UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Anatomia 2 A

1819-1-H4101D002-H4101D008M

Aims

The objectives of the course are to provide expertise in normal anatomy, cytology, histology, embryology. Teachnig will include reference to topographic, radiologic, and clinical anatomy.

Practical activities using models (also virtual 3D), light microscope observations and clinical case simulations will be used to reach the teaching objectives.

Contents

The primary goal of the course is to provide a good knowledge of the embryonic development and of the gross anatomy of the human body, and of the aging changes required for a correct physical examination and understanding of the diseases pathogenesis.

Detailed program

REGIONAL ANATOMY

THE HEAD

Surface anatomy.

Skeletal landmarks of the head: nasion, vertex, superior nuchal line, external occipital protuberance, mastoid process, zygomatic arch, pterion, anterior and posterior borders of the ramus of mandibula, superciliary ridges.

Basic anatomy.

The scalp and its layers. Muscle of the scalp. Muscles of facial expression and muscle of mastication.

Bones of the face. The skull and cranial fossae (see muscular-skeletal system). Temporomandibular joint. Blood and nerve supply and lymphatic drainage of the scalp and face.

External nose, nasal cavity and paranasal sinuses. Bony skeleton. External, internal opening and walls of the nasal cavity. Location, relations and morphological features of paranasal sinuses. Blood and nerve supply of the nasal region.

Parotid region: parotid gland and duct, their location, relations and morphological features. Submandibular and sublingual glands: location, relations and morphological features. Blood and nerve supply.

Oral cavity: subdivision in vestibule and mouth cavity proper; teeth (deciduous and permanent) and their general structure; lips; palate and floor of the mouth with their muscles; tongue, its relations and morphological features, extrinsic and intrinsic muscles. Blood and nerve supply.

Orbital region: Eyelids, lacrimal apparatus, orbital margins and walls, openings into the orbital cavity, orbital muscles. Blood and nerve supply.

The eye: see “Special senses”.

The ear: see “Special senses”.

THE NECK

Surface anatomy.

Surface landmarks of the neck: hyoid bone, upper border of the thyroid cartilage, isthmus of the thyroid gland, suprasternal notch, nuchal groove, sternocleidomastoid and trapezius muscles, platisma muscle, external jugular vein.

Basic anatomy.

Skin and cutaneous nerves of the neck. Superficial fascia, platysma muscle. Hyoid bone. Deep cervical fascia: investing, pretracheal and prevertebral layers, carotid sheath. The triangles of the neck: anterior, posterior and their subdivision. Superficial muscles: sternocleidomastoid and trapezius. Suprahyoid and infrahyoid muscles. Anterior, lateral and posterior vertebral muscles with focus on scaleni muscles.

Organs located in the neck: thyroid and parathyroid glands, pharynx , larynx, cervical portion of esophagus and trachea.

Main arteries, veins, nerves and plexuses, limph vessels and limph nodes contained in the neck.

THE TORAX

Surface anatomy.

Skeletal landmarks on anterior chest wall: suprasternal notch, sternal angle, xiphisternal joint, subcostal angle, ribs; Skeletal landmarks on posterior chest wall: spinous processes of the thoracic vertebrae, superior angle, inferior angle and spine of the scapula. Projection of breast and nipple, heart, lungs and pleura, aortic arch, superior vena cava, tracheal bifurcation on the thoracic wall. Lines of visceral and parietal pleural reflection, costodiaphragmatic recess.

The thoracic wall.

Skin and extrinsic chest muscle (thoracoappendicular and spinoappendicular). Thoracic cage and its components: thoracic vertebrae, ribs, sternum and costal cartilages. Intercostal spaces, intercostal muscles, intercostal vessels and nerves, endothoracic fascia, suprapleural membrane. Detalied knowledge of diaphragm: origin, morphological features, openings and structures that each one transmit, action, blood and nerve supply. Thoracic outlet: its relations to vessels, nerves and organs.

The thoracic cavity.

Division into a median part, the mediastinum, and two lateral parts, the pleural spaces containing lungs.

Mediastinum: definition, borders, subdivision in superior and inferior (plane of division). Vessels, nerves, organs and other structures contained in the two parts of mediastinum, with major focus on heart and pericardium. Thoracic duct.

Organs contained in the thoracic cavity: lungs and pleurae, heart and pericardium, trachea, principal bronchi and bronchial tree, thymus, esophagus

Main arteries, veins, nerves and plexuses, limph vessels and limph nodes contained in the thoracic cavity

THE ABDOMEN

Surface anatomy.

Surface landmarks of the abdominal wall: xiphoid process, costal margin, iliac crest, pubic tubercle, symphysis pubis, inguinal ligament, superficial inguinal ring, umbilicus, linea alba, linea semilunaris and tendinous insersections of the rectus abdominis. Abdominal lines: transpyloric plane, subcostal plane, intercristal plane. Abdominal quadrants.

Abdominal wall.

Anterolateral abdominal wall. Skin, superficial fascia, deep fascia. Muscles: external and internal oblique, transversus, rectus abdominis, pyramidalis. Rectus sheath. Fascia transversalis. Arteries, veins, limph vessels and nerves of the anterolateral abdominal wall. Inguinal canal: deep and superficial inguinal rings, walls of the inguinal canal. Development of the inguinal canal. Fascial layers of the spermatic cord and scrotum.

Posterior abdominal wall. Lumbar vertebrae. Iliac part of the hip bone. Muscles: psoas major, quadratus lumborum, transversus abdominis, diaphragm.

Peritoneum: general arrangement, ligaments, omenta, mesenteries, peritoneal cavity. Relationships of the different organs to their peritoneal covering. Intraperitoneal, retroperitoneal and subperitoneal organs. Peritoneal pouches, spaces and recesses. Lesser sac and epiploic foramen. Functions of the peritoneum.

Organs contained in the abdominal cavity: stomach, duodenum, cecum, ascending, descending and transverse colon, appendix, liver, gallbladder, spleen, kidney, pancreas.

Main arteries, veins, nerves and plexuses, limph vessels and limph nodes contained in the abdominal cavity.

THE PELVIS

Surface anatomy.

Pubic tubercle, symphysis pubis, posterior part of sacrum, sacral hiatus, coccyx.

Pelvic walls.

Hip bones, sacrum and coccyx, symphysis pubis, sacroiliac joints, promontory of sacrum, ileopectineal line, pubic arch. Pelvic inlet and pelvic outlet. Sacrotuberous and sacrospinous ligaments. Greater and lesser sciatic foramina. Anterior, posterior and lateral pelvic walls. Relation to sacral plexus.

Major focus on pelvic floor (inferior pelvic wall) : pelvic diaphragm with levator ani muscle and its different groups of muscular fibers; pelvic fascia.

Perineum. Anal triangle and its contents; anal sphincter; ischiorectal fossa and pudendal canal. Urogenital triangle: urogenital diaphragm and superficial perineal pouch. In male: penis, scrotum and male urethra. In female: clitoris, female urethra, greater vestibular glands, vagina, vulva.

Organs contained in the pelvic cavity: sigmoid colon, rectum, ureters, urinary bladder. In male: vas deferens, seminal vesicles, ejaculatory ducts, prostate, prostatic urethra. In female: ovary, uterine tube, uterus, vagina.

Main arteries, veins, nerves and plexuses, limph vessels and limph nodes contained in the thoracic cavity

UPPER AND LOWER LIMBS

Detailed knowledge of all the bones, joints and muscles and their relation to blood vessels, nerves and limphatic structures.

SYSTEMATIC ANATOMY

MUSCULAR-SKELETAL SYSTEM (LOCOMOTOR)

Classification of bones, muscles and joints, their general structure and function.

The skull. Neurocranium and facial bones. General architecture of the skull and main characteristics of the individual bones. External view of the skull as a whole: anterior, superior, posterior. Lateral view: temporal, infratemporal and pterygopalatine fossae and their contents. Inferior view: anterior, middle and posterior region. The cranial cavity: vault and base. Base of the skull: anterior, middle, posterior cranial fossae with their major foramina; nerves and/or vessels that each foramen transmits. Cranial sutures and craniometric points. Neonatal skull. Nasal cavity, orbital cavity, paranasal sinuses. Temporomandibular joint. Mimic and

masticatory muscles.

Vertebral column. General characteristics of the vertebrae and regional differences. Atypical cervical vertebrae: atlas and axis. Atlanto-occipital and atlanto-axial joints. Other joints of the vertebral column. General features of the muscles of the back.

Neck. Muscles and fasciae of the neck.

Chest. Bones and cartilages of the thoracic cage. Joints of the ribs and costal cartilages. Extrinsic and intrinsic muscles of the thorax, respiratory muscles, in particular diaphragm muscle.
Shoulder girdle and upper limb. Anatomical characteristics of the different bones. Shoulder, elbow, radio-ulnar, wrist joints, general features of the other joints. Muscles of the shoulder, the rotator cuff; arm, forearm and hand muscles.
Pelvis and lower limb. Morphological feature of hip bones in detail, and of the other bones of the lower limb. Joints and ligaments of the pelvis, hip, knee; tibio-fibular, ankle and tarsal joints; general features of the other joints. Hip, thigh, leg and foot muscles. Scarpa's triangle and adductor canal. Femoral sheath and femoral canal.
Abdominal wall. Anterolateral and posterior abdominal wall muscles. Inguinal ligament. Inguinal canal.
Pelvic floor. Pelvic diaphragm. Perineum.

CARDIOVASCULAR SYSTEM

Heart: morphological features of external surface, cardiac chambers, cardiac valves, conducting system. Structure of the heart wall. Blood and nerve supply. Large arteries and veins leaving or entering the heart. Pericardium: serous, fibrous pericardium and pericardial sinuses.

Blood vessels. Vessels structure: arteries, veins, capillaries. Anastomoses. Fetal circulation and its modification at birth. General organization of adult circulatory system, pulmonary and systemic vascularization. In systemic circulation major focus on: aorta and its branches; polygon of Willis; blood supply of the upper and lower limbs; blood supply of all organs; superior and inferior caval veins system; portal vein, portal-systemic anastomoses; parietal vessels.

LYMPHATIC SYSTEM

General organization of the lymphatic circulation. Thoracic and right lymphatic ducts: origin and course, relation with organs and other structures. Other major lymphatic trunks. Main lymph node chains and stations. Lymphoid organs: thymus, spleen, lymph nodes and tonsils; their position, relations and morphologic features.

Blood and nerve supply of all the structures and organs of the lymphatic system.

RESPIRATORY SYSTEM

Nose, nasal and paranasal cavities: see regional anatomy. Position, relations and morphological features of the respiratory tract organs: pharynx, larynx, tracheo-bronchial tree, lungs. Pulmonary segments and lobes.

Pleurae: visceral and parietal pleura, pleural cavity, regional nomenclature.

Blood and nerve supply of the nasal and paranasal cavity and of all the organs of the respiratory system.

DIGESTIVE SYSTEM

Oral cavity and parotid region: see regional anatomy.

Position, relations and morphological features of the gastrointestinal tract organs: esophagus, stomach, small intestine (duodenum, jejunum, ileum), large intestine (cecum, appendix, colon and rectum). Other organs of the digestive system: liver, bile ducts, gallbladder, pancreas; their position, relations, morphological features. Relationships of the different organs to their peritoneal covering. Intraperitoneal, retroperitoneal and subperitoneal organs.

Blood and nerve supply of the oral cavity, tongue, salivary glands and of all the organs of the digestive system.

URINARY SYSTEM

Position, relations and morphological features of the urinary tract organs: kidney with its covering, renal pelvis, minor and major calyces, ureter, bladder, female urethra, male urethra with the main aspects of its three parts (prostatic, membranous and penile). Blood and nerve supply of all the organs of the urinary system.

ENDOCRINE SYSTEM

General characteristics of hormones.

Position, relations and morphological features of the endocrine organs: pituitary gland and its connection with the hypothalamus, thyroid, parathyroid, adrenal gland, endocrine pancreas, pineal gland. Gastroenteropancreatic (GEP) system. Blood and nerve supply of all the organs of the endocrine system.

FEMALE REPRODUCTIVE SYSTEM

Position, relations and morphological features of the female genital organs: ovary, uterus, uterine tube, vagina. External genitalia: morphology and structure. Main characteristics of placenta.Blood and nerve supply of all the organs of the female reproductive system.

MALE REPRODUCTIVE SYSTEM

Position, relations and morphological features of the male genital organs: testis, epididymis, vas deferens, prostate, seminal vesicles and bulbourethral glands. Fascial layers of the spermatic cord and scrotum. External genitalia: morphology and structure.Blood and nerve supply of all the organs of the male reproductive system

INTEGUMENTARY SYSTEM

Skin and its appendages. Different types of skin. Skin functions. Skin lines. Age-related skin changes. Mammary gland: position, relations and morphological features.Blood and nerve supply and lymphatic drainage of the skin and mammary gland.

NERVOUS SYSTEM

Development of the nervous system: neurulation, neural crest formation and differentiation, primary and secondary brain vesicles and their development, formation of midline structures, development of the spinal cord. Neural tube defects and major disorder of brain development.

Introduction to the study of the nervous system. General organization: central and peripheral nervous system.

Central nervous system :

1. th ventricle. Functions of the cerebellum
2. Blood supply of the brain and spinal cord. Arteries of the brain: internal carotid artery, vertebral and basilar arteries, their course, relations and terminal branches. Detailed knowledge of circle of Willis. Arteries of the spinal cord: posterior and anterior spinal arteries. Regional arteries of the brain and segmental spinal arteries. Veins of the brain: deep and superficial veins; detailed knowledge of dural venous sinuses. Veins of the spinal cord.
3. Autonomic ganglia. Large autonomic plexuses.

   Anatomical, physiological and pharmacological differences between sympathetic and parasympathetic divisions. Sympathetic division: sympathetic trunks and ganglia, rami communicantes. Parasympathetic division: cranial and sacral components, cranial nerves involved..Functions of the autonomic nervous system.

   The enteric nervous system

   Some important autonomic innervation: eye, salivary and lacrimal glands, urinary bladder, gastrointestinal tract, heart, medulla of suprarenal gland, genital organs, skin.

SPECIAL SENSES

The eye. Coats of the eyball. Eyelids. Lacrimal apparatus. Blood supply and innervation of the eye.

The ear. External ear. Middle ear (tympanic cavity). Internal ear (Labyrinth). Blood supply and innervation of the ear.

LABORATORIES

Lectures will be partnered by multi approach interactive laboratories, to allow students a closer study of the examined topics. In particular, students will use both different anatomy models (Skull and skeleton; Upper and Lower limbs; Heart; Thorax and Abdomen; Male and Female Pelvis; Eye and Ear; Brain), and multimedia sources such as 3D virtual models, to recognize the main features of each organ. Some laboratories will focus on computer-assisted learning, to allow students to recognize radiological images, such as computed tomography and magnetic resonance imaging. In addition, some laboratories will be focused on quizzes based on lectures' topics, and/or on basic clinical cases, later discussed with the teacher.

Prerequisites

See Anatomia Istologia Umana

Teaching form

See Anatomia Istologia Umana

Textbook and teaching resource

-G. Anastasi e altri autori. Trattato di Anatomia Umana (3 volumi). Edi-Ermes (ed), 2009.

-“Prometheus” testo-atlante di Anatomia, II edizione, 3 volumi

-S. Standring. Anatomia del Gray – Le basi anatomiche per la pratica clinica – 41° ed. EDRA

Per approfondimento sul sistema nervoso centrale :

L. Heimer. The Human Brain and Spinal Cord –Functional neuroanatomy and dissection guide. Springer-Verlag (ed), 1995.

-“Barr: Il Sistema Nervoso dell’Uomo. Basi di Neuroanatomia” di Kiernan JA e Rajakumar N. II edizione. Edises (2015)

Atlanti:

- Netter. Atlante di anatomia umana, Frank H. Netter, Editore: Edra

- Anatomia umana. Atlante. Curatori: G. Anastasi, C. Tacchetti, Editore: Edi. Ermes

Semester

See Anatomia Istologia Umana

Assessment method

See Anatomia Istologia Umana

Office hours

See Anatomia Istologia Umana