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# Obsah prezentace

- Co je to “ Elibrary”?
- Jak to funguje
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# Co to je Elibrary?

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- Možnost výběru a-la-carte



# Jak to funguje?



# Jak to funguje?

- Výběr vhodných E-knih – řeší knihovna ve spolupráci s jednotlivými ústavami/klinikami
- Příprava cenové kalkulace
- Odsouhlasení cenové kalkulace
- Podpis smlouvy
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# Výhody pro studenty

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- Rychlé a efektivní vyhledávání pomocí klíčových slov
- Možnost přístupu vždy a všude – vzdálený přístup 24x7

# Výhody pro fakultu

- Vždy nejnovější vydání učebnice
- Výběr jen těch knih, které skutečně chcete a potřebujete, ne nevyužívané kolekce
- Předplatné na 12 měsíců – možnost flexibilně měnit používané tituly
- Přístup 24 hod/denně kdekoli chcete – fakulta, knihovna, nemocnice, vzdálený přístup
- Čtvrtletní podrobné statistiky ukazující jak jsou knihy využívány

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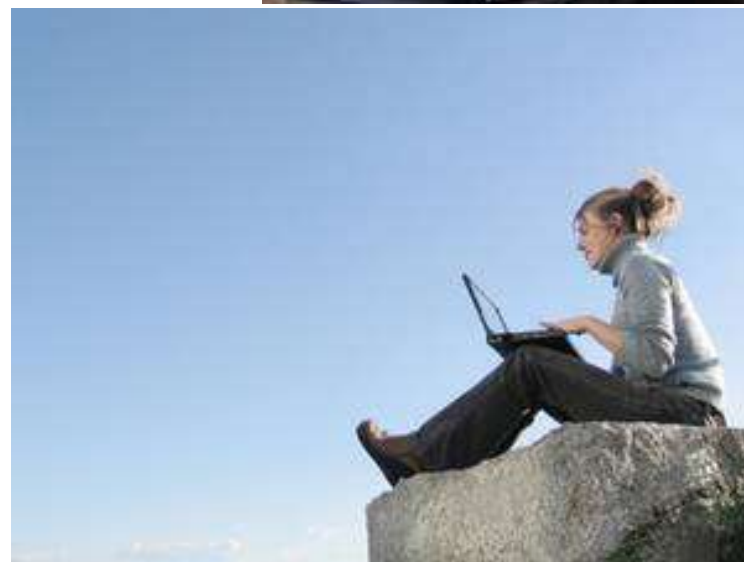


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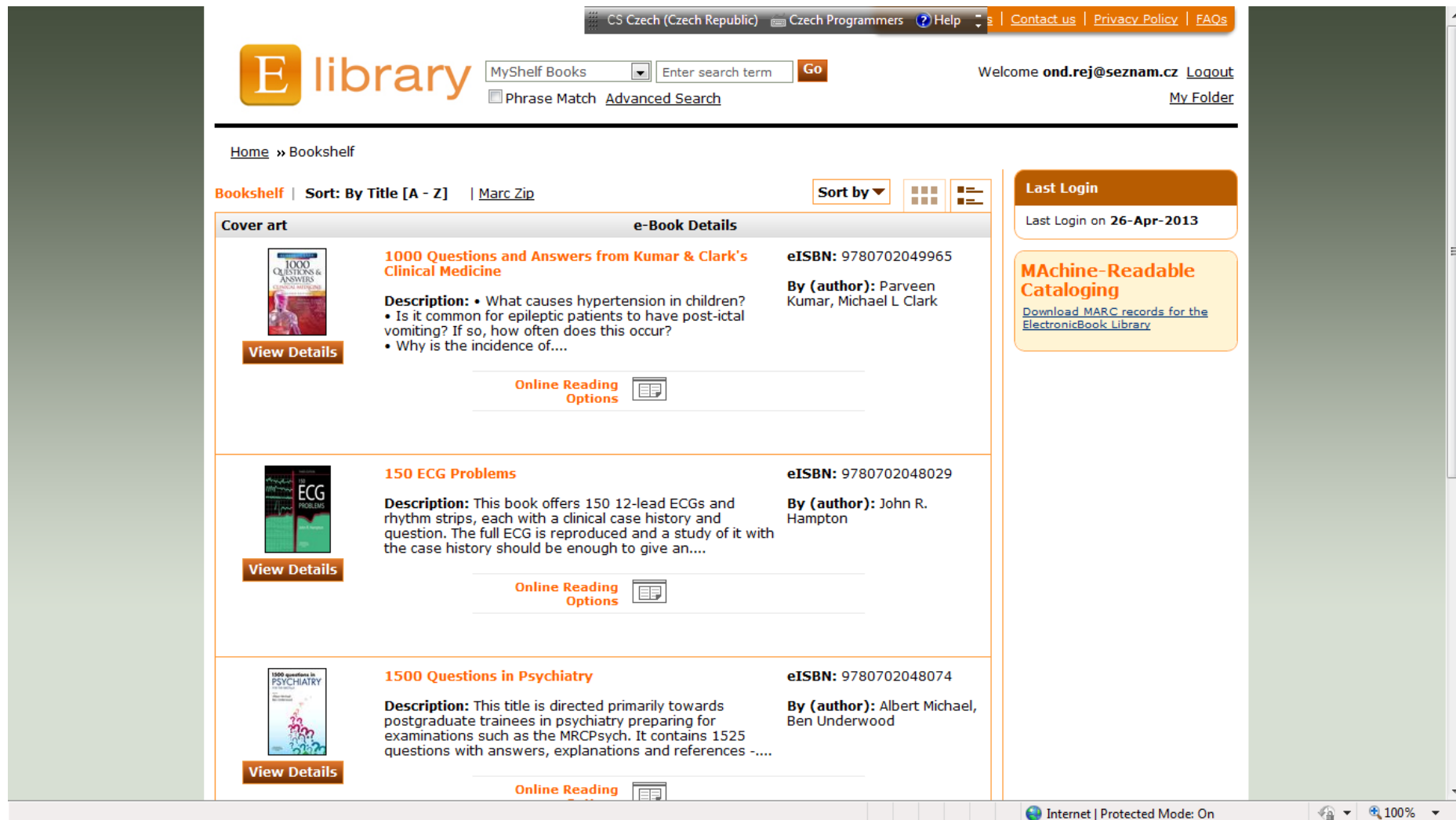
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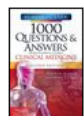


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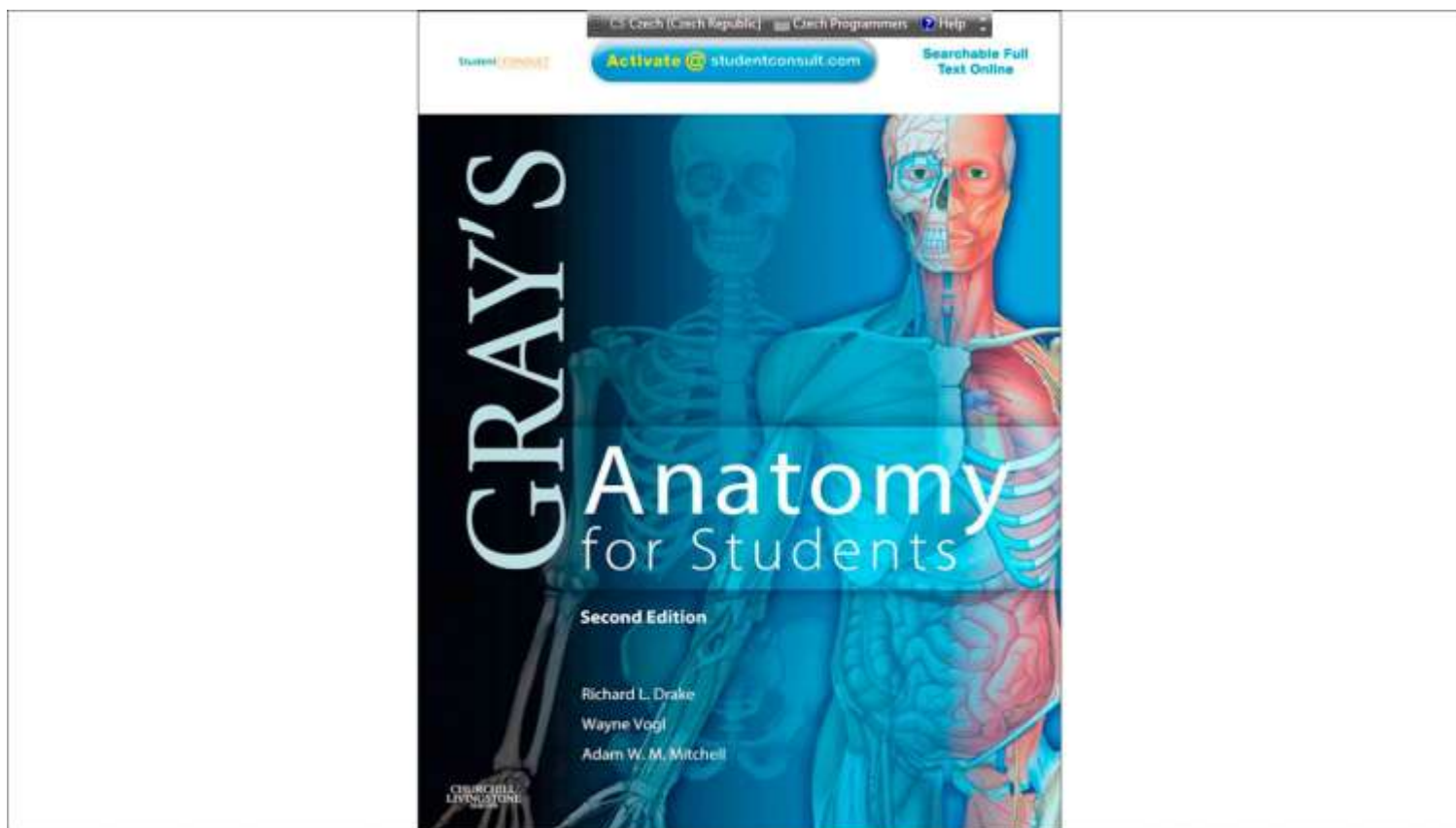
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## Back

### Conceptual overview

#### GENERAL DESCRIPTION

The back consists of the posterior aspect of the body and provides the musculoskeletal axis of support for the trunk. Bony elements consist mainly of the vertebrae, although proximal elements of the ribs, superior aspects of the pelvic bones, and posterior basal regions of the skull contribute to the back's skeletal framework (Fig. 2.1).

Associated muscles interconnect the vertebrae and ribs with each other and with the pelvis and skull. The back contains the spinal cord and proximal parts of the spinal nerves, which send and receive information to and from most of the body.

Fig. 2.1 Skeletal framework of the back.

#### FUNCTIONS

##### Support

The skeletal and muscular elements of the back support the body's weight, transmit forces through the pelvis to the lower limbs, carry and position the head, and brace and help maneuver the upper limbs. The vertebral column is positioned posteriorly in the body at the midline. When viewed laterally, it has a number of curvatures (Fig. 2.2):

- the primary curvature of the vertebral column is concave anteriorly, reflecting the original shape of the embryo, and is retained in the thoracic and sacral regions in adults;
- secondary curvatures, which are concave posteriorly, form in the cervical and lumbar regions and bring the center of gravity into a vertical line, which allows the body's weight to be balanced on the vertebral column in a way that expends the least amount of muscular energy to maintain an upright bipedal stance.

As stresses on the back increase from the cervical to lumbar regions, lower back problems are common.

##### Movement

Muscles of the back consist of extirinsic and intrinsic groups:

- the extirinsic muscles of the back move the upper limbs and the ribs;
- the intrinsic muscles of the back maintain posture and move the vertebral column; these movements include flexion (anterior bending), extension, lateral flexion, and rotation (Fig. 2.3).

Although the amount of movement between any two vertebrae is limited, the effects between vertebrae are additive along the length of the vertebral column. Also, freedom of movement and extension are limited in the thoracic region relative to the lumbar part of the vertebral column. Muscles in more anterior regions flex the vertebral column.

In the cervical region, the first two vertebrae and associated muscles are specifically modified to support and position the head. The head flexes and extends, in the nodding motion, on vertebra C1, and rotation of the head occurs as vertebrae C1 moves on vertebrae C2 (Fig. 2.3).

Fig. 2.2 Curvatures of the vertebral column.

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# Vyhledání pomocí klíčových slov

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The body

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The fluid in most lymphatic vessels is clear and colorless and is known as **lymph**. That carried by lymphatic vessels from the small intestine is opaque and milky because of the presence of chylomicrons and is termed **chyle**. There are lymphatic vessels in most areas of the body except the brain, bone marrow, and avascular tissues such as epithelia and cartilage. The movement of lymph through the lymphatic vessels is generated mainly by the indirect action of adjacent structures, particularly by contraction of skeletal muscles and pulses in arteries. Unidirectional flow is maintained by the presence of valves in the vessels.

### Lymph nodes

Lymph nodes are small (0.3–2.5 cm long) encapsulated structures that interrupt the course of lymphatic vessels and contain elements of the body's defense system, such as clusters of lymphocytes and macrophages. They act as elaborate filters that trap and phagocytose particulate matter in the lymph that percolates through them. In addition, they detect and defend against foreign antigens that are also carried in the lymph.

Because lymph nodes are efficient filters and flow through them is slow, cells that metastasize from (migrate away from) primary tumors and enter lymphatic vessels often lodge and grow as secondary tumors in lymph nodes. Lymph nodes that drain regions that are infected or contain other forms of disease can enlarge or undergo certain physical changes, such as becoming "hard" or "tender." These changes can be used by clinicians to detect pathologic changes or to track spread of disease.

A number of regions in the body are associated with clusters or a particular abundance of lymph nodes (Fig. 1.10). Not surprisingly, nodes in many of these regions drain the body's surface, the digestive system, or the respiratory system. All three of these areas are high-risk sites for the entry of foreign pathogens.

Lymph nodes are abundant and accessible to palpation in the axilla, the groin and femoral regions, and the neck. Deep sites that are not palpable include those associated with the trachea and bronchi in the thorax, and with the **spleen** and its branches in the abdomen.

### Lymphatic trunks and ducts

All lymphatic vessels coalesce to form larger trunks or ducts, which drain into the venous system at sites in the neck where the internal jugular veins join the subclavian veins to form the brachiocephalic veins (Fig. 1.11):

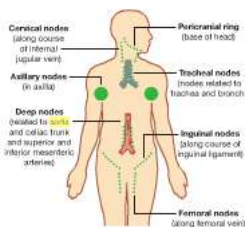


Fig. 1.10 Regions associated with clusters or a particular abundance of lymph nodes.

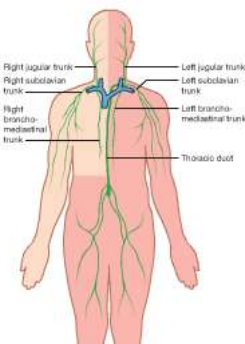


Fig. 1.11 Major lymphatic vessels that drain into large veins in the neck.

- Lymph from the right side of the head and neck, the right upper limb, right side of the thorax, and right side of the upper and more superficial regions of the abdominal wall is carried by lymphatic vessels that connect with veins on the right side of the neck.
- Lymph from all other regions of the body is carried by lymphatic vessels that drain into veins on the left side of the neck.

Specific information about the organization of the lymphatic system in each region of the body is discussed in the appropriate chapter.

### In the clinic

#### Lymph nodes

Lymph nodes are efficient filters and have an internal honeycomb of reticular connective tissue filled with lymphocytes. These lymphocytes act on bacteria, viruses, and other bodily cells to destroy them. Lymph nodes tend to drain specific areas, and if infection occurs within a drainage area, the lymph node will become active. The rapid cell turnover and production of local inflammatory mediators may cause the node to enlarge and become

tender. Similarly, in patients with malignancy the lymphatics may drain metastasizing cells to the lymph nodes. These can become enlarged and inflamed and will need to be removed if clinically symptomatic.

Lymph nodes may become diffusely enlarged in certain systemic illnesses (for example, viral infection), or local groups may become enlarged with primary lymph node malignancies, such as lymphoma (Fig. 1.12).

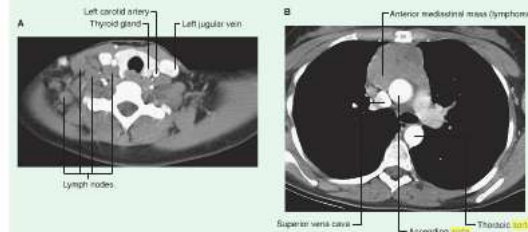


Fig. 1.12 A. This computed tomogram with contrast, in the axial plane, demonstrates the normal common carotid arteries and internal jugular veins with numerous other nonenhancing nodules that represent lymph nodes in a patient with lymphoma. B. This computed tomogram with contrast, in the axial plane, demonstrates a large anterior soft-tissue mediastinal mass that represents a lymphoma.



# Poznámky - Notes

## The body

### NERVOUS SYSTEM

The nervous system can be separated into parts based on structure and on function:

- structurally, it can be divided into the central nervous system (CNS) and the peripheral nervous system (PNS) (Fig. 1.133);
- functionally, it can be divided into somatic and visceral parts.

The CNS is composed of the brain and spinal cord, both of which develop from the neural tube in the embryo. The PNS is composed of all nervous structures outside the CNS that connect the CNS to the body. Elements of this system develop from neural crest cells and outgrowths of the CNS. The PNS consists of the spinal and cranial nerves, visceral nerves and plexuses, and the enteric system. The detailed anatomy of a typical spinal nerve is described in Chapter 2, as is the way spinal nerves are numbered. Cranial nerves are described in Chapter 8. The details of nerve plexuses are described in chapters dealing with the specific regions in which the plexuses are located.

### Central nervous system

#### Brain

The parts of the brain are the cerebral hemispheres, the cerebellum, and the brainstem. The cerebral hemispheres consist of an outer portion, or the **gray matter**, containing cell bodies, an inner portion, or the **white matter**, made up of axons forming tracts or pathways, and the **ventricles**, which are spaces filled with cerebrospinal fluid (CSF).

The cerebellum has two lateral lobes and a midline portion. The components of the brainstem are classically defined as the diencephalon, midbrain, pons, and medulla. However, in common usage today, the term "brainstem" usually refers to the midbrain, pons, and medulla.

A further discussion of the brain can be found in Chapter 8.

#### Spinal cord

The spinal cord is the part of the CNS in the superior two-thirds of the vertebral canal. It is roughly cylindrical in shape, and is circular to oval in cross-section with a central canal. A further discussion of the spinal cord can be found in Chapter 2.

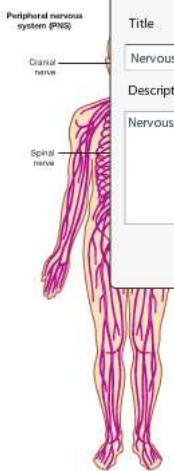


Fig. 1.133 CNS and PNS.

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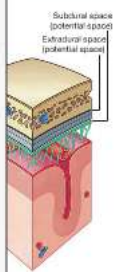


Fig. 1.134 Arrangement of meninges in the cranial cavity.

### Meninges

The meninges (Fig. 1.134) are three connective tissue coverings that surround, protect, and suspend the brain and spinal cord within the cranial cavity and vertebral canal, respectively:

- the **dura mater** is the thickest and most external of the coverings;
- the **arachnoid mater** is adjacent to the internal surface of the dura mater;
- the **pia mater** is adherent to the brain and spinal cord.

Between the arachnoid and pia mater is the **subarachnoid space**, which contains CSF.

A further discussion of the cranial meninges can be found in Chapter 8 and of the spinal meninges in Chapter 2.

### Functional subdivisions of the CNS

Functionally, the nervous system can be divided into somatic and visceral parts.

- The **somatic part** (*soma*, from the Greek for "body") innervates structures (skin and most skeletal muscle) derived from somites in the embryo, and is mainly involved with receiving and responding to information from the external environment.
- The **visceral part** (*viscera*, from the Greek for "guts") innervates organ systems in the body and other visceral elements, such as smooth muscle and glands, in peripheral regions of the body. It is concerned mainly with detecting and responding to information from the internal environment.

### Somatic part of the nervous system

The somatic part of the nervous system consists of:

- nerves that carry conscious sensations from peripheral regions back to the CNS; and
- nerves that innervate voluntary muscles.

Somatic nerves arise segmentally along the developing CNS in association with **somites**, which are themselves arranged segmentally along each side of the neural tube (Fig. 1.135). Part of each somite (the **dermatomyotome**) gives rise to skeletal muscle and the dermis of the skin. As cells of the dermatomyotome differentiate, they migrate into posterior (dorsal) and anterior (ventral) areas of the developing body.

- cells that migrate anteriorly give rise to muscles of the limbs and trunk (**hypaxial muscles**) and to the associated dermis;
- cells that migrate posteriorly give rise to the intrinsic muscles of the back (**epaxial muscles**) and the associated dermis.

# Poznámky - Notes

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Nervous system is located ..

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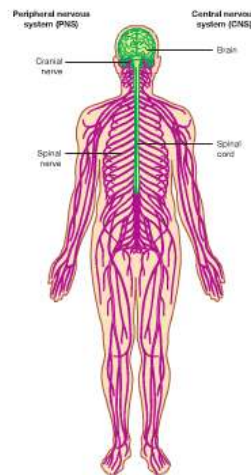


Fig. 1.33 CNS and PNS

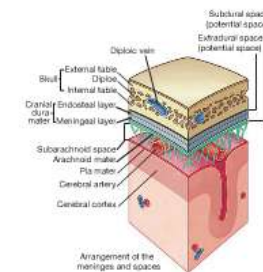


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# Zvýraznění - highlights

## The body

Testing movements at successive joints can help in localizing lesions in specific nerves or in a specific spinal cord level. For example:

- muscles that move the shoulder joint are innervated mainly by spinal nerves from spinal cord levels C5 and C6.

- muscles that move the elbow are innervated mainly by spinal nerves from spinal cord levels C6 and C7; and
- muscles in the hand are innervated mainly by spinal nerves from spinal cord levels C8 and T1.

### In the clinic

#### Dermatomes and myotomes

A knowledge of dermatomes and myotomes is absolutely fundamental to carrying out a neurological examination. A typical dermatome map is shown in Fig. 140.

Clinically, a dermatome is that area of skin supplied by a single nerve or spinal cord level. A myotome is that region of skeletal muscle innervated by a single nerve or spinal cord level. Most individual muscles of the body are innervated by more than one spinal cord level, so the evaluation of myotomes is usually accomplished by testing movements of joints or muscle groups.

Visceral parts of the body are also innervated segmentally. For example, pain fibers from the heart enter the spinal cord at a more superior level (approximately T1 to T4) than those from the appendix (T10).



Fig. 140 Dermatomes (anterior view).

## Visceral part of the nervous system

The visceral part of the nervous system, as is the somatic part, consists of motor and sensory components:

- sensory nerves monitor changes in the viscera;
- motor nerves mainly innervate smooth muscle, cardiac muscle, and glands.

The visceral motor component is commonly referred to as the **autonomic division of the PNS** and is subdivided into **sympathetic** and **parasympathetic** parts.

Like the somatic part of the nervous system, the visceral part is segmentally arranged and develops in a parallel fashion (Fig. 141).

**Visceral sensory neurons** that arise from neural crest cells send processes medially into the adjacent neural tube and laterally into regions associated with the developing body. These sensory neurons and their processes, referred to as **general visceral afferent fibers (GVAs)**, are associated primarily with chemoreception, mechanoreception, and stretch receptors.

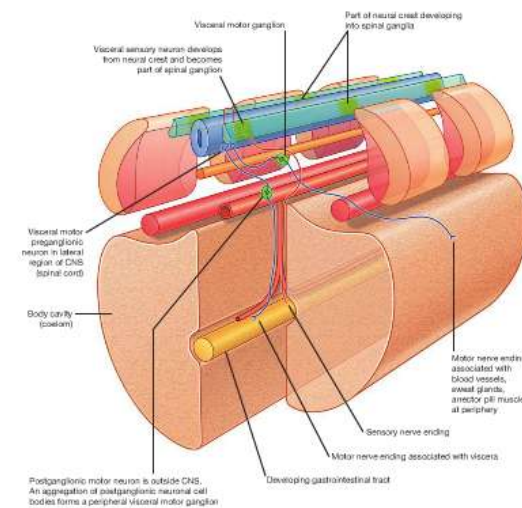


Fig. 141 Development of the visceral part of the nervous system.

# Zvýraznění - highlights

knowledge of dermatomes and myotomes is absol

## The body

Visceral motor neurons that arise from cells in lateral regions of the neural tube send processes out of the anterior aspect of the tube. Unlike in the somatic part, these processes, containing general visceral efferent fibers (GVEs), synapse with other cells, usually other visceral motor neurons, that develop outside the CNS from neural crest cells that migrate away from their original positions close to the developing neural tube.

The visceral motor neurons located in the spinal cord are referred to as preganglionic motor neurons and their axons are called preganglionic fibers; the visceral motor neurons located outside the CNS are referred to as postganglionic motor neurons and their axons are called postganglionic fibers.

The cell bodies of the visceral motor neurons outside the CNS often associate with each other in a discrete mass called a ganglion.

Visceral sensory and motor fibers enter and leave the CNS with their somatic equivalents (Fig. 1.43). Visceral sensory fibers enter the spinal cord together with somatic sensory fibers through posterior roots of spinal nerves. Preganglionic fibers of visceral motor neurons exit the spinal cord in the anterior roots of spinal nerves along with fibers from somatic motor neurons.

Postganglionic fibers traveling to visceral elements in the periphery are found in the posterior and anterior rami (branches) of spinal nerves.

Visceral motor and sensory fibers that travel to and from viscera form mixed visceral branches that are separate from the somatic branches. These nerves generally form plexuses from which arise branches to the viscera.

Visceral motor and sensory fibers do not enter and leave the CNS at all levels (Fig. 1.43):

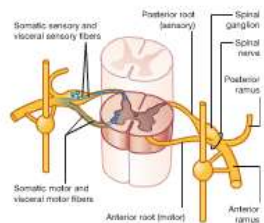


Fig. 1.43 Basic anatomy of a thoracic spinal nerve.

- in the cranial region, visceral components are associated with four of the twelve cranial nerves (CN III, VII, IX, and X);
- in the spinal cord, visceral components are associated mainly with spinal cord levels T1 to L2 and S2 to S4.

Visceral motor components associated with spinal levels T1 to L2 are termed **sympathetic**. These visceral motor components in cranial and sacral regions, on either side of the sympathetic region, are termed **parasympathetic**:

- the sympathetic system innervates structures in peripheral regions of the body and viscera;
- the parasympathetic system is more restricted to innervation of the viscera only.

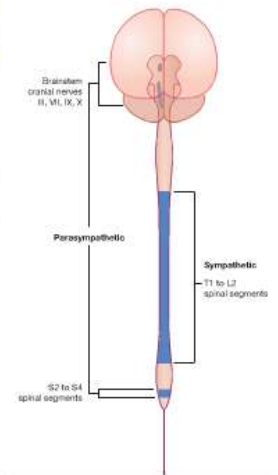


Fig. 1.43 Parts of the CNS associated with visceral motor components.

## Body systems • Nervous system

### Sympathetic system

The sympathetic part of the autonomic division of the PNS leaves thoracolumbar regions of the spinal cord with the somatic components of spinal nerves T1 to L2 (Fig. 1.44). On each side, a paravertebral sympathetic trunk extends from the base of the skull to the inferior end of the vertebral column.

where the two trunks converge anteriorly to the coccyx as the ganglion impar. Each trunk is attached to the anterior rami of spinal nerves and becomes the route by which sympathetics are distributed to the periphery and all viscera.

Visceral motor preganglionic fibers leave the T1 to L2 part of the spinal cord in anterior roots. The fibers then enter the spinal nerves, pass through the anterior rami and

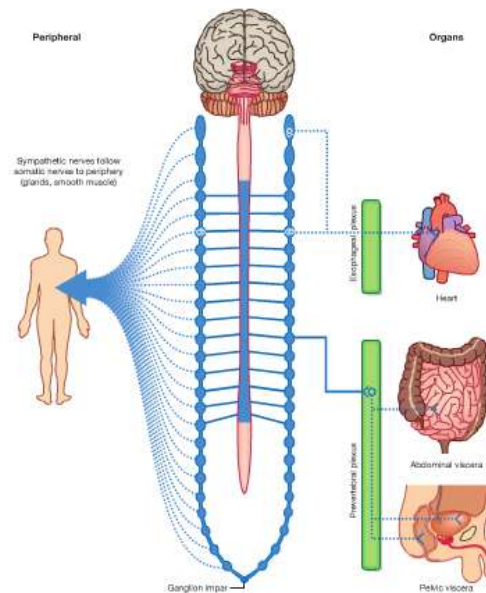


Fig. 1.44 Sympathetic part of the autonomic division of the PNS.

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**The body**

Visceral motor neurons that arise from cells in lateral regions of the neural tube send processes out of the anterior aspect of the tube. Unlike in the somatic part, these processes, containing general visceral efferent fibers (GVEs), synapse with other cells, usually other visceral motor neurons, that develop outside the CNS from neural crest cells that migrate away from their original positions close to the developing neural tube.

The visceral motor neurons located in the spinal cord are referred to as preganglionic neurons and their axons are called preganglionic fibers; the visceral motor neurons located outside the CNS are referred to as postganglionic neurons and their axons are called postganglionic fibers.

The cell bodies of the visceral motor neurons outside the CNS often associate with each other in a discrete mass called a ganglion.

Visceral sensory and motor fibers enter and leave the CNS with their somatic equivalents (Fig. 1.142). Visceral sensory fibers enter the spinal cord together with somatic sensory fibers through posterior roots of spinal nerves. Preganglionic fibers of visceral motor neurons exit the spinal cord in the anterior roots of spinal nerves along with fibers from somatic motor neurons.

Postganglionic fibers traveling to visceral elements in the periphery are found in the posterior and anterior rami (branches) of spinal nerves.

Visceral motor and sensory fibers that travel to and from viscera form mixed visceral branches that are separate from the somatic branches. These nerves generally form plexuses from which arise branches to the viscera.

Visceral motor and sensory fibers do not enter and leave the CNS at all levels (Fig. 1.143).

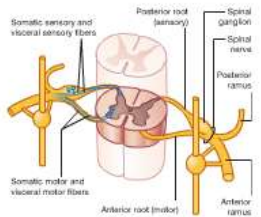


Fig. 1.143 Basic anatomy of a thoracic spinal nerve.

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Body system

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where the two trunks converge anteriorly to the coccyx as the ganglion impar. Each trunk is attached to the anterior rami of spinal nerves and becomes the route by which sympathetic fibers are distributed to the periphery and all viscera.

Visceral motor preganglionic fibers leave the T1 to L2 part of the spinal cord in anterior roots. The fibers that enter the spinal nerves, pass through the anterior rami and

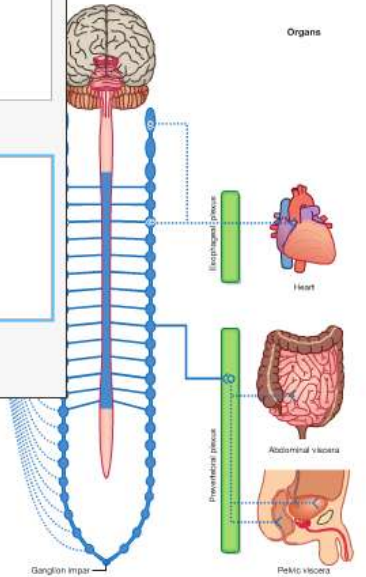


Fig. 1.144 Sympathetic part of the autonomic division of the PNS.

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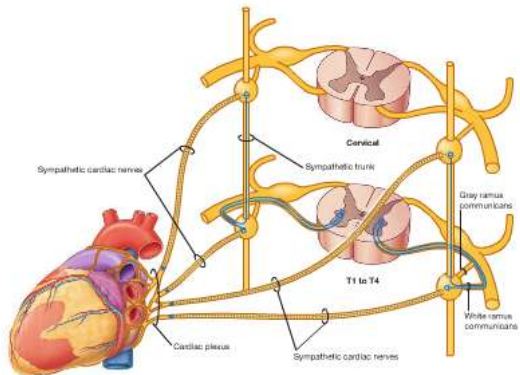
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Body systems

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**Fig. 147** Course of sympathetic nerves traveling to the heart.

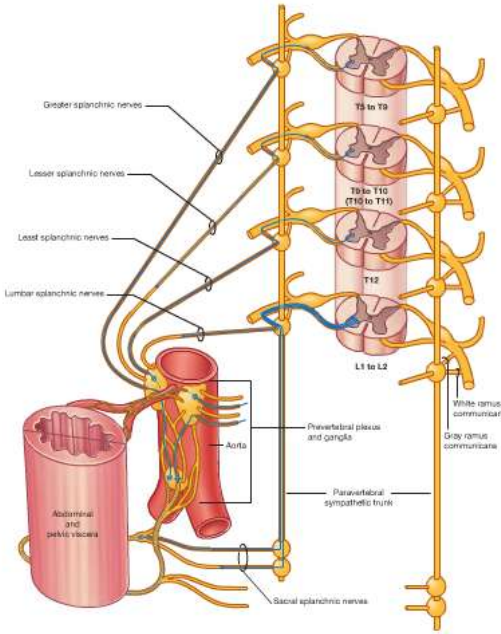
**Sympathetic innervation of the abdomen and pelvic regions and the adrenals**

Preganglionic sympathetic fibers may pass through the sympathetic trunk and paravertebral ganglia without synapsing and, together with similar fibers from other levels, form **splanchnic nerves: greater, lesser, least, lumbar, and sacral**, which pass into the abdomen and pelvic regions (Fig. 1.48). The preganglionic fibers in these nerves are derived from spinal cord levels T5 to L2.

The splanchnic nerves generally connect with sympathetic ganglia around the roots of major arteries that branch from the abdominal aorta. These ganglia are part

of a large prevertebral plexus that also has input from the parasympathetic part of the autonomic division of the PNS. Postganglionic sympathetic fibers are distributed in extensions of this plexus, predominantly along arteries, to viscera in the abdomen and pelvis.

Some of the preganglionic fibers in the prevertebral plexus do not synapse in the sympathetic ganglia of the plexus, but pass through the system to the adrenal gland where they synapse directly with cells of the adrenal medulla. These cells are homologues of sympathetic preganglionic neurons and secrete adrenaline and noradrenaline into the vascular system.



**Fig. 148** Course of sympathetic nerves traveling to abdominal and pelvic viscera.

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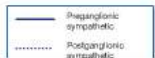
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The body

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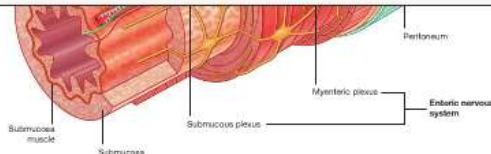


Fig 130 Enteric part of the nervous system.

**Nerve plexuses**

Nerve plexuses are either somatic or visceral and combine fibers from different sources or levels to form new nerves with specific targets or destinations (Fig. 1-51). Plexuses of the enteric system also generate reflex activity independent of the CNS.

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**Somatic plexuses**

Major somatic plexuses formed from the anterior rami of spinal nerves are the cervical (C1 to C4), brachial (C5 to T1), lumbar (L1 to L4), sacral (L4 to S4), and coccygeal (S5 to Co) plexuses. Except for spinal nerve T1, the anterior rami of thoracic spinal nerves remain independent and do not participate in plexuses.

# Nebo si prostě jen čtete...

## Clinical cases

### Case 1

#### APPENDICITIS

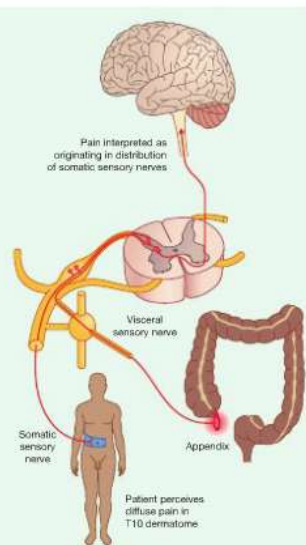
**A young man sought medical care because of central abdominal pain that was diffuse and colicky. After some hours, the pain began to localize in the right iliac fossa and became constant. He was referred to an abdominal surgeon, who removed a grossly inflamed appendix. The patient made an uneventful recovery.**

*When the appendix becomes inflamed, the visceral sensory fibers are stimulated. These fibers enter the spinal cord with the sympathetic fibers at spinal cord level T10. The pain is referred to the dermatome of T10, which is in the umbilical region (Fig. 1.52). The pain is diffuse, not focal; every time a peristaltic wave passes through the ileocecal region, the pain recurs. This intermittent type of pain is referred to as colic.*

*In the later stages of the disease, the appendix contacts and irritates the parietal peritoneum in the right iliac fossa, which is innervated by somatic sensory nerves. This produces a constant focal pain, which predominates over the colicky pain that the patient felt some hours previously. The patient no longer interprets the referred pain from the T10 dermatome.*

*Although this is a typical history for appendicitis, it should always be borne in mind that the patient's symptoms and signs may vary. The appendix is situated in a retrocecal position in approximately 70% of patients; therefore it may never contact the parietal peritoneum anteriorly in the right iliac fossa. It is also possible that the appendix is long and may directly contact other structures. As a consequence, the patient may have other symptoms (e.g., the appendix may contact the ureter, and the patient may then develop urological symptoms).*

*Although appendicitis is common, other disorders, for example of the bowel and pelvis, may produce similar symptoms.*



**Fig. 1.52** Mechanism for referred pain from an inflamed appendix to the T10 dermatome.



# Závěr

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