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Chiropractic BioPhysics
CBP—The Science of Spinal Health

2022
Module 13. CBP® Biomechanics of the Spine & Posture Seminar

Course Title: Biomechanics: Spine, Posture, Central Nervous System & Lower Extremities

Instructors: Dr. Deed Harrison, Dr. Paul Oakley, Dr. Stu Currie

Course Objective: This course provides an integrated education for the Doctor of Chiropractic in the science and art of spine, posture, and lower extremity biomechanics and health disorders. Physiological loads will be reviewed as will their resultant stress and strain patterns. Vertebral kinematics will be discussed and applied to postural alterations in normal and abnormal spine behavior. Central nervous system biomechanics will be presented and discussed relative to neuro-physiological consequences. The total permutations of abnormal posture using formulas from probability theory will be delineated and a literature review on postural displacements as they correlate to patient conditions will be provided. Biomechanical Etiologies of Common Pathological Conditions of the Foot and Lower Kinetic Chain and Orthotic Design and Implementation will be presented. A survey of research material will be reviewed supporting the utilization and efficacy of Chiropractic Biophysics drop table technique treatment methods across a population of patients with chronic pain conditions.

Total Hours: **12**

Saturday

9am – 11am **Biomechanical Principles Applied to the Spine and the Subluxation:**

- **Structural Subluxation Categories from the Literature**
  - Segmental displacement
  - Posture and spinal displacement patters
  - Instability at one or more segments
  - Coronal plane Euler buckling methods
  - Sagittal plane or Snap through buckling
- **Rotations and Translation Principles:**
  - Absolute rotation angles, relative rotation angles
- **4 Physiological Applied Loads and Consequent Resultant Stress and Strain**
  - Axial loads
  - Torsion loads
  - Pure bending loads
  - Transverse loads
- **Permutations of Postural Displacements**
  - Single postures of the head, thorax, and pelvis
  - Double, triple, quadruple, …, sextuple combination postures of head, thorax, and pelvis equating to 728 unique postural combinations of each region

11am – 1pm **Practical Ergonomics Applied to the Spine**

- Definitions and Applications: stress, strain, stress-concentrations, centric loading, eccentric loading, material direction, etc.
- Posture
- Kinesiology
- Vector Mechanics

1pm – 2pm Lunch

2pm – 3pm Biomechanics and Anatomy of the Sacro-Iliac Joint and Disorders

- Boney anatomy of the SI Joint Complex
- Ligamentous anatomy of the SI-Joint complex
- Biomechanics of the SI-Joint Complex- including loading studies, kinematic studies
- Biomechanics of the muscles surrounding the SI Joint complex—piriformis, biceps femoris, gluteus maximus, medius, multifidus, and thoraco-lumbar fascia
- Disorders of the SI Joint and treatment intervention strategies.

3pm – 4pm Vertebral Kinematics and Postural Rotations and Translations

- Sagittal head translation kinematics and range of motion.
- Sagittal thoracic translation kinematics and ration of motion.
- Coronal head translation kinematics and range of motion.
- Coronal thoracic translation kinematics and range of motion

4pm – 5:30pm Bone and ligament Mechanical Properties and Response to Loads

- Wolff's law and stress generated potentials.
- Streaming potentials and excitation of osteoblasts and osteoclasts.
- Degenerative-adaptive response of biological tissues in the spine to stress and strains.

5:30pm – 7pm Biomechanics of the Central Nervous System: The Spine Posture Connection

- Canal deformations and CNS strains due to physiological loads.
- Stresses action on the spinal cord due to physiological loads.
- Neurophysiological consequences resulting from CNS stresses and strains.

Sunday

9am – Noon Biomechanical Assessment of Orthotic Intervention for Foot and Lumbo-pelvic Disorders

- Understand the rationale for exploring a new approach to biomechanical management of the foot and lower kinetic chain.
- Explain the main design options for a MASS-type orthotic and correction position.
- Know the five key biomechanical goals of stance phase gait and understand their relationship to the dynamics of the lumbo-pelvic spine.
- Answer the question: should a biomechanical orthotic be rigid or flexible?
- Explain why typical custom orthotics appears to be effective.
- Assessing the patient for orthotic intervention: Demonstrate and give the rationale for correct gait-referenced casting technique.