Spinal Cord Injury (SCI) Facts:
- Prevalence is ~250,000 cases
- Incidence is ~11,000 new injuries annually
  - ~47% motor vehicle collisions ~24% falls, ~14% violence (GSW), ~9% sports (diving)
  - Falls most common in elderly
  - Concomitant traumatic brain injury (TBI) occurs in 25-65% of cases
  - Young M>>>F, summer, weekends, and night-time injuries most common.
  - Tetraplegia > paraplegia
  - C5 is most common level of injury overall; T12 is most common level for paraplegics
- SCI has many physiologic effects
  - Altered sensation and paralysis are the most obvious.
  - Cardiopulmonary effects: autonomic dysreflexia, orthostatic hypotension, impaired ventilation, and atelectasis.
  - Respiratory issues (PNA) are most common cause of mortality
  - Neurogenic bowel and bladder are common
  - Osteoporosis, pressure ulcers, heterotopic ossification, depression, spasticity, & pain.
- Acute pain
  - Massive sympathetic discharge
  - Whiplash
  - Post-traumatic headache associated with TBI
- Chronic pain: ~80% report chronic pain
  - Musculoskeletal (nociceptive) pain / Overuse syndromes
    - Cervical strain / myofascial pain / somatic dysfunction
    - Rotator cuff
  - Neuropathic pain – Allodynia, hyperalgesia, dysesthesia
  - Viscerosomatic reflexes / Visceral pain
  - Increased perception of pain from loss of spinal and thalamic inhibition or structural reorganization of the spinal cord dorsal horn

SCI vocab:
- Tetraplegia (Quadriplegia) = symptoms involving upper and lower limbs
- Paraplegia = symptoms involving lower limbs
- ASIA Classification: based on objective motor and sensory findings.
  - ASIA A = Complete (no motor or sensory S4/5 function)
  - ASIA B – D = gradations of incomplete SCI (sensory and/or motor sacral sparing)
  - ASIA E = normal motor and sensory function

Upper limb myotomes:
- C4: Diaphragm (3, 4, 5 keeps you alive)
- C5: Elbow flexors = biceps & brachialis (also shoulder abduction = deltoid)
- C6: Wrist extensors = extensor carpi radialis longus/brevis (also biceps, deltoids)
- C7: Elbow extensors = triceps (also wrist flexors)
- C8: Finger flexors to DIP of middle finger = flexor digitorum profundus
- T1: Small finger abductors = abductor digiti minimi (also finger intrinsics)
OMT in SCI:
- Beneficial to improve range of motion, decrease pain, improve muscular tone and spasticity, decrease headache, balance autonomic dysfunction, decrease edema related to vascular and lymphatic congestion, improve sleep, increase sense of well-being, balance the neuro-endocrine-immune system axis, decrease morbidity, and decrease the effects of post-concussion syndrome.
- Arienti et al. (2011, Spinal Cord) reported OMT in combination with medications provided significantly higher relief in neuropathic pain post SCI than medications alone.
- OMT is considered quite safe and effective; however there have been rare case reports published of SCI caused by spinal manipulation, therefore proper precautions should always be taken.

Supine/Recumbent Techniques:
- Cervical Diagnosis - Pt supine, Physician seated at bedside, facing Pt
  - Cephalad fingertips behind ipsilateral neck, Caudad fingertips contralateral
  - Use pads of fingers, assess: flexion/extension, sidebending/translation, rotation
  - Name for freedom of motion (Pt's Left/Right)
- Cervical Soft Tissue - Pt supine, Physician seated at bedside, facing Pt
  - Cephalad fingertips behind ipsilateral neck, Caudad fingertips contralateral
  - Primarily A/P movements w/ some lateral traction
  - May add rotational component
  - Smooth movements, shy of end ROM
  - Modification for Counterstrain, FPR and O-A release - to be discussed
- Levator counterstrain - supine, modification for seated/recumbent - to be discussed
  - Face-to-face with patient, seated at side
  - Cephalad hand monitors posterior tenderpoint; Pt hand on chest; Caudad hand cups elbow
  - Internal rotation, shoulder flexion/abduction 30-45° each, vector force through glenohumeral to tenderpoint (facilitation force)
  - Fine-tune with scapula elevation/protraction - 90 seconds or until release

Seated Techniques:
- Anterior Cervical Fascia Lift MFR
  - Face-to-face with patient
  - Hands on traps, thumbs lateral to the SCM clavicular head, directed posteriorly and inferiorly over the clavicles, and medially into the mediastinum
  - Respiratory and postural cooperation “putting the glove on the fingers”
  - Avoid going too deep
  - Clavicle BLT for asymmetry - to be discussed
- Modified Spencer
  - Extension
  - Flexion
  - Circumduction
  - Circumduction with traction
  - Abduction/Adduction
  - Internal rotation/External rotation
  - Traction