

The Development of a Research Agenda for the Canadian Chiropractic Profession: Report of the Consortium of Canadian Chiropractic Research Centres, November 2000

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Introduction

The Consortium of Canadian Chiropractic Research Centres (CCCRC) was established in 1997. The CCCRC's purpose is the development, through multi-disciplinary collaboration, of new chiropractic knowledge and its dissemination and integration within the health care community and health policy makers. In October of 2000, the CCCRC held a workshop, the purpose of which was to assemble leading researchers in chiropractic from the

academic institutions of the CCCRC in order to provide an opportunity for its members and invited participants to address the Canadian Institutes of Health Research (CIHR) mandate of health care research in Canada by further developing the research agenda of chiropractic science.

The workshop provided a venue for: 1. presentations on the state-of-the-art of scientific developments in chiropractic, with particular emphasis on the public health problem of spinal pain and disability, 2. the advancement of the emerging research framework of chiropractic science in Canada, and; 3. the development of collaborative research projects within the Consortium pursuant to the workshop.

The Workshop format consisted of invited scientific presentations and small-group developmental sessions. The deliverables of the Workshop consist of this report on research priorities for the CCCRC as well as the published proceedings of the scientific presentations, entitled *Spinal Pain and Disability: The State-Of-The-Art of Chiropractic Science*. It should be noted that, with only one afternoon session available for identifying research priorities in the Workshop topic areas, these priority lists are not yet fully refined. Subsequent CCCRC sessions should focus on further refinements as an objective.

The general goal of this workshop was to foster collaborative, multi-disciplinary research in the emerging area of chiropractic science, with the purpose of improving the health of Canadians.

1a Background

In March, 1997, the Canadian Chiropractic Association (CCA) commissioned the creation of the Consortium of Canadian Chiropractic Research Centres (CCCRC). Its history, objectives and composition are described in Appendix 2. The 1st CCA/CCCRC Research Symposium was held in November, 1998 at the University of Calgary. Over 150 registrants were in attendance. Representatives of the CCCRC's member institutions gave keynote presentations and leading chiropractic researchers from the

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1980's gave Heritage Lectures. Dr. Mark Bisby PhD, Director of Programs at the Medical Research Council of Canada (now the CIHR) also gave a keynote presentation. Free papers and posters were also presented.

1b Research Agenda Workshop

The primary goal of the October 2000 two-day workshop was for Canadian chiropractic researchers to further the development of the framework of research by which they address the problem of spinal pain and disability.

The specific objectives of the Workshop were:

1. To provide an opportunity for Canadian researchers in chiropractic science to present state-of-the-art reviews on the research ongoing in various areas addressing spinal pain and disability and its management by chiropractors.
2. To provide an opportunity for these researchers along with other chiropractic and biomedical researchers to conduct small-group sessions leading to the development of clear, concise, innovative and practical research agendas in each of the topic areas (see below).
3. To hold plenary sessions designed to integrate the individual research agendas into a coherent and comprehensive research framework for chiropractic research related to spinal pain and disability.
4. To initiate the development of two collaborative projects from within the CCCRC that will be submitted for funding to the CIHR in a timely fashion. To this end, part of the funding submitted in this proposal is to be dedicated to seed funding for the development of these specific projects.
5. To disseminate the outcomes of this Workshop to all interested parties and to facilitate the development of linkages with other agencies in the health care community such as CIHI, ICES and others.

The list of topic areas which formed the matrix for the research framework was:

Spine-related anatomy and neuroanatomy

Spine-related neurosciences

Regional or whole-body biomechanics as related to spinal pain

Segmental spinal biomechanics

Clinical diagnostic procedures in the assessment of spinal pain and disability

Population and health services epidemiology of spinal disorders in Canada

Basic science studies of the effect of spinal manipulation on pain

Clinical studies of the effect of chiropractic treatment on spinal pain and disability (clinical trials)

Educational research

1c Rationale for focusing on "Spinal Pain and Disability"

Spinal pain and disability is a public health problem in Canada (Cote, 1998; Cassidy, 1998). Data from the province of Saskatchewan indicate that during any six month period, nearly 5% and 11% of the adult population respectively are severely disabled by neck or low back pain (Cote, 1998; Cassidy, 1998). Furthermore, the costs associated with low back pain and whiplash are very high.

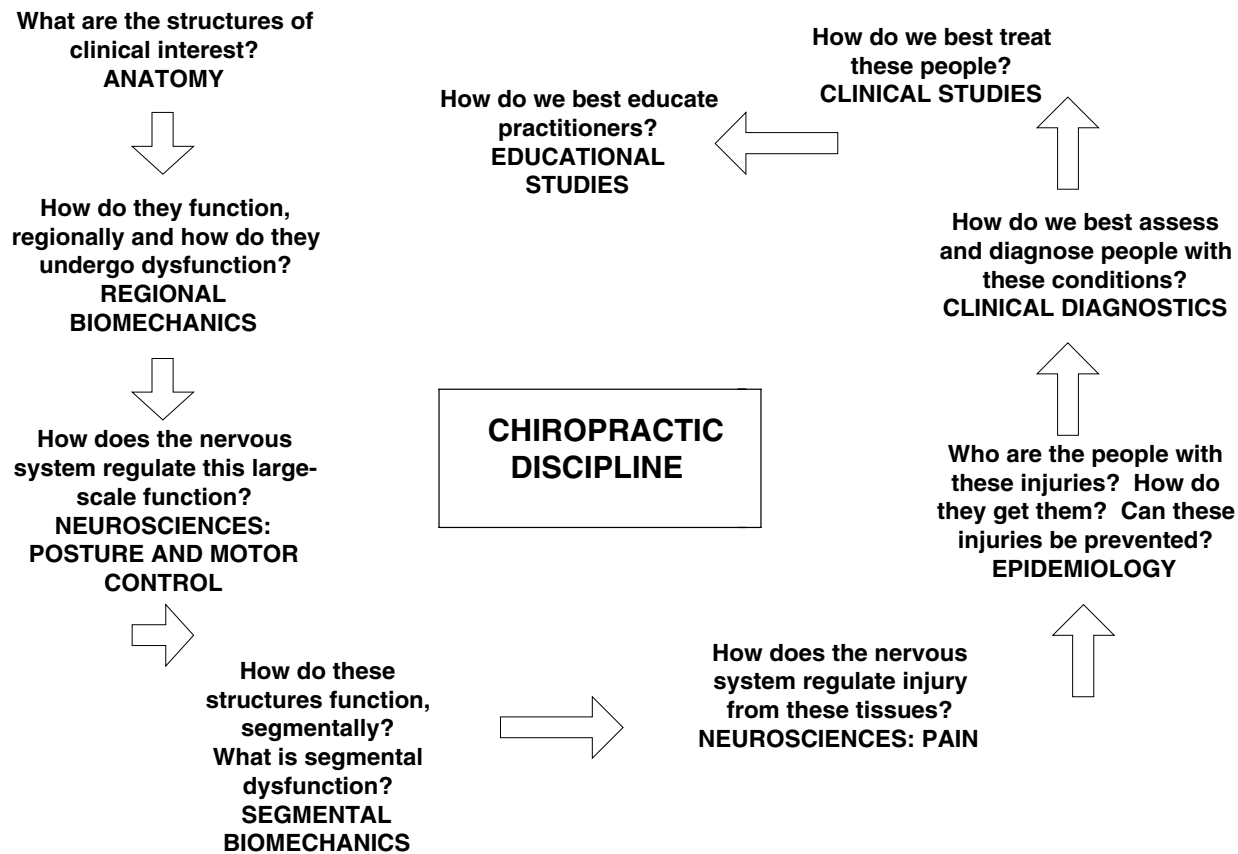
A recent Health Canada study revealed that musculoskeletal disorders ranked second after cardiovascular disease in terms of highest cost of burden of illness in Canadian society, at over 17 billion dollars or 13.8% of the total (direct and indirect) cost of illness in 1993. While musculoskeletal diseases account for one of the largest cost components of illness in Canada, a relatively small proportion of health science research expenditures (2.9%) is allocated to musculoskeletal research. This problem is made more urgent, given Canada's aging population.

The use of complementary/alternative medical (CAM) health care for musculoskeletal disorders is increasing rapidly in North America (Eisenberg, 1994, 1998; Millar, 1997). Rao et al. (1999) have recently reported that chiropractic treatment was the most frequently used CAM therapy amongst arthritis sufferers (31% of respondents) with the second highest satisfaction rating (73%).

Innovative, multi-disciplinary research is, therefore, required to better understand the etiology, prognosis, prevention and treatment of spinal pain and disability in order to address the growing health issues of quality of life, mobility and function of our citizens. The Canadian Chiropractic profession seeks to contribute to this research by establishing an agenda for pursuing this urgent need, by disseminating its results to the health care community and by promoting changes in public health policy which would lead to better health of Canadians. (references available from author)

Conceptual Matrix for CCCRC Workshop

The framework for a chiropractic research agenda is built upon a matrix of discrete topic areas. Conceptually, these are integrated hierarchically from the basic sciences to the



clinical sciences to the educational and public health sciences. The main topic areas of this agenda, and of the workshop were:

1. SPINAL ANATOMY

What are the structures of clinical interest to chiropractors? How are they constituted and what are their interconnections?

2. REGIONAL BIOMECHANICS

How do these tissues function regionally under normal conditions? What forms of regional dysfunction are of clinical importance?

3. NEUROSCIENCES: POSTURE AND MOTOR CONTROL

How does the nervous system regulate the large-scale and regional function of these tissues under both normal and dysfunctional conditions?

4. SEGMENTAL BIOMECHANICS

How do these tissues function at the segmental level? What constitutes and characterizes dysfunction at the segmental level?

5. NEUROSCIENCES: PAIN

How does the nervous system regulate injury to these tissues at the segmental level and how does this manifest clinically?

6. EPIDEMIOLOGY

Who are the people with these injuries and dysfunctions? How do they get them? What factors promote their becoming injured or preventing their injury?

7. CLINICAL DIAGNOSTICS

How do we assess and diagnose patients with these injuries? How do we establish a prognosis for these people?

8. CLINICAL STUDIES

How do we best treat people with these injuries and clinical states? What are the mechanisms by which our treatments have their effects?

9. EDUCATIONAL RESEARCH

How do we best educate practitioners to achieve the necessary knowledge, skills and attitudes to master all of the above issues?

Each of these topic areas was explored similarly, with a keynote presentation by an expert in the field followed by small group sessions which refined the sub-topics and developed research priorities. The small group sessions were facilitated and used the “Nominal Group Technique” to develop priority lists. In the following section, the topical presentations are reviewed, focussing on the key points for discussion. Appendix 1 provides the collated list of the research priorities which were submitted by the CCCRC for consideration nationally.

1. SPINAL ANATOMY

This presentation was given by Dr. Gregory Cramer.

Points of interest

1. Posterior Column structures: superficial and deep musculature, z-joints, costo-vertebral joints, unco-vertebral joints, sacroiliac joints
 - a. articulations – surface configurations, capsules, ligaments, nociceptors, mechanoreceptors
 - b. musculature: – attachments, innervations, relationships with neural structures
 - c. sympathetic chain
2. Middle column structures: IVF's, spinal canal, spinal cord and nerve roots, innervation of spinal cord and blood vessels, dural attachments
3. Anterior column structures: vertebral bodies, endplates, discs, ligaments
4. Methodologies of investigation: gross anatomy, micro-anatomy, histology, imaging (static and functional)

2. REGIONAL BIOMECHANICS

This presentation was given by Dr. Stuart McGill.

Points of interest

1. Trunk loading mechanisms
2. Lumbo-pelvic-hip interactions
3. Thoraco-lumbar and rib-cage dynamics in scoliosis
4. Interaction between upper and lower cervical spines and upper rib cage
5. Cranio-vertebral mechanisms
6. Assessment of regional biomechanical behavior
7. Aging and degenerative disease
8. Muscular stabilization mechanisms for each spinal region

3. MOTOR CONTROL AND POSTURE

This presentation was given by Dr. Jean Boucher.

Points of interest

1. Posture as a clinical issue
2. “Top-down” postural control mechanisms
 - cranio (ocular, vestibular, cerebellar)-vertebral mechanisms
3. “Bottom-up” mechanisms:
 - spino-pelvic interactions
4. Motor control paradigm applied to spinal function:
 - regional dynamics: stabilization, influence of pain
 - intersegmental dynamics: a model for “spinal segmental dysfunction”?
5. Gait as a clinical issue, particularly emphasizing spinal mechanisms during gait.

4. SEGMENTAL BIOMECHANICS

This presentation was given by Dr. Walter Herzog.

Points of interest

1. Neutral zone
2. Paraphysiological space / zone
3. Stiffness as a research paradigm
 - hypomobility / dysfunction
 - clarification of joint fixation
4. Motor control paradigm applied to intersegmental biomechanics
 - segmental stabilization
 - role of deep vs superficial muscles
5. Methodologies of investigating segmental biomechanics
 - radiological
 - non-radiological

5. NEUROSCIENCES: PAIN

This presentation was given by Dr. H. Vernon.

Points of interest

1. Peripheral nociceptors
2. Termination patterns in the dorsal horn
 - comparison of axial, proximal and distal tissues
3. Central sensitization and other neuroplastic changes
4. Motor implications
5. Autonomic implications
6. Neuropathic pain
7. Methodologies and models for investigating pain mechanisms
 - animal
 - human

6. EPIDEMIOLOGY

This presentation was given by Dr. Pierre Côté.

Points of interest

1. Population-based studies of incidence and prevalence
2. Age-specific disorders: childhood, adolescence, adult, geriatric
3. Gender-specific disorders and issues
4. Socio-economic issues
5. Health services research

7. CLINICAL DIAGNOSTICS

This presentation was given by Dr. Sil Mior.

Points of Interest

1. Assessment of total body function:
 - posture
 - gait
2. Assessment of regional function:
 - ROM
 - strength
 - muscular function (EMG, etc)
3. Assessment of segmental function:
 - palpation
 - static
 - dynamic
 - tenderness
 - stiffness
4. Subjective assessment:
 - pain
 - disability
 - quality of life
 - psychosocial factors
- 5 Clinical vs Research applications

8. CLINICAL STUDIES

Presentations were given by Dr William Meeker and Dr. Anthony Rosner.

Points of Interest

1. Placebo controls
2. Balanced designs
3. Quality scales
4. Systematic reviews
5. Clinical areas:
 - MSK
 - spinal
 - peripheral joints
 - non-MSK
6. Administrative issues

9. EDUCATIONAL RESEARCH

This presentation was given by Dr. Lisa Caputo.

Points of Interest

- 1 Curricular models
2. Didactic models
3. Chiropractic relevance
4. Outcomes research
5. Quality improvement
6. Graduate studies
7. Training chiropractic educators and educational researchers

APPENDIX 1

COLLATED LIST OF RESEARCH PRIORITIES AND QUESTIONS

The following represents a listing of all the priority items identified by each of the small groups. It should be noted that this material represents the efforts of these groups over a 2–3 hour period. As such, these lists are not as refined as many participants would have wanted, and are offered as a preliminary recommendation which requires further refinement in future CCCRC sessions, or by any users of these priorities. The author of this report has taken the liberty to edit these statements to create a consistent format.

Anatomy

1. Identify, describe and characterize the critical tissues involved in the fixation/subluxation lesion.
2. Identify the tissues affected by SMT and the force-effect profiles of each of these tissues.
3. Identify regional and gender-based variations for the Z-joint and interbody joints of the spine.
4. Identify the types of biomechanical lesions leading to inflammation.
5. Identify the concept of spinal instability with respect to the tissues involved and clinical relevance.

Regional Biomechanics

1. Evaluation of chiropractic techniques
2. Kinetic chain
3. Expansion of biomechanical modeling as it relates to the lesion
4. Integration of current biomechanical theory, principles and knowledge into clinical practice
5. Biomechanics, the spine and systems interactions
6. Regional bio-mechanics and functional abilities

7. Mechanical benefits of manipulative therapy
8. Biomechanics and the kinetic chain

Neurosciences: Motor Control

1. Does the chiropractic adjustment/manipulation modulate spinal reflexes?
2. Is there a correlation between poor posture, poor motor control and poor health?
3. Is there a muscle recruitment abnormality associated with spinal fixation/subluxation (joint dysfunction)?
4. What effect is there on spinal segmental motion of such a motor recruitment abnormality?

Segmental Biomechanics

1. Is it necessary to be specific to the segmental level in assessment and treatment in order to achieve optimal outcomes in spinal care?
2. What are the characteristics of spinal segmental tissues or the interaction between these tissues which predisposes to injury?
3. What is the CNS “sensory-motor map” of the spinal motion segment?
4. What are the normal biomechanics of the spinal motion segment and what are the short and long-term effects of these biomechanics on the tissues of the motion segment?
5. Develop a model for dynamic fatigue testing of the spinal motion segment in order to study its kinematics, load transmission characteristics, soft tissue properties and cellular changes.

Neurosciences: Pain

1. What mechanisms subserve the reflex organization of (para)spinal tissues?
2. What are the differences between nociception from the spinal/axial vs appendicular tissues?
3. What are the immediate stimulus encoding mechanisms in somatic/spinal/axial tissues? i.e. mechanoreceptor dynamics.
4. What are the relationships between spinal structures/mechanics and neural tissues?
5. How does sensori-motor processing in spinal/axial tissue pain contribute to central sensitization?

Epidemiology

1. Conduct feasibility studies
2. Investigate the etiology of stroke related to SMT
3. Conduct population-based studies to develop:

- prognostic models
- clinical applicability of demographics, socio-economic status, health status

4. Conduct RCT's:
 - efficacy studies
 - clinical interaction effects
 - specific effects of various modalities of treatment
5. Conduct cohort studies of impact of chiropractic care on “wellness”
6. Conduct clinical studies on diagnosis of the “manipulable lesion”

Clinical Diagnosis

1. Investigate diagnostic paradigms:
 - structural
 - functional
 - pathologic
2. Conduct descriptive research into clinical presentations
3. Develop normative standards for chiropractic assessments including sub-populations
4. Continue to investigate the psychometric properties of diagnostic tools (alone or combined):
 - reliability
 - validity
 - predictive value
 - responsiveness
5. Develop an inventory of diagnostic tools for the major conditions seen in practice
6. Identify what is a standard chiropractic clinical assessment, as applied to various modes of care: preventative, palliative, curative. In other words, develop diagnostic algorithms
7. Investigate the impact of diagnostic procedures on the outcomes of care.

Clinical Studies

1. Identification of specific and common chiropractic clinical practices and their effects.
2. Conduct cohort studies.
3. Investigate dose/exposure issues.
4. Develop methods of decreasing heterogeneity of samples.
5. Expand the training of chiropractic researchers to increase the critical mass of expertise.

Educational Studies

What is the validity/reliability of our current evaluation instruments?

Which evaluation methods could be adopted to improve education techniques (e.g. progressive testing)?

How do we integrate research into curriculum design and integration?

What was most useful aspect(s) of program related to practice? (New grads)

What effect have the clinical education courses had on self-directed learning? On critical thinking? How do we measure these things?

How do we balance clinical experience and evidence?

What do we do when the evidence isn't there?

How do we evaluate teaching and professional development?

How do we remediate deficiencies and change behaviours?

How do we evaluate and implement technological improvements in teaching?

What are the appropriate outcomes for the educational process?, and how do we identify them?

What models should we adopt to teach chiropractic techniques? How do we simulate human variability?

How do we manage different instructional methods and resource allocation?

How do we provide the methods necessary for individual learners?

How should we best use simulated patients?

What are the most effective methods of administering student feedback?

How can we introduce/improve active learning techniques?

How do we best evaluate Pre-professional identity?

How do we deal with conflict in our institutions?

What factors help/hinder changes in students beliefs/opinions?

How do we deal with "at-risk" students?

What is the best way to facilitate the structure of knowledge base to reflect clinical experience?

How do we foster the idea of a reflective practitioner in our students?

When do different diagnostic methods become appropriate in learning?

How do we measure competency in student for diagnosis?

How do we teach students to deal with clinical uncertainty?

Why do students go to practice management seminars?

How is wellness/health promotion taught in curriculum? Faculty development?

APPENDIX 2 WORKSHOP PARTICIPANTS

CCCRRC Members

1. Canadian Memorial Chiropractic College, Dr. Howard Vernon DC, FCCS. Division of Graduate Studies (CMCC) Includes all faculty researchers
2. University of Alberta, Dr. J. David Cassidy DC, PhD. Alberta Center for Injury Control (absent)
3. University of Calgary, Dr. Walter Herzog PhD. Faculty of Kinesiology. Includes chiropractic and biomechanics researchers
4. University of Calgary, Dr. Greg Kawchuk DC, PhD. University Health Services
5. Université du Québec à Trois-Rivières, Dr. Pierre Boucher DC, PhD. Département de Chimie Biologie (absent)
6. Institute of Work and Health, Dr. Pierre Côté DC, MSc, FCCS. Includes other chiropractic researchers
7. Université du Québec à Montréal, Dr. Jean Boucher PhD, Département de kinanthropologie
8. University of Toronto, Dr. James Hu PhD. Oral Physiology Laboratory, Faculty of Dentistry
9. University of Guelph, Dr. Jim Dickey PhD. Department of Human Biology
10. College of Chiropractic Sciences Dr. Francois Hains DC. Includes non-CMCC Fellows (absent)

Invited Speakers

Gregory Cramer, NHUC	Anthony Rosner, FCER
William Meeker, PCC	Lisa Caputo, CMCC

Invited Participants

Peter Cauwenberg, CMCC	Ron Saranchuk, CMCC
Kim Humphreys, CMCC	Haymo Thiel, AECC
Geoffrey Bove, Beth Israel Hospital, Boston, MA	Ted Crowther, CMCC
David Bereznik, CMCC	Marion McGregor, TBI
John Triano, Texas Back Inst.	Carol Hagino, CMCC
Phillip Conway, U of C	Partap Khalsa, SUNY
Gregory Lehman, CMCC	Cam McDermaid, CMCC
Esther Suter, U of C	Igor Steiman, CMCC
Gord McMorland, U of C	John Mrozek, CMCC
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