

Cell Function Study Guide

Outline of cell biology

provided as an overview of and topical guide to cell biology: Cell biology – A branch of biology that includes study of cells regarding their physiological properties

The following outline is provided as an overview of and topical guide to cell biology:

Cell biology – A branch of biology that includes study of cells regarding their physiological properties, structure, and function; the organelles they contain; interactions with their environment; and their life cycle, division, and death. This is done both on a microscopic and molecular level. Cell biology research extends to both the great diversities of single-celled organisms like bacteria and the complex specialized cells in multicellular organisms like humans. Formerly, the field was called cytology (from Greek κύτος, kytos, "a hollow;" and -λογία, -logia).

Leydig cell

Leydig cells may grow uncontrollably and form a Leydig cell tumour. These may be hormonally active, i.e. secrete testosterone. The function of Reinke

Leydig cells, also known as interstitial cells of the testes and interstitial cells of Leydig, are found adjacent to the seminiferous tubules in the testicle and produce testosterone in the presence of luteinizing hormone (LH). They are polyhedral in shape and have a large, prominent nucleus, an eosinophilic cytoplasm, and numerous lipid-filled vesicles. Males have two types of Leydig cells that appear in two distinct stages of development: the fetal type and the adult type.

B cell

cells, also known as B lymphocytes, are a type of lymphocyte. They function in the humoral immunity component of the adaptive immune system. B cells produce

B cells, also known as B lymphocytes, are a type of lymphocyte. They function in the humoral immunity component of the adaptive immune system. B cells produce antibody molecules which may be either secreted or inserted into the plasma membrane where they serve as a part of B-cell receptors. When a naïve or memory B cell is activated by an antigen, it proliferates and differentiates into an antibody-secreting effector cell, known as a plasmablast or plasma cell. In addition, B cells present antigens (they are also classified as professional antigen-presenting cells, APCs) and secrete cytokines. In mammals B cells mature in the bone marrow, which is at the core of most bones. In birds, B cells mature in the bursa of Fabricius, a

Cell Function Study Guide

lymphoid organ where they were first discovered by Chang and Glick...

Goblet cell

the cell, rather than a functional name, as he remained uncertain as to the mucus-producing function of the cell. In the present day, these cells are

Goblet cells are simple columnar epithelial cells that secrete gel-forming mucins, like mucin 2 in the lower gastrointestinal tract, and mucin 5AC in the respiratory tract. The goblet cells mainly use the merocrine method of secretion, secreting vesicles into a duct, but may use apocrine methods, budding off their secretions, when under stress. The term goblet refers to the cell's goblet-like shape. The apical portion is shaped like a cup, as it is distended by abundant mucus laden granules; its basal portion lacks these granules and is shaped like a stem.

The goblet cell is highly polarized with the nucleus and other organelles concentrated at the base of the cell and secretory granules containing mucin, at the apical surface. The apical plasma membrane projects short microvilli to give...

Cell culture

fields such as: Stem cell self-renewal Lineage specification Cancer cell phenotype Fibrosis Hepatocyte function Mechanosensing Cell culture in three dimensions

Cell culture or tissue culture is the process by which cells are grown under controlled conditions, generally outside of their natural environment. After cells of interest have been isolated from living tissue, they can subsequently be maintained under carefully controlled conditions. They need to be kept at body temperature (37 °C) in an incubator. These conditions vary for each cell type, but generally consist of a suitable vessel with a substrate or rich medium that supplies the essential nutrients (amino acids, carbohydrates, vitamins, minerals), growth factors, hormones, and gases (CO₂, O₂), and regulates the physio-chemical environment (pH buffer, osmotic pressure, temperature). Most cells require a surface or an artificial substrate to form an adherent culture as a monolayer (one single...

Stem-cell therapy

traditional stem cell therapy such as immunogenicity and tumorigenic risk. In 2013, studies of autologous bone marrow stem cells on ventricular function were found

Stem-cell therapy uses stem cells to treat or prevent a disease or condition. As of 2024, the only FDA-approved therapy using stem cells is hematopoietic stem cell transplantation. This usually takes the form of a bone marrow or peripheral blood stem cell transplantation, but the cells can also be derived from umbilical cord blood. Research is underway to develop various sources for stem cells as well as to apply stem-cell treatments for neurodegenerative diseases and conditions such as diabetes and heart disease.

Cell Function Study Guide

Stem-cell therapy has become controversial following developments such as the ability of scientists to isolate and culture embryonic stem cells, to create stem cells using somatic cell nuclear transfer, and their use of techniques to create induced pluripotent stem cells. This controversy...

Cell nucleus

in such a way to promote cell function. The nucleus maintains the integrity of genes and controls the activities of the cell by regulating gene expression

The cell nucleus (from Latin nucleus or nuculeus 'kernel, seed'; pl.: nuclei) is a membrane-bound organelle found in eukaryotic cells. Eukaryotic cells usually have a single nucleus, but a few cell types, such as mammalian red blood cells, have no nuclei, and a few others including osteoclasts have many. The main structures making up the nucleus are the nuclear envelope, a double membrane that encloses the entire organelle and isolates its contents from the cellular cytoplasm; and the nuclear matrix, a network within the nucleus that adds mechanical support.

The cell nucleus contains nearly all of the cell's genome. Nuclear DNA is often organized into multiple chromosomes – long strands of DNA dotted with various proteins, such as histones, that protect and organize the DNA. The genes within...

Parasol cell

A parasol cell, sometimes called an M cell or M ganglion cell, is one type of retinal ganglion cell (RGC) located in the ganglion cell layer of the retina

A parasol cell, sometimes called an M cell or M ganglion cell, is one type of retinal ganglion cell (RGC) located in the ganglion cell layer of the retina. These cells project to magnocellular cells in the lateral geniculate nucleus (LGN) as part of the magnocellular pathway in the visual system. They have large cell bodies as well as extensive branching dendrite networks and as such have large receptive fields. Relative to other RGCs, they have fast conduction velocities. While they do show clear center-surround antagonism (known as spatial opponency), they receive no information about color (absence of chromatic opponency). Parasol ganglion cells contribute information about the motion and depth of objects to the visual system.

Pyramidal cell

guided motor function. Pyramidal neurons in the prefrontal cortex are implicated in cognitive ability. In mammals, the complexity of pyramidal cells increases

Pyramidal cells, or pyramidal neurons, are a type of multipolar neuron found in areas of the brain including the cerebral cortex, the hippocampus, and the amygdala. Pyramidal cells are the primary excitation units of the mammalian prefrontal cortex and the corticospinal tract. One of the main structural features of the pyramidal neuron is the conic shaped soma, or cell

Cell Function Study Guide

body, after which the neuron is named. Other key structural features of the pyramidal cell are a single axon, a large apical dendrite, multiple basal dendrites, and the presence of dendritic spines.

Pyramidal neurons are also one of two cell types where the characteristic sign, Negri bodies, are found in post-mortem rabies infection. Pyramidal neurons were first discovered and studied by Santiago Ramón y Cajal. Since then, studies...

Stem cell

deleted or altered in order to study their function in pathology. In 1991, a process that allowed the human stem cell to be isolated was patented by Ann

In multicellular organisms, stem cells are undifferentiated or partially differentiated cells that can change into various types of cells and proliferate indefinitely to produce more of the same stem cell. They are the earliest type of cell in a cell lineage. They are found in both embryonic and adult organisms, but they have slightly different properties in each. They are usually distinguished from progenitor cells, which cannot divide indefinitely, and precursor or blast cells, which are usually committed to differentiating into one cell type.

In mammals, roughly 50 to 150 cells make up the inner cell mass during the blastocyst stage of embryonic development, around days 5-14. These have stem-cell capability. In vivo, they eventually differentiate into all of the body's cell types (making...

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