



# Craniosacral Therapy for Infants and Toddlers

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# Disclosures

## Relevant Financial Relationships:

- Employed at Veteran's Administration
- Employed at Serenity Family Wellness - Clinical Director
  - Co-Founder of Fusion Care

## Relevant Nonfinancial Relationships

- Past President of the ACA Acupuncture Council
- Former member of the IDFPR Acupuncture Board
- Educational Co-Coordinator for the ACA Pediatric Council

The information within this presentation will be given fairly and without major bias



# Course Objectives

1

Develop an understanding of CST principles and the use of significance of gentle touch in therapeutic interventions

2

Review infant anatomy including cranial sutures and cranial nerve structure and function within the skull

3

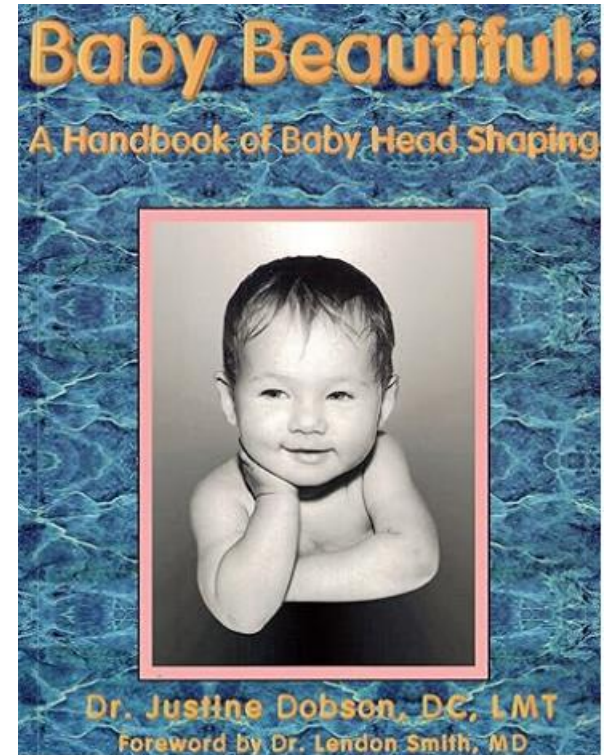
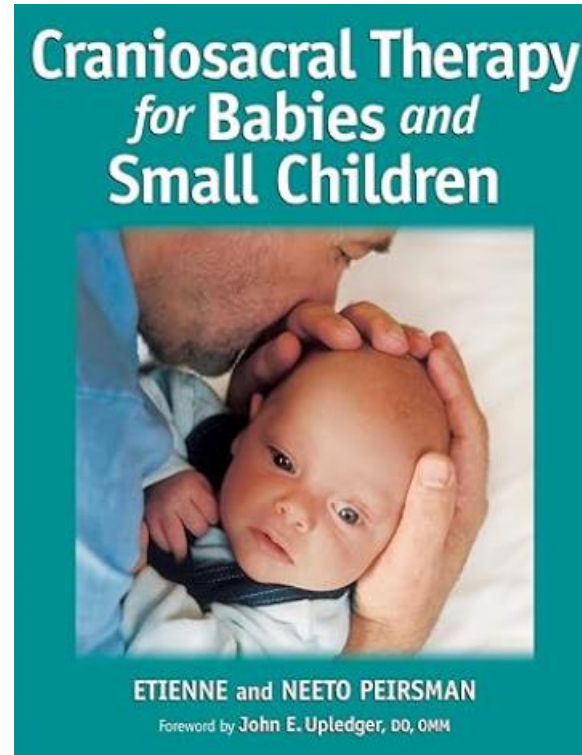
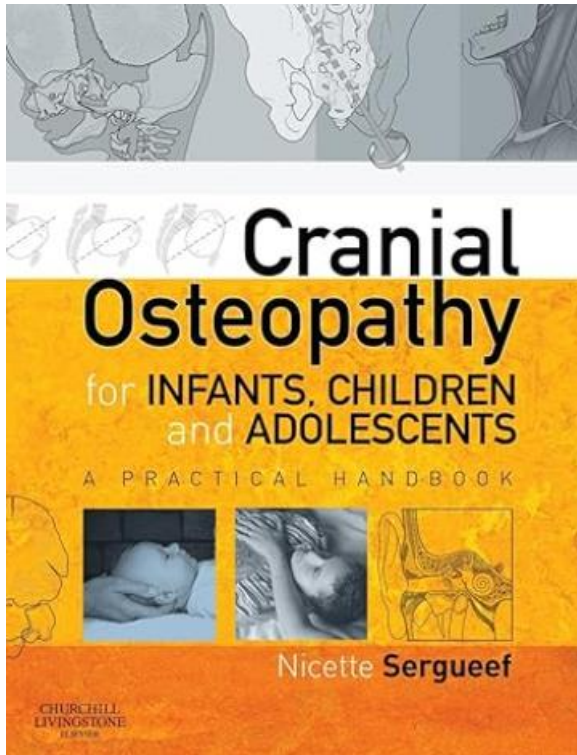
Conducting a thorough history & assessments including listening techniques to identify restrictions, indications and contraindications

4

Practice hands-on CST techniques for the pediatric population while discussing case studies and uses

# References / Books for Further Understanding

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# The Treatment of Children



DISCOVER • CHIROPRACTIC

“The doctor of the future will give no medicine, but will interest his patients in the care of the human frame, in diet, and in the cause and prevention of disease.”

• Thomas Edison

# Chiropractic & Children

- Chiropractic: from Greek *chiro-* χειρο- “hand-” + *praktikós* πρακτικός “concerned with action” founded in 1895 by Daniel David (D.D.) Palmer
- Any form of manual medicine technically falls into this definition not just CMT

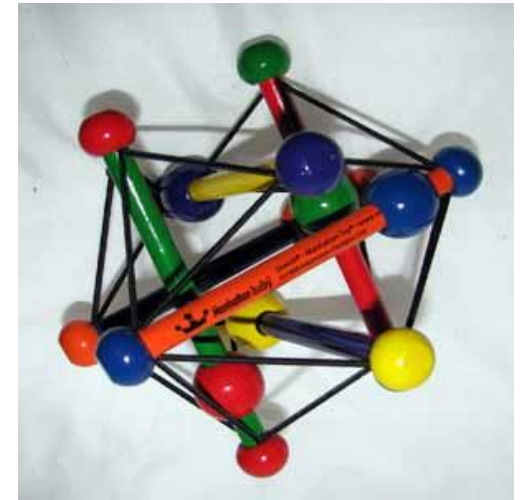


# Generally Treating Children

- If you plan to treat children, you have to at least like children (same for your staff)
- Kid proof your office
- Need some toys, devices & equipment
  - Occupy
  - Educate
    - Models, posters, and handouts
  - Make things less scary



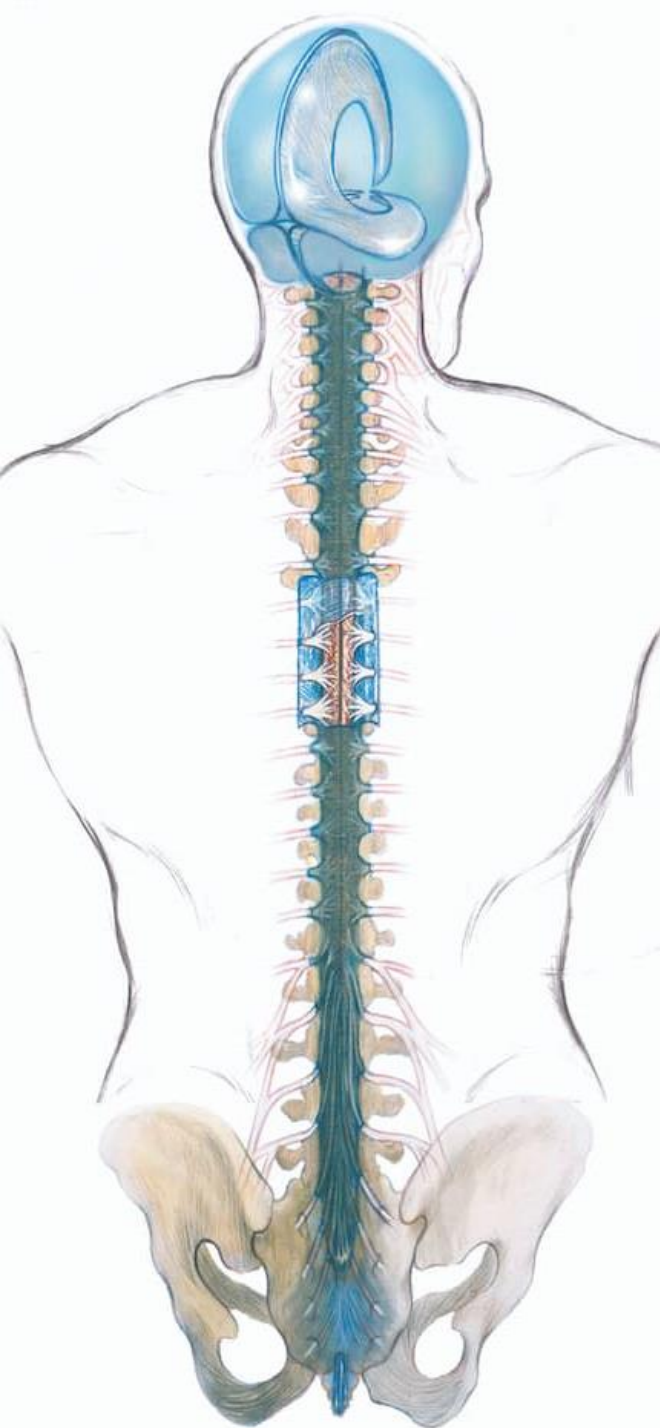
# Some Helpful Treatment Items







**Develop an Understanding of Principals of  
Craniosacral Therapy (CST)**



# What is Craniosacral Therapy

Gentle, hands-on method of evaluating and enhancing the functioning of physiological body system called the craniosacral system using soft touch (~5 grams, or about the weight of a nickel) to release restrictions within the system

Improve the functioning of the CNS as well as other systems, such as digestive, musculoskeletal, respiratory, circulatory, etc...

Has also been shown to help with the physical components related to such somatic conditions as Post Traumatic Stress, depression and anxiety

By facilitating the body's natural and innate healing processes, CST is increasingly used as a preventive health measure for its ability to bolster resistance to disease, and has been shown to be beneficial for people seeking help with a wide range of healthcare challenges and symptoms

<https://www.upledger.com/therapies>

# Craniosacral Therapy (CST) History

CST has its roots in the work of Andrew Taylor Still, MD, DO (1828-1917) the founder of Osteopathic Medicine



Harold I. Magoun, Sr., DO., FAAO. (1898-1981) – Sutherland’s student, contributed greatly to the ongoing field of cranial osteopathy as author/editor of Osteopathy in the Cranial Field



Founded by William Garner Sutherland, DO (1873-1954), a senior faculty at the American School of Osteopathy in 1899 as Cranial Osteopathy was a student of AT Still

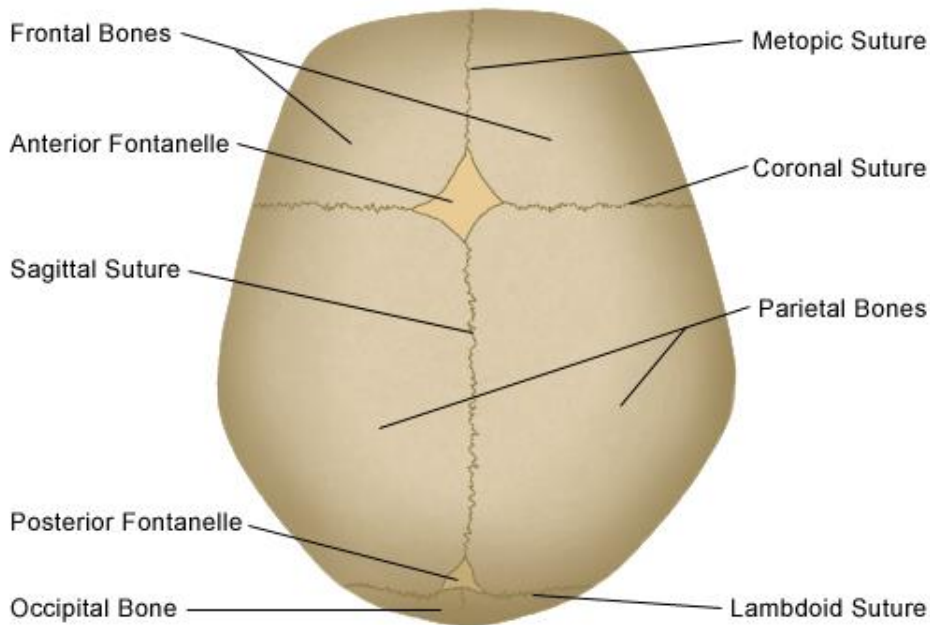


John E Upledger, DO, OMM (1932-2012) built on Magoun’s work and developed Craniosacral Therapy in 1970’s and founded the international Upledger Institute

# Craniosacral Therapy Uses

All forms of craniosacral work fall into the alternative medicine therapy definition used by physiotherapists, osteopaths, massage therapists, naturopaths, and chiropractors

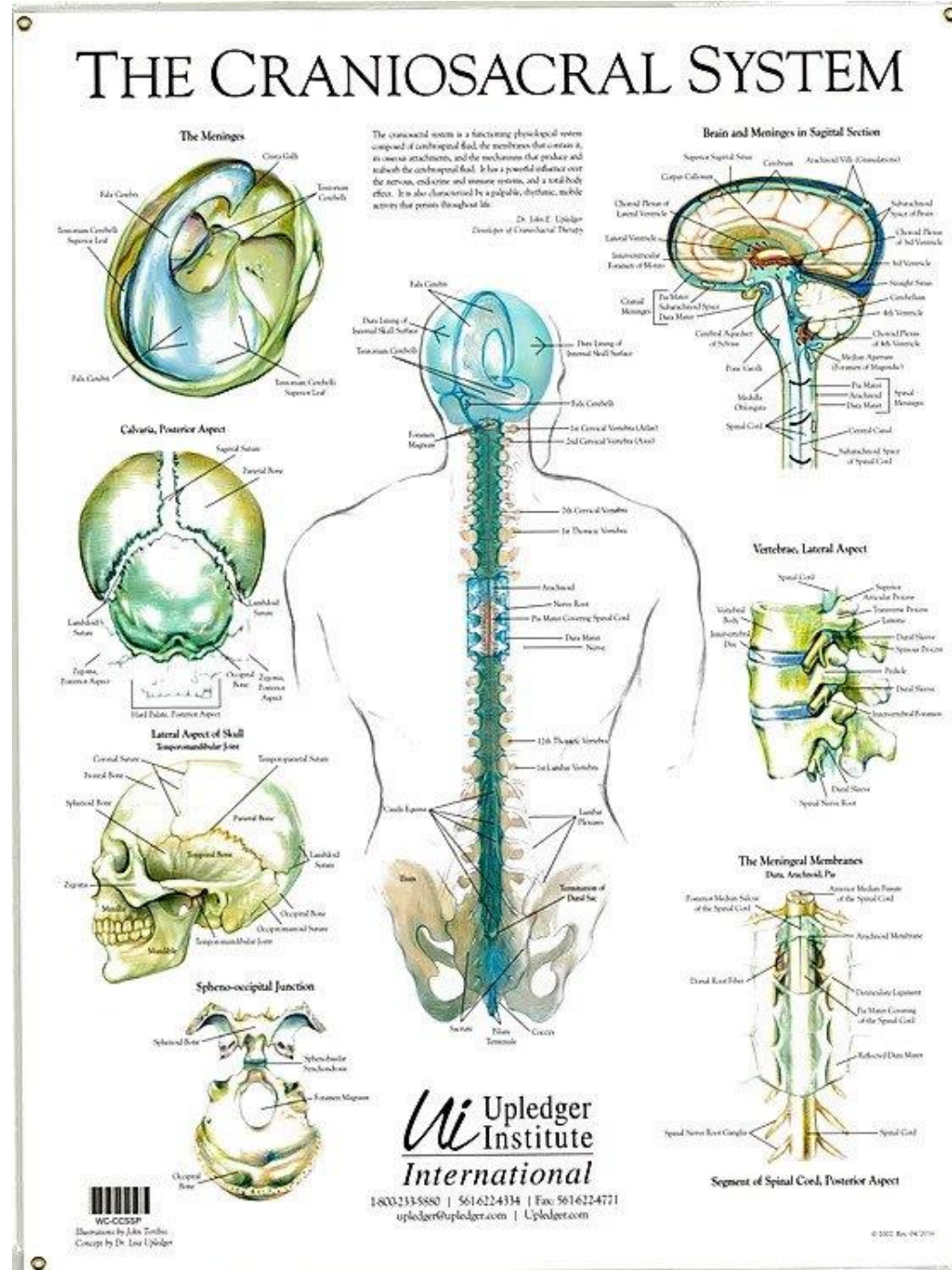
Normal Skull of the Newborn



# Craniosacral Therapy Theory

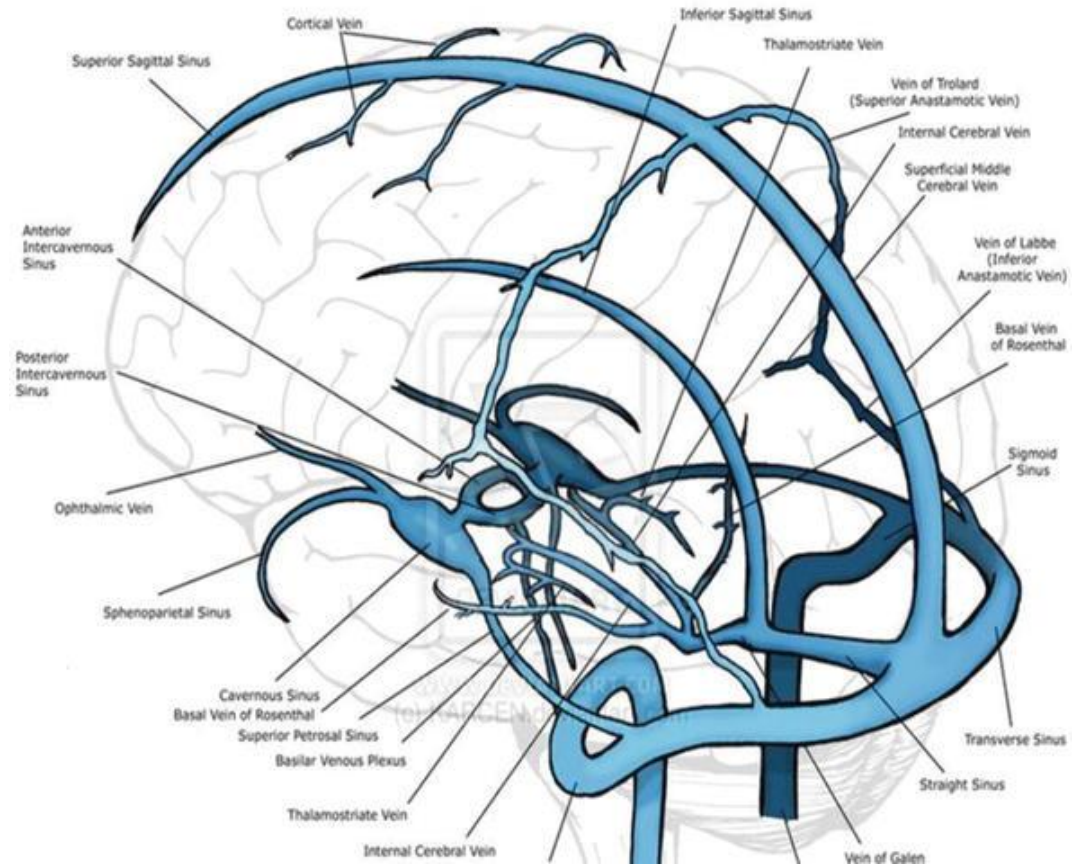
- Theory: dural membranes act as “guy-wires” for the movement of the cranial bones, holding tension for the opposite motion

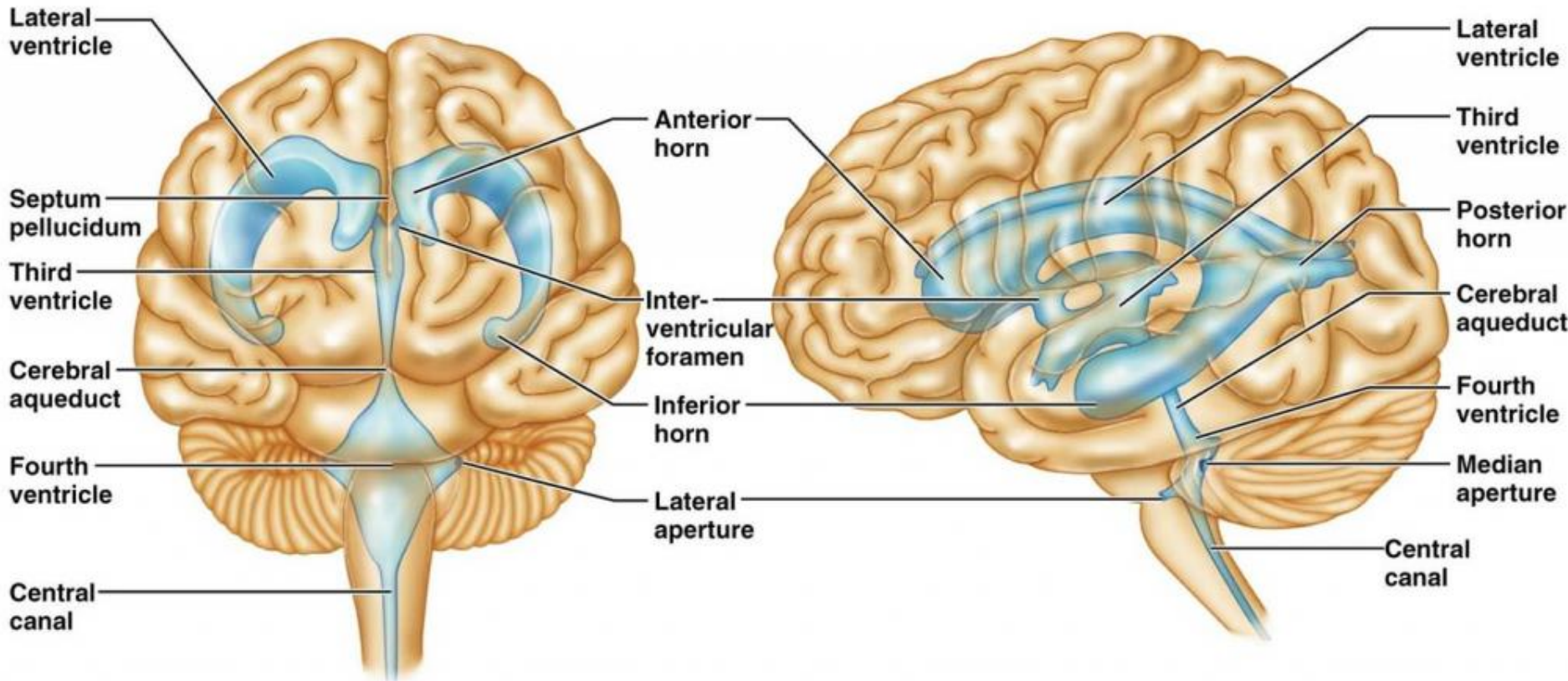
- Operates withing the *Reciprocal tension membrane system (RTM)* describes the tensegrity, which creates the cyclic movement of the cranium during inhalation and exhalation and the circulation of the cerebrospinal fluid called the “cranial rhythmic impulse (CRI)”



# Craniosacral Therapy Theory

- Movement of the bones creates a subtle pumping action of the cerebrospinal fluid (CSF)
- Bony compression = CSF congestion thus backing up the venous sinus system





**(a) Anterior view**

**(b) Left lateral view**

# Concept of Entrainment to CRI

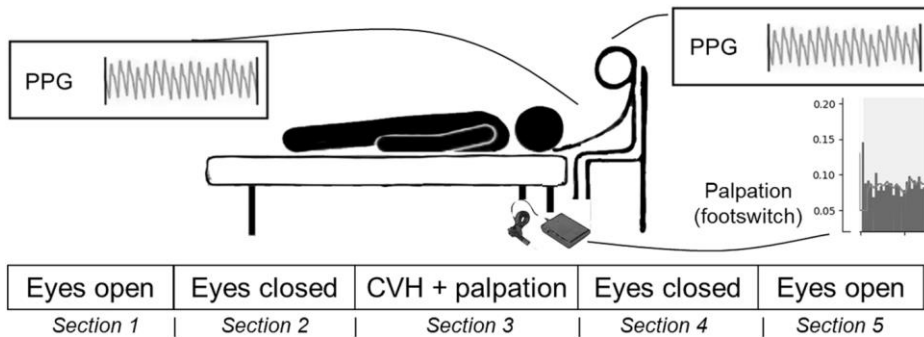
- Integration or harmonization of oscillators
- All organisms pulsate with a myriad electrical and mechanical rhythms
- Cranial rhythmic impulse (CRI) is palpable and is the perception of entrainment, a harmonic frequency that incorporates the rhythms of multiple biological oscillators
  - Though to be signals between the sympathetic and parasympathetic nervous systems
- Entrainment also arises between organisms
  - Dominant entrainment is enhanced by "centering" during palpation

Rhythm	Cycle length	Frequency, cycles/s
Electroencephalogram	0.1 s	$10^1$
Heart	1.0 s	$10^0$
Respiration	6.0 s	$1.67 \times 10^{-1}$
CRI	5.0 s to 12.0 s	$0.83 \times 10^{-1}$ to $2.00 \times 10^{-1}$
Sleep stage	90.0 min	$1.85 \times 10^{-4}$
Sleep/wake	24.0 hr	$1.15 \times 10^{-5}$
Menstrual	28.0 d	$4.13 \times 10^{-7}$
Hibernation	365.0 d	$3.17 \times 10^{-8}$

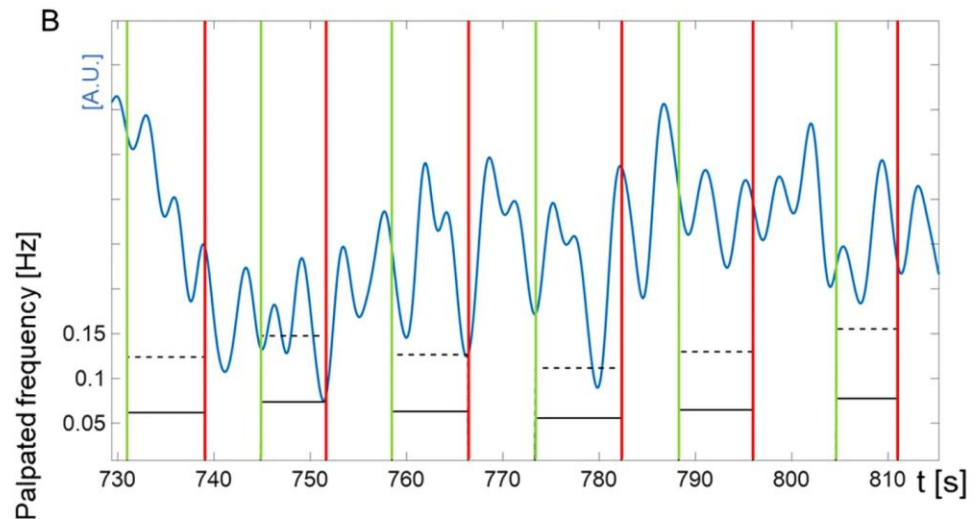
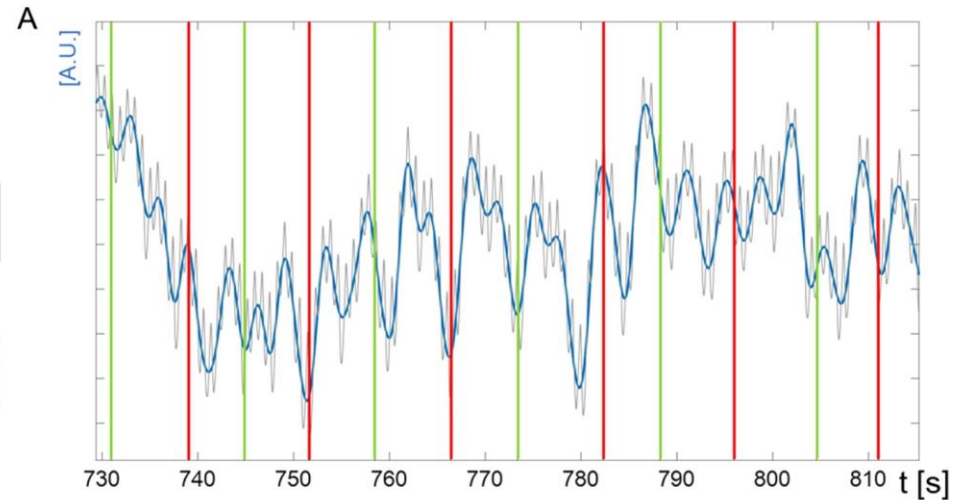


# CRI Can Really be Felt....

Validation of subjective manual palpation using objective physiological recordings of the cranial rhythmic impulse during osteopathic manipulative intervention



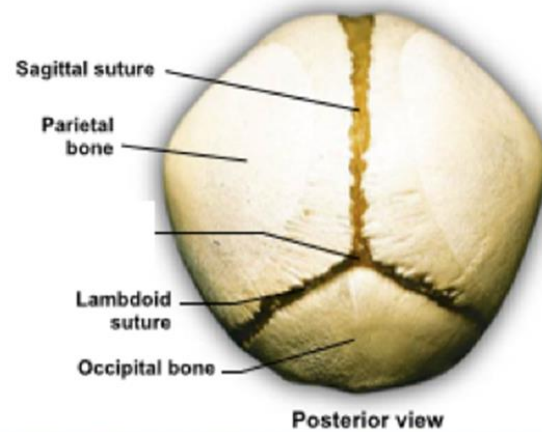
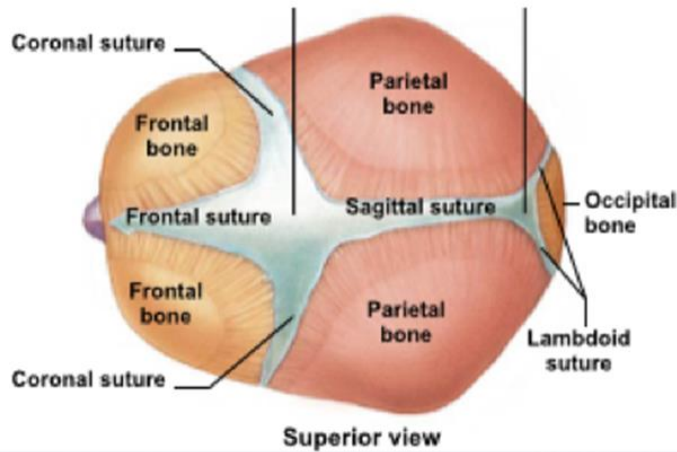
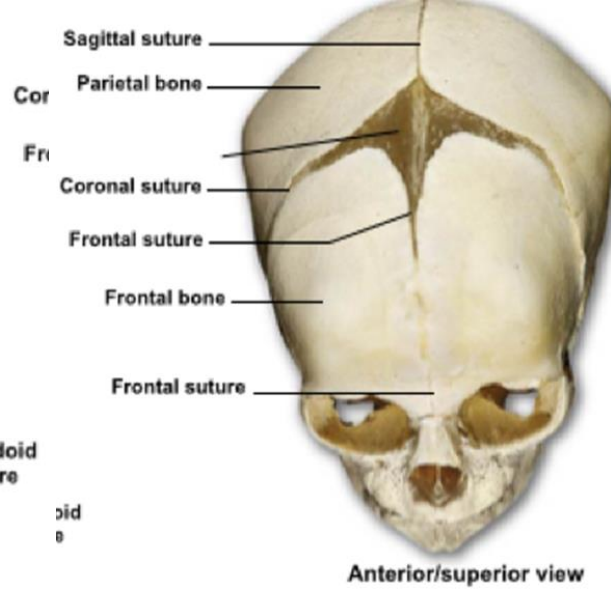
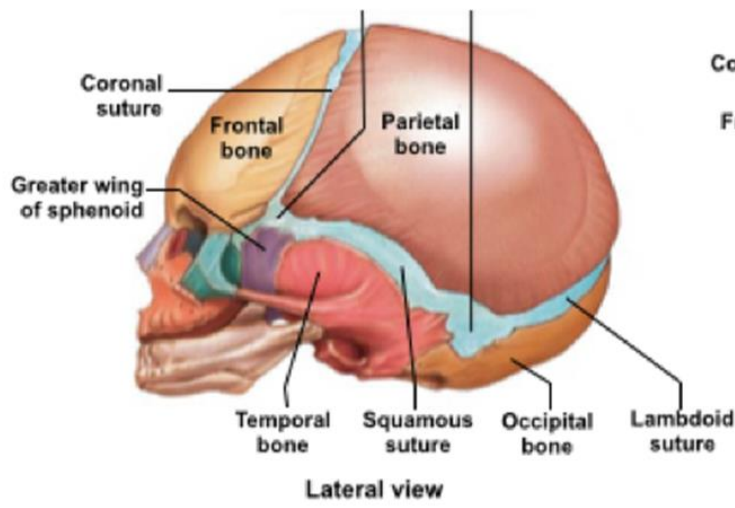
**Experimental paradigm.** Each session was comprised of 5 sections, lasting 300/330 seconds each. Section 1 and 5 (eyes open) as well as section 2 and 4 (eyes closed) were performed “hands-off”. Section 3 was “hands-on” during which examiners applied the cranial vault hold (CVH), recording palpation intervals by operating the Bluetooth footswitch. During the entire session, forehead skin blood oscillations (photoplethysmography) were recorded for participant and examiner.



# Informational Videos Are Helpful



SERENITY  
FAMILY WELLNESS

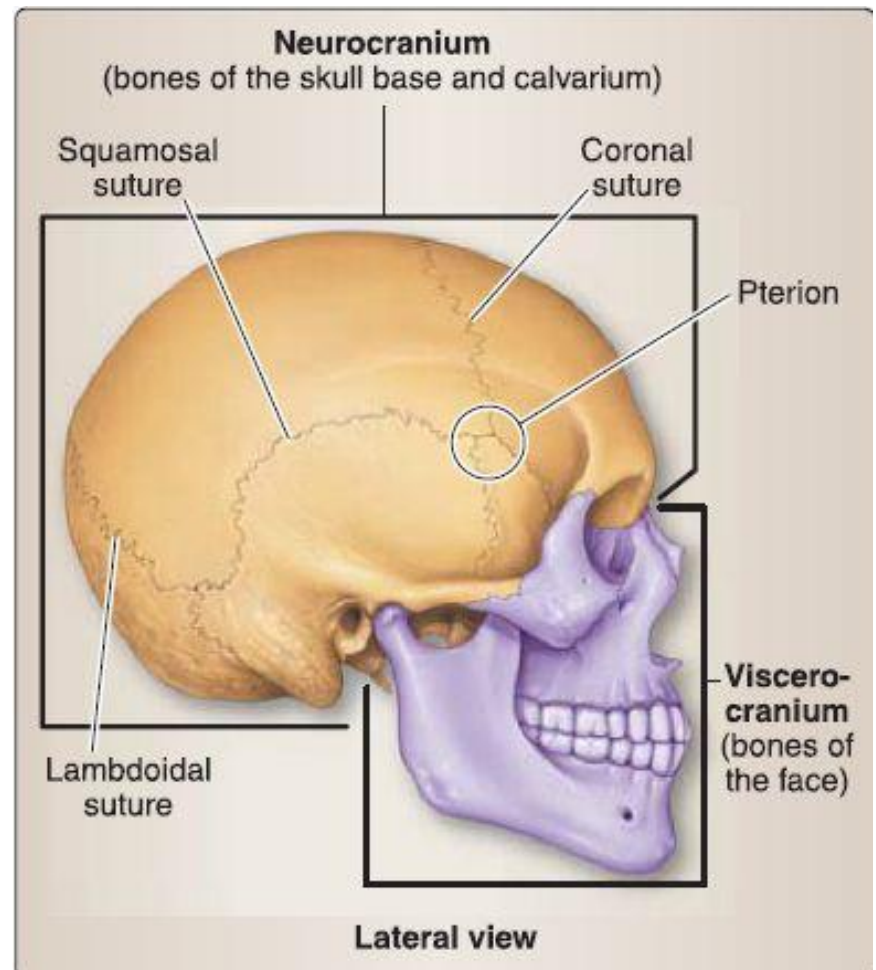


# Review Infant Skull Anatomy: Fontanelles, Sutures, Nerves Structure & Function

# Cranial Development

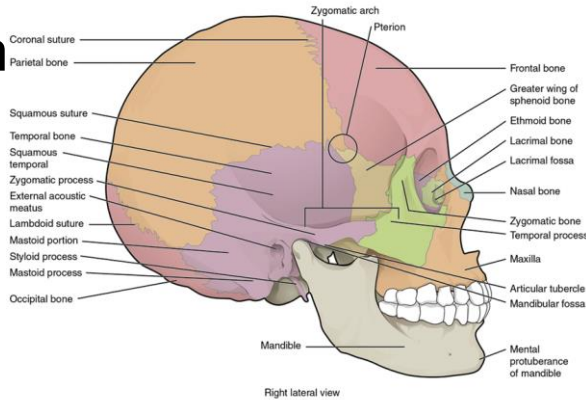
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- 22 bones connected by membranous sutures
- Neurocranium
  - Calvaria and skull base (basicranium)
- Viscerocranium
  - Facial bones

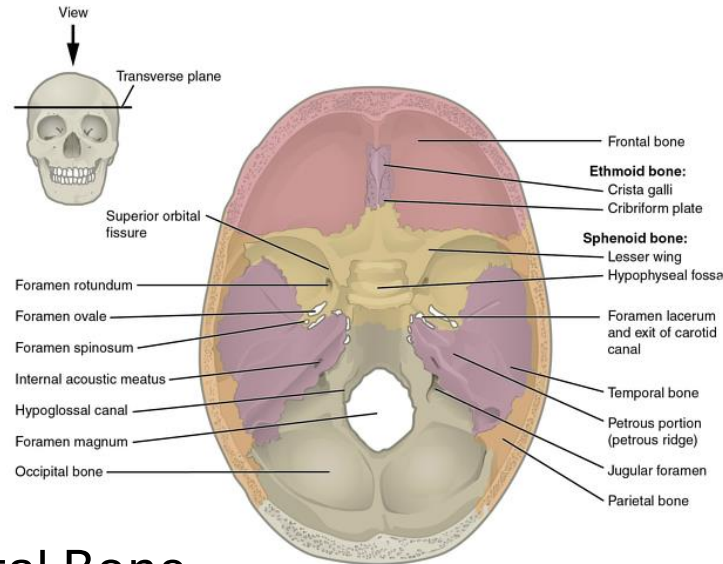


# Neurocranium: forms protective case around brain

## Calvaria



## Skull Base



- Paired frontal bones
- Paired parietal bones
- Squamous part of the paired temporal bones
- Interparietal part of the occipital bone

- Frontal Bone
- Ethmoid Bone
- Sphenoid Bone
- Temporal Bones (paired)
- Occipital bone
- Parietal bones (paired)
  - (varies depending on text)

# Viscerocranium (facial bones)

Vomer

Mandible

Palatine (x2)

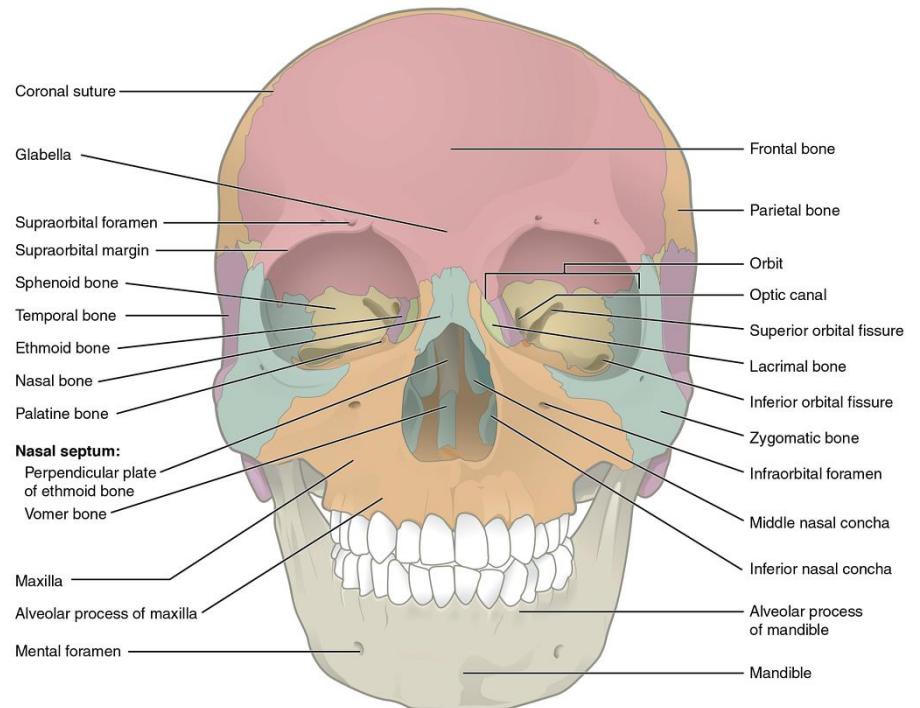
Nasal (x2)

Lacrimal (x2)

Inferior nasal concha (x2)

Zygoma (x2)

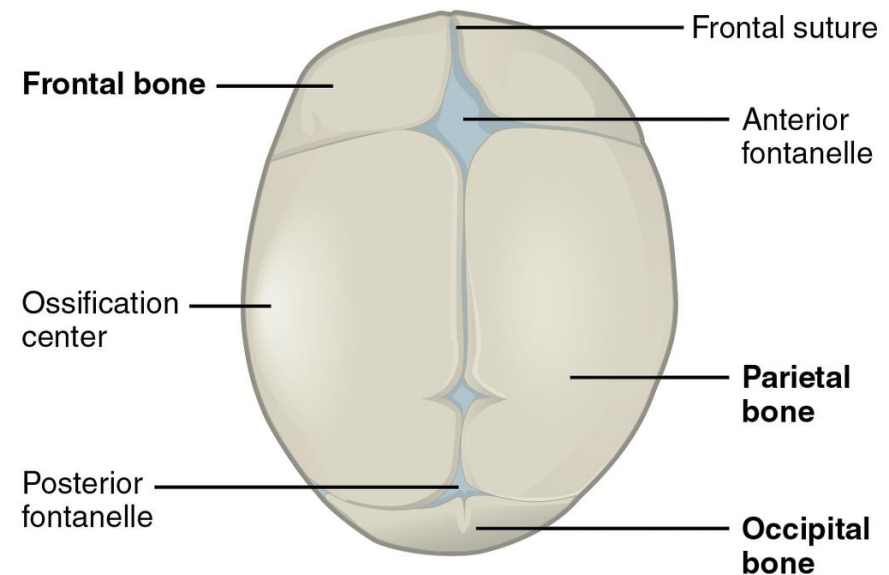
Maxilla (x2)



Anterior View

# Fontanelles/Fontanel

- Soft, membranous gaps of dura mater between the corners of developing flat bones
- Allow baby to traverse the birth canal AND for skull growth over the developing brain
  - The brain is only about 25% of its adult volume at birth, has only reached 50% of adult size by one year of age, and may continue growing until about 20 years of age
- Clinically:
  - Assessment of calvarial growth
  - Assessment of hydration status
  - Assessment of intracranial pressure
  - Provides window for neonatal head ultrasound

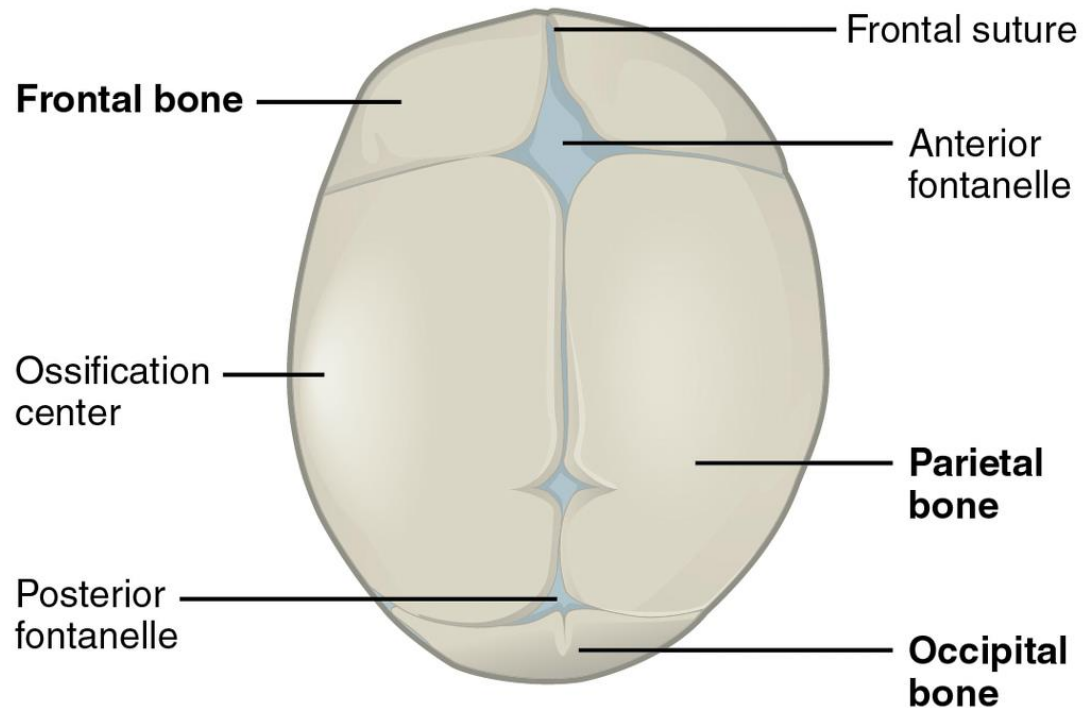


Superior View

# Anterior Fontanelle

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- Junction of the coronal and sagittal suture
- Persists until 18-24 months after birth (some sources say 12-18 months)
  - Become bregma



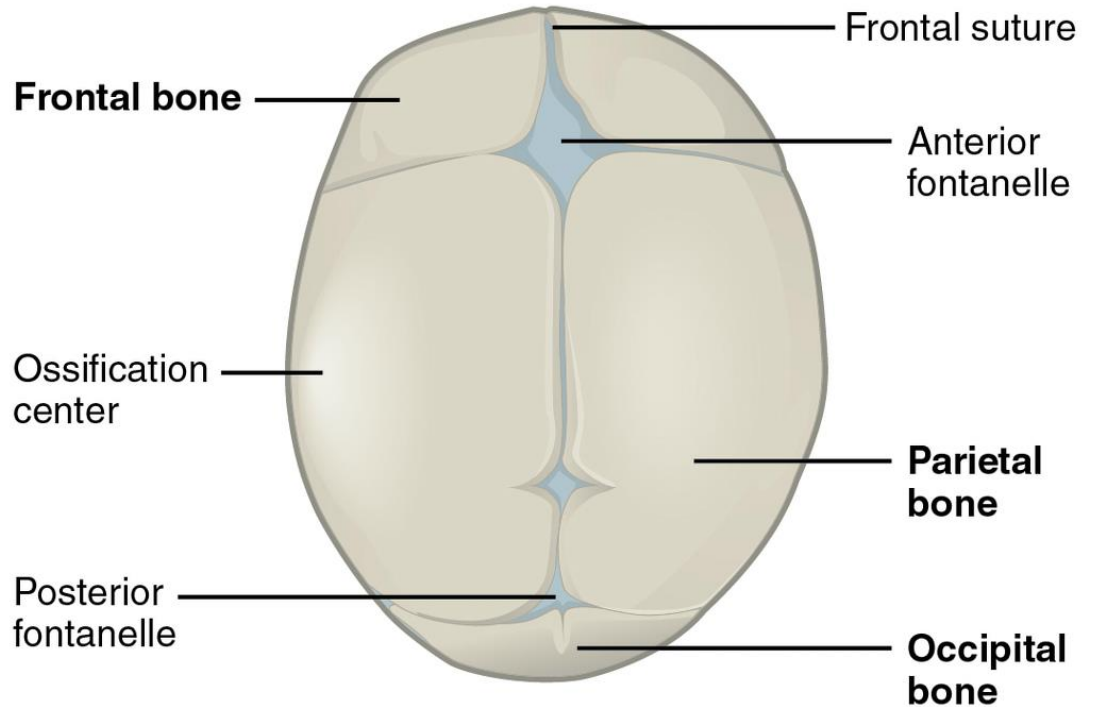
Superior View



# Posterior Fontanelle

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- Occipital fontanelle
- Junction of the lambdoid and sagittal sutures
- Persists until 2-3 months after birth (some sources say 6-8 weeks)
  - Becomes the lambda

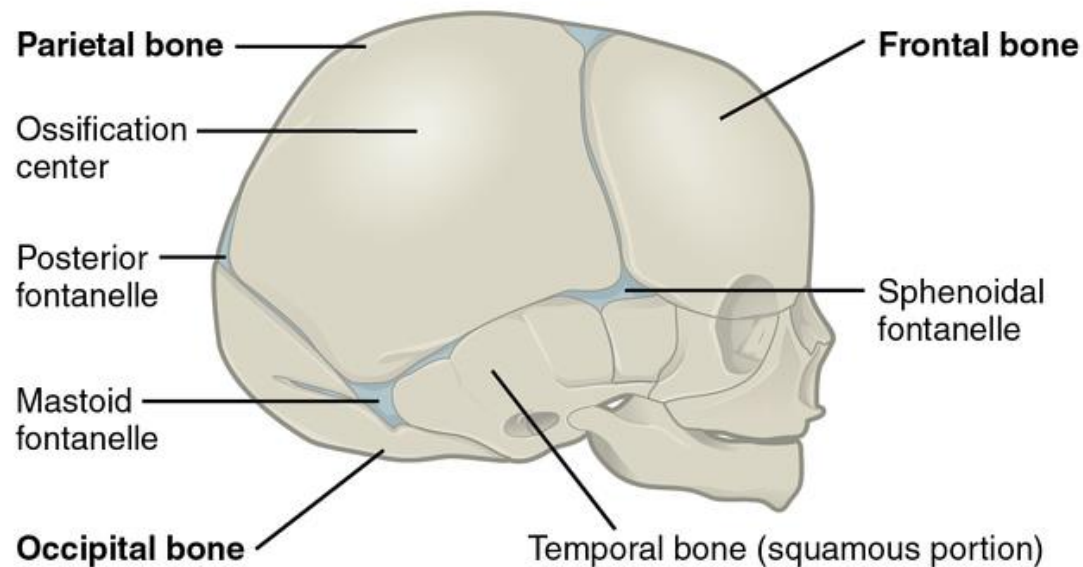


Superior View

# Sphenoidal Fontanelle

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- Anterolateral fontanelle
- Junction of the coronal, sphenofrontal, sphenoparietal, sphenosquamosal, and squamosal sutures
- Persists until 6 months after birth
  - Becomes the pterion

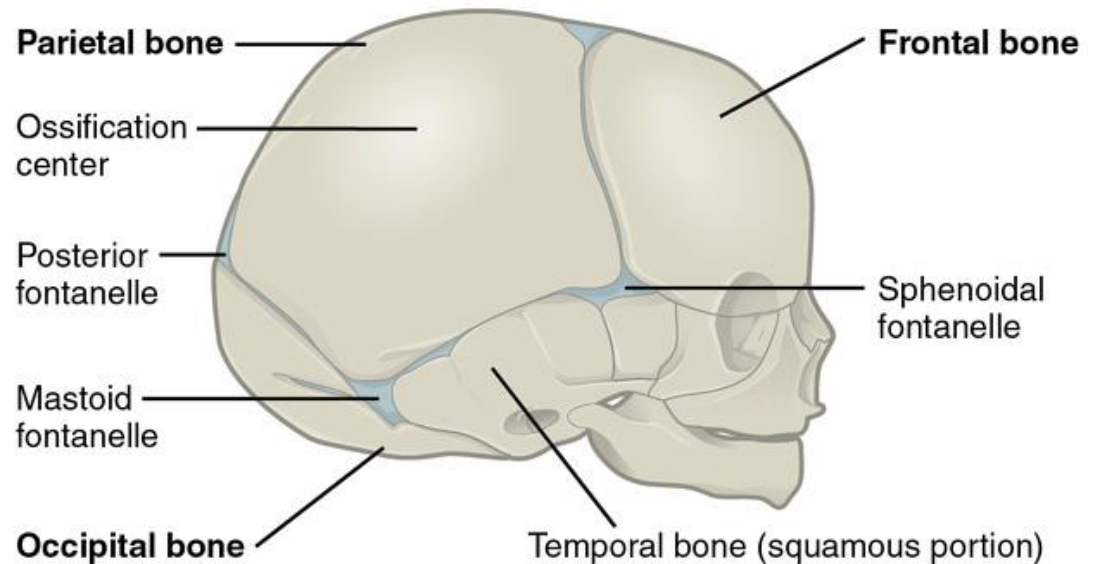


Lateral View

# Mastoid Fontanelle

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- Posterolateral fontanelle
- Junction of the parietomastoid, occipitomastoid, and lambdoid sutures
- Persists until 2 years after birth (some sources say 6-18 months)
  - Becomes the asterion

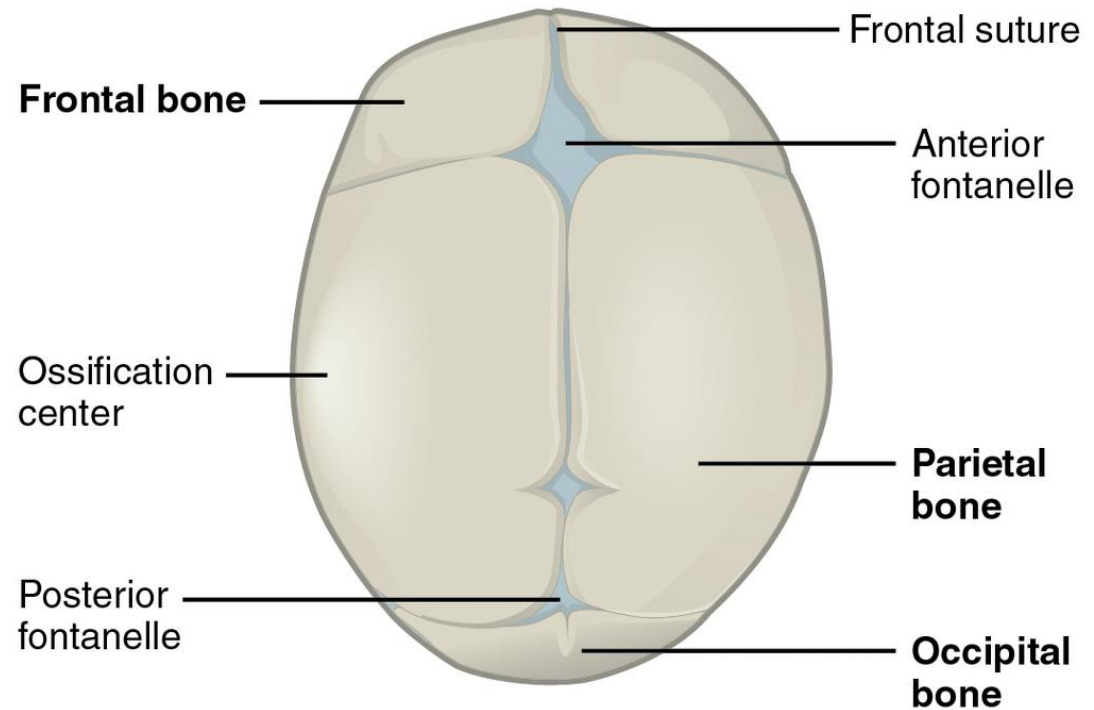


Lateral View

# Third Fontanelle

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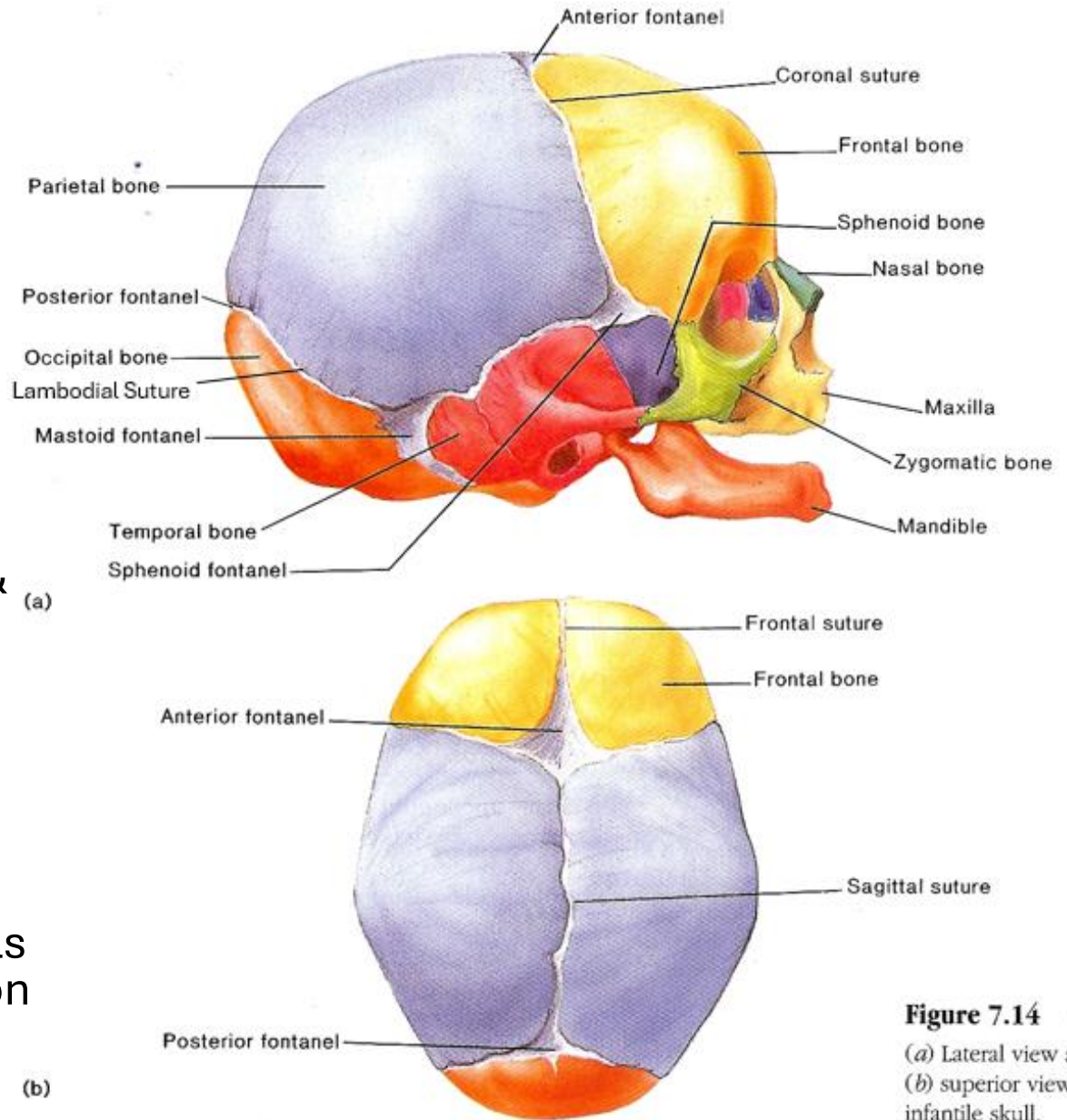
- Generally abnormal
- Between the anterior and posterior fontanelles
- Congenital conditions
  - Down syndrome
  - Congenital infections – rubella
  - 6.4% of the population



Superior View

# Summary of Fontanelles

- Four open fontanelles
  - Anterior (~1-2 years) & Posterior (~2-3 months)
  - Sphenoid (~6 months) & Mastoid (~6-18 months)
- Only two are noticeable (anterior and posterior)
  - Making the baby more vulnerable
  - Protects a baby from injury from common falls making the skull function like a football helmet



**Figure 7.14**

(a) Lateral view and (b) superior view of infantile skull.

Summary –  
Ages of  
Normal  
Suture/Fontan  
elle Closure

Posterior fontanelle – 2-3 months

Metopic suture – 3-9 months

Sphenoidal fontanelle – 6 months

Anterior fontanelle – 18-24 months

Sagittal – 22 years

Coronal – 24 years

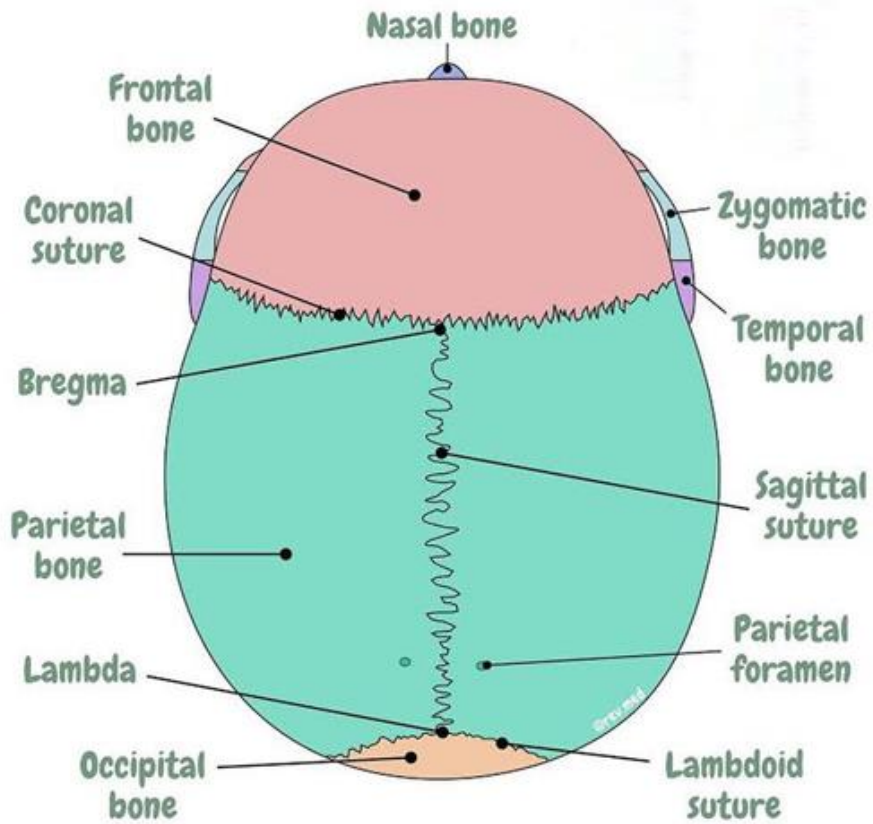
Lambdoid – 26 years

Squamosal – 60 years

# Sutures of the Skull

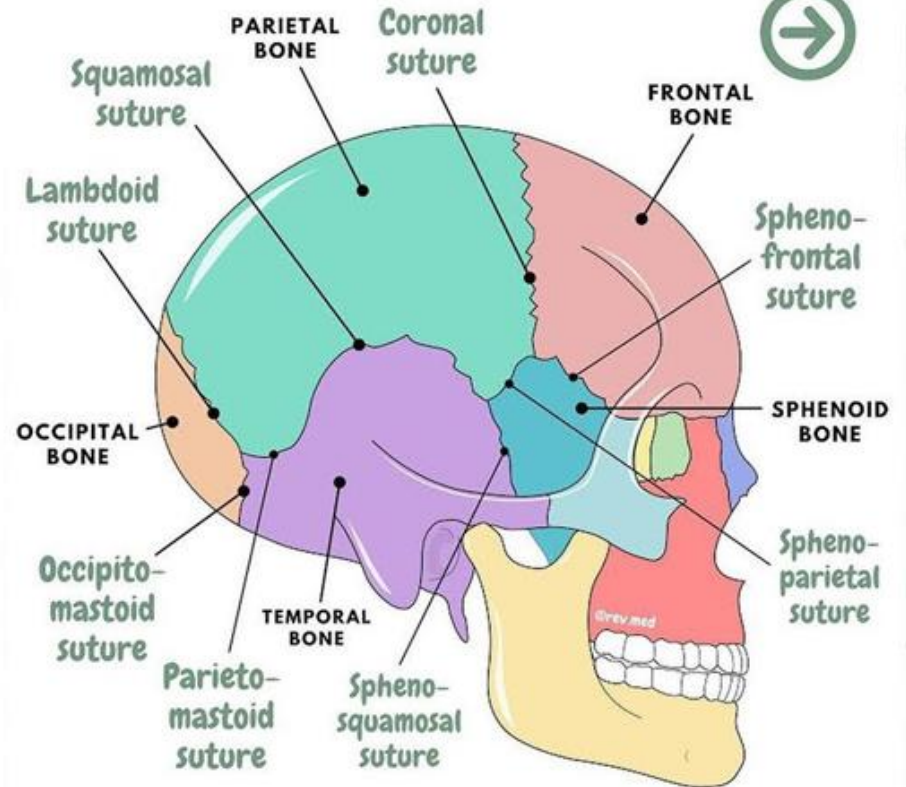
## Skull Sutures

SUPERIOR VIEW



## Skull Sutures

LATERAL VIEW



# Anatomy: Sutures

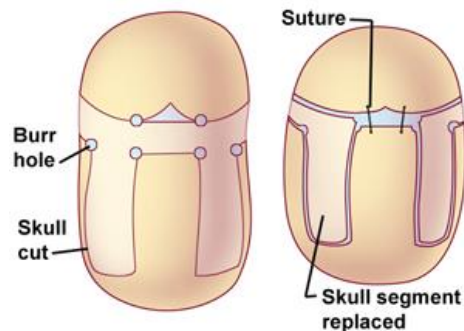
- Cranial sutures are wavy fibrous joints (synarthroses) between the bones of the vault or face
  - Periosteum externally and outer layer of dura mater internally
  - Both fontanelles and sutures are important for cranial vault and brain growth
  - Humans show a delayed pattern of suture ossification; remain patent (and capable of growth) until early adulthood (late in the third decade of life - once the brain is done growing)
  - Fusion of sutures in humans has been used as an age indicator, but is highly variable and unreliable because of the range of variation in the timing of obliteration
- Movement between the sutures reported to be less than 1/100th of a centimeter (the width of a human hair)



# Craniosynostosis

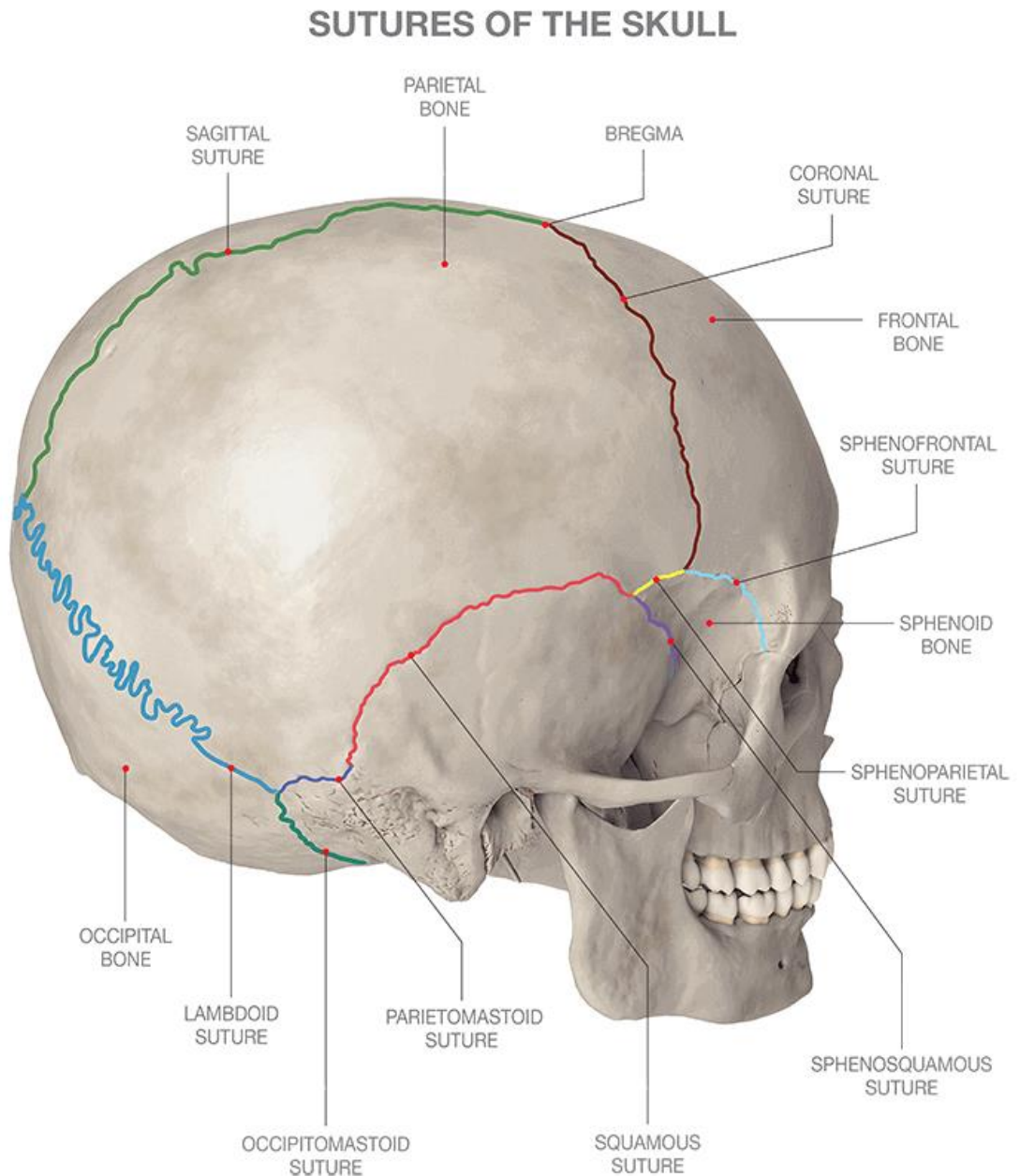
Early closure of one suture causing uneven skull growth (sagittal is m/c) – will not respond to CST

- Skull growth in the prematurely closed area constricts, forcing bone overgrowth in other areas
- Affects 1 in 2,000 to 2,500 live births worldwide
- Results in increased intracranial pressure, leading to impairments in vision, sleep (apnea), eating, or an impairment of mental development / IQ
- Treatment for craniosynostosis is usually surgical



# Sutures – Overview

- Major/Primary Sutures
  - Coronal Suture
  - Sagittal Suture
  - Lambdoid Suture (occipitomastoid suture)
  - Squamosal Suture
  - Metopic Suture



# Sutures of the Skull

- **Coronal Suture (Dark Red Crown)**

- Between parietal & frontal bones
- Fusion occurs ~24 years of age

- Premature fusion (craniosynostosis):

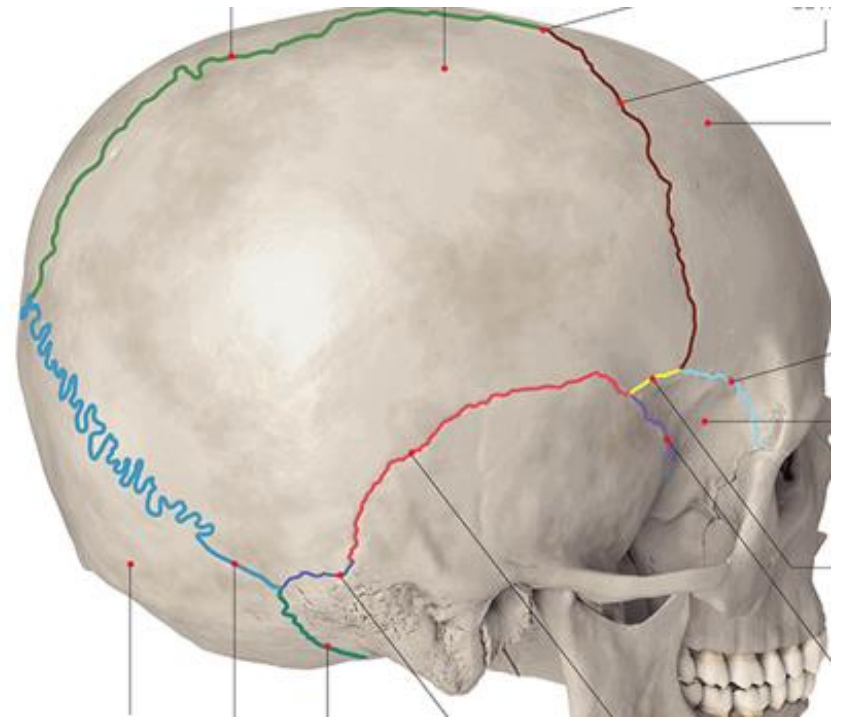
- Oxycephaly (aka turricephaly)

- Most severe
- Premature fusion of ALL sutures
- “Tower-Like” Skull

- Plagiocephaly

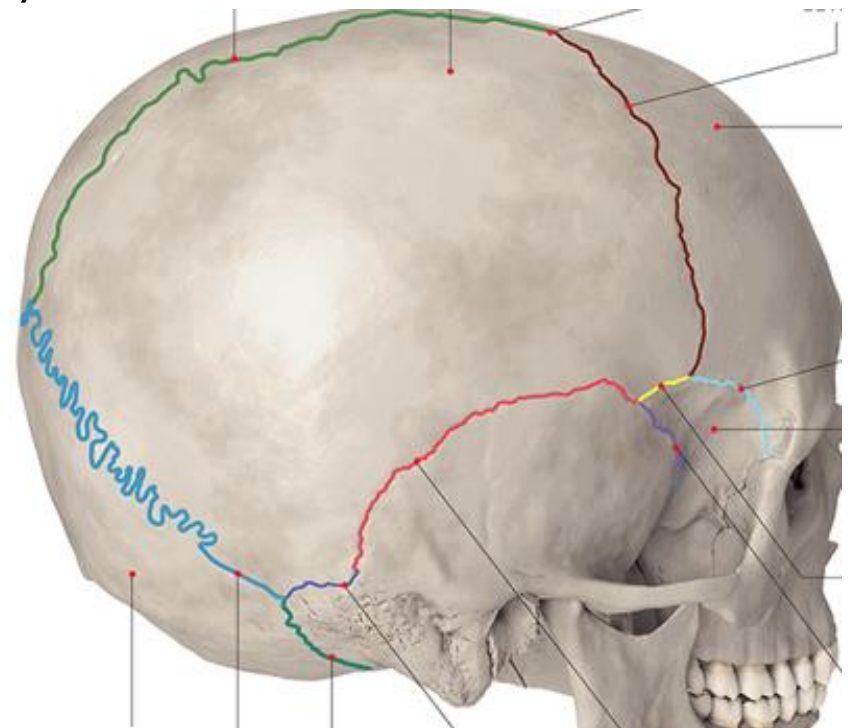
- Asymmetric premature closure of coronal and/or lambdoid sutures
- Single or asymmetric multiple sutures

- Brachycephaly



# Sutures of the Skull

- **Sagittal Suture (Green Center Top)**
  - Between 2 parietal bones
  - Fusion occurs at around 22 years of age
- **Premature fusion (craniosynostosis):**
  - Scaphocephaly - aka dolichocephaly
  - M/C form of craniosynostosis
  - Impedes lateral growth; A-P growth continues
  - Elongated, narrow skull
  - M:F 3:1



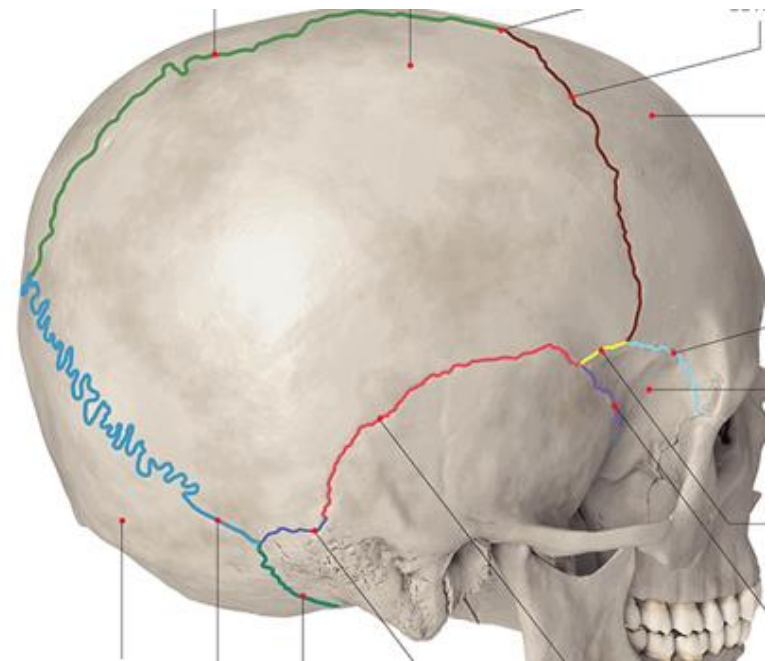
# Sutures of the Skull

- **Lambdoid Suture (Blue at Back)**

- Between superior border of occipital bone and posterior borders of the right and left parietal bones
- Fuses at approximately 26 years of age

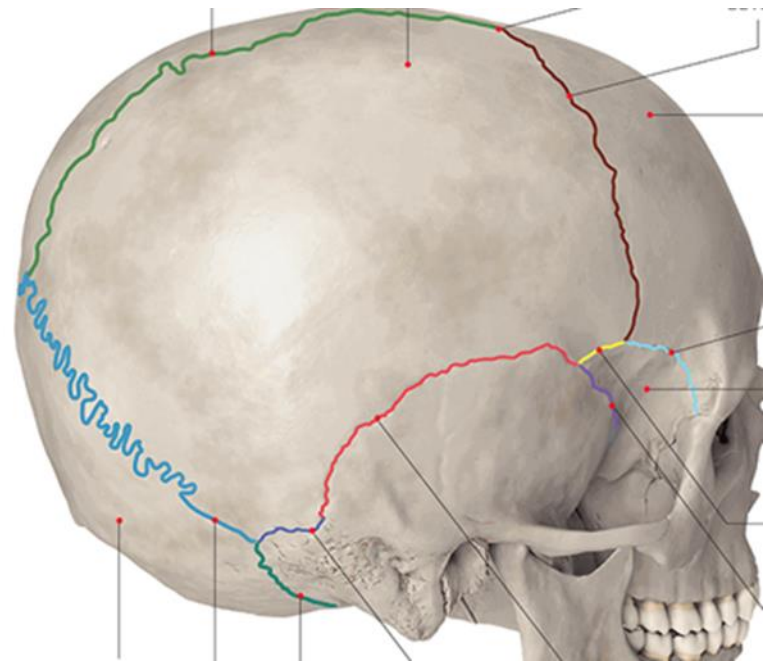
- **Premature fusion (craniosynostosis):**

- Posterior plagiocephaly – one of the rarest craniosynostosis



# Sutures of the Skull

- Squamosal Suture (light red/orange above ear)
  - Between the temporal & parietal bone
  - Contributes to vertical height of cranium
  - May not completely close until 60 years of age



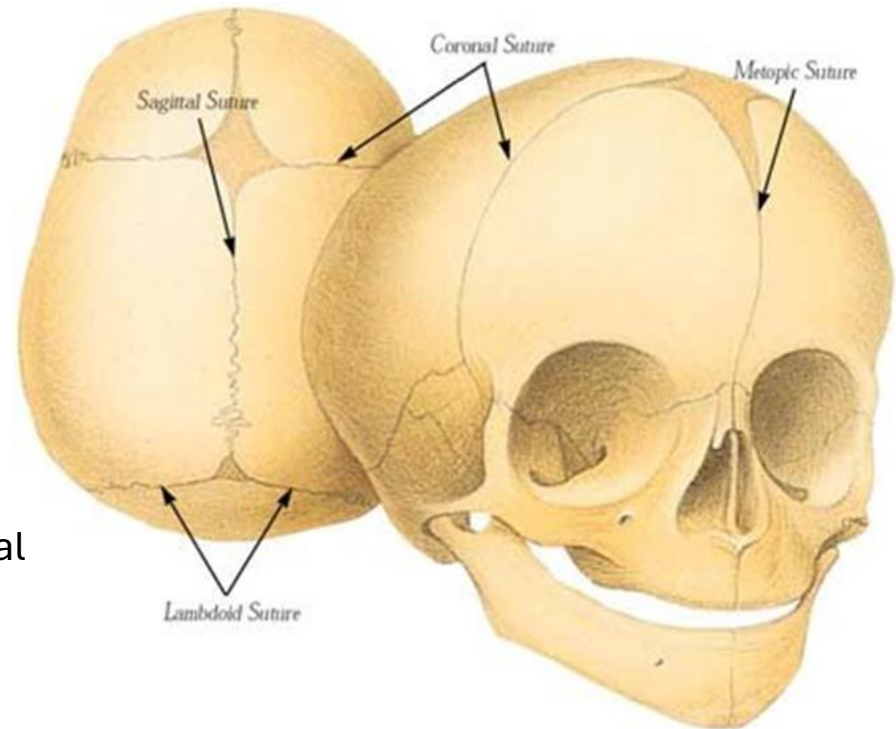
# Sutures of the Skull

- **Metopic Suture**

- Divides the frontal bone
- Present in newborns; should fuse by 9 months; -may fuse as early as 3 months
- Usually obliterated by 7 years
- If persists = anatomic variant of little clinical significance

- **Synostosis**

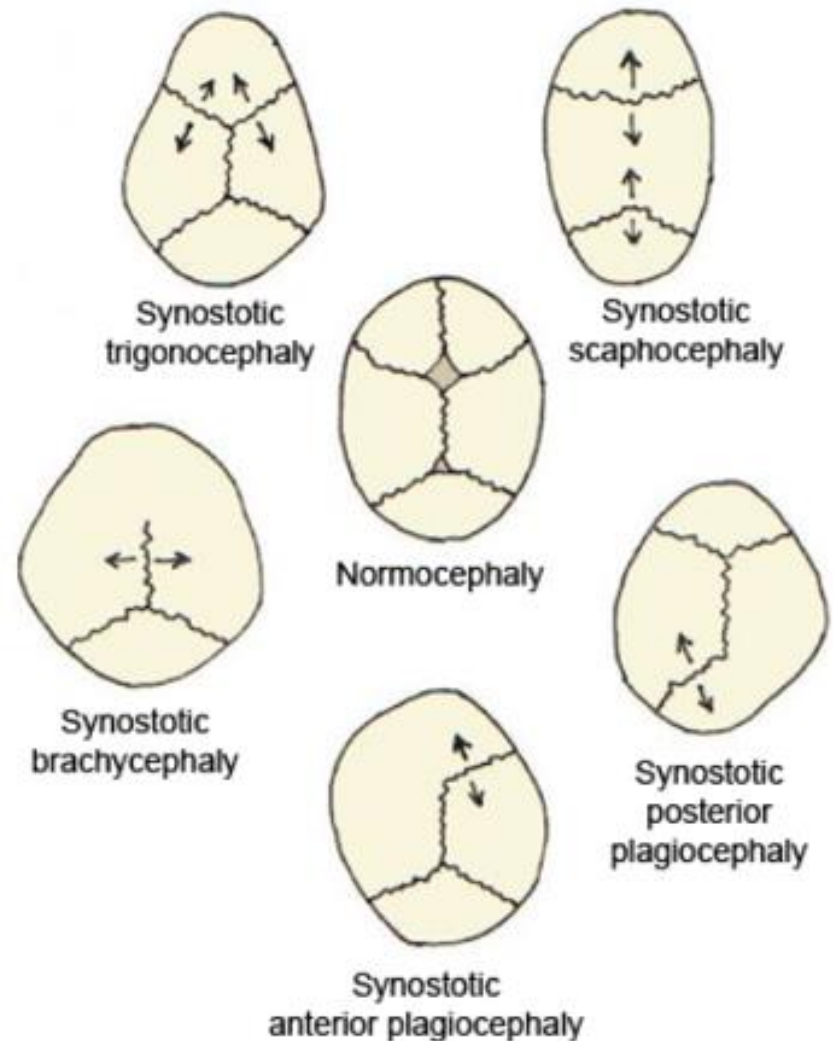
- Trigonocephaly = triangular shaped frontal bone
  - 5% of craniosynostosis
- Orbital hypotelorism
  - Abnormal closeness of the eyes



# Summary – Craniosynostosis

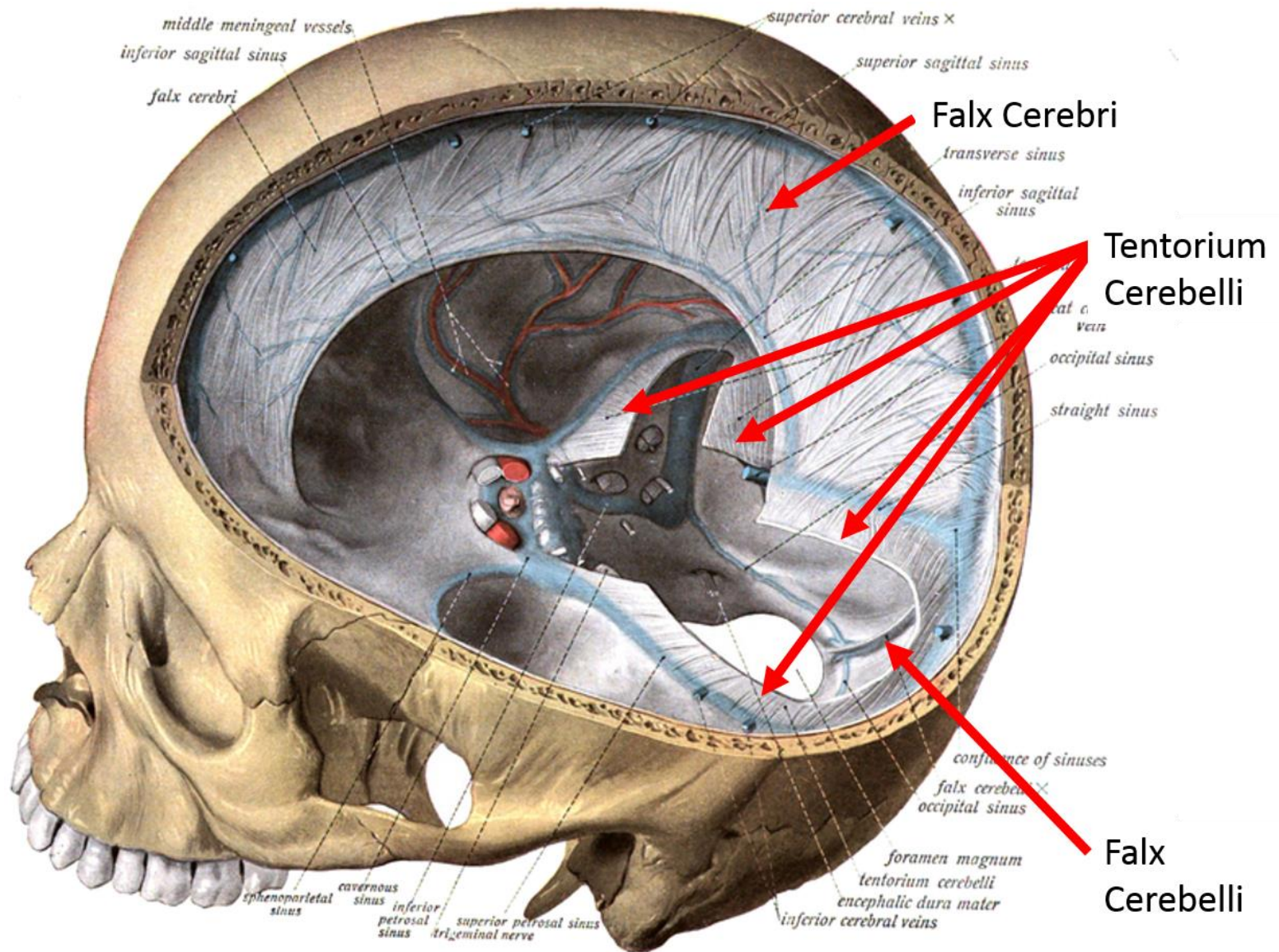
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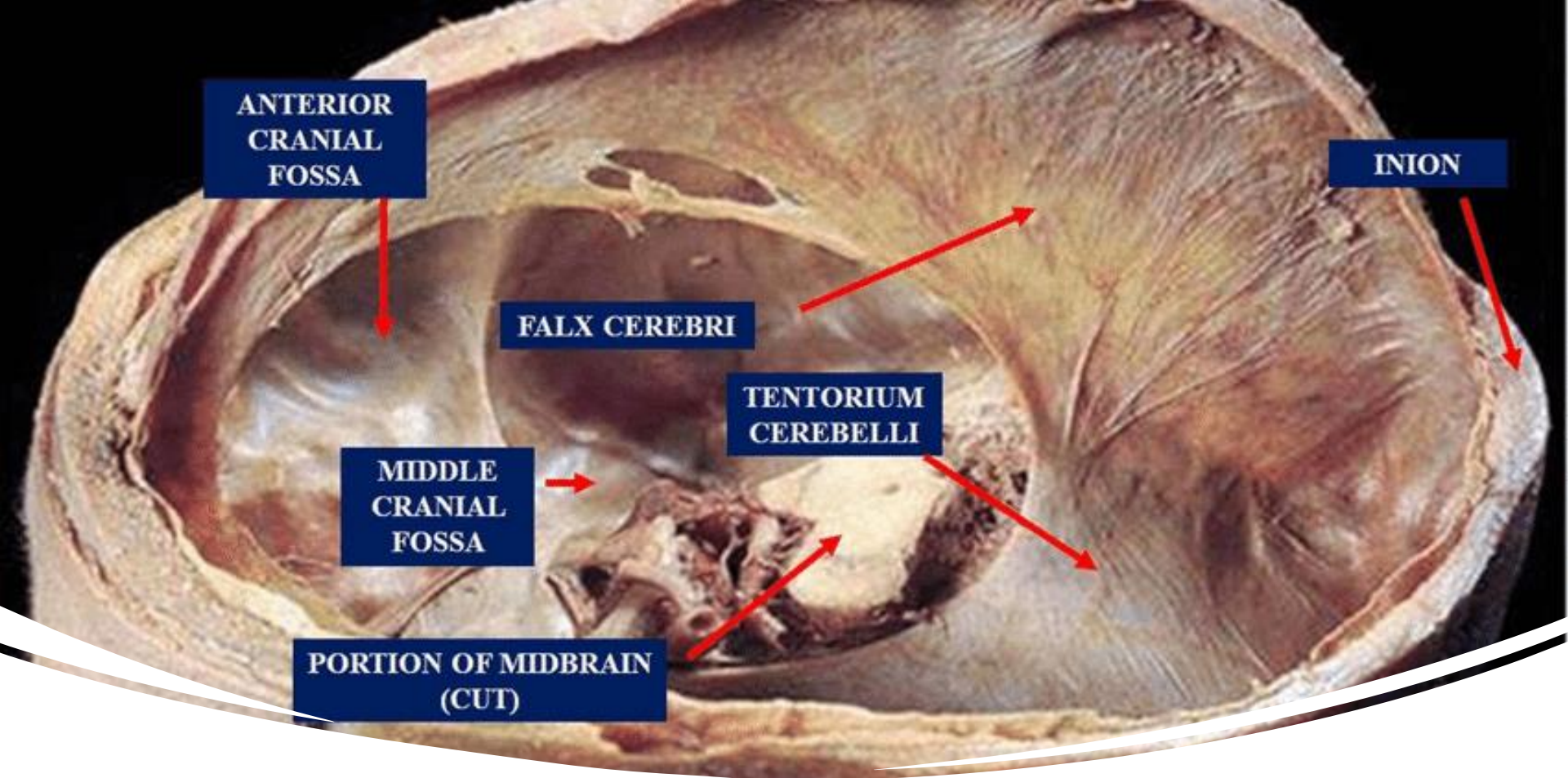
- Brachycephaly – bicoronal and/or bilambdoid sutures
- Scaphocephaly – sagittal suture
- Plagiocephaly – unilateral coronal or lambdoid suture
- Oxycephaly – all sutures
- Commonality for craniosynostosis:
  - Sagittal (50%)
  - Coronal (20%)
  - Lambdoid (5%)
  - Metopic (5%)





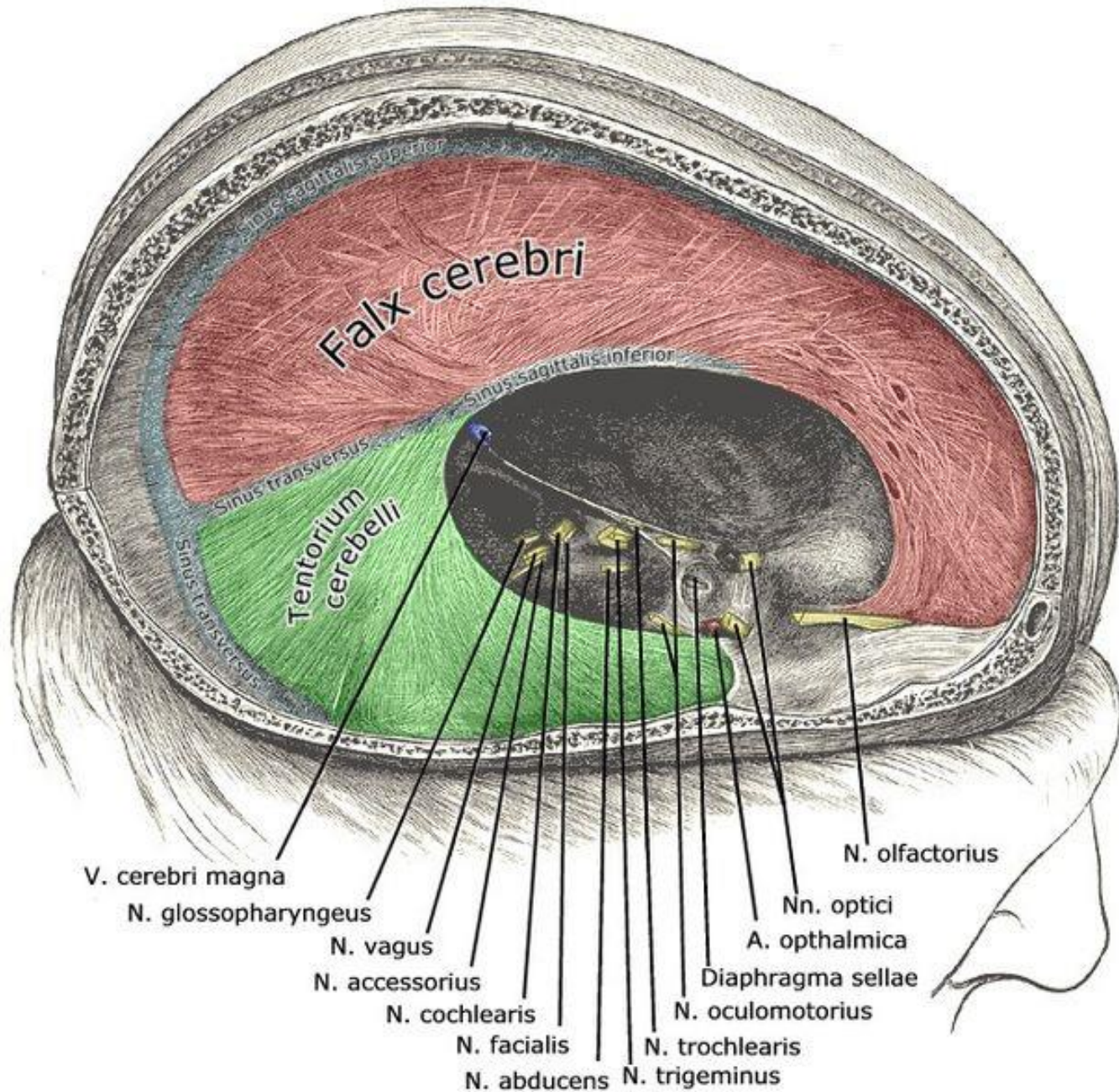
# Membranes of the Skull



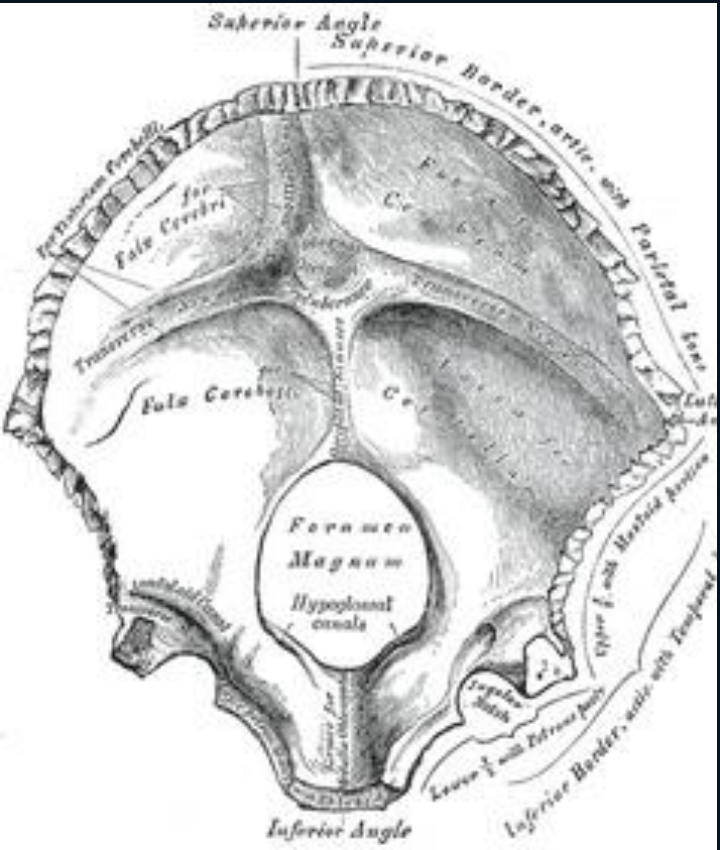
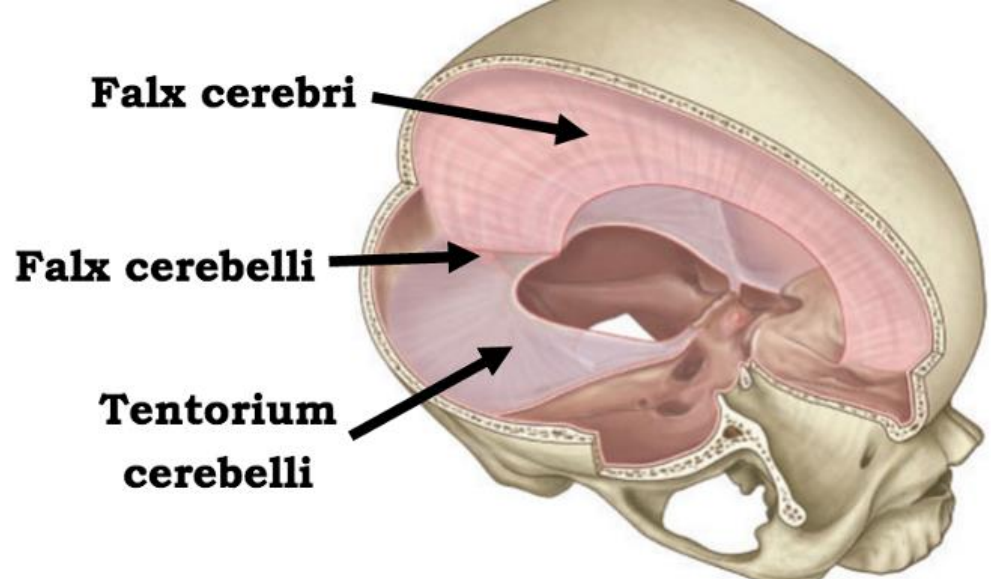


## Dura & Membrane Divisions

- Falx Cerebri
  - From occipital and frontal bones
  - Separates the two cortex
  - Pathway for sagittal & inferior sinus
  - Anchors on ethmoid (crista galli), vomer and sphenoid
- Tentorium Cerebelli
  - Separate from falx cerebri
  - Anchors to sphenoid at the sella turcica and temporal bone at mastoid, parietal and occiput
  - Supports occiput and lays superior to cerebellum



# Dura & Membrane Divisions



- Falx Cerebelli
  - Base attaches under the tentorium cerebelli
  - Descends to house the ring around the foramen magnum
  - Houses many blood vessels and venous sinus
  - Tension from cervical muscles affecting cranial base function can interfere with structures within the jugular foramen
    - Dysfunction of CN9-12
    - Colic, nursing, heart-lung-digestive problems, reflux and swallowing

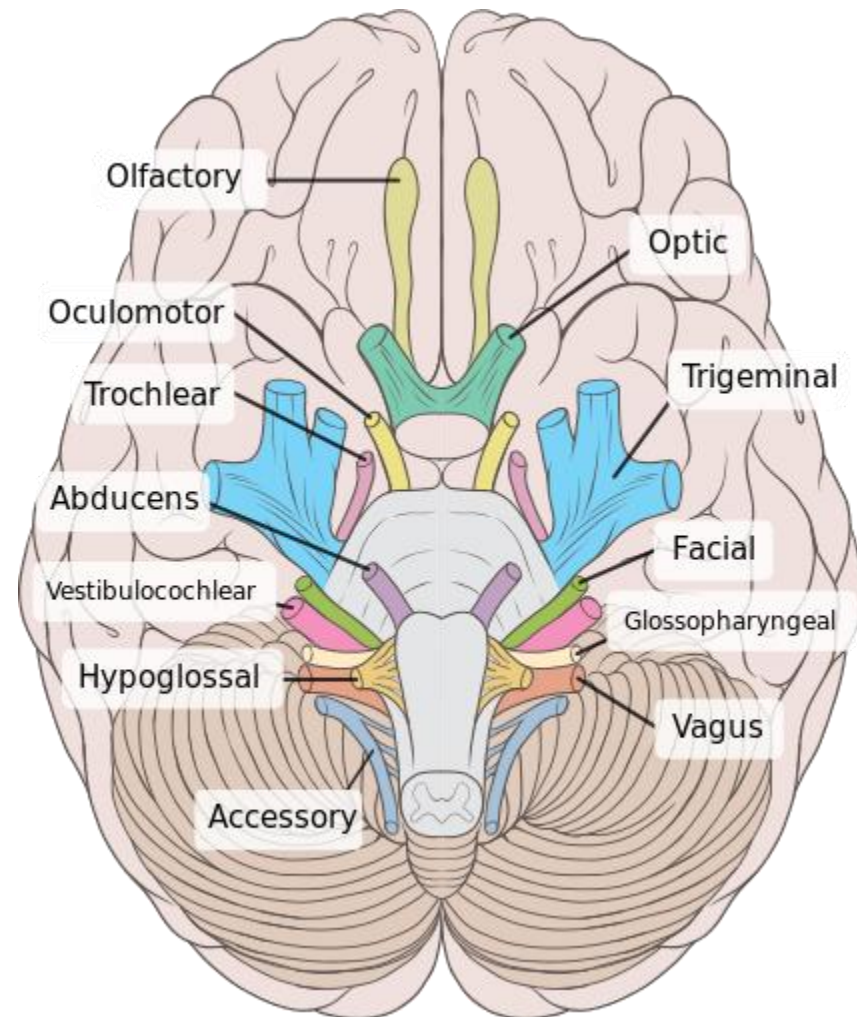
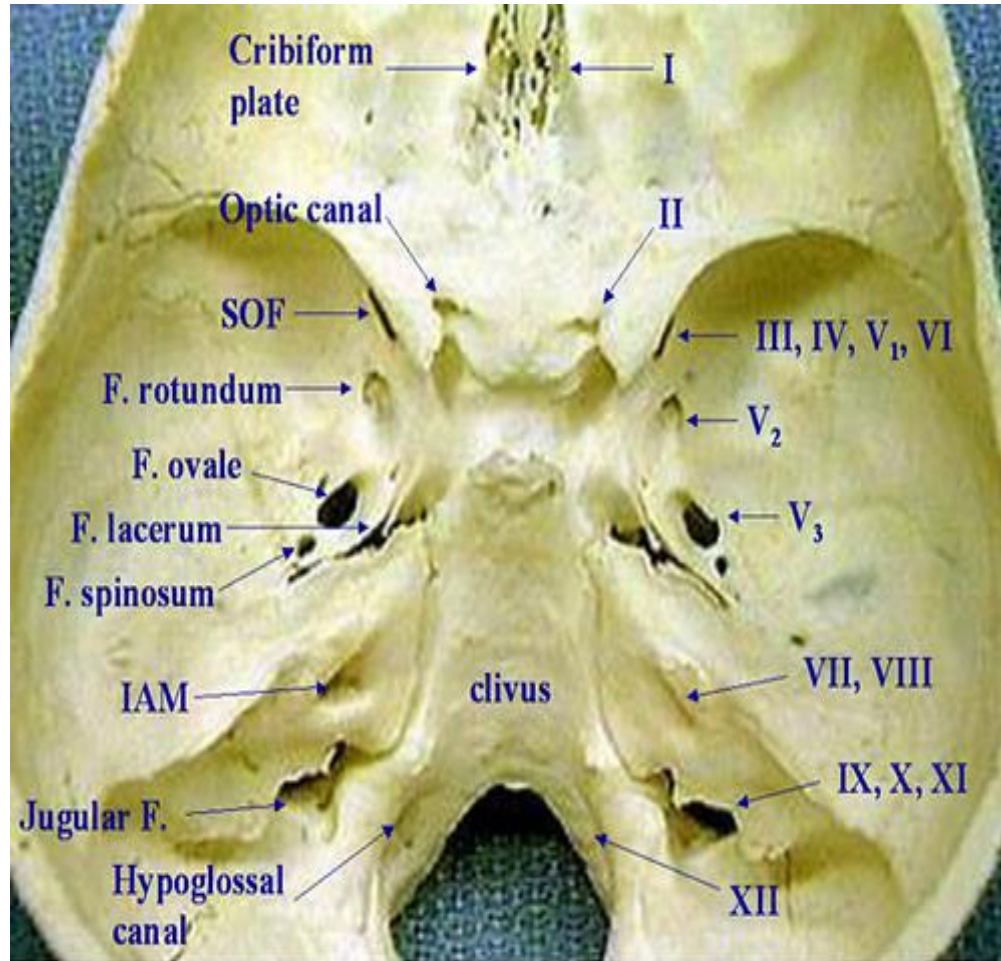


# Birth Process

# Cranial Ossification & Movement

- Dura helps guide the bony plates back after birth
- Full bony ossification
  - Frontal bone (2 pieces): 8 years
  - Temporal and sphenoid (3 pieces each): 1 year
  - Occiput (4 pieces): 6 bones connect here
    - Squama: unites with condylar portion at 3-5 years
    - 2 condylar: unite with basilar portion at 7-8 years
    - Basilar: see above
- Occiput directs pattern of cranium; sphenoid directs pattern of facial bones

# Cranial Nerves: Brain & Skull



# 12 Cranial Nerves & Function

- 1. Olfactory - Transmits the sense of smell from the nasal cavity
- 2. Optic - Transmits visual signals from the retina of the eye to the brain
- 3. Oculomotor - Eyeball and eyelid movement (levator palpebrae superioris, superior rectus, medial rectus, inferior rectus, and inferior oblique; pupil constriction (pupillae sphincter))
- 4. Trochlear - Innervates the superior oblique muscle (depresses and lateral rotation)
- 5. Trigeminal - Mastication, pain & touch of the face and palate
- 6. Abducens - Innervates the lateral rectus, which abducts the eye



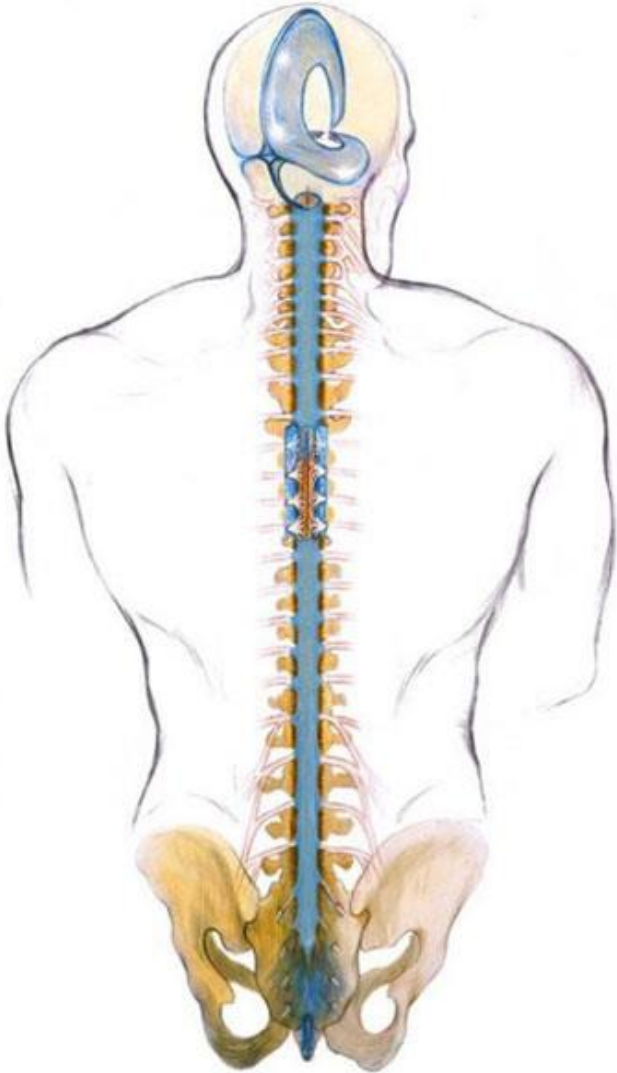
# 12 Cranial Nerves & Function

- 7. Facial - Motor to face, tear glands, salivary glands (not parotid) including posterior belly of the digastric muscle, and stapedius muscle, taste anterior 2/3 of the tongue
- 8. Vestibulocochlear - Hearing and balance
- 9. Glossopharyngeal - Taste posterior 1/3 of tongue, somatosensory information from tongue, tonsil, pharynx and parotid secretion; controls some muscles used in swallowing
- 10. Vagus - Sensory, motor and autonomic functions of viscera (glands, digestion, heart rate), controls muscles for voice and resonance and the soft palate
- 11. Accessory - Swallowing and SCM
- 12. Hypoglossal - Tongue movements

# 12 Cranial Nerves & Function

<b>Cranial Nerve</b>		<b>General Function</b>	<b>Cranial Exit Opening</b>
<b>I</b>	<b>Olfactory</b>	<b>Sense of Smell</b>	<b>Cribriform Plate of the Ethmoid</b>
<b>II</b>	<b>Optic</b>	<b>Sight</b>	<b>Optic Foramen</b>
<b>III</b>	<b>Oculomotor</b>	<b>Eye Movement</b>	<b>Superior Orbital Fissure</b>
<b>IV</b>	<b>Trochlear</b>	<b>Eye Movement</b>	<b>Superior Orbital Fissure</b>
<b>V</b>	<b>Trigeminal</b>	<b>Face: sensory, motor</b>	<b>Superior Orbital Fissure</b>
<b>VI</b>	<b>Abducens</b>	<b>Eye Movement</b>	<b>Superior Orbital Fissure</b>
<b>VII</b>	<b>Facial</b>	<b>Face: expression, and sensory</b>	<b>Stylomastoid Foramen</b>
<b>VIII</b>	<b>Vestibulocochlear</b>	<b>Hearing and Balance</b>	<b>Internal Acoustic Meatus</b>
<b>IX</b>	<b>Glossopharyngeal</b>	<b>Tongue and Throat - motor and sensory</b>	<b>Jugular Foramen</b>
<b>X</b>	<b>Vagus</b>	<b>Parasympathetic</b>	<b>Jugular Foramen</b>
<b>XI</b>	<b>Accessory</b>	<b>Head, neck, shoulder - movement &amp; swallowing</b>	<b>Jugular Foramen</b>
<b>XII</b>	<b>Hypoglossal</b>	<b>Speech, Chewing and Swallowing</b>	<b>Hypoglossal Canal</b>

# Craniosacral Therapy System



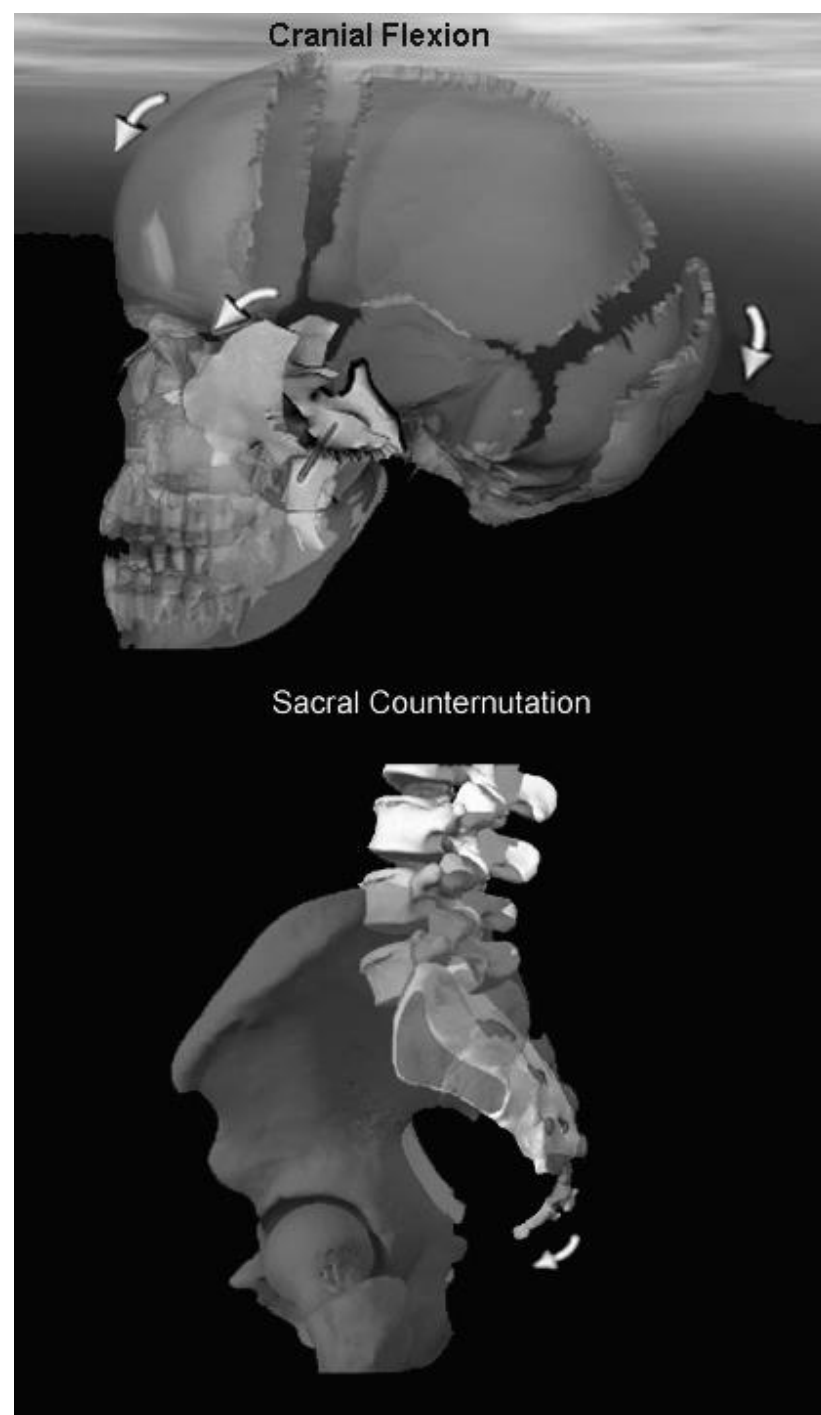
- Purpose: enhance the system function by examining the movement of the bones, dura, and soft tissue by locating restrictions resulting from injury (mental, emotional, or physical) and correcting the dysfunction

# Craniosacral Therapy System

- Practitioners listen to the subtle rhythms and pulsations of the system by monitoring the wavelike motion of the cerebrospinal fluid's changes in pressure to determine any restriction or dysfunction
- Correction facilitates and elicits the body's own innate healing mechanisms

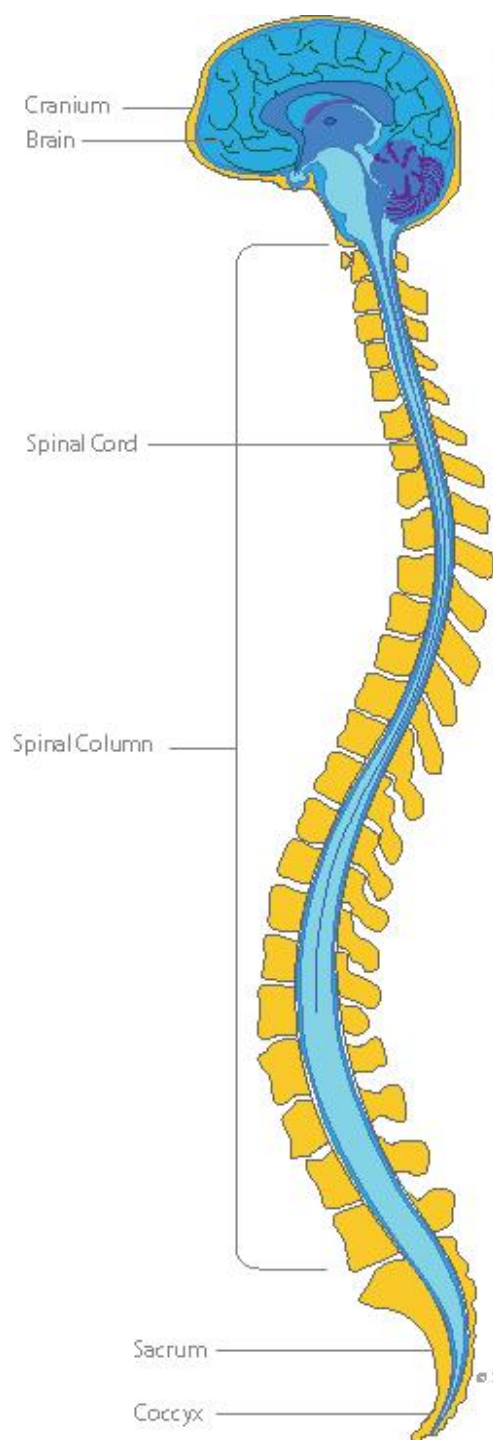
# Craniosacral Movements

- Sacrum and occiput are connected by the dura
  - Attached to anterior sacrum at S2
- Mobility of the sacroiliac joint fulcrums through S2
- Occiput extension = sacral nutation
- Occiput flexion = sacral counternutation
- Cranial lesion can lock the sacrum in either nutation or counternutation



Sagittal Section of the Cranium, Spinal Column, Sacrum, Coccyx, Brain and Spinal Cord. The craniosacral system is also shown surrounding the brain and spinal cord.

## Appearance = Function

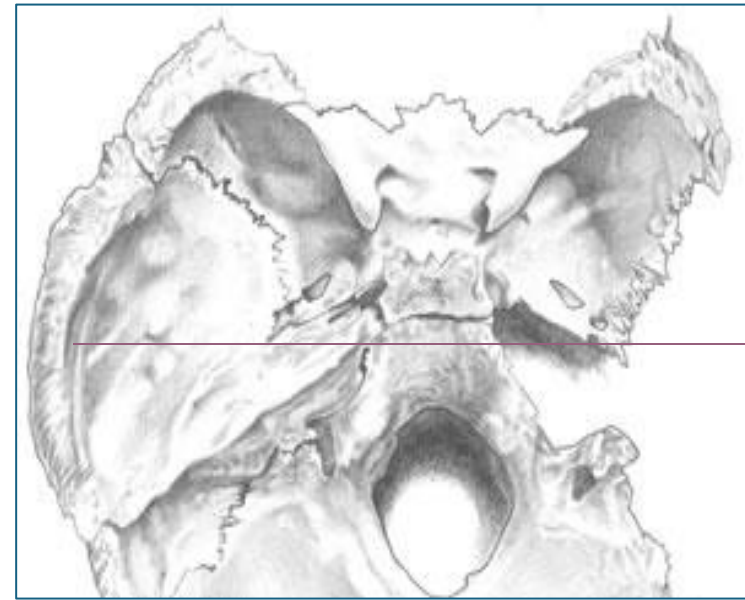


All areas shown in shades of blue contain cerebrospinal fluid (CSF).

Total normal volume of CSF within the craniosacral system, brain and spinal cord = 140 milliliters.

Average daily production of CSF = 650 milliliters.

Average amount of CSF produced per craniosacral rhythm cycle = .05 milliliters (1/10th teaspoon).

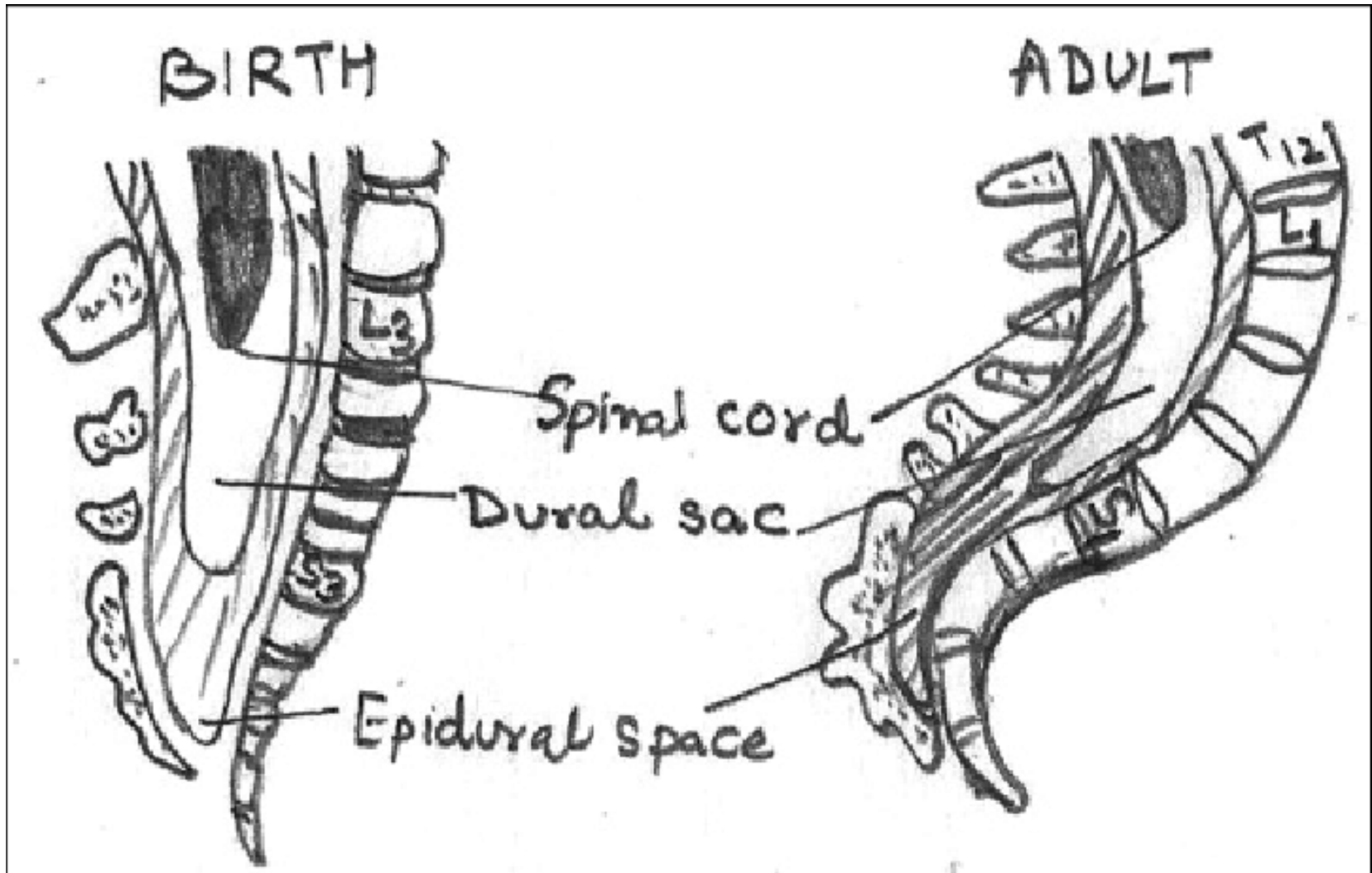


# Structure of Sacrum in Infants



- Birth = sacrum consists of 21 separate elements; develop recognized morphology by 1 yoa
- 2–5 yoa = begin to fuse
- Age 6 = five unfused segments
- Puberty = 14 sacral epiphyses begin to appear
- Age 20, the sacral segments are united with epiphyseal lines remaining until the late 20's

# Spinal Cord in Relationship to Sacrum





# What About Sacral Dimples?

- Can be harmless – must US or MRI to R/O large issues
- Can be part of something else – look for hair / hyperpigmentation
  - Tethered Cord Syndrome – see next slide
  - Dermal sinus tract: can lead to infection / meningitis
  - Pilonidal cyst (m/c in males)
  - Spina bifida occulta

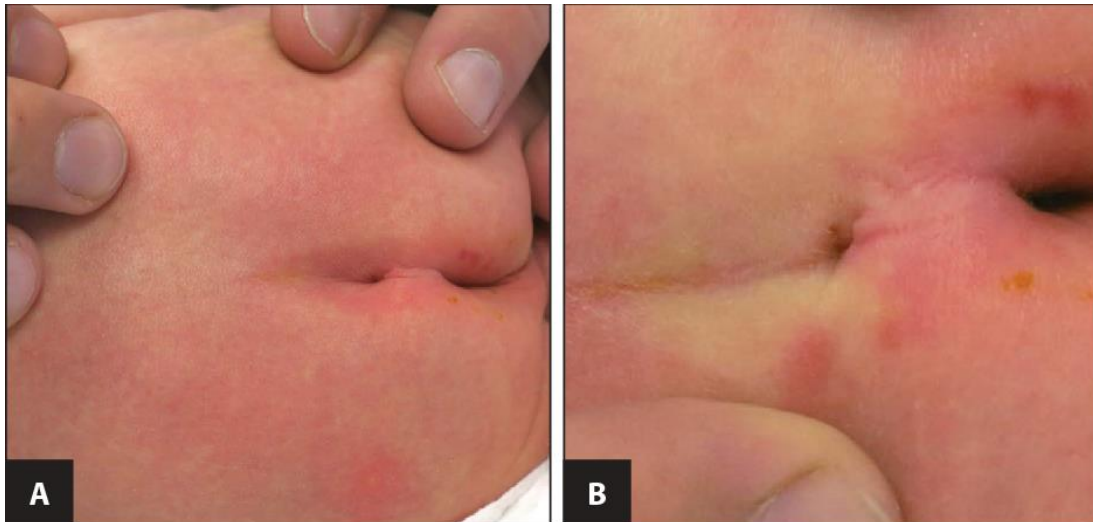


Figure 3. (A) An 11-day-old white male who has a very deep coccygeal dimple within 2.5 cm of the anal

# Tethered Cord Syndrome (TCS)

- Tissue attaches to the spinal cord, restricting its movement
- Can be present from congenital (myelomeningocele) or it can develop after a spinal cord injury (scar tissue) and is progressive if left untreated
- Symptoms of TCS include:
  - Difficulty walking
  - Dimples, noncancerous tumors, or patches of hair on the lower back
  - Discolored skin patches and hemangiomas
  - Numbness in the legs or back
  - Severe leg or back pain, which may extend to the rectum or genital area
  - Scoliosis
  - Skin tags
  - Trouble with bladder and bowel control
  - Fluid-filled cysts in the spinal cord (syringomyelia)
  - Loss of muscle mass
- In children with spina bifida defects that are repaired shortly after birth, 20-50% may require surgery at some point to untether the spinal cord

# History, Assessment & Contraindications





# History

- CC/PI: cover all the bases
- Pregnancy
  - Care during pregnancy, abnormal maternal blood tests, vaccines, medications, gestation / parity / EDD
- Labor and delivery
  - Place of delivery, lye, onset of labor, types, instruments, medications / anesthesia, hemorrhage
- Birth and after care
  - APGAR, meconium, blood tests / needs, fever, feeding problems, hearing, eye discharge, current problems, infant reflexes, vaccines
- Concomitant health issues / challenges
- Family history
- Social history

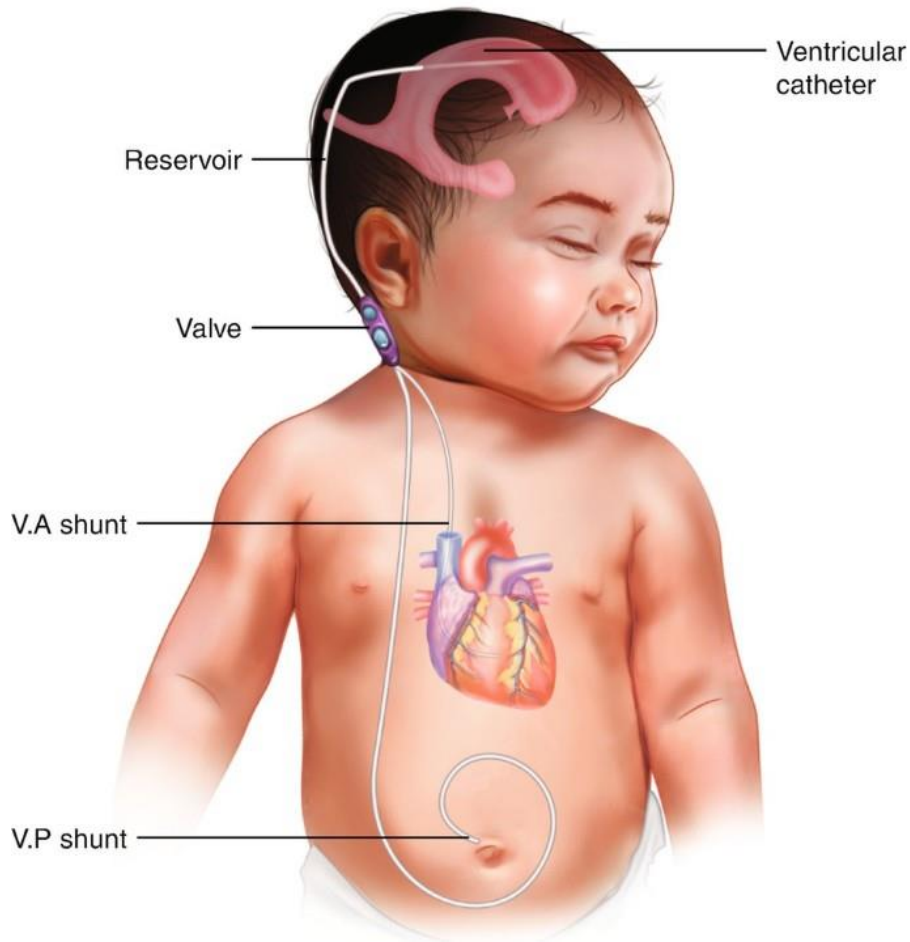


## Examination

- Observation – take off clothes and diaper
  - Color, asymmetries in development, birth marks, hernias, etc....
- EENT
  - Check mouth for TOTs
- Auscultate – belly, heart and lung as needed
- Reflexes and neuro - need to know your primitive reflexes
  - Acoustic blink, Moro, Galant, etc....
- Palpate spine – squeeze the gluts
  
- Know the differences between preemies and term babies

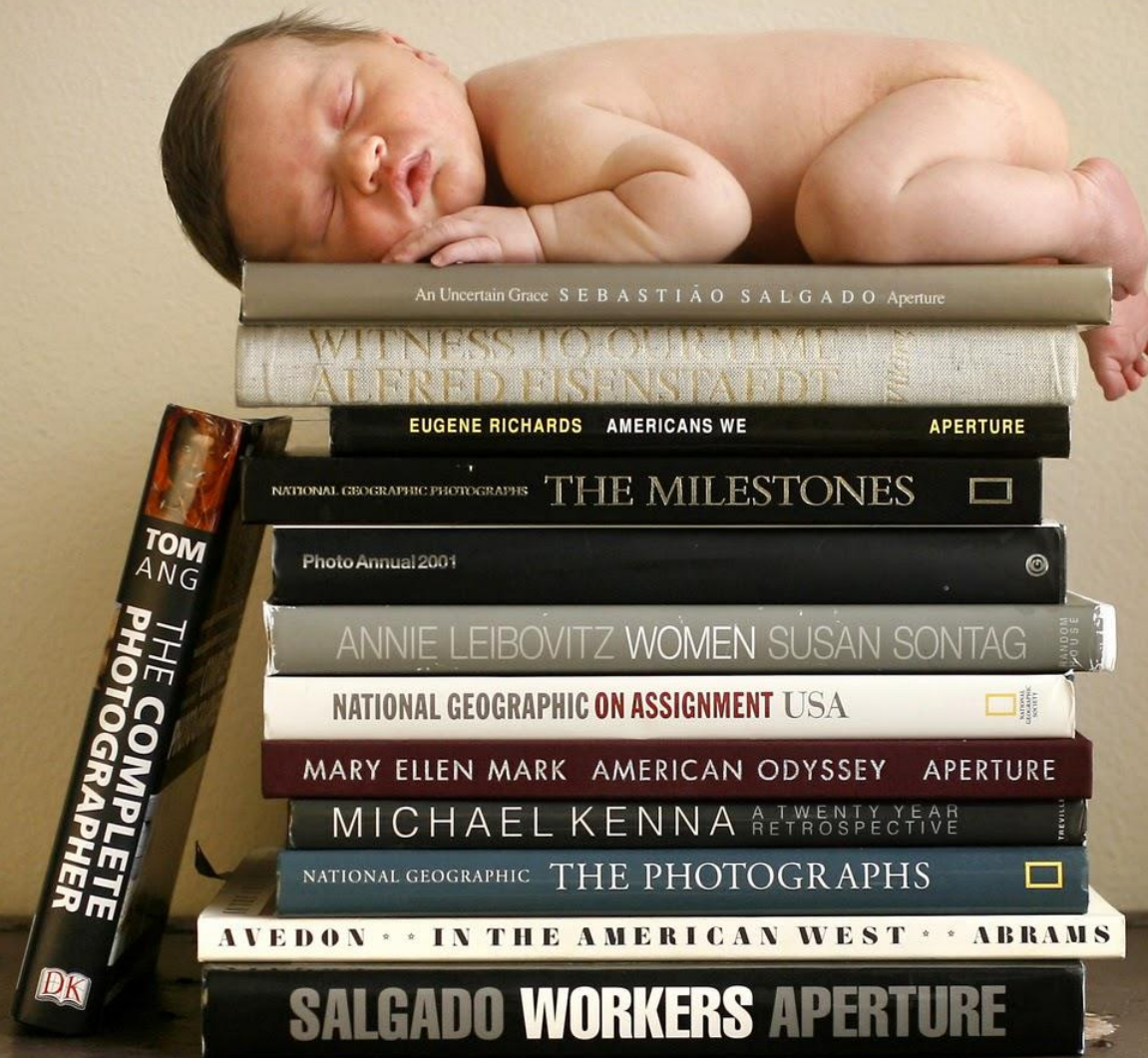
# Contraindications

- Craniosacral therapy (CST) is generally considered safe however, consider temporary suspension of CST during the following medical conditions:



- Increased intracranial pressure
  - Shunt placement (6-8 weeks)
- Recent skull fracture (6–8 weeks)
  - Acute stroke (6–8 weeks)
  - Cerebral aneurysm
- Herniated medulla oblongata
- Spina bifida (myelomeningocele)
  - Arnold Chiari malformation
  - Cerebrospinal fluid leak
  - Recent concussion
  - Cerebral swelling

# CST Uses & Research



# Plagiocephaly

- Condition characterized by an asymmetrical distortion (flattening of one side) of the skull. It is a common finding at birth and may be the result of a restrictive intrauterine environment (Wikipedia) or positional post birth





# Plagiocephaly Variants

- NOT craniosynostosis
- Responds to CST & bracing
- Shapes of the head
  - A. Plagiocephaly:
    - Uneven
  - B. Trigonocephaly:
    - Triangular
  - C: Scaphocephaly:
    - Long narrow
  - D: Brachycephaly:
    - Short wide (flat back)

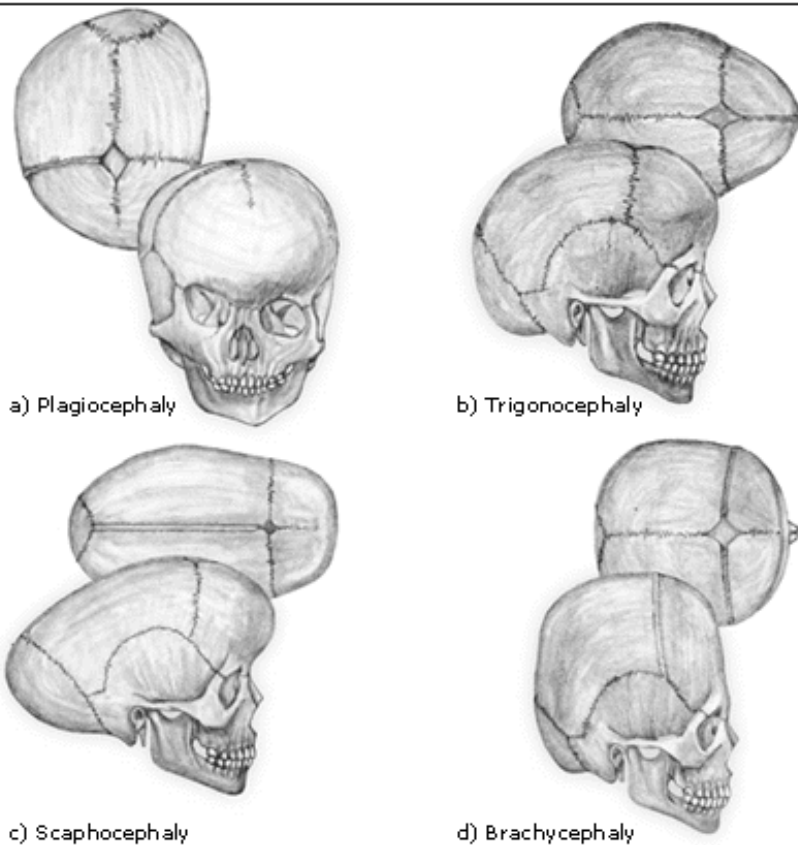
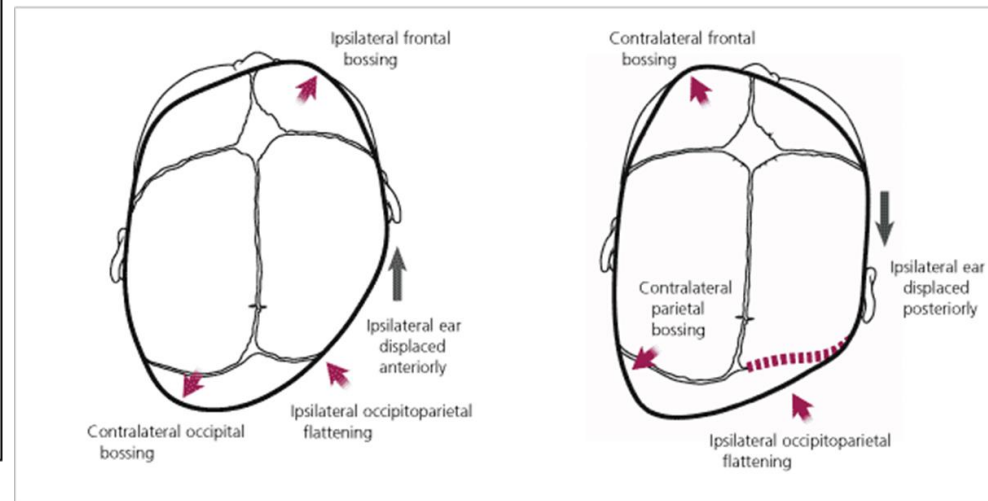


Figure 2



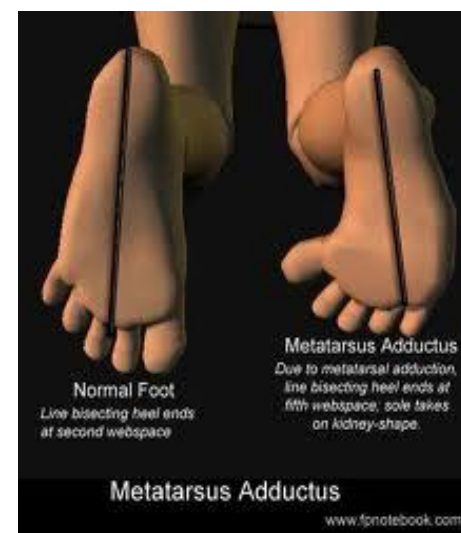
# Positional Plagiocephaly Causes & Treatment

- Positional molding: pre- or post-natal
  - Premature birth, restrictive intrauterine positioning, cervical abnormalities, birth trauma, torticollis and sleeping positions
- 1994: AAFP “Back to Sleep” Campaign
  - Following the campaign, an increase in the diagnosis of congenital muscular torticollis and plagiocephaly



# Torticollis Leads To Plagiocephaly

- Treat the torticollis first!
- “Children with torticollis should have their craniosacral systems evaluated for restrictions”
  - Karmel-Ross, Karen: *Assessment and Treatment of Children with Congenital Muscular Torticollis*, Physical & Occupational Therapy in Pediatrics, 1997, Vol. 17, No. 2 , Pages 21-67
- Torticollis can be seen in association with developmental dysplasia of the hip (DDH) and metatarsus adductus...all associated with fetal intrauterine malposition (high correlation with breech)
  - Forsman, Carolyn, MD: Presentation - *Toe walking and Torticollis*, April 20, 2012, Pediatric Physical Medicine and Rehabilitation

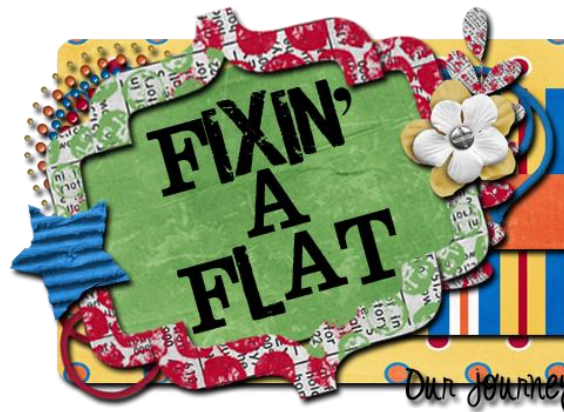


# Safe Sleep, Plagiocephaly, and Brachycephaly: Assessment, Risks, Treatment, and When to Refer

- The Safe to Sleep campaign started in 1994, reducing the risk of sudden infant death syndrome (SIDS) by 40% to 60%.
  - However, an undesirable consequence has been a 400% to 600% increase in positional head deformities. We review the risks for positional plagiocephaly or brachycephaly, treatment modalities, and when to refer
  - Differential diagnoses for non-positional deformities are discussed.
  - Risks for positional head deformities include prenatal, perinatal and postnatal factors. These include torticollis, inadequate tummy time, abnormal intrauterine positioning, premature or postmature birth, prolonged labor, complex medical conditions, prolonged hospitalizations, developmental delay, and use of supportive or convenience devices.
  - Recommended treatment involves repositioning techniques or physical therapy with or without helmet use. Early referral to physical therapy or a head shape program insures better outcomes for full correction of the deformity.
  - The severity of residual deformities is directly related to the age at which the child is referred.
- [Pediatr Ann. September 22, 2020;49(10):e440–e447.]

# Cranial Orthosis for Plagiocephaly

- Ideal period for initiating is 4-6 months
  - Treatment lasts ~ 3 months and is worn 23 ½ hours every day; expensive (\$2000-\$4000)
  - Well tolerated; should be considered in patients <1 y.o.a.
  - Only risk: pressure spots if not well fitted



# Gastroesophageal Reflux (GER)

- Common in healthy infant; >50% of all babies experience reflux in the first 3 months of life, but most stop spitting up usually by 6-8 months or as late as 12 - 24 months
  - Spitting up, vomiting, coughing, irritability, poor feeding

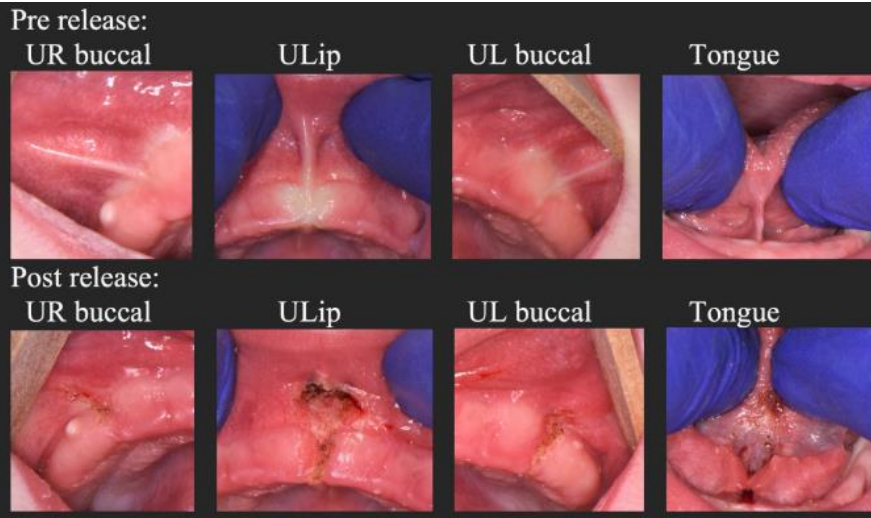
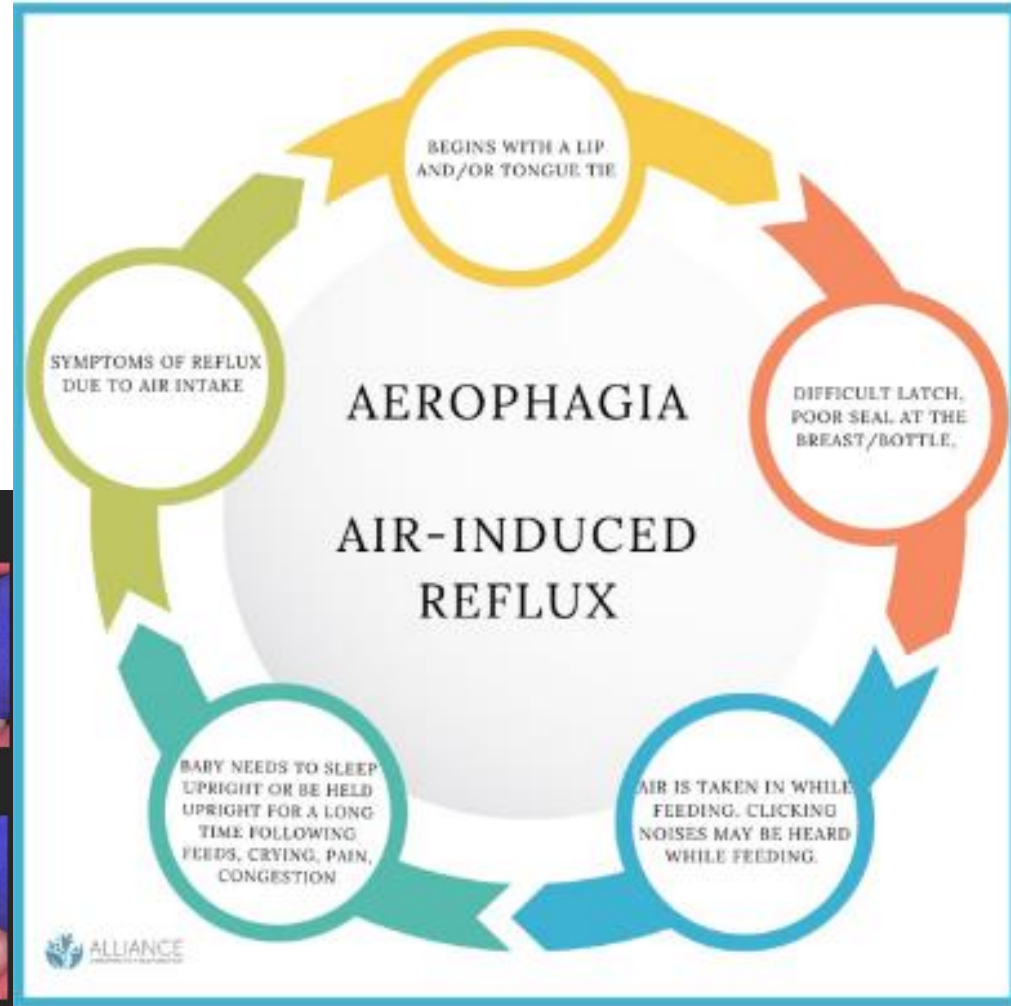


# Gastroesophageal Reflux Symptoms (GER)

- Feeding issues: may refuse to feed, have prolonged feedings, or have difficulty swallowing – ensure check for TOTs
- Irritability: after feeding or arch their backs
- Respiratory issues: Babies may have chronic coughing, wheezing, stridor, or trouble breathing; frequent aspirate chest infections
- Weight: Babies may be underweight or not gain weight as expected and may continue to spit up after their first birthday
- Other issues: Babies may experience chest pain, epigastric pain, or non-localized abdominal pain

# TOTs – Tethered Oral Tissue

- Reflux / GERD
- Clicking
- Excessive gas / bloated belly
- Belching / Spitting-Up
- Colic





# Sucking – Evaluate the Palate & Suck

- Normal: intact, arched, symmetrical, wide U-shaped dental arch
- Abnormal:
  - Bubble palate: rounded and elevated in the anterior portion, lower posteriorly
  - Channel palate: a central groove, high
  - Vaulted palate: very high centrally tapering toward the dental arches
  - Cleft; complete or incomplete

## DIGITAL SUCK EXAM

- Pad of your finger toward the palate
- Allow baby to initiate sucking
- How does the palate feel? Shape, height, width?
- Is baby "chomping" on your finger?
- Do you feel their tongue between your finger and their lower gum ridge?
- Is the tongue cupping your finger? Remaining relatively flat in shape?
- Do you feel a wave-like motion of the tongue from anterior to posterior?
- When they pause, do they lose suction completely? Or remain suctioned?

# Oral Ties (Lingual, Buccal, Oral) Signs / Symptoms

- Recurrent plugged ducts
- Pain while nursing
- Thrush
- Mastitis
- Low milk supply
- Lipstick shaped nipple post feeding
- Cracked, bleeding nipples
- Inefficient breastfeeding
- Frequent nursing and subsequent sleep deprivation
- Reflux, GERD
- Colic
- Gassiness
- Difficulty initiating/maintaining latch
- Slow or low weight gain
- Bubble or vaulted palate
- Heart shaped tongue
- Cervical rotation pref. / torticollis
- Hypertonicity, flexed hips, diaphragmatic tension
- Clicking noises during ANY feed
- Snoring
- Open mouth sleep / rest posture
- Excessive drooling
- Choking / Gasp for air
- Popping on and off the breast
- Frustration at the breast
- Preference for bottle feeding
- Lip blisters / cobblestone lips



## Concerns in Gastroesophageal Reflux (GER)

- Vomiting large amounts or persistent projectile (forceful) vomiting, particularly in infants younger than 2 months old
- Poor growth, refuse food or inability to hold down enough food to gain weight / or fall off growth chart
- Irritability or refusing to feed due to pain with excessive crying
- Blood loss from acid burning the esophagus (green, yellow, bloody or coffee ground looking vomit)
- Breathing problems after vomiting or spitting up

# RSI: Reflux Symptom Index

- Questionnaire to assesses reflux severity of reflux symptoms
- Better for adults (can't assess all parts in kids)
- 9 Questions - According to Pediatric Oncall,  $\geq 13$  is significant
- Commonly assessed using Riddler's point and history
  - If needed testing can be done – see next slide

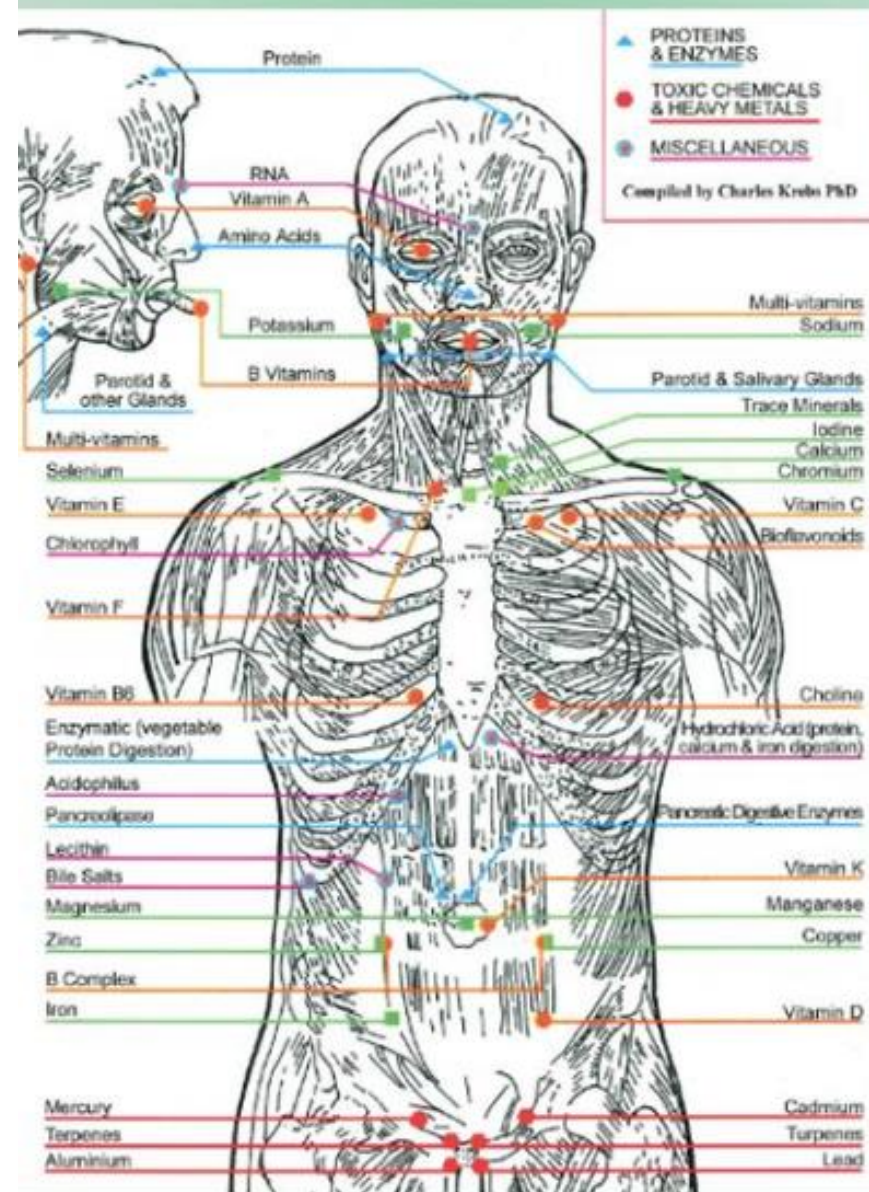
Symptoms						
Within the last MONTH, how did the following problems affect you?	0 = no problem 5 = severe problem					
1. Hoarseness or a problem with your voice	0	1	2	3	4	5
2. Clearing your throat	0	1	2	3	4	5
3. Excess throat mucus or postnasal drip	0	1	2	3	4	5
4. Difficulty in swallowing food, liquids or pills	0	1	2	3	4	5
5. Coughing after you ate or after lying down	0	1	2	3	4	5
6. Breathing difficulties or choking episodes	0	1	2	3	4	5
7. Troublesome or annoying cough	0	1	2	3	4	5
8. Sensations of something sticking in your throat or a lump in your throat	0	1	2	3	4	5
9. Heartburn, chest pain, indigestion or stomach acid coming up	0	1	2	3	4	5
<b>Total</b>						

# Medical Testing GER

- **Ultrasound:** r/o pyloric stenosis
- **Lab tests:** rule out possible causes of recurring vomiting and poor weight gain
- **Esophageal pH monitoring:** NG tube into the esophagus to monitor acidity in-patient
- **X-rays:** for blockages post barium formula feed
- **Upper endoscopy**

# RIDDLER POINTS

## NUTRITIONAL DEFICIENCY + EXCESS



# Gastroesophageal Reflux

- Medical Advice
  - Let it resolve by itself
  - Thicken feed with cereal
  - Kept upright for 30 minutes after eating
  - Don't overfeed
  - Suspect food allergy, change the baby's formula or if breastfeeding, mothers may be asked to change their own diets for 1 to 2 weeks minimum
  - H-2 receptor agonists or PPIs



**BREASTFEEDING**

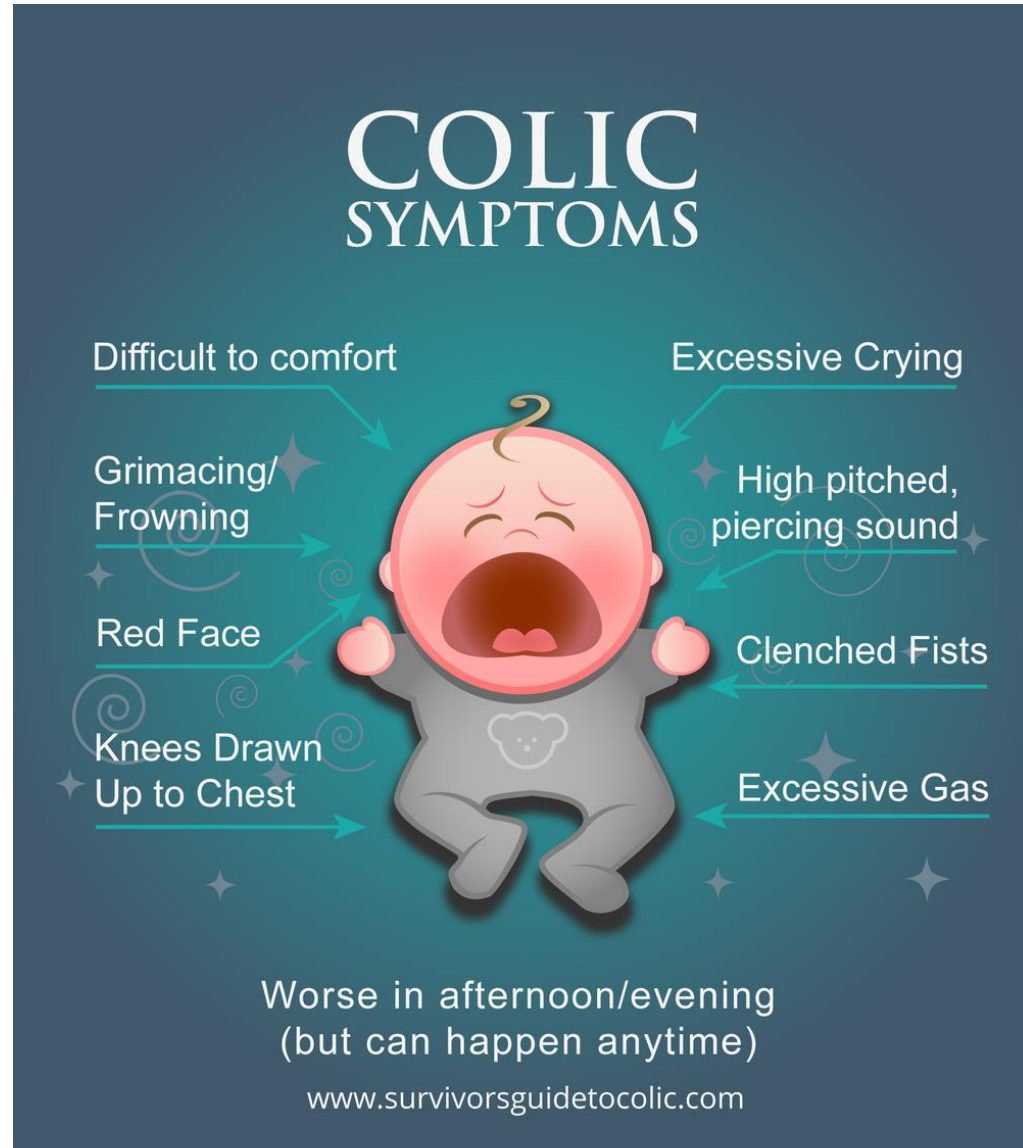
It Rocks!

# Craniosacral Therapy & GERD

- Case study: 3-month old girl with GERD
  - Her complaints included frequently interrupted sleep, excessive intestinal gas, frequent vomiting, excessive crying, difficulty breastfeeding, plagiocephaly and torticollis
  - Previous medical care consisted of Prilosec without notable improvement
  - Notable improvement in the patient's symptoms was observed within four visits and total resolution of symptoms within three months of care (parietal, occiput and mandible)
  - Alcantara, Joel BSc DC, and Anderson, Renata, DC: *Chiropractic care of a pediatric patient with symptoms associated with gastroesophageal reflux disease, fuss-cry-irritability with sleep disorder syndrome and irritable infant syndrome of musculoskeletal origin*, Journal of Canadian Chiropractic Association 2008; 52(4):248–255

# Colic

- Defined as crying for more than three hours a day, three or more days a week, for more than three weeks
- Usually goes away by 3-4 up to 6 months
- Exact cause ??? - theories:
  - Immaturity of the bowel
  - Food allergies
  - Sensitivity to something in the baby's formula or what the nursing mother is eating
  - The baby trying to adjust to the sights and sounds of the world





# Home Care for Colic

- Colic can be difficult to calm
  - Changing how your baby is fed
  - Using different calming methods
    - “Happiest Baby on the Block 5-S”
  - Putting your baby in bouncy seats or swings
  - Playing white noise, such as vacuum cleaner, dishwasher, or washing machine noise
  - Taking your baby on car rides
  - Swaddling your baby
  - Giving your baby a massage



**Swaddling**  
DUDU wrap (Down Up Down Up)  
Tight swaddling provides the continuous touching and support your baby is used to experiencing within the womb.


- 1
- 2
- 3
- 4

**Side/Stomach Position**  
The infant is placed on their left side to assist in digestion, or on their stomach to provide reassuring support. When a baby is in a stomach down position do not leave them even for a moment.

**Shushing**  
These imitate the continual whooshing sound made by the blood flowing through arteries near the womb. Shush as loudly as your baby is crying. As she calms down, lower the volume of your shushing to match.

**Swinging**  
This refers to jiggling your swaddled baby using very small, rapid movements. Be sure to support your newborn's head and gently jiggle - do not shake - your baby. This is more of a "shiver" than a shake, moving back and forth no more than an inch in any direction.

**Sucking**  
"Sucking has its effects deep within the nervous system," notes Karp, "and triggers the calming reflex and releases natural chemicals within the brain." This simply means giving your baby a pacifier or thumb to suck on.



HARVEY KARP | THE HAPPIEST BABY ON THE BLOCK  
www.happiestbaby.com

# Osteopathic Manual Therapy for Infant Colic: A Randomized Clinical Trial

- **Background:** Infant colic is a multifactorial syndrome for which various therapeutic strategies have been proposed. In this study, we evaluate the effectiveness of osteopathic manual therapy in treating symptoms related to infant colic.
- **Method:** A prospective, randomized, blinded clinical trial was conducted of patients diagnosed with infant colic. The treatment group were given osteopathic manual therapy, and their parents received two sessions of counselling. The control group received no such therapy, but their parents attended the same counselling sessions. The non-parametric Mann–Whitney U test was applied to determine whether there were significant differences between the groups for the numerical variables considered. For the qualitative variables, Fisher's exact test was used. The threshold assumed for statistical significance was 0.05.
- **Results:** A total of 42 babies were assigned to each group. Those in the experimental group presented less severe infant colic with a trend towards statistical significance after the first session ( $p = 0.09$ ). In sucking, excretion, eructation and gas there were no significant differences between the groups. Crying was a statistically significant dimension both after the first intervention ( $p = 0.03$ ) and two weeks after ( $p = 0.04$ ). Regurgitation values were significantly lower in the experimental group during the three weeks of follow-up ( $p = 0.05$ ). Values for sleep were lower in the experimental group, but the differences were not statistically significant. In both groups, colic severity decreased over time, with no side effects.
- **Conclusions:** Treatment with osteopathic manual therapy alleviates the symptoms of infant colic and could be recommended for this purpose from the onset of the condition.



Aiden: poor latch / reflux /  
fussy / poor sleep



Elise: torticollis

# CST Hands on Practice

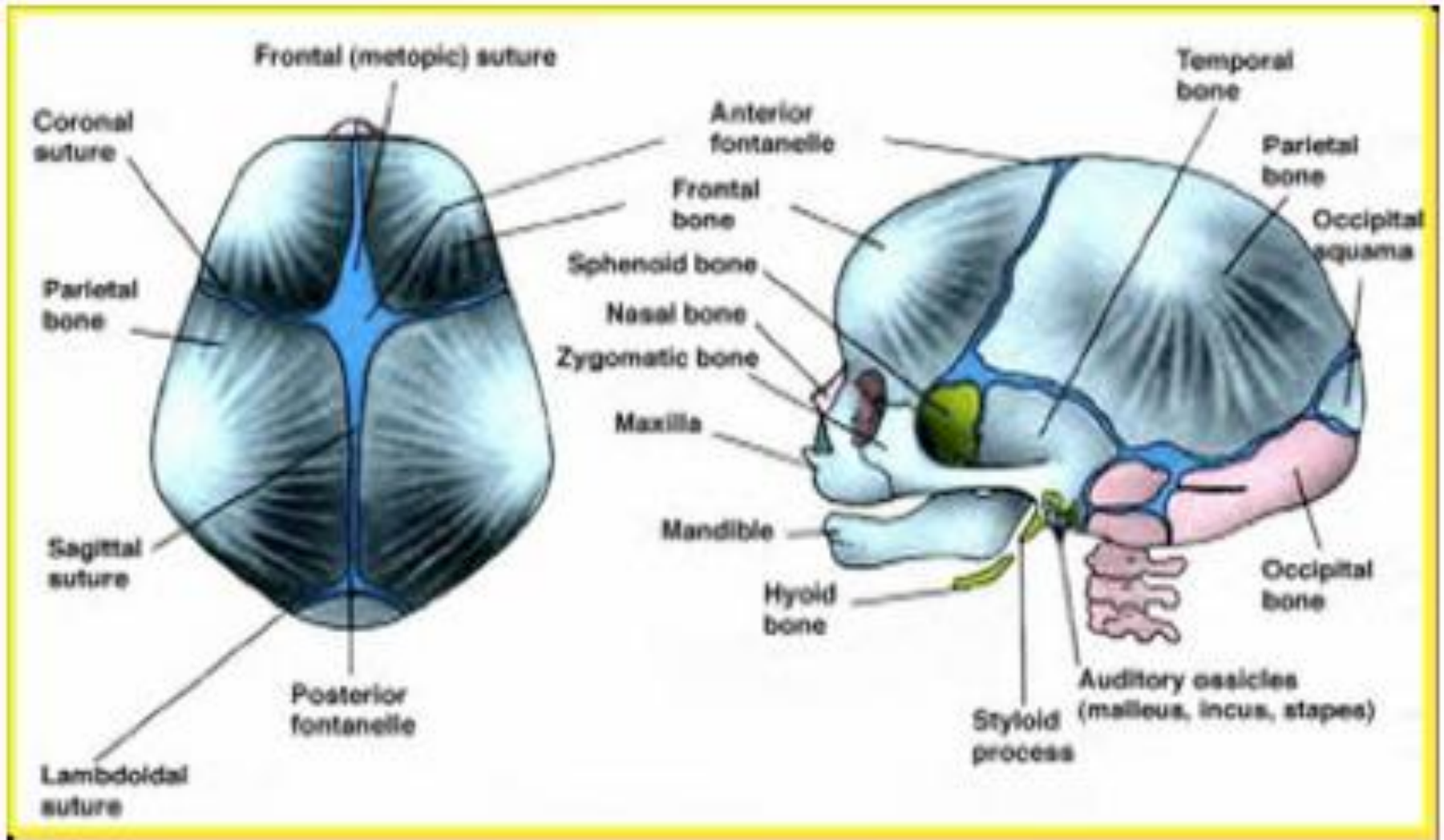


# Craniosacral Therapy

Clear chiropractic restrictions first; if baby is too uncomfortable start with CST first then adjust



# Let's Make a Baby Head







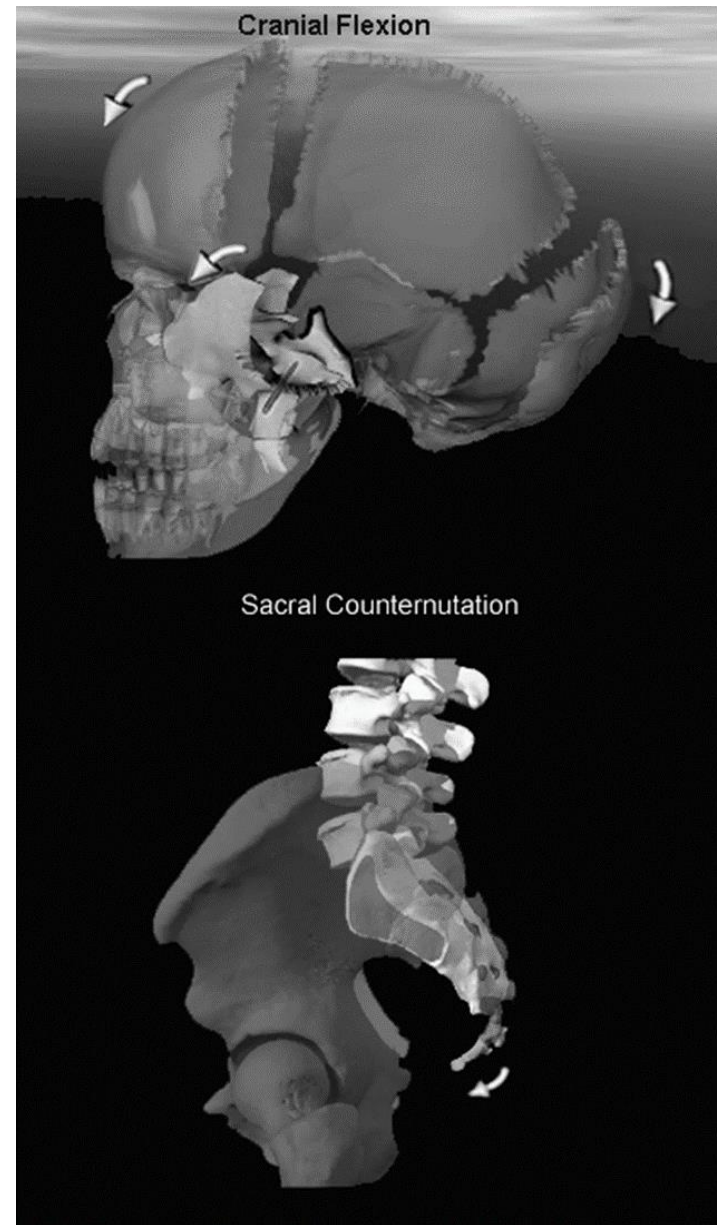






# Assessments & Listening Techniques

- Maintain grounding and breathing
  - Hand will get pulled / let symptoms guide you at first
  - Find rhythm of flexion / extension of body
- Touch light – don't deform the balloon  
4-5gms of pressure
- Movements can happen quick – not always
- Suck helps move OCB and sphenoid (so does crying)
- Kids – do not need to compress to decompress
- Work until still / softening
- Review the movements



## BALANCED FACIAL FEATURES

- FACE should be symmetrical in appearance
- EYES should be level, and equal in size.
- EARS should be level and lie flat against the
- CHEEKBONES should be equally high and v
- NOSTRILS should be equal in size.
- NOSE should be midline and straight.
- UPPER LIP GROOVE should be midline.
- CHIN CLEFT should be midline.

## FACIAL DISTORTIONS

VISUAL	DISTORTION
Protruding eye	Sphenoid Wing rotated f
Upper Lip Groove larger on one side	Maxilla externally rotated
Upper teeth slope laterally on one side	Maxilla externally rotated
Forehead shifted to one side	Sphenoid lateral to that s
Jug ear	Temporal bone externally that side
Nostril large on one side	Frontal bone internally that side
Ridge along a Suture	Overlap of that Suture
Groove at a Suture on one side	Separated Suture

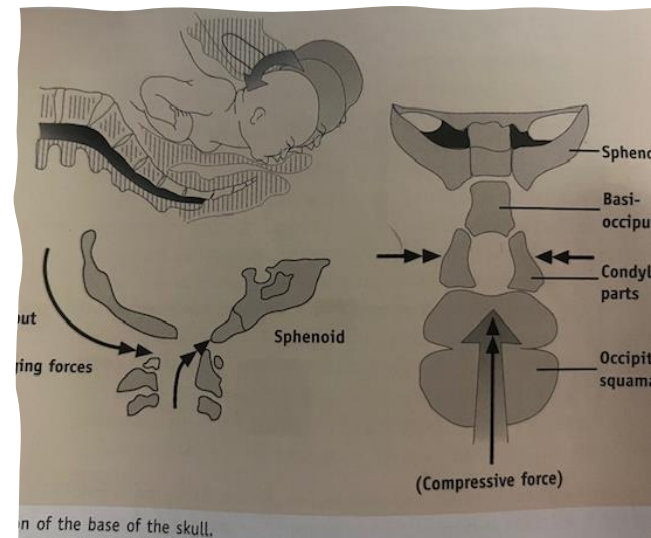
# Craniosacral Therapy Full Session

- Observe head / body shape, movements and check the infant's palate
  - OCB and balance occiput to sacrum
  - Frontal lift
  - Parietal lift
  - Sphenoid lift
  - Nasal frontal separation for ethmoid / sphenoid
  - Temporal release: using ear
- For individual stuck sutures - Finger pad side up in the low palate during cranial treatment (gloved or pacifier); traction away from sutures using index and middle finger
- Do NOT perform more than 3-4 procedures in 1 session

# OCB and Balance Occiput to Sacrum

---

- OCB: occipital cranial base ; Done in 2 parts – supine baby
  - Part 1: Condylar lift – left hand stabilizes C1 with thumb and finger; right hand cups occiput fingers toward spine – gently distract occiput away
  - Part 2: Separation of condyles – as occiput lifts away, spread fingers 3 and 4 apart (laterally)
- Occiput to Sacrum:
  - Supine infant; slide hand under skull fingers toward spine; other hand between legs on the sacrum fingers toward spine
  - Follow flexion and extension and infant movement (rotation side bending)



# Frontal & Parietal

## Frontal Bones

- 1 finger in mouth (gloved for suck); Other hand pincer contact – 1 on each bone
- Two Moves
  - Separate metopic suture with index and middle fingers (overlap)
  - Glide superior or inferior as needed (look for smaller eye)



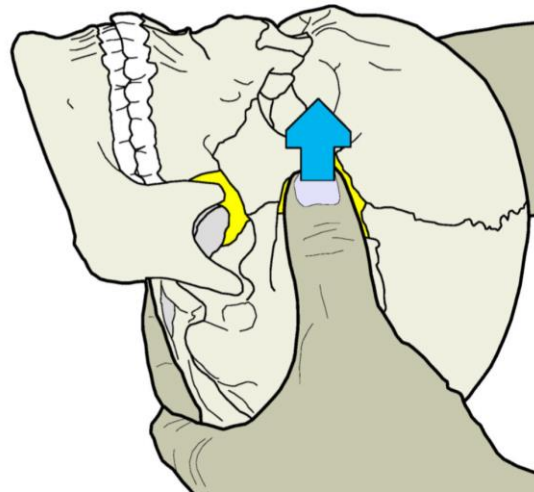
## Parietal Bones

- 1 finger in mouth (gloved for suck - point toward side moving); Other hand cup skull at parietal eminence thumb and chiro index – 1 on each bone
- Three moves (last 2 can be done at same time)
  - Separate the sagittal suture with index and middle fingers (overlap)
  - A-P (forward will have low frontal eminence)
  - Superior / inferior (superior = high frontal eminence)

# Sphenoid & Ethmoid

## Sphenoid Bone

- Supine baby with thumb and chiropractic index on wings (temple hole) – do not squeeze and draw anterior like taking off glasses
- Good for 1 eye smaller - common compression with forceps, OP babies



## Ethmoid Bone

- Pincer at the bridge on the nose
- 2 finger above and traction apart
- Good for congestion



## Temporal Bone

- Ear pull – forceps delivery but M/C in toddlers slow to walk, speak or with ear infections (look for primary)
- Supine baby and thumb in edge of EOM and index on pinna
- Traction at 45-degree angle cephalad and lateral





# Craniosacral Therapy General

- Sphenoid lesions
  - Persistent cry, little sleep sessions, regularly wakes screaming, overreact to stimuli (ADHD), strabismus
- Jugular foramen OCB / hypoglossal canal lesion
  - Suck, gag, poor swallow, regurgitation
- Temporal bone
  - Ear infections (upper cervical C0-C2)



CHIROPRACTIC CARE  
  
IS A FAMILY AFFAIR



**Thank You**

**Very Much**

