

# Assessing the Child



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# Case Scenario Links

## Paediatric Ophthalmology and Strabismus

- Diplopia (Oph06)
- Infant with an altered light reflex (Oph12)
- Infant with strabismus (Oph09)
- Pupil abnormality (Oph08)
- Watery eye in an infant (Oph03)



# Paediatric Ophthalmology

**The 'Assessing the Child' Lecture sits as a supplement to the general paediatric ophthalmology lecture.**

**It focusses on assessment techniques specific to children.**



# Paediatric visual impairment

Worldwide 19 million children are visually impaired  
and 1.4 million children are blind <sup>1</sup>

Social, economic, and emotional impacts

The majority of cases can be treated or prevented <sup>1</sup>



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1. Gilbert & Foster, Childhood blindness in the context of VISION 2020 – The Right to Sight. *Bulletin of the World Health Organisation*. 2001;79(3):227-232



# Paediatric ophthalmic assessment

## 1. Patient History

- Presenting problem
- Ocular history
- General health
- Family ocular history
- Child development

## 2. Visual acuity

## 3. Refraction

- Retinoscopy
- Cycloplegic refraction

## 4. Binocular vision and ocular motility

## 5. Ocular health

## 6. Discussion with parents and children

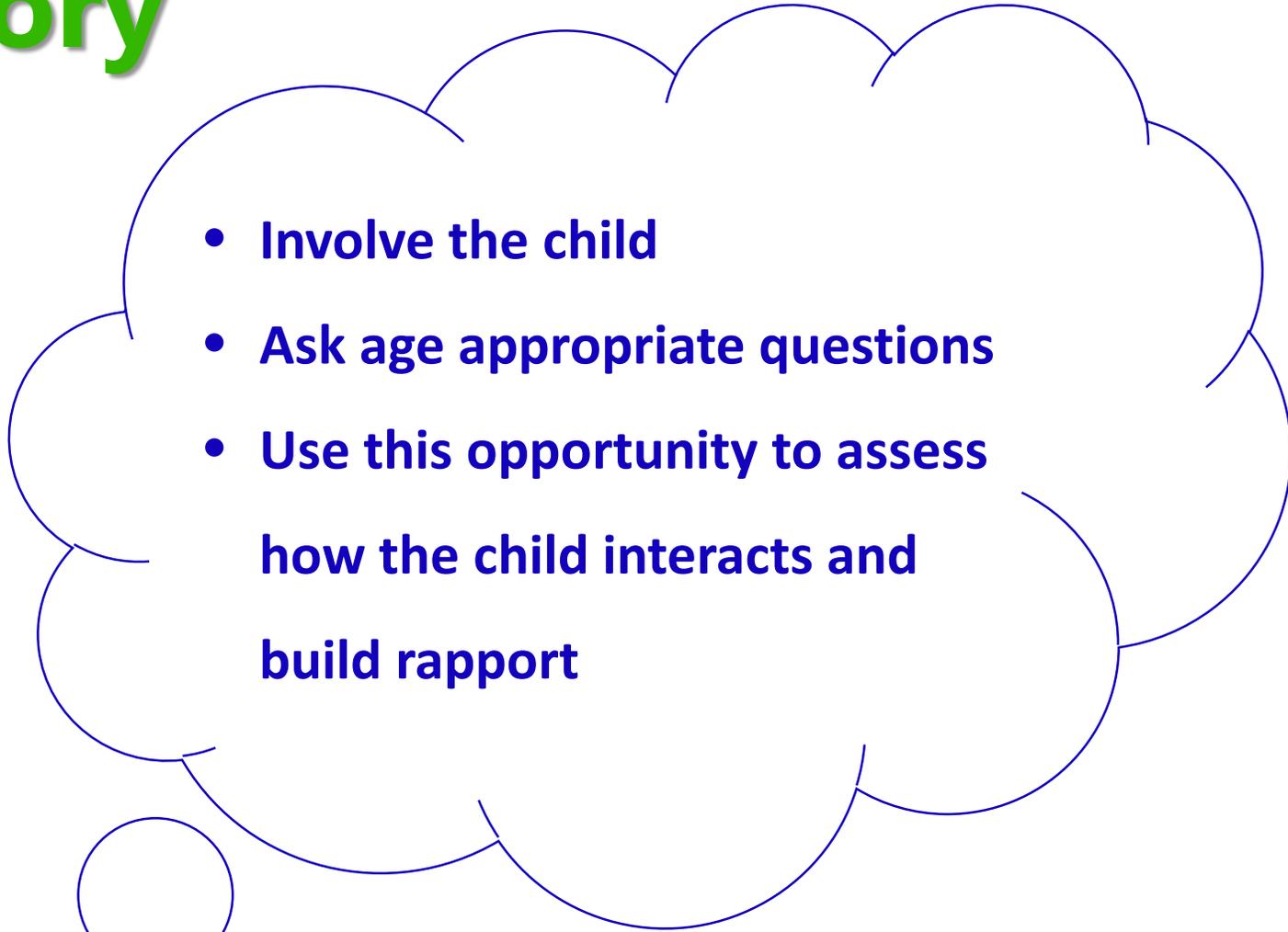


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# Patient History

- Presenting problem
- Ocular history
- General health
- Family ocular history
- Child development
  - Pre-natal
  - Peri-natal
  - Post-natal
  - Developmental milestones

- 
- **Involve the child**
  - **Ask age appropriate questions**
  - **Use this opportunity to assess how the child interacts and build rapport**



# Visual Acuity

- Use age and developmental age appropriate tools
- Adult VA tests do not just test vision
  - Recognition
  - Matching
  - Language
  - Other skills
- Need to check monocular and binocular vision



# Visual Acuity

Vision develops rapidly in the first few years of life

- 6/180 @ 1 month of age
- 6/6 @ ~5 years of age
- Good visual input needed for normal visual development
- Abnormal development can result in amblyopia
  - Ambly 'dull'
  - Opa 'eye'



# Fixing and following



Also check objection to occlusion in these patients



# Fixing and following

- Use light source or object of interest
- Toys
- Faces
- Ensure fixation first
- Then move object of interest side to side slowly to check for following
- Following should be smooth

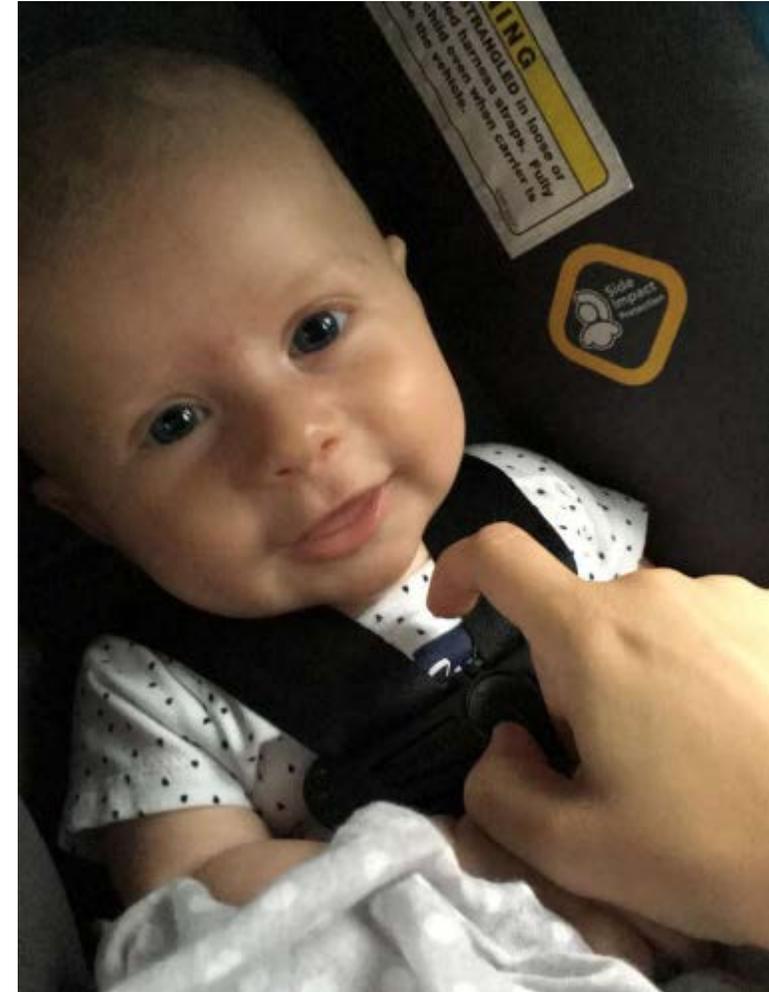


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# Preferential Looking

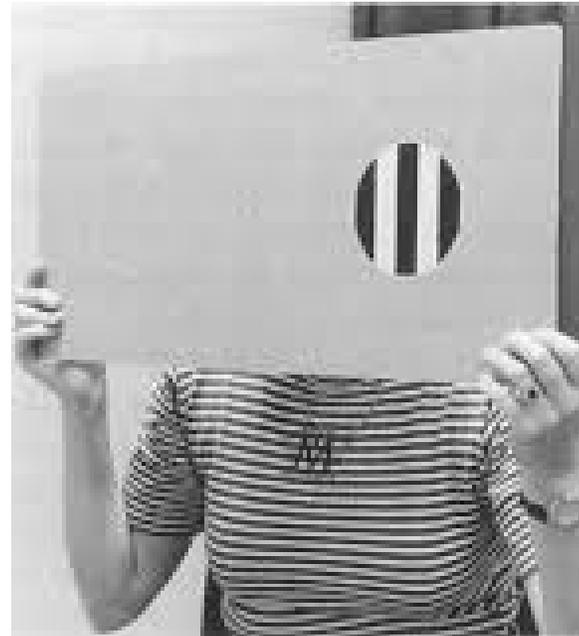


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# Preferential Looking

- Keeler acuity cards
- Teller acuity cards
- Cardiff cards
- If children can see it they will look to the object of interest
- Careful observation required





# Optokinetic Nystagmus





# Picture Tests

- Kay Pictures and Lea symbols
- Matching card
- Naming as children get older and more confident
- Can be single letter, single line or crowded charts
- Can be 3, 4 or 6 metre based charts

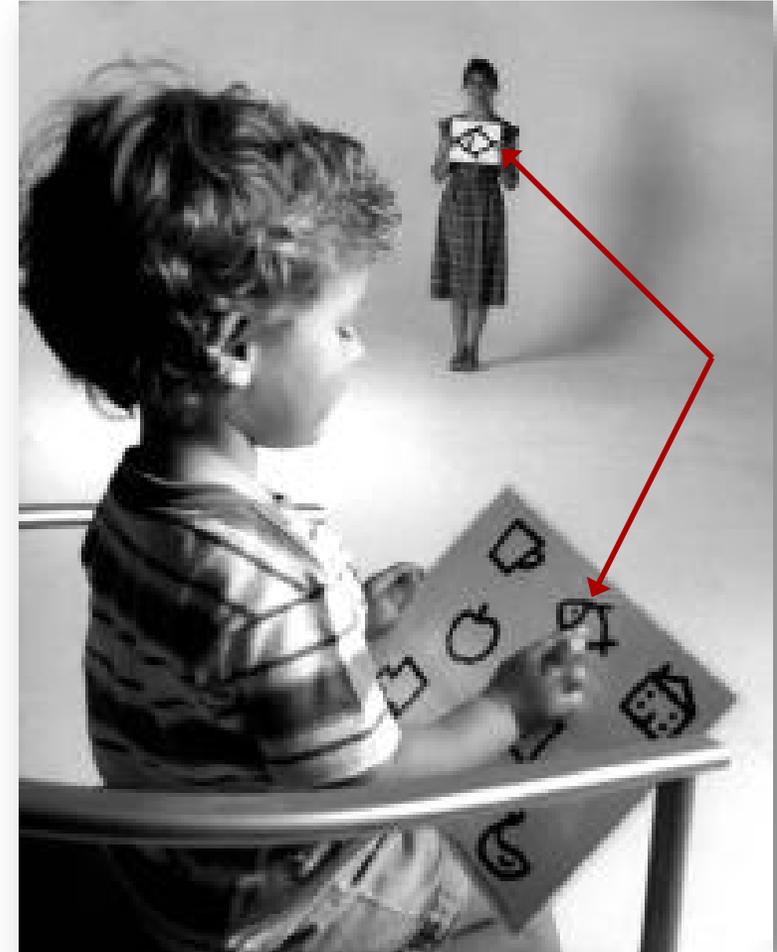


Figure © University of Auckland Staff



# Letter Tests

- Sheridan Gardiner or HOTV tests
- Getting closer to adult tests
- Matching or naming
- Can be single letter, single line or crowded charts
- Can be 3, 4 or 6 metre based charts



Image from <https://www.visus-sehteste.de>



# Visual Acuity

- Use the test the child can do most reliably
- Use the opportunity to train them to move closer to adult tests as you can
- By 5 years old letters should be used
- Use a matching card for shy children
- **ENCOURAGE, ENCOURAGE, ENCOURAGE!!**



# Refraction

- Older children are able to do subjective refraction, ie '1 or 2'
- Retinoscopy
  - 'Dry' and 'Wet'
  - Cycloplegia with 1gtt OU cyclopentolate 1.0% and 1 gtt OU Tropicamide 1.0%.
  - Retinoscopy requires a lot of practice



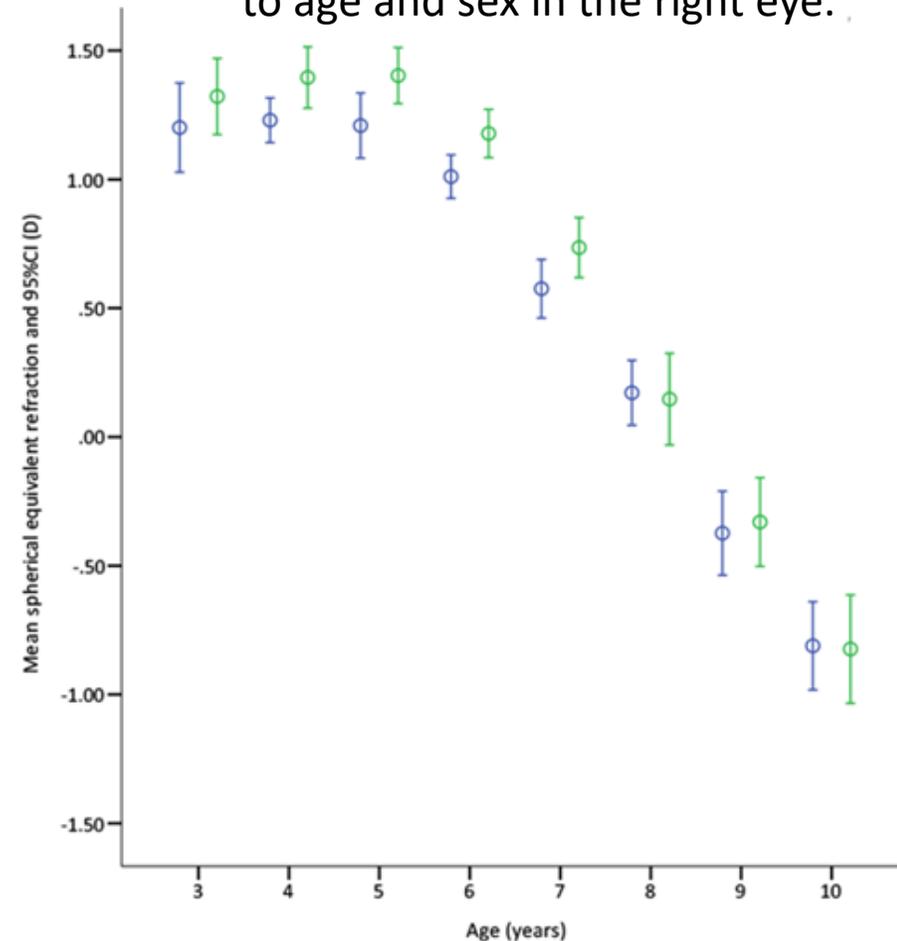
Image courtesy of Dr Shuan Dai



# Expected Refraction by Age

- Infants are born hyperopic with an average axial length  $\leq 17$ mm
- The majority of ocular growth occurs before 24 months
- Emmetropisation is normally completed by 6-8 years
- Can continue to change with eye growth, ie. Childhood myopia

Mean SE refraction and 95% CI according to age and sex in the right eye.





# Binocular Vision & Ocular Motility

- Age appropriate assessment of stereoacuity
  - Lang stereotest
  - Stereofly
  - TNO stereotest





# Binocular Vision & Ocular Motility

- Check eye movements
  - Vergence
  - Versions
  - Ductions
- Cover test
  - Strabismus - needs treatment
  - Phorias impact refraction correction



Image courtesy of Dr Shuan Dai



# Binocular Vision & Ocular Motility

- For younger children if the cover test is not possible:
- Hirschberg test
- Bruckner test



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# Binocular Vision & Ocular Motility

- **Children often enjoy these tests – keep them up your sleeve for when other parts of the eye examination aren't as fun**
- **Very important for reading to have good binocular vision so check carefully**



# Ocular Health Assessment

- Slit lamp examination
  - Hand held option
- Posterior examination
  - Ophthalmoscope
  - BIO
- Examination under anaesthesia
- Red reflex examination



Image courtesy of Dr Shuan Dai



# Ocular Health Assessment

- **Maximise the time you have**
- **Be well practiced at techniques prior to trying on children**
- **Utilise the parents to help hold child in the best position**



# Red reflex screening

Red reflex test is included in the newborn health checks

- 1 week by LMC
- 6 weeks by GP
- Congenital cataracts <sup>2,3</sup>
- Retinoblastoma <sup>4,5</sup>
- 4/5 screeners have not had any formal training for red reflex screening. <sup>3</sup>
- Sensitivity of **4%** for posterior disease <sup>6</sup>



Image property of Samantha Simkin

2. Rahi JS, Dezateux C on behalf of the British Congenital Cataract Interest Group. National cross sectional study of detection of congenital and infantile cataract in the United Kingdom: role of childhood screening and surveillance. *British Medical Journal* 1999;318:362-365.
3. Raouf & Dai, Red reflex screening in New Zealand: a large survey of practices and attitudes in the Auckland region. *New Zealand Medical Journal*. 2016;129:39-43.
4. Abramson DH, Beaverson K, Sangani P, et al. Screening for retinoblastoma: Presenting signs as prognosticators of patient and ocular survival. *Pediatrics* 2003;112:1248-1255.
5. Khan & Al-Mesfer, Lack of Efficacy of Dilated Screening for Retinoblastoma. *J Pediatr Ophthalmol Strabismus*. 2005;42:205-210
6. Sun et al, Sensitivity and Specificity of Red Reflex Test in Newborn Eye Screening. *J Pediatr*. 2016;179:192-196



# Red reflex screening

- Red reflex test is included in the newborn health checks
- It is also useful in checking older children for media clarity and large posterior abnormalities.
- Uses an ophthalmoscope which is a widely available tool



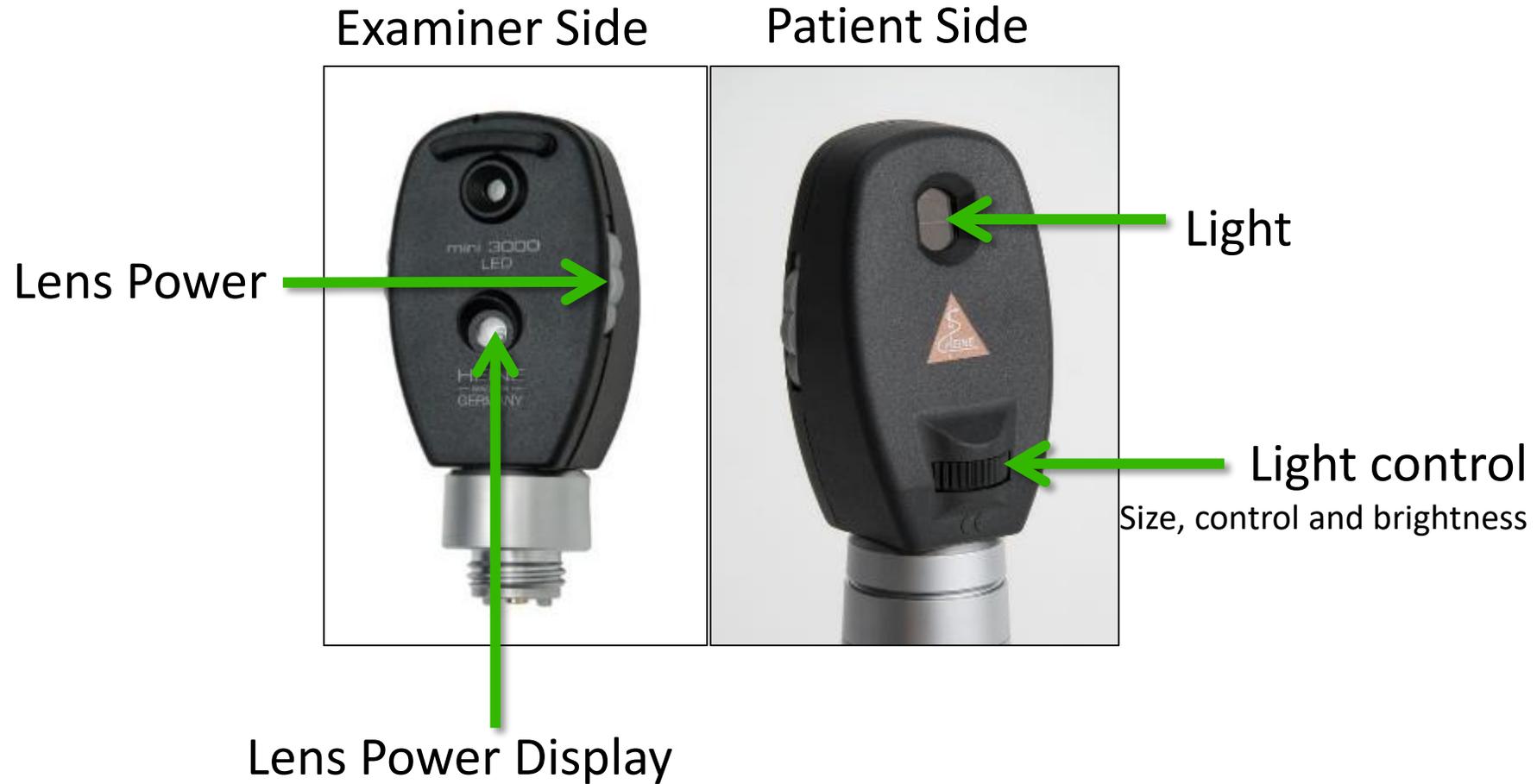


# The Ophthalmoscope





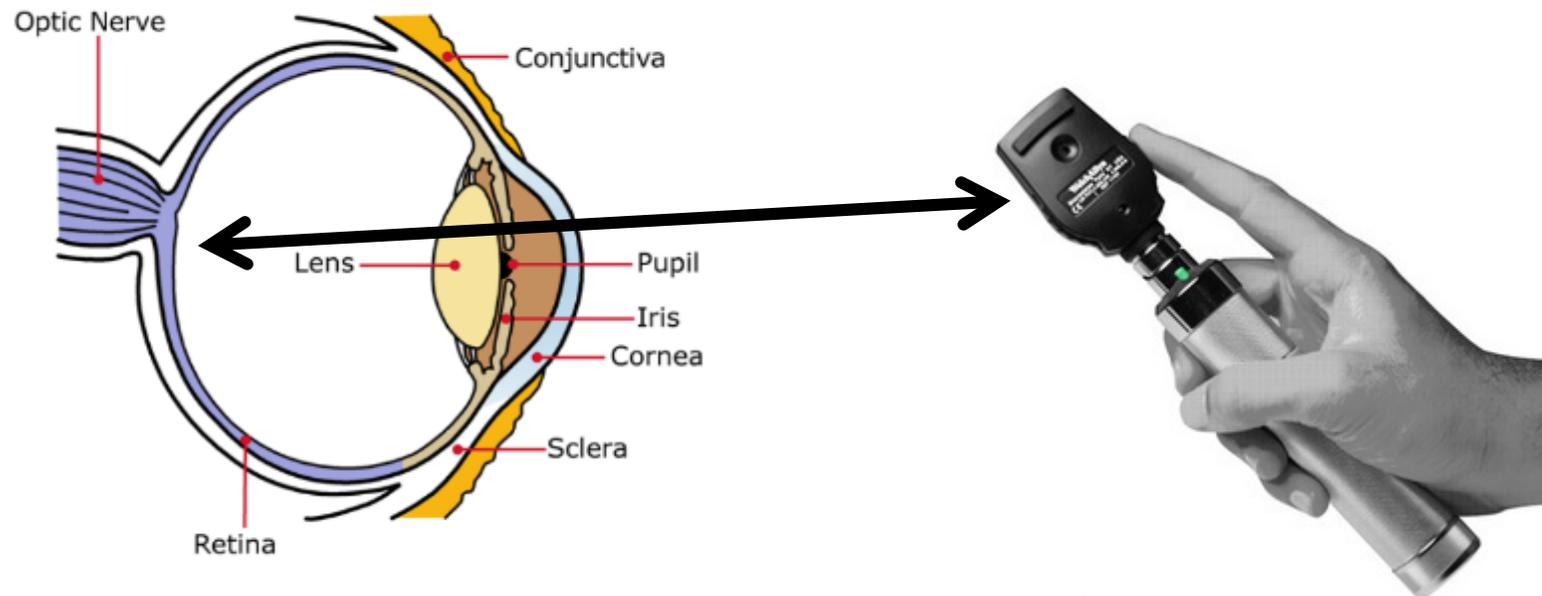
# The Ophthalmoscope





# Red reflex screening

Transmission of an ophthalmoscope light through the optical media to reflect off the ocular fundus, the reflection is transmitted back through the optical media to the aperture of the ophthalmoscope, to be viewed by the examiner.





# How to do the red reflex test

- Fully charged ophthalmoscope
- Set the power of the ophthalmoscope lens to “0”
- Dark room
- Ophthalmoscope close to examiner’s eye
- 50-60cm from the infant’s eyes
- Light to reach both eyes simultaneously



Image courtesy of Dr Shuan Dai



# How to interpret the results

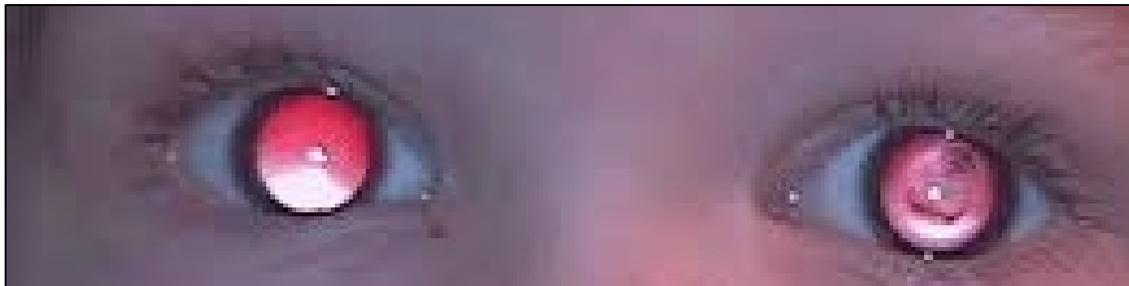
The result of the red reflex examination is to be rated as normal when the reflections of the 2 eyes viewed simultaneously and individually are equivalent in colour, intensity, and clarity and there are no opacities or white spots (leukocoria) within the area of either or both red reflexes.





# Examples

Images courtesy of Dr Shuan Dai





# Referral

- Refer to Ophthalmology
- Mark as “URGENT”
- Specify ‘poor red reflex’ or ‘abnormal red reflex’
- All concerned should receive a corresponding letter as per outcome – make sure LMC and GP are clearly stated on referral
- Other reasons for referral even with normal red reflex:
  - High risk categories eg. Family history of retinoblastoma, congenital cataracts, congenital glaucoma
  - When parents/observers describe history of leukocoria as small retinoblastomas and retinal lesions may present in a subtle fashion.



# Referral

Images courtesy of Dr Shuan Dai





# Management Plan and Discussion

- Include children in discussions when possible – or give them something to play with
- Realise that parents will have many questions and a lot of concerns
- Crying over their child needing glasses is not uncommon
- Manage both the child and the family



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# Other tips

- Know normal values for children
- Know your sub-specialists for referral
- Look at lots of eyes to build confidence
- Your attitude and engagement will reflect on the child – consider this
- Instil eye drops at speed with caregiver ‘hug’



# References

1. Gilbert & Foster, Childhood blindness in the context of VISION 2020 – The Right to Sight. *Bulletin of the World Health Organisation*. 2001;79(3):227-232
2. Rahi JS, Dezateux C on behalf of the British Congenital Cataract Interest Group. National cross sectional study of detection of congenital and infantile cataract in the United Kingdom: role of childhood screening and surveillance. *British Medical Journal* 1999;318:362-365.
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6. Sun et al, Sensitivity and Specificity of Red Reflex Test in Newborn Eye Screening. *J Pediatr*. 2016;179:192-196
7. American Academy of Pediatrics. Red Reflex Examination in Neonates, Infants, and Children. 2018. doi:10.1542/peds.2008-2624

**Extra reading:** American Academy of Ophthalmology. Pediatric Eye Evaluations Preferred Practice Pattern. 2017.  
<http://dx.doi.org/10.1016/j.ophha.2017.09.032>



# Questions



# Translational Vision Research



Department of Ophthalmology

## The End

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