INTRODUCTION TO SPINAL CORD INJURIES AND DISORDERS

FSARN REHABILITATION NURSING REVIEW COURSE 2025

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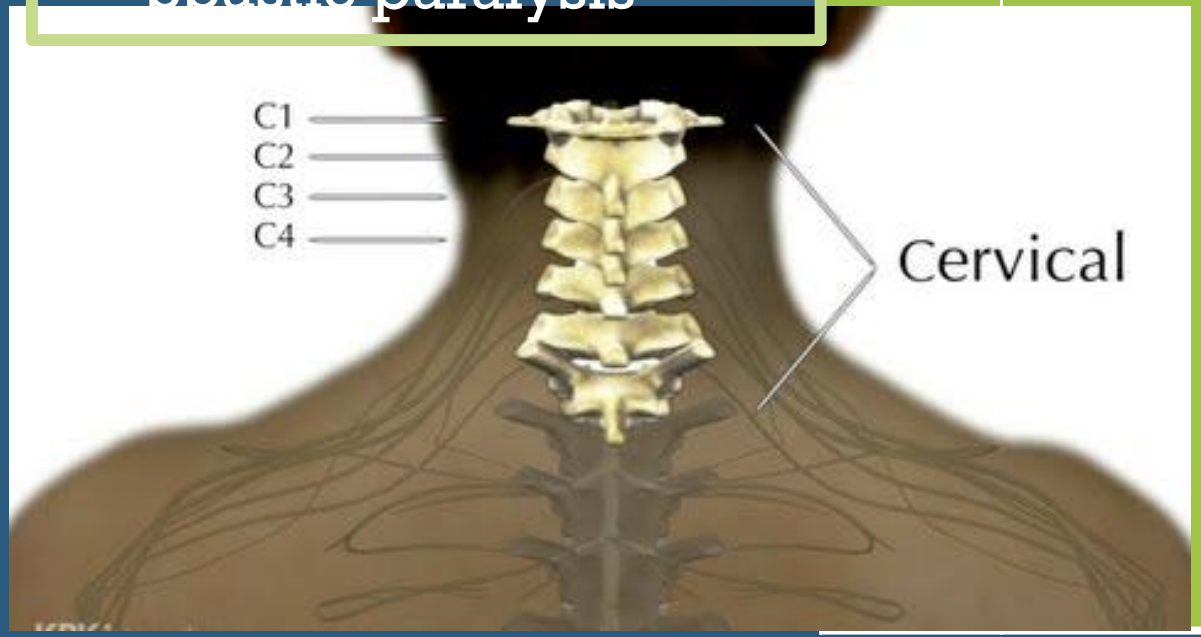
LEVEL OF INJURY AND EXPECTATIONS

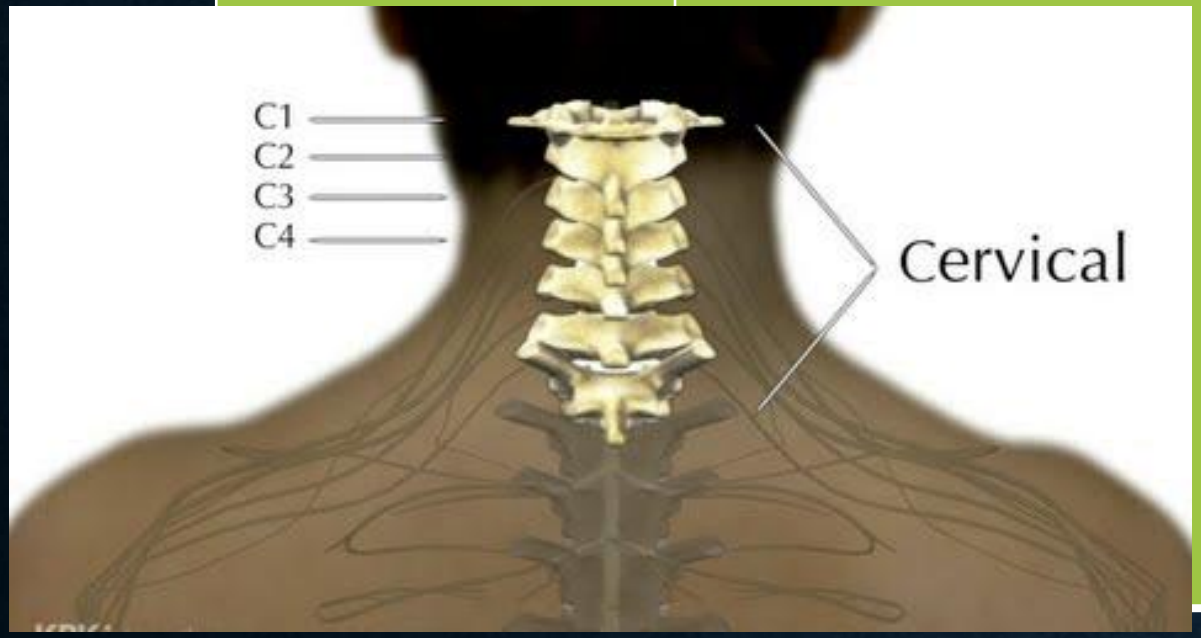
Upper motor neuron (UMN) injury

- Lesions above T12-L1
- Injury is to the spinal cord
- Loss of control over all reflexes below the level of injury
- Spastic paralysis

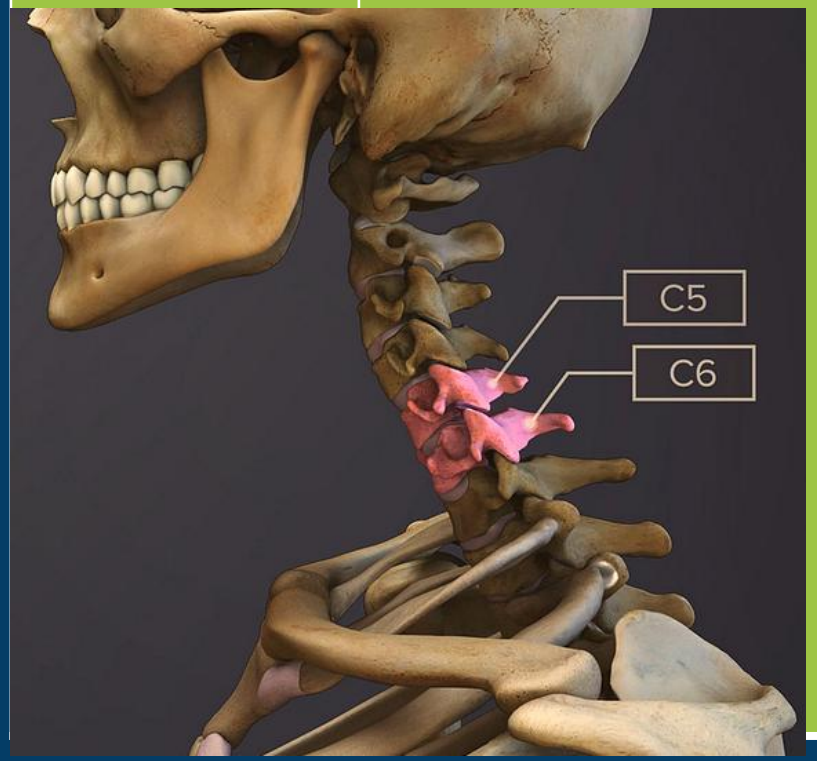


C1-C3	**Limited movement of head and neck**	**Breathing: Depends on a ventilator for breathing.**
		Communication: Talking is sometimes difficult, very limited or impossible. If ability to talk is limited, communication can be accomplished independently with a mouth stick and assistive technologies like a computer for speech or typing. Effective verbal communication allows the individual with SCI to direct caregivers in daily activities, like bathing, dressing, personal hygiene, transferring, and bladder and bowel management.
		Daily tasks: Assistive technology allows for independence in tasks such as turning pages, using a telephone and operating lights and appliances.
		Mobility: Can operate an electric wheelchair by using a head control, mouth stick, or chin control. A power tilt wheelchair for independent pressure relief.

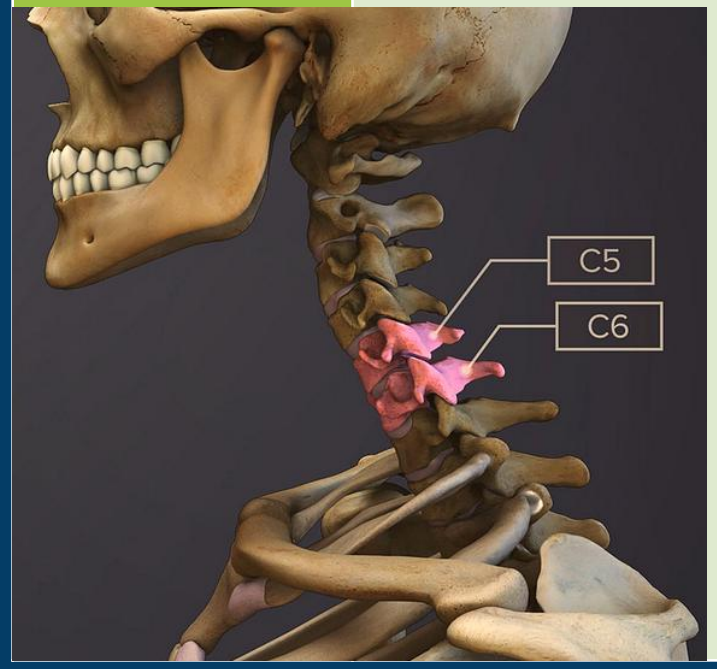
C3-C4	**Usually has head and neck control. Individuals at C4 level may shrug their shoulders.**	**Breathing: May initially require a ventilator for breathing; usually adjusts to breathing full-time without ventilator assistance.**
		Communication: Normal.
		Daily tasks: With specialized equipment, some may have limited independence in feeding and independently operate an adjustable bed with an adapted controller.

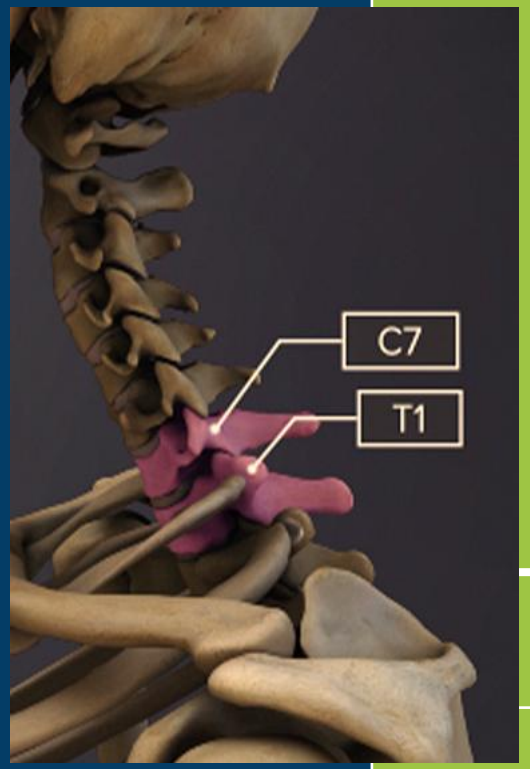


C5	**Typically, has head and neck control, can shrug shoulder and has shoulder control. Can bend his/her elbows and turn palms face up.**	**Daily tasks: Independent with eating, drinking, face washing, brushing of teeth, face shaving and hair care after assistance in setting up specialized equipment.**
		Health care: Can manage their own health care by doing self-assist coughs and pressure reliefs by leaning forward or side -to-side.
		Mobility: May have strength to push a manual wheelchair for short distances over smooth surface. A power wheelchair with hand controls is typically used for daily activities. Driving may be possible after being evaluated by a qualified professional to determine special equipment needs.



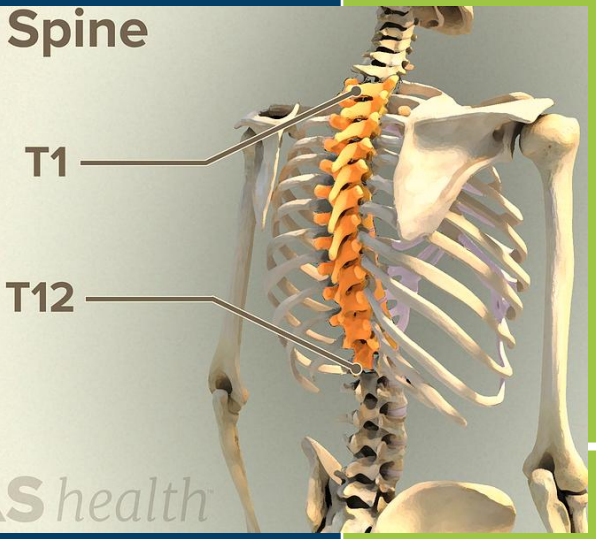
C6	Has movement in head, neck, shoulders, arms and wrists. Can shrug shoulders, bend elbows, turn palms up and down and extend wrists.	Daily tasks: With help of some specialized equipment, can perform with greater ease and independence, daily tasks of feeding, bathing, grooming, personal hygiene and dressing. May independently perform light housekeeping duties.
		Health care: Can independently do pressure reliefs, skin checks and turn in bed.
		Mobility: Some individuals can independently do transfers but often require a sliding board. Can use a manual wheelchair for daily activities but may use power wheelchair for greater ease of independence.



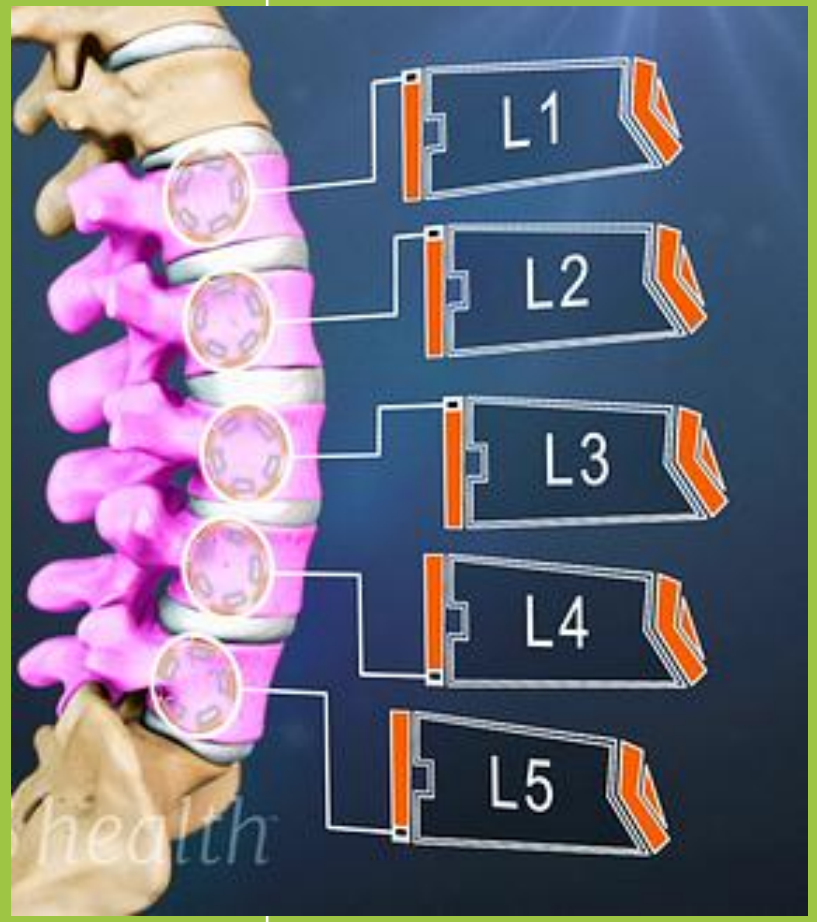


C7	**Has similar movement as an individual with C6, with added ability to straighten his/her elbows.**	**Daily tasks: Able to perform household duties. Need fewer adaptive aids in independent living.** Health care: Able to do wheelchair pushups for pressure reliefs. Mobility: Daily use of manual wheelchair. Can transfer with greater ease.
C8-T1	Has added strength and precision of fingers that result in limited or natural hand function.	Daily tasks: Can live independently without assistive devices in feeding, bathing, grooming, oral and facial hygiene, dressing, bladder management and bowel management. Mobility: Uses manual wheelchair. Can transfer independently.

T2-T6	**Has normal motor function in head, neck, shoulders, arms, hands and fingers. Has increased use of rib and chest muscles, or trunk control.**	**Daily tasks: Should be totally independent with all activities.**
		Mobility: A few individuals are capable of limited walking with extensive bracing. This requires extremely high energy and puts stress on the upper body, offering no functional advantage. Can lead to damage of upper joints.
T7-T12	Has added motor function from increased abdominal control.	Daily tasks: Able to perform unsupported seated activities.
		Mobility: Same as above.
		Health care: Has improved cough effectiveness.

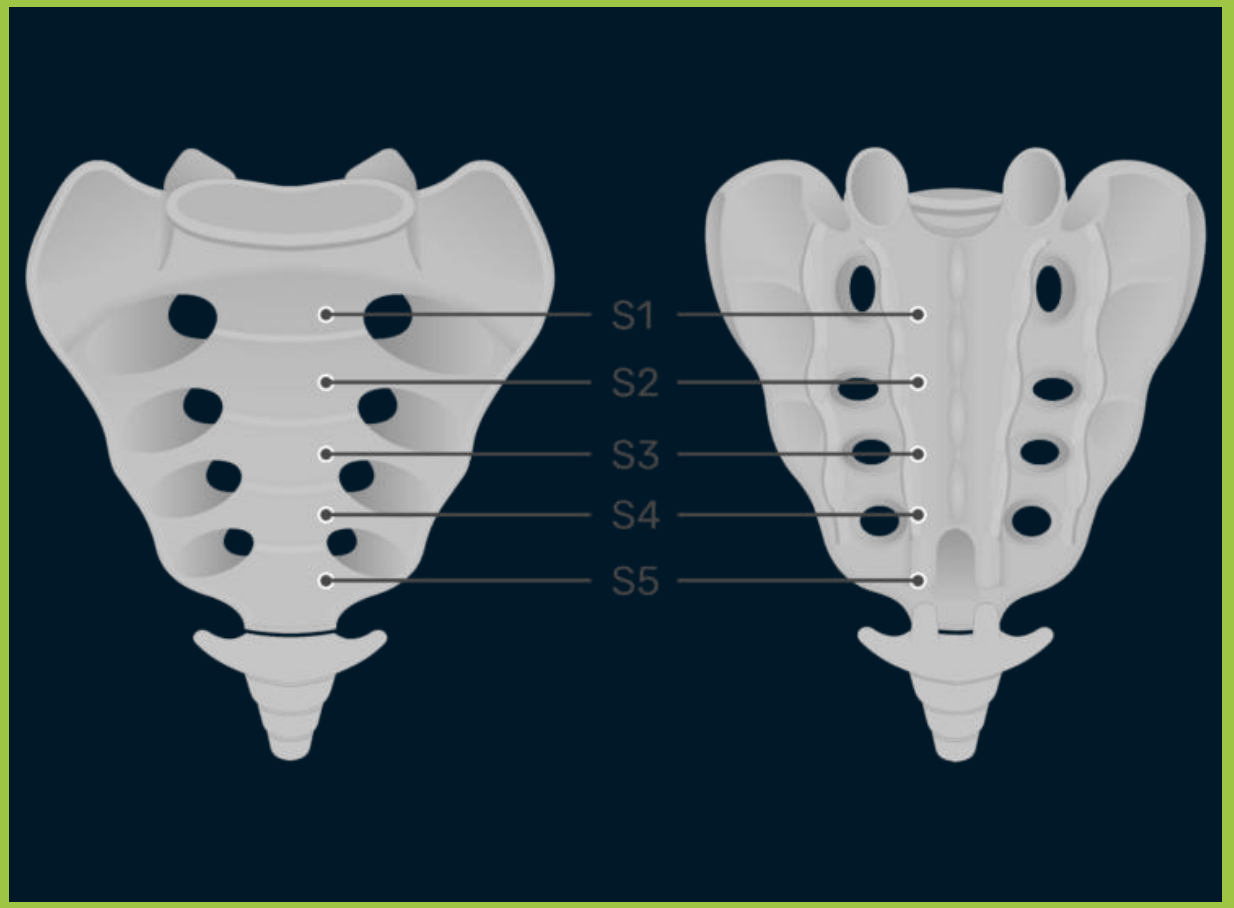


L1-L5	**Has additional return of motor movement in the hips and knees.**	**Mobility: Walking can be a viable function, with the help of specialized leg and ankle braces. Lower levels walk with greater ease with the help of assistive devices.**



Lower motor neuron (LMN) injury

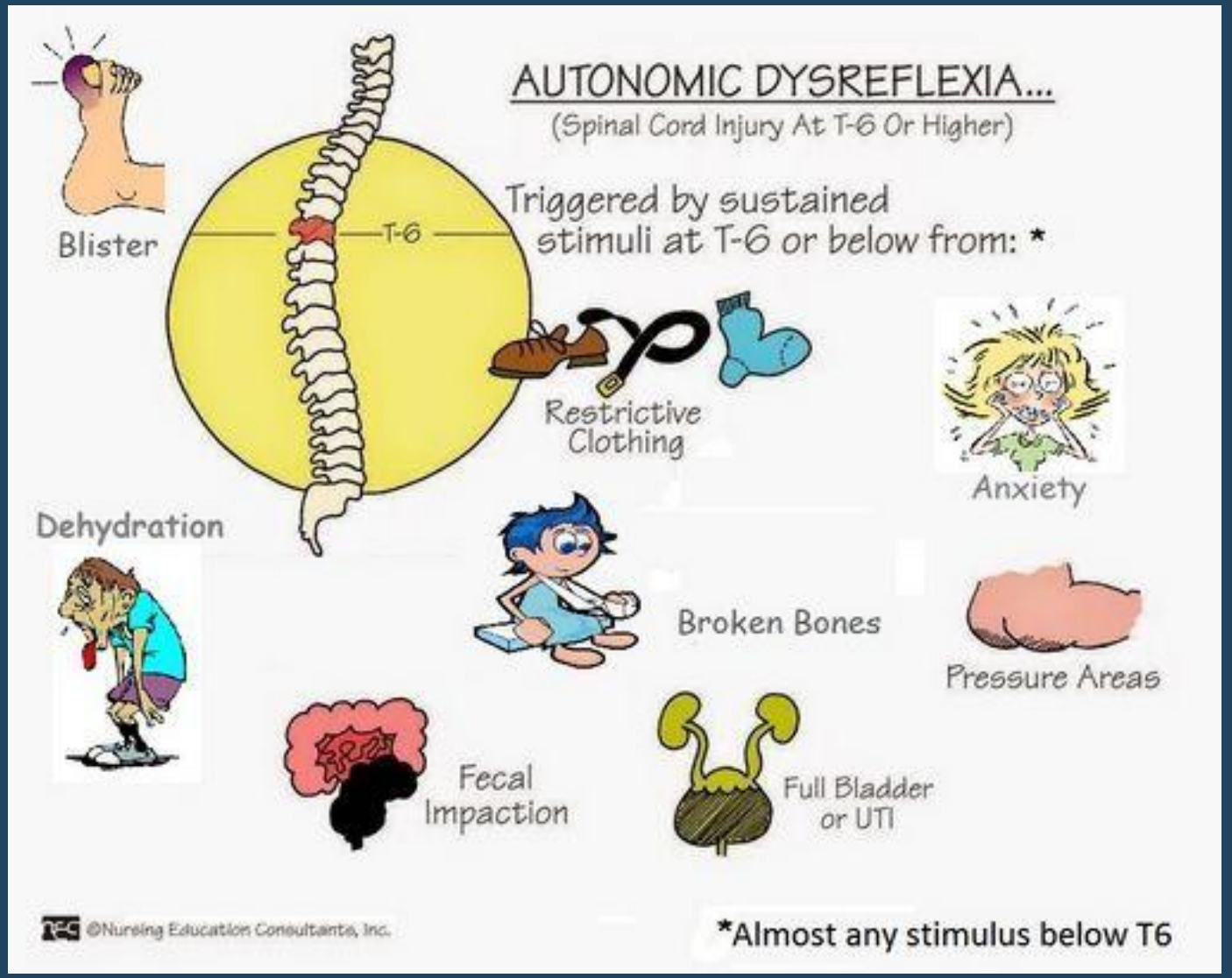
- **Lesions below T12-L1**
- **Injury is to the conus medularis and cauda equina**
- **Loss of reflex arc**
- **Flaccid paralysis**

S1-S5	**Depending on level of injury, there are various degrees of return of voluntary bladder, bowel and sexual functions.**	**Mobility: Increased ability to walk with fewer or no supportive devices.** 

THE DANGERS OF AUTONOMIC DYSREFLEXIA

Causes:

- Distended bladder
- Urological procedures or infection/ stones
- Distended bowel
- Pressure ulcers
- Ingrown nails
- Fractures
- Deep Vein Thrombosis (DVT)
- Gynecological procedures/ pregnancy/delivery
- Restrictive clothing/shoes



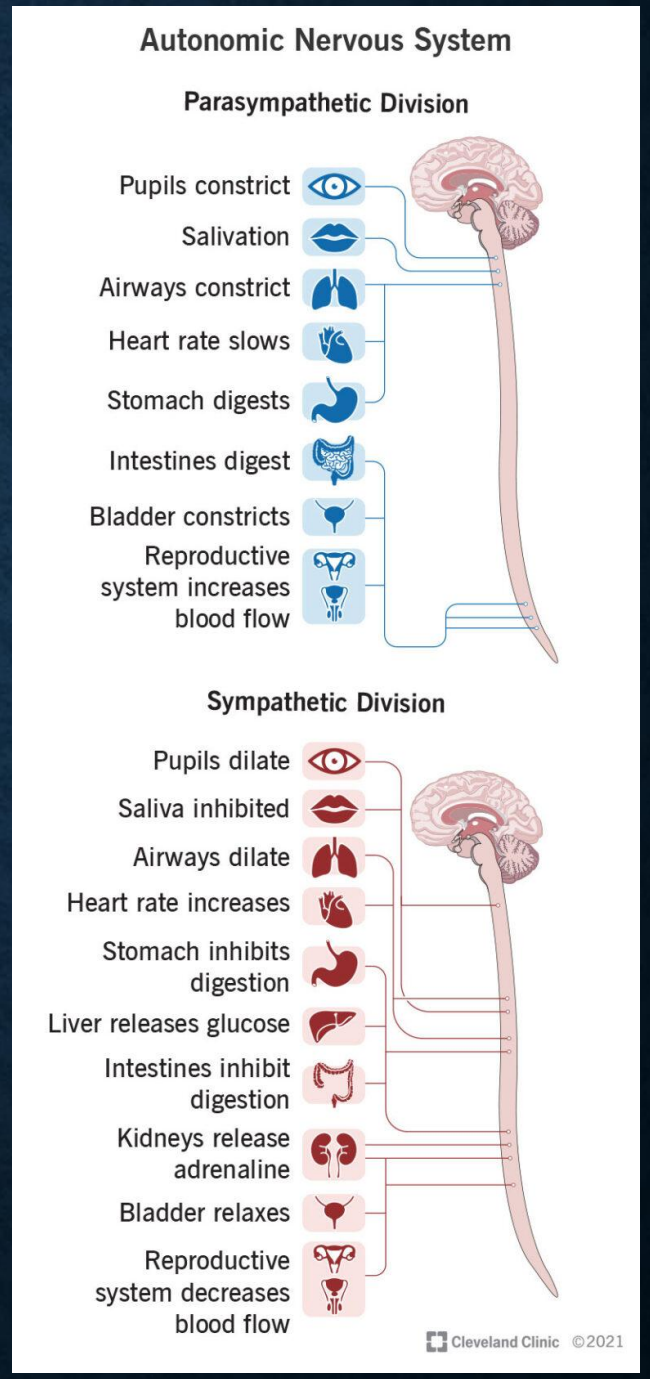
AUTONOMIC DYSREFLEXIA

Signs/symptoms:

- Blood pressure 20-40 mmHg above baseline with bradycardia
- flushing,
- perspiration,
- piloerection (goosebumps) above injury level,
- nasal congestion,
- blurred vision/dots in vision

Treatment:

- Remove noxious stimuli
  - Bladder and bowel most common
- Untreated can result in stroke or coma or death
- Preventable with proper bladder and bowel management



SCI: PHYSICAL ASSESSMENT

- **Neurological**
  - Cognitive, motor, sensory status, reflexes, cranial nerves, signs/symptoms of changes in function, pain and abnormal sensations
- **Respiratory**
  - Breath sounds, airway patency, O2 sat, diaphragm function, sputum and aspiration, pulmonary emboli
- **Cardiovascular**
  - Blood pressure, pulse, HR, rhythm, edema, DVT, orthostatic hypotension
- **Nutritional**
  - Weight, hydration, dietary intake, CBC, electrolytes, albumin and prealbumin

SCI: PHYSICAL ASSESSMENT

- **Elimination**
  - Abdominal tenderness/distention/masses, bowel sounds, premorbid/current bowel patterns, urine characteristics and amount
- **Musculoskeletal**
  - Swelling, spasticity, ROM, tone, contractures, orthopedic injuries, HO
- **Integumentary**
  - Skin breakdown: assessment, prevention
- **Psychosocial**
  - Family support, coping, adjustment, potential responses to fear/anxiety, suicidal ideation, emotional state, behaviors of denial/anger/depression
- **Sexual**
  - Physical capabilities, significant other/spouse, birth control practices, sexually transmitted diseases

SCI: INTERVENTIONS

- **Planning: setting goals should focus on**
  - Ability not disability
  - Should be directed toward helping the individual attain and maintain maximum independence
  - Should include the patient and family
- **Interventions:**
  - Spinal stability, preservation of life
    - Log rolling, no twisting
    - Surgery
    - Orthotics
      - Collars, TLSO, LSO
      - Usually worn for 3 months post surgery or post injury
- **Prevention of complications**
    - Infections, psychiatric disorders, pressure sores, cardiovascular problems

SCI: INTERVENTIONS

- Interventions determined by team including patient and family
- Teaching patient and family
  - Problem solving, adaptive devices, safe and effective performance of skills
  - Learning new skills while maintaining newly learned skills
- Therapeutic relationship: rapport, trust
- Provide safe environment for verbalizing feelings without judgment
- Answer questions, find answers, don't take away hope
- Meet physical as well as emotional and psychosocial needs
- Promote a good self concept and body image
- Involve the team including the patient and family

SCI: INTERVENTIONS

- Common concerns of individuals with SCI:
  - Walking
  - Sexual function
  - Pain
  - Bowel and bladder
  - Finances
  - Loss of independence
  - anxiety
- Common concerns of family caregivers:
  - Negative attitudes toward SCI
  - Feelings of guilt
  - Frustration over lack of appreciation
  - Loss of alone time
  - Feeling overwhelmed
  - Setting boundaries in the relationship of caregiving

SCI: SYSTEM MANIFESTATIONS

- **Cardiovascular**
  - Hypotension and vasodilation decreases cardiac output
    - Orthostatic hypotension – problem getting blood from lower extremities back to heart
    - Vasodilation – loss of sympathetically induced vasoconstriction, pulling blood in abdomen and lower extremities
  - Bradycardia caused by unopposed vagal tone
  - Impaired temperature regulation (poikilothermia) due to inability to sweat or shiver below injury
  - Cardiac dysrhythmias (in first few weeks especially severe injuries)
  - Blood clots (3x higher)

SCI: DISCHARGE PLANNING

- It's never too early
  - Preadmission through rehabilitation
  - Collaborative process
    - Identify caregivers
    - Return demonstration
    - Prevention of secondary complications
    - Discharge destination
    - Home evaluation
    - Durable Medical Equipment (DME)
    - Funding/Transportation

RESOURCES/LINKS:

- Atlanta Brain and Spinal Cord Injury Rehabilitation | Shepherd Center
- The Christopher & Dana Reeve Foundation | Paralysis Foundation (christopherreeve.org)
- Home (pva.org)
- Spinal Cord Injury Rehabilitation | SCI Physical Therapy Center (craighospital.org)
- Spinal Cord Injuries and Disorders System of Care Home (va.gov)

TERMS TO REMEMBER

- Tetraplegia: C 1- 8, most common levels of injury for cervical area are C-5, C-6, C-7
- Paraplegia: T-1 and below, most common levels of injury for thoracic/lumbar areas are L-1, L-2
- Complete - No motor or sensation in lowest sacral segment
- Incomplete - Partial loss of motor or sensation including lowest sacral segment

- Upper Motor Neuron Injury- **Lesions above T12-L1**
  - **Injury is to the spinal cord**
  - **Loss of control over all reflexes below the level of injury**
  - **Spastic paralysis,** Reflexes intact- Spasticity
- Lower Motor Neuron Injury- **Lesions below T12-L1**
  - **Injury is to the conus medularis and cauda equina**
  - **Loss of reflex arc**
  - **Flaccid paralysis,** No reflexes – Flaccid