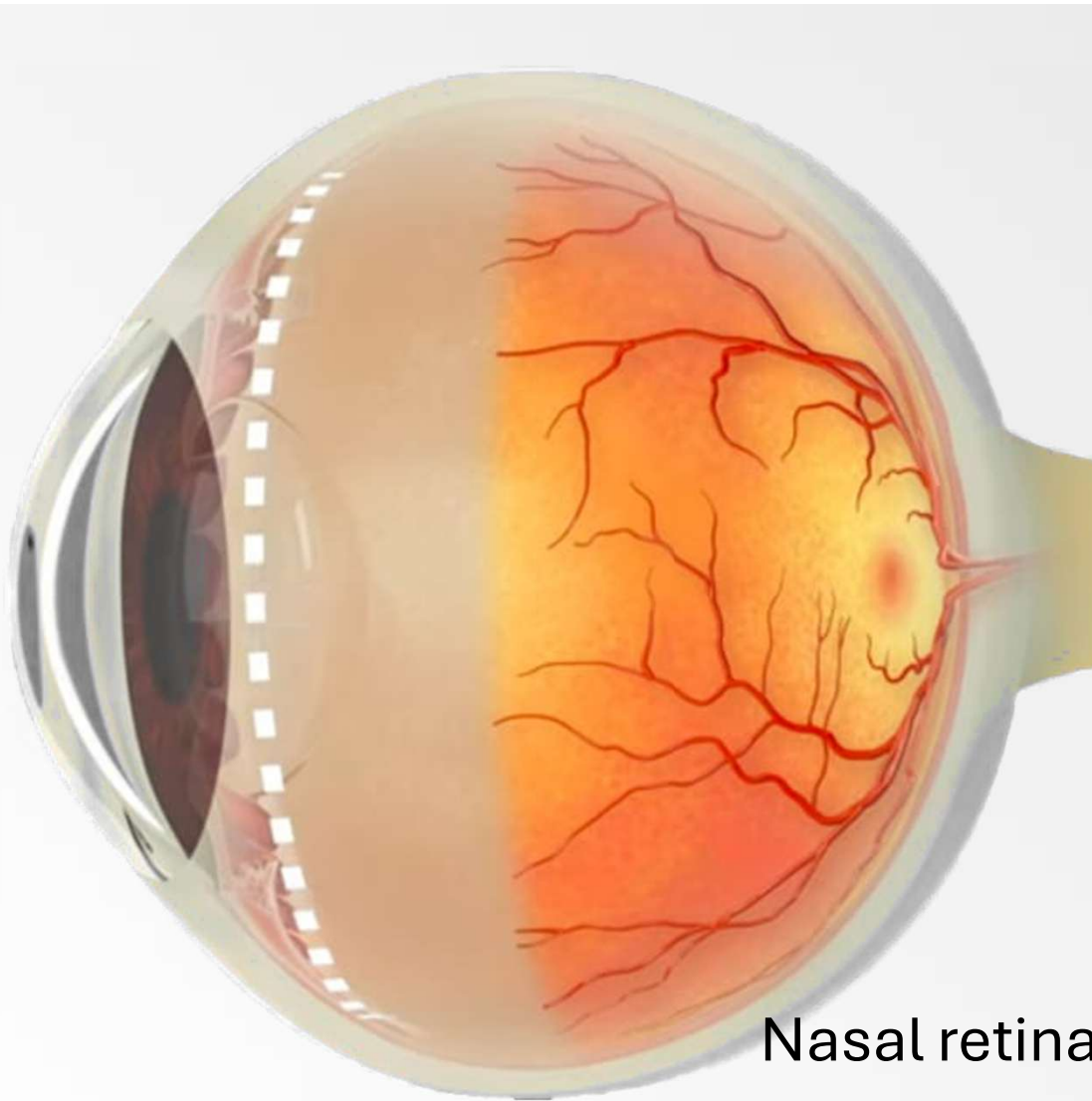
- Developmental vascular proliferative disorder that occurs in the retina of preterm infants
- Recognized as an avoidable cause of blindness in children

**What is
Retinopathy
Of
Prematurity?**

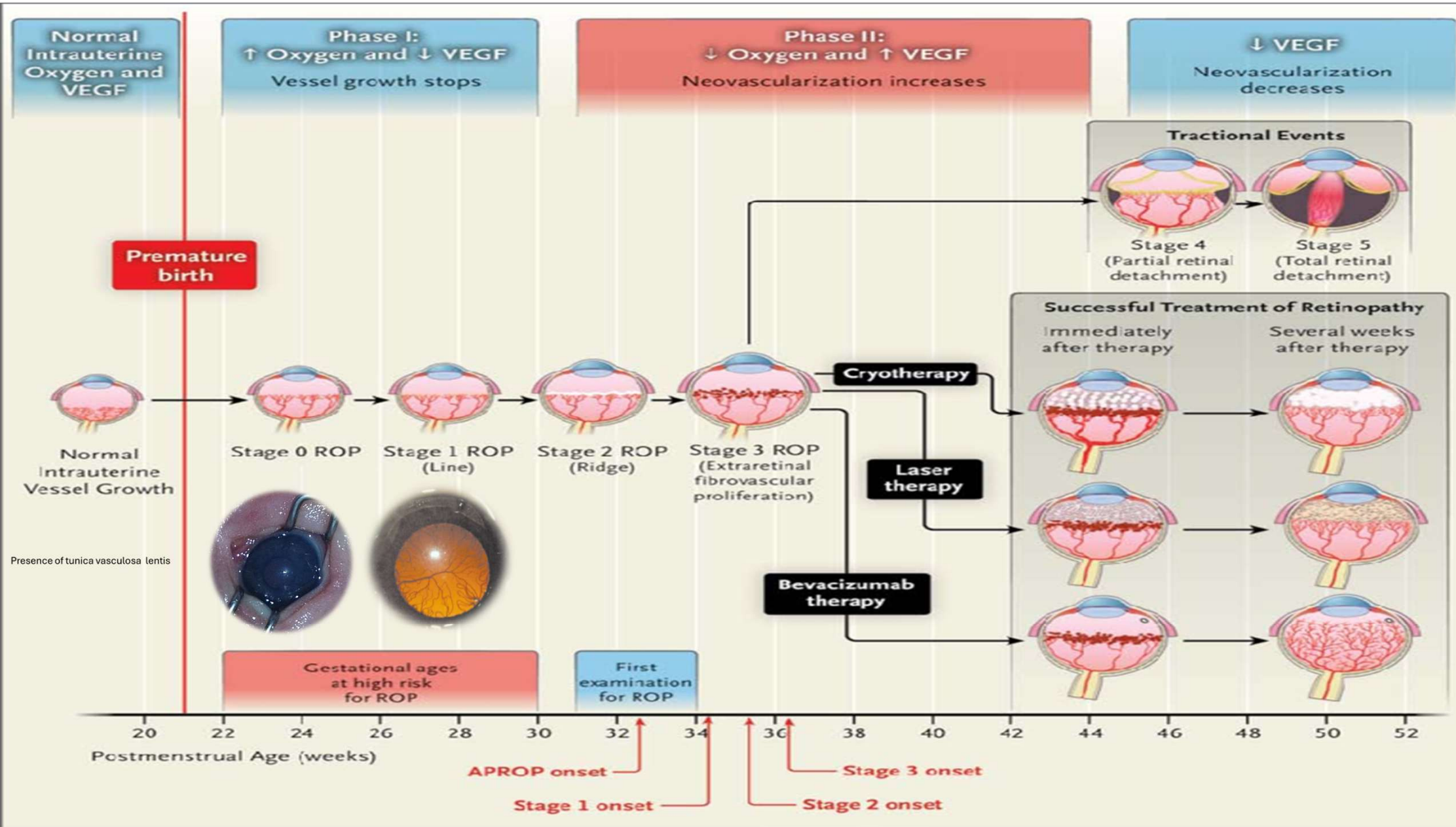
Normal vascularisation

Beginning at 16 weeks





Nasal retina by 36 weeks
Temporal retina by 40
weeks



- All preterm infants <31 weeks gestation
- Consider screening infants 31+ 0 – 6days (changed)
- Neonates <1501g (unchanged)

Who to screen for retinopathy of prematurity

AAP
2018
Who?

- $\leq 1500\text{g}$
- <30 weeks
- $1500\text{g} - 2000\text{g}$ or > 30 weeks at risk
 - Hypotension + inotropes
 - O₂ supplementation
 - O₂ without monitoring

UK 2024

Roya l College of Pediatrics
and Child health +
Ophthalmologist + perinatal
medicine

- Who?
 - <31 weeks gestation
 - Or $<1501\text{g}$
 - $31 + 0$ weeks – 6 weeks considered (low grade)

India
Who?

- 34 weeks
 - >34 weeks + risk factors
 - Birthweight $>2000\text{g}$
- when?
- Before DC from NICU
 - Or by 30 weeks (whichever is first)

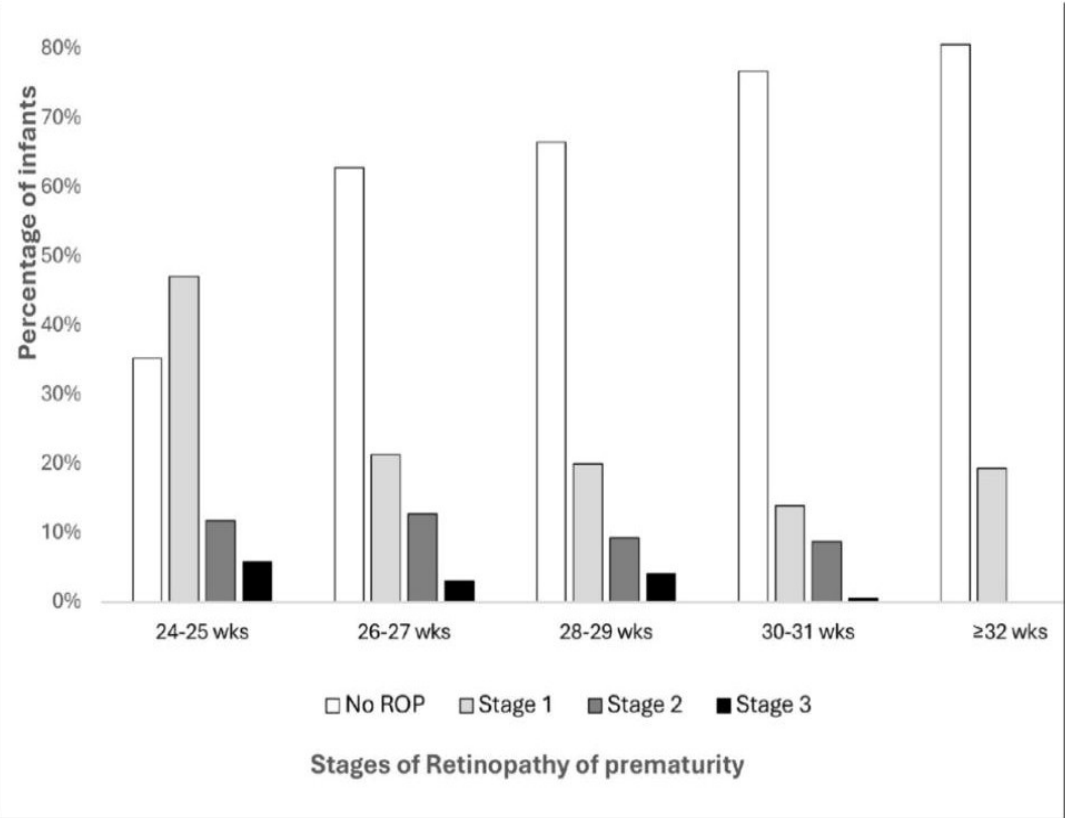
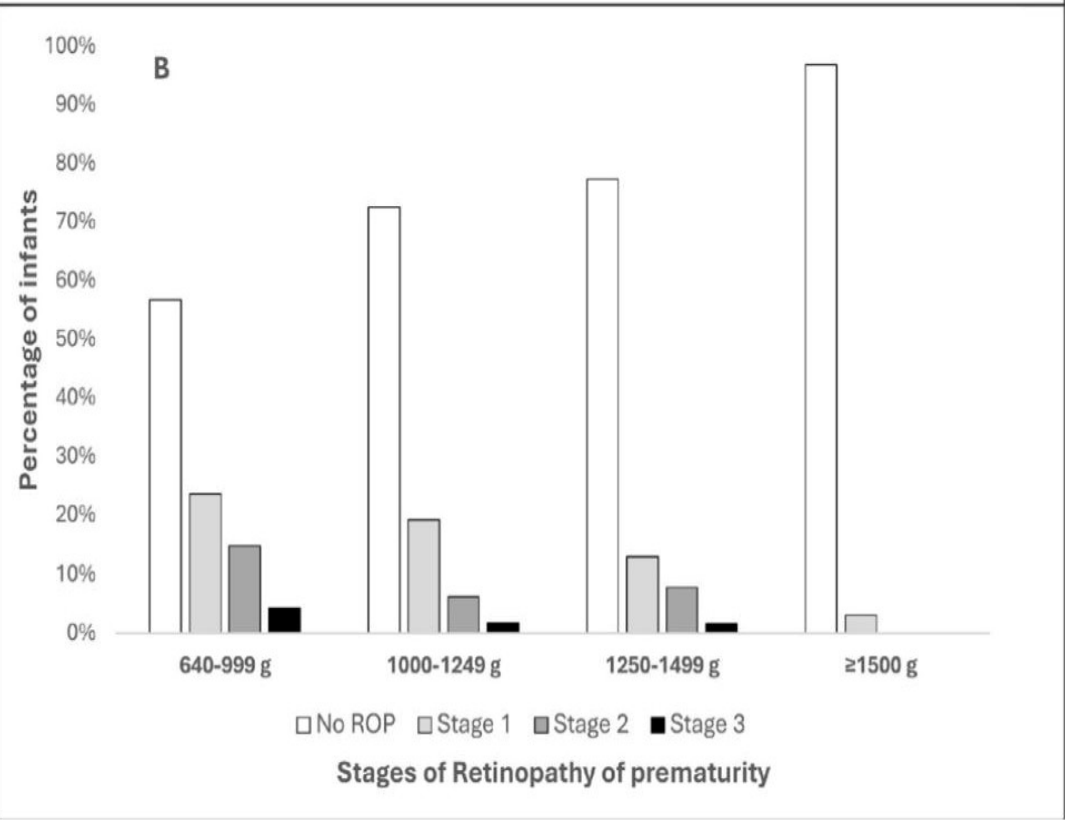
2013 ROP South African working group

- <32
- $<1500\text{g}$
- $1500 - 2000\text{g}$ + risk factors

Van de Lecq *et al* (2025)

1 May 2022 and 31 January 2023, 1879 infants were born in the region who fulfilled the GA or BW criteria for screening, that is, GA<32 completed weeks, or BW<1250 g

Maximum stage of ROP in infants screened for ROP (n =696), by gestational age and birth weight



- <31 weeks: Whichever is later
 - 31 + 0 to 31 +6 PMA
 - 4 weeks PNA
- ≥ 31 weeks: Whichever is sooner
 - 36 +0 and 36+6 PMA
 - 4 weeks PNA

When to screen for retinopathy of prematurity

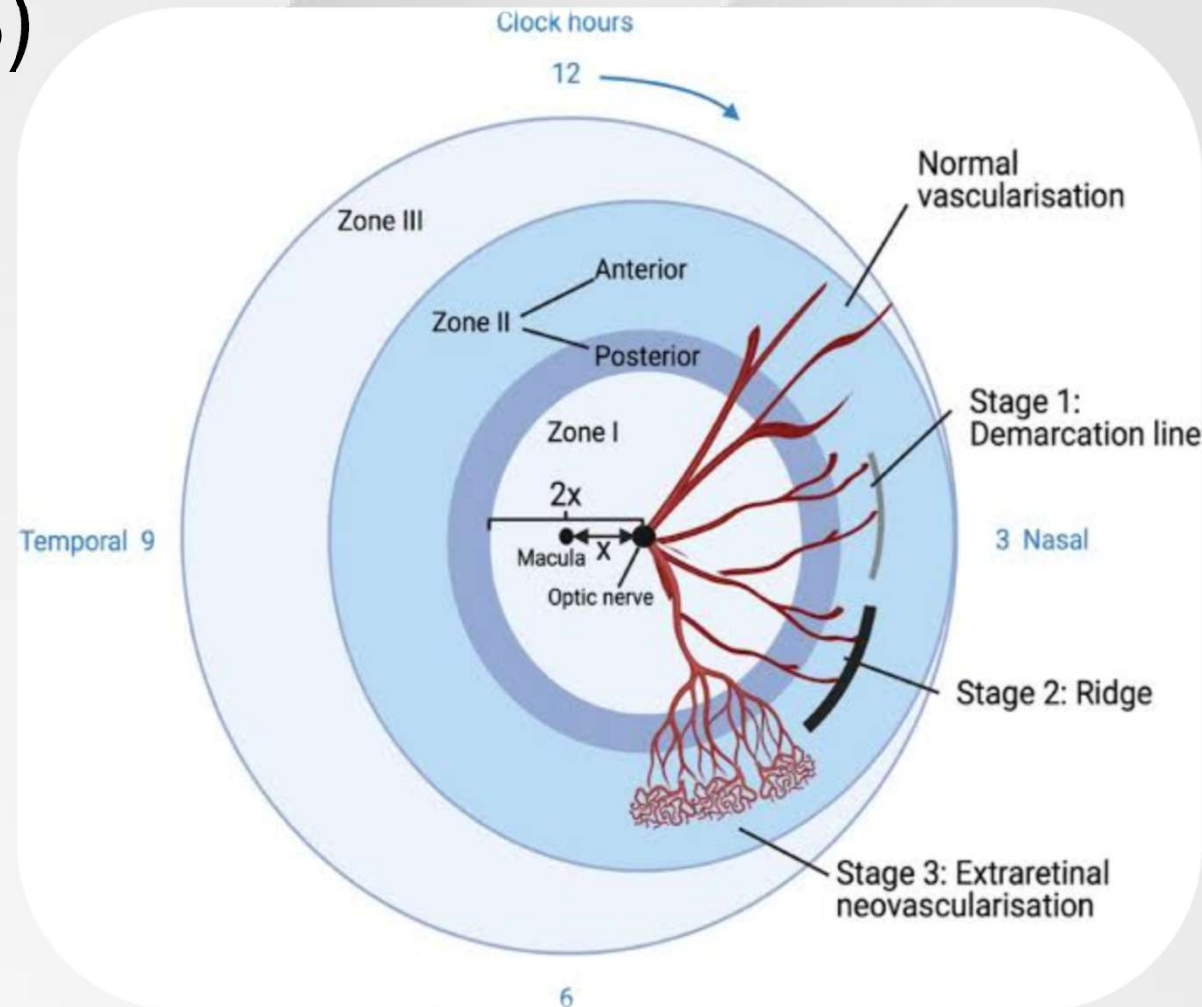
All infants <31 weeks gestation All infants <1501g Infants 31 + 0 weeks to 31 + 6 days		
Gestational age (weeks)	Post-menstrual age (weeks)	Post-natal age (weeks)
22	31	9
23	31	8
24	31	7
25	31	6
26	31	5
27	31	4
28	32	4
29	33	4
30	34	4
31	36	4
32 (birth weight <1501g)	36	4
33 (birth weight < 1501g)	36	3
34 (birth weight <1501g)	36	2
35 (birth weight < 1501g)	36	1

- Limited examination without an eyelid speculum and scleral indenter
 - Postpone
 - Counsel parents and caregivers
 - Rationale
 - Its implications
 - Next steps in screening
 - Record discussion in the file
 - Reschedule no later than one week beyond intended examination
- Apnoea's
 - Bradycardia (oculocardiac reflex)
 - tachycardia
 - Pain
 - Desaturations
 - Hypertension
 - Feed intolerance

**What if the baby is
too unstable to be
screened?**

International Classification of retinopathy of prematurity (ICROP3)

- Consensus statement created standard **nomenclature for classification** of retinopathy of prematurity
- Initially published 1984
- Revisited in 2005
- Currently 3rd version



Extent of retinal vascularization:
Zone I, zone II, zone III

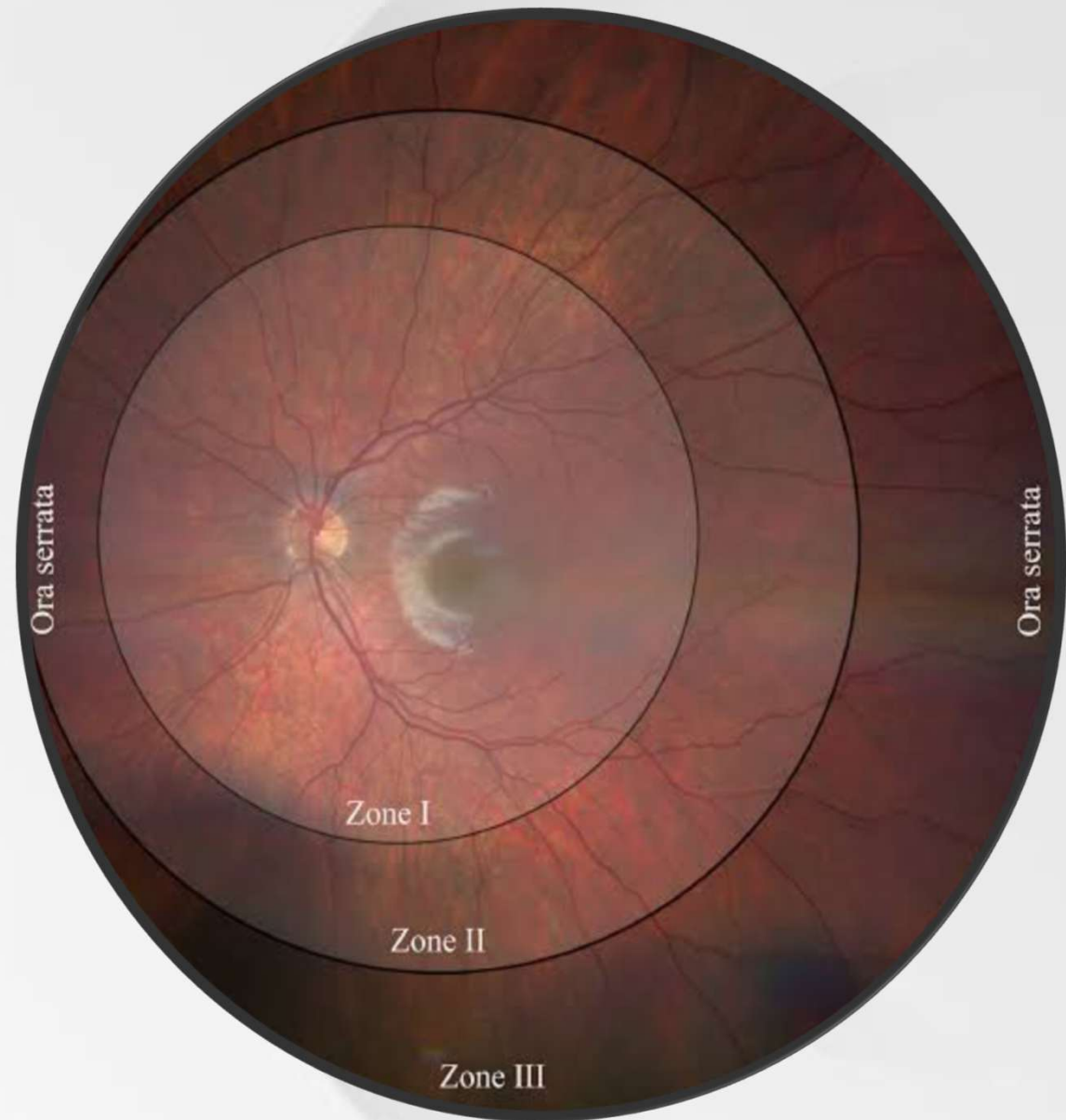
Retinopathy stage (1, 2, 3, 4, 5)

Plus disease (Plus, Pre-plus)

Categories (No ROP, mild, type -2, type-1, AROP)

Classification of ROP

Zones	Location
1	A circle of radius - twice the distance from the disc centre to the macula
2	From the edge of zone 1 to the nasal ora serrata
3	Residual crescent of retina area of the temporal retina

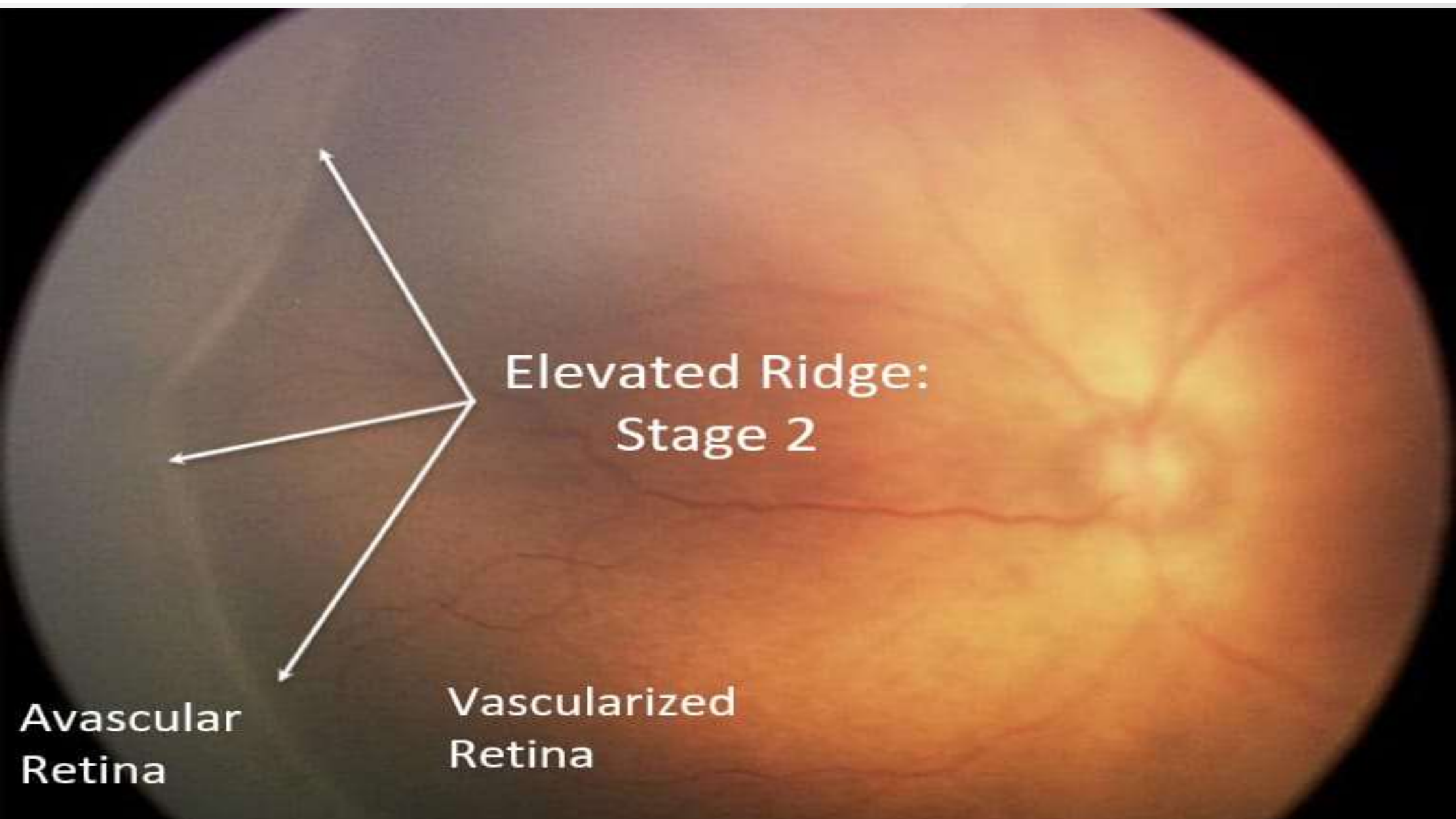


Stage 1 ROP

Demarcation line

A thin but definite structure (white line) separating the avascular retina anteriorly from the posteriorly vascularised retina

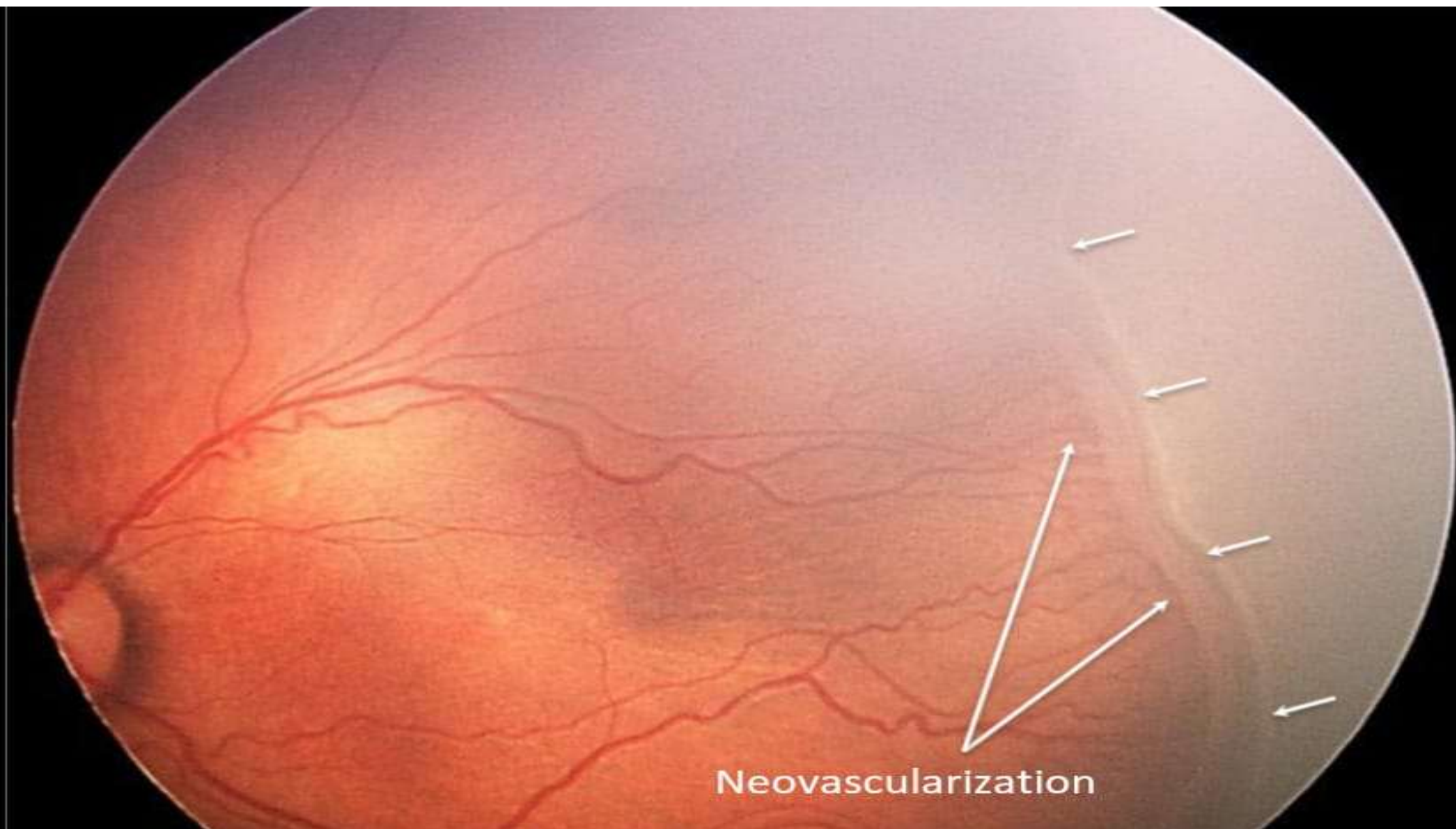




Elevated Ridge:
Stage 2

Vascularized
Retina

Avascular
Retina



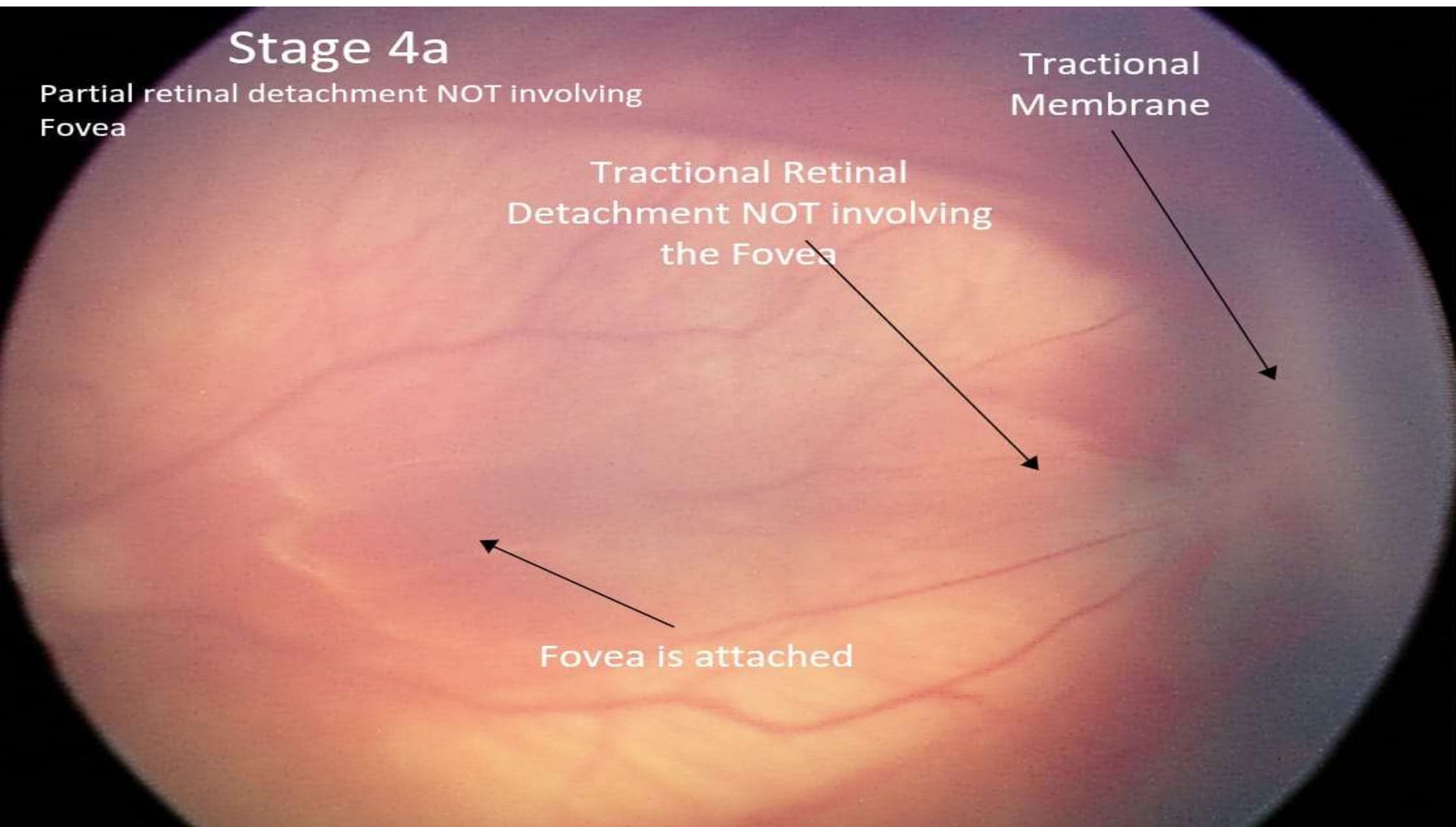
Stage 4a

Partial retinal detachment NOT involving
Fovea

Tractional
Membrane

Tractional Retinal
Detachment NOT involving
the Fovea

Fovea is attached



Stage 5 ROP

Total retinal detachment

- Retinal detachments are generally tractional but
- may occasionally be exudative,
- and are usually funnel-shaped.



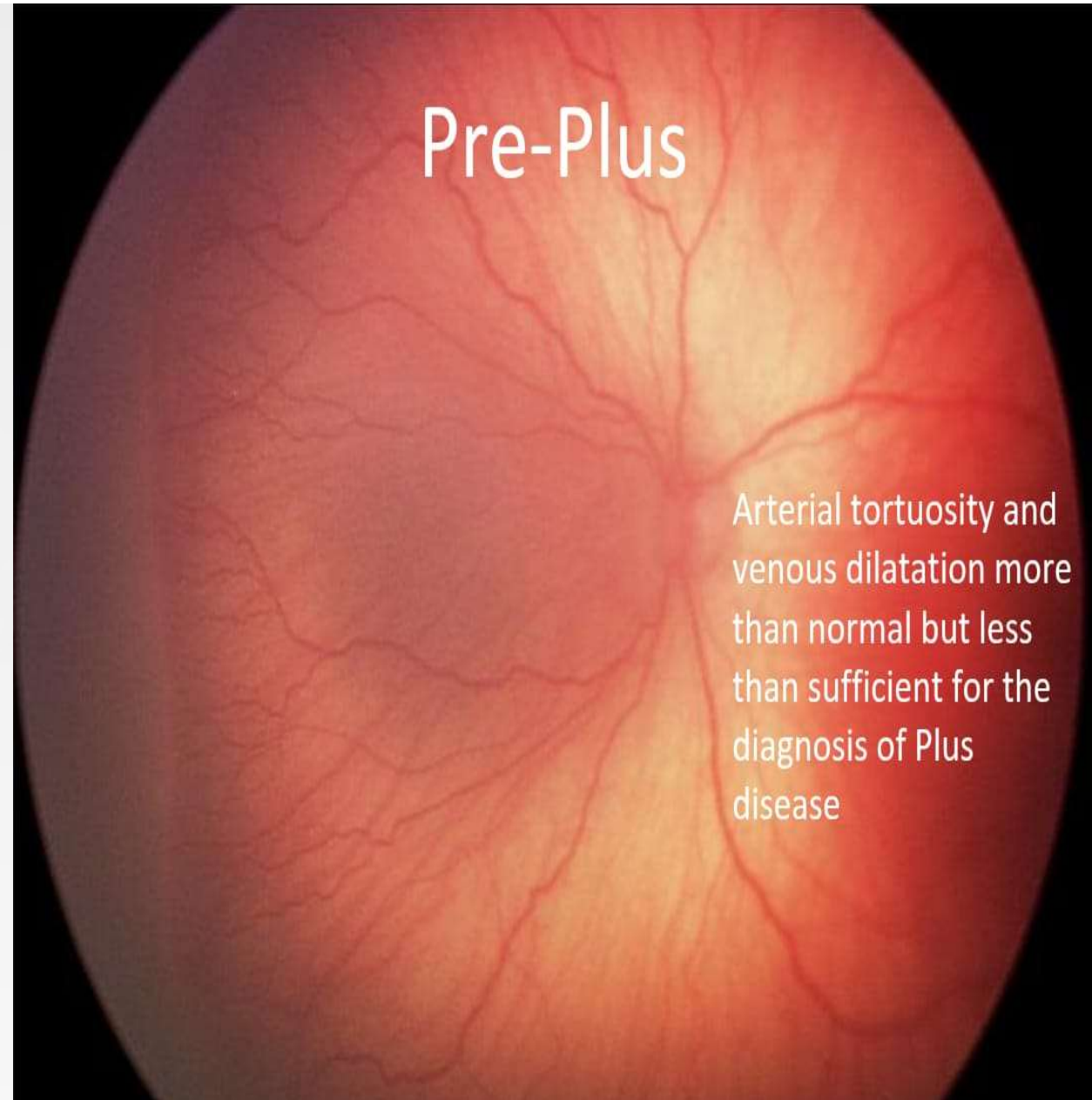
Plus disease

- Dilation and tortuosity of the retinal vessels within zone 1
- Added to staging system in 2005 revision of the international classification of retinopathy of prematurity ICROP
- pre-plus disease
 - Marked than normal changes



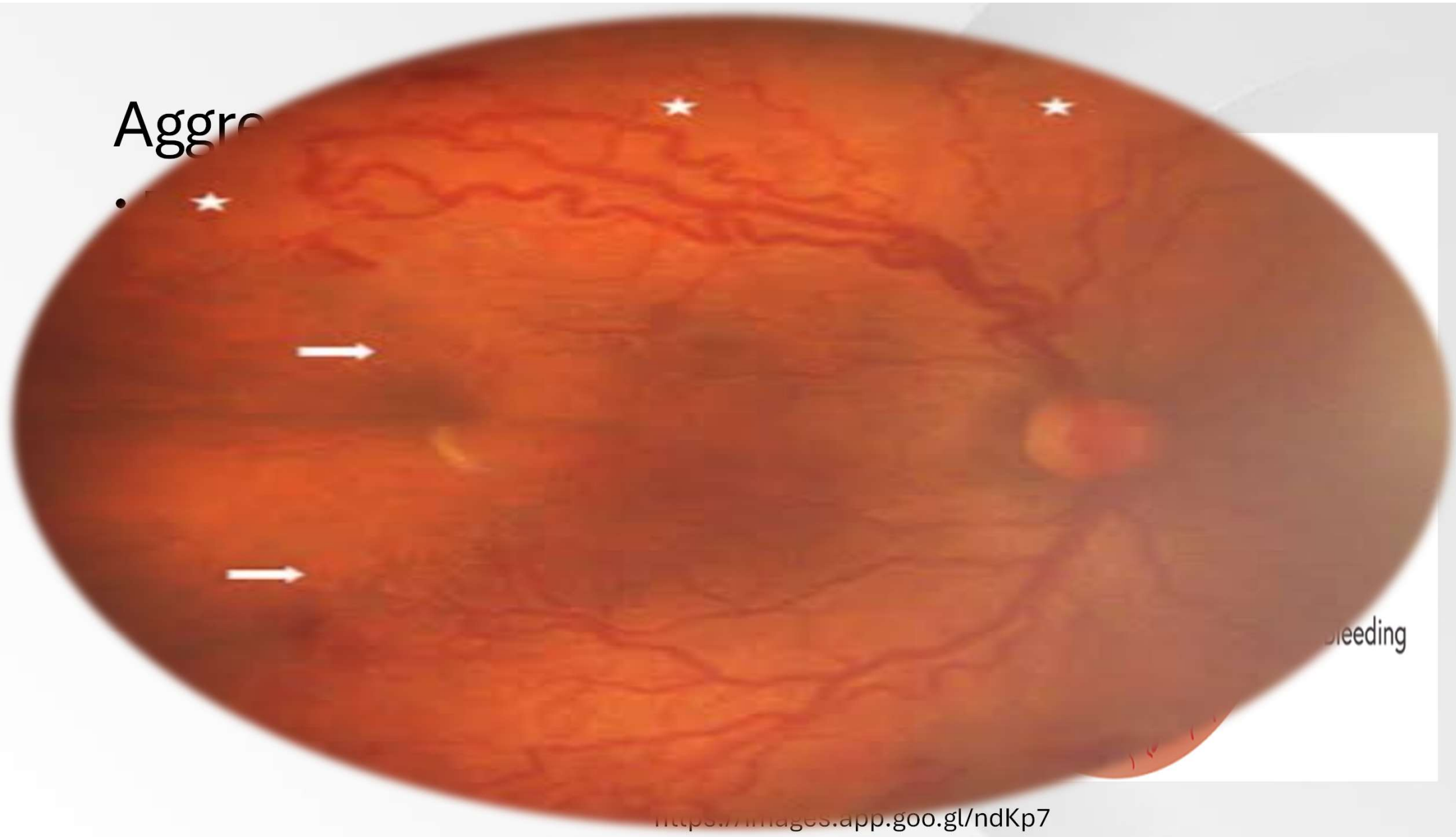
Pre-plus disease

- Active retinopathy of prematurity
- Features insufficient for diagnosis of plus disease
- Vascular changes more marked than normal
- pre-stage which could progress to plus disease



Aggre

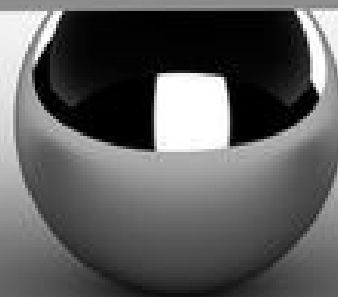
•



ROP screening Program



Identify retinopathy of
Prematurity and treat sight
threatening ROP



- Minimizing the number of stressful examinations required for sick neonates
- Cost effective
 - Number needed to screen to identify 1 infant needing treatment is 41 (Visser *et al*) 2014



VISION

SKILL



SERVICE

QUALITY



ADVICE



RISK

2022 ICROP

Posterior zone II AR vs AP-ROP
Definition of plus disease
Set stage for AI assisted screening

2024 UK
<31 weeks

2021 AAP

Advances in antiVEGF &
follow-up
recommendations
Use of telemedicine and
wide-field imaging

2018 UK
≤1501g
<32 weeks
Incorporated
digital imaging
Implementation
of standard
documentation



2001 AAP
<1500g
<30 weeks



2013

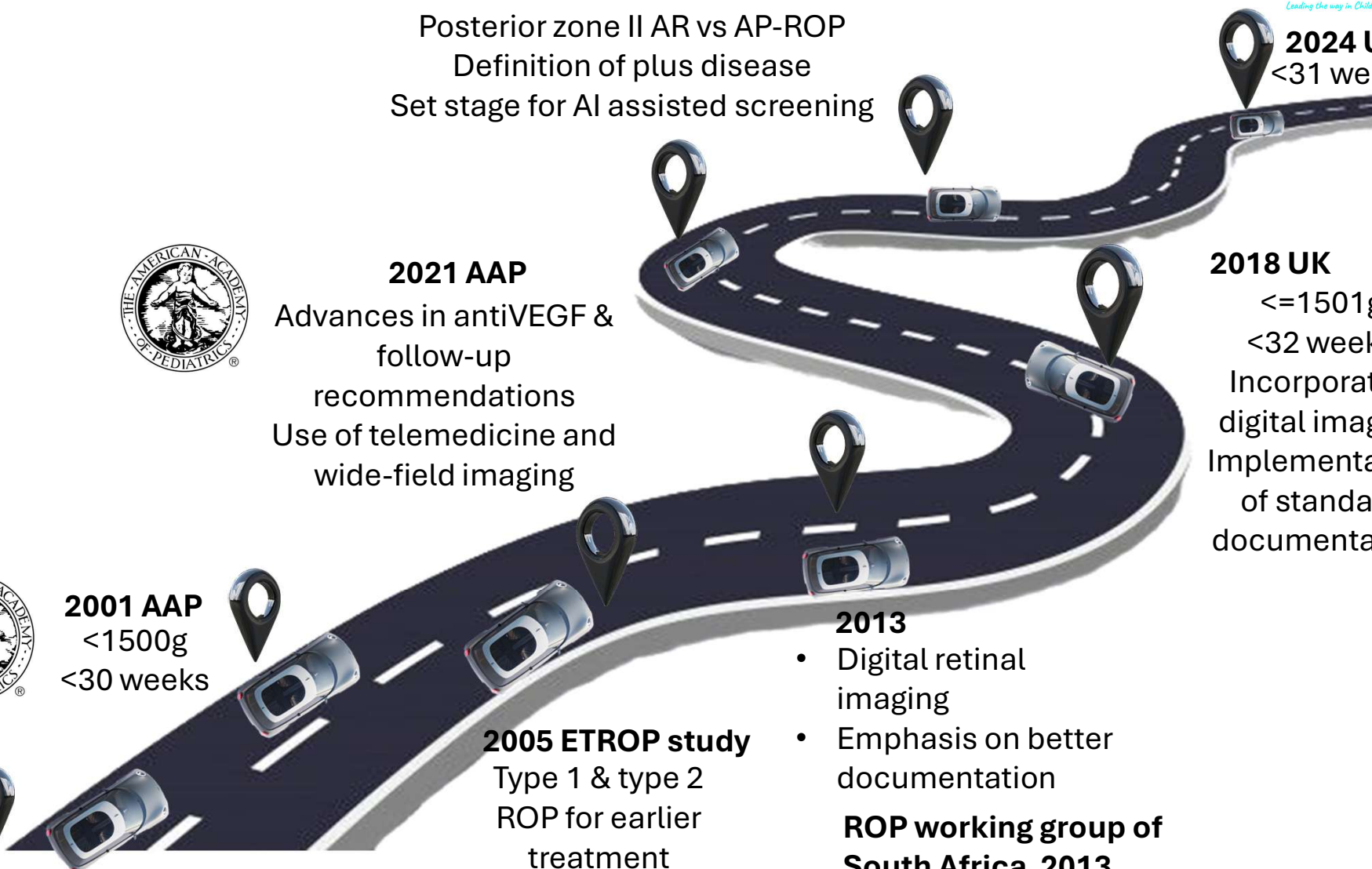
- Digital retinal imaging
- Emphasis on better documentation

2005 ETROP study

Type 1 & type 2
ROP for earlier
treatment

**ROP working group of
South Africa 2013**

1988 CRYO ROP
<1500g
<32 weeks



Summary guidelines

- Latest guidelines from Royal College of Pediatrics & child health (RCPCH)
- Separate guideline on treatment developed by the Royal College of Ophthalmology



<https://images.app.goo.gl/ZsKBE>



Who to screen

Timing of first examination

Preparation for screening

Importance of follow-up
examination

Guidelines on when to refer

Record keeping and
communication

Algorithm for observations and
screening record form

Summary of Updates

- Equipment
- Preparation
- Procedure
- Treatment
- Follow-up plan
- Recording of findings
- System
- Counseling of care givers

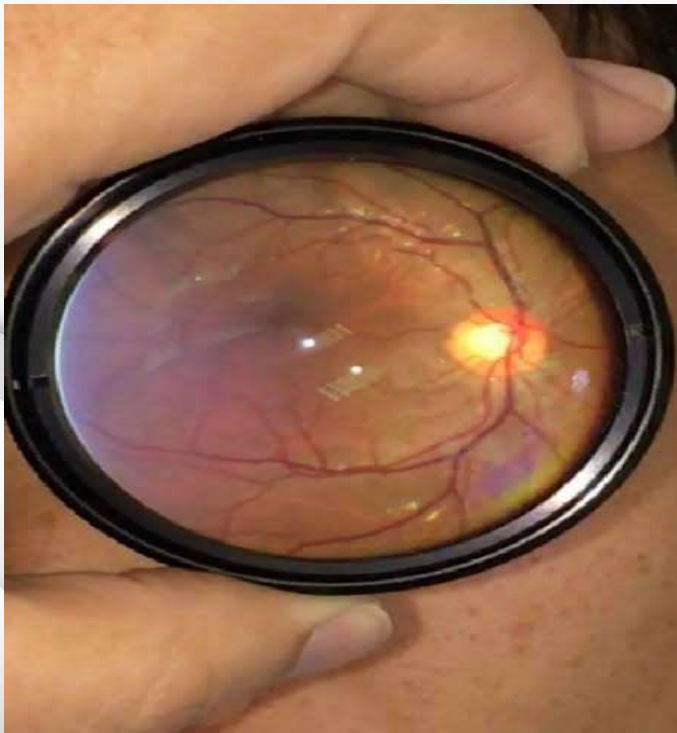
Screening procedure



Equipment

Screening exam techniques

- Binocular indirect ophthalmoscopy



- Wide field digital imaging



- Resuscitation equipment
- Monitor
 - Blood pressure
 - Heart rate
 - Respiratory rate
- Eyelid speculum and scleral indenter
 - Visualize the peripheral retina
 - Indenter is used gently to rotate the eye



Infection control and preventative measures

- Sterilize all reusable instruments
- Disinfect the lenses as per hospital policy and manufacturer
- Or use single use instruments



Preparation for the exam

- Mydriatic combination
 - Phenylephrine 2.5 % + cyclopentolate 0.5%
 - Cyclomidril
 - 1 drop in 2 doses
 - 1hr prior
 - 5 minutes apart
 - Tropicamine 0.5 % (alternative to cyclopentolate 0.5% - shorter duration of action)
- Topical anesthetic
 - Proxymetacaine 0.5%
 - Oxybuprocaine 0.4% (shorter duration of action)



Pain relief & comfort care during procedure

- Topical anesthetic
 - Proxymetacaine 0.5%
 - Oxybuprocaine 0.4% (shorter duration)
- Non-pharmacological
 - Nesting
 - Cuddling
 - Non-nutritive suck
 - Giving expressed breastmilk
 - Oral sucrose



- Extent of **vascularization** by zone in the absence of ROP
- **Zone and stage of ROP**
- **Extent** of ROP stage in clock hours
- Presence and extent in quadrants of any **pre-plus or plus disease**
- Name of the examiner
- Date of the next examination or discharge from screen
- All communications should be documented
- Can be done documented electronically or on paper compatible with the international classification of ROP.

Record keeping and communication

Retinopathy of Prematurity Examination Record

Name:

Hospital No:

DoB:

Male/Female

Gestational age (wks):

Birth Weight (g):

Previous screening? Y/N Hospital:

Previous treatment? Y/N Type:

Stage 1



Stage 2



Stage 3



Stage 4/5



Laser



Date of examination:

Name of examiner:

Postmenstrual age:

Findings:

Progression ☐

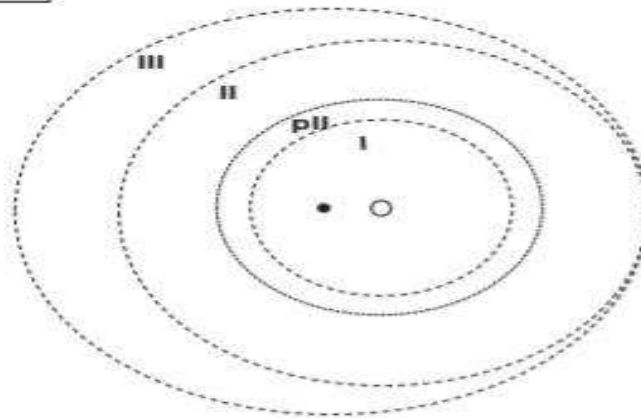
Regression ☐

No change ☐

Follow up:

Refer: Y/N

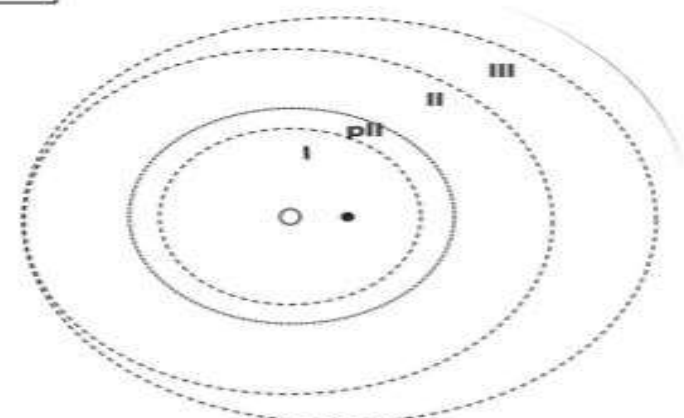
R



Zone: Stage: A-ROP: Y/N

Zone I/posterior zone II due to temporal notch: Y/N Plus: Y/N Pre-plus: Y/N

L



Zone: Stage: A-ROP: Y/N

Zone I/posterior zone II due to temporal notch: Y/N Plus: Y/N Pre-plus: Y/N

Comments:

Assessment

No ROP

- The retina is not completely vascularised until 40 weeks gestation
- Premature infants may have immature retinal vessels without having ROP.

Mild ROP

- Presence of ROP that is at low risk for requiring treatment
- Low stage
- Peripheral retina where it is unlikely to affect the visual axis
- Zone II, stage 1 or 2 (without plus disease)
- Zone III, any stage (without plus disease)

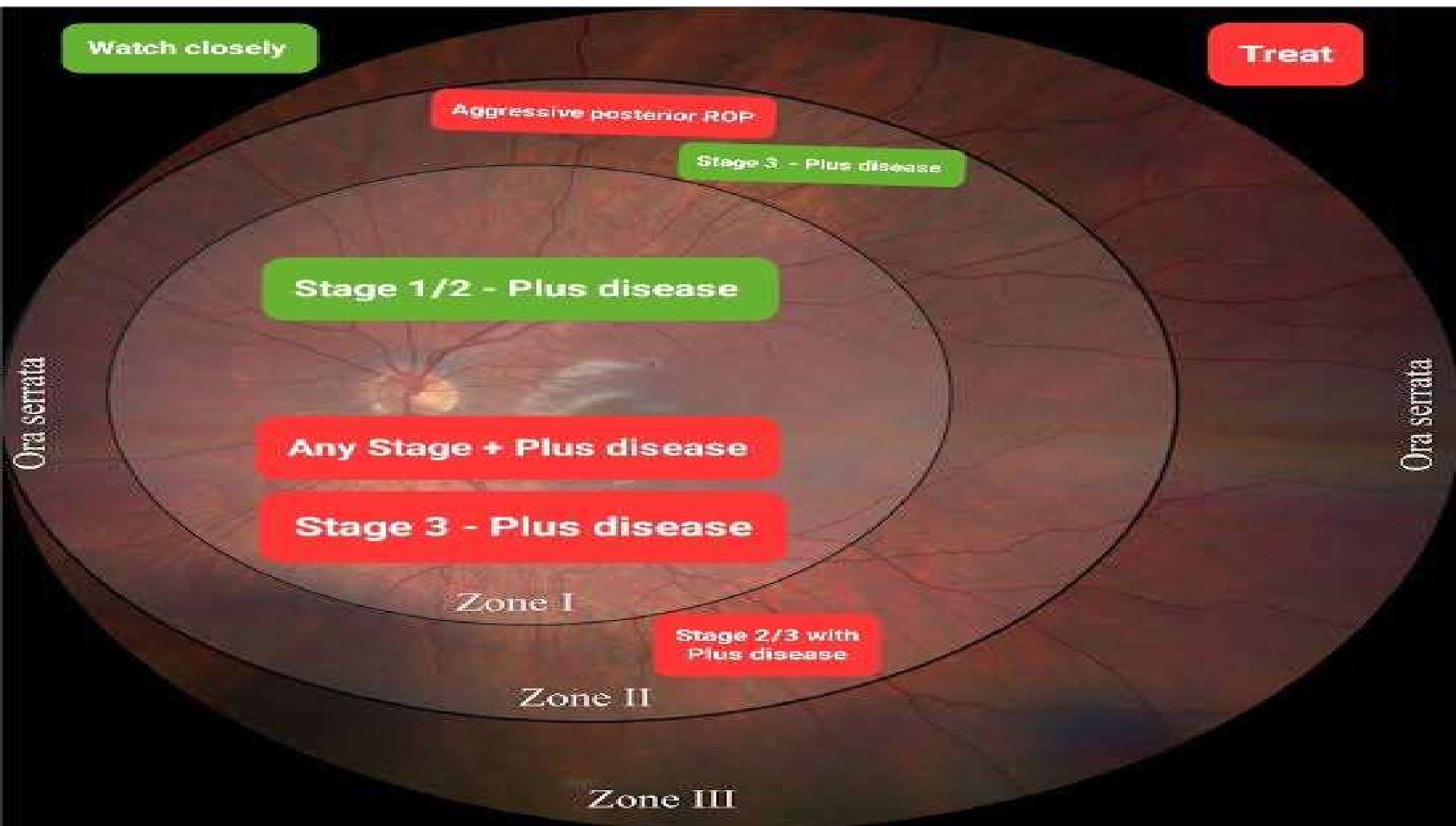
The early treatment for retinopathy of prematurity (ETROP) trial

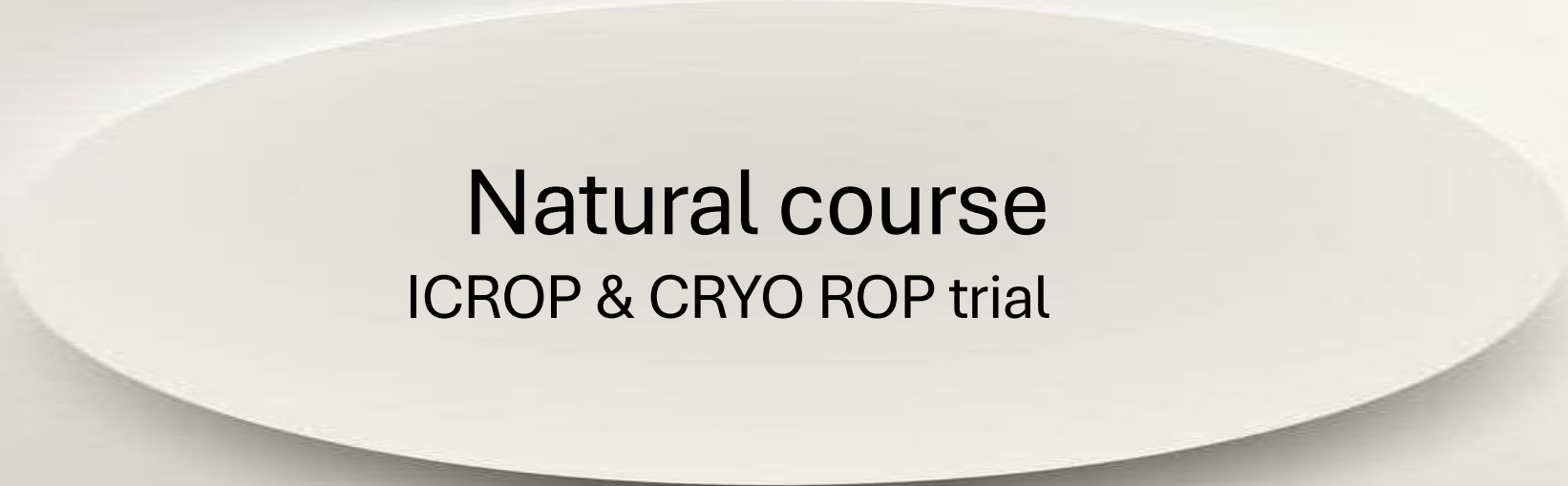
Type 2

- Requires close follow-up
- Not severe enough to require treatment
- Zone 1, stage 1 or 2 without plus disease
- Zone II, stage 3 without plus disease

• Type- 1 ROP

- Severe disease needing treatment within 48 hrs
- Zone I, any stage with plus disease
- Zone 1, stage 3 without plus disease
- Zone II, stage 2 or 3 with plus disease





Natural course

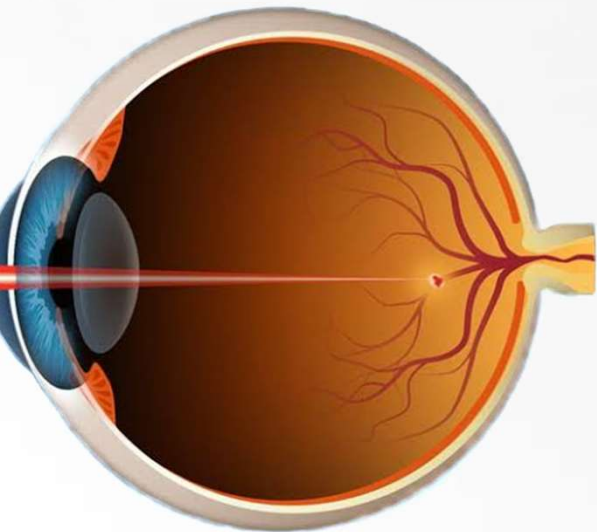
ICROP & CRYO ROP trial

7 – 10 % develop
threshold ROP

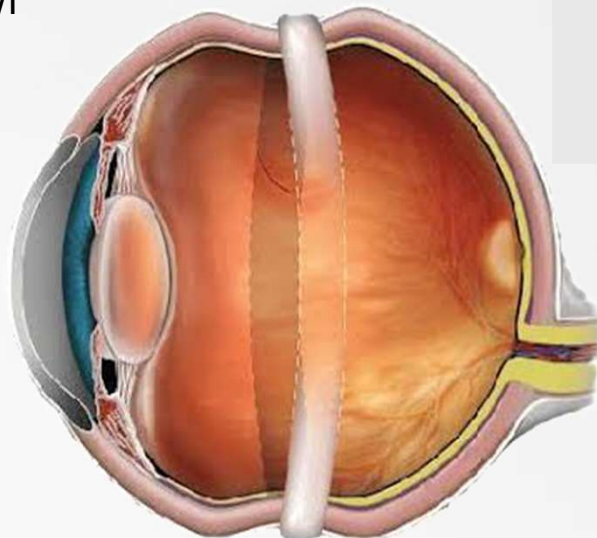
85 % will
spontaneously
regress



<https://images.app.goo.gl/884Wr>



<https://images.app.goo.gl/MtqwT>



<https://images.app.goo.gl/hjRas>

Treatment of retinopathy of prematurity

Regression

- New ICROP3
- Disease involution and resolution
 - Complete or incomplete
- Persistent avascular retina

Reactivation

- Recurrence of acute phase features of ROP
- Typically, ~37 – 60 weeks or later
- Common after antiVEGF >laser

Why should we follow-up?

What is the big deal?



<https://images.app.goo.gl/tMHR9>



<https://images.app.goo.gl/sHoQV>



<https://images.app.goo.gl/jmwd6>



<https://images.app.goo.gl/ZiYXi>



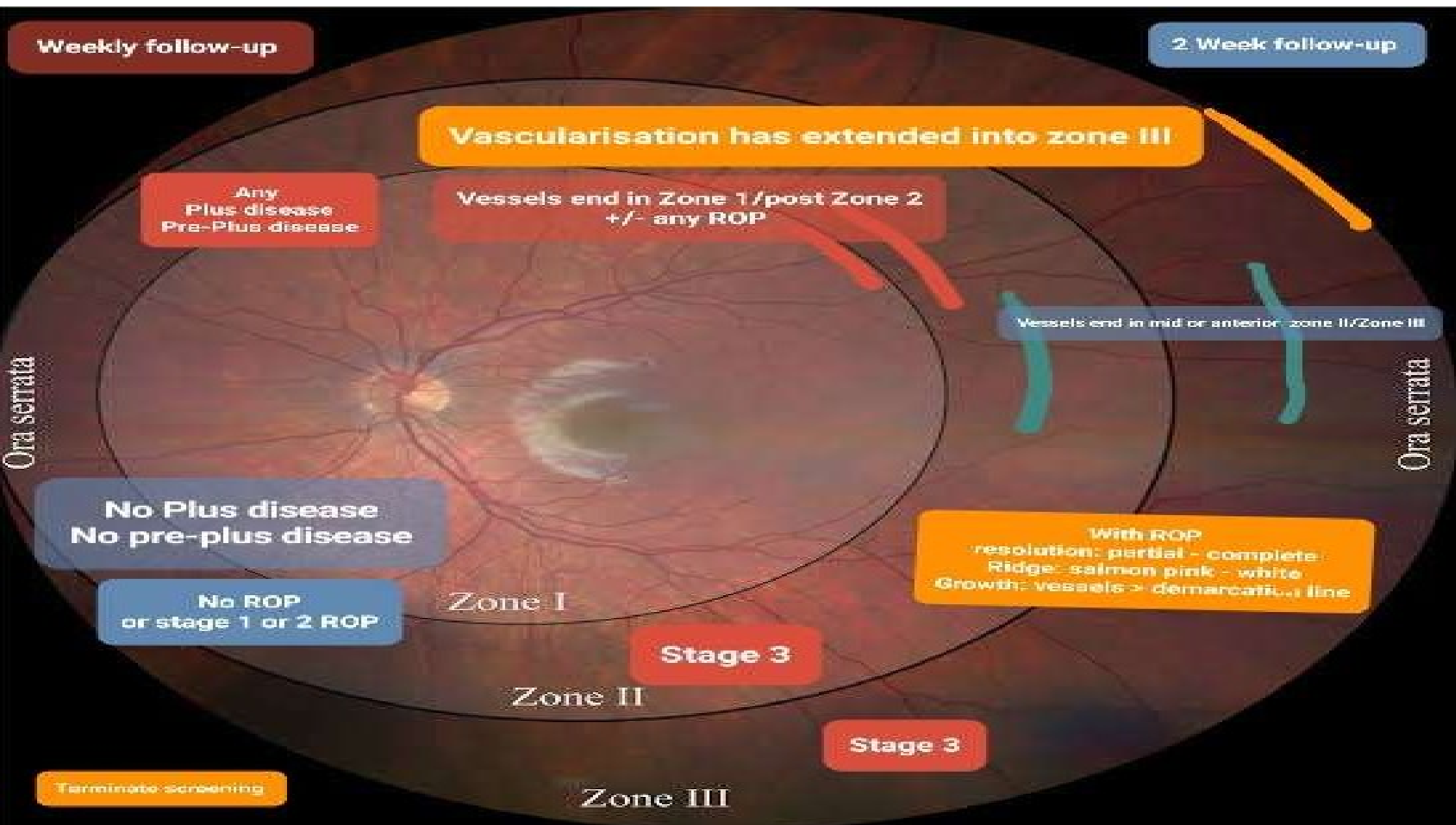
<https://images.app.goo.gl/iisxe>



<https://images.app.goo.gl/ZcxPv>



<https://images.app.goo.gl/eeS4c>



Counseling Parents/caregivers

Long term outcome

Potential for
development of
refractive errors or
strabismus later

**Written information/
pamphlet**

Explain why
Counselling
Need for screening

Implications for missed appointments

Risk of not
detecting
progression

**Transfer /
discharge
checklist**

Telephone and
written
communication





Service configurations

 Uninterrupted service

 Ophthalmologist- knowledge, skill and competency

 Standard operating procedure

- Safe and timely treatment onsite or transfer

Protocol

 Role players:

- Scheduling first and follow-up
- Responsible for treatment

 Record keeping, stores, equipment and its maintenance

 Communication

 SOP, audit recommendations for quality of service

Take home message

- ROP is one of the preventable cause of blindness
- Screening is important to identify infants at risk for severe disease
 - Definitively screen infants <31 weeks or <1500g at 31 weeks PMA or 4 weeks of life
 - ≤ 32 weeks can be screened at 36 weeks PMA or 4 weeks PNA whichever is earliest
- Counselling and documentation
!!!!!!!

Take home message
TTO

References

- https://www.rcpch.ac.uk/sites/default/files/2024-10/rop-screening-guideline-full-2022_updated-2024.pdf
- Chiang MF, Quinn GE, Fielder AR, Ostmo SR, Paul Chan RV, Berrocal A, Binenbaum G, Blair M, Peter Campbell J, Capone A Jr, Chen Y, Dai S, Ells A, Fleck BW, Good WV, Elizabeth Hartnett M, Holmstrom G, Kusaka S, Kychenthal A, Lepore D, Lorenz B, Martinez-Castellanos MA, Ozdek S, Ademola-Popoola D, Reynolds JD, Shah PK, Shapiro M, Stahl A, Toth C, Vinekar A, Visser L, Wallace DK, Wu WC, Zhao P, Zin A. International Classification of Retinopathy of Prematurity, Third Edition. *Ophthalmology*. 2021 Oct;128(10):e51-e68. doi: 10.1016/j.opthta.2021.05.031. Epub 2021 Jul 8. PMID: 34247850; PMCID: PMC10979521
- L Visser, R Singh, M Young, H Lewis, N McKerrow (ROP Working Group, South Africa) Guideline for the prevention, screening and treatment of retinopathy of prematurity (ROP) *S Afr Med J* 2013;103(2):116-125. DOI:10.7196/SAMJ.6305
- Jang, J.H., Kim, Y.C. Retinal vascular development in an immature retina at 33–34 weeks postmenstrual age predicts retinopathy of prematurity. *Sci Rep* 10, 18111 (2020). <https://doi.org/10.1038/s41598-020-75151-0>
- Lai Y-H, Chen H-L, Yang S-N, Chang S-J, Chuang L-Y, Wu W-C (2018) The characteristics of premature infants with transient corneal haze. *PLoS ONE* 13(3): e0195300. doi:10.1371/journal.pone.0195300
- Mintz-Hittner, Helen & Kennedy, Kathleen & Chuang, Alice. (2011). Efficacy of Intravitreal Bevacizumab for Stage 3+ Retinopathy of Prematurity. *The New England journal of medicine*. 364. 603-15. 10.1056/NEJMoa1007374.
- Hong, E.H., Shin, Y.U., Bae, G.H. et al. Ophthalmic complications in retinopathy of prematurity in the first decade of life in Korea using the national health insurance database. *Sci Rep* 12, 911 (2022). <https://doi.org/10.1038/s41598-021-04616-7>

THANK YOU
FOR YOUR
ATTENTION

