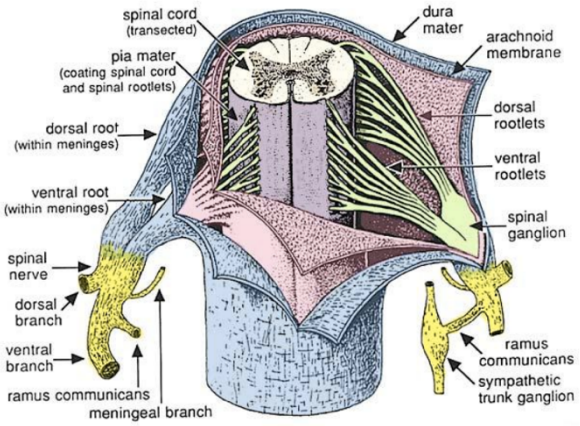
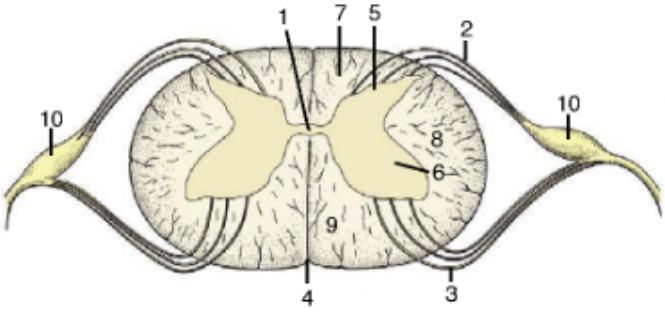
Number	Name	Type	Distribution
I	Olfactory	Sensory	Nasal mucous membrane
II	Optic	Sensory	Retina
III	Oculomotor	Motor	Most muscles of eye + iris
IV	Trochlear	Motor	Dorsal oblique muscle
V	Trigeminal	Mixed	Sensory to eye and face, motor to muscles of mastication
VI	Abducent	Motor	Retractor + lateral muscles of eye
VII	Facial	Mixed	Sensory to region of ear and cranial 2/3 of tongue, motor to muscles of facial expression and parasympathetic to mandibular and sublingual salivary glands
VIII	Vestibulocochlear	Sensory	Cochlea and semi circular canals
IX	Glossopharyngeal	Mixed	Sensory to pharynx and caudal 1/3 of tongue, motor to muscles of pharynx and parasympathetic to parotid salivary glands
X	Vagus	Mixed	Sensory to pharynx and larynx, motor to muscles of larynx and parasympathetic to visceral structures of the thorax and abdomen
XI	Accessory	Motor	Muscles of shoulder and neck
XII	Hypoglossal	Motor	Muscles of tongue

Spinal Chord:

The spinal chord leaves the skull from the foramen magnum and runs through the vertebral column to the 6th or 7th lumbar vertebrae. It has a cervical intumescence and a lumbar intumescence (enlargements) and a conus medullaris at the end where it becomes thin and elongated. The two major plexuses of the spinal chord are the brachial plexus – innervates the thoracic limbs – and the lumbosacral plexus.





The spinal chord is split into segments (36 in the dog), each of which give rise to a pair of spinal nerves leaving through the intervertebral foramina. Arising as a serious of rootlets, the dorsal and ventral spinal roots exist on each segment; a spinal ganglion is present distally on each dorsal root. The dorsal branches innervate the epaxial (dorsal) tissues while the ventral branches innervate the hypaxial (ventral) tissues including the limb.

Interneurons – Interposed between each input and resulting output from the spinal chord.
Projection neurons – Send axons into white matter to form cranial projecting pathways.
Efferent neurons – Send axons via ventral roots to innervate muscles and glands.

Spinal Nerves:

The spinal nerves are numbered according to the number of the spinal vertebrae cranial to them e.g. C6 → spinal nerve C5. All the remaining spinal nerves leave through the sacral foramina.

The first cervical spinal nerve leaves through the lateral vertebra foramina and spinal nerves 2-7 leave through foramina cranial to vertebrae of the same number. The cervical enlargement is centred at the C6-C7 intervertebral disc.

At the thoracolumbar junction, spinal nerves are positioned within their corresponding vertebrae. The functional spinal chord terminates at L6-L7 before changing into the conus medullaris.

Cauda equine – Caudally streaming spinal roots.
Filum terminale – A glial continuation persisting beyond the functional end of the spinal chord.

Grey Matter:

Divided into dorsal, lateral and ventral horns in the centre of the spinal chord, the grey matter consists of neuron cell bodies, dendrites and axons and a rich blood supply. Somatic and visceral afferent neurons enter the grey matter via the dorsal horn and efferent neurons leave via the ventral horn.

White Matter:

Has both myelinated and non-myelinated axons divided into dorsal, lateral and ventral funiculi (columns).

Spinal Pathways:

All spinal pathways involve a sequence of neurons and can be either ascending (to the brain) or descending (away from the brain).

Tract – A bundle of functionally related axons in the central nervous system.

Spinal tracts are found in the white matter divided into dorsal, lateral or ventral funiculi. Tracts that carry sensory information are ascending while ones that carry motor commands are descending. There are three main sensory tracts found in white matter: spinothalamic tract and dorsal and ventral spinocerebellar tracts. There are five main motor tracts found in white matter: corticospinal tract, vestibulospinal tract, reticulospinal tract, tectospinal tract and rubrospinal tract. The motor tracts can be grouped into two categories:

Ventromedial motor system – axial and proximal limb muscles
Dorsolateral motor system – distal limb muscles

Rubrospinal tract – voluntary and skilled movements in non-primate animals
Vestibulospinal tract – subconscious posture control
Reticulospinal tract – subconscious posture control
Tectospinal tract – automatic orientation of the head and eyes to stimuli

Extrapyramidal motor system

Corticospinal tract – voluntary skilled movement – pyramidal motor system

The motor system is able to transform neural information to physical energy by the control of skeletal muscles. Skeletal muscles do not contract until they are commanded to by the alpha lower motor neuron.

Spinothalamic pathway:

A signal enters the body via pain, cold and heat receptors in the skin and travels via the primary afferent neuron into the spinal chord. In here, it moves through the marginal nucleus and the nucleus proprius in the grey matter and enters the spinothalamic tract