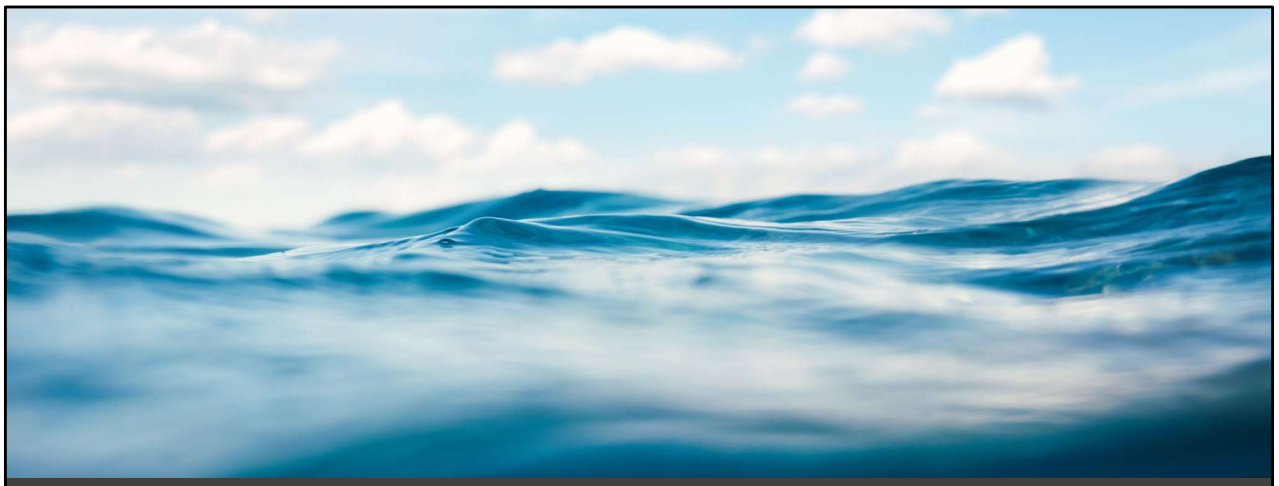


INTRODUCTION TO OCMM

Kimberly Wolf, DO

Hi everyone, very excited to be bringing you your first lecture on OCMM. May also hear it referred to as cranial osteopathy or osteopathy in the cranial field but all referring to same group of techniques and style of treatment.

This will definitely be one of the most challenging aspects of your OPP curriculum, both conceptually and when it comes to palpating. So I encourage you as we enter this unit to keep an open mind and push yourself beyond what you'd previously done and be open to what you can do with this modality. Be aware that although it feels a little abstract and challenging at times, if you remain open and persistent to learning it (just like everything last year), there can be huge pt benefits for you in the future with this modality. Hopefully I'm able to elucidate some of these for you through these lectures and our time in lab.

Objectives

Identify	Identify the five (5) components of the Primary Respiratory Mechanism (PRM) and their interrelationship
Differentiate	Differentiate between motility and mobility, and the different functions of each within the PRM.
Explain	Explain the concept of the core link and understand its importance to somatic dysfunction in the cranium and beyond.
Identify	Identify the vault contact, and the landmarks that each finger contacts in this position.

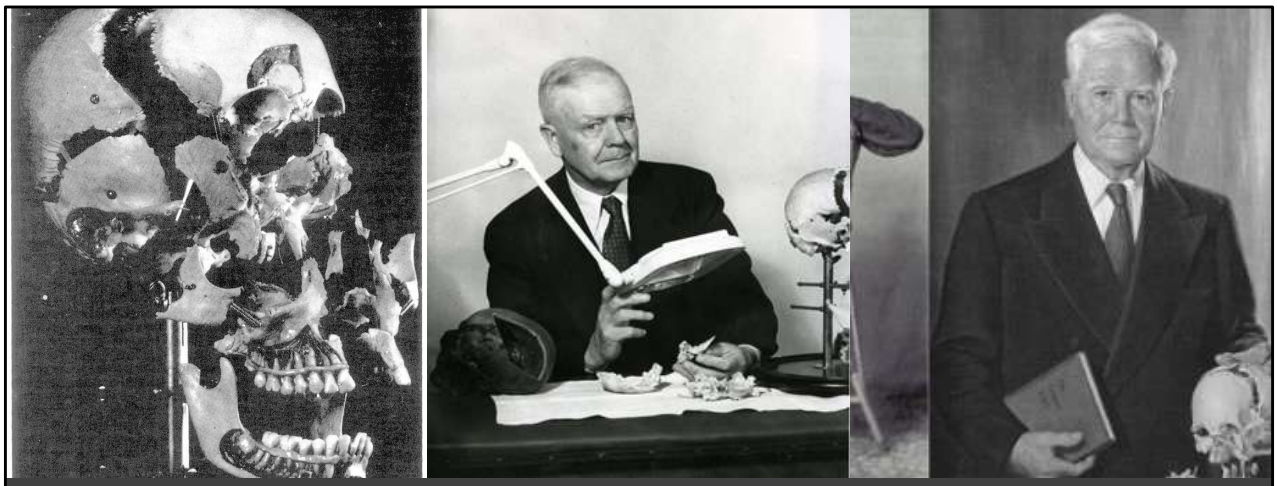
The vault contact is the major standard contact for cranial evaluation. You will learn a few different contacts/holds in labs, but this is the most common and the one you will use and practice most of the time in lab.

William Garner Sutherland, D.O., D.Sc. (Hon.)
March 27, 1873 – Sept. 23, 1954

Before moving into the concepts we will have a brief history lesson on this modality. This is William Garner Sutherland is credited as founder of OCMM. He was a student of Still's who wasn't teaching much about manipulation of the head.

Sutherland was a newspaper writer who went to Kirksville to debunk osteopathy and write against it, but instead was swayed by what he saw and ended up becoming a student under Still.

While looking at a skull one day he got curious by what he saw and began to study this area more. And study this area more.

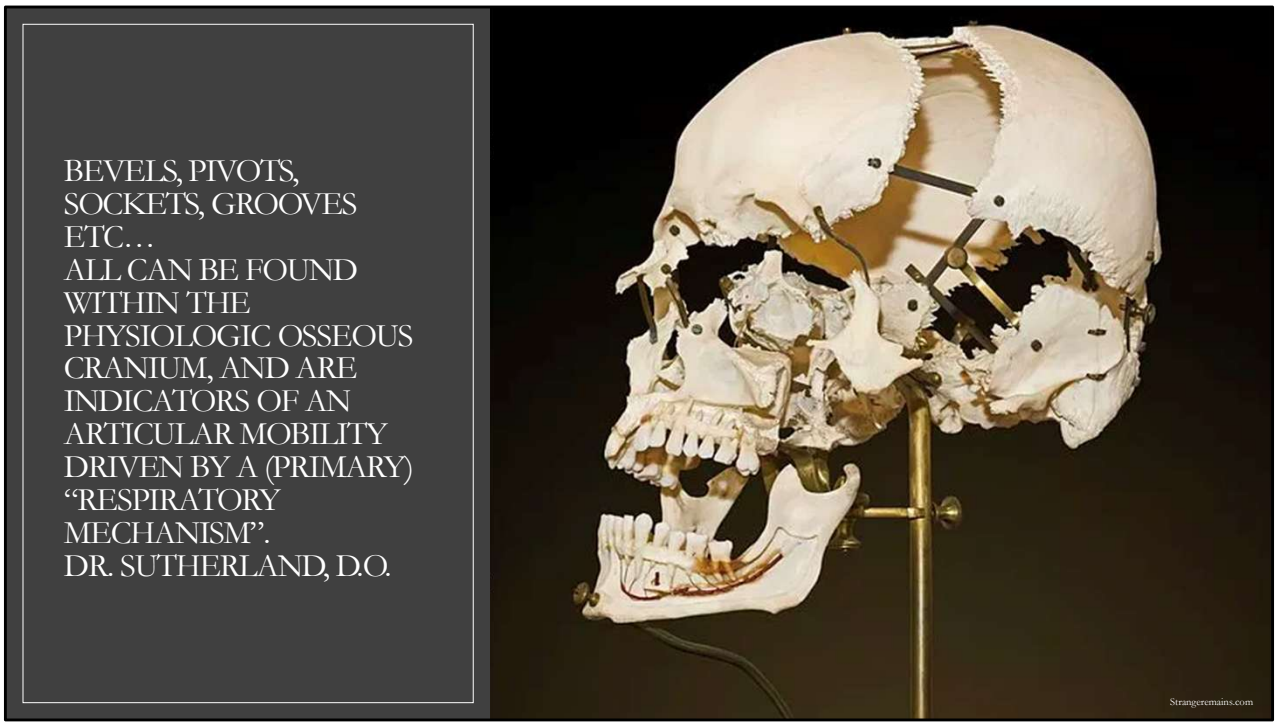


"BEVELED LIKE THE GILLS OF A FISH"
DR. W.G. SUTHERLAND, DO
KIRKSVILLE, MO. CIRCA 1898

What he noticed was that while looking at a skull he noticed that the edges of the bones were beveled like the gills of a fish.

Gills are designed for respiration and motion so this made him think of the skull differently. Previously the skull was thought of as a bony box which is often how it is still thought about today. But is living breathing tissue that has motion to it. Data has shown that and there is science to back that up. This seems abstract and is a challenge to what we typically think of. I've included some of these studies later in the lecture for you.

On the left is a beauchene skull which is what Still was looking at for the observations above. To get it to explode like this, they put dry beans in a real skull and put it in water. As the beans absorb the water and expand, it will blow the skull apart like this into these separate pieces. Each skull will do this and look very similar in appearance as far as where it disrupts those sutures so that got him thinking about what he was seeing. When you look at these bevels (better images coming up on future slides). They are not straight joints – a fused joint – but rather designed for this motion so this had Sutherland intrigued about what else could be happening in the skull.



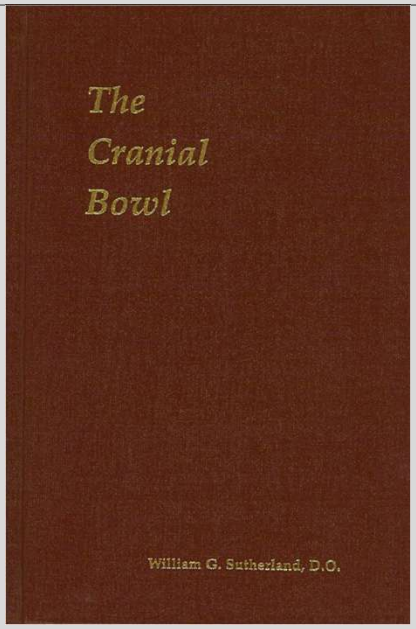
So the conclusion Sutherland came to is: These Bevels, pivots, sockets, grooves etc… All can be found within the physiologic osseous cranium, and are indicators of an articular mobility driven by a (primary) "respiratory mechanism".

This is a different image of another Beauchene skull but you can see the bevels and pivtos and how they fit together. They were living the mechanical age so began looking at the skull from that perspective, in a machine-like manner. Looking at these joints where things were happening and saw pivot points that are classically set up for motion. He really began saying "what else are we missing with the skull". He pursue this research for years on his own. He did his own experiments including some more extreme things like tying belts around his head to induce motion/dysfunction and over years his philosophy evolved.

The Cranial Bowl
W.G. Sutherland DO

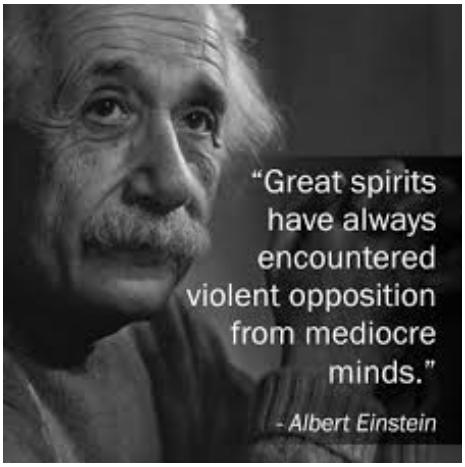
Mankato MN. 1939

Note: 41 years after the original Kirkville observations



Finally 41 years after this initial thought, he published the cranial bowl in 1939. It is a small but dense book that described his findings and his research in the field of OCMM. He, like Still, studied anatomy very closely and from that was able to derive its function and how he thought this was working. In addition to input from palpation.

Some of the things he described and palpated all these years ago we are now, almost 100 years later, just now devising the basic science to validate this with imaging and measuring these minute motions that he was describing. We have new technology to allow imaging of motion of CSF that he described palpating. It took him 41 years of processing before he was ready to release his findings to the world, and we almost a century later are just getting to a point where our machines and technology are catching up with his hands.



"The idea of bony movement taking place without muscular action is, to say the least, unique to a degree difficult to follow."

Anonymous member of the first A.O.A Bureau of Professional Development when commenting on *The Cranial Bowl* manuscript

So how did everyone else react to his findings/publication? I'm sure many of you are sitting here with a grain of skepticism since this is different than what is typically thought of or taught about the skull.

This is an anonymous quote from his peers at the time. "The idea of bony movement taking place without muscular action is, to say the least, unique to a degree difficult to follow."

He had skeptics of his own at the time. But so did AT Still. Just because you have these ideas that are different and challenging the norm, does not mean that you shouldn't pursue them. I encourage all of you to do the same as you continue to study medicine and move into the practice of medicine – pursue it. Quote from Einstein…great spirits have always encountered violent opposition from mediocre minds. True across many fields.

Dr. Viola M. Frymann DO,
JAOA 70:928-945, May 1971

A Study of the Rhythmic Motions of the Living Cranium

*By: Viola M. Frymann, D.O., FAAO, La Jolla, California**

The hypothesis of inherent motility of the cranium has been supported by palpation of the living head. The hypothesis that a rhythm synchronous with the arterial pulse and another associated with thoracic respiration might be detected is in accord with known physiologic phenomena. The report of a third palpable rhythm, slower then either pulse or respiration, required more study. This article records a series of experiments conducted with instrumentation suitable for studying minute expansile-contractile motions of the live cranium. The recordings show that there is a cranial motility slower than and distinguishable from the motility of the vascular pulse and thoracic respiration, and that such motion can be recorded instrumentally. Studies of rhythmic cellular function and movement of cerebrospinal fluid have been reported elsewhere. More investigation is needed to establish the relations among the various physiologic phenomena described. Additionally, the clinical significance of the rhythmic motion of the cranium needs documentation.

It has been 70 years since Sutherland conceived the idea that the cranial bones are beveled for articular mobility to accommodate the motion of a respiratory mechanism.[1] His meticulous study of the cranial bones revealed that each bone is beveled reciprocally, with corrugations running transversely, diagonal friction gears, balls and sockets, pintles, pulleys, fulcrums, hinges, and other mechanical arrangements that made provision for movement. Palpation of the living head lent support to the hypothesis, first advanced in 1939,[2] that there is inherent motility of the cranium. It was a plausible contention and in accord with known physiologic phenomena, that a rhythm synchronous with the arterial pulse might be detected, but his report of a third palpable rhythm, slower than either pulse or respiration, needed further study. Does such a motion really occur? Can it be mechanically recorded? If it exists, what is its relation to known physiologic functions?

This paper is intended to present the results of exploration of these three questions. With regard to the first question, as to the existence of such a rhythmic motion, slower than and different from the thoracic respiratory rhythm, within the living cranium, those trained in skillful palpation of the human body have claimed for nearly 30 years that such inherent motility is detectable. The validity of the palpatory findings of persons with trained hands is, however, subject to question by those who lack such palpatory skill. The doubt is due primarily to the plausible hypothesis that the sense of touch will experience systematic tactile illusions when subjected to small cyclic motions.

It can be shown mathematically that if the pressure-sensing nerve ends are acted on by the sum of two oscillatory pressures of different frequency, and if the effective signal developed by the nerves is a nonlinear function of the total pressure, then the signal will contain two pseudo-oscillations of which the frequencies are the sum and the difference of those actually present. Further, if the neural networks are developed by attention and practice to filter out all but the lowest frequency, the sense of touch will experience the illusion that a repetitive motion is clearly felt at a frequency which is the difference between the two frequencies actually present. In palpation, the fingertips are subjected to four cyclic motions of different frequency, one each from the pulse and the respiratory cycles of the operator and of the subject. It may be contended with some force of argument that the apparent sensation of a slow cranial rhythm represents only a "beat" frequency between, say, the two pulse cycles.

It should be noted in this regard that the ear is known to be subject to the same error. When two piano strings vibrate at slightly different rates, a beat note is distinctly heard at the difference frequency, although the note is not physically present. Furthermore, a variety of tactile illusions are known to exist. Perhaps the most common one is generated when an object is touched with the tips of crossed fingers, so that an impression of two objects instead of one is received.

Because exceptions of this sort can be taken as evidence perceived by palpation alone, it was essential to devise an instrument program to demonstrate whether the tactile observations of cranial motility are, in fact, valid.

An intensive search of scientific literature failed to reveal any investigation of the motility of the living

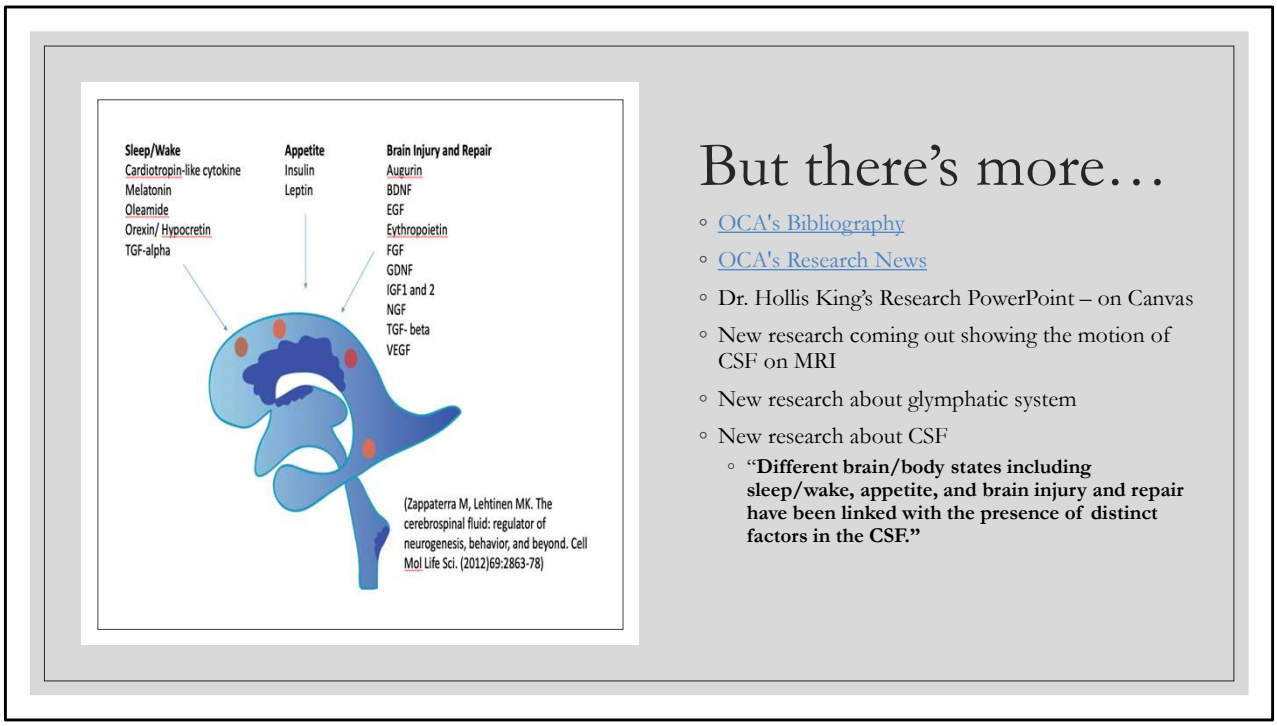
Viola Frymann was a student of Sutherland's and did a lot of research in the field of OCMM. One of the first studies she published was this one in the JAOA (now JOM) in 1971. She passed away several years ago but was a mentor to many – including myself when I was a student. She almost exclusively pediatric patients so has been a big influence in my life and practice.

Other Research That Supports

- Ferre JC, Barbin JY. The osteopathic cranial concept: Fact or fiction. Surg Radiol Anat. 1991;13:165-170.
- Hartman SE, Norton JM. Interexaminer reliability and cranial osteopathy. Sci Rev Altern Med. 2002;6:23-34.
- Bolk L. On the premature obliteration of sutures in the human skull. Am J Anat. 1915;17:495-523.
- Melsen B. Time and mode of closure of the spheno-occipital synchondrosis determined on human autopsy material. Acta Anat. 1972;83:112-118.
- Perizonius WRK. Closing and non-closing sutures in 256 crania of known age and sex from Amsterdam (A.D. 1883-1909). J Hum Evol. 1984; 13:201 -216.
- Cohen Jr MM. Sutural biology and the correlates of craniosynostosis. Am J Med Genet. 1993;47:581-616.
- Sahni D, Jit I, Neelam, Suri S. Time of fusion of the basisphenoid with the basilar part of the occipital bone in northwest Indian subjects. Forensic Sci Int. 1998;98:41-45.
- Todd TW, Lyon DW. Endocranial suture closure, its progress and age relationship. I. Adult males of white stock. Am J Phys Anthrop. 1924;7:325-384. II. Am J Phys Anthrop 1925;8:23-45.
- Todd TW, Lyon DW. Endocranial suture closure, its progress and age relationship. III Endocranial closure in adult males of negro stock. Am J Phys Anthrop 1925;8:47-71. IV Am J Phys Anthrop. 1925;8:149-68.
- Dart P. An overview of research supporting the fundamental concepts of osteopathy in the cranial field. Unpublished manuscript.
- Singer R. Estimation of age from cranial suture closure: Report on its unreliability. J Forensic Med. 1953;1:52-59.
- Pritchard JJ, Scott JH, Girgis FG. The structure and development of cranial and facial sutures. J Anat. 1956;90:73-86.
- Sabini RC, Elkowitz DE. Significant differences in patency among cranial sutures. J Am Osteopath Assoc. 2006;106:600-604.
- Retzlaff EW, Updedger JE, Mitchell FL Jr, Walsh J. Aging of cranial sutures in humans. Anat Rec 1979;193:663 (abst).
- Retzlaff EW, Mitchell FL Jr, Updedger JE, et al. Neurovascular mechanisms in cranial sutures. J Am Osteopath Assoc. 1980; 80:218-219 (abst).
- Retzlaff EW, Jones L, Mitchell FL Jr, et al. Possible autonomic innervation of cranial sutures of primates and other animals. Brain Res 1973;58:470-477 (abst).
- Michael DK, Retzlaff EW. A preliminary study of cranial bone movement in the squirrel monkey. J Am Osteopath Assoc. 1975;74:866-869.
- Heisey SR, Adams T. Role of cranial bone mobility in cranial compliance. Neurosurgery. 1993;33(5):869-876.
- Heisey SR, Adams T. A two compartment model for cranial compliance. J Am Osteopath Assoc. 1995;95:547.
- Adams T, Heisey RS, Smith MC, Briner BJ. Parietal bone mobility in the anesthetized cat. J Am Osteopath Assoc. 1992;92(5):599-622.
- Jaslow CR. Mechanical properties of cranial sutures. J Biomechanics. 1990;23(4):313-321.
- Frymann VM. A study of the rhythmic motions of the living cranium. J Am Osteopath Assoc. 1971;70:1-18.
- Heifitz MD, Weiss M. Detection of skull expansion with increased intracranial pressure. J Neurosurg. 1981;55:811-812.
- Oleski SL, Smith GH, Crow WT. Radiographic evidence of cranial bone mobility. J Craniomandib Pract. 2002;20(1):34-38.
- Moskalenko YE, Cooper H, Crow H, Walter WG. Variation in blood volume and oxygen availability in the human brain. Nature. 1964;202(4926):59-161.
- Moskalenko YE, Weinstein GB, Demchenko IT, et al. Biophysical aspects of cerebral circulation. Oxford: Pergamon Press; 1980.
- Moskalenko YE, Kravchenko TI, Gaidar BV, et al. Periodic mobility of cranial bones in humans. Human Physiology. 1999;25(1):51-58.
- Moskalenko YE, Frymann VM, Weinstein GB, et al. Slow rhythmic oscillations within the human cranium: phenomenology, origin, and informational significance. Human Physiology. 2001;27(2):171-178.
- Moskalenko YE, Frymann VM, Kravchenko T. A modern conceptualization of the functioning of the primary respiratory mechanism. In King HH. (Ed) Proceedings of international research conference: Osteopathy in Pediatrics at the Osteopathic Center for Children in San Diego, CA 2002. American Academy of Osteopathy, Indianapolis, IN, 2005;12-31.
- Hargens AR. Noninvasive intracranial pressure (ICP) measurement. 1999 Space Physiology Laboratory. http://spacephysiology.arc.nasa.gov/projects/icp.html
- Ballard RE, Wilson M, Hargens AR, et al. Noninvasive measurement of intracranial volume and pressure using ultrasound. American Institute of Aeronautics and Astronautics Life Sciences and Space Medicine Conference. Book of Abstracts, pp. 76-77, Houston, TX, 3-6 March 1996.
- Ueno T, Ballard RE, Cantrell JH, et al. Noninvasive estimation of pulsatile intracranial pressure using ultrasound. NASA Technical Memorandum 112195. 1996.
- Ueno T, Ballard RE, Shuer LM, Yost WT, Cantrell, Hargens AR. Noninvasive measurement of pulsatile intracranial pressure using ultrasound. Acta Neurochir. 1998;[Suppl]71:66-69.
- Ueno T, Ballard RE, Macias BR, et al. Cranial diameter pulsation measured by non-invasive ultrasound decrease with tilt. Aviation, Space and Environmental Medicine. 2003;74(8):882-885.
- Nelson KE, Sergueff N, Lipinski CL, Chapman A, Glonek T. The cranial rhythmic impulse related to the Traube-Hering-Meyer oscillation: Comparing laser-Doppler flowmetry and palpation. J Am Osteopath Assoc. 2001;101(3):163-173.36.
- Sergueef N, Nelson KE, Glonek T. Changes in the Traube-Hering-Meyer wave following cranial manipulation. Amer Acad Osteop J. 2001;11:17.
- Nelson KE, Sergueff N, Glonek T. The effect of an alternative medical procedure upon low-frequency oscillation in cutaneous blood flow velocity. J Manipulative Physiol Ther. 2006;29:626-636.
- Nelson KE, Sergueff N, Glonek T. Recording the rate of the cranial rhythmic impulse. J AM Osteopath Assoc. 2006;106(6):337-341.

Just so you know – if this is all sounding a little abstract, vague, and difficult to comprehend. There is a lot of research out there to support cranial bone motion and that it does have pulsing motion that we describe to you and you will hopefully palpate in lab.

These are tiny – to sort of prove the point that there are an extensive number of studies that show this motion. Many of these are not osteopathic studies and cross a variety of fields, including some NASA scientists. There are lots of basic scientists continuing to research this as well. There is the data out there to support this.



We're getting better technology to help us better understand what we're palpating and why this modality might have some of the broad influences and extreme patient changes that we see when we are utilizing it in practice. For example, I treat children with concussions, ASD, behavioral issues, sleeping problems and I use OCMM as a big modality for treating these patient populations and it is amazing some of the changes I have seen. One of the most significant was a four year old who had sleep walked almost nightly for two years, and after one treatment with OCMM, he stopped sleep walking. I can't tell you the exact mechanism and what physiologic change happened, but something with the treatment changed his physiology and allowed his body to work better and restore function and he was able to sleep better. Kids with concussions, they're recovering years out from their initial injuries by allowing these treatments to work in their bodies.

There is additional research out there – click on this link to OCA and you can see the research that exists. They have it broken down by condition that may benefit from OCMM but there is also anatomy research that exists to support this. There is constantly new research coming out including some on the motion of CSF. New research in the last few years seeing the motion of CSF on MRI. It doesn't flow as previously taught in anatomy books with the arrows showing moving around the

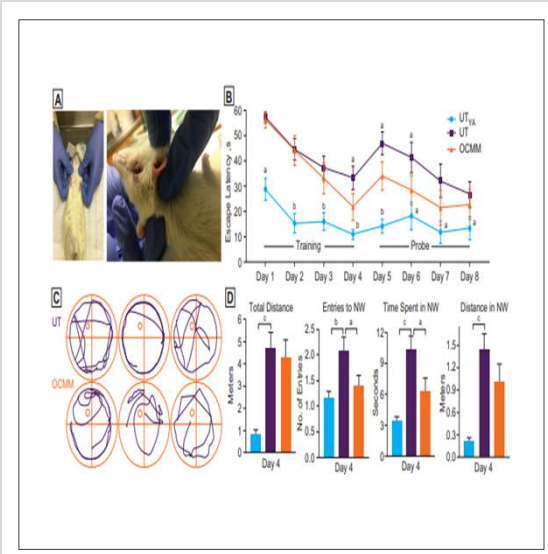
cranium, down the spine, and back up but actually that it pulsates and fluctuates like Sutherland was describing based on his palpation years ago.

We're learning more about the glymphatic system that we didn't know existed several years ago. Many of us using this, believe that we're influencing this system and helping it to function better which could help with processes like Parkinson's, Alzheimer's etc.

Also new research about what is in CSF. Was previously thought of as a cushiony water bath but there are different brain and body states including sleep/wake cycle, appetite, brain injury/repair that are linked to distinct factors in the CSF. This image here shows the study from Zappotera and lists some of the hormones and endocrine factors that we've found so far in CSF and this is newer research so expect to learn more about it in the future. Have additional references for you on all of these topics if interested so reach out. But long story short – our technology and research are finally catching up with our hands!

Highlights

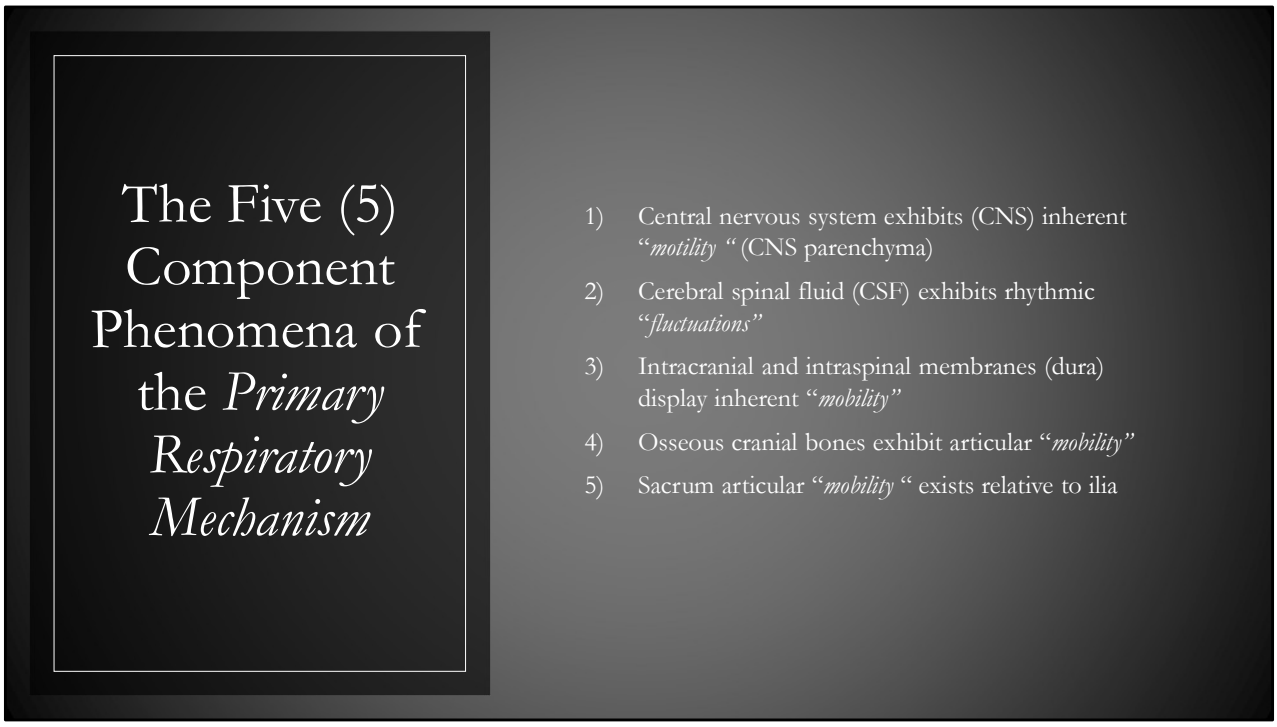
- Elevated cytokines and chemokines, proteins, growth factors, axial-CSF, BH4, HVA, and ganglioside GM in the CSF of the ASD group.
- Decreased folate, oxytocin, vasopressin, neopterin, quinolinic acid, and 5-HIAA levels are reported in CSF of the ASD group.
- β-endorphins, serotonin, immunoglobulin levels, nerve growth factor, IAA, S100 protein, IGF-2, and TGF-β1 were unchanged in ASD.
- Huge variability in the sample sizes and ages of the participants in both ASD and control groups.
- Studies had all-male cohorts or few female participants. The proportion of females in the ASD group was between 16% and 32% only.



Additional New Research

- Effect of Osteopathic Cranial Manipulative Medicine on an Aged Rat Model of Alzheimer Disease
  - "Significant improvement was found in spatial memory in 6 rats after 7 days of OCMM sessions. Live animal positron emission tomographic imaging and immunoassays revealed that OCMM reduced amyloid β levels, activated astrocytes, and improved neurotransmission in the aged rat brains."
- Cranial manipulation affects cholinergic pathway gene expression in aged rats
  - "Transcriptome analysis revealed that OCMM significantly affected the expression of 36 genes in the neuronal pathway"

increased aquaporins as well - clearing plaques and creating new paths to clear the plaques



So when we talk about OCMM, we're talking about palpating the PRM and that consists of these 5 component phenomena and we're going to go through each of them in more depth on the next few slides.

The 5 phenomena are: Central nervous system exhibits (CNS) inherent "*motility* " (CNS parenchyma)
Motility is different than mobility. Motility implies that it can move on its own independently and that is what actually drives the other motions that are happening around it.

Cerebral spinal fluid (CSF) exhibits rhythmic "*fluctuations" and we now have the research to back this up. It fluctuates and is influenced by secondary respiration or thoracic respiration.*

Intracranial and intraspinal membranes (dura) display inherent "*mobility"* so this is different than motility – don't move on their own inherently but they have potential for motion when they are encouraged by something else triggering that motion.

Osseous cranial bones exhibit articular "*mobility"*
Sacrum articular "*mobility* " exists relative to ilia that it is located between

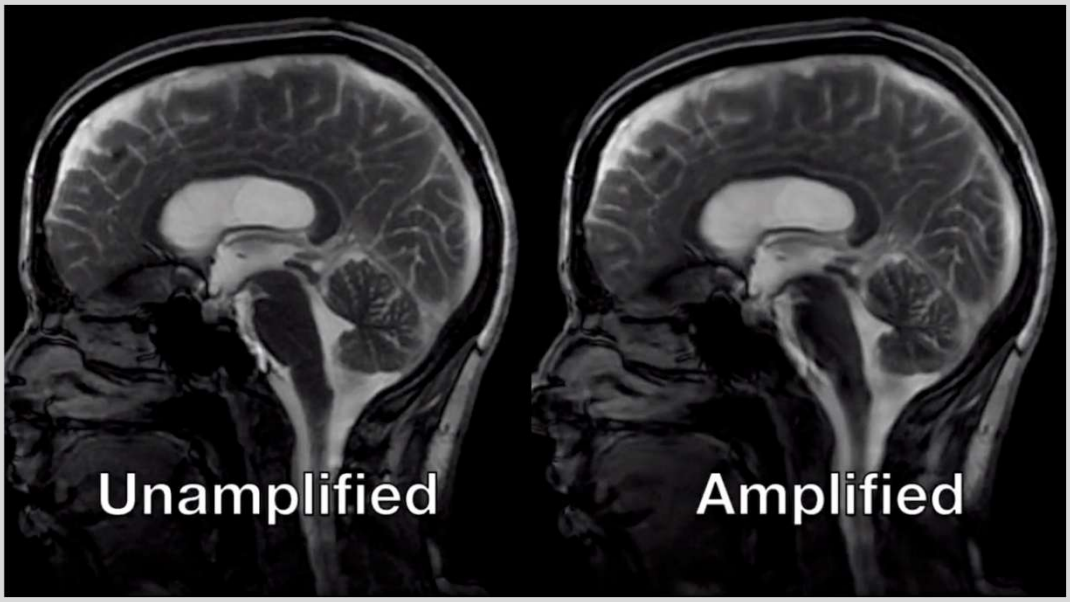
due to the dura attachments

Let's look closer at these.

Central nervous system exhibits (CNS) inherent "*motility* "

- Referring to motility of CNS/brain parenchyma
- Inherent vitality – moves independently
- Rate unique to the CNS
- https://www.youtube.com/watch?v=__HelmnvyBs

This concept sounds abstract at first but when you look at patients in the operating room for neurosurgery you can see that this brain pulsates (play video)>. You can see the full length youtube clip which was a surgery for a tumor, but you can see that the brain pulsates and moves on its own. This is the inherent motility of the brain parenchyma. It is referring to this motion of this tissue. It has its own inherent vitality and a rate unique to the CNS so it is different than HR or RR, secondary respiratory rate.

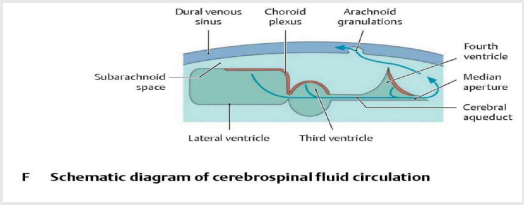


https://www.auckland.ac.nz/en/news/2018/05/30/new-mri-moving-brain.html

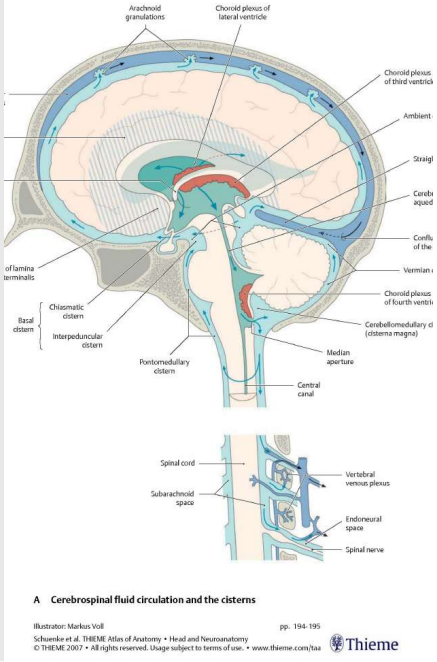
There is also this image – this is from a study from Australia and on this MRI when you amplify the motion you can see the inherent motility on MRI. If you read the article, they talk about pulsatile blood flow and pulsatile motion but we think it is more complex than that and the rate doesn't match exactly for that to be the only explanation.

Cerebral spinal fluid exhibits rhythmic "*fluctuations*"

- Think of it like waves
- Serves many purposes within the CNS and beyond
  - Immunologic
  - Metabolic/Endocrine
- Transmission of energy → dura → cranial bones



F Schematic diagram of cerebrospinal fluid circulation



A Cerebrospinal fluid circulation and the cisterns

Illustrator: Markus Voll pp. 194-195

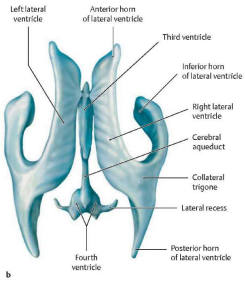
The CSF exhibits rhythmic fluctuations.
Here on the right you can see these arrows of where we teach the CSF starts in the lateral ventricles then move to the third and fourth ventricles into the spinal canal and then back up…
It turns out even though this is what we teach and looks lovely in an anatomy book this is not what is actually happening. There's new technology from Japan where they imaged fluctuation of CSF in conjunction with secondary respiration. So it moves like waves and this fluid is very strong and powerful (like all fluid – hence hydraulic power). This fluid wave created by these fluctuations create energy which ultimately move dura which ultimately moves cranial bones which is the motion that we as osteopathic physicians are training you to palpate.

CSF

We knkow that the CNS is serving many purposes within the CNS and beyond it, including a large immunologic function, metabolic, endocrine, etc that we're still learning about/understanding. These fluctuations are serving a bigger healing role than we might have thought.

The Ventricular System

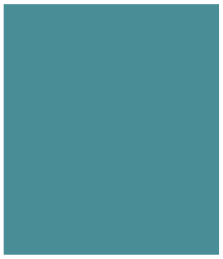
- Lateral Ventricles (X2)
- Third Ventricle
- Cerebral Aqueduct
- Fourth Ventricle

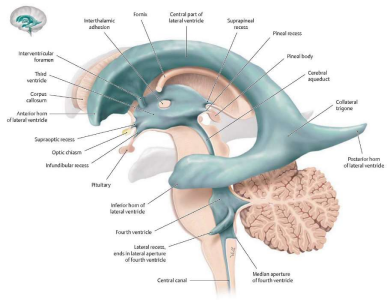


B Cast of the ventricular system

b Superior view.

Illustrator: Markus Voll

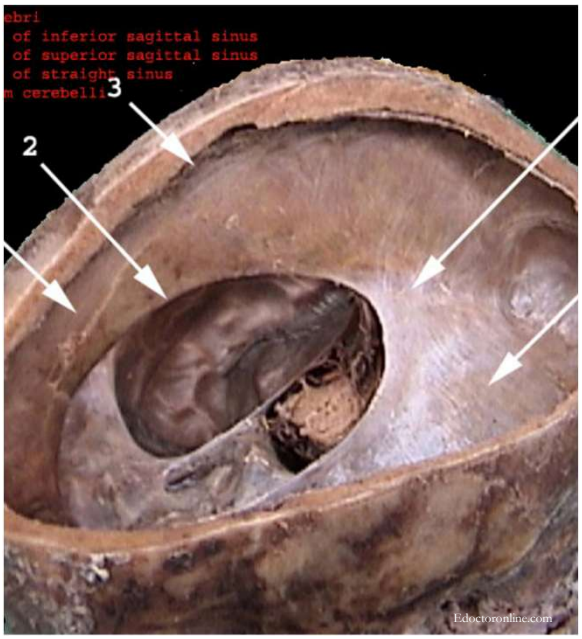




Lateral and Superior views

A reminder of what the ventricular system looks like. Superior view on the left and a lateral view on the right.

We have two lateral ventricles and then the third ventricle which flows through the cerebral aqueduct into the fourth ventricle. Keep this particular anatomy in mind as we'll be revisiting this with a technique in lab you'll learn called the compression of the fourth ventricle.



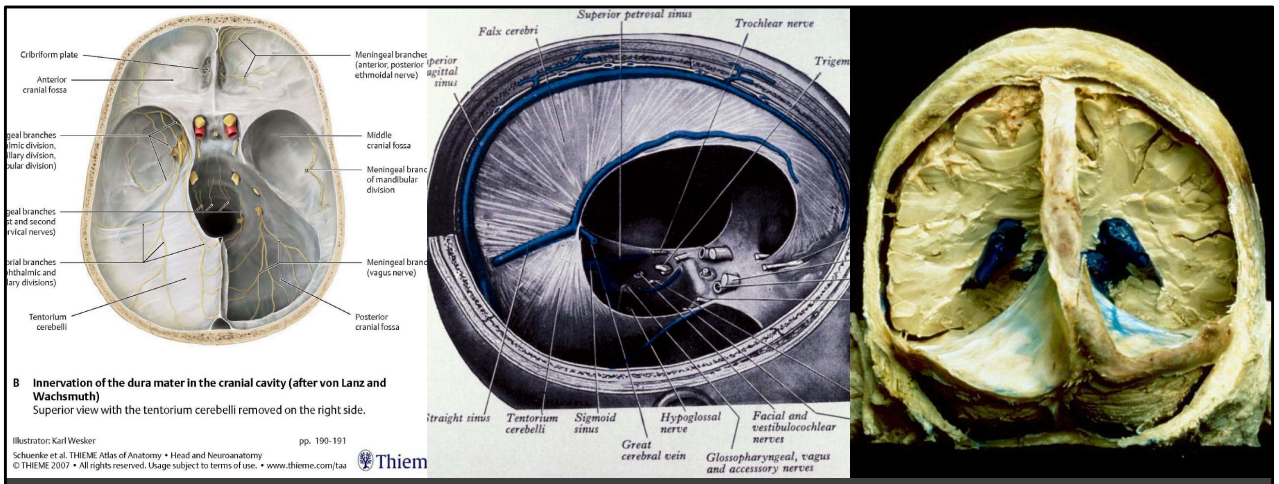
Intracranial and intraspinal membranes display inherent "*mobility*"

- Referring to the dura
  - Falx cerebri
  - Falx cerebelli
  - Tentorium cerebelli
- Mobility implies they are able to move but dependent on something else
  - CNS motility
  - CSF fluctuations
- Reciprocal Tension Membrane
  - What happens in the head – happens in the pelvis and vice versa
  - The Core Link

The third component - Intracranial and intraspinal membranes display inherent "*mobility*"

They don't move on their own – they move due to the motility of something else – namely the fluctuations of the CSF creating the energy from the flow of the fluid but also the inherent pulsatile motility of the CNS itself and between those two things exerting a force on this dura, you get this motion. This is referring to the 2 falxes and tentorium.

When we see this motion, we refer to it as the reciprocal tension membrane, what this means as you get motion from this tension, you see it exhibited elsewhere where it is attached (we'll review that in a sec) so what is happening in the head is happening in the pelvis and vice versa because of these attachments. We call this connection between the intracranial and intraspinal membranes that allow this communication between these regions the core link.

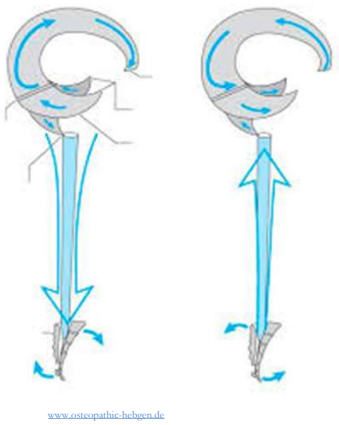


INTRACRANIAL DURAL MEMBRANES

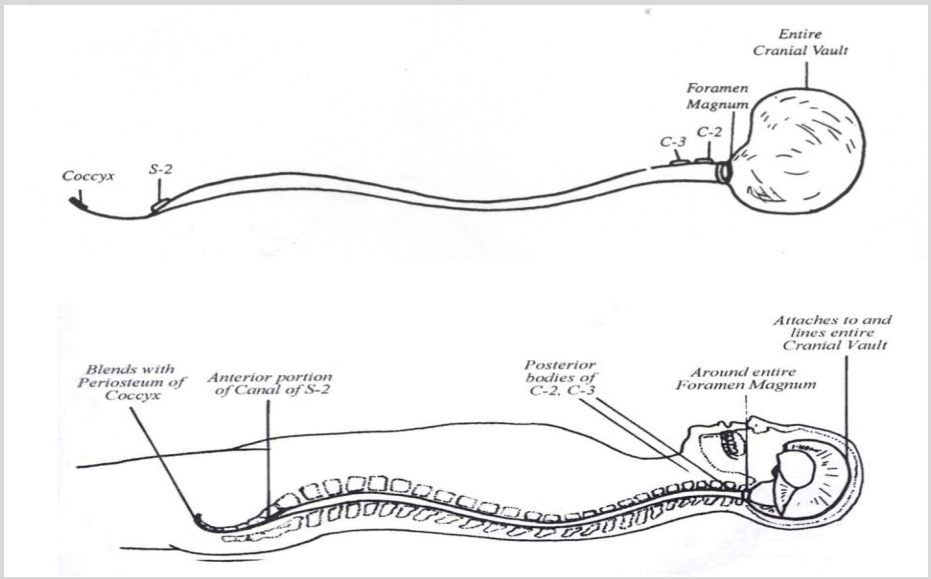
On the left is a superior view looking from above with brain removed.
Middle image is an oblique angle and you can note the venous sinuses which we'll be discussing shortly in a different lecture to prep you for one of the first techniques you'll be learning in lab.

This is a posterior view on the right. This image looks at falx coming down and coming out laterally to the tent and you can see why it is named the tent.

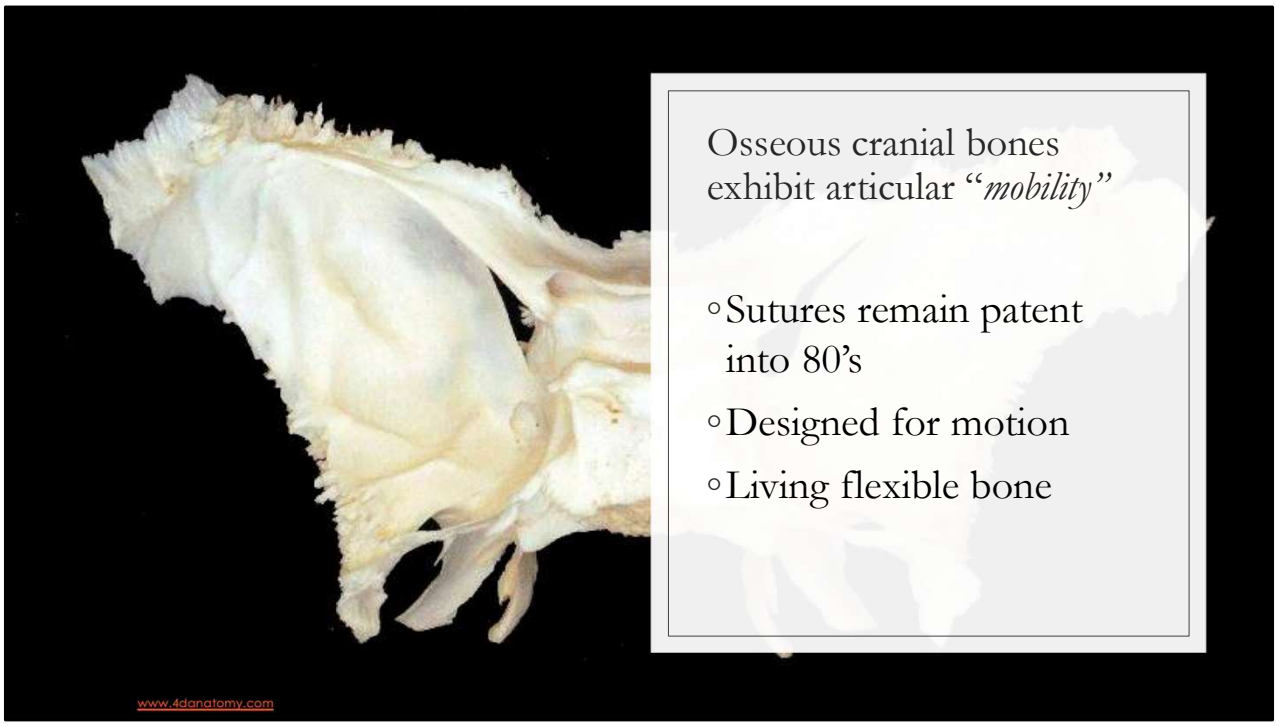
EXTRADURAL DURAL MEMBRANES (CORE LINK)



This is the attachment to the sacrum. It attaches to S2 and is a very strung attachment. This dura is a very strong and tense fiber and these are very strong attachments and when broken they can actually fracture or cause avulsions on the bones where they are attached. So you can see how when motion happens in the head, it pulls on the intraspinal membranes and ultimately causes motion in the sacrum. This is the RTM or core link.



These are the attachments of dura – entire cranial vault, foramen magnum, C2, C3, and down at S2 and even a small attachment at the coccyx that blends with periosteum so you can see all of the places that this dura is attaching and these are very strong connections.

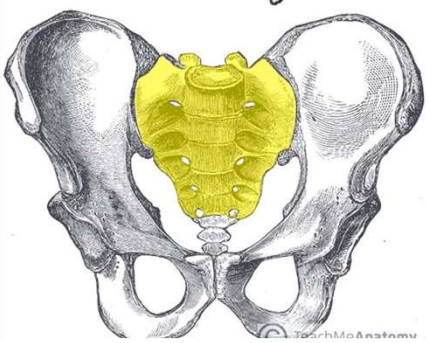


Moving into the fourth concept. Osseous cranial bones exhibit articular "*mobility*" *We have now shown through research that these remain patent into the 80s. The sphenoid looks like it is literally ready to take flight – screams motion.*

The other thing to think about with these bones is that we think about how you palpated them in your dissections or bony specimens as these hard brittle very fragile structures but remember when in a living body, they are breathing flexible malleable tissue. So you need to reframe that idea of bone when you're palpating in this modality.

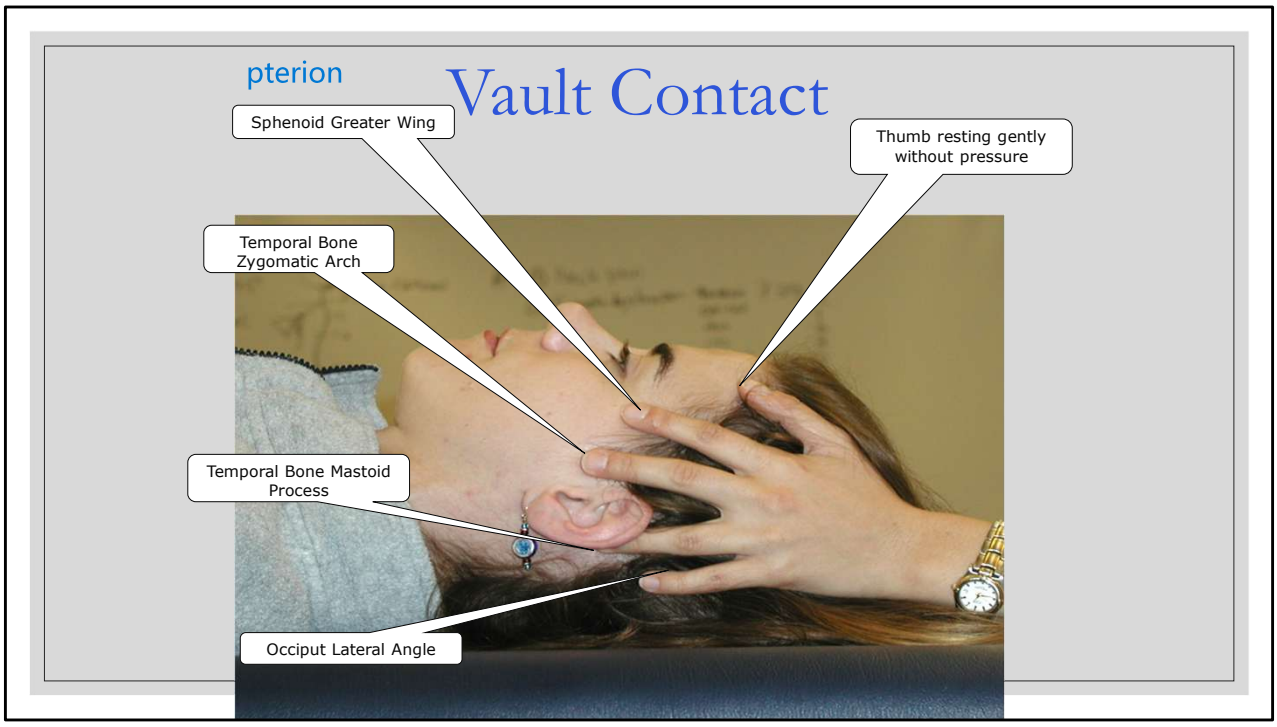
Sacrum articular "*mobility*" exists relative to ilia

- 3 distinct transverse axes
  - Superior – PRM/Respiratory motion
  - Middle – postural/gait motion KNOW
  - Inferior – innominate motion
- This mobility is secondary to the core link from dura



The fifth component is Sacrum articular "*mobility*"
exists relative to ilia

3 distinct transverse axes in the sacrum, don't forget your oblique axes as well.
Superior axis is the axis about which PRM occurs
Middle is postural/gait motion
Inferior is innominate motion. When you have ant/post innominate rotations – this is the axis for those. You can see the drawing on top where each of these.
All the motion from this top axis is secondary to the core link from the dura.



Final thing to cover is the vault contact. Historically was called a hold so may hear that terminology as well. You'll get lots of practice with this in lab.

Before you get into palpating, especially with OCMM, you want to take a second to center yourself and get yourself into a good space and let tension in your own body go, let your own distracting thoughts go before putting your hands onto a patient's head.

This is one of the most common contacts that is used to assess OCMM, but there are others as well. First digit is resting gently where it falls naturally – usually on parietals or frontals depending on hand size and patient's head size. Second digit is on greater wing of sphenoid near pterion and we'll be reviewing these landmarks with in lab and upcoming lecture. Third digit is laying over zygomatic arch of the temporal bone. Fourth digit is lying over the mastoid process of the temporal bone and the fifth digit is contacting lateral aspect of the occiput.

In this contact – the most important contacts are second and fifth digits – contacting sphenoid and occiput. These two fingers will give you a concept of motion at the SBS – sphenobasilar synchondrosis which we will be covering extensively in the next

couple lectures.

Acknowledgments

- Special thanks to Drs. R. Mitchell Hiserote, Hollis King, and Rebecca Giusti for assistance with slides
- Thanks to my mentors and teachers in OCMM, especially Viola Frymann, DO

Thanks to Drs. Hiserote and Giusti for slides and sharing resources with me.
And special thank you to my mentors and teachers especially those in OCMM. This is us at Convo when I was a fourth year medical student.
Hope you've enjoyed this intro and I look forward to teaching you more.