Nn.Spinales

- The nerves emerged from spinal cord have four types of fibres ;
- Sensory fibres – neurons are located in cornu dorsale
- Motor fibers – neurons are located in cornu ventrale
- Sympathetic fibres – neurons are located in cornu laterale of all thoracal and first 3 lumbal segments
- Parasympathetic fibres – neurons are located in cornu laterale of sacral segments

Sensory fibres

- Sensory neurons (pseudounipolar neurons) are accumulated in spinal ganglia located in for.intervertebrale. The peripheral arms of the neurons takes the sense from body, central arms (radix dorsalis) relay the data to the dorsal horn of spinal cord.

Motor fibres

- Motor neurons located in ventral horn of spinal cord. The axons of the neurons originate from sulcus lateralis ventralis and form radix ventralis as bundles.

Nn.spinales

- Radix dorsalis and radix ventralis are fused with each other inside intervertebral foraminas and forms the spinal nerve.

Nn.spinales

- N.spinalis divides two branches, as ramus dorsalis and ramus ventralis. Dorsal branches are thin and contains both sensory and motor fibres seperatly for each segment. They divide on local area for innervation. Ventral branches generally combine and form nerve plexus.

Nn.spinales

- Spinal nerves are named according to the spinal cord segments

		Eq.	Rum.	Sus	Car.
*Nn.cervicales	-	8	8	8	8
*Nn.thoracici	-	18	13	13	13
*Nn.lumbales	-	5	6	6	7
*Nn.sacrales	-	5	5	4	3
*Nn.caudales	-	5-6	5-6	5-7	5-7

Nn.Cervicales - Cervical Spinal Nerves

- Dorsal branches of Nn.cervicales;

  These thin branches also seperate two subbranches as Lateral ve Medial. Lateral subbranches have motor fibres on the contrary Medials' have sensory.

- Ventral branches of Nn.cervicales;

  They combine with together and form nerve plexuses (plx.cervicalis and plx.brachialis).

*Plx.cervicalis

*Plx.brachialis

Plexus cervicalis

- It is formed by united ventral branches of first 4 or 5 cervical spinal nerves. The nerves arising from the plexus innervate skin, fascia and muscles of the neck area. Phrenic nerve also originates from the plexus.
- N.phrenicus; The fibres coming from the 5th, 6th and 7th cervical spinal nerves. It is a Mix nerve contains motor and sensory fibres. Motor fibres innervate diaphragma, sensory fibres go to pleura.

Plexus brachialis

The brachial plexus is a network of nerves formed by;

- In eq., bo., ca.;

  ventral branches of C6, C7, C8. and T1, T2 spinal nerves

- In su.;

  ventral branches of C5, C6, C7, C8 and T1 spinal nerves

- In ov. and fe.;

  Ventral branches of C6, C7, C8 and T1 spinal nerves.

It supplies afferent and efferent nerve fibers to the thorax, shoulder and foreleg.

Coto

The branches of Plexus brachialis

1- N.suprascapularis
2- N.musculocutaneus
3- Nn.subscapulares
4- N.axillaris
5- Nn.pectorales craniales
   (mm.pectorales)
6- Nn.pectorales caudales
   (m.pectoralis)
7- N.thoracodorsalis
   (m.latissimus)
8- N.thoracicus lateralis
   (m.cutaneus)
9- N.thoracicus longus
   (m.serratus)
10- N.radialis
11- N.ulnaris
12- N.medianus

Coto

PLX. BRACHIALIS – Nn.subscapulares

- Number of thin branches innervate m.subscapularis.

PLX. BRACHIALIS – N.suprascapularis

- A branch enters the intermuscular area between scapular muscles and goes to outside of scapula.
- It innervates m.supraspinatus and m.infraspinatus.

PLX. BRACHIALIS – N.axillaris

- When we pull the plexus, the branch goes to directly scapula between m.subscapularis and m.teres major.

PLX.BRACHIALIS - N.musculocutaneus

- It surrounds the axillary artery on the cranial part of the leg and combine with median nerve.

PLX.BRACHIALIS – Nn.pectoreles craniales et caudales

- A few disintegrated branches

  go to pectoral muscles

PLX.BRACHIALIS - N.thoracicus lateralis

PLX.BRACHIALIS - N.thoracicus longus

PLX.BRACHIALIS - N.thoracodorsalis

- A few disintegrated branches go to thoracal muscles

PLX. BRACHIALIS – N.radialis

- The thickest nerve of the plexus. It goes to m.triceps brachii and m.brachialis.

PLX. BRACHIALIS – N.ulnaris

- It is emerged with median nerve. At the level of distal portion of humerus the two nerves seperate. The ulnar nerve goes to olecranon.

PLX. BRACHIALIS – N.medianus

- The longest nerve of plexus.
- Last branches are the nerve can be different among animals;
- Eq: n.palmaris medialis et lateralis
  (n.digitalis palm. comm. II et III)
- Rum : n.digitalis palmaris communis II,
  n.digitalis palmaris III axialis and
  n.digitalis IV axialis
- Car : n.digitalis palmaris communis I,
  n.digitalis palmaris communis II and
  n.digitalis palmaris communis III

Coto

Nn.thoracici

- **Dorsal branches of Nn.thoracici;**

  Ramus medialis is motor, ramus lateralis is sensory

- **Ventral branches of Nn.thoracici;**

  They are segmented fibers between the ribs (named as intercostal nerves). They don't form plexus except T1 and T2.

Nn.lumbales

- **Dorsal branches of Nn.lumbales;**

  Ramus medialis is motor, ramus lateralis is sensory

- **Ventral branches of Nn.lumbales;**

  N.iliohypogastricus is the ventral branch of L1 (in car; n.iliohypogastricus cranialis)

  N.ilioinguinalis is the ventral branch of L2. (in car; n.iliohypogastricus caudalis). In Carnivors; N.ilioinguinalis is the ventral branch of L3.

  The others form a plexus (plexus lumbalis)

Plexus lumbalis

- Last 4 ventral branches of lumbal spinal nerves forms the plexus. Plexus lumbalis also combine with plexus sacralis and named as plexus lumbosacralis.

The Branches of Plexus lumbosacralis

1- N.iliohypogastricus

2- N.ilioinguinalis

3- N.genitofemoralis

4- N.cutaneus femoris lateralis

5- N.femoralis

6- N.obturatorius

7- N.gluteus cranialis

8- N.gluteus caudalis

9- N.cutaneus femoris caudalis

10- N.pudendus

11- N.rectalis caudalis

12- N.ischiadicus

Coto

Nervus Ischiadicus

- The thickest nerve of the body.
- It contains the fibers of last lumbal and first two sacral spinal nerves.
- It provides the motor and sensory innervation of hindlimb.

Nervus Ischiadicus

- It passes through the for.ischiadicum majus and goes to gluteal area.

Nervus Ischiadicus

- Under the gluteal muscles, it turns the distally along the femur.
- It gives some small branches for the muscles and subdivides on the distal part of femur.
- The last branches of the nerve are n.tibialis ve n.fibularis communis

Last branches of N.ischiadicus

N.tibialis; Medial branch is also divided two thin nerves ;n.plantaris lateralis et medialis.

N.Fibularis communis; Lateral branch is also divided two thin nerves; n.fibularis superficialis et profundus.

Autonomic Nervous System

The ANS is a division of the peripheral nervous system that supplies smooth muscle and glands, and thus influences the function of internal organs. It is a control system that acts largely unconsciously (involuntary) and regulates the working of the body. The ANS is only connected with the motor side.

The autonomic nervous system has two branches that both of these systems have "opposite" actions where one system activates a physiological response and the other inhibits it. 1. Sympathetic system 2. Parasympathetic system

1-Sympathetic System (fight or flight)

- The sympathetic nervous system is a "quick response mobilizing system".
- The sympathetic division emerges from the spinal cord in the thoracic and lumbar areas. It consists of cells with bodies in the lateral horn from T1 to L2/3. The myelinated fibres of the cells go to vertebral ganglia. After synapse, the unmyelinated fibres branches via spinal nerves.

Ggl.vertebrale- Ggl.trunci sympahtici

- They are clustered sympathetic neurons located segmentally under the vertebral body.
- Rami communicantes albi - fibrae preganglionares
- Rami communicantes grisei - fibrae postganglionares
- Rami communicantes
- Rami interganglionares – truncus sympathicus (like a ladder)

Truncus sympathicus

- It contains 5 divisions;

I-Pars cephalica trunci sympathici ; ggl.cervicale craniale

II-Pars cervicalis trunci sympathici ; ggl.cervicale medium-caudale

ggl.cervicothoracicum (ggl.stellatum)

III-Pars thoracalis trunci sympathici ; ggl.thoracici

n.splanchnicus major-minor-imus

IV-Pars lumbalis trunci sympathici ; nn.splanchnici lumbales

ggl.coeliaca – plx.solaris – plx.mesentericus

V-Pars sacralis trunci sympathici ; ggl.sacralia – ggl.impar

Coto

2-Parasympathetic System – rest and digest

- The parasympathetic nervous system consists of cells with bodies in one of two locations: the brainstem (Cranial Nerves III, VII, IX, X) or the sacral spinal cord (S2, S3, S4). Hence it is named as craniosacral system.

Pars cranialis

- 1-) Nucleus parasympathicus n.oculomotorii

* Ggl.ciliare - M.ciliaris, m.sphincter pupillae

- 2-) Nucleus parasympathicus n.facialis

* Ggl.mandibulare - gl.mandibularis, gll.sublinguales
* Ggl.pterygopalatina - gl.lacrimalis, mucosa of oral and nasal cavities

- 3-) Nucleus parasympathicus n.glossopharyngei

* Ggl.oticum - gl.parotis

- 4-) Nucleus parasympathicus n.vagi

Innervation of thoracal and abdominal internal organs

Pars sacralis

- Nn.pelvini (nn.splanchnici-nn.erigentes) arise from sacral segments and form plexus pelvinus. The parasympathetic fibres innervate the organs in the pelvic cavity (bladder, end part of large intestines, uterus-vagina, penis/clitoris).