**Spinal Cord – White Matter Dr. Gary Mumaugh**

**Outline**

* White matter structure
* White matter function
* References

**White Matter Structure**

* White Matter = myelinated axons
  + Made of lipid and protein which is what gives the white appearance
  + Formed by oligodendrocytes (central nervous system) and Schwann cells (peripheral nervous system)
  + Tract = bundle of Axons in the CNS
* Basic Anatomy of White matter
  + Anterior (Ventral) Funiculus or Column
  + Lateral Funiculus or Column
  + Posterior (Dorsal) Funiculus or Column
  + Anterior White Commissure
    - Where fibers Cross
* Ascending Tracts → Sensory
* Descending Tracts → Motor

Diagram

Description automatically generated

**Diagram

Description automatically generated**

**Ascending Sensory Tracts of White Matter Structure**

* **Dorsal White Column**
  + Fasciculus Gracilis
  + Fasciculus Cuneatus
  + There is no descending tract in the Dorsal White Column
* **Lateral White Column** 
  + Dorsal Spinocerebellar Tract Ventral
  + Spinocerebellar Tract
  + Lateral Spinothalamic Tract
  + Spino-Olivary Tract
* **Ventral White Column** 
  + Ventral Spinothalamic Tract
* **Somatotopic Arrangement of Lateral Spinothalamic Tract**
  + Lower extremity and legs are laterally
  + Upper extremity and arms are medially
  + Dorsal Column
    - Fasciculus Graci**l**is → Lower extremities
    - Fasciculus Cuneatus→ Upper extremities

**Descending Motor Tracts of White Matter Structure**

* **Lateral White Column**
  + Lateral Corticospinal Tract
  + Rubrospinal Tract
* **Ventral White Column** 
  + Lateral Reticulospinal Tract
  + Medial Reticulospinal Tract
  + Vestibulospinal Tract
  + Tectospinal Tract
  + Anterior Corticospinal Tract
* **Somatotopic Arrangement of Lateral Corticospinal Tract**
  + Lateral Corticospinal Tract going from lateral →→→ medial
    - Sacral → Lumbar →Thoracic →Cervical
  + Fibers that control the upper extremity located medial to those that control the lower extremity

**Functions of White Column Tracts**

|  |  |
| --- | --- |
| **Ascending Tracts** | **Descending Tracts** |

|  |  |  |
| --- | --- | --- |
|  |  | **Function** |
| **Dorsal Column** | Fasciculus Gracilis → T6 and below | Fine Touch, Vibrations, Proprioception |
|  | Fasciculus Cuneatus → T5 and above | Fine Touch, Vibrations, Proprioception |
|  | No Descending Tracts |  |
|  | Dorsal Spinocerebellar Tract | Proprioception (C8-L2) |
|  | Ventral Spinocerebellar Tract | Proprioception (L2-Co 1) |
|  | Spino-Olivary Tract | Proprioception → Inferior Olives →Cerebellum |
| **Lateral Column** | Lateral Spinothalamic Tract | Pain, Temperature |
|  | Lateral Corticospinal Tract | 85% of the fibers of the Pyramidal decussate Stimulate Lower Motor Neurons → Voluntary control of skeletal muscles |
|  | Rubrospinal Tract | Stimulate Lower Motor Neurons → Flexors |
|  | Ventral Spinothalamic Tract | Crude Touch and Pressure |
|  | Lateral Reticulospinal Tract aka Medullary Reticulospinal Tract | Flexors |
| **Ventral Column** | Medial Reticulospinal Tract aka Pontine Reticulospinal Tract | Extensors |
|  | Vestibulospinal Tract | Extensors |
|  | Tectospinal Tract | Head, Neck and Eye Movements |
|  | Anterior Corticospinal Tract | Lower Motor Neurons → Voluntary Skeletal Muscle Control |

**References:**

* AMBOSS: medical knowledge platform for doctors and students. (n.d.). Amboss. Retrieved August 22, 2021, from https://www.amboss.com/us/
* Blumenfeld, H. (2010). Neuroanatomy Through Clinical Cases (2nd ed.). Sinauer Associates, Inc.

**Answers 1) A 2) C 3) C 4) B 5) D 6) B 7) A 8) A 9) C 10) B 11) C**