

# Special Conference

## AOA Research Conference

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**Program Chair: Hollis H. King, DO, PhD**

### **PROGRAM AT A GLANCE**

The studies and data presented in the annual AOA Research Conference document the ever increasing evidence base for the benefit of the application of osteopathic manipulative treatment (OMT) in clinical practice. This year's conference presents the basic and clinical science on the mechanisms of action for OMT in viscerosomatic and somatovisceral interactions, and the benefits of OMT for immune system function, physiologic functions, and chronic low back. Highlighted is the osteopathic tenet that the body is self-regulating and self-healing and that the physician's duty is to assist the patient's body to optimize the self regulating and healing process through the application of OMT.

### **TOPIC AND SPEAKER HIGHLIGHTS**

(Co-Sponsorship: American College of Osteopathic Pediatricians)

**CONFERENCE THEME:** "The Science Supporting the Impact of OMT on the Human Condition: The Structure-Function Relationship and Mechanisms of Action for Self-Regulatory and Healing Processes."

### **Learning Objectives:**

- To describe the data supportive of the concept of somatovisceral and viscerosomatic interactions which is one of the greatest contributions of the osteopathic medical profession to healthcare.
- To understand and apply the data on immune system benefit in clinical practice.
- To appreciate the benefits of OMT for pneumonia, balance dysfunction, and neurological disorders in clinical practice.

### **SUNDAY, OCT. 30**

#### ***Welcome and Introduction***

7:30 a.m. – 7:40 a.m.

Hollis H. King, DO, PhD

***Biomechanical Regulation of Cell Function in Vitro: An Opportunity for Clinical Translation to Osteopathic Manipulative Treatment***

7:40 – 8:20 am

Paul Standley, PhD

***The Current Status of Research on Autonomic Nervous System Function and the Relationship to Korr's Model of the Facilitated Segment***

8:20 a.m. – 9:00 a.m.

Jänig Wilfrid, MD

***Pain, Cross-organ Sensitization and Viscero-somatic Reflexes Involving the Heart***

9:00 a.m. – 9:40 a.m.

Robert Foreman, PhD

***Spinovisceral Reflexes: From Paraspinal Tissues to Autonomic Effects***

9:40 a.m. – 10:20 a.m.

Joel Pickar, DC, PhD

***Directions for research on Mechanisms of Action for OMT/MM/MT***

***Panel of presenters plus discussant***

10:20 a.m. – 11:00 a.m.

Partap Khalsa, DC, PhD

***AOA Research Abstracts Presentations***

11:00 a.m. – 12:00 p.m.

***AOA Research Poster Session***

1:30 p.m. – 5:00 p.m.

(Poster Set Up Begins at 10:00 am in the convention Center Exhibit Hall)

**MONDAY, OCT. 31**

***Opening Session of the 116th Annual Osteopathic Medical Conference & Exposition***

8:00 a.m. - 10:00 a.m.

Keynote Address

***The Effects of Osteopathic Manipulation in Animal Models of Disease***

10:00 a.m. – 10:40 a.m.

Lisa Hodge, PhD

***The Evidence Base for OMT in the Treatment of Musculoskeletal Disorders***

10:40 a.m. – 11:20 a.m.

John Licciardone, DO

**NCCAM Strategic Priorities**

11:20 a.m. – 12:00 p.m.

John Killen, Jr., MD, Deputy Director, NCCAM

***Challenges in OMT Research: Sham and Placebo Controls in OMT Research***

1:30 p.m. – 2:10 p.m.

Michael Patterson, PhD

***Osteopathic Considerations in HEENT Research***

2:10 p.m. – 2:50 p.m.

Michael Kuchera, DO

***OMT in the Treatment of Pneumonia***

2:50 p.m. – 3:30 p.m.

Brian Degenhardt, DO

***Research Directors Meeting***

4:00 p.m. – 6:00 p.m.

***Research Reception***

6:30 p.m. – 7:30 p.m.

Student Poster Award Winners Presentations

**TUESDAY, NOV. 1**

***The Impact of OMT in Pregnancy, Labor, and Delivery with Emphasis on Physiologic Function***

8:00 a.m. – 8:40 a.m.

Kendi Hensel, DO, PhD

***Effect of OMT on Vascular Variability and Biorhythm Entrainment Phenomenon***

8:40 a.m. – 9:20 a.m.

Michael Seffinger, DO

***The Impact of OMT on Balance and Equilibrium***

9:20 a.m. – 10:00 a.m.

Rita Patterson, PhD

***Research on Hospital Based OMT***

10:00 a.m. – 10:40 a.m.

William Thomas Crow, DO

***Research Supportive of Cranial Bone Motion and Clinical Benefit***

10:40 a.m. – 11:20 a.m.

Hollis H. King, DO, PhD

*The Effects of OMT on Cardiac Function in Patients with Hypertension*

11:20 a.m. – 12:00 p.m.

Francesco Cerritelli, DO, Italy

***The Journal of the American Osteopathic Association***

1:15 p.m. - 3:15 p.m.

Gilbert E. D'Alonzo, Jr, MS, DO

Diane Lang

For more information about the AOA Research Conference, go to:

<http://www.osteopathic.org/inside-aoa/events/annual-aoa-research-conference/Pages/presentation-summaries.aspx>

## **AOA Research Conference**

Orlando Convention Center

October 30 to November 1, 2011

“The Science Supporting the Impact of OMT on the Human Condition: The Structure-Function Relationship and Mechanisms of Action for Self-Regulatory and Healing Processes.”

The studies and data presented in the annual AOA Research Conference document the ever increasing evidence base for the benefit of the application of osteopathic manipulative treatment (OMT) in clinical practice. This year’s conference presents the basic and clinical science on the mechanisms of action for OMT in viscerosomatic and somatovisceral interactions, and the benefits of OMT for immune system function, physiologic functions, and chronic low back. Highlighted is the osteopathic tenet that the body is self-regulating and self-healing and that the physician’s duty is to assist the patient’s body to optimize the self regulating and healing process through the application of OMT.

### **Learning Objectives**

1. To describe the data supportive of the concept of somatovisceral and viscerosomatic interactions which is one of the greatest contributions of the osteopathic medical profession to healthcare.
2. To understand and apply the data on immune system benefit in clinical practice.
3. To appreciate the benefits of OMT for pneumonia, balance dysfunction, and neurological disorders in clinical practice.

### **References**

1. King HH, Jänig W, Patterson M (Eds.) The science and clinical application of manual therapy. Edinburgh, Churchill Livingstone, 2011.
2. Chila AG (Ed.) Foundations for osteopathic medicine. 3/e. Philadelphia, Lippincott, Williams & Wilkins, 2011.
3. Seffinger MA, Hruby RJ. Evidence-based manual medicine. Edinburg, Churchill Livingstone, 2007.

### **Program**

Sunday October 30, 2011

**7:30 a.m. – 7:40 a.m.**

Welcome and Introduction

Hollis H. King, DO, PhD

**7:40 a.m. – 8:20 a.m.**

Biomechanical Regulation of Cell Function in Vitro: An Opportunity for Clinical Translation to Osteopathic Manipulative Treatment

Paul Standley, PhD

### **Presentation Summary**

Our laboratory has developed an in-vitro human cell culture system that allows biomechanical strain modeling of various osteopathic manipulative treatments. Both

2- and 3-dimensional human fibroblast constructs have been developed and subjected to various biomechanical strains including repetitive motion strain, modeled counterstrain, and modeled myofascial release. We have focused our attention on a number of physiological outcomes such as cell morphology, hypertrophy, hyperplasia, wound healing ability, myoblast-to-myotube differentiation, and cytokine expression and secretion. We have linked the importance of several strain-regulated autacoids e.g., (IL-6, IL-1beta, nitric oxide, etc.) with known abilities to mediate the outcomes noted above. Newest in-vitro data strongly suggest that cytokine expression/secretion depends upon both the duration and magnitude of modeled myofascial release. If translatable clinically, these studies may serve to help explain cellular mechanisms of action of various OMT's as well as guide further optimization of OMT strategies.

### **Learning Objectives**

1. Discuss how human cells are exposed to biomechanical strain in-vivo and in-vitro.
2. List various ways cell function is regulated by biomechanical strain.
3. Discuss the potential utility of how in-vitro strain studies might guide new or enhanced osteopathic manipulative treatment strategies.

**8:20 a.m. – 9:00 a.m.**

The Current Status of Research on Autonomic Nervous System Function and the Relationship to Korr's Model of the Facilitated Segment

Wilfrid Jänig, MD

### **Presentation Summary**

Korr's concept of the "osteopathic lesion" and the "facilitated segment" has dominated osteopathic medicine for more than 50 years. The core of this concept is to use the body's endogenous recuperative power and promotion of self-healing in the manual therapeutic approach. The concept still appears to be modern as far as its philosophical superstructure is concerned, i.e. connecting biological and pathobiological processes in the deep body domains and their regulation by the brain, involving afferent systems, neuroendocrine systems and neural motor systems, with health and disease of the organism. However, is this concept still tenable in the light of modern neurobiological research in the fields of pain, neural regulation of autonomic targets and regulation of the somatomotor system? Does this concept reflect mechanistically the neurobiological complexities on which the functioning of the body in health and disease and the curative manual interventions in disease are based? Will this concept lead to answers explaining why manual therapeutic interventions can be successful in the treatment of dysfunctional states of the body? Does the concept supply us with ideas as to how functional disorders of the body are anchored and can be explained in the frame of modern neurobiology? We have to reformulate the concept on the basis of modern research in neurobiology. We have to reformulate the research questions and restructure the research approach. Clinical investigations on patients, research on the human subject as model (healthy subjects and patients) and research on animal models have to be more closely integrated.

### **Learning Objectives**

1. The modern concept underlying the functioning of autonomic nervous system.
2. The modern concept of the neurobiology underlying nociception and pain.
3. Possible modern research strategies in Osteopathic Medicine, based on the neurobiology of the autonomic nervous system and of the nociceptive system, and the translation of this research into clinical reality.

**9:00 a.m. – 9:40 a.m.**

Pain, Cross-organ Sensitization and Viscero-somatic Reflexes Involving the Heart

Robert Foreman, PhD

### **Presentation Summary**

Visceral pain is one of the most common types of pain humans experience throughout a lifetime. However, a common assumption is that visceral pain is generated by mechanisms that are similar to somatic pain but that assumption is incorrect. The objective of this presentation is to address complexities of the mechanisms underlying visceral pain, and more specifically to focus on visceral pain that results from cross-sensitization between two visceral organs. In addition this presentation will address possible mechanisms viscerosomatic reflexes activated in normal and diabetic animals.

Some characteristics of visceral pain include referral/transference to overlying somatic structures, diffuseness and difficulty in locating the source, augmentation of autonomic and/or motor reflexes, and hyperalgesia of somatic structures. Cardiac afferent fibers transmitting nociceptive information can be ischemic sensitive, ischemic insensitive, or silent. Visceral nociceptors in most internal organs are commonly classified according to their responses to mechanical stimuli. However, because locally acting agents are released in a diseased heart, chemical sensitive nociceptive receptors might be more important than mechanosensitive nociceptors. Viscerosensory fibers transmitting cardiac nociceptive information release substance P and possibly other neurotransmitters onto thoracic spinal neurons receiving convergent input from somatic afferent fibers; these neurons include cells of origin of ascending pathways and the newly discovered postsynaptic dorsal column pathway. However, the postsynaptic dorsal column pathway only transmits mechanical information from the heart; whereas, spinothalamic tract cells and cells of other ascending pathways transmit cardiac nociceptive chemical information. In addition to convergence of visceral and somatic input onto spinal neurons, nociceptive visceral afferent input from a diseased visceral organ can converge onto a spinal neuron that receives afferent input from another normal visceral organ. For example, chronic inflammation of the esophagus or nociceptive distension of the gallbladder increases the responsiveness of spinal neurons receiving cardiac nociceptive inputs. This presentation will also show that nociceptive information from the heart activates viscerosomatic reflexes that are exaggerated by vagotomy and suppressed in animal models of diabetes.

### **Learning Objectives**

1. Explain the mechanisms underlying visceral pain.

2. Discuss how disease in one visceral organ can affect the function of another visceral organ and the sensitivity of somatic structures.
3. Describe the differences of somato-visceral reflexes between normal and diabetic animal models.

**9:40 a.m. – 10:20 a.m.**

Spinovisceral Reflexes: From Paraspinal Tissues to Autonomic Effects  
Joel Pickar, DC, PhD

**Presentation Summary**

Manual therapists often treat the vertebral column. Dysfunction of this complex structure and its correction are thought to affect homeostatic processes by altering somatosensory input from paraspinal tissues, and through neural pathways, influence autonomic efferent activity and ultimately end-organ function. This presentation provides an overview and summary of the peer-reviewed, experimental literature in which animal models have been used to investigate this aspect of the neurophysiology of paraspinal tissues.

**Learning Objectives**

1. Become familiar with experimental animal models used to study spinovisceral reflexes.
2. Know the experimental data that provides a mechanistic basis for the vertebral column's role in reflexly affecting autonomic function.
3. Recognize the gaps in our knowledge regarding spinovisceral reflexes.

**10:20 a.m. – 11:00 a.m.**

Directions for research on Mechanisms of Action for OMT/MM/MT  
Panel of presenters plus discussant  
Partap Khalsa, DC, PhD

Monday October 31, 2011

**10:00 a.m. – 10:40 a.m.**

The Effects of Osteopathic Manipulation in Animal Models of Disease  
Lisa Hodge, PhD

**Presentation Summary**

The lymphatic system provides a means to return excessive interstitial fluid to the blood circulation. In this process, interstitial cells and substances are also transported from tissue to blood. As leukocytes circulate between tissue, lymph, and blood, they continuously sample the internal environment for foreign antigens, a process termed "immune surveillance". Diseases that impair lymph flow, such as infection and lymphedema, hinder lymphocyte recirculation and may exacerbate disease. The osteopathic medical profession has developed manipulative medicine treatments, specifically termed lymphatic pump techniques (LPT), to increase lymph flow. Although there are anecdotal reports of clinical benefits of LPT, there is a paucity of research to support this treatment modality. Recent investigations using animal models have demonstrated that LPT increases lymph flow and leukocyte trafficking



and thus have provided insight into the mechanisms by which LPT enhances the lymphatic and immune function. These experimental observations support case reports and limited clinical findings that LPT is a valuable complimentary therapy for infectious diseases, including influenza and pneumonia. The objective of this presentation is to discuss:

### **Learning Objectives**

1. Current research models for the study of LPT.
2. The ability of LPT to enhance the lymphatic and immune systems.
3. Potential mechanisms by which LPT protects individuals with disease.

**10:40 a.m. – 11:20 a.m.**

The Evidence Base for OMT in the Treatment of Musculoskeletal Disorders  
John Licciardone, DO

### **Presentation Summary**

This presentation will entail a systematic review of the relevant biomedical literature involving OMT in the treatment of musculoskeletal disorders, with particular emphasis on low back pain.

### **Learning Objectives**

1. To describe the process of systematically reviewing the biomedical literature relating to OMT.
2. To describe the background and processes relating to the development of the current AOA guidelines for OMT in patients with low back pain.
3. To identify and describe emerging evidence relating to OMT in the treatment of musculoskeletal disorders.

**11:20 a.m. – 12:00 p.m.**

NCCAM Strategic Priorities  
John Killen, Jr., MD, Deputy Director, NCCAM

### **Presentation Summary**

Dr. Killen will summarize the latest data on the prevalence of use of various forms of complementary and alternative medicine in the US, the trends and major reasons for use. She will describe the research challenges, areas of promise, and research objectives in research on complementary and alternative medicine, especially manipulative therapies. She will discuss approaches for research on interventions where blinding of patients and practitioners is not possible.

### **Learning Objectives**

1. To provide the latest data on the prevalence of use of various forms of complementary and alternative medicine in the US, the trends and major reasons for use.
2. To describe the research challenges, areas of promise, and research objectives in research on complementary and alternative medicine, especially manipulative therapies.

3. To outline the standards and approaches for research on interventions where blinding of patients and practitioners is not possible.

**1:30 p.m. – 2:10 p.m.**

Challenges in OMT Research: Sham and Placebo Controls in OMT Research

Michael Patterson, PhD

### **Presentation Summary**

One of the most formidable challenges in designing and performing clinical studies of the efficacy of OMT is designing the contrast group. There are two basic types of OMT research designs (although they are sometimes commingled): technique studies and treatment studies. Technique studies ask about the effect of a single or small set of manipulative techniques on a particular symptom. In this study type, the full effect of OMT is not tested. Therefore a true sham control can be used, because the question is not what is the effect of OMT, but what is the effect of x technique. However, OMT is a multifaceted treatment that, by definition, varies with findings on different patients and should even be modified during treatment according to the patient response. It also entails the patient's psychological state, and necessarily includes touch and doctor-patient interactions. At present, we do not know which of these things is the "active ingredient" of OMT, so all must be considered active, and there could be interactions between the various ingredients. Thus, by definition, a control group that involves doctor presence, touch etc, is not a placebo or sham control, since the definition of placebo is a treatment or substance that is like the active treatment, but does not contain the active ingredient. A sham is a treatment that fools the patient into thinking he/she is being treated, but also must not contain any of the active ingredient(s). Thus, a sham also cannot involve touch or doctor presence, etc., that are part of OMT. We propose that the most effective design involves comparing OMT with no treatment. Once an effect is shown, a study can be designed to separate various aspects of OMT from the full effect. However, until it has been shown by study that a specific part of OMT has no effect on functions being studied, it must be assumed that a part of OMT such as touch has an influence on outcome and must be considered an alternative treatment, not a sham.

Further readings: Patterson, M.M. (2011) The use of sham and placebo controls in manual medicine research. In King, H., Janig, W, and Patterson, M.M. (Eds) The Science and Clinical Application of Manual Medicine, Elsevier, 181-191.

### **Learning Objectives**

1. To differentiate two basic OMT research designs and the objectives of each.
2. To explain the problems of commonly used controls in OMT.
3. To suggest the proper way to design OMT efficacy research.

**2:10 p.m. – 2:50 p.m.**

Osteopathic Considerations in HEENT Research

Michael Kuchera, DO

**2:50 p.m. – 3:30 p.m.**

OMT in the Treatment of Pneumonia

Brian Degenhardt, DO

**Presentation Summary**

This presentation will highlight lessons learned from the Multicenter Osteopathic Pneumonia Study in the Elderly (MOPSE). Focusing on three manipulative techniques used within the study treatment protocol which was performed by 62 osteopathic physicians throughout the study on over 400 subjects, objective data will be presented to quantify the similarities and differences in the performance of these three techniques. Based on this data, perspectives regarding the objectification of OMT and the use of objective feedback in the training of manipulative skills for osteopathic clinicians will be offered.

**Learning Objectives**

1. Briefly review the methodology and outcomes of the MOPSE study.
2. Evaluate on three techniques - rib raising, suboccipital inhibition and thoracic pump technique - the surface area, pressure and force data collected from numerous physicians who provided treatments in the study.
3. Discuss the variables that impact the standardization of technique and the use of objective feedback in the development of manual skills.

Tuesday November 1, 2011

**8:00 a.m. – 8:40 a.m.**

The Impact of OMT in Pregnancy, Labor, and Delivery with Emphasis on Physiologic Function

Kendi Hensel, DO, PhD

**Presentation Summary**

This lecture and workshop will provide a brief review of the current literature regarding the efficacy of OMT in pregnant women. It will also demonstrate the OMM protocol used in the current study of OMM at UNTHSC/TCOM, as well as some other techniques for pregnant patients.

**Learning Objectives**

1. Be familiar with current research on the efficacy of OMM for certain conditions associated with pregnancy.
2. Gain practical experience with the protocol used in a study on OMM on low back pain in pregnancy.

**8:40 a.m. – 9:20 a.m.**

Effect of OMT on Vascular Variability and Biorhythm Entrainment Phenomenon

Michael Seffinger, DO

**Presentation Summary**

This lecture will review the scientific literature on the impact of OMT on select physiological functions in human clinical research. Namely, heart rate and blood flow variability and biorhythm entrainment phenomenon.

### **Learning Objectives**

1. State the evidence in support of the ability of OMT to alter heart rate variability.
2. State the evidence in support of the ability of OMT to alter blood flow variability.
3. State the evidence in support of the phenomenon of entrainment of biorhythms during OMT.
4. State the clinical applicability of the research on the impact of OMT on these physiological functions.

**9:20 a.m. – 10:00 a.m.**

The Impact of OMT on Balance and Equilibrium

Rita Patterson, PhD

### **Presentation Summary**

The purpose of this study was to understand the effect of Osteopathic Manipulative Treatment (OMT) on vestibular balance control structures. It was hypothesized that following an OMT treatment protocol, elderly patients would show significant improvement in empirical outcome measurements used to quantify postural stability. Forty healthy elder subjects (> 65) were enrolled into the study and separated into two groups, those receiving OMT and those not receiving OMT. Subjects were asked to stand on the force platform with their arms hanging loosely by their sides, and to look at a landmark on the wall in front of them. Outcome measures included anterior/posterior (AP) and medial/lateral (ML) variance of the COP values over the 30 second data collection. Patients in the OMT group received 4 weekly treatments of 25-30 minutes by the same practitioner to eliminate inter-examiner variability. The results show that the OMT protocol employed in the present study improved the postural stability of healthy elderly patients as measured by the force platform in the AP and ML directions. The reduction in AP direction sway, is particularly important because of the greater likelihood of falls associated with AP instability. However, further study is required to demonstrate the correlation between OMT reduced sway observed in this study and fewer falls in the elderly.

### **Learning Objectives**

1. To understand how cranial Osteopathic Manipulation might affect balance.
2. To understand how to use a force plate to measure center of pressure.
3. To learn how to calculate sway as a measure of balance.

**10:00 a.m. – 10:40 a.m.**

Research on Hospital Based OMT

William Thomas Crow, DO

### **Presentation Summary**

A review of the literature review of manual medicine as applied to the visceral organs in the hospital and outpatient setting.

### **Learning Objectives**

1. To understand the research concerning cardiac surgery patients and manual medicine

2. To understand the research concerning ileus in the hospitalized patient and manual medicine
3. To understand the research concerning peptic ulcer disease and manual medicine

**10:40 a.m. – 11:20 a.m.**

Supportive of Cranial Bone Motion and Clinical Benefit

Hollis H. King, DO, PhD

### **Presentation Summary**

Osteopathy in the cranial field has been practiced by osteopathic physicians for over 80 years, and is part of the Osteopathic Principles and Practice curriculum in every osteopathic medical school. Controversy has accompanied the practice of cranial manipulation because of difficulty in acquiring the palpatory skills required and the perceived lack of evidence of cranial bone motion and clinical benefit. This presentation describes the basic science and clinical research supportive of both the concept of cranial bone motion and benefits to patients in clinical practice. After viewing the presentation slides and participating in the presentation, the participant will be able to:

### **Learning Objectives**

1. Describe the research supportive of the biomechanical motion of calvarial structures.
2. Describe the research defining of the motion of cerebral spinal fluid, the dural attachments between calvarium and sacrum, and mobility of brain and spinal cord structures.
3. Describe the research indicative of therapeutic benefit of the application of cranial manipulation.

**11:20 a.m. – 12:00 p.m.**

The Effects of OMT on Cardiac Function in Patients with Hypertension Francesco

Cerritelli, DO, Italy

### **Presentation Summary**

Hypertension is the leading cause of cardiovascular events and is highly prevalent. In 2000 the worldwide prevalence rate was 26.4% (95% CI 26.0, 26.8%) with a sex standardized rate of 26.6% [26.0–27.2%] for men and 26.1% [25.5, 26.6%] for women, and it has been projected to rise up to 29.2% (28.8, 29.0%, men 29.0% [28.6, 29.4%] and women 29.5% [29.1, 29.9%]) by 2025 affecting 1.56 billion (1.54, 1.58) people (Kearney, Whelton et al. 2005). However the last report of the National Center for Health Statistics estimates the prevalence rate in USA of 32% (NCHS 2011) highlighting an higher burden of the disease in USA.

Incidence of hypertension is influenced by age, gender and race. In an analysis of the Framingham Heart Study was shown that the lifetime risk of developing hypertension for middle-aged and elderly individuals is close to 90%, with a two-fold higher risk for men compared to women (Vasan, Beiser et al. 2002). The mortality estimate for hypertension is 7.1 million premature deaths worldwide equal to 4.5% of the cardiovascular disease burden (64 million DALYs) (Whitworth 2003).

Therefore hypertension is considered a very challenging health problem, realistically affecting large part of the worldwide population. Measuring the cardiac function is a way to control, detect and early diagnose hypertension. Ultrasounds, sphygmomanometer, Holter are the easiest and the most costeffective tools used for assessing the cardiovascular system and its process of atherosclerosis. Particularly effective is the monitoring of intimate-media vessels walls which produces an estimate of the risk of developing a cardiovascular event.

Numerous strategies, treatments and health programs were developed to reduce the risk of cardiovascular event (Whitworth 2003), but not many studies provided evidence about the role of OMT in hypertension. Papers published by Johnston et al (Johnston, Hill et al. 1980; Johnston, Hill et al. 1982; Johnston and Kelso 1995; Johnston and Golden 2001) mainly focused on the relationship between cardiac function and somatic dysfunctions but few studies were planned to establish a correlation between the application of OMT and a change in cardiovascular function. Cerritelli et al (Cerritelli, Carinci et al. 2011) carried out a research to look at the association of OMT to a change in blood pressure and intimatedia thickness (IMT). Results from this one-year follow-up observational study based on 63 hypertensive patients (31 OMT group and 32 control group), consequently recruited, showed an association between OMT and systolic blood pressure  $-4.523\text{mmHg}$   $[-6.291, -2.755]$  (delta pre-post measurements between study and control group) and OMT and IMT  $-0.517\text{mm}$   $[-0.680, -0.353]$ , but not with diastolic blood pressure. Authors argue that the possible explanation could be based on the relationship between somatic dysfunctions and the release of cytokines which in turn are precursors of vessel wall alteration as well as the ability of OMT techniques to re-balance the autonomic nervous system. However these assumptions are hypothetical and not based on evidence on cardiovascular field and therefore further specific RCT studies are needed to prove them as stated also from Spiegel (Spiegel, Capobianco et al. 2003). The latter published a review on the possible potential effect of OMT in treating hypertension and concludes that OMT could have a support role in an integrated and holistic hypertensive treatment scenario. Therefore OMT seems to be effective in modifying cardiac functions in a cohort of hypertensive patients, even though the scarcity of structured and strong studies has to be considered as a limitation in the interpretation of these results. However the inner feature of OMT to be less invasive as well as well tolerated can open a way to consider it as a potential complementary method in the management of hypertension.

### **Learning Objectives**

1. Potential applications of OMT in improving hypertensive condition (systolic vs diastolic responses).
2. Effectiveness of osteopathic treatment in ameliorating health of cardiovascular system.
3. OMT as possible complementary method for managing hypertension in primary care.