



Hope

**Head shape issues,
often overlooked,
hugely misunderstood.**

Charl Stenger

RESEARCH ARTICLES AND REFERENCES



Oh AK, Hoy EA, Rogers GF. Predictors of severity in deformational plagiocephaly. *J Craniofac Surg*. 2009;20:1629-1630.

Huang MH, Mouradian WE, Cohen SR, Gruss JS. The differential diagnosis of abnormal head shapes: separating craniosynostosis from positional deformities and normal variants. *Cleft Palate Craniofac J*. 1998;35:204-211. [Abstract](#)

Morriss-Kay GM, Wilkie AO. Growth of the normal skull vault and its alteration in craniosynostosis: insights from human genetics and experimental studies. *J Anat*. 2005;207:637-653. [Abstract](#)

Ridgway EB, Weiner HL. Skull deformities. *Pediatr Clin North Am*. 2004;51:359-387. [Abstract](#)

Laughlin J, Luerssen TG, Dias MS; Committee on Practice and Ambulatory Medicine, Section on Neurological Surgery. Prevention and management of positional skull deformities in infants. *Pediatrics*. 2011;128:1236-1241. [Abstract](#)

Hagan JF, Shaw JS, Duncan PM, eds. *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*. 3rd Edition. Elk Grove Village, IL: American Academy of Pediatrics; 2008.

Looman WS, Flannery AB. Evidence-based care of the child with deformational plagiocephaly, Part I: assessment and diagnosis. *J Pediatr Health Care*. 2012;26:242-250. [Abstract](#)

Cigna Medical Coverage Policy 0056 (CareAllies). Cranial orthotic devices for positional or deformational plagiocephaly. Effective date March 15, 2013.

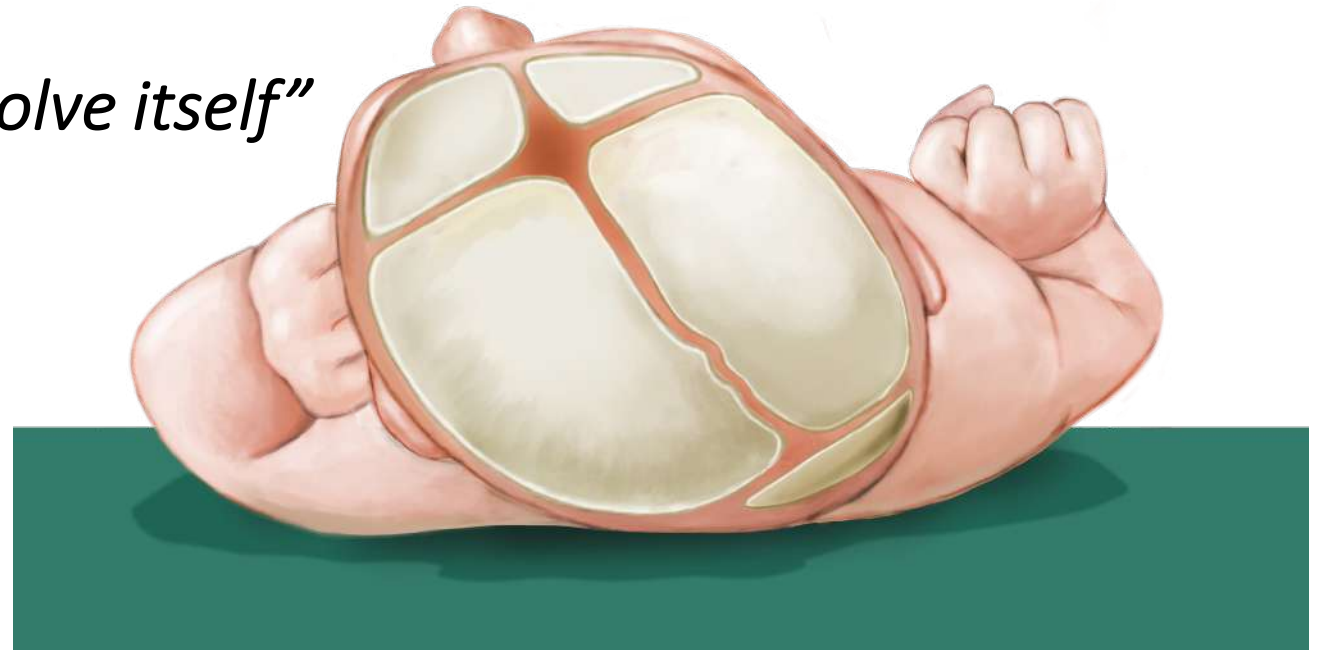
Stellwagen L, Hubbard E, Chambers C, Jones KL. Torticollis, facial asymmetry and plagiocephaly in normal newborns. *Arch Dis Child*. 2008;93:827-831. [Abstract](#)



Hope 

Misconceptions:

“Pediatric head deformity will resolve itself”





“Good evening sir

How are you?

My child has a problem and I want to consult you about this problem.

He is 18 months

And the shape of his head is not normal, his doctor kept telling me not too concern it will get better, but now still very bad.

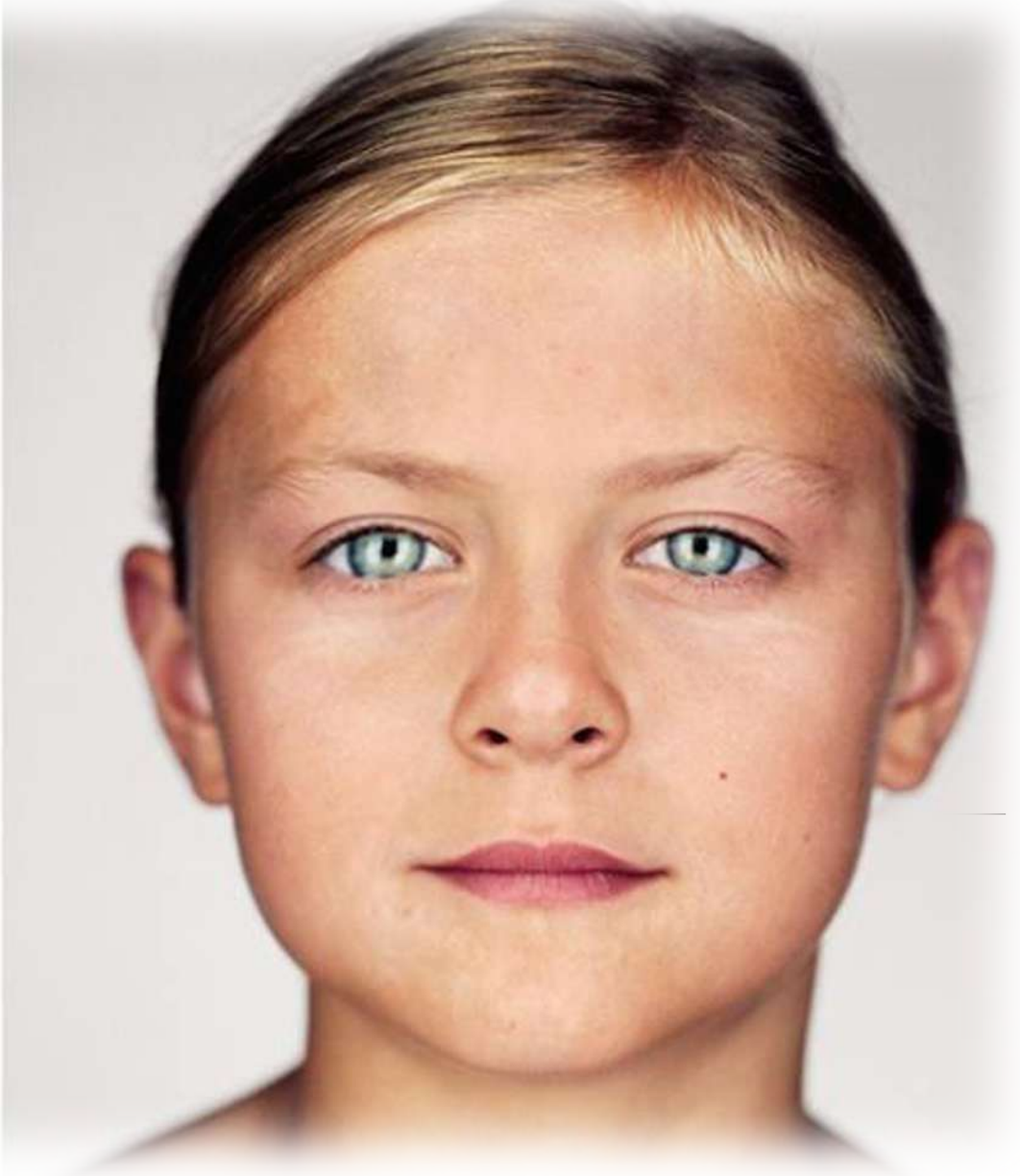
I want to ask you sir if you had before Patient in my kid age and the problem is solved?”



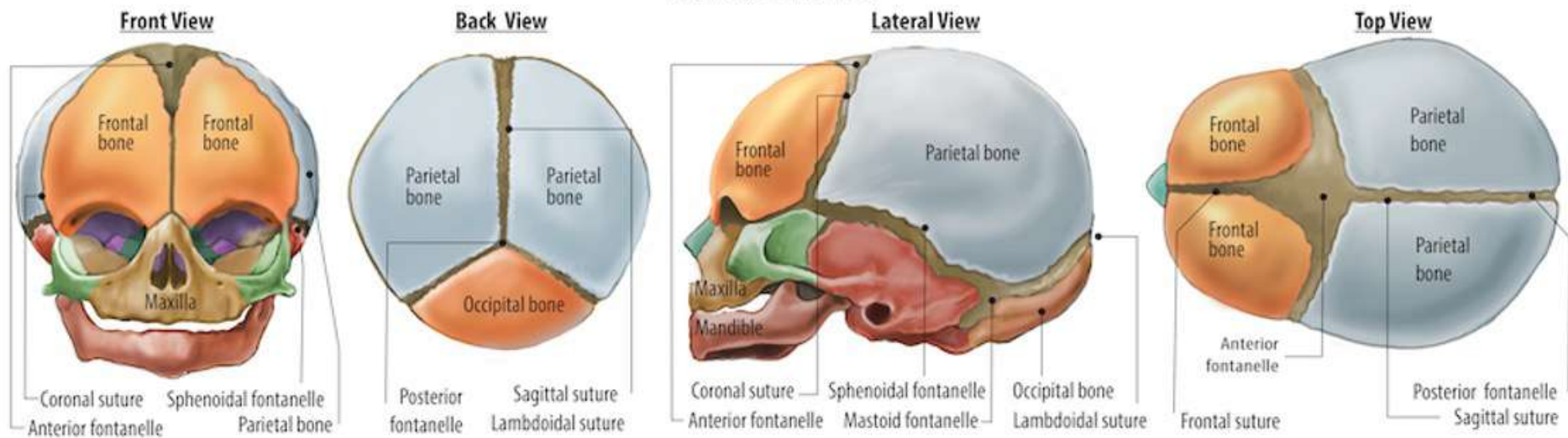
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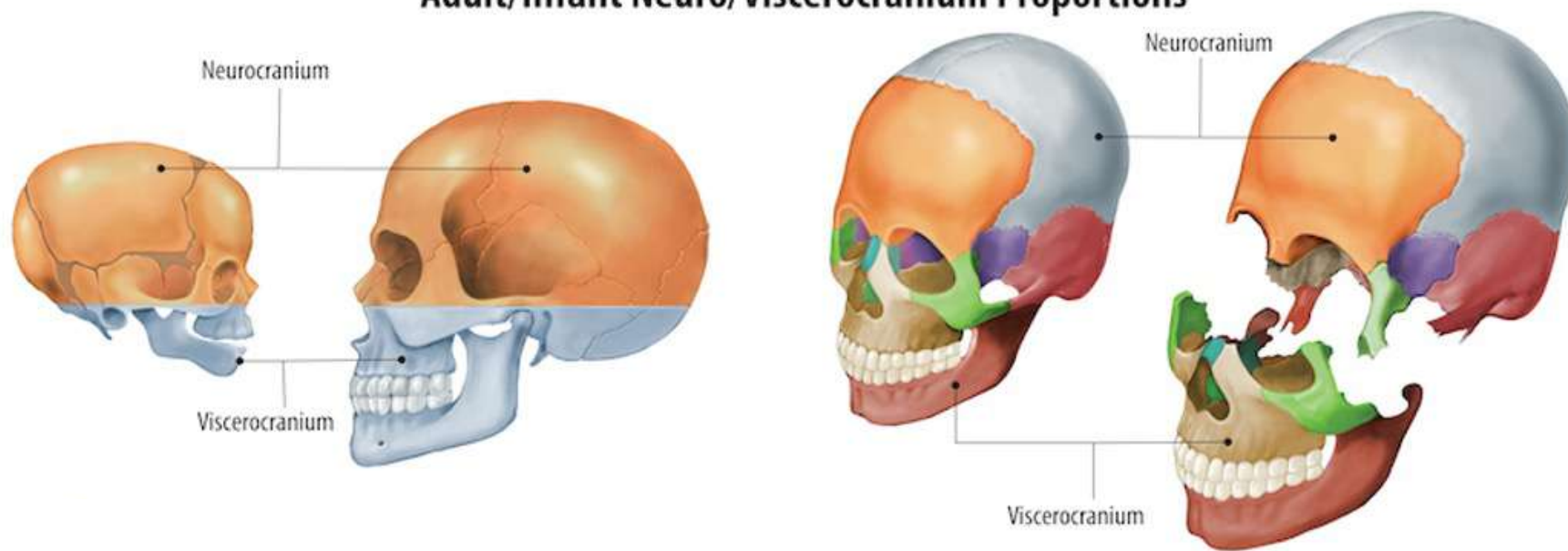
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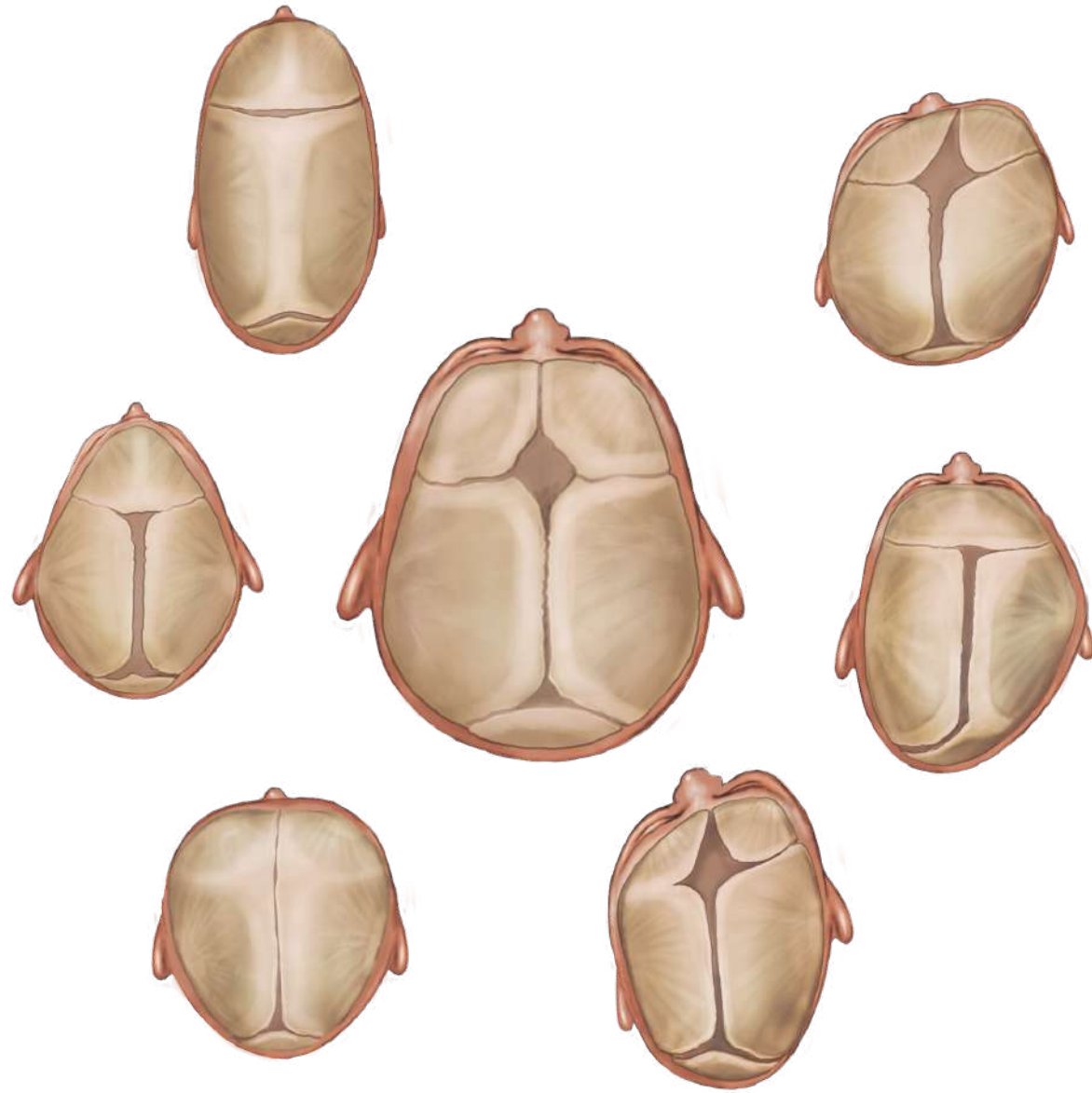
Newborn Skull

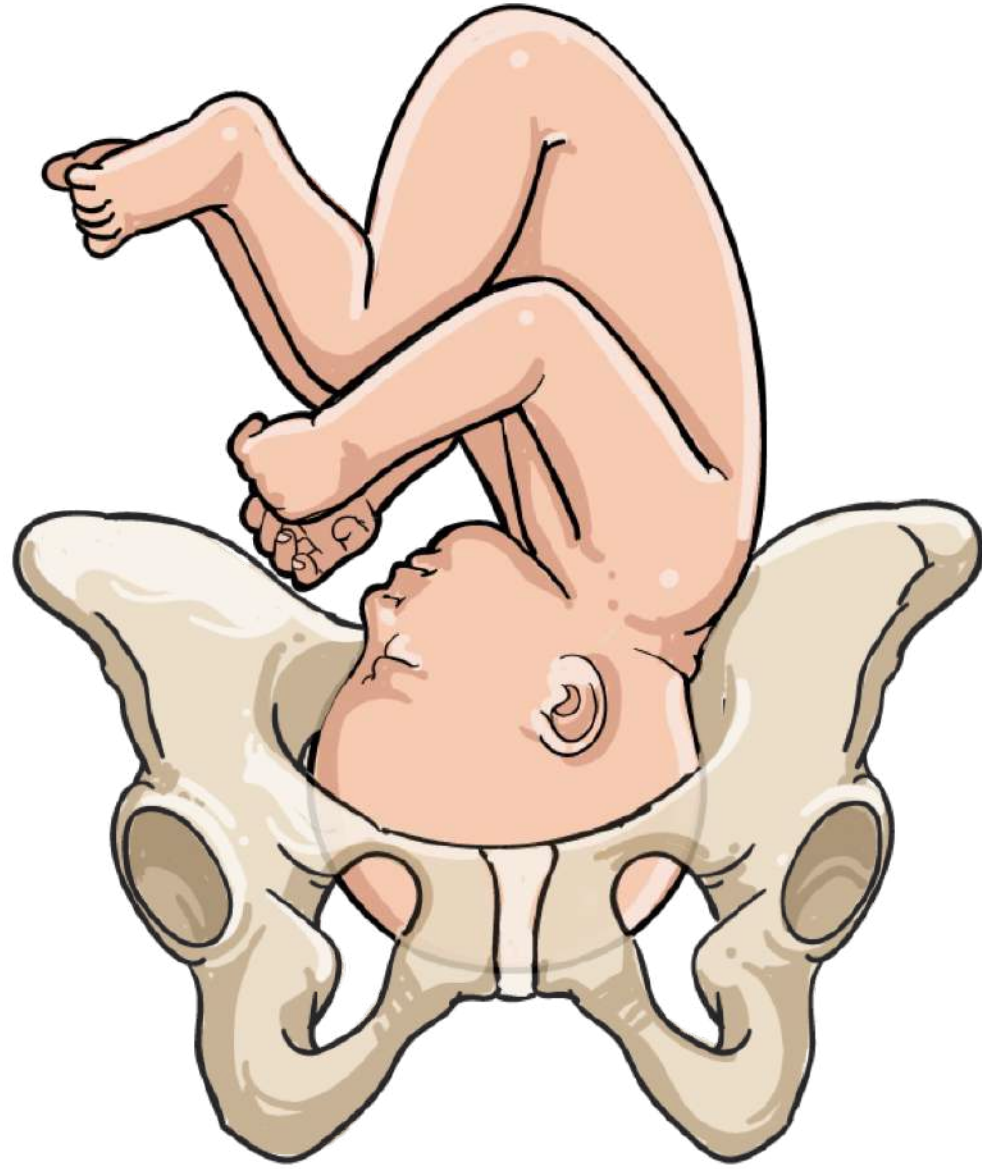


Adult/Infant Neuro/Viscerocranium Proportions



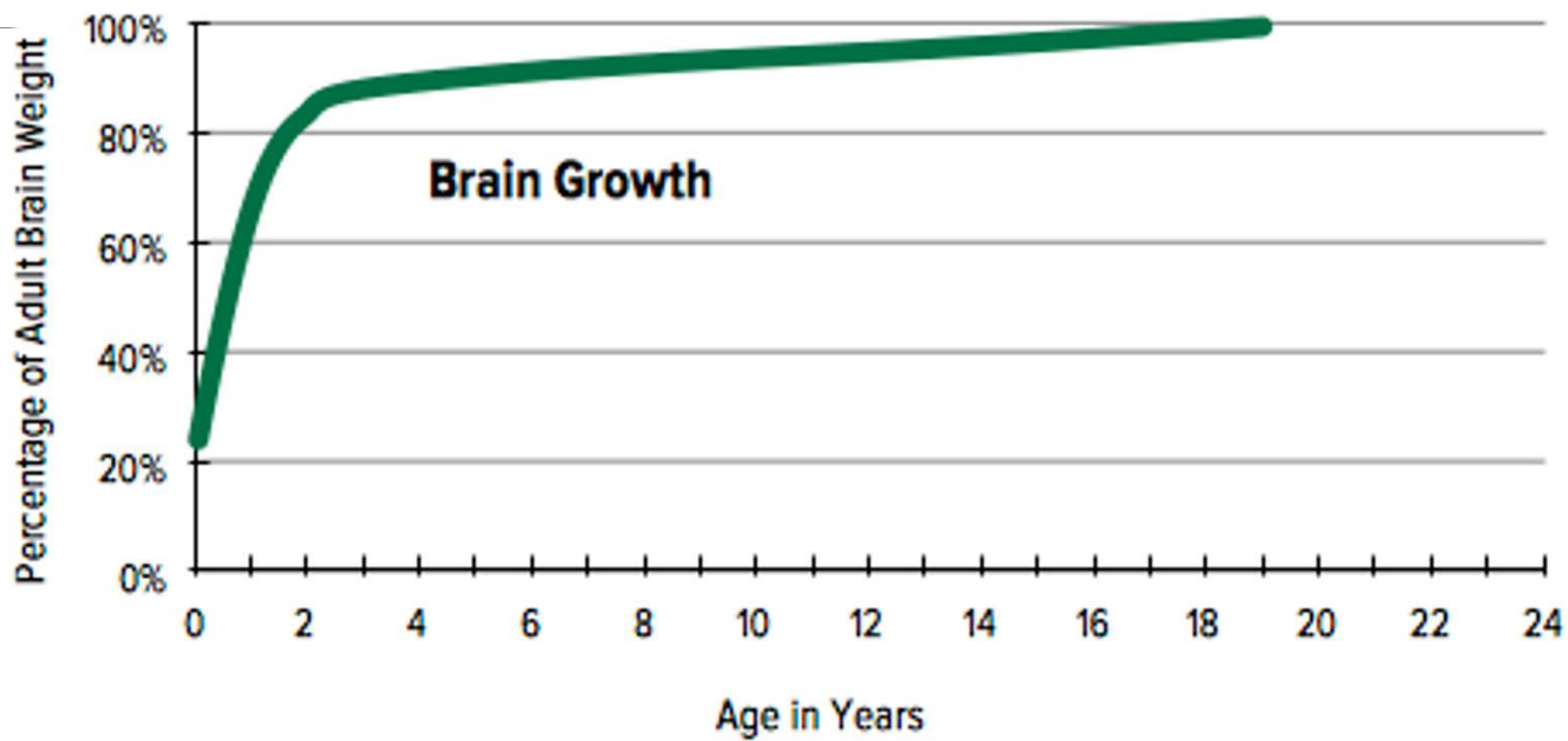
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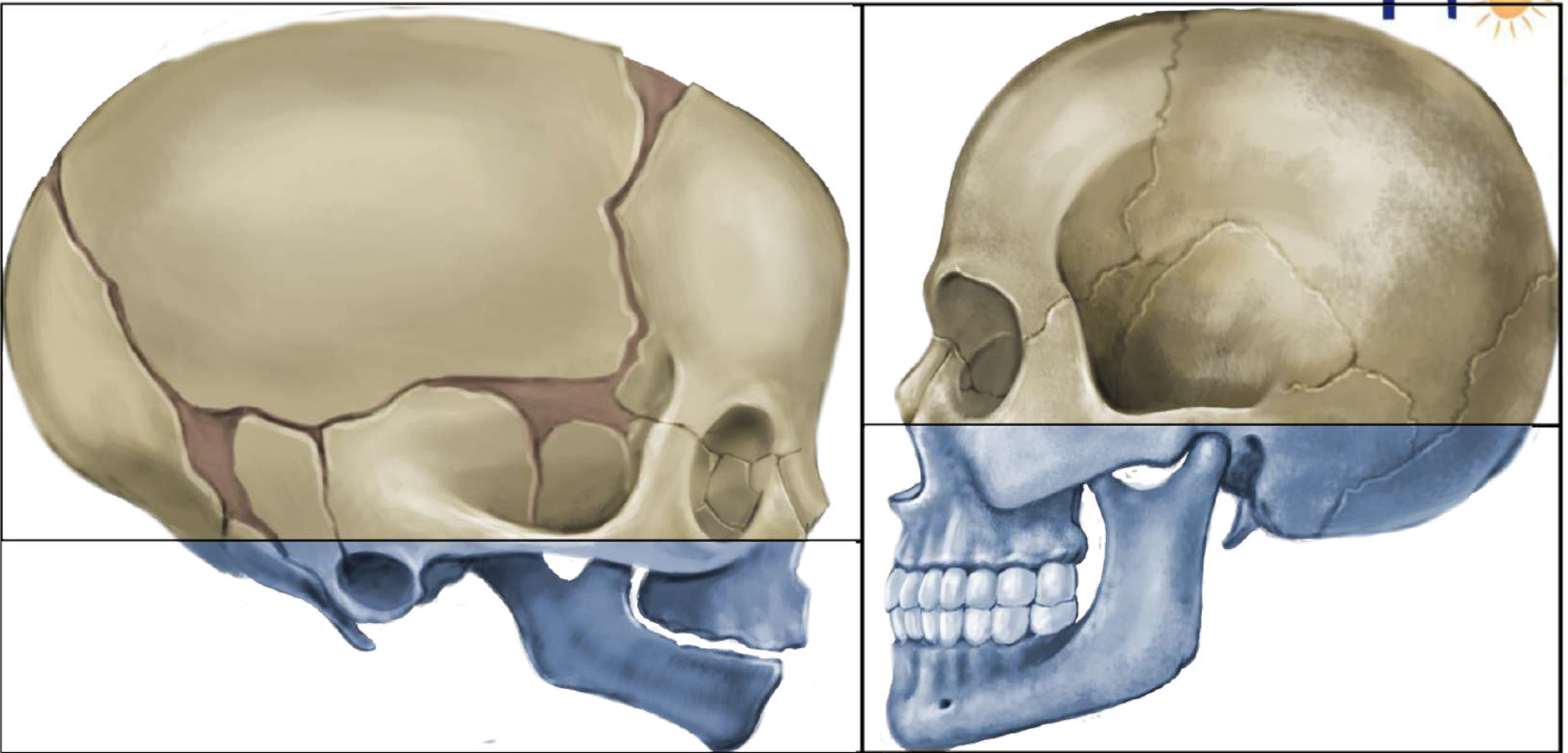


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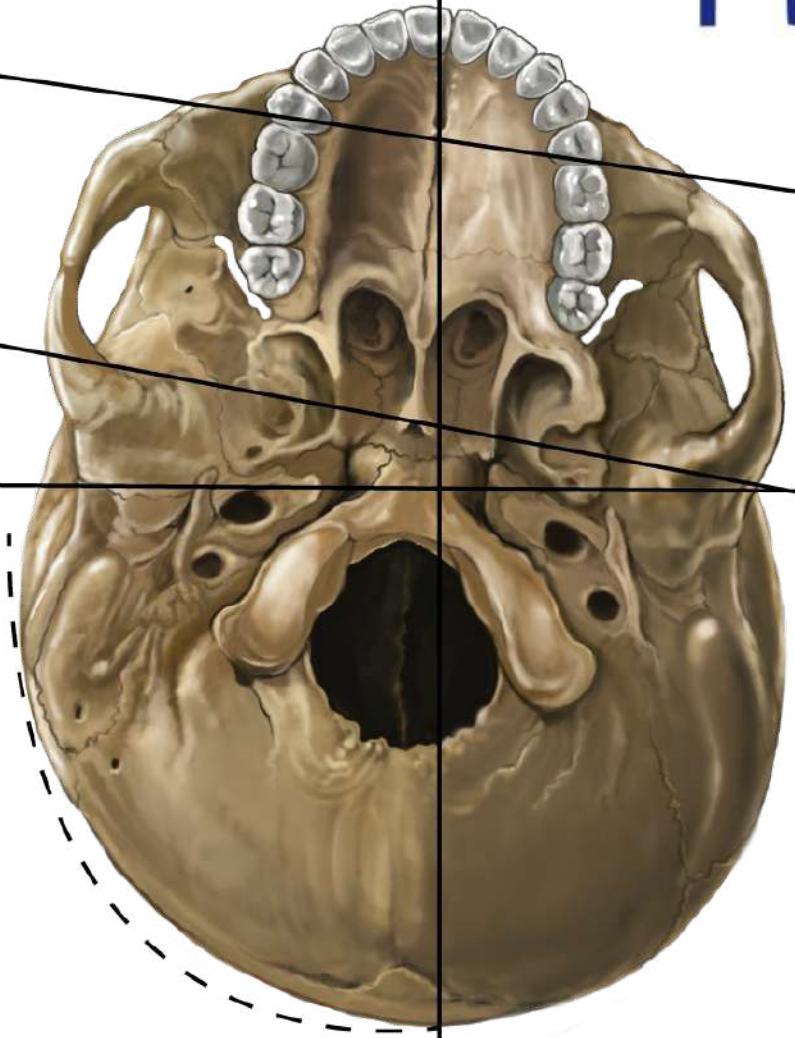
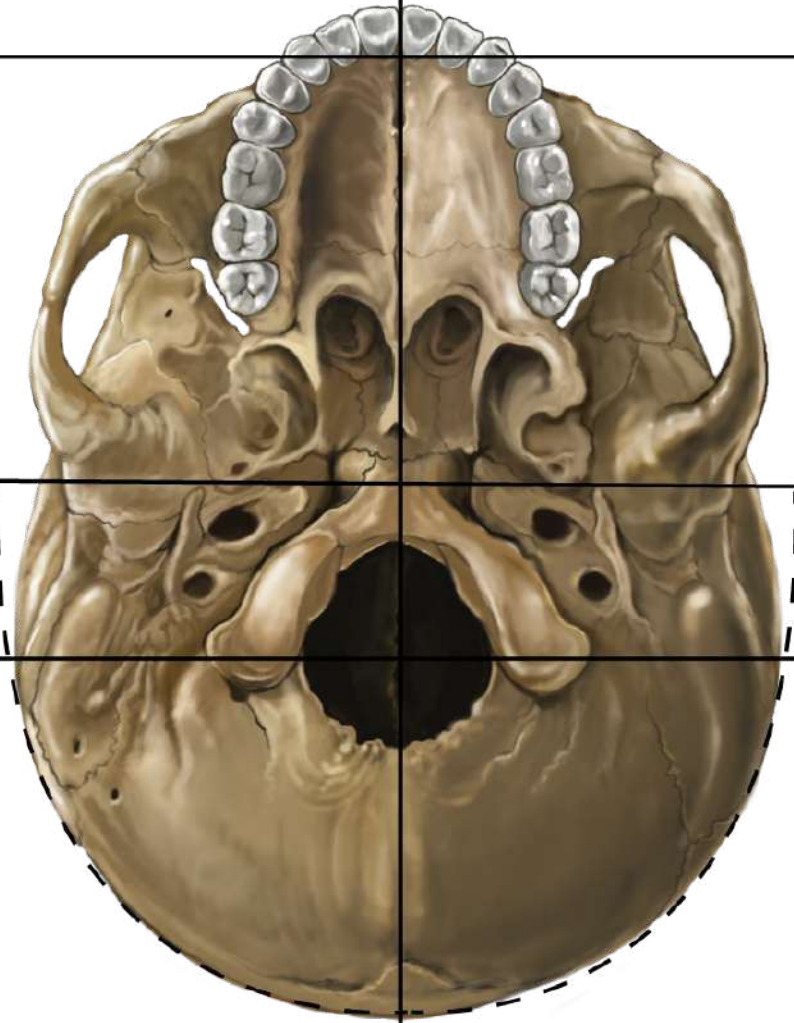


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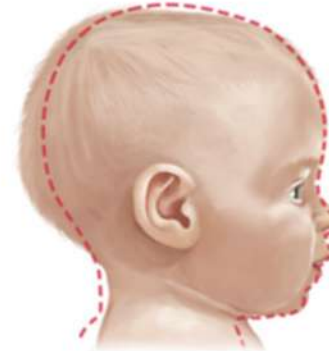
Plagiocephaly



Brachycephaly with Assymetry



Brachycephaly



Scaphocephaly



Why are infant skulls subject to deformation?

Extrinsic (modifiable, environmental)

Intrinsic (not modifiable)

Newborn's skull has high levels of plasticity

Susceptible to external pressures in womb, during the and after birth

Prolonged periods in a position puts pressure on moldable skulls causing deformity

Why are infant skulls subject to deformation?

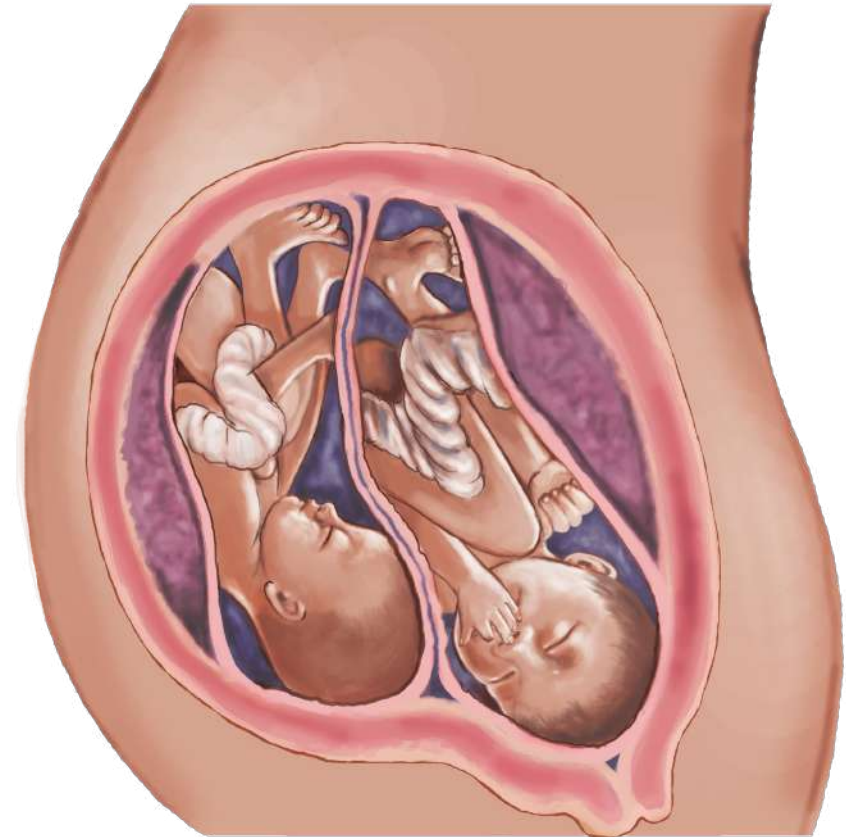
Spontaneous movement may be inhibited

Prenatally:

- restricted uterine environment
- multiple births
- breech position births

Postnatally:

- neonatal intensive care units
- lack of tummy time,
- excessive times in a carrier, car seat
- tight clothing, cultural practices (swaddling)





Why are infant skulls subject to deformation?

Back to Sleep Program

Reduce incidence of SIDS

Increase incidence of cranial deformity

Gold standard, infants placed down to sleep on backs





Why are infant skulls subject to deformation?

Multiple births

Breech birth positions

Forceps and vacuum assisted deliveries

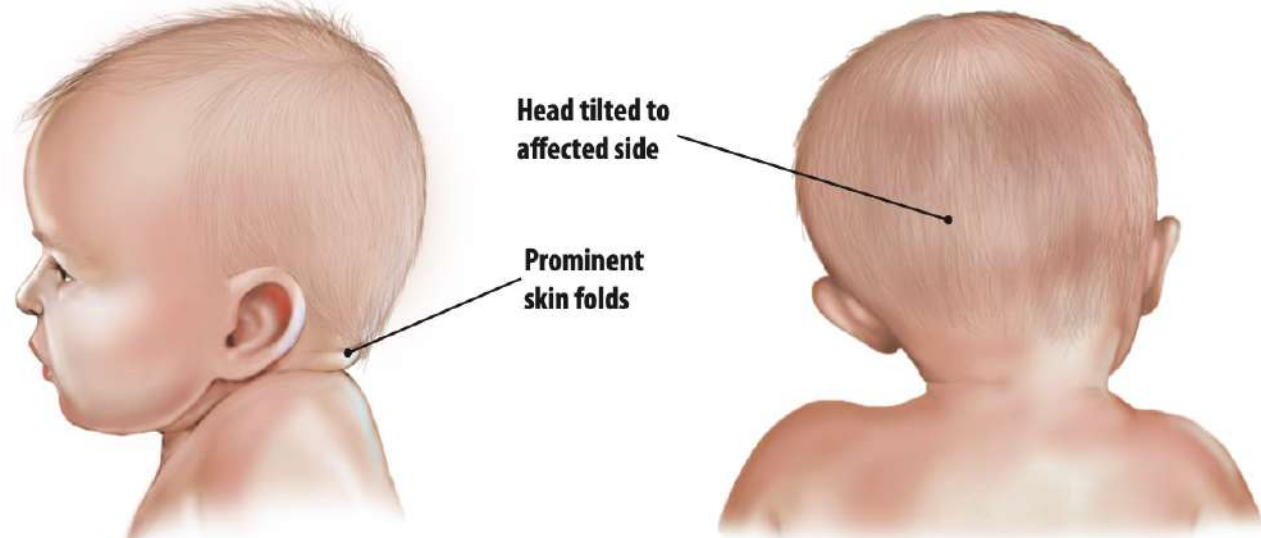
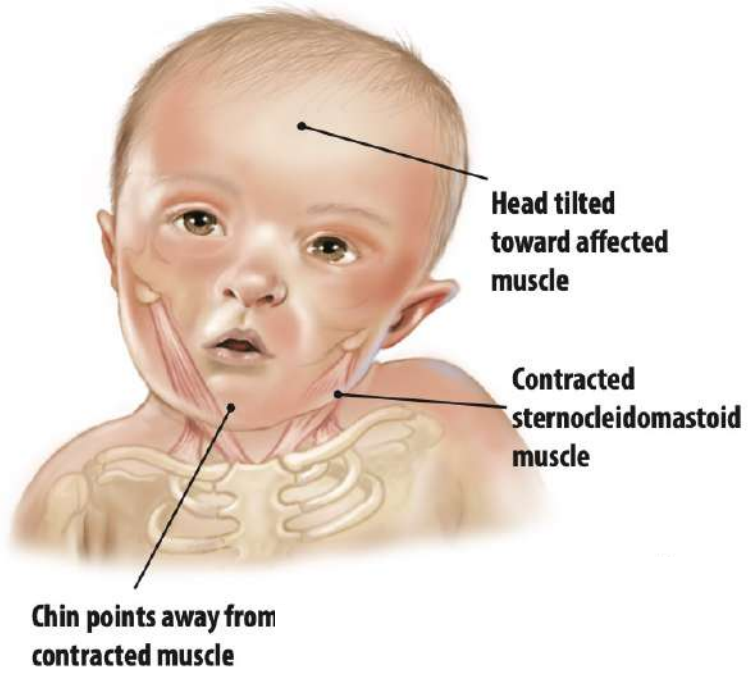
Premature birth's

Developmental delays





Torticollis restricts head rotation



Congenital Torticollis

Diagnosis

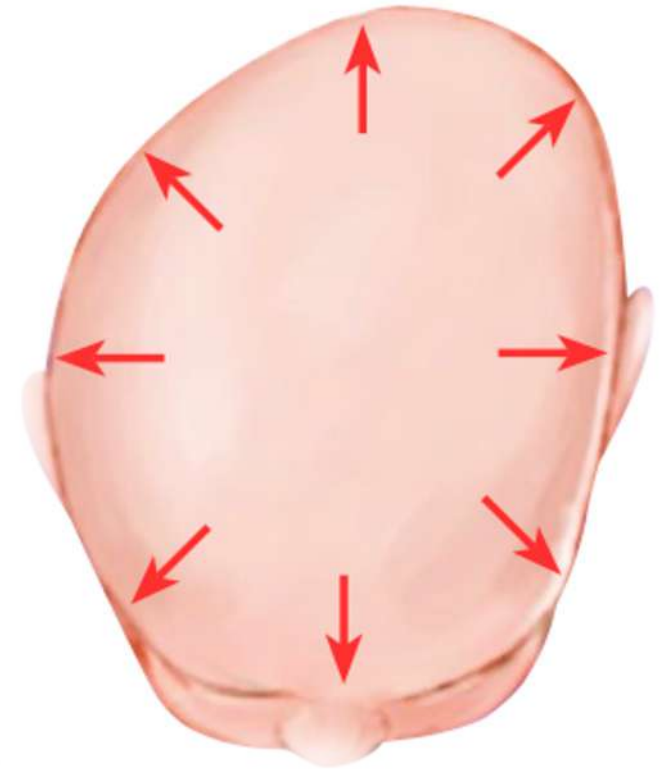
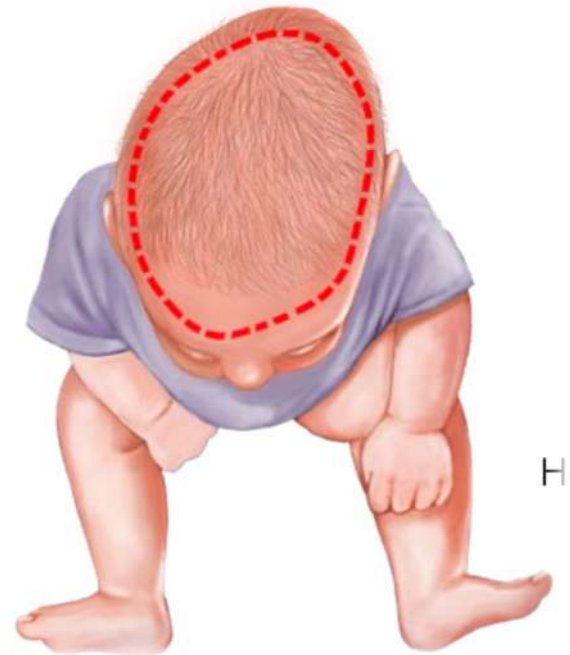
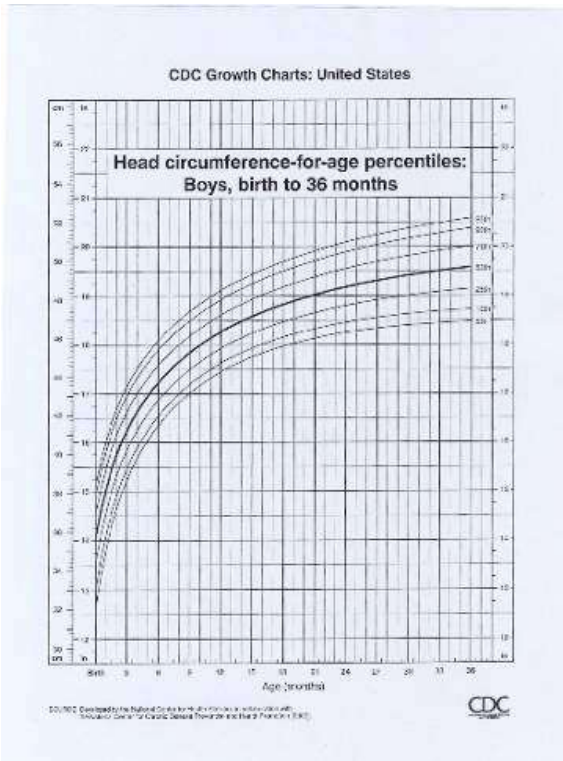


- recognize cranial deformity
- quantify the severity
- optimize interventions
- insure the best possible outcomes
- window of opportunity is extremely limited
- cranial deformities less responsive past 8 months
- window of opportunity closes at 12 months

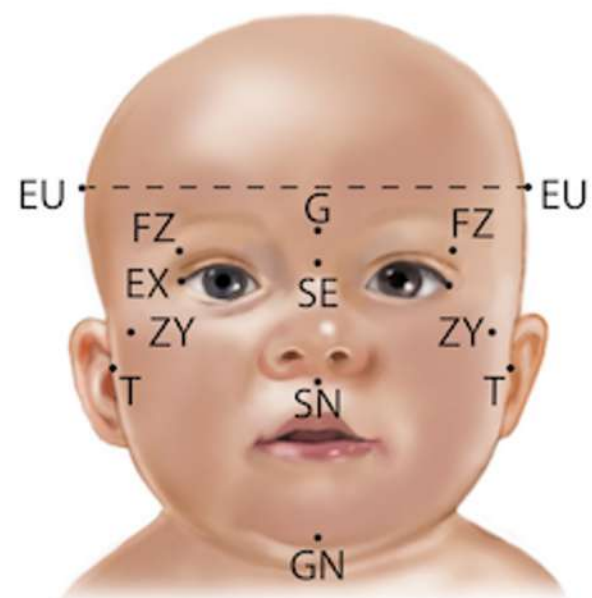
Diagnosis



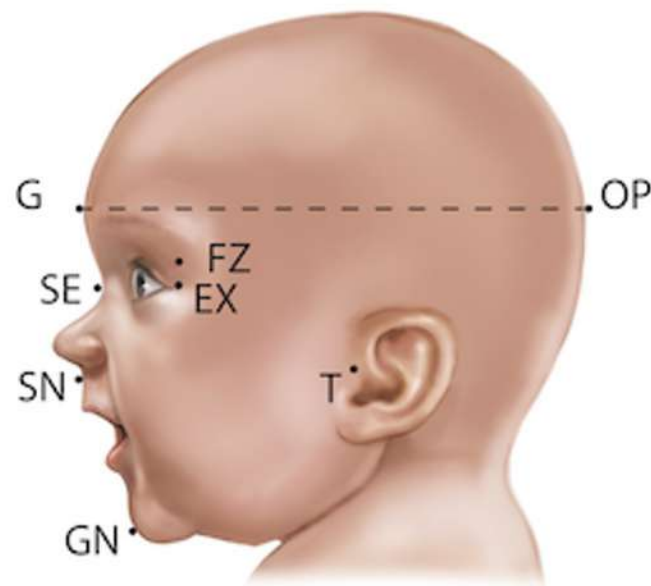
- Head circumference not indicator of head deformity



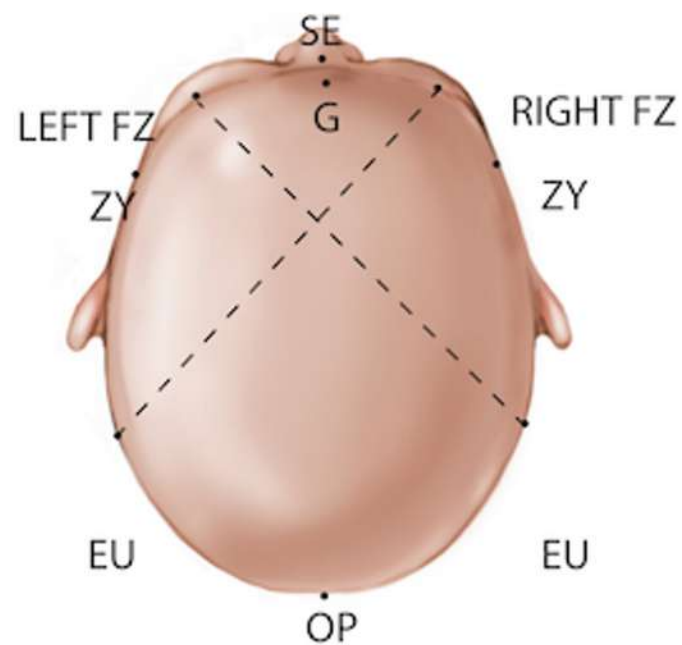
CRANIOMETRY



EU = Eurion
 EXR = Exocanthion Right
 EXL = Exocanthion Left



SE = Sellion
 SN = Subnasal
 G = Glabella point



GN = Gnathion
 LFZ = Lfronтоzygomaticus
 RFZ = Rfronтоzygomaticus
 TRL = Tragion Left
 TRR = Tragion Right
 OP = Opisthocranium

Diagnosis

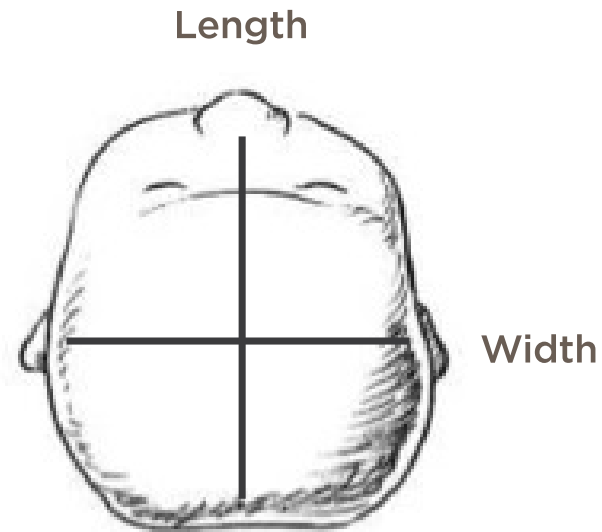
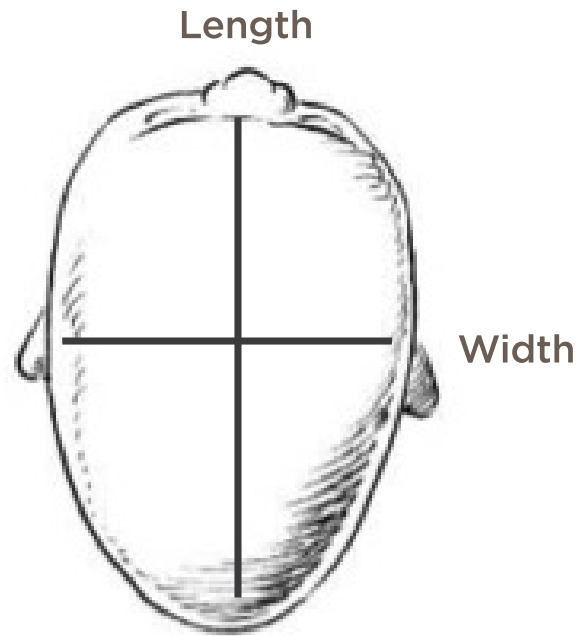


Anthropometric landmarks measured using calipers (slide or spreading)

The five primary measurements

- *Head circumference:*
- *Head width: side-to-side*
- *Head length: anterior-posterior*
- *Cranial Index (CI)*
- *Cranial vault asymmetry (CVA)*

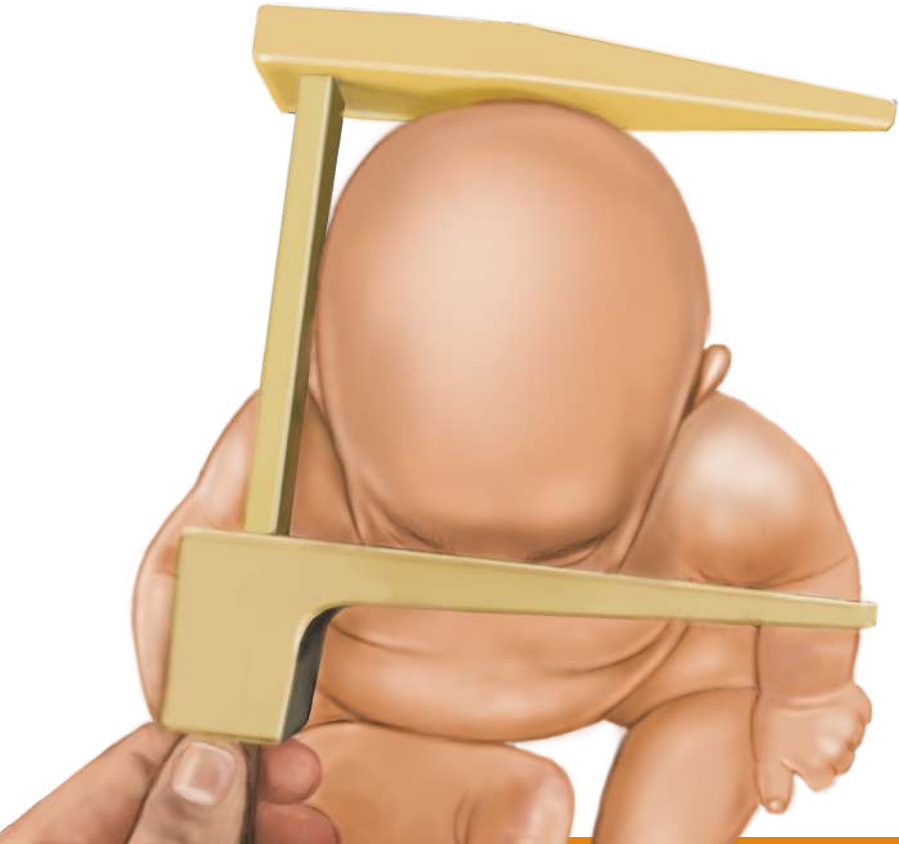
Cephalic Index (CI) or cephalic ratio



$$CI = \left(\frac{\text{Width}}{\text{Length}} \right) \times 100$$

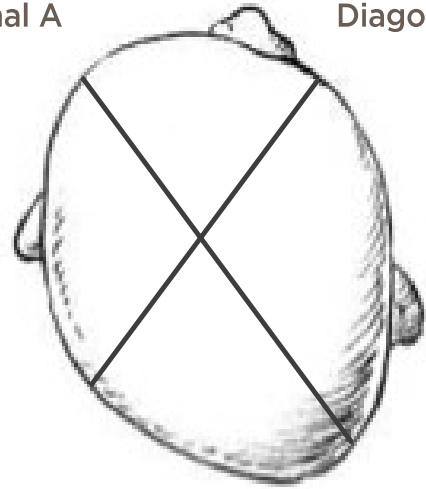
Sex	Age	-2 SD	-1 SD	Mean	+1 SD	+2 SD
Male	16 days to 6 months	63.7	68.7	73.7	78.7	83.7
	6 to 12 months	64.8	71.4	78.0	84.6	91.2
Female	16 days to 6 months	63.9	68.6	73.3	78.0	82.7
	6 to 12 months	69.5	74.0	78.5	83.0	87.5

Sex	Age	-2 SD	-1 SD	Mean	+1 SD	+2 SD
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Diagonal A

Diagonal B



$$CVAI = \frac{(A - B) \times 100}{A \text{ or } B}$$

(Whichever is greater)



$$CVA = A - B$$

Normal < 3mm

Mild/Moderate < 12mm

Moderate/Severe > 12mm





Can deformational conditions be prevented?

- timely diagnosis and protocol referenced treatment
- acquiring accurate anthropometric data
- parent education specially in high risk cases
- limit time in carriers and positioning devices
- preventative repositioning strategies
- tummy time home program

Can deformational conditions be prevented?



Early referral: Pediatric physiotherapy

- Strong positional head/neck preference
- Torticollis
- Developmental delay
- Cranial deformity

Use of cranial remolding orthotic when indicated



Cranial remoulding orthoses

Derives name from purpose — symmetry through active remolding

Functions to accommodate growth, promote symmetry and improve proportion

Ideal cranial orthosis treatment results - treatment before six months of age

Multiple studies demonstrated cranial remoulding orthoses more effective than repositioning in correcting skull deformities

How does it work?



How does it work?



When to prioritize referral for a Cranial Band

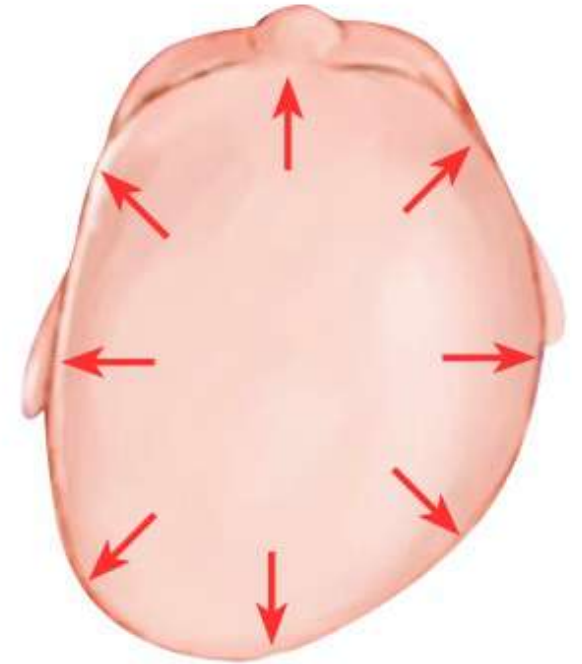
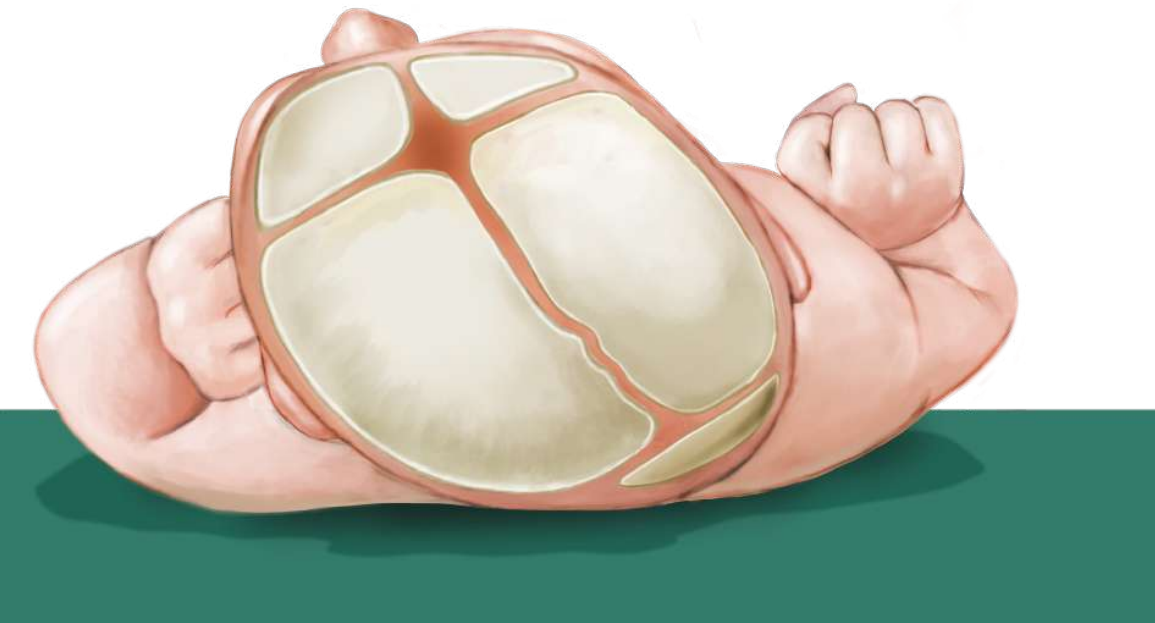
- when assessment indexes indicate
- earlier for severe asymmetry
- chronological age
- delayed motor skills, hypotonic infants
- torticollis
- none responsive to repositioning / therapy
- multiples (twins, triplets, etc.)



Misconceptions

“Paediatric head deformity will resolve itself”

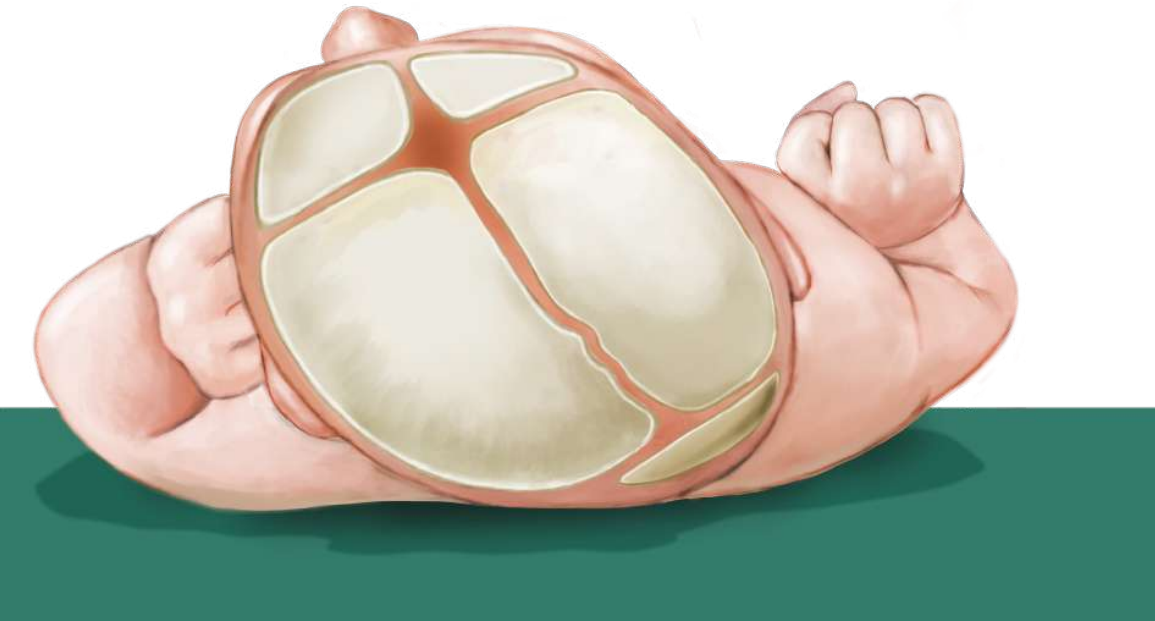
based on outdated scales of motor development and a lack of understanding on the effect of supine sleep positioning



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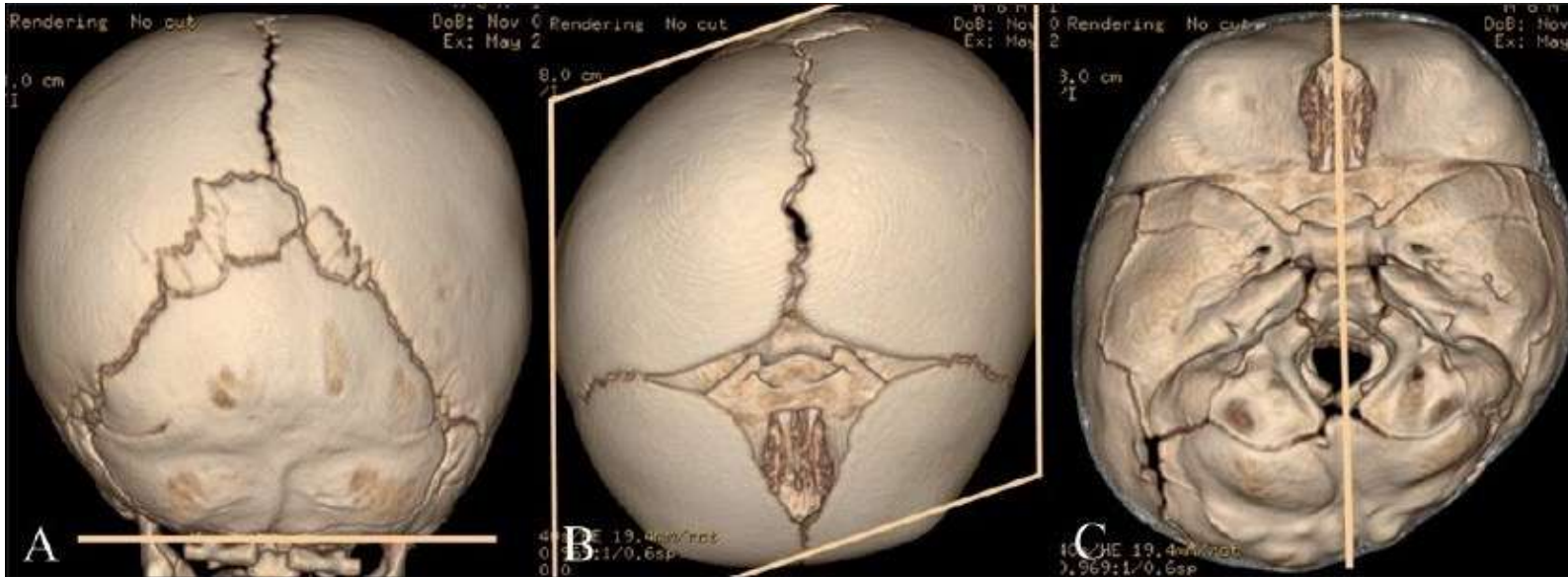
based on outdated scales of motor development and a lack of understanding on the effect of supine sleep positioning



Misconceptions

“The deformity is only on the back of the head, and probably will be covered with hair”

“It is only a cosmetic issue”



Misconception



“The window of opportunity and correction is up to 12 or even 16 months of age”

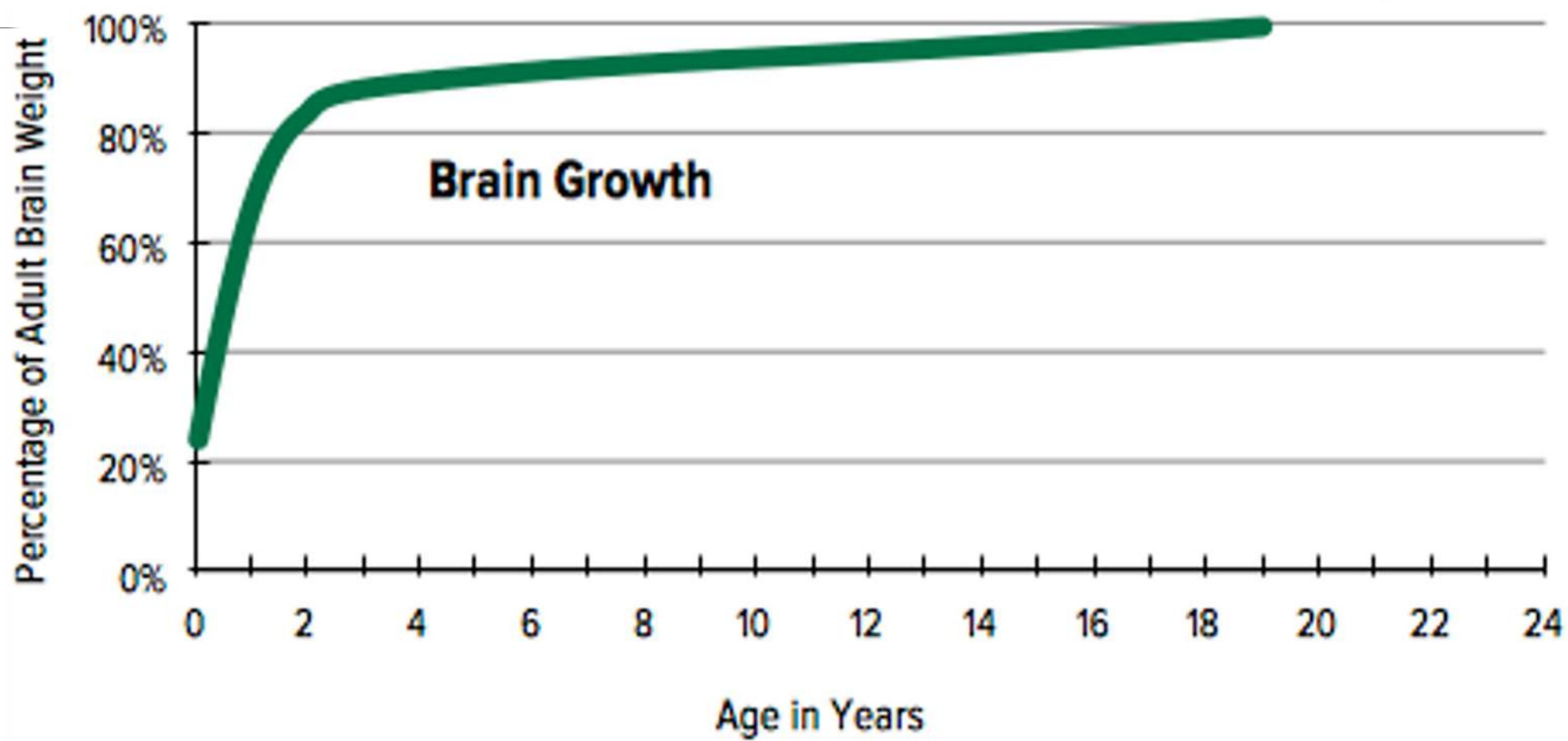
Truth

Early recognition and treatment paramount

Paediatric physical = milestones = assist in reducing the effects of torticollis presentations.

Severe cases = cranial remolding at 4 months

Mild to moderate = 6 month



Misconception

‘Cranial remolding orthosis only correct the posterior (occipital) flatness’



Truth

Cranial orthotics directly effect on frontal, parietal, sphenoid, temporal, and one of the occipital bones

Indirectly, it affects the entire facial alignment

Measurable changes in the cranial base, cranial vault, orbitotragial depth, and cephalic index are achieved

Misconceptions



“Cranial remoulding orthoses are uncomfortable to the baby and might be unsafe”

“Cranial orthotics management is not approved by insurance companies”