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KU Children's Services

INFLICTED TRAUMATIC BRAIN INJURY IN CHILDREN

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“...peak of peaks”



***ACQUIRED* BRAIN INJURY (ABI)**

**any damage to the
brain that occurs
after birth**

...causes?

- **stroke**
- **alcohol or other drug abuse**
- **brain infection**
- **neurological diseases (Parkinson's disease, Huntington's disease etc.)**
- **oxygen loss (asthma, near-drowning etc.)**
- **accident or trauma**

PHYSICAL DISABILITY

- **paralysis**
- **poor balance and coordination**
- **chronic pain**
- **fatigue**
- **seizures (1 in 6)**
- **loss of sense of taste or smell**
- **vision and hearing disturbance**
- **speech impairment**



COGNITIVE DISABILITY

**poor memory and concentration
(2 in every 3)**

= reduced ability

- to learn**
- to plan and**
- to solve problems**

“CHALLENGING BEHAVIOUR”

for 2 out of 3, the *most* disabling

- increased irritability
- poor impulse control
- verbal and physical aggression
- disinhibition

abusive head trauma

non-accidental head injury

shaken baby syndrome

[shaken impact syndrome]

inflicted head injury

inflicted traumatic brain injury



inflicted traumatic brain injury – “type 1”

*(Queensland Police Service -
review of 52 cases fatal ITBI)*

“victims were shaken, thrown,
punched, head-butted, and
attacked with objects such as
lumps of wood”

inflicted traumatic brain injury – “type 2”

“a significant amount of [ITBI] is *not necessarily deliberately inflicted, that is; premeditated...* A lot of it occurs in the heat of the moment, in the middle of the night.”

**inflicted traumatic brain injury –
“type 2”**

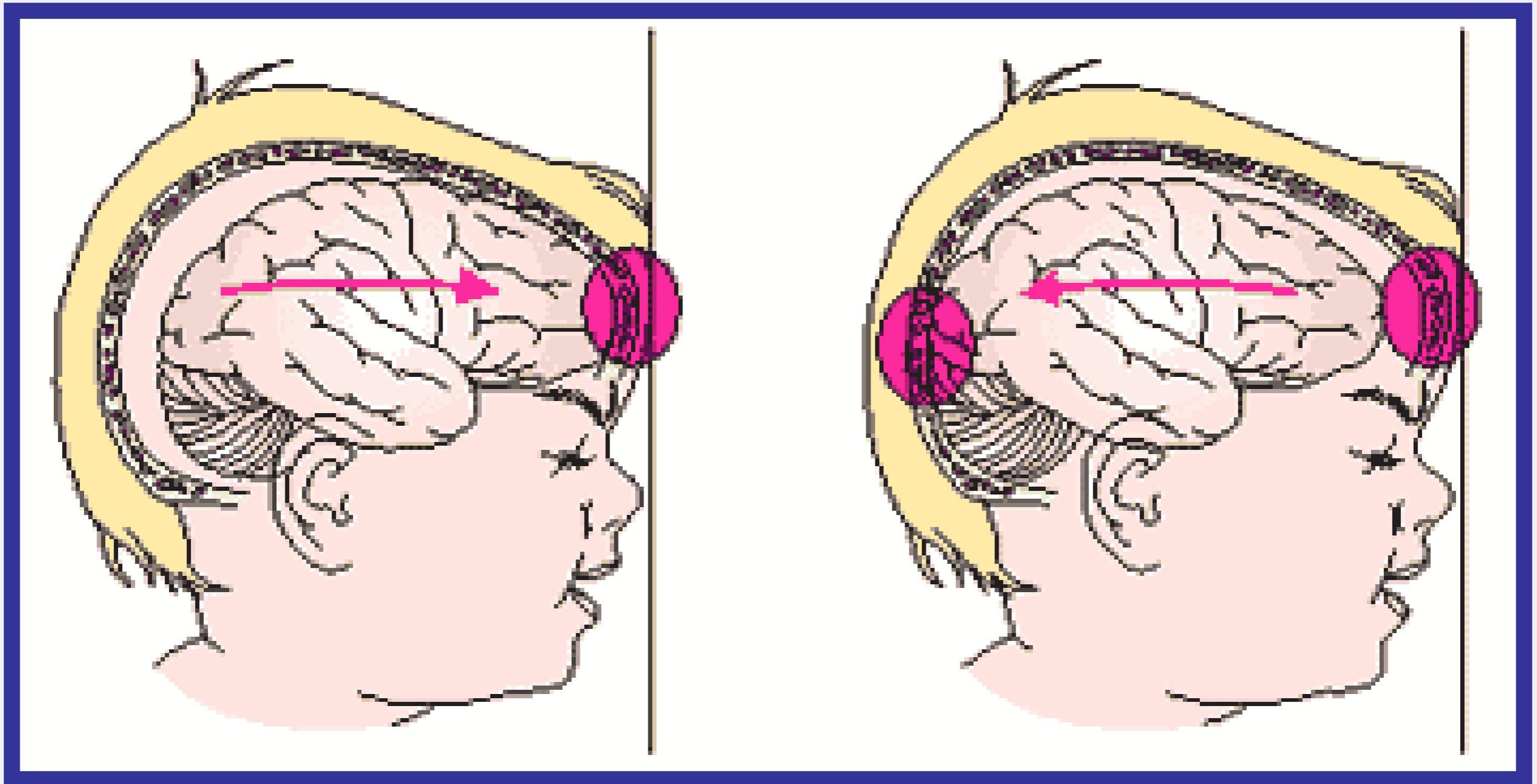
**crying = “the only child-specific
variable consistently identified
as important in the cycle of
escalation to shaking”**

“PURPLE Crying”



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“contre coup”

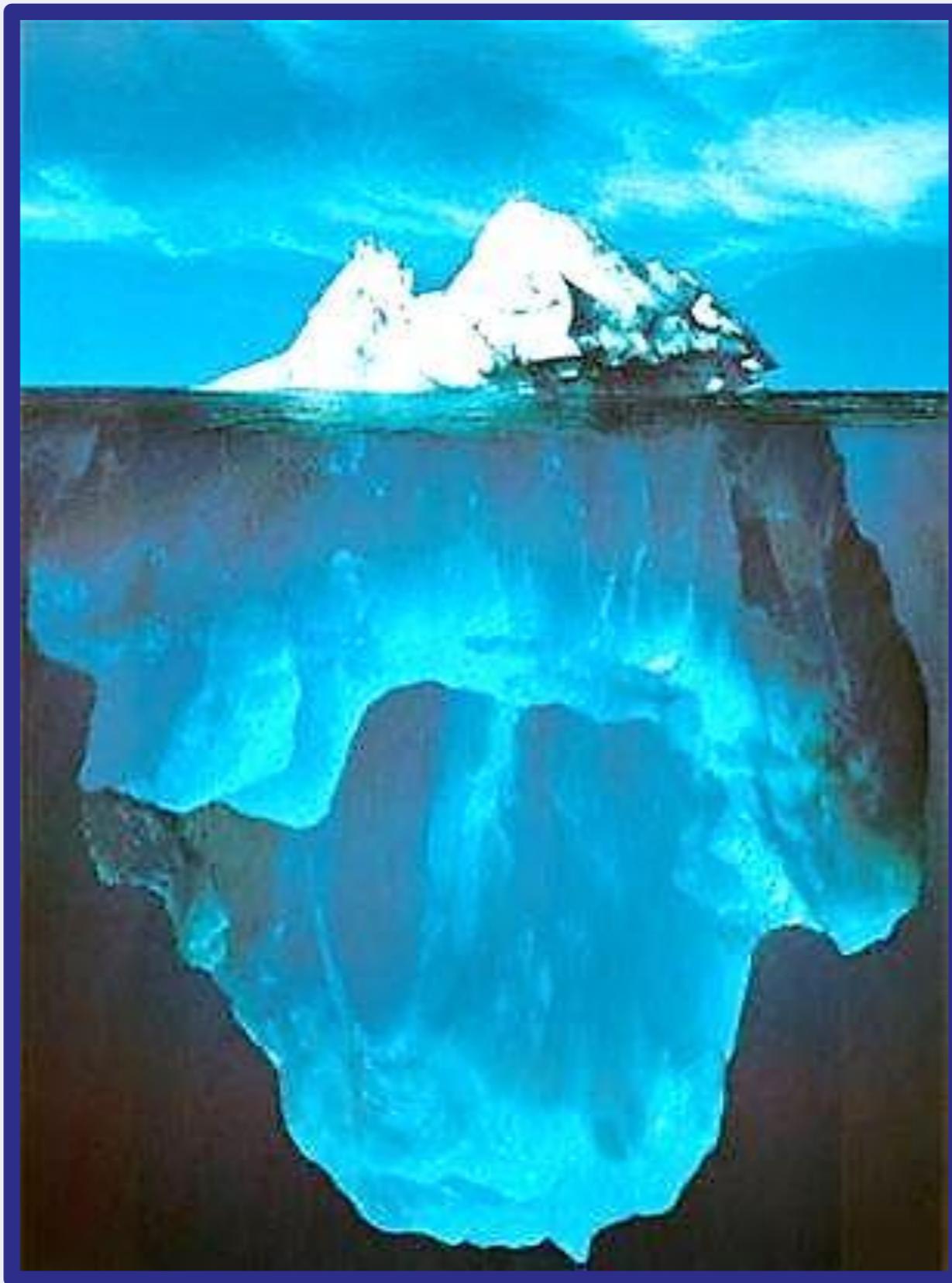




incidence - hospitalisations

hospital	period	#	average age (mnts)
<i>The Children's Hospital at Westmead</i>	2001-2008	25	10
<i>Sydney Children's Hospital</i>	2004-2008	34	10
<i>John Hunter Hospital, Newcastle</i>	2007-2009	16	16





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hospitalisations – “assault”

2007-08 ; 194 separations
for infants (< 12 months)

218 for children (1- 4 years)

“assault” includes: “injuries inflicted by another person with intent to injure or kill, by any means”; “assault by bodily force”; “assault by unspecified means”; “homicide (attempt)” “manslaughter (non-accidental)” murder “(attempt)”; “other maltreatment syndromes” (“physical abuse”, “torture”) etc.

- hospitalisations ("missed cases")

The Children's Hospital in Denver, Colorado; 1990-1995

- **54 (31.2%) of 173 "abused children with head injuries had been seen by physicians after [ITBI] and the diagnosis was not recognised"**
- **15 (27.8%) "reinjured"**
- **4/5 "deaths in the group with unrecognised [ITBI] might have been prevented by earlier recognition of abuse"**
- **("...Infants with recognized [ITBI] were more likely to be minority children or children whose mothers and fathers were not living together...")**

incidence - hospitalisations ("missed cases")

- **irritability**
- **vomiting**
- **poor appetite**
- **lethargy**

“The fact that 60% of children present to hospital with symptoms that would be consistent with many childhood illnesses seen in this age group suggests that [ITBI] may never be considered in many cases.”

incidence – “community”

2002; 1435 households @ North, South Carolinas (US)

telephone survey
[mothers] of "potentially
abusive behaviours
used by either
themselves or their
husbands or partners"

'v' incidence of
hospitalised ITBI
in North Carolina
over 2 years

“...for every 1 child less than 2 years of age who
sustains a serious or life-threatening injury,
another 152 children may be shaken by their
caregivers and sustain sub-clinical
brain trauma that goes undetected.”



incidence – “community”

(NSW Community Services, 2005 - 2009)

- 514 “Child Protection Reports relating to shaking of children aged 0-2 years”
- 236 “secondary assessments determined actual harm or risk of harm relating to shaking of children”

(Families and Communities South Australia, 2004-2009)

- of 7973 “children in Notifications” of child abuse less than 2 years of age, there were 2089 “children in Substantiations”
- 23 “Substantiations involving Shaking”
- 7 “Substantiations involving Skull Fracture”.



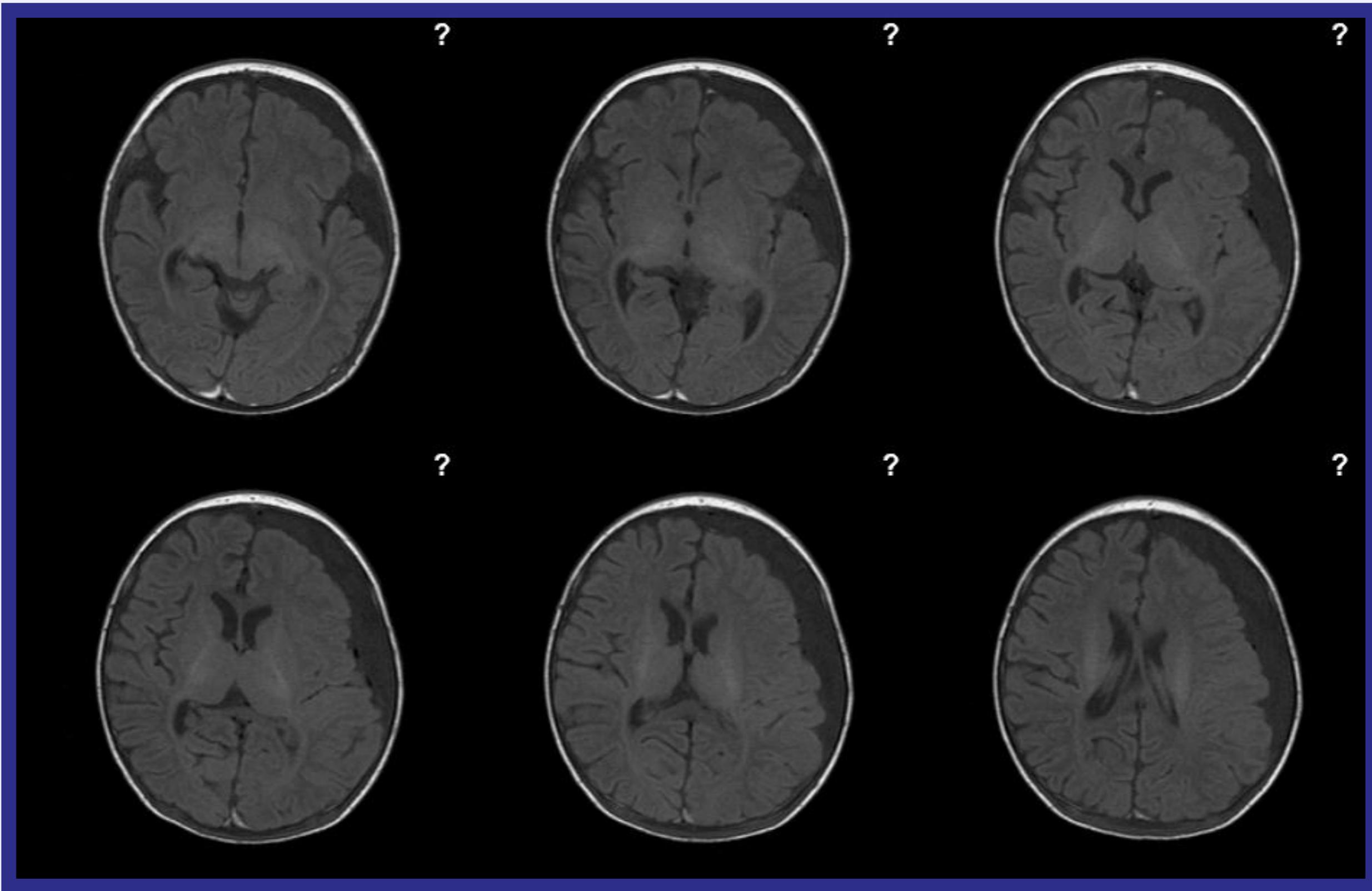
outcomes?

“the short-term outcome in infants with [ITBI] is poor and the associated mortality ranges from 11% to 36%; in surviving children, long-term morbidity is usual and ranges from mild learning difficulties to severe physical and cognitive impairment.”

Children’s Hospital at Westmead (1995 and 2002, n=65)

- 4 died
- 7 vegetative state
- 17 discharged with “severe disability”
- 12 “moderate disability”
- 25 “good” outcome

- (follow up @ 1-73 months - n=56)
- 17 “severe disability”
 - 12 “moderate disability”
 - 19 “good” outcome



incidence – “community”; outcomes?

“habitual, prolonged, casual whiplash shakings may produce an insidious progressive clinical picture...which is often inapparent to both parents and physicians. It usually first becomes evident at school age when minor cerebral motor defects are first detected along with mild mental retardation...The actual number of such cases is incalculable from current evidence but it appears to be substantial.”

- John Caffey

incidence - “community”; outcomes?

AUSTRALIAN EARLY DEVELOPMENT INDEX (AEDI)
(261,203 five yr-olds surveyed = 97.5 per cent of the estimated population)

- 21,800 “developmentally vulnerable”, 34,300 “developmentally at risk, in the *“language and cognitive (school-based)”* domain
- 21,700 “vulnerable” 37,900 “at risk” in the *“emotional maturity”* domain
- 23,200 “vulnerable” and 37,300 “at risk” in the *“social competence”* domain
- 22,600 “vulnerable” and 38,800 “at risk” in the *“communications skills and general knowledge”* domain



incidence – “community”; outcomes?

**10-18% of cerebral palsy in Australia
acquired post-neonatally
(n = 60-100 p.a.)**

1/10 the result of ITBI

**“the non-accidental group
is slightly rising”**



incidence – “community”; outcomes?

Attention Deficit Hyperactivity Disorder (ADHD)

1998: 355,600 children/ adolescents estimated to have ADHD (11.2% aged @ 4 - 17)

ADHD: occurs in 20%-50% of children following ABI

RACP “guidelines” on ADHD: “ a thorough medical history and examination are required to identify any ABI or other neurological condition that may contribute to the presenting symptoms.”

prevention1?

*World Health Organisation 2009
“systematic review of reviews” (298 studies)*

“small and medium effect sizes”
for parent education in direct measures of the
reduction in child abuse

“...comprehensive hospital-based parent
education programme in New York State.
[“Dias model”] The programme was found to
reduce the incidence of abusive head trauma
by 47%...”

prevention2?

Nurse Family Partnership (US, Professor David Olds)

“...the only home visiting programme whose effectiveness has been unambiguously demonstrated.”

randomised controlled trial - NY state; 48% reduction in the incidence of child abuse @ 15-year follow-up

- 28 states
- 20,000 families enrolled
- 2009; US\$2.25 billion in expansion funding

Australian Nurse-Family Partnership Program

Australia = 2nd country to receive approval from program's originator to run it outside of US

- 1,900 Aboriginal/Torres Strait Islander families, 10 sites (2008-2009; ATSI children = 7.5X the subject of substantiations of child abuse and neglect as non-ATSI)



prevention3?

ITBI/[SBS] “get ‘lost’ in a general program...SBS is probably different because (1) it is the only form of child abuse for which there is a positive feedback for the abuse (i.e. if you shake hard enough, you get a mild concussion and the crying stops, whereas if you punch the baby, the crying increases) and (2) [the data is only suggestive and not good on this] that it is likely that SBS is not as ‘enmeshed’ in difficult-to-change risk factors (like single parents, depressed, etc.) as other forms of child abuse. Bottom line; in this respect, SBS may be “more” preventable than other forms of child abuse.”

- Professor Ron Barr (Pediatrics), University of British Columbia, (National Center on Shaken Baby Syndrome)



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