CYTOLOGY AND MICROSCOPIC ANATOMY pdf

1: MicroAnatomyAtlas

Histology, also microanatomy, is the branch of biology which studies the tissues of animals and plants using microscopy. [2] [3] It is commonly studied using a light microscope or electron microscope, the specimen having been sectioned, stained, and mounted on a microscope slide.

Fixation histology Chemical fixatives are used to preserve tissue from degradation, and to maintain the structure of the cell and of sub-cellular components such as cell organelles e. For electron microscopy, the most commonly used fixative is glutaraldehyde , usually as a 2. These fixatives preserve tissues or cells mainly by irreversibly cross-linking proteins. The main action of these aldehyde fixatives is to cross-link amino groups in proteins through the formation of methylene bridges -CH2- , in the case of formaldehyde, or by C5H10 cross-links in the case of glutaraldehyde. This process, while preserving the structural integrity of the cells and tissue can damage the biological functionality of proteins, particularly enzymes , and can also denature them to a certain extent. This can be detrimental to certain histological techniques. Further fixatives are often used for electron microscopy such as osmium tetroxide or uranyl acetate. However, extraction and analysis of nucleic acids and proteins from formalin-fixed, paraffin-embedded tissues is possible using appropriate protocols. It is often used after surgical removal of tumors to allow rapid determination of margin that the tumor has been completely removed. Processing - dehydration, clearing, and infiltration[edit] The aim of tissue processing is to remove water from tissues and replace with a medium that solidifies to allow thin sections to be cut. For light microscopy, paraffin wax is most frequently used. Since it is immiscible with water, the main constituent of biological tissue, water must first be removed in the process of dehydration. Samples are transferred through baths of progressively more concentrated ethanol to remove the water. This is followed by a hydrophobic clearing agent such as xylene to remove the alcohol, and finally molten paraffin wax , the infiltration agent, which replaces the xylene. Paraffin wax does not provide a sufficiently hard matrix for cutting very thin sections for electron microscopy. Instead, resins are used. Epoxy resins are the most commonly employed embedding media, but acrylic resins are also used, particularly where immunohistochemistry is required. Again, the immiscibility of most epoxy and acrylic resins with water necessitates the use of dehydration, usually with ethanol. Embedding[edit] OCT embedding [13] optimal cutting temperature compound After the tissues have been dehydrated, cleared, and infiltrated with the embedding material, they are ready for external embedding. During this process the tissue samples are placed into molds along with liquid embedding material such as agar, gelatine, or wax which is then hardened. This is achieved by cooling in the case of paraffin wax and heating curing in the case of the epoxy resins. The acrylic resins are polymerised by heat, ultraviolet light, or chemical catalysts. The hardened blocks containing the tissue samples are then ready to be sectioned. Because formalin-fixed, paraffin-embedded FFPE tissues may be stored indefinitely at room temperature, and nucleic acids both DNA and RNA may be recovered from them decades after fixation, FFPE tissues are an important resource for historical studies in medicine. Embedding can also be accomplished using frozen, non-fixed tissue in a water-based medium. Pre-frozen tissues are placed into molds with the liquid embedding material, usually a water-based glycol, OCT, TBS, Cryogel, or resin, which is then frozen to form hardened blocks. Microtome For light microscopy, a steel knife mounted in a microtome is used to cut 4- micrometer -thick tissue sections which are mounted on a glass microscope slide. For transmission electron microscopy, a diamond knife mounted in an ultramicrotome is used to cut nanometer -thick tissue sections which are mounted on a 3-millimeter-diameter copper grid. Then the mounted sections are treated with the appropriate stain. Sections can be cut through the tissue in a number of directions. For pathological evaluation of tissues, vertical sectioning, cut perpendicular to the surface of the tissue to produce a cross section is the usual method. Horizontal also known as transverse or longitudinal sectioning, cut along the long axis of the tissue, is often used in the evaluation of the hair follicles and pilosebaceous units. Frozen section procedure Fixed or unfixed tissue may be frozen and sliced using a microtome mounted in a refrigeration device known as a cryostat. The frozen sections are mounted on a glass slide and may be stained to enhance the contrast between different tissues. Unfixed frozen sections can also be

used for studies requiring enzyme localization in tissues and cells. It is necessary to fix tissue for certain procedures such as antibody linked immunofluorescence staining. Frozen sectioning can also be used to determine if a tumour is malignant when it is found incidentally during surgery on a patient. Sample of a trachea coloured with hematoxylin and eosin Main article: Staining Example of staining [14] in light microscopy: Staining is employed to give both contrast to the tissue as well as highlighting particular features of interest. Where the underlying mechanistic chemistry of staining is understood, the term histochemistry is used. Hematoxylin, a basic dye, stains nuclei blue due to an affinity to nucleic acids in the cell nucleus; eosin, an acidic dye, stains the cytoplasm pink. Uranyl acetate and lead citrate are commonly used to impart contrast to tissue in the electron microscope. There are many other staining techniques that have been used to selectively stain cells and cellular components. One of these techniques involves marking peripheral tumors or surgical margins, in which a certain color of dye is applied to the posterior border of a sample, another to the anterior, etc. Other compounds used to color tissue sections include safranin , Oil Red O , Congo red , Fast green FCF , silver salts, and numerous natural and artificial dyes that usually originated from the development of dyes for the textile industry. Histochemistry refers to the science of using chemical reactions between laboratory chemicals and components within tissue. A commonly performed histochemical technique is the Perls Prussian blue reaction, used to demonstrate iron deposits in diseases like hemochromatosis. Histology samples have often been examined by radioactive techniques. In historadiography , a slide sometimes stained histochemically is X-rayed. More commonly, autoradiography is used to visualize the locations to which a radioactive substance has been transported within the body, such as cells in S phase undergoing DNA replication which incorporate tritiated thymidine , or sites to which radiolabeled nucleic acid probes bind in in situ hybridization. For autoradiography on a microscopic level, the slide is typically dipped into liquid nuclear tract emulsion, which dries to form the exposure film. Individual silver grains in the film are visualized with dark field microscopy. Recently, antibodies have been used to specifically visualize proteins, carbohydrates, and lipids. This process is called immunohistochemistry , or when the stain is a fluorescent molecule, immunofluorescence. This technique has greatly increased the ability to identify categories of cells under a microscope. Other advanced techniques, such as nonradioactive in situ hybridization, can be combined with immunochemistry to identify specific DNA or RNA molecules with fluorescent probes or tags that can be used for immunofluorescence and enzyme-linked fluorescence amplification especially alkaline phosphatase and tyramide signal amplification. Fluorescence microscopy and confocal microscopy are used to detect fluorescent signals with good intracellular detail. Digital cameras are increasingly used to capture histological and histopathological image Common laboratory stains[edit].

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2: Color Atlas of Cytology, Histology and Microscopic Anatomy by Wolfgang KÃ¼hnel

*Cytology, Histology, and Microscopic Anatomy [Wolfgang Kuehnel] on www.enganchecubano.com *FREE* shipping on qualifying offers. A proven classicon the market since , translated into eight languages Outstanding histologic and electron microscopic illustrations (in all) Â·An ideal companion to any textbook of histology and microscopic anatomy Numerous tables of differential diagnosis Â·Specimens.*

Skeleton of a diamondback rattlesnake Reptiles are a class of animals comprising turtles , tuataras , lizards , snakes and crocodiles. They are tetrapods , but the snakes and a few species of lizard either have no limbs or their limbs are much reduced in size. Their bones are better ossified and their skeletons stronger than those of amphibians. The teeth are conical and mostly uniform in size. The surface cells of the epidermis are modified into horny scales which create a waterproof layer. Reptiles are unable to use their skin for respiration as do amphibians and have a more efficient respiratory system drawing air into their lungs by expanding their chest walls. The heart resembles that of the amphibian but there is a septum which more completely separates the oxygenated and deoxygenated bloodstreams. The reproductive system has evolved for internal fertilization, with a copulatory organ present in most species. The eggs are surrounded by amniotic membranes which prevents them from drying out and are laid on land, or develop internally in some species. The bladder is small as nitrogenous waste is excreted as uric acid. They have an inflexible trunk encased in a horny carapace above and a plastron below. These are formed from bony plates embedded in the dermis which are overlain by horny ones and are partially fused with the ribs and spine. The neck is long and flexible and the head and the legs can be drawn back inside the shell. Turtles are vegetarians and the typical reptile teeth have been replaced by sharp, horny plates. In aquatic species, the front legs are modified into flippers. There is one living species, Sphenodon punctatus. The skull has two openings fenestrae on either side and the jaw is rigidly attached to the skull. There is one row of teeth in the lower jaw and this fits between the two rows in the upper jaw when the animal chews. The teeth are merely projections of bony material from the jaw and eventually wear down. The brain and heart are more primitive than those of other reptiles, and the lungs have a single chamber and lack bronchi. The tuatara has a well-developed parietal eye on its forehead. This results in the jaws being less rigidly attached which allows the mouth to open wider. Lizards are mostly quadrupeds, with the trunk held off the ground by short, sideways-facing legs, but a few species have no limbs and resemble snakes. Lizards have moveable eyelids, eardrums are present and some species have a central parietal eye. The skeleton consists of a skull, a hyoid bone, spine and ribs though a few species retain a vestige of the pelvis and rear limbs in the form of pelvic spurs. The bar under the second fenestra has also been lost and the jaws have extreme flexibility allowing the snake to swallow its prey whole. Snakes lack moveable eyelids, the eyes being covered by transparent "spectacle" scales. They do not have eardrums but can detect ground vibrations through the bones of their skull. Their forked tongues are used as organs of taste and smell and some species have sensory pits on their heads enabling them to locate warm-blooded prey. The head and trunk are dorso-ventrally flattened and the tail is laterally compressed. It undulates from side to side to force the animal through the water when swimming. The tough keratinized scales provide body armour and some are fused to the skull. The nostrils, eyes and ears are elevated above the top of the flat head enabling them to remain above the surface of the water when the animal is floating. Valves seal the nostrils and ears when it is submerged. Unlike other reptiles, crocodilians have hearts with four chambers allowing complete separation of oxygenated and deoxygenated blood. Bird anatomy Part of a wing. Birds are endothermic , have a high metabolic rate , a light skeletal system and powerful muscles. The long bones are thin, hollow and very light. Air sac extensions from the lungs occupy the centre of some bones. The sternum is wide and usually has a keel and the caudal vertebrae are fused. There are no teeth and the narrow jaws are adapted into a horn-covered beak. The eyes are relatively large, particularly in nocturnal species such as owls. They face forwards in predators and sideways in ducks. The only cutaneous gland is the single uropygial gland near the base of the tail. This produces an oily secretion that waterproofs the feathers when the bird preens. There are scales on the legs, feet and claws on the tips of the toes. Mammal anatomy Mammals are a diverse class of animals, mostly terrestrial but some

are aquatic and others have evolved flapping or gliding flight. They mostly have four limbs but some aquatic mammals have no limbs or limbs modified into fins and the forelimbs of bats are modified into wings. The legs of most mammals are situated below the trunk, which is held well clear of the ground. The bones of mammals are well ossified and their teeth, which are usually differentiated, are coated in a layer of prismatic enamel. Mammals have three bones in the middle ear and a cochlea in the inner ear. They are clothed in hair and their skin contains glands which secrete sweat. Some of these glands are specialized as mammary glands , producing milk to feed the young. Mammals breathe with lungs and have a muscular diaphragm separating the thorax from the abdomen which helps them draw air into the lungs. The mammalian heart has four chambers and oxygenated and deoxygenated blood are kept entirely separate. Nitrogenous waste is excreted primarily as urea. The exception to this are the egg-laying monotremes , the platypus and the echidnas of Australia. Humans have a head , neck , trunk which includes the thorax and abdomen , two arms and hands , and two legs and feet. Generally, students of certain biological sciences , paramedics , prosthetists and orthotists, physiotherapists , occupational therapists , nurses , podiatrists , and medical students learn gross anatomy and microscopic anatomy from anatomical models, skeletons, textbooks, diagrams, photographs, lectures and tutorials, and in addition, medical students generally also learn gross anatomy through practical experience of dissection and inspection of cadavers. The study of microscopic anatomy or histology can be aided by practical experience examining histological preparations or slides under a microscope. Human anatomy can be taught regionally or systemically; that is, respectively, studying anatomy by bodily regions such as the head and chest, or studying by specific systems, such as the nervous or respiratory systems. They are often involved in teaching anatomy, and research into certain systems, organs, tissues or cells. By definition, none of these creatures has a backbone. The cells of single-cell protozoans have the same basic structure as those of multicellular animals but some parts are specialized into the equivalent of tissues and organs. Locomotion is often provided by cilia or flagella or may proceed via the advance of pseudopodia , food may be gathered by phagocytosis , energy needs may be supplied by photosynthesis and the cell may be supported by an endoskeleton or an exoskeleton. Some protozoans can form multicellular colonies. The most basic types of metazoan tissues are epithelium and connective tissue, both of which are present in nearly all invertebrates. The outer surface of the epidermis is normally formed of epithelial cells and secretes an extracellular matrix which provides support to the organism. An endoskeleton derived from the mesoderm is present in echinoderms , sponges and some cephalopods. Exoskeletons are derived from the epidermis and is composed of chitin in arthropods insects, spiders, ticks, shrimps, crabs, lobsters. Calcium carbonate constitutes the shells of molluscs , brachiopods and some tube-building polychaete worms and silica forms the exoskeleton of the microscopic diatoms and radiolaria. The outer epithelial layer may include cells of several types including sensory cells, gland cells and stinging cells. There may also be protrusions such as microvilli , cilia, bristles, spines and tubercles. He observed that when a ring-like portion of bark was removed on a trunk a swelling occurred in the tissues above the ring, and he unmistakably interpreted this as growth stimulated by food coming down from the leaves, and being captured above the ring. Arthropod , Insect morphology , and Spider anatomy Arthropods comprise the largest phylum in the animal kingdom with over a million known invertebrate species. The segments of the body are organized into three distinct parts, a head, a thorax and an abdomen. The thorax has three pairs of segmented legs , one pair each for the three segments that compose the thorax and one or two pairs of wings. The abdomen is composed of eleven segments, some of which may be fused and houses the digestive , respiratory , excretory and reproductive systems. Spiders have no wings and no antennae. They have mouthparts called chelicerae which are often connected to venom glands as most spiders are venomous. They have a second pair of appendages called pedipalps attached to the cephalothorax. These have similar segmentation to the legs and function as taste and smell organs. At the end of each male pedipalp is a spoon-shaped cymbium that acts to support the copulatory organ. Other branches of anatomy[edit] Superficial or surface anatomy is important as the study of anatomical landmarks that can be readily seen from the exterior contours of the body. Superficial is a directional term that indicates that structures are located relatively close to the surface of the body.

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3: Histology | physiology | www.enganchecubano.com

The terms histology and microscopic anatomy are sometimes used interchangeably, but a fine distinction can be drawn between the two studies. The fundamental aim of histology is to determine how tissues are organized at all structural levels, from cells and intercellular substances to organs.

4: Microscopic anatomy | Define Microscopic anatomy at www.enganchecubano.com

This timeless pocket atlas is the ideal visual companion to histology and cytology textbooks. First published in and translated into eight languages, Kuehnel's Pocket Atlas of Cytology, Histology and Microscopic Anatomy is a proven classic.

5: microscopic anatomy

The microscopic examination of body fluids for the detection of disease; in cytology, the most common specimen is the Pap smear, a normal component of a gynaecologic examination which is the best means of detecting early, curable stages of cancer of the uterine cervixâ€"formerly the most common cause of death in sexually active womenâ€"as well.

6: Anatomy - Wikipedia

Whereas most oral histology textbooks are deficient in the number of color photos present, this atlas has more than magnified colored photographs of normal microscopic anatomy of oral tissues to assist the reader in identifying features of each tissue.

7: Microscopic anatomy | biology | www.enganchecubano.com

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8: Histology : Human Anatomy

microscopic anatomy n. The study of the structure of cells, tissues, and organs of the body as seen with a microscope.

9: Anatomy Atlases: Atlas of Microscopic Anatomy A Functional Approach - Histology | Histology Atlas

Histology is the study of the structure and function of microscopic anatomy of plants and animals. Study of structure, function and chemistry of cells is known as cytology. In cytology, we go only for cellular level, but in histology, we mainly examine the tissue architecture of a particular tissue.

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