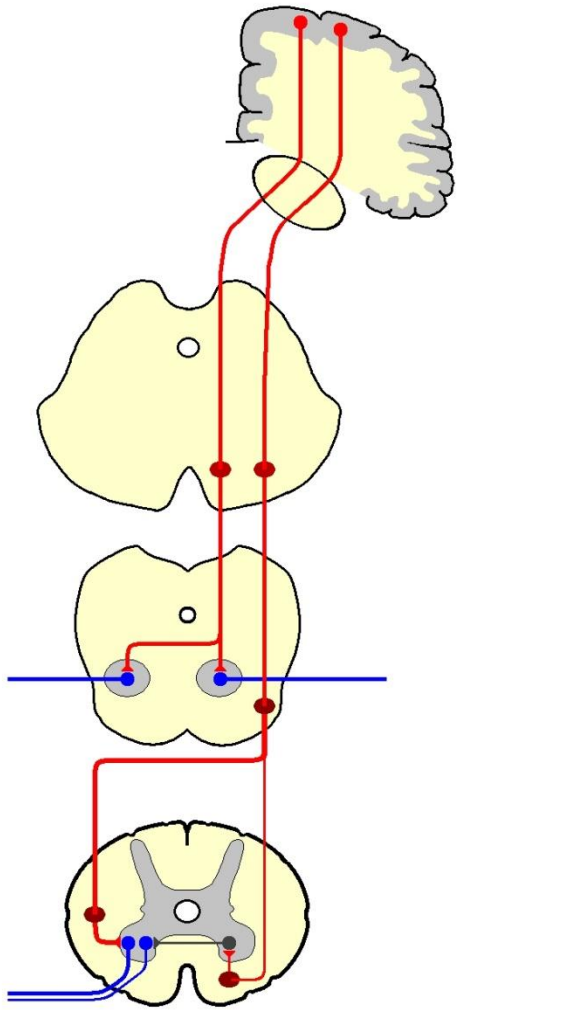
Pathophysiology of the spinal cord



Central motoneurone

Peripheral motoneurone

Interneurone

The main symptoms of spinal lesions

- **Motoric** - due to affection of corticospinal tract (pyramidal) and ventral spinal horns
- **Sensitive** - global (= associated), dissociated
- **Sphincter** and other **autonomic** disorders

Transversal spinal cord lesion syndrome

- Causes: trauma, tumor, hemorrhage, degenerative processes
- Functional deficit always bellow the lesion level
- **Spinal shock**: occurs after acute spinal cord lesion

  = **complete suppression of spinal activity** (including reflexive)
  The disorder has a character of the pseudoflaccid palsy.
- In humans: **2 – 3 weeks**

Manifestation:

- Loss of any voluntary movements and sensation
- Areflexia
- Disorder of vegetative functions (vasodilation, drop of blood pressure)
- Relaxation of sphincters, urinary bladder atony, relaxation of m. detrusor, urine retention, stool retention

Transversal spinal cord lesion syndrome - after spinal shock

- Sings of motor function recovery:

  spinal reflexes including pathological reflexes (Babinski) appear
- **Automatic** reflexive urinary bladder

  In higher lesion over the spinal urination center (above S2-4), voluntary control is lost. M. detrusor is hyperactive, evacuation of the bladder is spontaneous, reflexive.

  In the lesion of the urination center (S2-4), reflexive mechanism is also disturbed, the bladder is permanently relaxed, m. detrusor is inactive - distension of the bladder - paradoxical ischuria – **autonomous** urinary bladder
- Mechanisms of defecation are analogous, - stool retention or incontinency
- Disorders of erection: lesion at the level of Th12-L1, S2-S4

Spinal lesion level impact

- Upper cervical segments (C1 - C4): **quadriplegia**, diaphragm paresis – respiratory insufficiency (pentaplegie)
- Cervical intumescence (C5 – Th2): **qadriparesis**, lower extremities - plegia, upper extremities - paresis
- Th3 – Th12: **paraplegia** - plegia of the lower extremities
- Lumbar intumescence (L1 – S2): **paraparesis** - paresis of lower extremities
- Epiconus: Disorder of foot extensors, disorder of dorsal and plantar flexion of the foot
- Conus: no marked motor deficit, only affection of short flexors of the fingers

Brown-Sequard hemisyndrome

= transversal interruption of one half of the spinal cord:

Causes: trauma, herniation of the intervertebral disc, epidural abscess, tumors compressing the spinal cord from the lateral direction

Disorders of motor functions:

Ipsilateral central (spastic) palsy below the lesion level, peripheral (flaccid) palsy in the area innervated by the destroyed segment

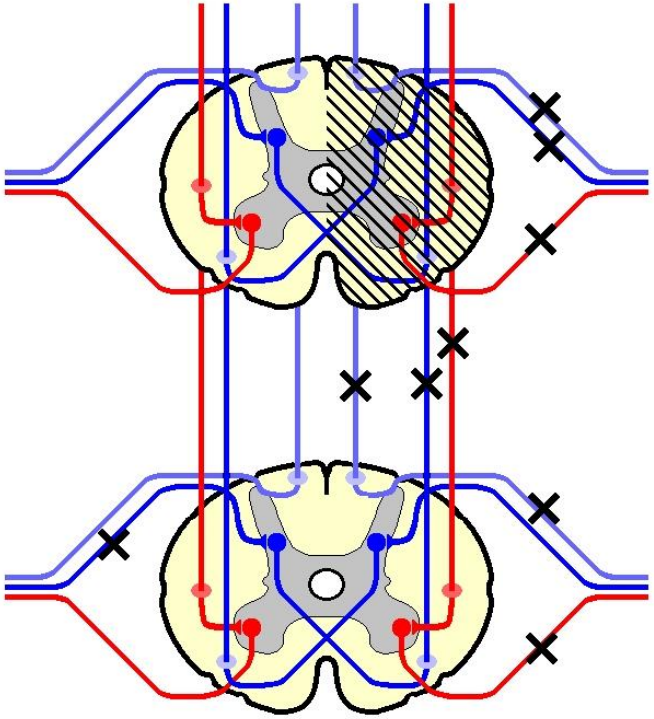
Disorders of sensitive functions:

Ipsilateral loss of tactile sensation and proprioception

Contralateral loss of algic a thermic sensation (1 – 2 segments lower)

At the lesion level often radicular pain

Brown-Sequard hemisyndrome



motor pathway

anterolateral system - pain, thermic sensation, pressure sensation

dorsal tracts - proprioception, tactile sensation

A. spinalis anterior syndrome

- A. spinalis anterior supplies ventral 2/3 of the spinal cord with blood.
- Proprioception preserved
- Disorder of thermic sensation and nociception