1. Critically evaluate the contribution of histopathology to the staging of solid cancers.

Support your response with at least two examples explored in this module.

ANSWER: Histopathology is microscopic analysis of tissues that are removed during a biopsy. The histopathological examination in general is a microscopic analysis that serves to detect possible alterations or lesions and aims to inform the clinical status of the nature, severity, extent, course and intensity of any problem of the sample analyzed, and may suggest or confirm the cause of the problem. It is an extremely technical act, which should only be done by medical specialists, pathologists who are trained to analyze small fragments of any organ, in order to confirm, elucidate or discard one or more diagnostic hypotheses. The types of cancer are classified according to the type of embryonic origin of the tissues in which the tumor is derived. Carcinoma is the most common type of cancer and it develops in the epithelial cells that cover the skin and the vast majority of organs. The contribution of histopathology in cancer is clear, because the examination thoroughly analyzes the tissues and can identify diseases and abnormalities from which it is not possible to detect with any type of examination. Epithelial tissue is part of one of the four basic types of tissues, is formed with epithelial cells, and distributed diffusely throughout the body. Cancer appears when epithelial cells mutate. Among the carcinomas there are the subtypes: adenocarcinoma, basal cell carcinoma, squamous cell carcinoma and carcinoma in situ. In cases where it is not possible to analyze which epithelium the carcinoma originated from, they are then classified as an undifferentiated carcinoma or an anaplastic carcinoma.

A good example may be breast cancer, which affects mostly women over 50 years ofage, represents a very important public health problem, because of its high incidence and mortality rates in females, being the second most recurrent neoplasm in the world and having about 20% of new cases every year, histopathological parameters are used to perform the diagnosis of breast cancer, as well as morphological classification and evaluation of clinical evolution. To define the molecular subtype and make the therapeutic indication, the immunohistochemistry test becomes essential, having been used to evaluate the predictive and prognostic factors, for the research of metastatic cells in lymph nodes, molecular and differential diagnosis and to define the possible origin of metastatic neoplasms.

Another example is skin cancer in the United States, representing one third of all cancers that are diagnosed annually in the country, with basal cell carcinoma being the most frequent and representing a percentage of more than 75%. It is the most frequent malignant disease that can affect humans throughout their life. The skin is the largest organ of the human body, besides being the site that originates the various malignant neoplasms. Skin cancer is abnormal and uncontrolled growth of the cells that make up the skin. These cells are allocated forming layers and the affected layer is what defines the different histological types. Performing histopathology in this type of cancer is very important as it will give a parameter of extent and type of cancer that is affecting the human being. Skin cancer and breast cancer are just a few examples that we can use, but histopathology is very important in any cancer due to all the facts already presented and because it is a precise examination and done by qualified professionals, so it is also necessary to know and understand the pattern of the lesion, as well as its size, its location , the margins, among other specific characteristics, of which it is of great importance for the choice of the ideal therapeutic approach free of complications.

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**2.** Critically evaluate the use of stem cells in regenerative medicine. Include appropriate example in your response.

ANSWER: The use of stem cells for the repair of injured organs and tissues opens opportunities for a new era, full of possibilities, and named as regenerative medicine, of which, according to some researchers, it has a great revolutionary potential that can be compared to the advent of penicillin. It still takes a lot of research, funds and political, ethical and moral accommodations to obtain the perfect setting for the full development of this therapeutic area. A research at the Heart Institute (Incor) of São Paulo, is being carried out and with good results, direct applications of stem cells in patients with heart failure, which is caused by Chagas disease, hypertension or even of unknown origin. Two different techniques are being used: the application of stem cells isolated from the bone marrow and the use of a hormone that stimulates the release of stem cells from the bone marrow to the blood circulation. The hypothesis is that stem cells can be stimulated to go in one direction, alone, in injured regions of the organism according to researcher Edimar Bocchi, who is one of those responsible for the research. There are other stem cell studies that also present hopeful results, among them is the treatment of traumatic injuries where a local injection with medullary stem cells is used. There are several types of stem cells such as: Embryonic Stem Cell (CTE); Neural stem cell (CTN); Germ cell (CTG); Hematopoietic stem cell (CTH); Mesenchymal stem cell (MTc); Induced Pluripotent Stem Cells or Reprogrammed Cells. Despite their differentiation ability, stem cells can also in turn have the ability to self-renew. This means that cells have the ability to proliferate and create other identical stem cells. . We can say that in medicine, stem cells provide great service, because they can be used to replace the sick cells. With this methodology, known as cell therapy, it is possible to approach different diseases. Multiple studies have pointed out the efficiency of stem cells in the reconstitution of cardiac tissue after infarction and in the treatment of neurological diseases, for example. It is necessary to remember that matured stem cell transplants have been performed since the 1950s by the bone marrow transplantation methodology. This technique, respectfully efficient, has been used to treat diseases that affect the hematopoietic system, which is responsible for the production of blood cells. The study of stem cell therapies in the restoration of injured tissues or organs in people who have chronic-degenerative diseases is still very new. The first discovery of the competence of bone marrow stem cells to distinguish themselves in more specific cells was reported in 1998. In an experimental sample of lesions in the muscle region chemically introduced in scid/bg mice, Ferrari and co-workers showed that stem cells (myogenic precursors) of the bone marrow of adult animals could migrate to the injured muscle region and distinguish themselves in skeletal muscle. Among the chronic-degenerative diseases possible to obtain treatment with stem cells, cardiovascular pathologies certainly make up the most extensively studied and observed up to the present moment in which we live. Although the effects to date are prosperous using bone marrow cells in cell therapies for heart diseases, it is not yet known for sure which types of cells are indispensable for the tissue repair process. In the same way it is not yet known how and how many soluble factors are part of the method of recruitment and induction of the distinction of these cells after their location in the tissues to which one wishes to reform. Much still needs to be perfected also on the part of the mechanism by which stem cells renew injured tissues. The two main mechanisms recognized to date are transdifferentiation and cell fusion. Therefore, further studies are needed in the area to better understand the functioning of the various types of stem cells and in which diseases they are most competent.

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