

# INFANTS AND HYPEROPIA

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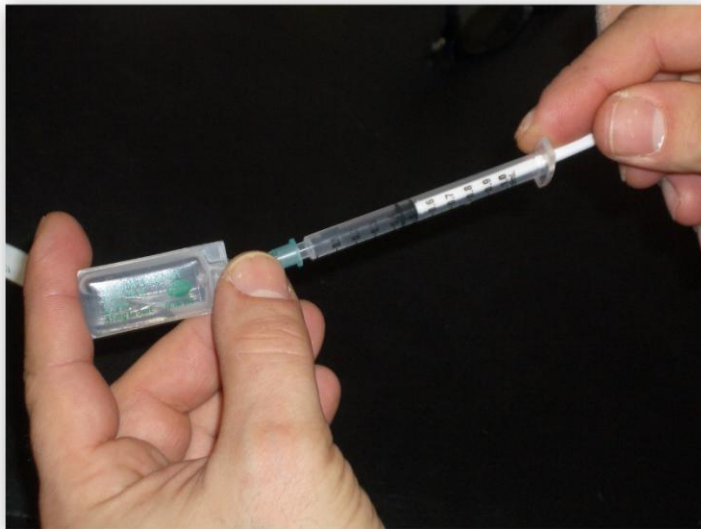
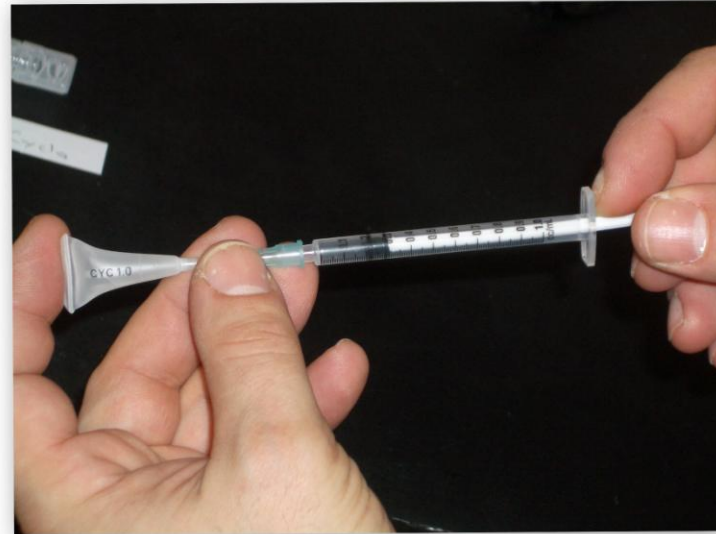
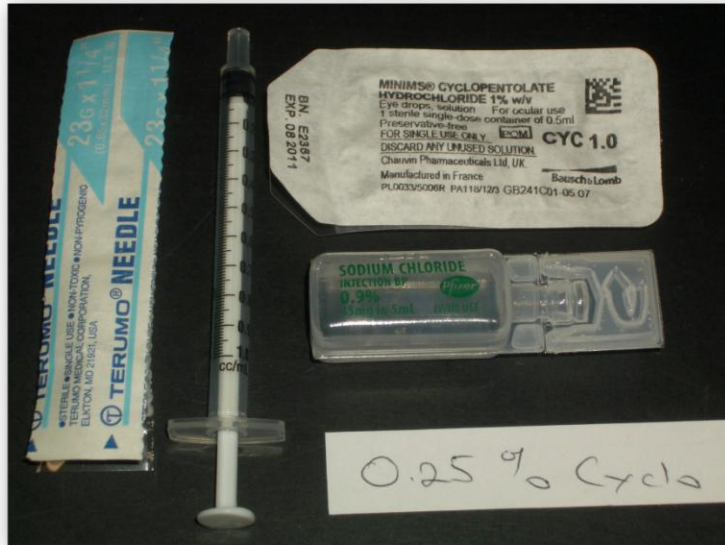
ACBO 2009

9mo, straight, +6 DS OU documented  
when examined for epiphora  
What do you do?



# Retinoscopy gives the answer

- Dry ret – to assess functional significance of wet ret in straight eyed baby
- Wet ret – quantitative assessment
- Use Cyclopentolate
- 0-12 months of age = 0.25% cyclo. Use a local anesthetic first. Wait 15 minutes between eyes.  
12 months- 2 years of age = 0.5% cyclo  
>2 years of age = 1 % cyclo



# Hyperopia in Newborn infants

- #1: Atropine gel: 30% had  $\geq +3$ DS [black = white]
- #2: mostly white 3 mo: 25% had  $\geq +3$ DS. By 9mo, 5.4% [Muti]
- #3: 6mo: 9% had  $\geq +3.5$ DS [Ingram]
- #4: 12mo: 4% had  $\geq +3.5$ DS [Ingram]
- #5:  $\geq +2$ DS @ 12m: UK 12%, US 20%

# Emmetropisation

Beware: ***Data has a lot of scatter***

- Mostly happens  $\leq 12$  mo
- Ingram:  $\geq +2$  DS @ 12 & 40 m mo: 11%

Muti:

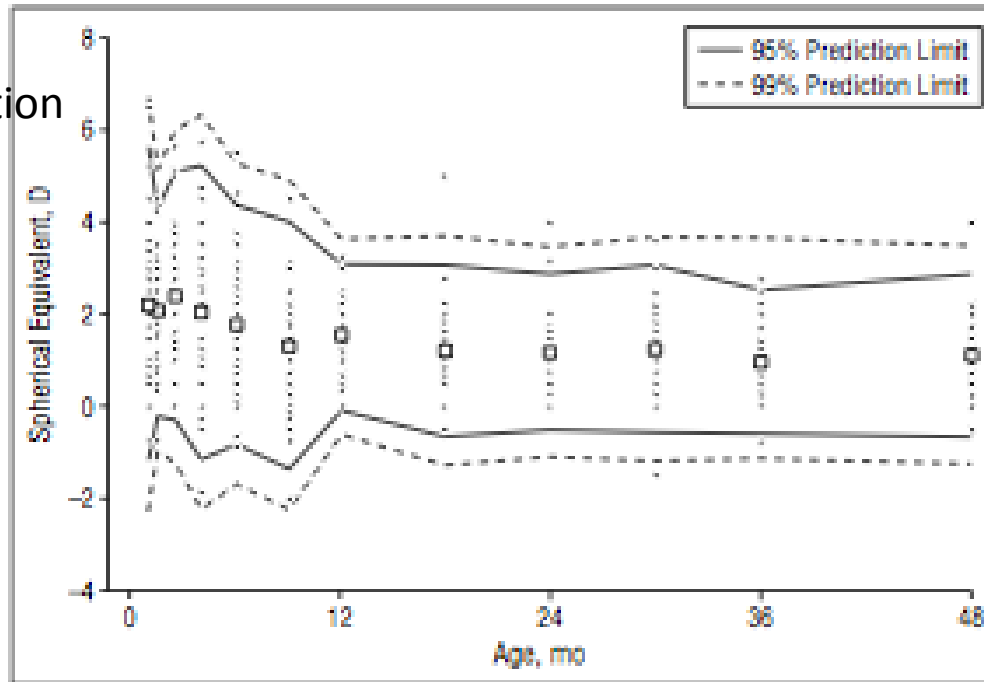
- emmetropisation proportional to refractive error  $\leq +4$ .
- $\geq +4$  less likely to emmetropise
- rapid growth of the eye b/w 3 - 9 mo - increases in axial length by  $1.20 \pm 0.51$  mm and decreases in lens power by  $3.62 \pm 2.13$  D to reach values that are 90% of the average axial length and 155% of the average lens power of a child age 6 y

# HYPEROPIA IN CAMBRIDGE INFANTS

- #1: 6-9mo. Cycloplegic photorefraction.  $\geq +3.5$ DS in any meridian. 4.6%
- #2: 7-9mo: ...5.7%
- #3: 8mo: non cyclo photorefraction. Lag  $>1.5$ DS in any meridian: 4.5%.

# Fulton: Boston

Emmetropisation  
Wide scatter  
Myopia 3%



**Figure 1.** Spherical equivalent of the right eye in 514 subjects in 12 age groups. For each group, the mean spherical equivalent (open squares) and prediction limits connected by line segments are shown. D indicates diopters.

# CAUSES OF HYPEROPIA

## 1. GENETIC

Parent / sibling with ET:

Risk of  $\geq +4$  @ age 6mo is 38%.

## 2: Environmental.

An unexpected association  
between Childhood Hyperopia  
and Parental Smoking

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# Background

The association between maternal smoking in pregnancy, other early life characteristics and childhood vision: the Twins Eye Study in Tasmania.

Ponsonby AL, Brown SA, Kearns LS, MacKinnon JR, Scotter LW, Cochrane JA, Mackey DA

*Ophthalmic Epidemiol.* 2007 Nov-Dec;14(6):351-9.

- N = 346 (172 multiple births)
- Mean age = 9.25 yo
- **Maternal smoking during pregnancy – associated with poor stereo-acuity and esotropia**
- Postnatal maternal smoking not associated with these factors

# Background

Prevalence of hyperopia and associations with eye findings in 6- and 12-year-olds.

Ip JM, Robaei D, Kifley A, Wang JJ, Rose KA, Mitchell P  
Ophthalmology. 2008 Apr;115(4):678-685.

- N = 1765 (6 yo); N = 2353 (12yo)
- **Maternal smoking associated with moderate hyperopia in 6 yo** but not 12 yo
- Smoking during pregnancy – borderline significant with moderate hyperopia (p=0.055)
  - Not significant when controlled for ethnicity
- Moderate hyperopia is significantly associated with amblyopia, strabismus, poor stereoacuity and abnormal convergence

# Pilot Smoking study

- Aim
  - To explore the relationship between hyperopia and parental smoking in a population who present to a subspecialty strabismus practice
- Methods
  - Patients between the age of 0 -12 undergoing a cycloplegic retinoscopy were recruited
  - A short questionnaire was administered to the accompanying parent[s]
    - Information regarding parental smoking status, gestational smoking status, parental refractive error and ethnicity were collected

# Results

- N = 142 participants
  - Mild hyperopia (+0.25 - +1.75) = 59
  - Moderate hyperopia (+2.00 - +5.75) = 59
  - Severe hyperopia (>+6.00) = 15
  - Myopia = 8
- Mean age = 5.29, SD = 2.99, Range 0-12yo
- 52% female
- 21% mother smoke; 16% smoked during pregnancy
- 26% father smoke; 32% smoked during pregnancy
- 32% have either parent smoking now
- 38% have parent smoking during pregnancy

# Results

Adjusted for age

# Discussion

- Gestational smoking is NOT associated with hyperopia
- Having a mother who is smoking now increases the odds of moderate to severe hyperopia (>+3 DS) by nearly **21 fold**
- Mother with myopia is protective of a child having > moderate hyperopia

Submitted to AAPOS meeting 2010

Unknown author

## The association between passive smoking and the risk for hypermetropia in children

### Methods:

- 413 children with SE refraction of +3.0 D or more and 413 age matched children with refraction between 0.0-2.75D were included.
- Smoking habits of the parents or other family members living at home with the children in both groups were compared.

### Results:

- Average age in hypermetropia&control groups:  $6.34 \pm 3.1$  &  $6.33 \pm 3.2$  y ( $P=0.82$ ).
- 121 children (29.3%) with hypermetropia were exposed to passive smoking at home for an average duration of  $1.84 \pm 3.49$  years as opposed to 113 (27.3%) children in the control group which were exposed for an average duration of  $1.68 \pm 3.1$  years.
- Logistic regression revealed that **longer duration of exposure to passive smoking was associated with increased risk for hypermetropia ( $P=0.03$ ).**

### Conclusion:

- Passive smoking is associated with increase risk for hypermetropia in children.

# 9mo, straight, +6 DS OU documented when examined for epiphora

**Dynamic retinoscopy:  
accommodates well  
& symmetrically OU:**

We know this is a high risk baby –

1. Monitor with frequent flash and  
non- flash photos

Look for asymmetric corneal reflexes

Look for asymmetric red eye

2. See 3 monthly



# 9mo, straight, +6 DS OU documented when examined for epiphora

**Threshold for giving full +:**

Frequent ET on photos

ET easily precipitated in office  
exam

Doesn't accommodate for  
near on 2 consecutive  
examinations

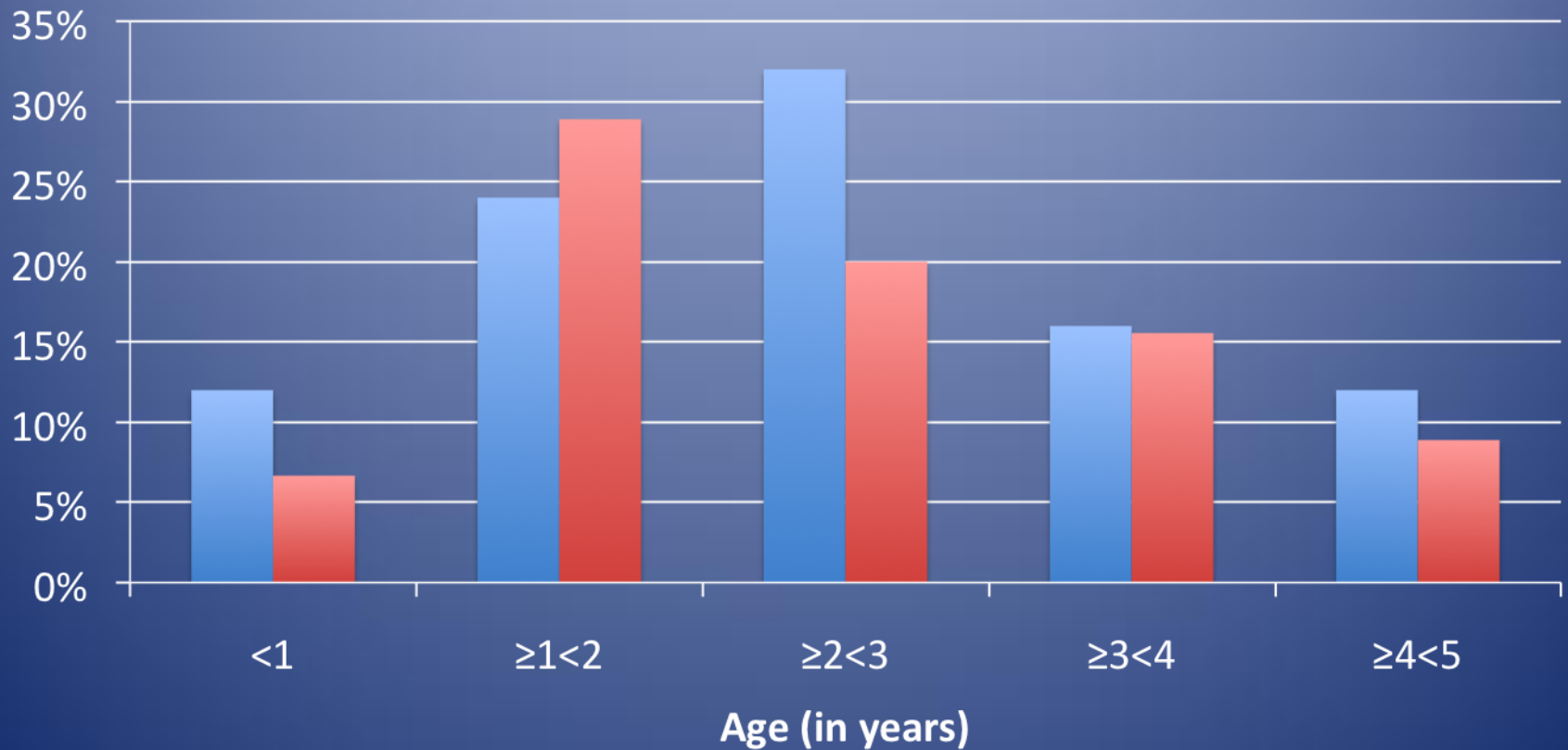


# Some extra caution: High +

- Association with retinal dystrophy
- Look for paradoxical pupils
- Low threshold for ERG
- ET more difficult to manage
- Lower expectations

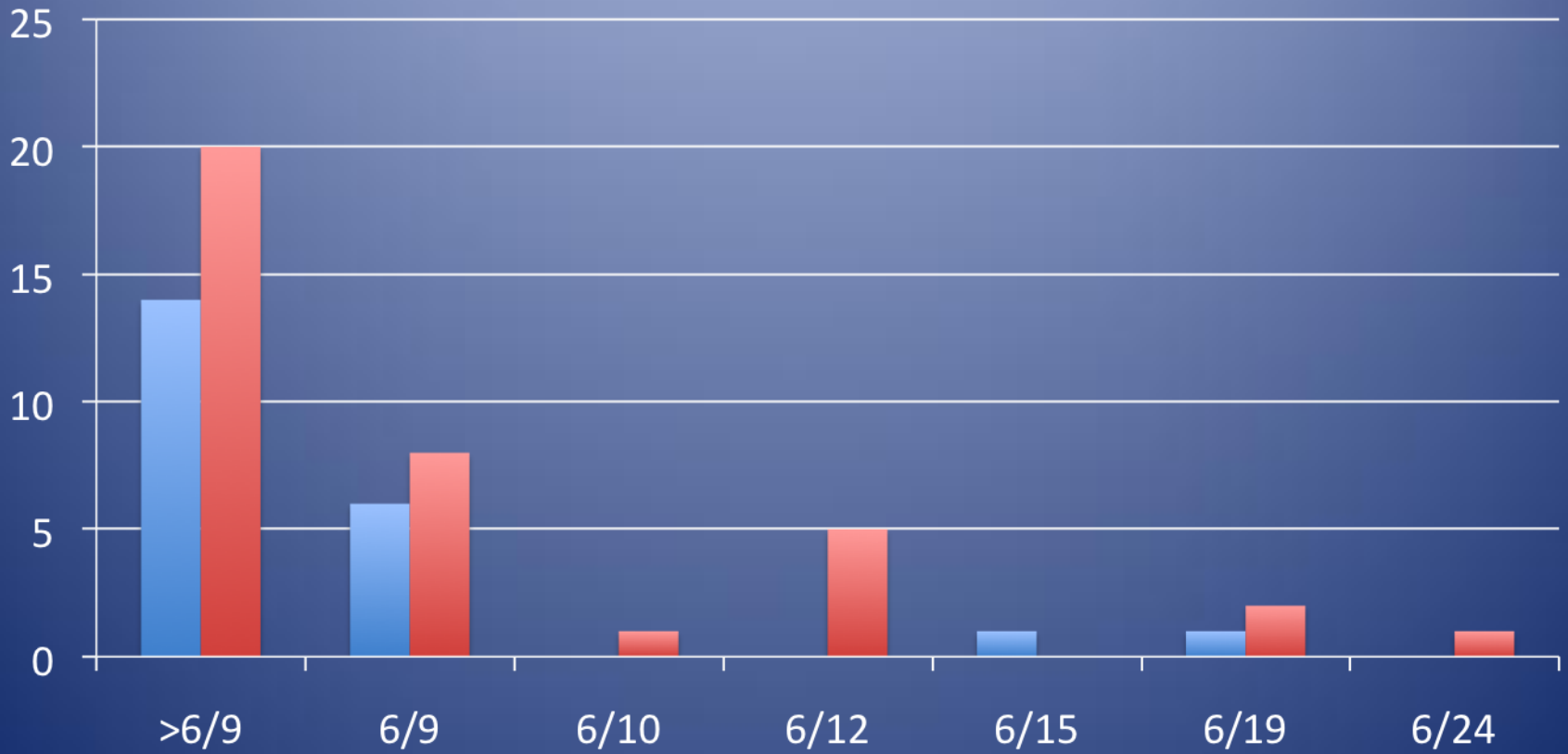
# Age of Presentation (%)

■ Progressive Hyperopia    ■ Non-progressive Hyperopia



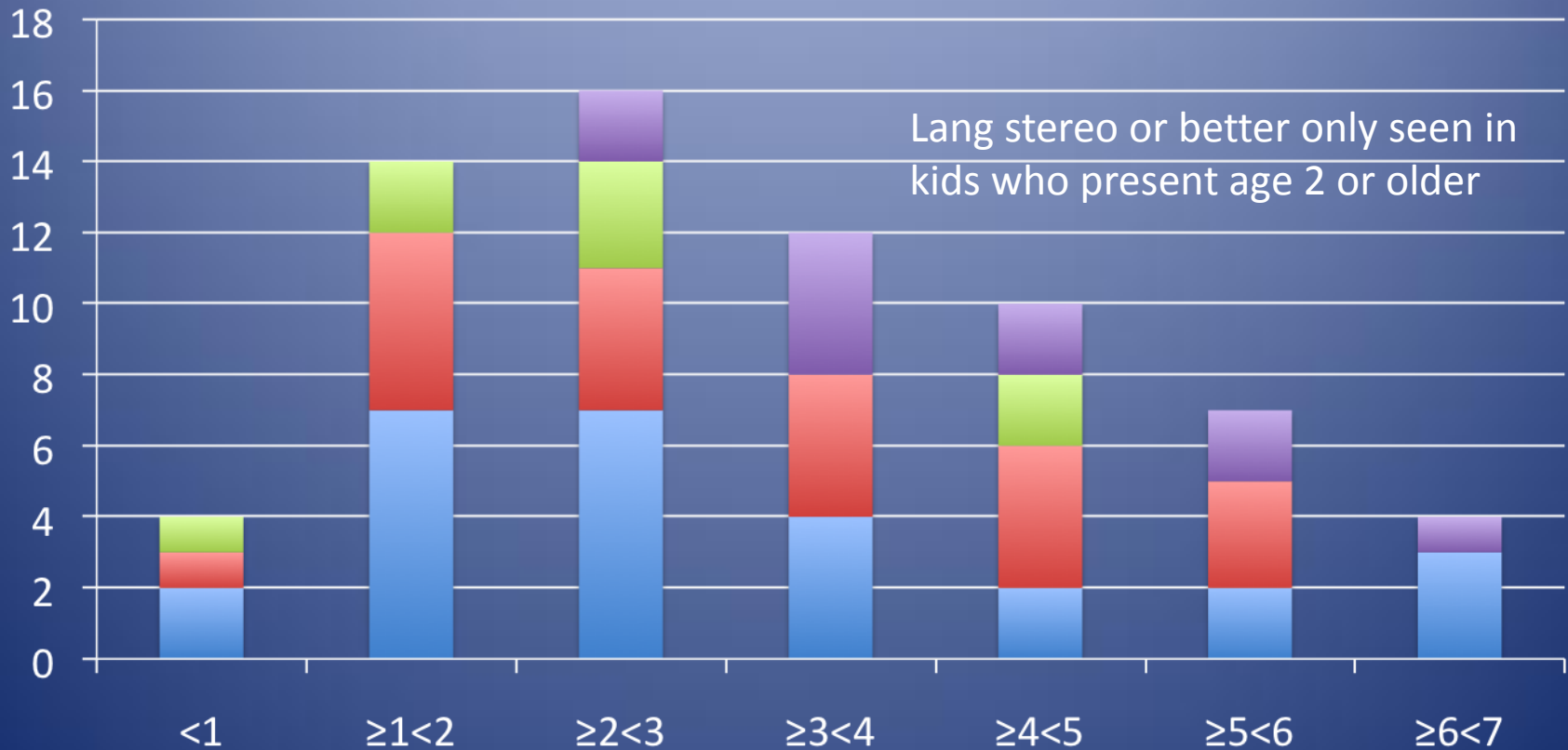
# BCVA better eye

■ Progressive hyperopia    ■ Non-progressive hyperopia



# Age of Presentation & Best Sensory Fusion

■ No Stereopsis ■ 4dot ■ FLY ■ 200"-25"



# Does + prevent devpt of accomm ET?

Ingram: 2 studies

- #1:  $\geq +2$  age 12mo: ~15% have ET by age 3.5y, gls ~non-gls
- #2:  $\geq +3.5$  age 6mo : ~25% develop ET, gls ~non-gls

Does + prevent devpt of accomm ET? #2

Atkinson:

- #3:  $\geq +3.5$  age 8 mo : ~10% develop ET with gls, **23%** no gls!
- Benefit NOT confirmed in 2<sup>nd</sup> study

***Overall: uncertain benefit***

# Does + prevent devpt of accomm ET?

- Both Ingram & Atkinson –
- Giving gls did not interfere with emmetropisation

# Why you can do it better

- You're seeing one patient, not 100's
- You can review frequently to assess significance of +
- Dry ret is a good guide to adequacy of accommodation through the +, & to amblyopia
- Infrequent transient ET: probably give full+
- ET > infrequent / transient: full+ [or a little more]

Thank you