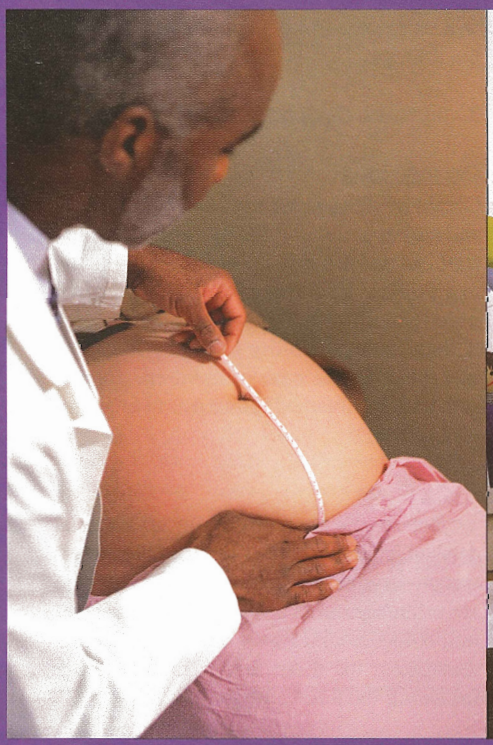
THE AAO

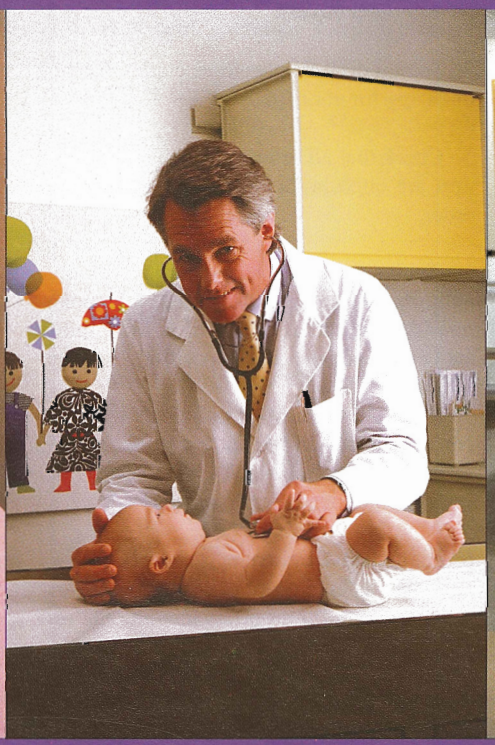
FORUM FOR OSTEOPATHIC THOUGHT

JOURNAL

A Publication of the American Academy of Osteopathy

TRADITION SHAPES THE FUTURE • VOLUME 13 NUMBER 4 WINTER 2003





Neuromusculoskeletal Medicine/ OMM: Useful to ALL DOs

page 15...

Instructions to Authors

The American Academy of Osteopathy® (AAO) Journal is a peer-reviewed publication for disseminating information on the science and art of osteopathic manipulative medicine. It is directed toward osteopathic physicians, students, interns and residents and particularly toward those physicians with a special interest in osteopathic manipulative treatment.

The AAO Journal welcomes contributions in the following categories:

Original Contributions
Clinical or applied research, or basic science research related to clinical practice.

Case Reports
Unusual clinical presentations, newly recognized situations or rarely reported features.

Clinical Practice
Articles about practical applications for general practitioners or specialists.

Special Communications
Items related to the art of practice, such as poems, essays and stories.

Letters to the Editor
Comments on articles published in *The AAO Journal* or new information on clinical topics. Letters must be signed by the author(s). No letters will be published anonymously, or under pseudonyms or pen names.

Professional News of promotions, awards, appointments and other similar professional activities.

Book Reviews
Reviews of publications related to osteopathic manipulative medicine and to manipulative medicine in general.

Note
Contributions are accepted from members of the AOA, faculty members in osteopathic medical colleges, osteopathic residents and interns and students of osteopathic colleges. Contributions by others are accepted on an individual basis.

Submission
Submit all papers to Anthony G. Chila, DO, FAAO, Editor-in-Chief, Ohio University, College of Osteopathic Medicine (OUCOM), Grosvenor Hall, Athens, OH 45701.

Editorial Review
Papers submitted to *The AAO Journal* may be submitted for review by the Editorial Board. Notification of acceptance or rejection usually is given within three months after receipt of the paper; publication follows as soon as possible thereafter, depending upon the backlog of papers. Some papers may be rejected because of duplication of subject matter or the need to establish priorities on the use of limited space.

Requirements for manuscript submission:

Manuscript
1. Type all text, references and tabular material using upper and lower case, double-spaced with one-inch margins. Number all pages consecutively.

2. Submit original plus three copies. Retain one copy for your files.

3. Check that all references, tables and figures are cited in the text and in numerical order.

4. Include a cover letter that gives the author's full name and address, telephone number, institution from which work initiated and academic title or position.

5. Manuscripts must be published with the correct name(s) of the author(s). No manuscripts will be published anonymously, or under pseudonyms or pen names.

6. For human or animal experimental investigations, include proof that the project was approved by an appropriate institutional review board, or when no such board is in place, that the manner in which informed consent was obtained from human subjects.

7. Describe the basic study design; define all statistical methods used; list measurement instruments, methods, and tools used for independent and dependent variables.

8. In the "Materials and Methods" section, identify all interventions that are used which do not comply with approved or standard usage.

Computer Disks
We encourage and welcome computer disks containing the material submitted in hard copy form. Though we prefer Macintosh 3-1/2" disks, MS-DOS formats using either 3-1/2" or 5-1/4" discs are equally acceptable.

Abstract
Provide a 150-word abstract that summarizes the main points of the paper and it's conclusions.

Illustrations
1. Be sure that illustrations submitted are clearly labeled.

2. Photos should be submitted as 5" x 7" glossy black and white prints with high contrast. On the back of each, clearly indicate the top of the photo. Use a photocopy to indicate the placement of arrows and other markers on the photos. If color is necessary, submit clearly labeled 35 mm slides with the tops marked on the frames. All illustrations will be returned to the authors of published manuscripts.

3. Include a caption for each figure.

Permissions
Obtain written permission from the publisher and author to use previously published illustrations and submit these letters with the manuscript. You also must obtain written permission from patients to use their photos if there is a possibility that they might be identified. In the case of children, permission must be obtained from a parent or guardian.

References
1. References are required for all material derived from the work of others. Cite all references in numerical order in the text. If there are references used as general source material, but from which no specific information was taken, list them in alphabetical order following the numbered journals.

2. For journals, include the names of all authors, complete title of the article, name of the journal, volume number, date and inclusive page numbers. For books, include the name(s) of the editor(s), name and location of publisher and year of publication. Give page numbers for exact quotations.

Editorial Processing
All accepted articles are subject to copy editing. Authors are responsible for all statements, including changes made by the manuscript editor. No material may be reprinted from *The AAO Journal* without the written permission of the editor and the author(s).

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TRADITION SHAPES THE FUTURE • VOLUME 13 NUMBER 4 WINTER 2003
A PEER-REVIEWED JOURNAL

The Mission of the American Academy of Osteopathy® is to teach, advocate, and research the science, art and philosophy of osteopathic medicine, emphasizing the integration of osteopathic principles, practices and manipulative treatment in patient care.

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2004 Calendar of Events

JANUARY

23-25 *Diagnosis of Muscle Imbalance & Exercise Prescription (The Greenman Protocol)* AZCOM,Glendale, AZ

FEBRUARY

13-16 *Osteopathic Treatment of Headache*; Honoluu, HI

MARCH

15-17 *Osteopathic Approach to Gastroenterology (Visceral Technique)*, Colorado Springs, CO

18-21 *2004 Annual Convocation*, Colorado Springs, CO

APRIL

24-25 *Dr. Fulford's Advanced Percussion Technique* CCOM, Downers Grove, IL

MAY

14-16 *Prolotherapy: Above the Diaphragm* UNECOM, Biddeford, ME

JUNE

4-6 *Clinical Jones Strain-Counterstrain I for the Spine and Rib Cage*; Indianapolis, IN

JULY

23-25 *Still Technique (Applications of a Rediscovered Technique)*, WVSOM, Lewisburg, WV

AUGUST

19-22 *14th Annual OMT Update*; Buena Vista, FL

SEPTEMBER

30 - Oct 2 *Emotional Diagnosis and Release (Barral Approach***;** San Diego, CA

OCTOBER

3- 5 *Unlocking the Cranial Sutures (The Face)* San Diego, CA

NOVEMBER

6 *Modifying Delivery of OMT in an Allopathic Environment***;** San Francisco, CA

7-11 AOA / AAO Convention; San Francisco, CA

12-14 *Prolotherapy: Below the Diaphragm* UNECOM, Biddeford, ME

DECEMBER

4-5 *Facilitated Positional Release* NUSOM; Ft. Lauderdale, FL

Osteopathic Approach to Gastroenterology

(Visceral Technique)

Kenneth Lossing, DO, Program Chair

March 15-17, 2004
Colorado Springs, CO

COURSE DESCRIPTION: LEVEL III

In this course the role of visceral dysfunction in various gastroenterology diseases is explored. We follow traditional osteopathic thought of looking at the whole body, along with the specific area of symptoms. Principles originating with Dr. Still, along with many of his students, are incorporated, along with principles and approaches from Barral. Medical diagnosis of GERD, dyspepsia hiatial hernia, peptic ulcers, cholestasis, chronic hepatitis, irritable bowel syndrome, and constipation, along with associated musculoskeletal disorders will be covered.

LEARNING OBJECTIVES:

- Palpate and identify the global body strain pattern
- Palpate and identify the local body strain pattern
- Develop a treatment plan, incorporating medical and osteopathic approaches
- Treat the visceral dysfunctions of the gastrointestinal system

PROGRAM TIME TABLE:

Monday, March 15 ..... 8:30 am – 6:00 pm
Tuesday, March 16 ..... 8:30 am – 6:00 pm
Wednesday, March 17 ..... 8:30 am – 6:00 pm
(each day includes (2) 15 minute breaks and a (1) hour lunch)

For more information or to register contact:
Christine Harlan, Membership Services Coordinator
American Academy of Osteopathy®
3500 DePauw Blvd., Suite 1080
Indianapolis, IN 46268
Phone: (317) 879-1881; E-mail:
charlan@academyofosteopathy.org

The Application of Force

Osteopathic educators have for many years commented on the absence of direct information regarding osteopathic technique as utilized by Andrew Taylor Still. The exception in recent years has been the effort and success of Richard L. Van Buskirk, DO, PhD, FAAO in addressing this issue. Noted for reawakening interest in the *"Still Technique"*, Dr. Van Buskirk's contribution should serve to stimulate further archival research in the hope that other sources may shed light on the methods of diagnosis and treatment utilized by Dr. Still. A source which has been available to the profession for many years is ***The Osteopathic Technique of William G. Sutherland, DO***. Written by Howard A. Lippincott, DO, this paper was originally published in the 1949 *Year Book of the Academy of Applied Osteopathy.* In all photographs, Doctor Sutherland is the treating physician. Dr. Lippincott noted:

"At the time that Dr. Sutherland received his osteopathic training at Kirksville, Dr. Andrew Taylor Still was carefully supervising all the instruction given at the college. The principles that were taught had to conform exactly to his concept. Dr. Sutherland made good use of every opportunity to learn and understand them and has adhered closely in his thinking and practice to Dr. Still's principles throughout his professional career. In consequence, the technique which he has presented to us is a reflection of the clear vision of our founder. In these days of rapid changes in medicine, older methods are constantly being replaced by new, and there is scoffing at the procedures that were used in the day of our grandfathers. On the other hand, the changes in the human structure, due to environment, are such that it is now even more susceptible to the strains that were considered by Dr. Still to be the most important cause of disease. Physical response to various types of osteopathic treatment is essentially the same now as in the nineteenth century. The technique presented here is of more than historical interest; it is of real practical value in our everyday work."

Beginning with *General Considerations*, ligamentous articular strains and principles of corrective technique are discussed. The section on *Cervical Vertebrae* covers treatment of flexion, extension, rotation sidebending dysfunctions; condyloatlantal and atlantoaxial ligamentous strains. The section on *Thoracic Vertebrae* discusses palpation for motion and treatment of flexion, extension, rotation sidebending dysfunctions. A variation is offered in having the patient sit on the knees of the physician. A similar presentation is given in the section on *Lumbar Vertebrae.* The section on *Ribs* addresses treatment of Rib 1, Ribs 2-3, Ribs 4-10 and floating ribs. Other considerations include a bedside technique for the upper ribs and treatment of dysfunction associated with hyperextension of vertebrae. The section on *Pelvic Girdle* addresses respiratory dysfunctions of the sacrum, postural dysfunctions, and the pubic symphysis. The standing, lateral recumbent and patient on knee approaches are demonstrated. The section on *Upper Extremity* addresses the clavicle, humerus, forearm, wrist and hand. The section on *Lower Extremity* addresses the hip joint, tibiofemoral and fibular dysfunction, tarsal arch and foot. The section on *Non-Osseous Structures* addresses the anterior cervical fascia, diaphragm, arcuate ligaments, liver turn, abdominal treatment, the psoas muscle, iliopsoas tendon, pelvic lift and popliteal drainage.

Dr. Lippincott concludes with the following observations:

"Dr. Sutherland's technique seems a radical departure to most of us. It avoids the familiar thrusting and popping of joints. However, it is based upon the fundamental principles of osteopathy as conceived by Dr. Still and accords with his admonition that osteopathic technique should be gentle, easy and scientific."

Perhaps this document could/should serve as the basic teaching document for colleges of osteopathic medicine, supplemented with the teaching of more contemporary manipulative models. Doing so would require a major reorientation of thought by all osteopathic educators.

Anthony G. Chila D.O., FAAO

Contributors

Van Buskirk, RL. Neuromusculoskeletal Medicine/ OMM: Useful to ALL DOs. In this 2003 Scott Memorial Lecture, the author describes his intellectual odyssey in osteopathic thought. The several perspectives of his own career development (Basic Scientist, Osteopathic Medical Student, Practitioner and Teacher) are brought to bear in this lecture. A strong statement is given for accuracy of diagnosis in the utilization of OMM. Arguments pro and con the present teaching of osteopathic theory, method and practice are presented. Recognized for the reawakening of interest in the "Still Technique" Dr. Van Buskirk offers simple steps to be followed in fundamental, progressive and advanced teaching and practice. **(p.15)**

Pope, RE. The Common Compensatory Pattern: Its Origin and Relationship to the Postural Model. J. Gordon Zink, DO, FAAO, passed on in 1982. Through a small body of papers, he left us the development of his idea of *The Common Compensatory Pattern*. Occasional papers have appeared in the intervening years. The present paper offers a comprehensive revisiting of Zink's concept, emphasizing that "a general postural model is a lifelong interplay between genetics, development and postural symmetry." A major bibliographic listing is suitable for facilitating additional study of this model. Submitted in partial fulfillment of requirements for Fellowship in the American Academy of Osteopathy®, Dr. Pope was conferred status as Fellow in 2002. **(p.19)**

Regular Features

Dig On. A general overview and commentary on the Primary Respiratory Mechanism Research Symposium/ Sutherland Cranial Teaching Foundation Continuing Studies Program of 2003 is presented. Sponsored by The Cranial Academy with additional funding made available by The Cranial Academy Foundation, this program was designed to "meet the needs of physicians and scientific investigators desiring a more comprehensive understanding of Cranial Osteopathy." Research presentations focused on fluid dynamics. Clinical lectures and practical sessions facilitated investigation of the physiologic phenomena of the Primary Respiratory Mechanism discovered by William Garner Sutherland, DO, DSc (Hon.). The conference was a joint venture of The Cranial Academy and the Sutherland Cranial Teaching Foundation, celebrating the 50th Anniversary of the latter organization. **(p.9)**

From the Archives. Carl Philip McConnell, DO (1874-1939) served as Chairman of the ***Osteopathic Manipulative Therapeutic and Clinical Research Association*** in 1937. He was followed in this capacity by Perrin T. Wilson, DO (1938-1944). Thomas L. Northup, DO served as Secretary (1937-1944) and as Editor (1938-1944). It was in the latter capacity that Dr. Northup served also as Chairman, Publications Committee. The organization established in 1937 was granted affiliation by the American Osteopathic Association in 1938, and was the forerunner of today's ***American Academy of Osteopathy***®. Doctor McConnell began the study of Osteopathy in 1894. Throughout his professional career, he contributed significantly to the advancement of the philosophy, science and art of the new profession. Two selections highlight his observations of Andrew Taylor Still's palpation and persona: *A Glimpse of Dr. Still's Art* (*JAOA*: July, 1917) and *Some Personal Traits of Dr. Still* (*JAOA*: January 1918). These pieces enclose the last months of Still's life. **(p.12)**

Book Review. Carreiro, JE: *An Osteopathic Approach to Children.* **(p.41)**

Elsewhere in Print. Due to space limitations in this issue, this column is deferred and will resume in the next issue of *AAOJ*.❐

Component Societies' CME Calendar

and other Osteopathic Affiliated Organizations

January 17-19, 2004
Basic Course Level 2
NSU/COM
Fort Lauderdale, FL
Hours: 24 Category 1A anticipated
The Cranial Academy
Contact: The Cranial Academy
317/594-0411

January 21-24
15th Osteopathic Winter Seminar and National Clinical Update
Tradewinds Resort
St. Pete Beach, FL
Hours: 27 Category 1A anticipated
Pinellas County Osteopathic Medical Society
Contact: Dr. Kenneth Webster
Phone: 717/581-9069 or 866/254-8798

February 18-22
Midwinter Basic Course in Osteopathy in the Cranial Field
Tampa Palms Golf Resort
Tampa, FL
Hours: 40 Category 1A anticipated
The Cranial Academy
Contact: The Cranial Academy
317/594-0411

February 27-March 2
Osteopathy in the Cranial Field: Basic Course
Sutherland Cranial Teaching Foundation
CCOM, Downers Grove, IL
Hours: 40 Category 1A
Contact: Judy Staser
817/926-7705

March 6-7
Advanced Course: Ligamentous Articular Strain Technique
Dallas Osteopathic Study Group
Dallas, TX
Hours: 16 Category 1A anticipated
Contact: Conrad Speece, DO
214/321-2673

March 21-23
Osteopathy in the Cranial Field: The FACE (an intermediate course)
Sutherland Cranial Teaching Foundation
Hours: 20 Category 1A
Colorado Springs
Contact: Judy Staser
817/926-7705

March 31, 2004
Closing Date for submission of Abstracts for International Conference on Advances in Osteopathic Research
Lake Erie College of Osteopathic Med.
British College of Osteopathic Med.
Contact: E-mail: icar@bcom.ac.uk
or authors can find instructions and an abstract template at
www.bcom.ac.uk/research/ICAOR5.asp

April 21-25
82nd Annual Convention
Wyndham Buttes Resort
Tempe, AZ
Hours: 38 Category 1A anticipated
Arizona Osteopathic Medical Assn
Contact: AOMA
602/266-6699

April 22-25, 2004
49th Annual Conference
Florida Academy of Osteopathy
Grosvenor Resort at WDW®
Lake Buena Vista, FL
CME: 22 Category 1A (anticipated)
Contact: Kenneth Webster, EdD
727/581-9069

May 14-16
Crash Recovery the Long Road Home: Treating Victims of Motor Vehicle Accidents and Brain Injuries
PCOM, Philadelphia, PA
Hours: 16 Category 1A anticipated
The Cranial Academy
Contact: The Cranial Academy
317/594-0411

June 19-23
Basic Course in Osteopathy in the Cranial Field
Doubletree Columbia River Complex
Portland, OR
Hours: 40 Category 1A anticipated
The Cranial Academy
Contact: The Cranial Academy
317/594-0411

June 20-23
Experiencing Osteopathy: An Introduction to Continnuum Movement
Doubletree Columbia River Complex
Portland, OR
Hours: 24 Category 1A anticipated
The Cranial Academy
Contact: The Cranial Academy
317/594-0411

June 24-27
Annual Conference
Doubletree Columbia River Complex
Portland, OR
Hours: 21 Category 1A anticipated
The Cranial Academy
Contact: The Cranial Academy
317/594-0411

June 27-29
Biodynamic Approach to the Fluid Body
Doubletree Columbia River Complex
Portland, OR
Hours: 16 Category 1A anticipated
The Cranial Academy
Contact: The Cranial Academy
317/594-0411

August 21-22
Ligamentous Articular Strain Technique
Dallas Osteopathic Study Group
Dallas, TX
Hours: 16 Category 1A anticipated
Contact: Conrad Speece, DO
214/321-2673

Letter to the Editor

Osteopathic Development Internationally

There have been a number of articles published recently regarding the development of osteopathy internationally. As we know, everyone's perception of the world is quite different. However, some of these perceptions are at odds with fact.

Firstly, an article in *The AAO Journal*, Fall 2003[1] compares OMM hours at an Australian Osteopathic College with an American college ie. 1573 vs. 155. This is very misleading. Why? Firstly, the quality of OMM education provided and secondly, the end result. End result being the quality of osteopathic skills evidenced by the graduate. Also, does the American college quoted provide osteopathic education equal to other American colleges and viz a viz the Australian situation.

Being in the unique position of having conducted osteopathic technique workshops for the AAO, various American colleges, combined MD and Australian DO workshops and Australian college undergraduates, I believe I have a reasonable overview of the educational aspect. This is combined with having a number of American-trained students on rotation from KCOM and having treatment from Australian-trained DOs. Anecdotally, reports from various Australian DOs has qualified my comments. The American DOs had palpably better osteopathic hand skills and better diagnostic skills (excuse the pun). The range of technique models was considerably broader from the American graduates. Indeed, the technique range of the Australian DOs was embarrassingly limited. Quantity does not always equate to quality.

The reasons for this situation may be multifaceted. The American system is older and more established. As an art form based on science, osteopathy could be reasonably expected to be more proficiently taught and better resourced in personnel. Some opinion in Australia is that osteopathy ceased to be taught proficiently after the 1970s. Further, that was due to teaching by "osteopaths" who had inadequate osteopathic education and skills. A teacher could have attended only limited osteopathic education (under 2 years) yet still teach at an Australian college. Registration as an osteopath/chiropractor was granted in some instances based on length of time in practice rather than the successful completion of a state examination. Australian osteopathic education was guided by English graduates in the early 1980s onwards. This education was not universally perceived as being of the prior 1980 level. Other factors may be the scarcity of American teaching input to Australian colleges of recent years, the fact that Australian colleges are government funded with limited funding for facilities and staff, a complacency in skill levels and others of which I am unacquainted.

Secondly, there are moves to create a global osteopathic organization. This is a noble concept and one, which acknowledges that there are osteopaths outside the USA. However, people simply acknowledging the philosophy of osteopathy, does not automatically bestow osteopathic skills of diagnosis and manual techniques. If one refers to history Dr. Still clashed with J. Martin Littlejohn over his teaching of osteopathy to the extent that Still installed Dr. Arthur Hildreth to the American School of Osteopathy as dean of the college in 1899. Dr. Littlejohn and his brothers subsequently resigned in 1899[2] and began legal action, which continued until settled out of court in 1902. This is well documented in 48 letters at the A.T. Still Museum at KCOM and in Hildreth's book, *The Lengthening Shadow of Andrew Taylor Still*. Littlejohn went on to found the British School of Osteopathy in 1917. If he was not teaching "Osteopathy" in 1899, did he change by 1917? Do his graduates practice osteopathy?

Registration of osteopaths in different countries has a colored past. As related to with the Australian experience, registration does not guarantee osteopathic skills. Various courses in the United Kingdom taught osteopathy and naturopathy during their four-year term. Were the graduates osteopaths or naturopaths? Osteopaths are not government registered in a number of countries, yet people claim to practice osteopathy there. How do you establish a membership base and with what qualification or examination criteria? Can MDs or other health professionals who attend a number of osteopathic workshops claim to be osteopaths?

As aforementioned, I think the aim to create an organisation is admirable. There remain many practical obstacles to this otherwise the nomenclature of "Osteopath" will become even more confusing to people seeking osteopathic health care.

Terence C. Vardy, DO,
Master of Applied Science -
Musculoskeletal Medicine

1. The Osteopathic Education, Moresi, A.C., *The AAO Journal*, Vol.13, No.3 Fall 2003.
2. *The Lengthening Shadow of Andrew Taylor Still*, 1938.

Dig On

Anthony G. Chila, DO, FAAO

"I Don't Know"

The Primary Respiratory Mechanism Symposium/ Sutherland Cranial Teaching Foundation Continuing Studies Program was held at Indian Lakes Resort, Bloomington, IL, October 17-20, 2003. This conference was the first joint venture of The Cranial Academy and the Sutherland Cranial Teaching Foundation, celebrating the 50th Anniversary of the latter organization. Additional funding was made available by The Cranial Academy Foundation. One hundred registrants were in attendance, including 15 speakers. All were osteopathic physicians with the exception of 3 MDs, 2 Dentists, 18 Foreign Affiliates and 2 students. Michael P. Burruano, DO, President of the SCTF, served as Chair of the Continuing Studies Program; I served as Chair of the PRM Research Symposium segment. Between us, approximately one year of ongoing communication via E-mail, telephone and in person was involved in the development of this conference. Evaluations were exceptionally high for all speakers.

Since the occasion was the celebration of the 50th Anniversary of the Sutherland Cranial Teaching Foundation, numerous photographs of Dr. Sutherland were shown. One in particular helped set the tone for the PRM Research Symposium segment of the conference. Dr. Burruano showed and commented on a photograph of Dr. Anne Wales sitting with Dr. Sutherland at his home, near a piano, with a view of the ocean. This setting was the last time that the two were together before Dr. Sutherland's death. Over many years of working with Dr. Sutherland, Dr. Wales had often asked "What accounts for the fluctuation of the Cerebral Spinal Fluid?" Dr. Sutherland's answer was invariably "Do you have to know"? At the time the photograph was taken, the question was asked again, and the answer was "I don't know".

This anecdote, as related by Dr. Burruano, is, in my mind, a fundamental statement about William Garner Sutherland, Clinician Researcher. Research activity is not a matter of "proving" or "disproving"; entering any research proposition with either intention is a fatal flaw in the design of the proposed study. Research activity properly undertaken is the process of constant refinement of the essential proposition. When this becomes the intention, the appearance of answers (pro or con the essential proposition) will lead to the development of further appropriate questions. The result will then be (pro or con the essential proposition) elegance in the design and conduct of the study. Dr. Sutherland conducted his 50 years of research along the lines of constant refinement of his essential proposition. As a student at the American School of Osteopathy in 1899, he was viewing disarticulated bones of a skull which belonged to Doctor Andrew Taylor Still. The bones were exhibited in North Hall of the A. T. Still Infirmary Building. It occurred to him that the articular surfaces of the bones seemed to indicate that there was a design for articular mobility. The cardinal points of the clinical model which he developed were postulates; as he made rational claims for each of the points, he made it clear that "I have only drawn aside a curtain", thus leaving the demand for further study. He made no assumption that his postulates were to be taken for granted as premises or axioms. Dr. Sutherland passed on in 1954. The electron microscope became available as a research tool in 1955. Girgis, Scott and Pritchard, (1956) reported on the connective tissue characteristics of inter and intra-sutural cranial findings, across species. Of the cardinal points of Dr. Sutherland's clinical model, research activity today is most effectively developed in the area of fluid dynamics. It is here that very great facility has been demonstrated in understanding of physiology and measurement of phenomena. For these reasons, particular emphasis was given to fluid dynamics in procuring presenters for the PRM Research Symposium Segment of this conference.

The osteopathic educational environment has always held that people must talk to each other from their respective venues in order to establish progress in research of the osteopathic concept. When done in a spirit of collegiality and interpersonal communication, the explanation of clinical phenomena reinforced by measurement becomes immediately applicable to the particular clinical model. The presenters chosen for this conference, and their topics, were: ➔

Kenneth Nelson, DO, FAAO, FACOFP and Thomas Glonek, PhD. **Wave Phenomena: Clinician Measurement.** This presentation discussed the ongoing development of clinical research protocols for the assessment of the Traube-Hering-Meyer wave. Nicette Sergueef, DO (France), an active participant in these studies, was not able to be present for this conference.

Yuri Moskalenko, DSc, DO (Hon) and Viola M. Frymann, DO, FAAO, FCA. **Wave Phenomena: Circulatory Dynamics.** These presentations examined basic physiological understanding of Cerebrospinal Fluid activity and the measurement of same in response to cranial treatment of children.

Toshiaki Ueno, MD, PhD. **Cranial Diameter Pulsations.** This presentation provided insight into NASA interest in intracranial pressure responses to microgravity.

Frank Willard, PhD. **The CSF, Ventricles, Circumventricular Organs and HPA; Diaphragm, Lymphatics and Immune Function.** These presentations provided a clear focus for the anatomical basis of osteopathic clinical practice.

Individually and collectively, the presenters contributed greatly to exposition of the original contribution of William Garner Sutherland, DO. It is the intention of The Cranial Academy to publish **Proceedings** of the PRM Research Symposium Segment of this conference.

The American Academy of Osteopathy, through *The AAO Journal* offered support for this conference by providing readers with supplemental writings related to the Sutherland model:

Vol. 12, No. 4 (2002):
Chila, AG. **Fifty Years; p. 5**
Chila, AG. **Recent Research; p. 8**
Sutherland, WG. **Untitled Talk (1944); p. 10**
Nelson, KE. **The Primary Respiratory Mechanism; p. 25**

Vol. 13, No. 2 (2003):
Lippincott, RC and Lippincott, HA. **A Manual of Cranial Technique; Preface to the Second Edition; p. 13**
Moskalenko, Y; Frymann, V; Kravchenko, T; Weinstein, G. **Physiological Background of the Cranial Rhythmic Impulse and the Primary Respiratory Mechanism; p. 21**

Vol. 13, No. 3 (2003):
They went to Paris; p. 10

The Sutherland Cranial Teaching Foundation was chartered in 1953. In that same year, Edmund Hillary and Tenzing Norgay successfully ascended Mt. Everest. Hillary has written of that event as entering the realm of allegory, supposed to mean more than it has any right to mean. In doing so, he was comparing the conquest of Everest to the ultimate feat of exploration, the arrival of *Apollo II* upon the moon. Was that really so? The same assessment might be given to the arduous study of William Garner Sutherland, DO. Was his work allegorical? As Hillary also noted, many hundreds of people have climbed the summit of Everest since 1953. In the case of Sutherland's model, the past 50 years have only begun to show some organization for the planning of a truly successful ascent to the summit of his thought. Based on his effort and the limited technological support available to him during his years of study, his answer to Dr. Anne Wales was one of total accuracy and honesty: *"I Don't Know"*. It remains for others to build on his foundation.❐

Clinical Jones Strain-CounterStrain I for the Spine and Rib Cage

June 4-6, 2004
Indianapolis, Indiana

Problems with whiplash, lowback pain and rib pain?

Edward K. Goering, DO
Program Chair, Co-author of *Jones Strain-CounterStrain*

The program anticipates being approved for 20 hours of AOA Category 1-A CME credit pending approval by the AOA CCME.

Course Description: Level II

Clinical Strain-CounterStrain I is an exciting presentation of a proven clinically effective experience modality for every practitioner. Dr. Goering brings clinical experience from years of practice as well as over 7 years of direct instruction from Dr. Lawrence H. Jones. He has taught throughout the United States as well as international venues. His clinical understanding helps participants appreciate the clinical application of Strain-CounterStrain as taught by its discoverer, L. H. Jones, DO. During the 20-hour course, participants will discuss the theory of somatic dysfunction and manipulation. A very specific presentation of the classic Jones Strain-CounterStrain will be provided as it impacts common clinical problems. The applications of this technique will be demonstrated in multiple clinical examples upon which the student can build an evaluation and treatment. There will be a full presentation of cervical, thoracic, and lumbar spine, as well as the ribs and sacrum. There will also be hands on laboratory time for participants to practice their newly acquired knowledge as they develop skills with each other. A brief review of documentation and coding will be provided.

Prerequisites: Functional Anatomy; One Level I course or equivalent

Learning Objectives:

The participants will be able to clearly discuss the physiology of somatic dysfunction and manipulation as it relates to Strain-CounterStrain in a real-life clinical setting. They will be able to assess a patient for somatic dysfunction utilizing Strain-CounterStrain and determine an appropriate treatment sequence and perform that treatment. Clinical application of this information can be made after the course.

Program Time Table:

Friday, June 4 ..... 8:00 am – 5:30 pm
Saturday, June 5 ..... 8:00 am – 5:30 pm
Sunday, June 6 ..... 8:00 am –12:30 noon
(Friday & Saturday include (2) 15 minute breaks and a (1) hour lunch; Sunday includes a 30 minute break.)

Course Location:

The Radisson Hotel City Centre

Hotel Accommodations:

The Radisson Hotel City Centre
31 West Ohio Street, Indianapolis, Indiana 46204
Room Rate: $125 single/double
Reservation Phone: 317/635-2000
Cut off Date: May 4, 2004

Registration Form
Clinical Jones Strain-CounterStrain I
June 4-6, 2004

Full Name _____
Nickname for Badge _____
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_____
City _____ State _____ Zip_____
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AOA # _____ College/Yr Graduated _____
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(AAO makes every attempt to provide snacks/meals that will meet participant's needs. However, we cannot guarantee to satisfy all requests.)

	Registration Rate On or Before 5/6/04	After 5/6/04
AAO Member	$550	$650
Intern/Resident	$450	$550
AAO Non-Member	$755	$855

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From the Archives

A Glimpse of Dr. Still's Art

One of the most striking features of Dr. Still's art, as I understand it, is his intensive palpation. He early came to the conclusion that the body organism is complete, that the properties of self-repair are either actively or potentially at one's command if he but knows how to liberate the forces. Of this, I am certain he is absolutely convinced. For his experience includes innumerable instances over a long period of time and embraces a wide range of disorders. The osteopathic problem resolves itself to one's ability to adjust successfully the disordered mechanism. But the adjustment in itself is a minor problem. The crux of the matter rests upon one's definite knowledge of anatomical data. To Dr. Still, anatomy means something far more than descriptive texts of dead house findings. It is inclusive of physiology and histology. For what does mere verbiage of macroscopic tissues amount to if the functioning organism is not included? Structure and mechanism is of little use if the dynamics, the living forces, are absent.

To know the living body from the conception of the tactual sense, to know how the tissues feel and react tactually, this is the special desideratum. This takes into consideration something vastly different from structure and mere machine. Foremost in therapy, though directly associated with structure, is function. Without function the organism is a thing of the past. Through the physics and chemistry are expressed in mechanical terms, still there are attributes that carry mechanism beyond the confines of mere machine.

It is the property of the vital organism, as revealed through tactual discipline, the tone, mobility, temperature, and resistance of tissues, not alone structural position and relation, that demand no small part of tactile efforts. All of these are in one sense structural of mechanical expressions, to be sure. But upon the other hand they are in another sense removed from mechanism as we ordinarily understand it, which mechanism after all may only be a simple method of explanation, for they are part and parcel of living phenomena. That is, there is a subtle regulatory system that, at the present time at least, is most difficult to explain in terms of mechanism. Test tube and microscope have their places as instruments of precision, but they cannot supplant a certain definite invaluable knowledge that is obtained by the educated tactual sense. This knowledge is of foremost consideration in actual practice. It distinctly reflects the status of the life-giving forces. In the final analysis, of course, all methods most be coordinated, not in the abstract, but in their application to the concrete case.

Consequently with Dr. Still's conviction that the body is a complete vital mechanism, physiologically unified, it is not surprising that with him the necessity of tactual education is stressed to the point of a martinet. Of this necessity there are no qualifications or howevers. It is absolutely insisted upon. For in no other practical way can the art of osteopathy be attained.

And probably right here is our most serious lapse as a profession, individually and collectively. The very essence of osteopathic science and art comprises the etiologic diagnosis. This is just what makes osteopathy a complete system. The conception is simple and rational enough in theory, but so difficult in practice. Reducing each and every treatment to an individuation, not formula, demands creative endeavor, and require painstaking and exhausting effort. The pulsating, life-giving tissue, with its many possible gradations, must actually be felt with the educated hand in order to that appreciation of its functional integrity may be determined. All diagnostic methods are at best crude and probably will always be so. But this does not preclude that there are certain invaluable measures to be prosecuted. Dr. Still says that probably each tissue is to a certain extent a creator of its own fluid substance. This has been proven in experiments. It goes to show that there is a most practical importance attached to the tactual effort, that to the educated touch invaluable data might be elicited. This is definitely shown in our every day work. Not only can one sense the status of local tissues directly, but there is also a reflected expression of the mechanisms that make up the concatenated organism. In elucidating the significance of circulatory, nervous and chemical mechanisms Dr. Still propounded some of his greatest discoveries that today are being fully vindicated by

experimental work. He always sees beyond the part; physiological unification along normal line is his practical goal. Most important of all has been the practicalness of his efforts. Definite results are secured.

At one period in the history of the parent school Dr. Still practically did all of the examining of patients. He was not especially concerned with the symptoms, although these did not escape notice, but he was concerned with the signs. He personally saw the student's mind was osteopathically educated through his fingertips. Taking the student's fingers in his and specifically revealing or pointing out, and feeling, the lesions and contrasting the same with normal tissues for months at a stretch was his favourite method. And interspersed with this procedure were his many fundamental physiologic conclusions, which have been verified, in later years. It required several months of daily practice before he was satisfied that the student could begin to ascertain through the tactual sense what he should find out. The tactile or palpation corpuscles can be wonderfully developed.

This is the point of view that is so essentially osteopathic, and which is so elusive if the necessary educational groundwork is not forthcoming. And still to put it into practice is difficult. For so much of our present-day literature, at least, and the vast bulk of medical writings, deals with symptoms and post-mortem physiology. The actual osteopathic pathology of the living should demand more of our attention and study. This is not saying that other things are not of value, but emphasizing the point that relative proportions are hugely distorted. We are not lacking in theory, and which is receiving added support from many quarters, but it is safe to say that every one of us falls short in etiologic diagnosis of our art. And this is the very thing that determines our success.

How many of us ever stop and think how absolutely revolutionizing the osteopathic viewpoint is? It is so clear-cut and logical, in fact, exceedingly practical when once attained. The difficulty arises in divorcing ourselves from preconceived ideas of which medical coloration comprises no small portion. The contrast of data between the really osteopathic with that of the so-termed medical is sharp and common sense that nothing else can so clearly reveal the genius of Dr. Still.

Every day technique is a definite index of one's osteopathic conception. If an osteopathic diagnosis is really made there can never be even to the uninitiated any semblance of routine.

Starting with the theory of osteopathy, which from its wide and fundamental biological viewpoint, mustneeds give a new and added value to every subject in the curriculum, the chief reliance of students as well as practitioner must always be in anatomy and physiology. The living body should be interpreted by this scale. All other measures are subsidiary. This is the osteopathic yardstick and nothing will suffice. A laboratory diagnosis, for example, amounts little to the practitioner unless it is interpreted individually and in conjunction with other factors elicited by the patient. The law of averages and statistical deductions are no more absolute than routine technique. Every case must stand out as a distinct and definite problem. This is a point that Dr. Still has always insisted should be clearly understood.

The native ability of a student always means far more to Dr. Still than traditional influence or formula. In fact the latter tends to stultify the effort.

He clearly saw the pitfalls of both tradition and imitation. Nothing can warp one's judgment like tradition, though in certain instances it may serve a useful purpose. For individual premises are revealed in every problem. And an art that is based upon limitative effort can rarely succeed, for art means creative endeavor. Here, to him, as I understand it, is the essence of osteopathic practice. There can be no repetition in a series of cases from the very nature of things. Every instance stands out sharp and clear-cut, depending upon problems presented, of which no two can be alike, and thus demanding a different application of the principle involved. This requires art, science, skill, dexterity. This, to Dr. Still, I am certain, is osteopathy. This is the great reason he was so reluctant to have any one try to imitate some technique manipulation. He clearly foresaw its dangers. He undoubtedly saw that the spirit of tradition dominated medical practice, and he fought hard to get away from it. For if the fundamentals, the basic principles of osteopathy are correct the successful practitioner must by virtue of this, by absolute necessity, account by his own ability in solving the many and varying applications of the principles at the bedside. Manipulation can never be anything but a means to an end. Etiologic diagnosis is the leading star.

Thus back in his practical work he always came back to the anatomical study. This is the bedrock upon which the values will be found. Anatomy is not something to be studied, laid aside and then forgotten. It is the source of eternal knowledge.

To apply an art demands a definite preconception of the thing applied. Otherwise the technician cannot be anything else than a bungler. Certainly routine technique is not an art, but a crude imitation. This is not implying that systematic overhauling of the mechanism is routine. There is almost as much difference between the two as between abortion and a full term delivery.

I know that I am bearing down strongly upon this point. But it is a feature that Dr. Still emphasized for years.

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"Engine wiping" was his proverbial red tag. He so well knew that it was one of osteopathy's great dangers.

The osteopathic concept stands out so vivid and clear-cut that if it is once thoroughly attained the student should never have any doubt as to the indicated method of procedure. Manipulative skill is far from being the first thing to be desired, but instead skill in osteopathic diagnosis. Only by the latter can one develop a keenness of tactual sense that is so essential in practice. This is by all odds the first step to manipulative efficiency. The second is a knowledge of mechanics. Fundamental to both is an understanding of minute living anatomy and its physiological unification. There is no royal road to such an attainment. Even the practitioner of many years' experience is constantly perfecting his methods if he expects to continually improve his work. This is one lesson that Dr. Still taught that is irrevocable.

It is evident that there is only one way to thoroughly apply the osteopathic art. And that is to know the living anatomy, how it looks and feels, and reacts to the tactual sense. Then one is in a position to make a study of the all-essential minutiae revealed in each and every case. The indicated mechanics, or manipulative technique, will offer its own solution if one has any mechanical ability.

Those who have had the great privilege of seeing the masterful work of Dr. Still over a period years know full well that his examination and technique have no qualities of hit or miss, of general movements, and the like. He is never satisfied until he is reasonably certain that the specific lesions have been located. Then he is just as particular in applying the individual technique. He never for a moment loses sight of minutiae, for herein is the key of the inception of pathologic processes.❒

Some Personal Traits of Dr. Still

My acquaintance with Dr. Still began in the late summer of 1894 when I went to Kirksville to take up the study of osteopathy. My first meeting was probably a typical one of those days. He had just finished a four-hour period, beginning at seven in the morning, of treating patients and was ready for a ramble of an hour or two in the woods below the infirmary. I was invited to accompany him. Dr. Patterson had just introduced me, saying I was a prospective student. As we walked along, he talked of various things aside from osteopathy. It was one of those experiences that many have thoroughly enjoyed. For Dr. Still was a rare observer of nature. Nothing apparently escaped his notice. No doubt he received much refreshment in this way. But beyond all he was a child of nature. He saw far beyond the mere objects. Everything to him seemed to be literally pulsing with life, of which the inner meaning was sought, analyzed and arranged after a certain order of cause and effect and its relationship to the universe. Nothing was isolated. There was order and a certain completeness, subject to the law of change, in his scheme of life. Natural history and astronomy evidently had especial fascination. Many a striking biologic conclusion worked out in his actual experience with disease received added confirmation due to his keen observation and understanding of wildlife.

To a student, I think his love of work, aside from his store of exact knowledge, was most noticeable. Sixteen hours a day seemed to be his usual time spent in study, experiment and demonstration. But I am certain it was never irksome. He got pleasure from his work. His mind was not a single track. His thoughts embraced extensive researches. Books on science interested him provided they were not too much padded with theory. Actual facts and pertinent observations were the features that commanded him. He was a master of painstaking detail.

At this period the patients were treated and the classes held just across the street from the present buildings. The infirmary was being completed, consisting of the central portion of the present school, a building at that time of beautiful architectural lines. I believe nothing could have pleased Dr. Still more than the erection of this structure. It was substantial evidence of a thorough going establishment, representing a culmination of years of toil, struggle and every form of discouragement. This in one sense was the material answer to his many carping critics, and probably the only answer a number could really understand. His buoyant and youthful nature held full sway, and we saw Dr. Still at his best. His sincerity and simplicity stood out in outline, and these qualities, in my opinion, added many years to his life. The truth to him was something sacred. This is not to say that he was not appreciative of honors provided they were not fulsome, but riches and favors in the ordinary sense would not interest him.

To analyze a character at best always leaves a certain coldness and flatness. For this reason I am referring to a few personal characteristics. The courage and fortitude of a man

continued on page 42

Neuromusculoskeletal Medicine/ OMM: Useful to ALL DOs

Richard L. Van Buskirk, DO, PhD, FAAO

Many of those who have given the Scott Memorial Lecture over the years have presented new ideas, thoughtful statements on the state of osteopathic medicine and reexaminations of the philosophy of osteopathy as first enunciated by its founder, Dr. Andrew Taylor Still. Today, I propose to look at a more practical set of issues related to the use of osteopathic manipulative treatment. Most of these ideas stem from my personal experience and growth, largely triggered by my redevelopment and use of the Still technique in my daily practice.

During the early years of osteopathy all DOs utilized osteopathic manipulative treatment (OMT) as one of their major modes of treatment. Today the statistics suggest that few osteopathic specialists and only a minority of family practitioners, internists and pediatricians use OMT on any routine basis. Osteopathic physicians who have specialized in musculoskeletal medicine deliver the vast majority of OMT. One of my objectives, based on personal experience, is to suggest reasons why it is useful for primary care physicians and other medical specialists to include OMT in their practices. My second objective is to suggest that we need a change in our educational programs if we are to regain strong support for and use of OMT by most practitioners. My final objective is to encourage those of you who find in yourselves a strong affinity for OMT to consider the neuromusculoskeletal specialty.

Like many osteopathic physicians who have specialized in musculoskeletal medicine, I started out doing a different form of osteopathic practice. I am residency trained and board certified in osteopathic family medicine and for the first twelve years of practice I functioned as a family practitioner. For theoretical, personal and financial reasons I always included manipulative medicine in my treatment armamentarium, but my practice was focused on the general health and healing issues facing all primary care physicians.

When I first began to practice I did not possess a manipulative technique that was fast, easy, safe, relatively pain-free and effective. Like most osteopathic physicians, I found the formal musculoskeletal diagnosis taught in school cumbersome and time consuming. Further, to perform a good diagnosis required detailed analysis and equally detailed knowledge of neural, vascular, musculoskeletal and fascial anatomy.

HVLA became my primary method of OMT because, as commonly practiced it is fast, relatively safe and reasonably effective. However, as used by most osteopathic physicians HVLA is performed without too much attention to segmental diagnosis ("shot gunning"), it is certainly not pain-free and it does tend to generate a fear-factor in many patients. Muscle energy and counterstrain are easy, safe, pain-free and effective but both require an additional level of knowledge and sensitivity to the nuances of musculoskeletal anatomy and function to be truly effective. As well, counterstrain certainly is not fast. In my early practice I used all three techniques: HVLA for the majority of the spinal dysfunctions, muscle energy and counterstrain for patients who were afraid of HVLA or who I judged to be too dangerous for me to be working on with my limited command of HVLA or for "clean up" after HVLA. Like many others, I could "get the job done." In retrospect, I am not happy that I was so cavalier about musculoskeletal diagnosis. As osteopathic physicians we should be evaluating our patients as carefully and accurately as possible before initiating any treatment. This is just as true of a musculoskeletal dysfunction as it is for cardiovascular disease.

After a few years of practice, I almost literally stumbled onto the Still technique. It is not my intent to go into the details of its rediscovery and redevelopment as I have discussed this in and out of print many times. When I first began redeveloping the Still technique, I was quite surprised at its relative ease of application and really had to struggle to understand how it could have been lost to the profession. I knew that Dr. Still had emphasized the philosophical and anatomical underpinnings of his new science of osteopathy and didn't feel that any one technique, including his own, was worthy of becoming the

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osteopathic treatment method. Nonetheless, it seemed to me that Dr. Still's manipulative method came close to the ideal for a musculoskeletal technique that could be used by most physicians in their daily practice. The Still technique was fast, safe, pain-free, relatively easy, and effective. The only problem was that to make it work for spinal somatic dysfunction required more accurate diagnosis than I had been used to. This was not a bad thing since I should have been working toward accurate musculoskeletal diagnosis all along. Over the years as I redeveloped the Still technique I also was developing and in some cases borrowing faster diagnostic techniques from other, more experienced osteopathic physicians. Using these tools today, adequate diagnosis probably adds between two and four minutes to the routine evaluation and management. Treatment limited to the spine, ribs and pelvis, the most common areas of complaint and the areas most likely to have big effects on other health issues, typically requires another two to four minutes.

As I treated between 15 and 25 patients a day, 4 and 1/2 days a week, I developed increasing proficiency at treating musculoskeletal problems. This led to many new patients coming into my practice because they had heard that I was an osteopathic physician who was in fact doing OMT and performing it increasingly well. I am sure the change to a more gentle and effective treatment mode as embodied in the Still Technique was also a strong selling point. Even though there are more than 60 osteopathic physicians in my community, few perform OMT on their patients. As a result I also began to see many patients who were disappointed that their osteopathic physicians weren't doing OMT.

Among the local MDs only the orthopedic surgeons typically address musculoskeletal problems and their tools are limited to surgery, injections and referral to physical therapy. For many patients this is not sufficient, particularly when the problem involves the spine. So they seek treatment elsewhere. As in most communities there are many chiropractors treating back and neck problems. In spite of the chiropractic use of x-rays and other limited diagnostic tools, most chiropractic treatment consists of a routine set of high-velocity operations that are not dependent on the specific structural findings of any individual patient. Chiropractors also frequently include the use of a vast array of adjunctive physical therapy treatments. Although many patients are satisfied with chiropractic care, many more become dissatisfied over time and seek other treatment. Thus, because of my increasing competence in dealing with musculoskeletal problems, I also began to attract increasing numbers of patients who sought care specifically for musculoskeletal problems.

Over time my practice grew. I was able to hit the upper third of the income range for family physicians within six years of starting private practice and did so without seeing the large number of patients per week that is the lot of generalist physicians in this day and age. In my final year of practice as an osteopathic family physician my income was in the top 2% of all family physicians according to data from *Medical Economics* and I was seeing an average of 20 patients a day. I had a loyal following of patients and was well regarded in the medical and general community. Unfortunately, the number of patients in my family practice grew too large for one physician.

I had initially started with OMT integrated into my practice for theoretical reasons. Certainly there were benefits to the patients beyond the treatment of their musculoskeletal complaints. For instance, in my 12 years of family practice I did not have one patient develop status asthmaticus, even though I had many asthmatics in my practice. Again, based on musculoskeletal reflexes I was able to predict whether patients with new chest pain had a cardiac component, much to the amazement of the cardiologists to whom I referred these patients. Thus, my patients were enjoying the health benefits of a medical practice with integrated OMT and I had all the patients I could handle along with a very good income. In this regard I was not unique in the osteopathic medical community. This is the experience of many of those osteopathic physicians who choose to practice what I would term neo-traditional osteopathic medicine.

Based on my own experience, I believe firmly that virtually every osteopathic physician, whether in primary care or a specialty, should seriously consider integrating OMT into his or her practice. The problem for you, as for me, is to find a technique that fits the needs of such a practice. It is perfectly reasonable to practice in an eclectic fashion as I did initially. Another option is to learn and utilize a single manipulative technique frequently. If you indeed practice on each patient, soon your level of proficiency will astonish you. In either case, I would urge you to develop some skill at rapid diagnosis so that, as discussed earlier, you are practicing the musculoskeletal component with the same degree of diagnostic skill as the rest of your practice.

The issue I have with the current system is that we are teaching osteopathic manipulative medicine with too much detail, too little of which applies to an actual day-to-day medical practice. This and the lack of practice on real patients lead to the feeling among students that they are learning nothing of practical value. Again, because the diagnostic techniques taught are too complex and time consuming, and they are not

typically tied to structural and functional anatomy, diagnosis becomes something learned for tests. Ultimately then the current system fosters little appreciation of how OMT fits into real day-to-day osteopathic practice. There is a great need to teach simple diagnostic and treatment techniques beginning in the first year of osteopathic medical school. A clear statement of the method behind each technique and how it works to restore normal functional anatomy should be taught from the beginning. I suggest that we need to minimize the number of techniques taught, keep the details at a level consistent with the needs of most practitioners, and emphasize repetition and application to real patients. Just as we teach the basics of surgical practice, not the details that make a surgeon, so too should we teach the basics of OMT, with just enough details to whet the students' appetites. Repeat these courses for students throughout the years of medical school and internship/residency and then again for practicing physicians. As physicians become very comfortable with one to three techniques as applied to the core spine, ribs and pelvis they can, if they wish, take more advanced courses in other techniques, and advanced versions of the techniques they are already comfortable with.

Over the past ten years, I have put a lot of time, research, and thought into redeveloping Dr. Still's manipulative method. It has been a labor of love and has led to significant changes in my practice and professional life. The technique is astonishing in its breadth of coverage and the apparent simplicity. Certainly the underlying basic principals of the treatment are simple. The current formulation of the method underlying the Still Technique is as follows:

1. Place the affected tissue in its position of ease

2. Introduce a force vector from another part of the body. This site of introduction when moved should induce motion in the affected tissue

3. Using the force vector as a "stirring rod" move the tissue in a smooth path from its position of ease toward and through the position of its restriction.

4. As the tissue moves through its restriction a "bump" and/or a click may be felt or heard.

5. Passively move the tissue back to neutral and retest.

With a minimum amount of training one can use the Still technique to effect good correction of spinal and pelvic dysfunctions. This makes the technique a potential candidate for every-day use by most osteopathic physicians who are interested in integrating OMT into their practices. If you would seek to include OMT in your osteopathic medical practice without specializing in musculoskeletal medicine you could easily master the Still technique at this level and do yourself and your patients quite a bit of good. Of course mastering any other osteopathic manipulative technique at a similar level, including knowing the basic underlying anatomy and accurate diagnosis, would give you a similar benefit.

The process of redeveloping the Still technique also led me down an unexpected path towards specialization. In a formal sense most of the original osteopaths were musculoskeletal specialists, because mastery of the musculoskeletal system and its relationship to the rest of the body were what made one an osteopathic physician. However, as the profession added the medical and surgical material that defined and made MD medicine so successful, emphasis on mastering the musculoskeletal system declined, and the new breed of osteopathic physicians came to be defined more by the mastery of medicine with an integrationist and humanistic philosophical bent. However there has always been a small group of osteopathic physicians who gravitated to the musculoskeletal and manual medicine aspect of the profession. These sometimes became the teachers of osteopathic principles and practices at the colleges. Others remained in private practice, functioning as specialists in musculoskeletal medicine just as other physicians specialize in cardiology, or neurology or orthopedic surgery.

As I used and redeveloped the Still technique I found it to be quite effective at dealing with a much wider range of musculoskeletal problems than just those present in the spine and pelvis. Treating problems as various as carpal tunnel, brachial plexopathy, headache, closed head injuries, costochondritis, sciatica, mechanical gait disturbances, sprains and strains, and finally in the cranial field I found that the need for diagnostic specificity of each problem forced me to become more knowledgeable about structural and functional human anatomy of nerves, muscles, tendons, ligaments, joints, joint capsules, menisci, arteries and veins. I have come to understand that at its most advanced level, the Still technique requires a very high level knowledge of musculoskeletal anatomy, particularly at a functional level.

I did not have that level of anatomical knowledge when I began this journey ten years ago in spite of an excellent course in anatomy in medical school and a one-year foray into general surgery during my residency years. It has only been the process of redeveloping this wonderful technique and applying it to my patients day in and day out that has given me the intimate knowledge of human anatomy that I possess today. It has been a steep learning curve. If I had had the foresight and wisdom to see the ultimate importance of functional anatomy to the kind of medicine I practice today, the process might have been easier.

Truly the Still technique is a form

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of applied anatomy, as are all forms of osteopathic manipulation. I believe that this is the ultimate reason Dr. Still was so adamant about osteopathic physicians learning anatomy and one of the principle reasons his technique did not become the standard manipulative technique for the profession.

Finally I would like those of you who find an interest in osteopathic manipulative treatment (OMT) to consider seriously becoming a specialist in neuromusculoskeletal medicine. I have argued long and hard, both in print and in teaching, for the tight integration of musculoskeletal medicine in the practice of all osteopathic physicians. However, over the past century medical knowledge has burgeoned and the use of chemicals and surgery to improve the functional well being of our patients has drastically improved. So vast is the amount of medical information that the most likely strategy any medical or osteopathic student will adopt is to specialize, thereby limiting the scope of detailed knowledge that must be mastered. While I am philosophically disturbed by the fractionation of medical care and believe strongly that there is a great need for integrationists (commonly termed generalists), I have finally come to accept the need for the specialty that osteopathic medicine is now terming neuromusculoskeletal medicine. The number and complexity of potential problems arising from the musculoskeletal and nervous systems and the variety of treatment methods, including those unique to the osteopathic profession (OMT) makes this uniquely osteopathic specialty a virtual necessity. Some of you will be willing to concentrate on learning the nuances of the musculoskeletal system at a level sufficient to truly become a master. For you the path is clear: learn anatomy, learn the basics of neural and musculoskeletal diagnosis and treatment and then take coursework beyond the basics, do a neuromusculoskeletal residency, and above all, practice. When you have treated 100 patients a week for 50 weeks, you have just scratched the surface. When you do this year after year, you will come to a point where you and your patients have the confidence that you are able to help them find a new, more effective balance and perhaps even heal their musculoskeletal problems. In my journey in the land of osteopathic medicine, I have finally arrived at this point and I must say it is intensely gratifying. This is what the rediscovery and redevelopment of the Still technique has done for me.❒

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Sarasota, FL 34233
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Dr. Fulford's Advanced Percussion Course

April 24-25, 2004

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The Common Compensatory Pattern: Its Origin and Relationship to the Postural Model

Ross E. Pope, DO, FAAO

Introduction

J. Gordon Zink, DO[1] was the originator of the term Common Compensatory Pattern (CCP). He used the term to describe commonly found patterns of dysfunction in the body (neuromyofascial-skeletal unit[2]) as a whole. Several other physicians[3-6] before and since, have also described recurring patterns of dysfunction found in their patient populations. Dr. Zink, however, is considered to be "… the first to provide a written, understandable, and clinically useful explanation for treatment, with a method of diagnosing and manipulative methods of treating the fascial patterns of the body."[7] Zink himself considered these concepts to be the basis of a respiratory and circulatory care model.[2]

As osteopathic clinicians we frequently find recurrent patterns of fascial bias, postural asymmetry, somatic dysfunction, and functional disturbances. We frequently see a clinically short right leg, a cephalad pubes dysfunction on the left, a posterior ilium on the left and an anterior ilium on the right. Patients regularly display a left-on-left sacral torsion with L-5, side bent left and rotated right as well. These are just a few of many commonly found somatic dysfunctions; the list is long. Radiographically, with our patients' postural studies, we can find recurring patterns of postural asymmetry that includes the anatomic short right leg and a sacral base declination to the right with compensatory rotoscoliosis. Beyond these findings we have recurrent patterns of functional disturbance such as muscle imbalance and visceral dysfunction, coupled with common systemic complaints.

Why do we see these same patterns over and over again? Is there a linkage between all of these commonly found clinical phenomena? Further, what is the clinical significance of these patterns? There appears to be an inherent fascial bias found in most people. There also appears to be a causal linkage between fascial bias and subsequent growth of the individual. Could these governing factors explain recurrent patterns of postural asymmetry that we find in the postural model? The probable key to these questions and their answers reside in the fascia.

The Fascia

" The fascia is the place to look for the cause of disease and the place to consult and begin the action of remedies in all diseases" — A.T. Still.

The fascia is found in sheets or bands of fibroelastic connective tissue throughout the body. The term is Latin for 'band' or 'fillet'. Every bone, muscle, nerve and organ develops within and is covered with some form of fascia. "If all other organs and tissues were removed from the body, with the fascia kept intact, one would still have a replica of the human body".[8]

Fascia is classified as deep, subserous, and superficial.[9] The deep layer serves to compartmentalize organs and muscles and nerves. Examples of these deep and thick fascias include the fibrous pericardium, parietal pleura, perineurium, and perimysium. The subserous fascias are fibroelastic connective tissues that cover and protect organs. Examples of these are the pleura, pericardium, peritoneum, and other organ capsules. The superficial fascia lies beneath and is continuous with the reticular dermis. There are numerous small fibrils that act to anchor the superficial to the deeper fascias of the body.

From the study of anatomy we know that the majority of fascia is arranged longitudinally. Consequently, we would expect that forces directed through palpation parallel to fasciae would allow an examiner to appreciate a greater sense of freedom in this direction than in the side to side direction. But clinically we can find that the fasciae move with greatest ease obliquely in a direction of side bending and rotation[10], thus displaying a combination of longitudinal and lateral movements.

Areas of muscular imbalance or somatic dysfunction can impose functional restrictions that will inhibit fascial motion. Frequently, the regions

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of most restriction can be found in what is known as transitional zones (Table 1).

Anatomically, these areas are also known as junctions, where the function of the spinal column changes. Zink[11] considered these the anatomical weak points. Additionally, each of these zones is associated with an actual or functional transverse diaphragm. There is extensive mobility at the OA or the craniocervical junction. At this junction the heavy head balances on the supple cervical spine. This is the site of the tonic neck reflexes, which influences postural muscular tone throughout the trunk.[13] If function is disturbed here, it frequently creates hypertonus of the postural muscles, disturbances of equilibrium and locomotor deficits. Rotational movement is most affected at this junction because only the atlantoaxial joint is ideally suited for rotation. There is a direct connection between the dura at the rectus capitis posterior minor at this junction, and cranial nerves IX, X, and XI also traverse this junction.

The cervicothoracic junction is the region where the most mobile part of the spinal column is joined to the relatively rigid thoracic spine. It is also where the powerful muscles of the upper extremities and shoulder girdle insert. It is associated with the thoracic outlets/inlets through which traverse the lymphatic ducts, the right and left brachial plexus, and the phrenic and vagus nerves.

At the thoracolumbar junction spinal function changes abruptly as is seen in the differences in the upper (thoracic) and lower (lumbar) apophyseal joints of T-12. Somatic dysfunction in this area can be associated with hypertonus of the iliopsoas, quadratus lumborum, thoracolumbar erector spinae and inhibition of the rectus abdominus muscles. The abdominal diaphragm, which is physiologically the most important diaphragm, is found in this transitional zone. Through it passes the esophagus, the thoracic duct, the aorta, vena cava, and the azygous veins as well as the vagus and phrenic nerves. Contraction and relaxation of this diaphragm provides the impetus for breathing and it also produces alternating intrathoracic and intra-abdominal pressure gradients which provide the pumping mechanism for the venous and lymphatic circulation.

TABLE 1. TRANSITIONAL ZONES

ZONES	JUNCTIONS	TRANSVERSE DIAPHRAGMS
Occipital-Atlantal (OA)	Craniocervical Junction	Tentorium Cerebelli
Cervico-Thoracic (CT)	Cervicothoracic Junction	Thoracic Inlets/Outlets
Thoraco-Lumbar (TL)	Thoracolumbar Junction	Respiratory Diaphragm
Lumbo-Sacral (LS)	Lumbosacral Junction	Pelvic Diaphragm

The lumbosacral junction forms the base of the spinal column and is therefore a major determinant of body statics. Movement from the legs is transmitted through this junction to the superincumbent spine. By muscular and fascial continuity the pelvic diaphragm is associated with this junction. It supports the pelvic viscera and invests the sacral plexus. It transmits lymphatics, splanchnic and pudendal nerves, the anal canal, the urethra, and the vagina. Its normal function is to remain relaxed and work in synchrony with the abdominal diaphragm and thus allow efficient return of lymph back into the venous circulation.

Restrictions in these transitional zones can cause major alterations in the function of surrounding structures, and thus directly or indirectly influence the health of the body. Zink studied people who considered themselves healthy and recorded "normal" fascial motions in each of these four zones.[12] He also studied the fascial patterns of hospitalized patients and outpatients who were considered to have low levels of wellness. With this information he identified three classifications of fascial patterning and labeled these *(1) ideal, (2) compensated, and (3) uncompensated.* He then associated these patterns with perceived patient wellness.

The ideal pattern is demonstrated by equal fascial glide in the side to side and longitudinal directions. Thus, there would be no apparent preference for fascial rotation or sidebending to either the right or the left, in any transitional zone. This ideal pattern is seldom if ever seen in the clinical setting. Alternating patterns of fascial ease and restriction are common. Usually a rotational bias in one transition zone is accompanied by an opposite fascial rotation in the next zone throughout the body. This alternating pattern, found in healthy subjects, was considered compensated (Figure 1). Zink reasoned that counterbalanced rotations were more adaptive and that was why these individuals responded more favorably to stress or illness. Those people with uncompensated fascial patterns, where the rotational pattern did not alternate, were thought to be less healthy.[12] They were more likely to have suffered trauma and demonstrated slower recovery from illness.

During these studies, Zink found that approximately 80% of healthy people had body patterns of L/R/L/R, while the other 20% displayed the opposite R/L/R/L pattern. He named this first pattern the Common Com-

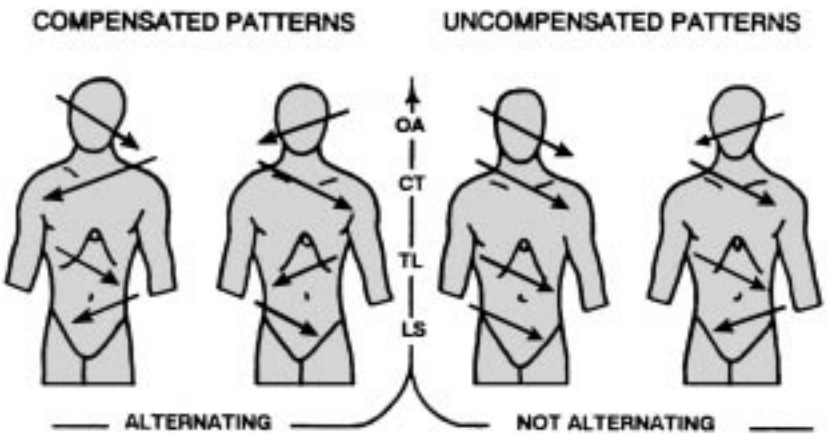

Figure 1. Compensated and Uncompensated Patterns. [Reprinted with Permission. Adapted from *Osteopathic Principles in Practice* by William A. Kuchera and Michael L. Kuchera, Copyright 1994.]

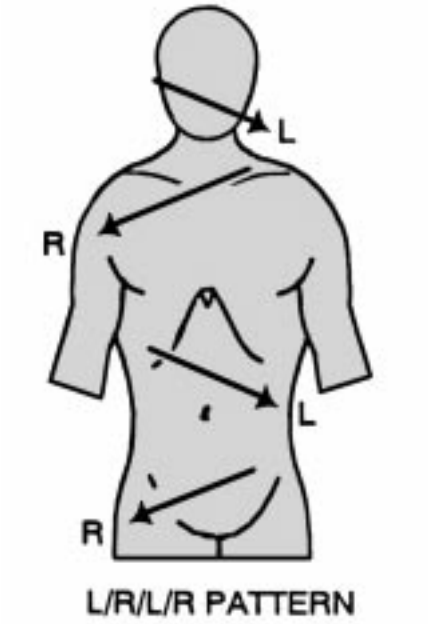

Figure 2. The Common Compensatory Pattern [Reprinted with Permission. Adapted from *Osteopathic Principles in Practice* by William A. Kuchera and Michael L. Kuchera. Copyright 1994.]

pensatory Pattern or CCP (Figure 2). The CCP can be seen as a bias of the fascias of the body along its length, occurring from the ground up. Such that, with respect to the feet the pelvic girdle is found to be rotated to the right, the lower thoracic outlet to the left, the upper thoracic outlet to the right, and the craniocervical junction to the left.

"The Tie that Binds"

The Common Compensatory Pattern can also serve as the common denominator between several of the therapeutic models used in osteopathic medicine. There are a number of recurrent patterns of dysfunction found in the muscle energy model that have already been mentioned and will be addressed further in the section entitled, Postural Asymmetries and the Postural Model. Janda[6] and Greenman[14] have described commonly found muscular adaptations where the postural muscles tend towards hypertonus and contracture while the dynamic muscles tend towards overstretch and hypotonus. These imbalances usually occur between the paired antagonist muscle groups in such a manner that the tight postural muscles, unopposed by the inhibited dynamic muscles mirror the sidebending and rotation of the body found in the common compensatory pattern. There are also many commonly found craniosacral patterns that are associated with the CCP. The relationships between the craniosacral model and the CCP are highlighted in a subsequent subsection entitled the "bent twig". Finally there are also numerous correlations between the postural model and the CCP which we will explore in some depth in later sections.

Of course as students and clinicians we all have an intuitive sense that all of these models should be interconnected, but what is their connection? This is a question that the osteopathic profession has been working with for a long time and it goes to the heart of one of the primary tenets of osteopathic philosophy, that "Structure and Function of the human body are interrelated at all levels."[15]

Thus far we have looked at the universal anatomical nature of the fascia and the universal clinical nature of the common compensatory pattern. To have a better understanding of how they are related and in turn how they relate to many different osteopathic models, let's look at these universal factors from a developmental standpoint. To begin with, how does the common compensatory pattern originate?

3. The Origin of the Common Compensatory Pattern

Figure 3 shows a brief overview of the development of erect posture.[16] We know that as the embryo is enfolded in the womb its back describes a C-curve. It is not one continuous curve but rather a series of bent segments that intersect at what will become the transitional junctions. The child attains upright posture first through the development an anterior cervical convexity and then an anterior lumbar convexity.

Zink[1] believed that the lumbar spine of the growing child was especially vulnerable to repeated minor traumas that result in twisting of the torso. He also felt that the ideal physiologic pattern was best suited for lo-

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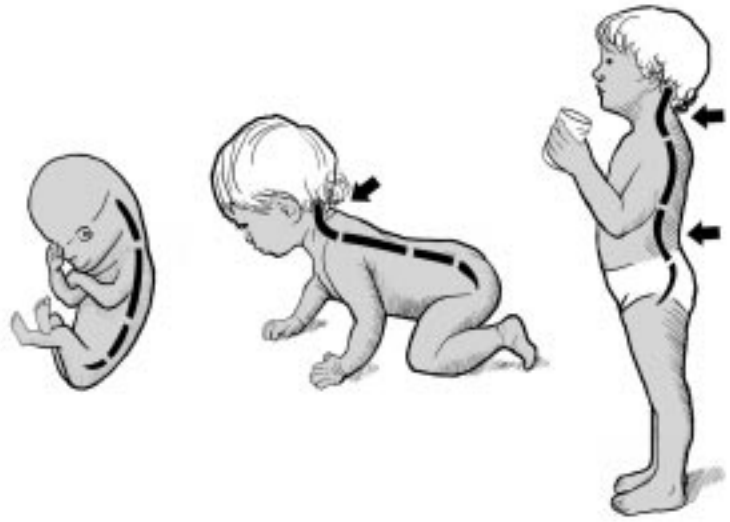

Figure 3. Developmental Stages. [Reprinted with Permission. Illustrated by Laura Maaske – Medimagery LLC, Copyright 2003. All rights reserved.]

comotion, and that while the CCP was not as efficient a pattern, it was very adaptive.

Implicit in these statements is the reasoning that during childhood development, as the infant attains the ability to crawl and then eventually to stand and walk, that they will adopt the more adaptive rotational pattern of the CCP. In other words, as a consequence of repeated minor traumas the lumbar spine develops a twist or bias of rotation. Then through the reciprocating rotational motions of walking this torsional bias is transmitted to the other junctional regions of the spine.

There have been several other reasons offered to explain the common compensatory pattern. It is generally known that there is a predisposition toward early left hemispheric dominance or cerebral lateralization in the human brain. This same cerebral lateralization has been found in primates and implies a genetic origin.[17] Gerchwind's theory[18,19] of cerebral lateralization acknowledges a genetic basis for predominance of left hemispheric dominance, hence right hand and foot dominance. He related variance in dominance to prenatal testosterone levels that account for a myriad of neurobiologic observations in children and adults. These findings include: (1) the excess of left-handedness in males, (2) male predominance in stuttering, autism and dyslexia, (3) superior verbal ability in females, (4) superior spatial ability in males, (5) left-handedness being more common in developmental disorders and learning disabilities, and (6) immune disorders being more common in non right-handers. Cerebral lateralization causes right hand and foot motor dominance, which through repetitive use is thought to cause the common compensatory pattern. Previc[20] postulated that right hand and foot dominance could also be in part due to left vestibular dominance. Interestingly enough he traced this vestibular lateralization to asymmetric positioning of the fetus *in utero* during the final trimester. We will discuss this concept in more depth in the section on postural control.

Some have even suggested a genetic basis by comparison with helical formations found in nature.[21] Structural asymmetries have also been implicated. Osteopathic clinicians have long thought that there is a positive correlation between the postural asymmetries (anatomic short leg, a small hemipelvis, and asymmetric position of the liver, etc.) and the CCP.[21] Hence, many have attributed the origin of the CCP to these asymmetries. Finally, still others have "…wondered if the fact that most children are delivered in a vertex presentation with the left occiput anterior might be a factor in the development of the functional asymmetry of the musculoskeletal system".[5]

As we have seen, Zink's explanation for the origin of the CCP has a developmental basis. There is further evidence, which will be discussed that supports the conclusion that the CCP and postural asymmetry may be developmentally related. It appears then; that there are several different factors related to the origin of the Common Compensatory Pattern.

1) Genetic Potential
2) Development Influences
3) Structural Asymmetries

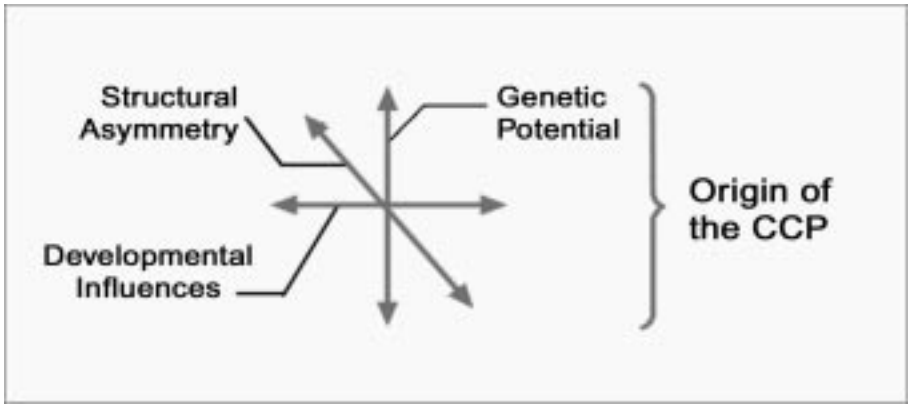

Figure 4. Origin of the Common Compensatory Pattern

This can be abstractly represented in the familiar xyz-axes of the Cartesian coordinate system and are shown in Figure 4.

For purposes of discussion we can divide developmental influences into the events that occur before, during and after birth. Gestation is the time period between conception and birth and lasts approximately 40 weeks. Birth itself is a period of marked environmental transition and is divided into the stages of labor and delivery. Then after birth, growth and development includes not only changes in the size of an individual but also continuing adaptations of the individual to their environment. Even once we achieve adult proportion development does not end. Bone can be remodeled throughout life as the relative stresses on it change. New collagen realigns in the connective tissue in response to vectors of stress. Finally, muscles continue to respond to stress through patterns of disuse and overuse and can adaptively change their physiologic type, i.e. Type I into Type II muscle fibers and vice versa.[22]

In the following sections we will examine several of these developmental influences that can have an impact human on structure and function. The first of these factors to be considered is fetal growth.

4. Fetal Growth

Fetal growth has been divided into three phases. The first phase, from conception to the early second trimester, involves cellular hyperplasia, an increase in the number of cells of all organs. This phase is followed by a period of continued hyperplasia and hypertrophy, involving both cell multiplication and organ growth. In the third phase, beyond 32 weeks, cellular hypertrophy is the dominant feature of growth. Cell sizes increase rapidly and fat deposition begins. Fetal weight may increase by as much as 200 grams per week.

In these later weeks of pregnancy, the fetus assumes a characteristic posture sometimes called its *attitude* or *habitus*. This characteristic posture results partly from the natural growth of the fetus and partly from the natural process of accommodation to the uterine cavity. The *lie* of the fetus is the relation of its long axis to that of the mother and is either longitudinal or transverse. The longitudinal lies are present in approximately 99% of labors at birth.[24] The presenting part determines the *presentation*, which in longitudinal lies results in either a cephalic or a breech presentation. Table 2 displays the presentations found at various gestational ages. [25]

We note that as pregnancy progresses the fetus is increasingly found in the longitudinal lie.

The reason for this is thought to be relatively straightforward. [23] Until about the 32nd week, the amniotic cavity is large compared to the fetal mass and there is no crowding of the fetus by the uterine walls. Beyond the 32nd week, on a relative basis, the amniotic fluid decreases and the fetal mass increases. Therefore as a result, the uterine walls are apposed more closely to the fetal parts. Data in the table also points out that an overwhelming majority of fetuses are found in the cephalic presentation as shown in Figure 5. Conventional wisdom explains why the fetus presents cephalically by pointing towards the piriform shape of the uterus. "Although the fetal head at term is slightly larger than the breech, the entire podalic pole of the fetus–that is the breech and its flexed extremities–is bulkier and more movable than the cephalic pole. Thus the bulkier podalic pole makes use of the roomier fundus." [23]

The *position* of the fetus refers to the relation of the fetal presenting part to the right or left side of the birth canal. Accordingly, with each presen- ➔

TABLE 2. FETAL PRESENTATION AT VARIOUS GESTATIONAL AGES DETERMINED SONOGRAPHICALLY

Gestation (weeks)	Total Number	Percent		
		Cephalic	Breech	Other
21-24	264	54.6	33.3	12.1
25-28	367	61.9	27.8	10.4
29-32	443	78.1	14.0	7.9
33-36	638	88.7	8.8	2.5
37-40	463	91.5	6.7	1.7

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Figure 5. Left Occiput Anterior. [Reprinted with Permission. Illustrated by Laura Maaske – Medimagery LLC, Copyright 2003. All rights reserved.]

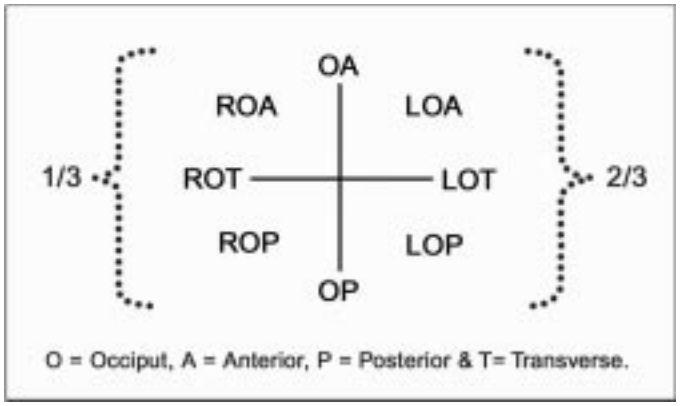

Figure 6. Fetal Presentation
LOA = Left Occiput Anterior, LOT = Left Occiput Transverse and LOP = Left Occiput Posterior. Of the three, LOA is the most frequent presentation and combined these three presentations comprise two-thirds of all births.

tation there can be two positions, either right or left. Finally, for still more accurate orientation, the relation of the presenting part to the anterior, transverse or posterior portion of the mothers' pelvis is considered *variety*. In a cephalic presentation, the presentation, position, and variety may be abbreviated and represented as shown in Figure 6. About two thirds of all vertex presentations are in the left occiput position, and about one third in the right.

As this data indicates, the primary fetal lie through pregnancy and through labor and delivery is with the head rotated to the left with the arms and legs otherwise curled in accommodation to the restrictions of the uterine cavity. The most compact profile for the fetus is for the arms and legs to curl in opposing directions with a resultant rotation along the longitudinal axis of the fetus. Some authors including Ida Rolf, PhD (the founder of Rolfing) have pointed out that this rotation could be an important factor in the final shape of the fetus.[26] It appears that as it grows, the fetus, the infant and ultimately the adult expands in size but retains this early pattern of rotation (Figure 7). There is a great deal of information, which supports this premise.

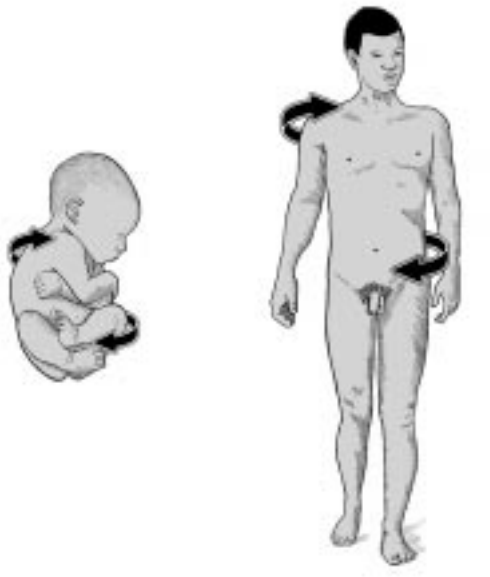

Figure 7. Fascial Bias in the Fetus and the Adult. [Reprinted with Permission. Illustrated by Laura Maaske – Medimagery LLC, Copright 2003. All rights reserved.]

First consider the connective tissue. We know it makes up a high proportion of body mass, connecting, supporting and organizing the body as a whole. It is known that during fetal development the majority of connective tissue growth occurs during the final trimester, during the time of greatest fetal restriction. Further, research demonstrates that pressure or tension in one area of the embryo results in increased secretion of connective tissue fibers in that area, and that these fibers tend to organize themselves along lines of tension.[26] Keeping in mind that all adults show adaptive rotational patterns, the most common being L/R/L/R. By comparison one can see the similarity between the fascial bias of the fetus and the common compensatory pattern in the adult. In both patterns the AO fascia rotates to the left and the LS fascia rotates to the right.

In the following section, we find another developmental factor–labor and delivery–which is also thought to have a significant impact on human structure.

5. Labor and Delivery

"Just as the Twig is bent, the Tree's inclined"

—Alexander Pope

The "bent twig" is an analogy used to describe the shape of the cranial bones and how they are often permanently modified by birth trauma before full ossification takes place. The perinatal period has been called "the

valley of the shadow of birth".[27] This somewhat melodramatic statement underscores the extreme nature of this "normal" process. A process traditionally recognized by the osteopathic profession, as one that can have potentially significant effect throughout the life of the individual.

The majority of the cranial bones of the fetus are relatively flat plates consisting of one layer of primary cancellous bone with no serrations. The vault is relatively large in comparison to the face and the rest of the body and is characterized by somewhat prominent frontal and parietal eminences. There are six fontanelles, one at each parietal angle, one at each mastoid, one at lambda in the occiput and one at bregma in the frontals. The base of the fetal skull is comprised of the occiput, made up of four flat cartilages and the temporal bones, each containing six separate cartilages. There is a great deal of prenatal molding of the fetal skull. "The vault lies against the pelvic inlet for the last two months or more—an inlet in which the sacrum sags forward while the ilia are pulled back by the gluteals in the effort to resist the anteriority of the pelvis".[27] Uterine contractions normally exert a pressure on the amniotic cavity, and subsequently on the fetus itself, varying from 4.5-26.5 pounds per square inch.

The intraosseous membranes serve as the only really effective protection for the immature brain during the last month prior to delivery when molding is taking place, as well as during the stress of actual delivery. The compressive forces of the uterus are carried by way of the spine to the base of the skull. Since the occiput is the presenting part it receives the most pressure, therefore ossification begins in the condylar parts before the other cranial bones.[27] "The skull of the infant is highly vulnerable to forces of labor. The physiological lack of development, the pliability necessary for the birth process…the disproportion between the passage and the passenger–all these militate against the proper growth and development essential to normal structure and function…"[27]

The mechanism of labor refers to the changes of the fetus as it passes through the birth canal. With the occipital presentation, the head must undergo several movements to accommodate to the maternal bony pelvis. This process has been divided into seven cardinal movements (1) engagement, (2) flexion, (3) descent, (4) rotation, (5) extension, (6) restitution, and (7) expulsion.[29] The following drawings, Figures 8 through 12 depict the mechanism of labor with respect to the most common LOA presentation. Each of the cardinal movements will be discussed separately.

Engagement is defined as descent of the biparietal diameter of the head below the pelvic inlet. Clinically, the head can be palpated below the level of the ischial spines. The fetal head enters the transverse diameter of the pelvic inlet, with the occiput to the left and with the saggital suture parallel to the long axis of the inlet.

Flexion of the neck will increase because of the drag of the forehead against the pelvic inlet. It allows for smaller diameters of the fetal head to present to the maternal pelvis.

Descent is in the oblique diameter because of resistance of the pelvis, which turns the occiput 45º to the left anterior position. As the head descends the left parietal bone will stem beneath the promontory of the sacrum.[27] The medial border of the left parietal will underride the edge of the more rapidly advancing right parietal bone. Meanwhile the cerebrospinal fluid and blood have partially transuded out of the cranium to lessen its volume. The occiput and frontals telescope beneath the parietals to further decrease the size of the head.

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Figure 8. Engagement with Flexion. [Reprinted with Permission. Adapted from *Basic Gynecology and Obstetrics* by N. Gant and F. Cunningham. Copyright Appleton & Lange 1993, the McGraw-Hill Companies, New York, NY.]

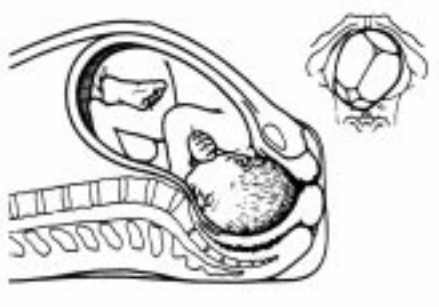

Figure 9. Descent and Beginning Rotation. [Reprinted with Permission. Adapted from *Basic Gynecology and Obstetrics* by N. Gant and F. Cunningham. Copyright Appleton & Lange 1993, the McGraw-Hill Companies, New York, NY.]

Figure 10. Complete Rotation and Beginning Extension. [Reprinted with Permission. Adapted from *Basic Gynecology and Obstetrics* by N. Gant and F. Cunningham. Copyright Appleton & Lange 1993, the McGraw-Hill Companies, New York, NY.]

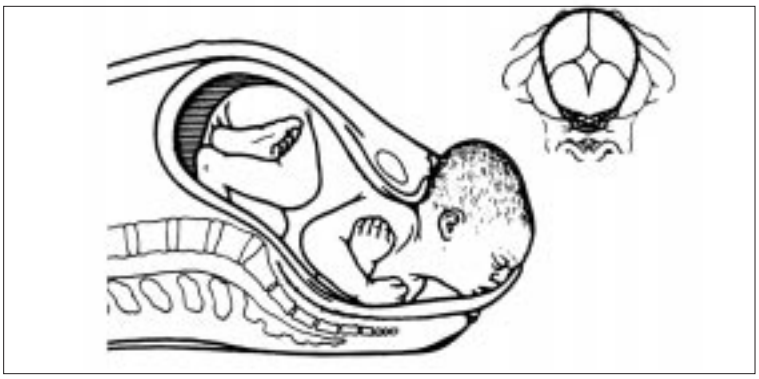

Figure 11. Complete Extension.
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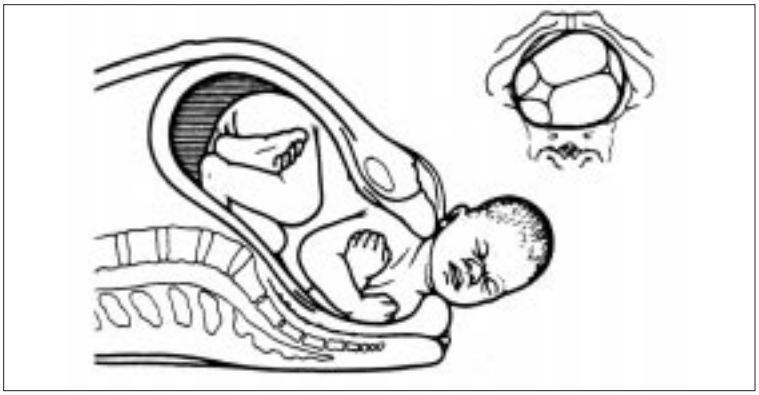

Figure 12. Restitution.
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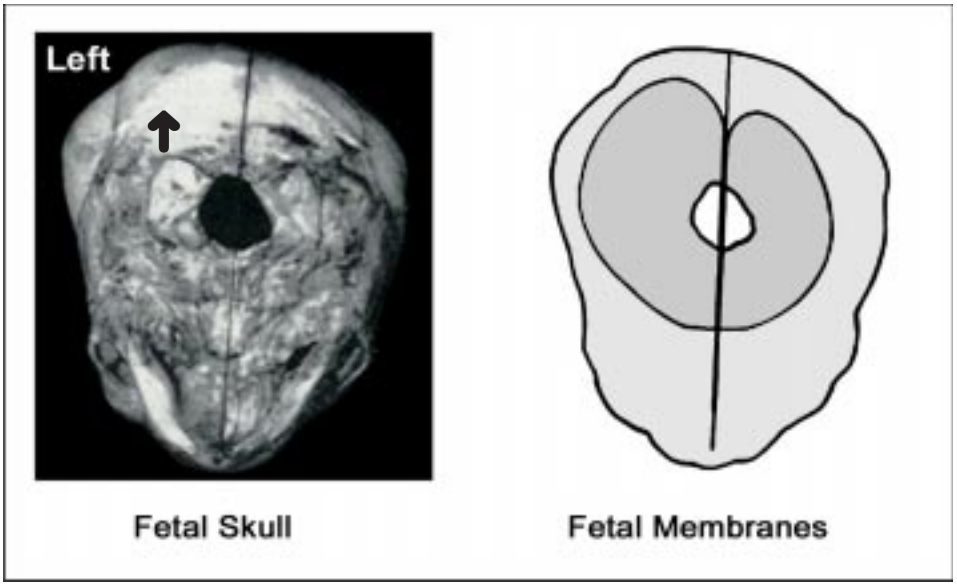

Figure 13. Cranial Asymmetry. [In the Public Domain. *Osteopathy in the Cranial Field*, 1st Edition, edited by Harold I. Magoun, Sr., published by the Sutherland Cranial Teaching Foundation. Fort Worth, TX.]

Rotation is then completed, which brings the saggital suture into an anteroposterior position. During internal rotation the occiput is subjected to significant forces of rotation and lateral resistance. After internal rotation the sharply flexed head reaches the vulva, it undergoes **extension**, which brings the base of the occiput into direct contact with the inferior margin of the symphysis. The head is delivered by further extension as the occiput, bregma, forehead, nose, mouth, and finally the chin pass successfully over the anterior margin of the perineum (Figure 11).

Restitution occurs when the delivered head externally rotates back to a 45° oblique position. The occiput, which was originally directed to the left, now lies towards the left ischial tuberosity (Figure 12).

Expulsion is the final delivery of the fetus from the birth canal and includes delivery of the right shoulder and then the left shoulder.

The "bent twig": During the internal rotation movement of labor the head moves from the oblique to the anteroposterior position. At this time the fetal skull must move against the resistance of the maternal symphysis. It is thought that this resistance is sufficient to keep the squamous portion of the occiput from achieving complete restitution. In a study of 1250 infant heads, Frymann[30] found less than 12% to be symmetrical with 69% displaying disturbances of the condylar parts. An example of this is asymmetry is shown in the skull of a newborn in Figure 13.

It shows that the squama of the occiput is bulging to the left and flattened on the right with mediolateral compression on the left and posteroanterior compression on the right. The lambdoidal suture overrides on the left and is separated on the right. The diagram to the right displays concurrent membranous tension and warping

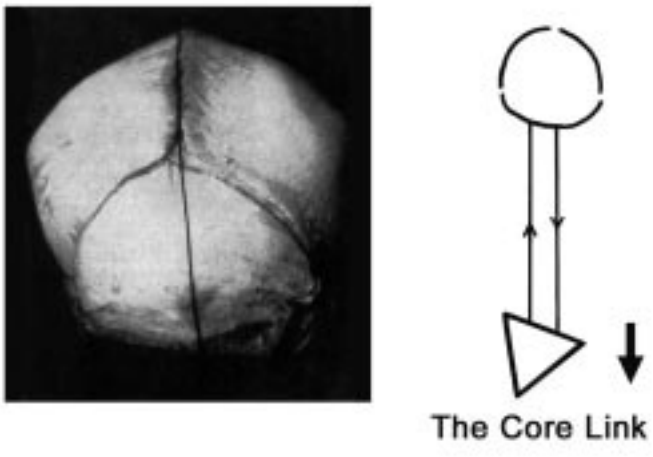

Figure 14. Craniosacral Tilt. [Reprinted with Permission. Adapted from the *American Academy of Osteopathy Yearbook* (1983) by Harold I. Magoun, Sr.: "Idiopathic adolescent scoliosis: A reasonabale etiology (1975)"]

of the tentorium cerebelli.[27]

Magoun[31] also describes a relationship between distortions of the infant head and the sacral base (Figure14), with the tilt of the occiput being similar to that of the sacrum. He commented that the sacrum necessarily assumes the same tilt because the meninges of the spinal cord attach firmly to the foramen magnum, the 2nd and 3rd cervicals and the 2nd sacral segment. This idea of a functional continuity between the cranium and the sacrum through the dura is an important osteopathic concept and that has been termed the "Core Link".[32]

It is believed that after delivery that most of the distortion of the fetal skull is corrected by the infant through crying which balloons the skull, and by sucking, which flexes the sphenobasilar junction thus normalizing the pull of the intracranial membranes.[27] Although in the majority of adults, residuum of the distortion persist. Given that in vertical posture the eyes are level in the horizontal and coronal planes, then these distortions would produce a vector of rotation to the left side (shown as an arrow in Figure 13) that could affect the incumbent neck and trunk. Also through the core link there could be a vector of sidebending of the sacrum and pelvis to the right (shown as an arrow in Figure 14). With the ubiquitous nature of this distortion it is likely that it is in part responsible for the CCP. These distortions could either cause or enhance the rotational bias of the fascia at the craniocervical junction to the left and may also increase the side bending bias of the pelvis to the right, both of which are found in the common compensatory pattern.

There could also be functional consequences to distortion of the cranial base. Clinical evidence that indicates that disturbance at craniocervical junction can have significant and primary affect upon balance and postural control. "By far the most important proprioceptive information needed for the maintenance of equilibrium is that derived from the *joint receptors of the neck*".[33] Lewit demonstrated that articular dysfunction at the craniocervical junction can cause an unequal distribution of weight between the lower extremities.[13] When weight distribution was measured by instructing a patient to put equal weight on both feet while standing on a pair of matching scales. Patients with movement restriction at the craniocervical junction, showed that one limb consistently registered at least 5kg (2.3lbs.) more than the other limb.

We have just seen how the developmental factors, prenatal habitus and perinatal labor and delivery, could have an impact on anatomic structure. We also have begun to see how these factors could affect function. One of the most important of all human functions is postural control.

6. Postural Control

The antigravity function of posture enables us to maintain an upright position and orientation. Postural control involves multisensory pathways, including visual, vestibular, and somatosensory data from proprioceptor and cutaneous receptors.[34] The central nervous system uses this sensory information to create an internal frame of reference that regulates the center of gravity. As conceptualized in Figure 15, feedback from somatosensory monitors includes neck and lower limb proprioceptors and pressor

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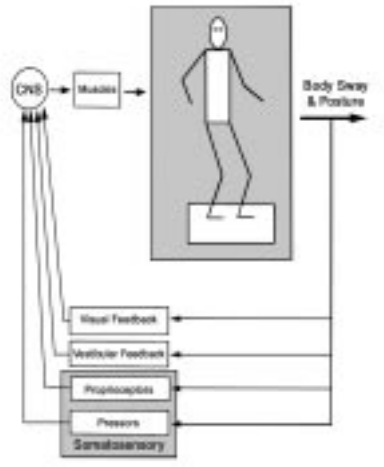

Figure 15. Postural Control. [Reprinted with Permission. Adapted from *Functional Movement in Orthopaedic and Sports Physical Therapy* by Bruce Brownstein and Shaw Bronner, Elsevier Science, Oxford, UK. Copyright 1998. Elsevier Inc.]

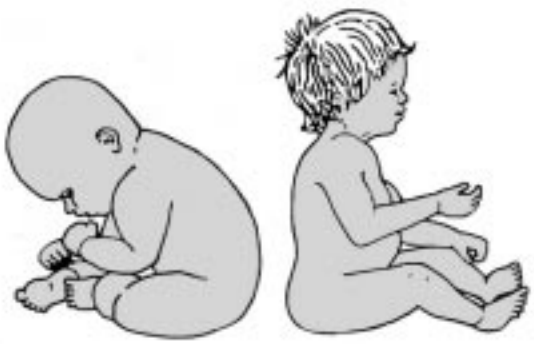

Figure 16. The Labyrinthine Reflex. [Reprinted with Permission. Adapted from *Muscles, Nerves and Movement* by Barbara Tyldesley and June Grieve, Blackwell Publishing, Oxford, UK.]

receptors from the feet. Feedback from these receptors is used to initiate postural compensation resulting in the activation of muscle groups to maintain or restore equilibrium through body sway. The central nervous system can also prepare against or anticipate disturbance in the center of gravity or the center of mass through feed forward control from visual and vestibular input.[34] The vestibular system is responsible for stabilizing the position of the body, head and eyes in space.

The earliest indication of vestibular control[35] is seen in the newborn with the labyrinthine reflex (Figure 16). This postural reflex which depends upon stimuli from both vestibular organs functions to automatically extend the head and hold it in an orthostatic posture.

Underlining the importance of this reflex we find that studies of posture in the adult show that the most stable segment of the body is the head and that displacement of the head is less than that of the trunk during balancing activities. We also know that when the head is in a near vertical position an adult can determine as little as a one-half degree of vertical tilt.[33] It is apparent that extreme sensitivity in the upright position is of major importance for maintenance of precise vertical equilibrium.

We know that each vestibular apparatus exerts control over the extensor muscle groups on both sides of the body, but its predominant effect is on the ipsilateral extensor or antigravity muscle groups. In other words the left vestibular apparatus primarily affects the left antigravity muscles while the right vestibular apparatus similarly affects the right side. This physiology becomes especially meaningful when we realize that there is a congenital or genetic bias towards one-sided vestibular dominance. This human trait is identified as vestibular lateralization.

Vestibular Lateralization: Several researchers have confirmed that left vestibular dominance occurs in roughly two-thirds of the human population.[36-40] Previc[20] describes a possible prenatal mechanism (figure 17) for the origin of left vestibular dominance. "Because the right side of the body faces outward in the left fetal position, the acceleratory component to the maternal walk would, from the standpoint of the fetus, be registered rightward. The more salient inertial force would consequently be leftward, providing for a more effective stimulation of the left utricle"; thereby promoting early growth and development of left vestibular neural and cortical control.

Overall, antigravity extension of the body is maintained by (1) Monosynaptic stretch reflexes operating at

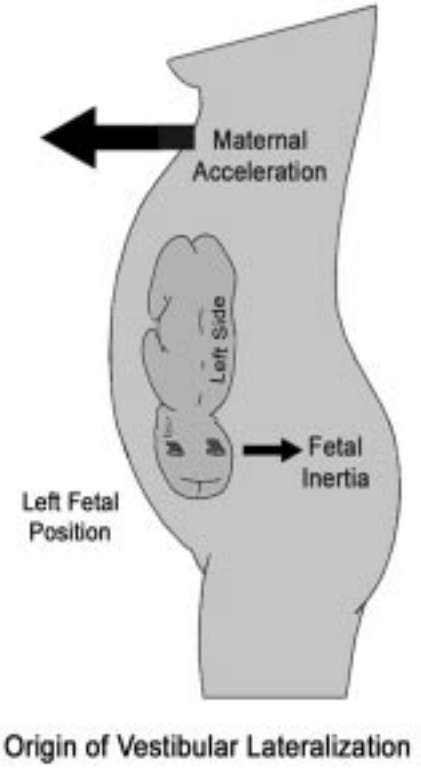

Figure 17. Origin of Vestibular Lateralization. In the Public Domain. Adapted from *Psychological Review*, 98(3): 299-334, by F. Previc: "A General Theory Concerning the Prenatal Origins of Cerebral Lateralization in Humans"

the level of the spinal cord, (2) Excitatory ipsilateral input from the vestibular organs and (3) Inhibitory input from the neck proprioceptors and the frontal cortex. Antigravity flexion activity of the body is under the control of the motor cortex.[20]

Therefore with general activities of daily living, one leg is primarily used for postural support (vestibular dominance) and the other for most voluntary activities (motor dominance). Kicking a ball (Figure 18) is a typical example; most people kick with the motor dominant right leg while simultaneously supporting themselves with vestibular dominant left leg.[41]

In support for this premise we find that in the majority of the adult population that the left leg has greater size and muscle mass.[42] Furthermore, this

Figure 18. Vestibular and Motor Dominance. [Reprinted with Permission. Adapted from *Anatomy of Movement* by Blandine Calais-Germain, Eastland Press, Seattle, WA. Copyright 1993. all rights reserved.]

physical asymmetry is not found at birth, but is a response to later growth and development.[43,44] This clearly shows how function can affect structure and further demonstrates the reciprocal nature of the two.

In the previous two sections we have discussed two mechanism that could cause asymmetric pressure upon the legs. The first is distortion of the cranial base induced by the birth process, which could result in persistent pressure differences between the lower extremities. The second is a functional control mechanism; we find that people primarily use only one leg for postural support. Could these factors coupled with later development be the explanation for why we commonly find growth differences between the lower extremities in children?

7. Leg Length Growth in Children

Studies of school children show that the majority of children show leg length discrepancies and that the likelihood of the discrepancy increases with a child's age.[45] Pearson[46] radiographed a group of 1446 school children between 5 and 17 years of age, 80% had at least a 0.16cm (1/16-inch) discrepancy and 3.4% had a difference of 1.3cm (1/2 inch) or more. By comparison, in another study, 75% of elementary school children displayed a measurable leg length discrepancy, while 92% of similarly measured senior high school students showed measurable leg length differences. This suggests that differences in leg length tend to increase as children grow. Still other studies show that if leg length differences are corrected with heel lifts during childhood then the discrepancies often become smaller.[47-49]

Figure 19. Long Bones of the Newborn. [Reprinted with Permission. Adapted from *Grant's Atlas of Anatomy*, 7th Edition, by J. Anderson, Lippincott William & Wilkins, Philadelphia, PA.]

At birth[50] the bodies or diaphyses of the long bones in the lower extremities are largely ossified, but most of the ends or epiphyses are still cartilaginous (Figure 19). During the first two years after birth the epiphyses become ossified with only the articular cartilage and the epiphyseal plate remaining cartilaginous. Growth in the length of the long bones continues at this plate until it is replaced by spongy bone at 18-20 years of age. All together there are eight of these growth plates, two each for the femur and the tibia, in both the lower extremities. There are a number of references to asymmetric growth of the lower extremities, as being the cause of leg length discrepancies in the postural literature. Cathie[51] attributed leg length disparity to very slight epiphyseal injuries that disturbed normal bone growth. Schwab[52] thought that simple unequal growth was the most common cause of unequal leg lengths. Unequal growth may result from pathologic involvement of long bone epiphyses by infection, trauma, tumor, radiation and disease, the most notable being poliomyelitis. Furthermore, during growth or after completion of growth, leg length inequity may result from fracture.[53,54]

A broader and more consistent explanation of commonly found asymmetric leg lengths could be that it is the result of asymmetric pressure along the length of the long bones during growth. Kappler[55] reported that the pelvis typically side shifts towards the longer leg; hence, there should be more pressure over the long leg side. Morscher[53] and Gofton[56] argue convincingly that there is increased pressure upon the hip and leg on the long leg side. Some authors invoke Wolff's

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law as causative, and believe increased growth of the long leg is secondary to increased pressure. On the other hand, there is experimental evidence that shows decreases in pressure parallel to the growth axis in the long bones favor growth in length, whereas increases inhibit and may even stop epiphyseal growth.[57] Finally, other researchers have taken a middle road and have said, "between zero load and some limit, increasing loads increase growth".[58] Based on the clinical data, it would be reasonable to assume that increased epiphyseal pressure, within certain physiologic ranges, encourages growth. This raises the question. From an etiological perspective, is it the short leg syndrome, or the long leg syndrome? There needs to be further study to determine which leg in the growing child routinely has the most pressure and relate that to which leg either does or does not grow.

We have discussed several possible mechanisms that may explain the origin of the CCP (1) developmental fascial bias (2) birth trauma and (3) asymmetric leg growth. The latter factor resulting in leg length inequity, the most commonly found postural asymmetry.[59] In the following section we will examine the relationship between these developmental factors and the postural model.

8. Postural Asymmetries and the Postural Model

Commonly found postural asymmetries and their biomechanical relationship to one another are the basis of the current postural model.[60]

There are three primary regions of anatomic or postural asymmetry that have been studied with regards to the postural model. They are the *lumbosacral junction*, the *lower extremities* (including leg length, foot posture and foot arches) and the *craniocervical mandibular junction*. This last term, craniocervical mandibular may be unfamiliar, it was coined by dentists[61] and it reflects contributions from the other disciplines concerning posture. Dentists and orthodontist, as well as physical therapists have shown that occlusion and the mandibular rest position are also intimately related to the posture of the head and neck. As we investigate information from these fields we will see that commonly found postural asymmetries in all of these regions are also biomechanically interrelated. A conceptual overview of these regions and their relationship to one another is displayed in Figure 20. Each of the primary regions of postural asymmetry will then be examined in some detail.

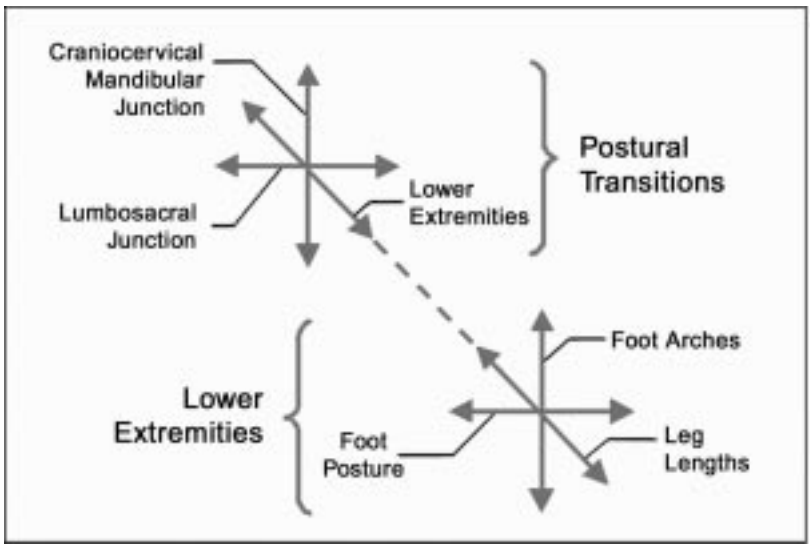

Figure 20. Primary Regions of Postural Asymmetry.

Lumbosacral Junction: Denslow and Chace[62] measured leg length discrepancy in 361 subjects. They found a higher incidence of low right femoral heads. In another study with 294 subjects they recorded the lateral curvature of the spine. This group demonstrated a high correlation between the direction to which the curvature occurred and the short leg with the lateral curvature most frequently occurring toward the short leg side. In yet another study these researchers measured pelvic rotation and discovered that pelvic rotation most commonly occurred contralateral to the short leg side. A composite of these findings produces the so-called "typical case" i.e., the most commonly found postural asymmetries. In the majority of cases where postural asymmetry is present Denslow and Chace[62] found that the lateral curvature is towards the short leg side with pelvic rotation towards the long leg side. This suggests a coupling of lumbopelvic mechanics, and they described two possible mechanisms for this coupling: (1) The two innominate bones and sacrum rotate as a block and (2) The two innominate bones rotate around the sacrum. Mitchell[63] definitively describes opposing rotation of innominate bones about a transverse axis through the lower sacrum as compensatory to leg length discrepancy with anterior rotation on the short leg side and posterior rotation on the long leg side. Denslow and Chace[62] further speculated that the high femoral head "drives" the anterior portion of the pelvis upward and backward, thus rotating the pelvis to that side and that the pelvis drops down on the low femoral head side. Thus unleveling the sacral base and producing a "buckling" of the lumbar segments.

Friberg[64] also described pelvic rotation as occurring opposite to that caused by lumbar coupling (Figure 21). He described the buckling or lat-

eral curve of the lumbar spine as a functional scoliosis secondary to the leg length inequity and the associated sacral base declination.

The lumbar spine follows Type I mechanics with side bending away and rotation towards the convexity, with an increase of backward bending. If one considers the pelvis as moving in block as described by Denslow and Chace, then the motion of the pelvis would also appear to follow Type I – like mechanics with side bending towards and rotation away from the short leg.

In the instance of the short right leg, the pelvis will then generally rotate to the left. This seemingly conflicts with the side bending and rotational pattern of the CCP; side bending and rotation both to the right. Furthermore, after observing obvious pelvic rotation to the left on a standing A/P film of the pelvis you can then manually test a patient for pelvic rotation in both standing and supine positions and find a clinically apparent rotational bias to the right. This disparity has certainly been a source of confusion for this author. How can these findings be reconciled? Since there is a great deal of plasticity in the pelvis, Zink[1] explained this disparity as a simple predominance of fascial twist (rightward fascial bias) over bony mechanics (left rotation) in the pelvis. Although if you conclude that motion testing of the pelvis follows Type I mechanics of the L/S junction you find that the disparity is resolved. The typical L/S junction test is performed with the patient prone, with the examiners' hand on the PSIS. The examiner lifts and medially rotates the pelvis to find ease of motion.[65] With the spine in the neutral position L-5 is sidebent left and rotated to the right. Rotation of the pelvis to the left is restricted by "facet locking" between L-5 and S-1. Thus, with motion testing of the L/S junction we could expect to find greater ease of motion to the right regardless of actual rotation of the bony pelvis. Another explanation for this paradoxical rotation involves the interaction of the lower extremities with the pelvis. Postural influences from the lower extremities include not only the leg lengths but also certain commonly found postures of the feet.

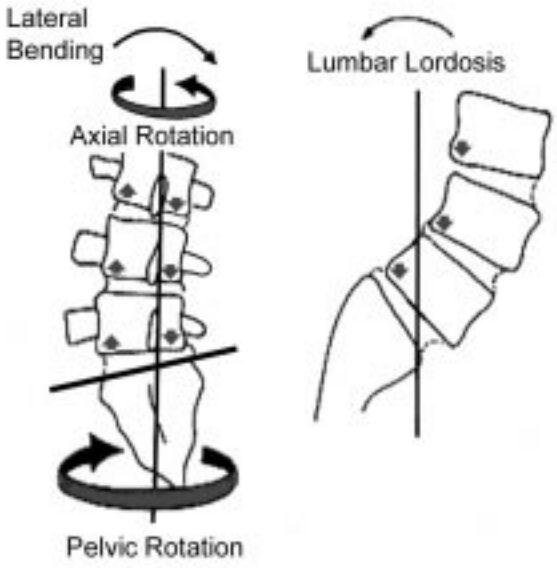

Figure 21. Lumbopelvic Coupling. [Reprinted with Permission. Adapted from *Spine*, 8(6): 643-651, by O. Friberg: "Clinical Symptoms and in leg length inequality", Lippincott William & Wilkins, Philadelphia, PA.]

Lower Extremities: The posture and architecture of the feet can have significant effect on leg length and the attitude of the pelvis. The most common asymmetrical foot position is the pronated foot (Figure 22), which is typically found on the long leg side and is considered compensatory to the long leg.[66] The supinated foot is also commonly seen and it is associated with the short leg.

A well-known result of foot posture is its capacity to affect the length

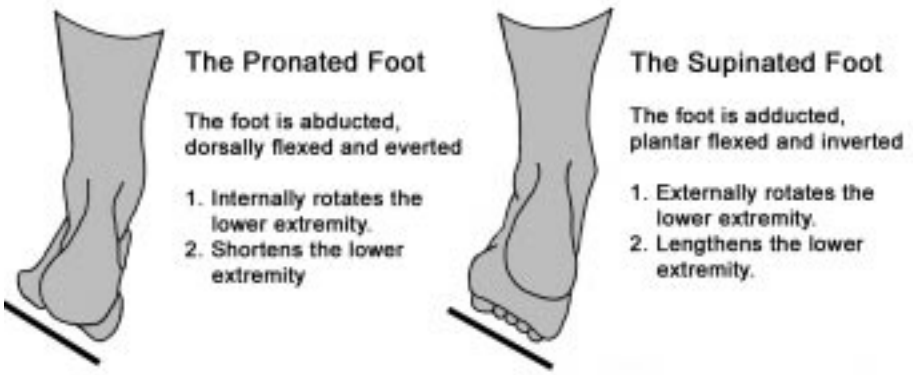

Figure 22. Foot Postures

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of the lower extremity.[66] The pronated foot acts to shorten the long leg and the supinated foot lengthens the short leg.[67] The pronated foot also causes internal rotation of the lower extremity and the supinated foot results in external rotation of leg and thigh.[68] Rotation of a lower extremity will also produce rotation of the pelvis. A supinated foot causing external rotation of the lower extremity will result in ipsilateral rotation of the pelvis. While on the other hand, with a pronated foot we find contralateral rotation of the pelvis. It is also reasonable to assume that rotation of the lower extremity causes change in the anteroposterior position of the femoral heads. The effect of forward position of one femoral head combined with posterior position of the opposite would result in an overall rotation of the bony pelvis.

The left side of Figure 23 depicts a posterior view of a person with a short right leg, a pronated left foot and a supinated right foot, while the right side of the figure shows cross sections of each corresponding level of the lower extremities and the pelvis.

The pronated position of the left foot causes internal (rightward) rotation of the left lower extremity and will result in a posterior positioning of the left femoral head. The supinated position of the right foot, resulting in external (also rightward) rotation of the lower extremity, causes an anterior positioning of the femoral head. Combined, one femoral head posterior and the other anterior, the result is rotation of the bony pelvis to the left or opposite to that of either lower extremity and thus provides an explanation for why the CCP fascial pattern differs from the bony radiographic presentation in the standing posture. This mechanism of anteroposterior femoral head position also helps to explain other clinical findings. For example, we commonly find patients with both feet pronated and with this we also observe increased lordosis. In this instance both femoral heads are positioned posteriorly which appears to translate the pelvis backward and results in a compensatory increase in lumbar lordosis. A corollary mechanism is bilateral supinated feet which results in an anterior translation of the pelvis. With this finding we clinically observe decreased lumbar lordosis or straightening of the spine. The pronated foot is generally associated with a subtalar joint (STJ) valgus and the supinated foot is associated with STJ varus. It should be kept in mind though that oftentimes you see a STJ varus with the pronated foot which can be the consequence of either an ipsilateral forefoot valgus or a tibial varus, or both. In other words, the position of the STJ and its coupling with lower extremity rotation depends upon an interaction between the rearfoot, the forefoot and the tibia.

Beyond these biomechanics there are also other fascial interactions between the arches of the feet and the attitude of the pelvis. Clinical experience suggests that bilateral pes planus is associated with a decrease in

Figure 23. The Relationship between Pelvic Rotation and Foot Postures

TABLE 3. A SUMMARY OF LOWER EXTREMITY EFFECTS

Postural Asymmetry	Sacral Base Declination	Pelvic Rotation	Pelvic Side Shift	Lordosis
Short Leg	Ipsilateral Low Base	Contralateral Rotation	Contralateral Side Shift	Increases
Unilateral Pronation	Ipsilaterally Lowers Base	Contralateral Rotation	Little or no effect	Little or no effect
Unilateral Supination	Ipsilaterally Raises Base	Ipsilateral Rotation	Little or no effect	Little or no effect
Bilateral Pronation	No effect	No effect	No effect	Increases
Bilateral Supination	No effect	No effect	No effect	Decreases
Supination & Pronation †	Towards Level	Decreases	Decreases	Decreases

† Typically the pronated foot is found on the long leg side and the supinated foot on the short leg side.

the lumbosacral angle and bilateral pes cavus is associated with an increased lumbosacral angle. Table 3 summarizes a number of the commonly found biomechanical interactions between the lower extremities and the lumbopelvis.

To reiterate in the postural model the body's response to lower extremity asymmetry are the commonly found somatic dysfunctions shown in Figure 24. These findings include (1) upslipped innominate on the left or downslipped right, (2) cephalad pubes left or caudad pubes right, (3) non-neutral FSR_L dysfunction at L-4 and/or L-5, and neutral S_LR_R at L-5 and (4) left on left sacral torsion.[69]

Other findings associated with the anatomical short right leg include a pronated left foot with a supinated right, an anteriorly rotated right innominate, and a posteriorly rotated left innominate. Functional rotoscoliosis is observed with a lumbar convexity to the right, thoracic convexity to the left and cervical convexity to the right.

To complete the postural model we should also examine the craniocervical mandibular junction and it's association with posture, because it has been known for a long time that structural and functional asymmetries at this junction can have profound effect on overall posture.

Craniocervical Mandibular Junction: Regarding fascia of the head and neck and its effect on the body as a whole Cathie[70] wrote, "Dental lesion and changes in the temporomandibular articulation are, singly or combined, capable of causing varied local and or distant disturbances." Conversely, we also know that fascial strains produced by structural asymmetries can directly contribute to craniomandibular dysfunction.[71-74] Magoun[75] summarizes this reciprocal relationship in the following manner, " While chronic postural

Figure 24. Common Structural Asymmetries

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tension can be a major factor in the maintenance or recurrence of cranial lesion pathology, it is equally true that faulty cranial mechanics, often existing since birth, can adversely influence all the structures below."

This is not necessarily an easy relationship to understand. But if we look at head posture in the saggital plane (Figure 25) we see that when the head is in an ideal, orthostatic position, its center of gravity is slightly anterior to the vertebral column.[76] There must be balanced tension between the anterior and posterior craniocervical bony and myofascial structures in order for the head to remain erect. Any change in the structures anterior to the cervical spine will necessitate compensatory changes in either the cervical spine or the posterior myofascial structures or both.

The most critical anterior bony relationship is dental occlusion.[77-80] Thus in order for balance to be maintained there must be proper occlusion. For example it has been shown that with the Class II occlusion (overbite) is associated with cervical lordosis and forward head posture while the Class III occlusion (underbite) is associated with a straightening of the anterior or the normal anterior cervical curvature with a posterior head posture.[81] Several researchers have established a relationship between total posture and the stomatognathic system.

Using electromyography, Strachan and Robinson[72,73] showed that they could correct abnormal muscle firing sequences of masticatory muscles found in patients with malocclusion by correcting their leg length discrepancies with heel lifts. What's more, when they removed the corrective heel lifts, they recorded resumption of the abnormal electromyographic firing sequences. Thus demonstrating a relationship between correction of the short leg and correction of malocclusion. Wheaton[82] also found several relationships between the mandibular rest position, occlusion, and posture. Of these, the most significant positive correlations linked mandibular rest position with incisive position and the long leg. (The incisive position is a comparison of midline between the central maxillary and mandibular incisors in the occluded position.) In other words she found that the mandible tends to deviate in the same direction as the teeth and also toward the same side as the long leg.

Rocabado[83, 84] put forth an influential conceptual model that states that ideal head posture is dependent upon three parallel lines of reference and these are the (1) bipupilar, (2) vestibular and (3) transverse occlusal planes (Figure 26). He surmised that the horizontal orientation of these planes would permit the visual gaze and vestibular system to remain level with the ground. He postulated that any change in the normal horizontal and parallel relationship of these planes to each other and to the ground would result in compensatory adaptations (flexion/extension, side-bending/rotation) by the incumbent spine.[83]

Huggare and others[85] studied the effect of scoliosis on head posture.

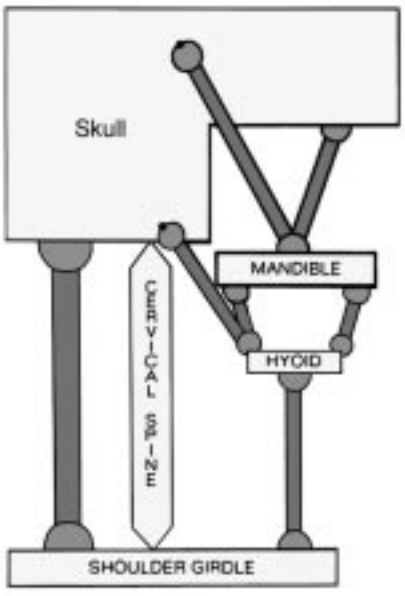

Figure 25. Saggital Head Posture. [Reprinted with Permission. Adapted from *New Concepts in Craniomandibular and Chronic Pain Management*, edited by Harold Gelb, Elsevier Science, Oxford, UK. Copyright 1994 Mosby Inc.]

Figure 26. Coronal Head Posture. Three parallel lines of reference: 1. Bipupilar Plane 2. Vestibular Plane 3. Transverse Occlusal Plane. Reprinted with Permission. Adapted from the *International Journal of Orofacial Myology,* 17(3): 8-10, D. MacConkey: "The relationship of posture and dental health"

Figure 27. Cephalmometric Studies. A composite of patients with scoliosis. Reprinted with Permission. Adapted from *Proceedings of the Finnish Dental Society,* 87(1): 151-8, by J. Huggare, P. Pirttiniem, W. Serlo: "Head posture and dentofacial morphology in subjects treated for scoliosis:

They found a high incidence of malocclusions in the scoliotic population, especially lateral malocclusion (crossbite). A composite cephalometric drawing of the location of these findings is shown in Figure 27. There was very little cranial tilting, but the overwhelming majority showed significant lateralization of the apical vertebra with compensatory craniocervical deviation to the opposite side. There was also increased rotation of the orbital, maxillary and mandibular planes in the frontal plane. Tilting of the mandibular plane, considered a vertical rotation in the frontal plane around a horizontal axis, is accompanied by a loss of posterior vertical dimension on one side of the bite with loss of anterior vertical dimension on the opposite side.[86]

Gelb[87] found that over time patients with a short right leg would develop left-sided loss of vertical dimension in the jaw. He found in these patients characteristic right-sided face changes that included (1) a higher eyebrow, (2) a higher and apparently larger eye, (3) a higher ear and (4) an up turning of the lips. Travell[88] noted that a useful clinical clue for identifying pelvic asymmetry and leg length discrepancy was that, "One side of the face is also smaller; this is most easily seen as a shorter distance between the outer corners of the eye and mouth". Relating to the remainder of the body Gelb[87] generally found the level of the shoulders, breast and hips to be lower to the right side. Royder[71] also found these common postural changes associated with the short right leg as well a number of others shown in Figure 28.

Royder[71] specifically mentioned that, "The flexible spinal mechanism allows the adjustment of the gravitational position of the head so that the eyes and the labyrinthine mechanism can remain level and stable". It follows that with left-sided loss of vertical dimension and concomitant cephalometric tilting that there is compensatory rotoscoliosis of the spine, cervical convexity to the right, thoracic convexity to the left and lumbar convexity to the right with a sacral base declination to the right. The muscle tightness and tenderness noted in the left cervicodorsal region are also consistent with the muscle imbalance patterns that are described by Greenman.[14] Royder also noted, as has been previously pointed out that, "Long-standing fascial strains, whether they come from above or below, soon become apparent throughout the entire body, and produce neural facilitation and somatic dysfunction. Therefore, malocclusion and mandibular dysfunction can be the result of somatic dysfunction resulting from structural imbalances in distant and seemingly unrelated parts of the body." He added, " Often TMJ pain and dysfunction can be traced back to sacral base declination through the fascial influences on cranial and mandibular function. Conversely, a torsion of the sphenobasilar symphysis will produce a torsion from the cranium caudad to the sacrum and on to the feet". Clinically, this author typically finds either sphenobasilar torsion or sidebending rotation cranial dysfunction associated with leg length discrepancy.

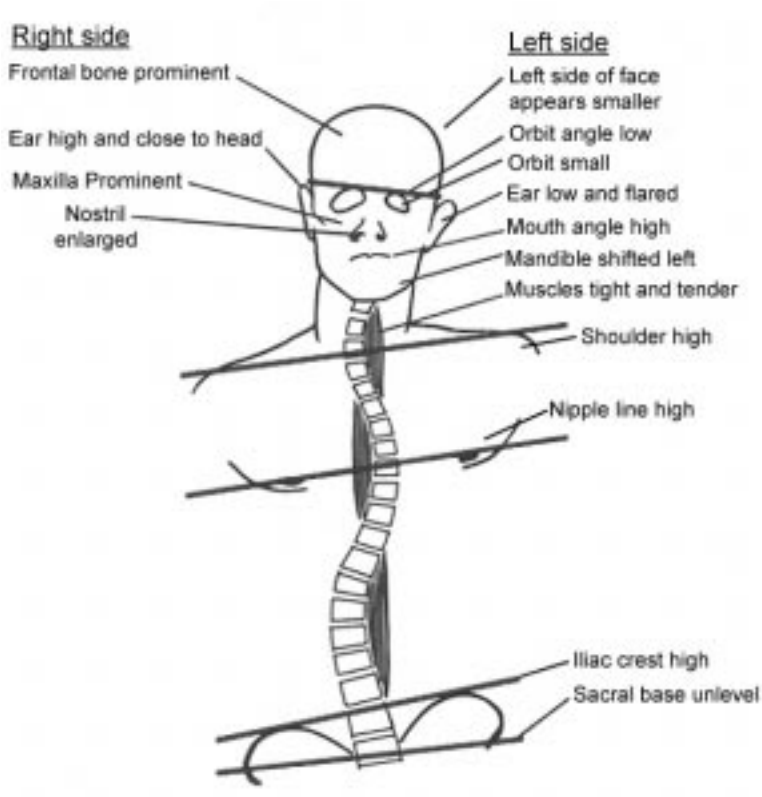

Figure 28. Short Right Leg Structural Findings. [Reprinted with Permission. Adapted from the *Journal of the American Osteopathic Association,* 80(7): 460-67, by James Royder: "Structural Influences in Temporomandibular Joint Pain and Dysfunction".]

Thus far we have examined Zink's circulatory / respiratory model, its origin and several biomechanical aspects of the postural model. Now let's look at specific relationships between these two models.

9. Relationships between the CCP and Posture

Regarding Zink's *compensated* patterns, there is evident agreement between the Common Compensatory Pattern and the common structural

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and functional asymmetries found in the postural model. Anecdotally, this author finds similar associations between the structural and functional findings of the short left leg and the Uncommon Compensatory Pattern. Zink [2] stated in the *ideal* pattern the patient presents with a level pelvis in both the horizontal and vertical planes and with equal leg lengths. In Kuchera's[89] description of Gravitational Strain Pathophysiology he said, "Gravitational force is constant and a greatly underestimated systemic stressor. Of the many signature manifestations of gravitational strain pathophysiology, the most prominent are altered postural alignment and recurrent somatic dysfunction." He went on to say that the signs and symptoms of gravitational strain pathophysiology "…often become apparent only after key host compensatory mechanisms are activated or overwhelmed. Zink's *uncompensated* patterns, associated with disease and lack of health, represent these patients whose ability to compensate has become overwhelmed.

It would seem that Zink's model and the postural model are fundamentally the same relationship seen from different perspectives. This hypothesis is the basis for a general postural model that is diagramed in part in Figure 29, with the complete model shown in Figure 31.

By substituting the specific term structural asymmetry found in the origin of the CCP relationship (Fig. 4), with the broader term *postural symmetry* you could derive a similar but more general relationship, the *origin of posture*. The reason for this substitution is that, as we have learned, human posture is not limited to structure. Clinical and experimental evidence suggests that developmental factors including third trimester fetal growth, birth trauma and cerebral lateralization can result in lifelong disturbances in structure and function of the human body. We have found that developmental influences acting on the human fetus along with its genetic potential come together to form a certain symmetry or asymmetry of structure and function in the adult. Postural symmetry is composed of three primary aspects. The first is symmetry of structure or anatomic mirror symmetry from right to left and vice versa. The second is symmetry of function, as in the phrase "symmetrical gait", used to describe equal use of the right and left sides of the body. The third is symmetry of mass, which is the attitude of the body from front-to-back and side-to-side. These three aspects of postural symmetry all under the influence of gravity directly relate to the concept of boundaries. Irvin[90] introduced the concept of boundaries by saying, "A tissue has the three qualities of structure, function, and conditions of boundary…" He further stated that, " the stability of the living system is a function of the boundaries within which proper structures perform, and is inversely proportional to the prevalence of accidents (somatic dysfunction and disease) that are consequent to suboptimal posture…" The words within parenthesis were added for context. The primary regions of postural asymmetry that were discussed in section 8 (Figure 20) are the same regions that determine the *boundaries of posture* and with this added perspective can also be related to human *function* and *structure*.

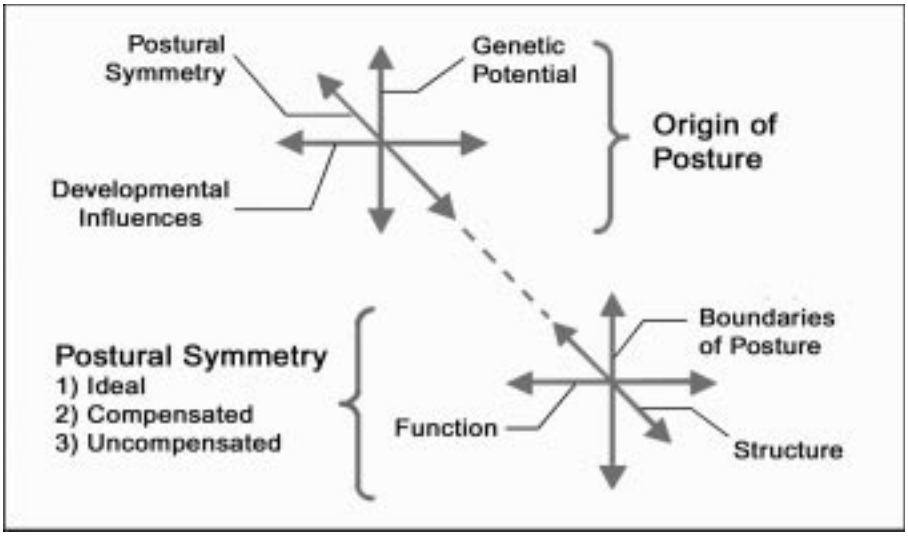

Figure 29. A General Postural Model (In Part)

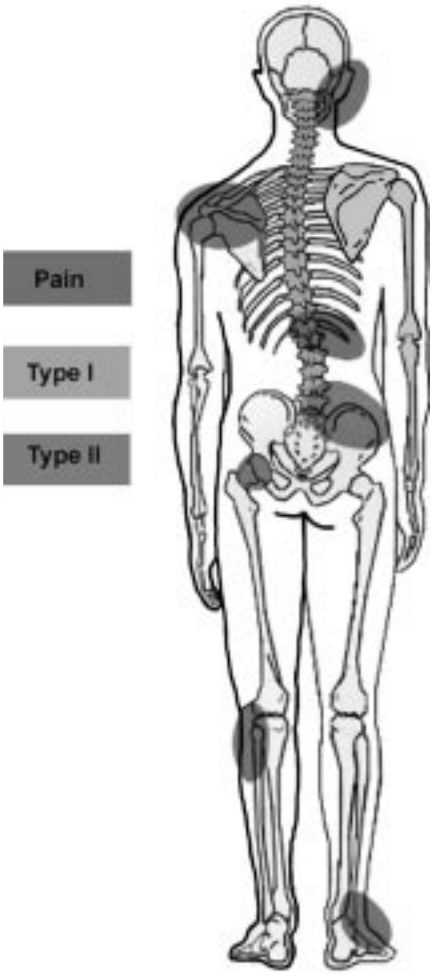

Figure 30. Common Pain Patterns

Having linked the origin of posture through the axis of postural symmetry to the thought that human structure and function are related through boundary conditions,[90] we can adopt Zink's nomenclature and characterized postural symmetry as ideal, compensated or uncompensated. These concepts organized in this manner allow for a general postural model. A model that takes into account the many varied aspects of posture and one that has a great deal of clinical utility.

10. Clinical Significance

Friberg[64] commented that the opposing torsional forces occurring at the L/S junction would cause significant stress to the numerous musculotendinous and ligamentous structures and result in inflammation and pain. Many clinicians[91-94] have noted that patients report pain accompanying these commonly found dysfunctions and postural asymmetries. Figure 30 illustrates some of the painful regions that are associated with a short right leg. In general, pain is reported at the junctional zones and associated with Type II mechanics. Foot and ankle pains are generally found on the right. Pain and osteoarthritis are frequently associated with the knee and hip of the long left leg. If shoulder pain is present, it is usually reported in the left shoulder. Additionally, if there is craniomandibular dysfunction and pain it is likely to be found on the right.[69] Ordinarily patients with postural asymmetry will describe their initial symptoms as recurrent. Then increasingly, the incidence of recurrence will become more frequent until finally their symptoms become persistent and their conditions then become subacute and chronic.

Treatment: In the approach to treatment of the patient with subacute and chronic pain of neuromyofascial-skeletal origin, clinical experience demonstrates that in general if the patient can achieve control in at least two of the three axes of postural symmetry then they will achieve compensation and cessation of painful symptoms.

Postural correction is used for treatment of the boundaries of posture. This includes the application of carefully crafted bite splints, foot orthotics, and heel lifts. For treatment of the functional axis you can prescribe specifically indicated strength, flexibility and neuromuscular re-education exercises. Finally, for the treatment of the structural axis we use osteopathic manipulative treatment (OMT). Nelson[95] stated that "the key to the entire relationship of posture to health lies in the entity of the osteopathic lesion, its production, maintenance and correction". He thought that postural imbalance produced and maintained somatic dysfunction and that its influence should be ruled out when considering treatment of any disease.

11. Conclusion

We have studied a number of the mechanisms thought to be responsible for the origin of the common compensatory pattern. Also based on a large body of theoretical, experimental and clinical evidence, we have described many relationships between the CCP and the Postural Model and discussed several factors that are common to both. There were several questions that were posed initially: Why do we see these same patterns over and over again? Is there a linkage between all of these commonly found clinical phenomena? What is the clinical significance of these patterns? We can answer these questions with the following simple conclusions.

• First with respect to their neurobiologic antecedents, Zink's fascial model and the postural model have the same genetic and developmental origins.

• Second that Zink's respiratory/circulatory model and the postural model are descriptions of the same phenomenon – human posture.

• Third that the two models can be combined to derive a general postural model.

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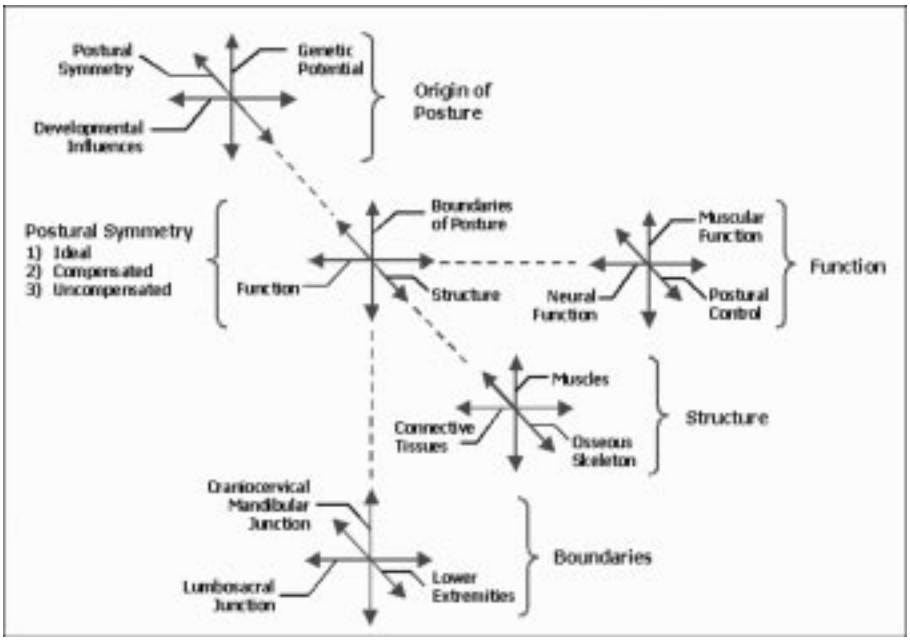

Figure 31. A General Postural

A general postural model (Figure 31) conceptually organizes what we know about commonly found structural and functional asymmetries.[96]

A General Postural Model: Clinical and experimental evidence suggests that genetic and developmental factors including third trimester fetal growth, birth trauma and cerebral lateralization can result in lifelong disturbances in structure and function of the human body. We find that these *developmental influences* on the human fetus along with its *genetic potential* come together to form a certain *symmetry* or asymmetry of structure and function in the adult. This can be abstractly represented in the familiar xyz-axes of the Cartesian coordinate system and are shown as such as the *Origin of Posture*. The most obvious structural asymmetries we see are the anatomic short right leg and the fascial bias throughout the body that was described by Dr. J. Gordon Zink as the common compensatory pattern.

There are also a number of commonly found functional patterns including recurrent patterns of somatic dysfunction and muscle imbalance. These well-known functional asymmetries are also related to motor dominance of the right hand and foot and postural dominance of the left leg.

Borrowing from Zink's work, we can characterize postural symmetry as ideal, compensated or uncompensated. The seminal thought that human structure and function are related through boundary conditions comes from Dr. Robert Irvin. [90] This general model recognizes three primary *boundaries of posture*: (1) the *craniocervical mandibular junction*, (2) the *lumbosacral junction* and (3) the *lower extremities*.

The interaction of these *boundaries* result in the commonly found pelvic types classified by Lloyd and Eimerbrink. [97] It should be noted that in this model the sacral base is not an independent variable. Rather, it is considered a part of the lumbosacral junction and its attitude is a resultant of the combined effects of the attitude of the craniocervical mandibular junction and the lower extremities. The latter including leg length, foot posture and to a lesser degree architecture of the foot arches.

If we expand along the axis of function in this model we can describe human function as an interrelationship between *neural* and *muscular function* and *postural control*. Similar treatment of the structural axis reveals a relationship between the support structures of the body. These include the *connective tissues* (composed of the fascias, ligaments, tendons and cartilages), the *muscles* and the *osseous skeleton*.

Finally a general postural model also allows us to conceptually link genetic and developmental factors to a number of commonly found clinical phenomena. The linkages within the model are summarized in Table 4.

Regarding the utility of a general postural model, Sir William Osler [71] once made the general statement, "In order to treat something, we must first learn to recognize it". Beyond that, Dr. Robert Kappler [55] specifically told us that, "Once the typical findings are defined and understood, then atypical postural balance patterns can be identified. If the patient has an atypical pattern, this alerts the physician to search for additional factors causing the patient's problem." Moreover a general postural model allows us to view human posture not as a simple static relationship between building blocks, one atop another, but as a lifelong interplay between genetics, development and postural symmetry.

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TABLE 4. CAUSAL LINKAGES IN A GENERAL POSTURAL MODEL

Factors	Linkage	Common Postural Findings
Genetic Factors	Cerebral Lateralization	Results in left cerebral dominance with right-sided motor dominance.
Prenatal Factors	Left Cephalic Fetal Lie Vestibular Lateralization	Results in a fascial bias that is consistent with the CCP. Resulting in left vestibular dominance left-sided extensor muscle dominance.
Birth Factors	Birth Trauma & Cranial Asymmetry	Results in the commonly found cranial assymmetries in infants that could in turn cause or reinforce the CCP in the adult.
Postnatal Factors	Growth and Development The cumulative effects of postural control, right sided motor dominance and left sided postural dominance.	Results in the long left leg and sacral base declination to the right with occipital tilting to the right. Also results in Gravitational Strain Pathology that includes recurrent somatic dysfunctions and muscle imbalances.

for their time, helpful criticism and encouragement.

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Book Review

Reviewer: Anthony G. Chila, DO, FAAO

An Osteopathic Approach to Children

Jane E. Carreiro, DO

pp. 257, incl. Index. Churchill Livingstone, (c)2003, Elsevier Science Limited. All rights reserved. $59.95.

The author organizes and presents a complex subject in two major considerations. Basic concepts of physiology are presented with an orientation familiar to practicing osteopathic physicians. The presentation and discussion of pathophysiological processes are related to children. Osteopathic treatment is presented in the context of familiar physiological models: somatovisceral interactions, postural/biomechanical influences, neuroendocrine-immune system, respiratory/circulatory model, and bioenergetic model. This approach permits interweaving of recurrent themes throughout the text. The reader soon realizes that this is a strong point in maintaining a concise presentation of detailed material.

Fifteen (15) Chapters are dedicated to: the nervous system, posture, movement, cranial development and pregnancy. Various body systems presentations and the concept of nociception and the neuroendocrine immune system are well represented. Chapter contents are engagingly presented in a sidebar format which permits immediate overview, and facilitates rapid retrieval of specific information within the chapter. With an average of 15-18 pages per chapter, the reader can conveniently and quickly utilize the information presented. Illustrations are numerous, well-chosen, and clear. Anatomical demonstration is addressed through the author's work with the gifted anatomist and photographer, Frank H. Willard, PhD. The *References and Further Reading* appended to each chapter provide ample opportunity for further study.

For the reader who studies and practices the concept offered by William Garner Sutherland, DO, the following excerpt is quite refreshing:

> "The adult cranium is often viewed as a modified sphere balancing atop a flexible rod. The fact that there are 29 distinct bones joined by harmonic, serrated, beveled and gomphotic sutures is too often forgotten. If all we needed from the head was a protected space for our brain and a soft tissue tube through which to pass food, air and water, why did we not get just that? Instead, we have a very intricate arrangement of bones, connective tissue and muscles which protect and facilitate the functions of many delicate structures. The 23 bones of the head (excluding the ossicles) started out as tiny centres of ossification scattered throughout a connective tissue matrix. At birth, many of these bones are in parts and most of them are still cartilaginous. There are six major fontanelles, or soft spots, located between adjoining bones in the vault: bregma at the top of the head, lambda towards the back, and pterion and asterion on each side. The sutures between the vault bones are quite plastic and flexible, so the bones may overlap each other during the delivery process. These characteristics do not change 'overnight' when the child is born. They linger, accommodating growth and development into the early adult years, and beyond." (p. 47)

It is always well to recall that Sutherland's originality reflected his ongoing effort to understand the principles of osteopathy given by his teacher, Andrew Taylor Still. Still, in turn, placed great emphasis on the necessity for the osteopath to understand anatomy. In this volume, the author continues this tradition in an admirable fashion.❐

when he meets adversity probably constitutes the real test. Of this in reference to Dr. Still osteopathic history has touched upon. I first met him when his star was well in the ascendancy. Material prosperity, another crucial test, aside from his scientific arrival, was well within his grasp. Of this I was a frequent spectator; it went without stint to innumerable charities and to the good of the profession. And with it all he never forgot an old friend.

His professional work was a delight, unequaled, I believe, to this day, though I am reasonably certain there is no good reason why it should not be. There is only one way to make a thorough-going osteopath, and this he impressed upon us day after day, and that is to really know anatomy and continuously develop and educate the tactile system by actual experience. Now descriptive anatomy and dissection and textbook physiology and pathology and histology have their places, but they can never be substituted for osteopathic applied anatomy. This is the sine qua non that was drummed into us day after day and by the actual and personal instruction of Dr. Still. For in those times he spent several hours every day examining and treating patients. One just simply had to learn how to diagnose and treat osteopathically, or else he was not wanted. This was a command, thoroughly enforced, and no disciplinarian was ever more exacting.

With all of Dr. Still's genius and wonderful ability for sensing underlying physiologic principles he never lost sight of the fact that the student was still a tenderfoot, and that the grim fact of war was to get results. In other words, in spite of the great principles that he saw so clearly, he realized to the full the practical and every day necessity of driving home a daily lesson of practical anatomic minutiae. This has always been and ever will be the keystone of the osteopathic arch.

Dr. Still was justly proud of his work. He knew the strength of osteopathy and the future held no terrors or even worries provided the profession held to the truth. This is probably well illustrated by the legislative history from the first enactment in Vermont to this day. He was satisfied that each state would fall into line just as soon as the people experienced the right kind of osteopathic treatment. His strength, fortitude and confidence towered well above his followers. Out of the ripeness of time based upon actual experience he knew what he could do and what others could do. He was far more interested in working out some new clinical problem. For osteopathy meant nothing, if practical results were not forthcoming. His confidence in the good judgment of the average citizen was sublime.❐

[*Selected Writings of Carl Philip McConnell, DO,* edited by Theodore Jordan, DO, and Richard Schuster, DO, Squirrel's Tail Press, Columbus, Ohio, 1994, pp 1-4]

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American® Academy of Osteopathy
3500 DePauw Boulevard, Suite 1080
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ADDRESS SERVICE REQUESTED

Osteopathic Treatment of Headache

Honolulu, Hawaii
February 13-16, 2004

The program anticipates being approved for 20 hours of AOA Category 1-A CME credit pending approval by the AOA CCME.

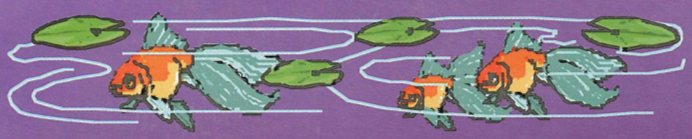
DESCRIPTION:
Overview of the osteopathic treatment of headaches

OBJECTIVES:
- Review epidemiology and etiology of headache
- Review types of headache
- Review current osteopathic treatment of headache including indications and contraindications
- Review osteopathic diagnosis
- Review osteopathic manipulative treatment
- Review coding & billing implications

COURSE LOCATION:
Hilton Hawaiian Village Beach Resort & Spa
2005 Kalia Road
Honolulu, HI 96815
Phone: 808/949-4321
Website: www.hawaiianvillage.hilton.com

ROOM ACCOMMODATIONS:	RANGE OF RATES:
Hilton Hawaiian Village	$185-$495

For optional hotel accommodations, visit: www.hotels.com; For best rates during January, type in Honolulu and appropriate dates.



REGISTRATION FORM

Osteopathic Treatment of Headache

February 13-16, 2004

Full Name _____

Nickname for Badge _____

Street Address _____

_____

City _____ State_____ Zip_____

Office phone # _____ Fax #: _____

By releasing your Fax number, you have given the AAO permission to send marketing information regarding courses via the fax.

E-mail: _____

AOA # _____ College/Yr Graduated _____

I need AAFP credit ❒

(AAO makes every attempt to provide snacks/meals that will meet participant's needs. However, we cannot guarantee to satisfy all requests.)

REGISTRATION RATES

	On or Before 1/13/04	After 1/13/04
AAO Member	$550	$650
Intern/Resident/Student	$450	$550
AAO Non-Member	$755	$855

AAO accepts Visa or Mastercard

Credit Card # _____

Cardholder's Name _____

Date of Expiration _____

Signature _____