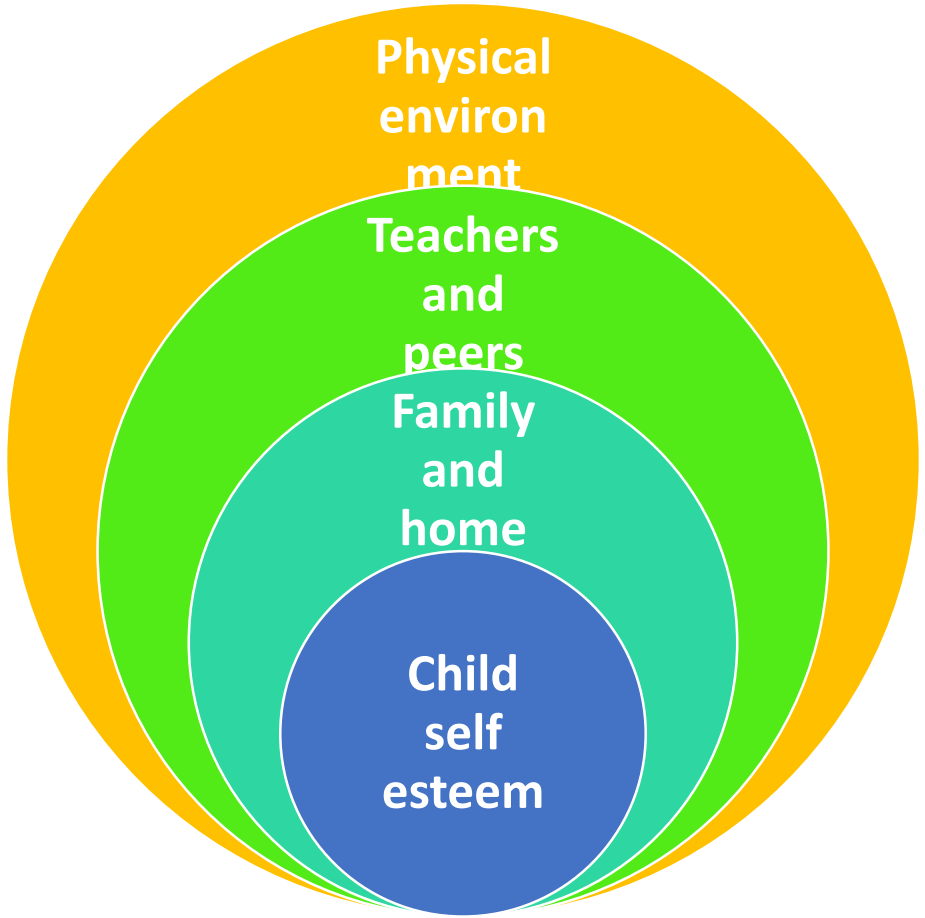
Cerebral Visual Impairment: How to help

Cathy Williams
Reader in Paediatric Ophthalmology
University of Bristol
Consultant Paediatric Ophthalmologist, Bristol Eye Hospital, UK

Multilevel approach

- Recognise the problem
  - Child doesn't blame themselves
  - Teachers/parents modify expectations
- Environmental modifications
  - Setting (home, school)
  - Work and play materials
- Treatment
  - General health
  - Ocular: glasses, ptosis
  - Practice makes Perfect? Neuroplasticity
- Prevention



What's already known..

- Preliminary systematic/scoping review
- BJO 2013
- 5 controlled trials
  - Glasses
  - UV paint
  - Training/Practice for eye movements

BJO

How to help children with neurodevelopmental and visual problems: a scoping review

C Williams, K Northstone, C Borwick, M Gainsborough, J Roe, S Howard, S Rogers, J Amos and J M Woodhouse

Br J Ophthalmol 2014 98: 6-12 originally published online October 24, 2013
doi: 10.1136/bjophthalmol-2013-304225

Child mental health

- Multiple government initiatives to improve mental health and well-being
- Child- and parent-derived outcomes in PenCRU study
  - Communication
  - Emotional well-being
  - Pain
  - Self-care
  - Mental Health

Morris *et al. Health and Quality of Life Outcomes* (2015) 13:87
DOI 10.1186/s12955-015-0284-7

HEALTH AND QUALITY OF LIFE OUTCOMES

RESEARCH ARTICLE Open Access

Meaningful health outcomes for paediatric neurodisability: Stakeholder prioritisation and appropriateness of patient reported outcome measures

General treatments

- Overall Health
  - Sleep
  - Diet

- Drugs eg antiepileptics
- Hormones eg thyroxine

- Vision and function can improve if general health improves

Ophthalmic interventions

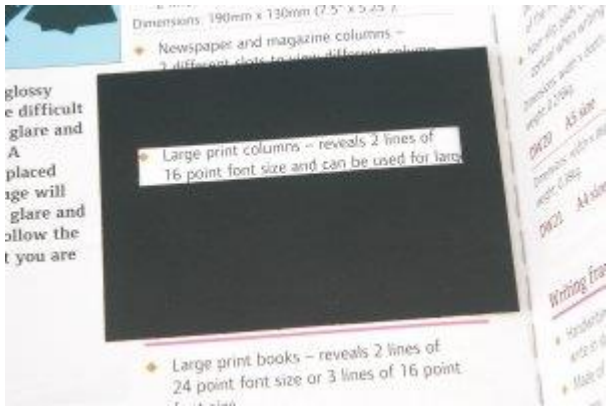
- Laser or CLs or surgery for high refractive error

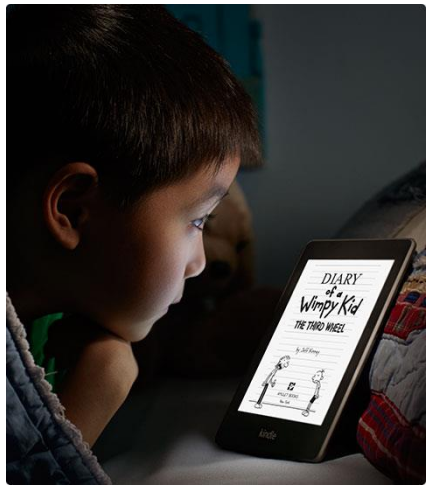
- Amblyopia treatment
- Sticky eyes
- Lid surgery

Environmental Modifications - decluttering

- Classroom
  - Walls
  - Work area
  - Worksheets
- Home
  - Play area
  - Clothes

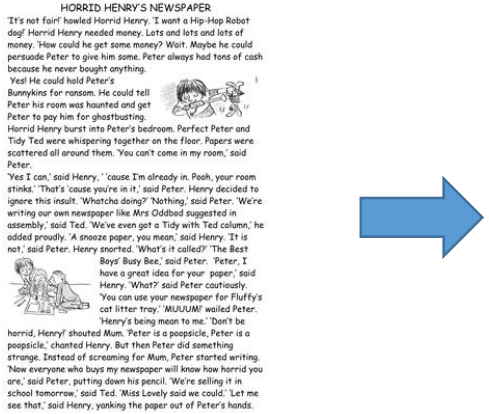
Fisher et al 2014
Psychological Science





Environmental Modifications- adapt to field or eye movement problems

- Position in class- defect to wall
- Try reading vertically (if homonymous hemianopia)


HORRID HENRY'S NEWSPAPER

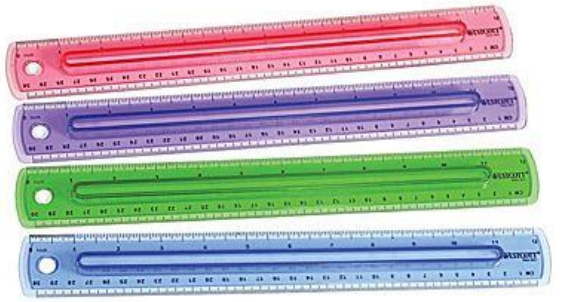
'It's not fair!' howled Horrid Henry. 'I want a Hip-Hop Robot dog!' Horrid Henry needed money. Lots and lots and lots of money. 'How could he get some money? Wait. Maybe he could persuade Peter to give him some. Peter always had tons of cash because he never bought anything.

Yes! He could hold Peter's Bunnykins for ransom. He could tell Peter his room was haunted and get Peter to pay him for ghostbusting.

Horrid Henry burst into Peter's bedroom. Perfect Peter and Tidy Ted were whispering together on the floor. Papers were scattered all around them. 'You can't come in my room,' said Peter.

'Yes I can,' said Henry, ' 'cause I'm already in. Pooh, your room stinks.' 'That's 'cause you're in it,' said Peter. Henry decided to ignore this insult. 'Whatcha doing?' 'Nothing,' said Peter. 'We're writing our own newspaper like Mrs Oddbod suggested in assembly,' said Ted. 'We've even got a Tidy with Ted column,' he added proudly. 'A snooze paper, you mean,' said Henry. 'It is not,' said Peter. Henry snorted. 'What's it called?' 'The Best Boys' Busy Bee,' said Peter. 'Peter, I have a great idea for your paper,' said Henry. 'What?' said Peter cautiously. 'You can use your newspaper for Fluffy's cat litter tray.' 'MUUUM!' wailed Peter. 'Henry's being mean to me.' 'Don't be horrid, Henry!' shouted Mum. 'Peter is a poopsicle, Peter is a poopsicle,' chanted Henry. But then Peter did something strange. Instead of screaming for Mum, Peter started writing. 'Now everyone who buys my newspaper will know how horrid you are,' said Peter, putting down his pencil. 'We're selling it in school tomorrow,' said Ted. 'Miss Lovely said we could.' 'Let me see that,' said Henry, yanking the paper out of Peter's hands.

- Own work (instead of copying)
- Lectern or book rest
- Markers to help positioning

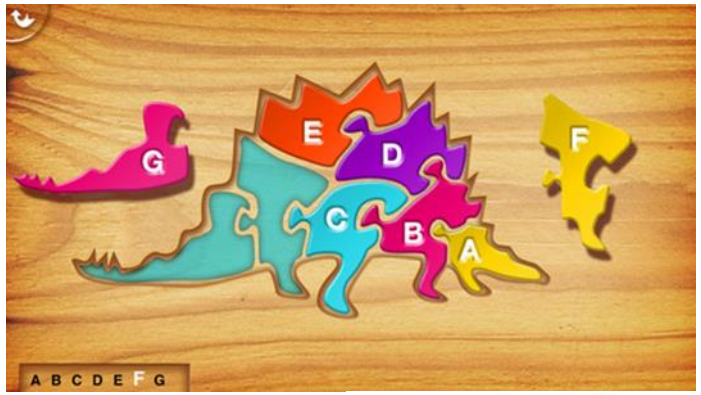


Environmental modifications - visuospatial prompts

- Large visual “clues” may help to develop more accurate visual guidance of movement
  - Steps
  - Corridors
  - Route-finding
- Use of tactile support eg walker, bike

Environmental modifications –multisensory approach

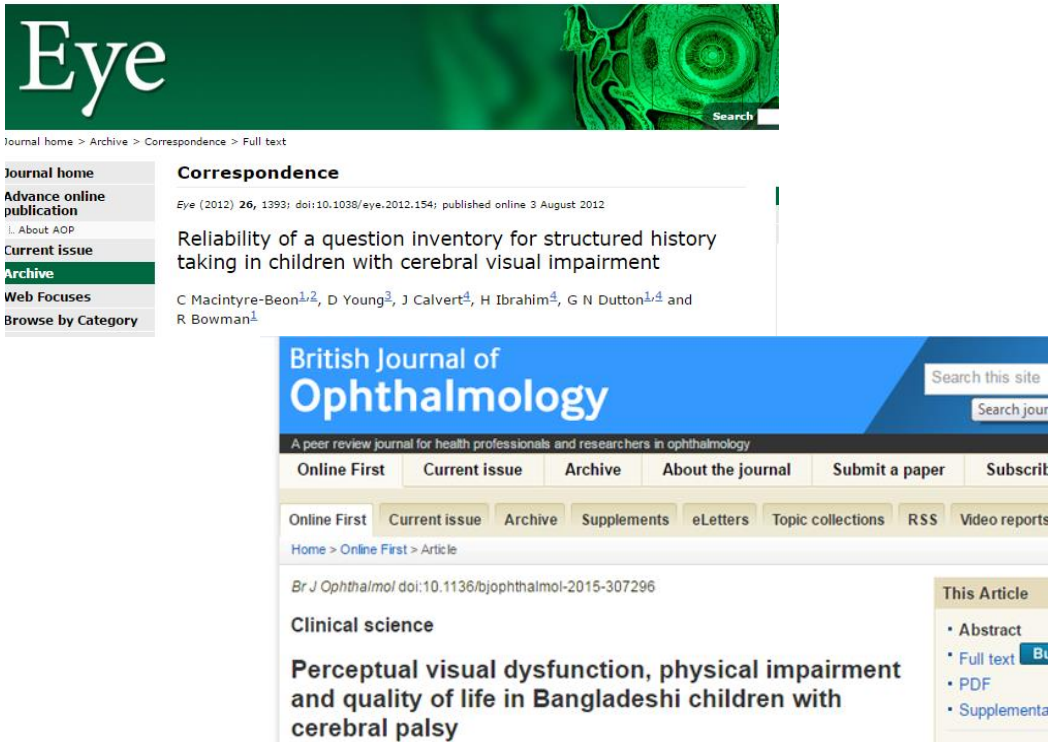
- If vision cannot convey the information needed - supplement with
  - Tactile
  - Auditory
- Observational studies suggest multi-sense can promote more advanced behaviour



Behavioural modifications: INSIGHT

- Professor Gordon Dutton and Mr R Bowman
- INSIGHT questionnaire and database
  - Discriminates between exprems with/without CVI (MacIntyre-Beon et al Eye 2012)
  - Agrees with direct tests in prems (Geldof et al Pediatric Research 2015, 78, 190–197)
  - Agrees with direct tests and predicts QoL in children with CP in Bangladesh (Mitry et al 2015)

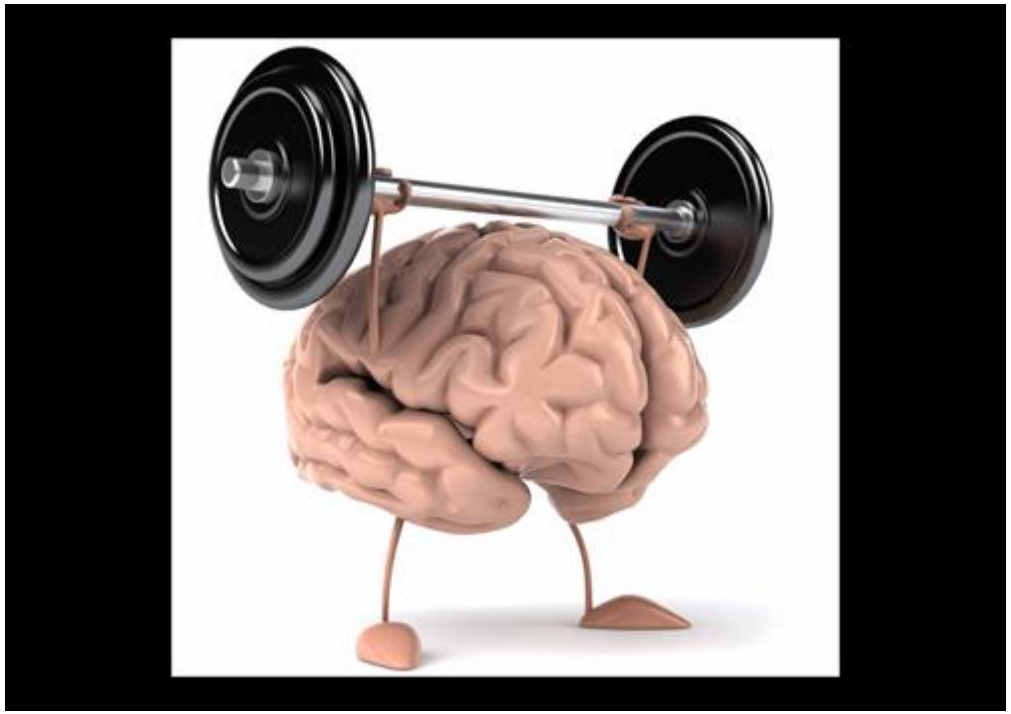
- Questions and Solutions curated by Prof K Saunders (Ulster)



http://biomed.science.ulster.ac.uk/research-institute/ulster-vision-resources/resources/resources-for-professionals/cvi-assessment/

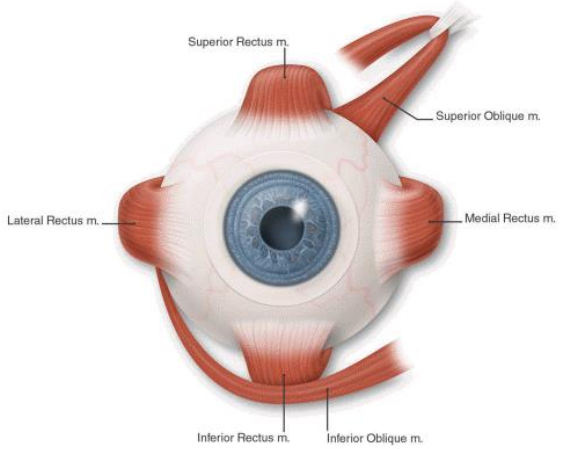
Treatments to restore/improve function

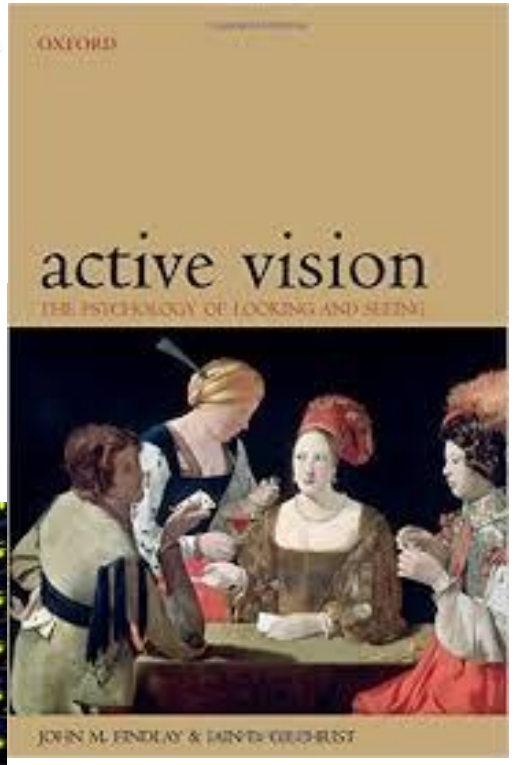
- Practice?
  - Eye movements
  - Visuocognitive/perceptual skill
- Reinforce with other senses
  - Auditory prompts
  - Proprioception/motor
- Neuroplasticity - promote if possible



Active Vision

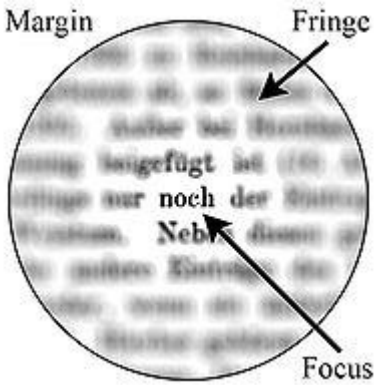
- Eye movements key to visual attention
- Peripheral retina not like fovea
- Constant checking of different places in visual field
- Closely linked to cognitive processes
- Eye Movements often abnormal in children with neurodevelopmental problems

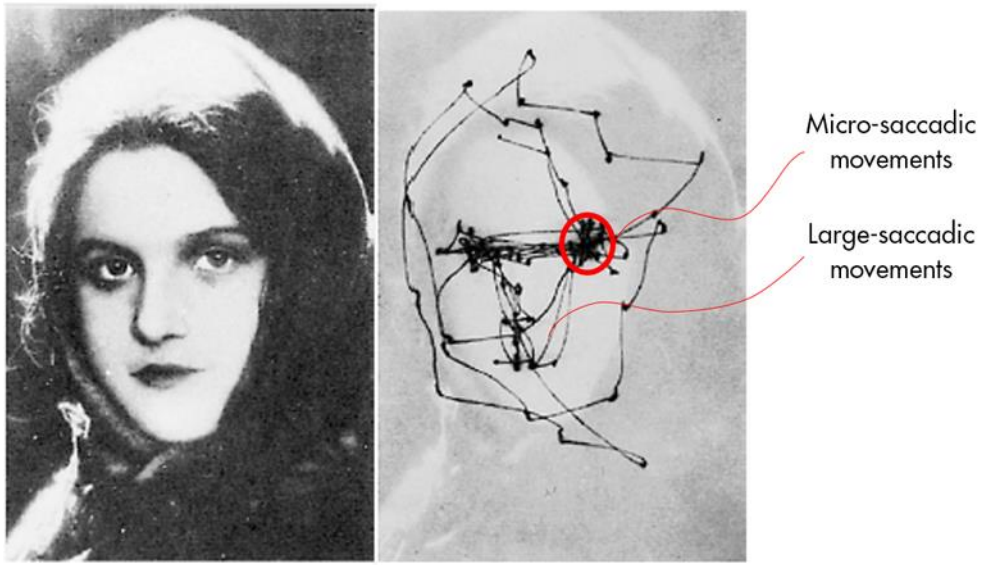




Treatment for poorly controlled eye movements

- In many brain disorders
  - impaired smooth pursuit (tracking)
  - saccadic (gaze changing) eye movements
- Treatments/exercises on offer
- Do they work? On NHS?
- Need for a randomised trial…





Prevention

- Public Health
  - Reduce premature births
  - Smoking in pregnancy
- Very early interventions
  - Cooling
  - Xenon
  - DRIFT

REVIEW

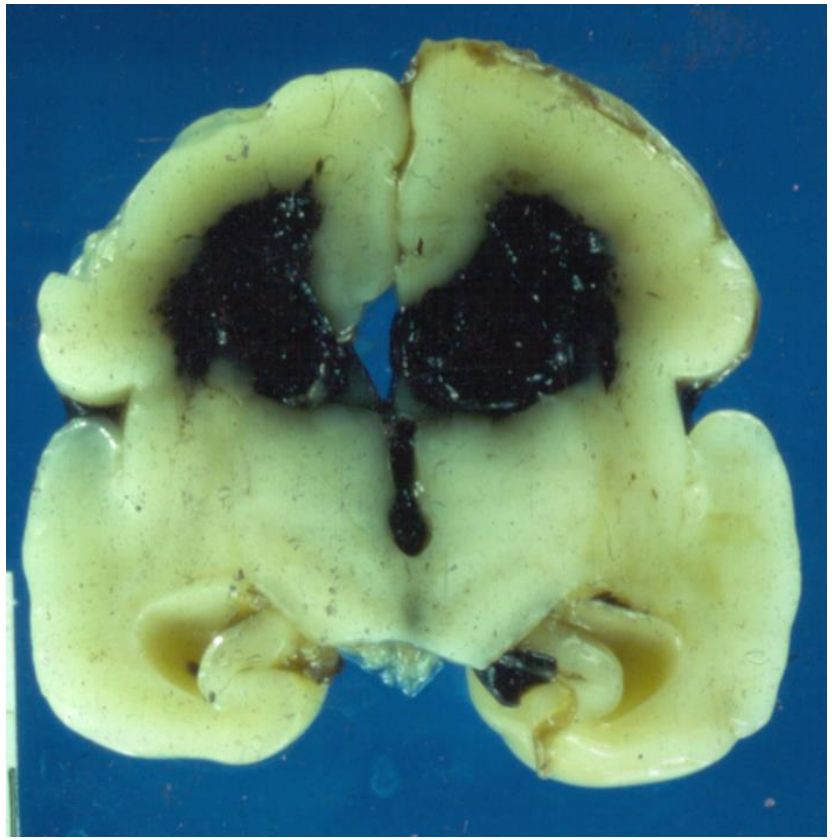
Therapeutic hypothermia for hypoxic–ischaemic encephalopathy in the newborn infant

Marianne Thoresen and Andrew Whitelaw

Curr Opin Neurol 18:111–116.

Prevention- DRIFT

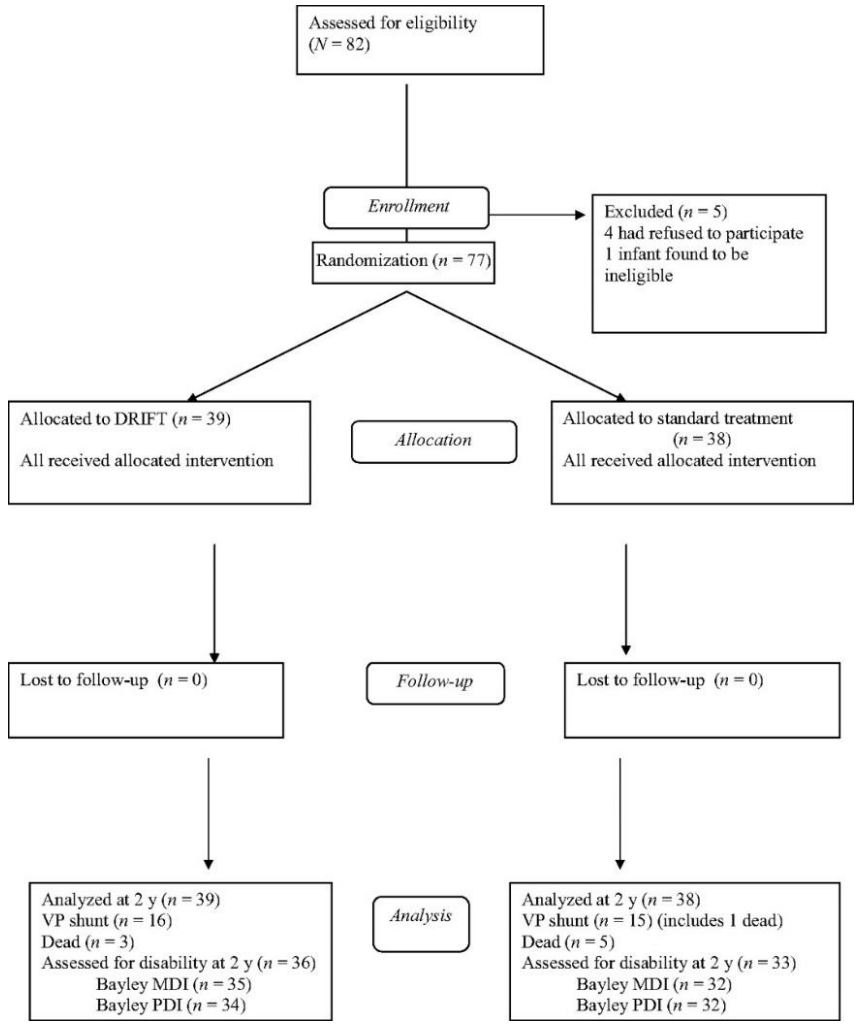
- DRainage, Irrigation , Fibrinolysis Treatment
- For premature infants with intraventricular haemorrhage and ventricular dilatation



DRIFT intervention

DRIFT study

- Randomised controlled trial
- Bristol, Poland, Glasgow
- 77 children randomised
  - DRIFT
  - Standard (meticulous) care
- All received intended treatment
- 8 died



DRIFT – Outcomes at age 2

- Primary Outcome was any of:
  - Death
  - IQ < 55
  - Blind (SSI)
  - Deaf
- At 2 yrs (corrected)
  - 54% (DRIFT) vs 71% (Standard) died or severe disability
    aOR = 0.25 (0.08 to 0.82)
  - Amongst survivors 31% (DRIFT) vs 59% (Standard) had IQ<55
    aOR 0.17 (0.05 to 0.57)

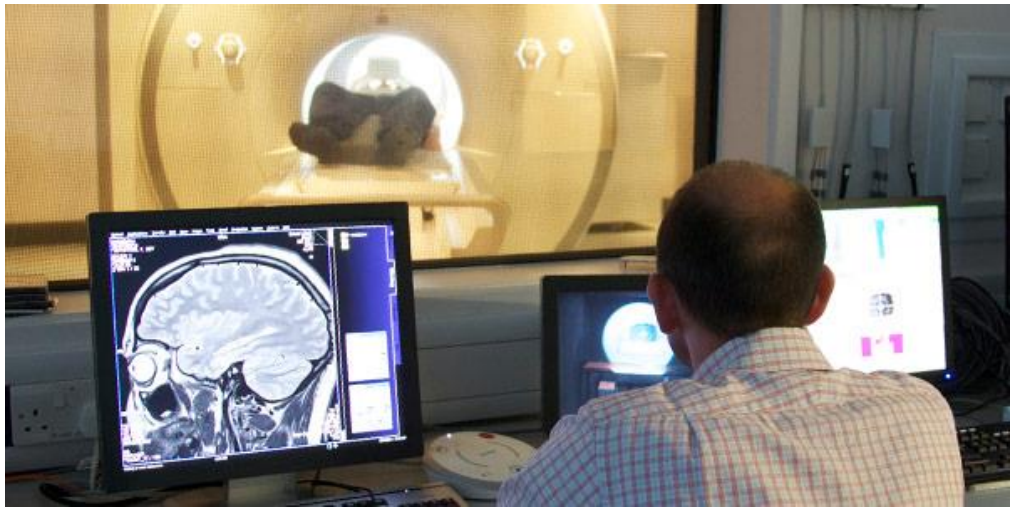
Pediatrics
April 2010, VOLUME 125 / ISSUE 4

Randomized Trial of Drainage, Irrigation and Fibrinolytic Therapy for Premature Infants with Posthemorrhagic Ventricular Dilatation: Developmental Outcome at 2 years

Andrew Whitelaw, Sally Jary, Grazyna Kmita, Jolanta Wroblewska, Ewa Musialik-Swietlinska, Marek Mandera, Linda Hunt, Michael Carter, Ian Pople

DRIFT10 -overview

- Age 2 early to decide on outcome for children
- DRIFT10 study designed to assess outcomes of DRIFT participants at 10-11 yr
  - Cognitive(BAS)
  - Motor (Motor ABC and GMFCS)
  - Visual
  - MRI and fMRI
  - Behaviour (SDQ)
  - Health Service Use and other costs
  - Quality of Life ((HUI)
- Primary Outcome at 10-11 is severely reduced IQ



DRIFT10 – vision data collected

- GD CVI-questions
- Acuity
- Alignment
- Contrast Sensitivity
- Refraction
- Eye Movements
- Visual Fields
- Stereoacuity
- Visuocognitive/Peceptual
    - Postbox
    - Rectangles
    - Contours

ntinuing to browse the site you are agreeing to our use of cookies. Find out more here

British Journal of Ophthalmology

A peer review journal for health professionals and researchers in ophthalmology

Online First | Current issue | Archive | About the journal | Submit a paper

Online First | Current issue | Archive | Supplements | eLetters | Topic collections | RSS

Home > Online First > Article

Br J Ophthalmol doi:10.1136/bjophthalmol-2014-305868

Clinical science

Normative data for three tests of visuocognitive function in primary school children: cross-sectional study

OPEN ACCESS

Cathy Williams[1,2], Iain D Gilchrist[3], Sue Fraser[2], HM McCarthy[2], Julie Parker[2], Penny Warnes[2], Jill Young[4], Lea Hyvarinen[5]

Author Affiliations

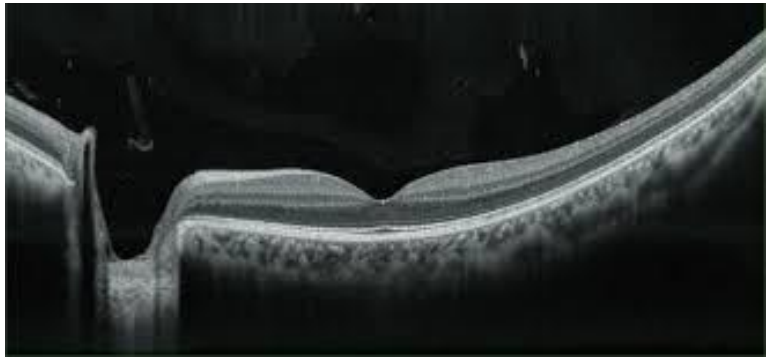
Correspondence to

Summary of DRIFT10 findings so far

- DRIFT is a useful intervention to help babies who suffer IVH
- Important to establish whether the procedure harms vision
- Clear evidence that visual system reflects extent of intracranial damage in many ways
- Preliminary results suggest possible improvement (in DRIFT group) in visuocognitive/perceptual outcomes
- Must include vision outcomes in future trial

Summary of support for CVI

- Multilevel approach needed
  - Recognition
  - Environments
  - Treatment
  - Prevention
- New studies suggest effective therapies will be available
- “Eye” vs “Brain” – increasingly less clearcut
- **Important to assess aspects of vision routinely in at risk children**
- **How to deliver this equitably? Training and Capacity building?**



Spreading the word…

- Kerry Tait visited 2015 and showed artwork from artist residence project

- Inspired Bristol project to get artist-in-residence Luke Jerram
- Leverhulme Trust- will fund work to promote understanding of brain-related vision problems in 2017

Teams and collaborators

- Bristol Special Needs Vision Team (Sue Fraser, Helen McCarthy, Julie Parker, Penny Warnes)
- Child Health Community Partnership
- Bristol Sensory Support Service (Sue Rogers)
- NIHR, MRC (EBI)
- The CVI Project team (Anna Pease and Rose Watanabe)
- Prof Iain Gilchrist and Dr Rosie Clark(University of Bristol)
- Emerson's Green and Belgrave Schools
- WESC and Dr J Waddington
- Dr Karen Luyt and DRIFT study team
- PENCru and DR C Morris
- Families in advisory groups
- Prof G Dutton, Prof K Saunders, Bartimeus (Rotterdam), Prof Lea Hyvarinen, Dr M Woodhouse

NHS National Institute for Health Research

University of BRISTOL
Elizabeth Blackwell Institute for Health Research