

PROPERTIES AND TYPES OF CELL CANCER

OUTLINE:

Introduction

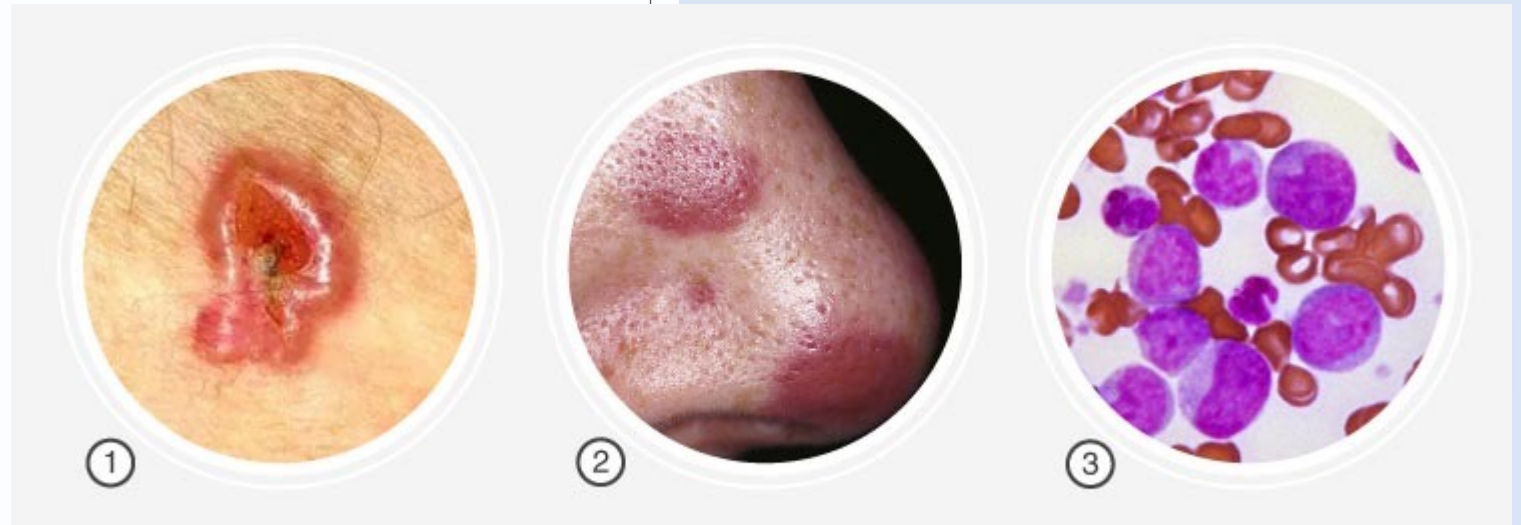
Definition of cancer

What is a tumor?

Causes of Cancer

Properties of Cancer Cells

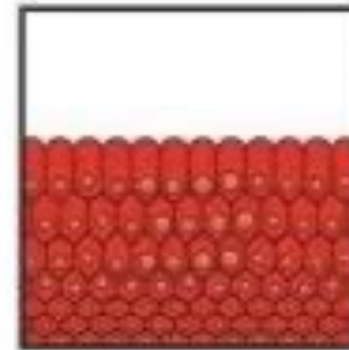
Types of cancer cell



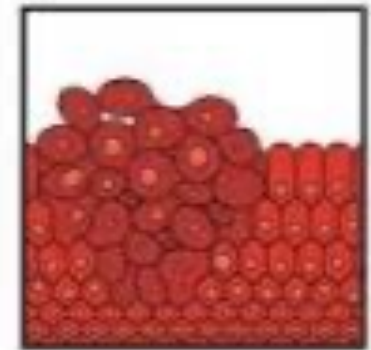
Introduction:

Cancer cells differ in many ways from normal cells, as normal cells may become cancerous when a series of mutations occur that leads to growth and division more than the normal limit, and they have abnormal membranes and poor differentiation, as they also differ from normal cells in that they are not sufficient to stay in place, but to grow and invade surrounding tissues and cells and may spread to distant and scattered areas of the body.

As normal cells have properties, there are also biomechanical properties and multiple types of cancer cells that characterize them and make them unfit for invasion from the immune system and how to enable their morphology as they can reshape their cytoskeleton and nano properties and put biochemical and biomechanical signals determined by microenvironment (Runel *et al.*, 2021).



Normal cells



Cells forming a tumour

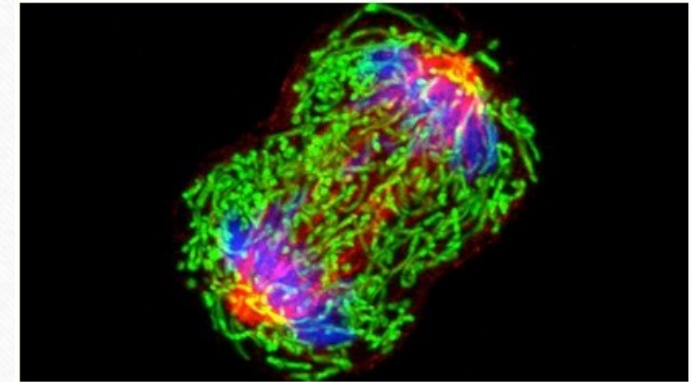
Definition of cancer :

Cancer is a disease in which some cells of the body grow uncontrollably and the possibility of invasion and spread to other parts of the body, where cells grow and divide to form new cells in place of the cells that die and decompose, but in cancer cells this process is disrupted and fails in programmed death and thus grow and divide irregularly natural(Cairns, 2011).

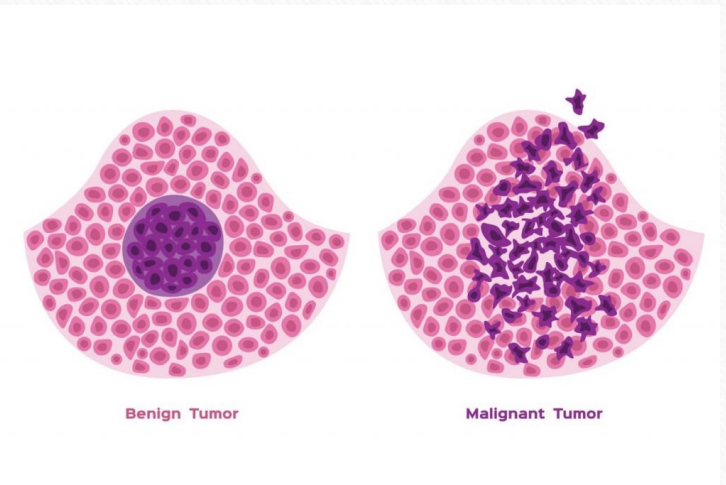
What is a tumor?

It is a bump or growth of some cancerous masses, where noncancerous masses are called benign and cancerous masses are called malignant

As tumors do not spread to different parts of the body, unlike cancer cells, which can separate from cells to other parts of the body and end up in the lymph nodes or other organs of the body, causing problems in the normal functions of cells(American Cancer Society medical, 2022).



A dividing breast cancer cell.



Benign Tumor

Malignant Tumor

Causes of Cancer:

There are many factors that are responsible for the possibilities of developing cancer inside the body, among these factors are radiation, chemicals, viruses, diet, lifestyle and many different factors

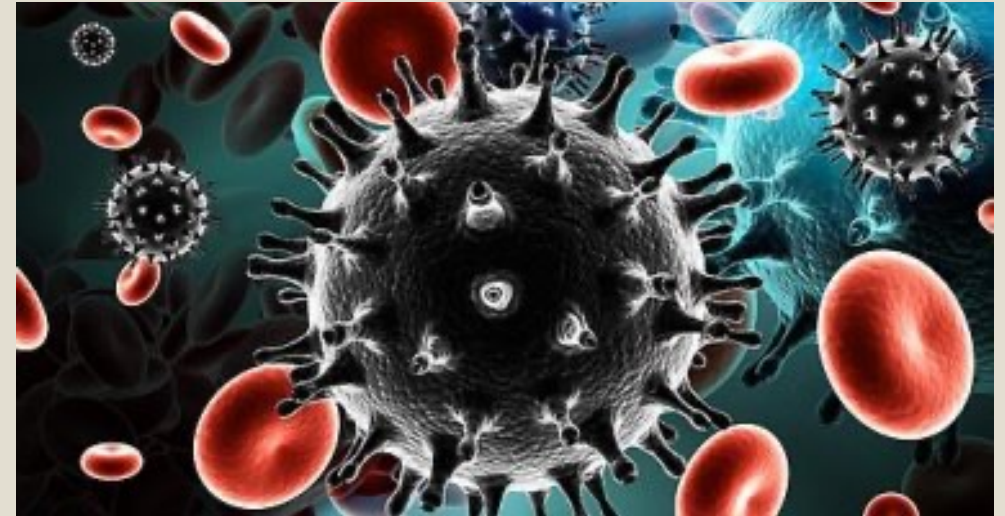
Radiation, such as solar ultraviolet rays, and chemicals such as tobacco, whose mechanism lies in causing DNA damage and generating mutations in some target genes, can be a precursor to the emergence of cancer, especially lung, laryngeal and esophageal cancers. Growing is necessary for the growth of a group of reproductive cells during the early stages of tumor development(Blackadar, 2016).



There are natural factors, including hormones produced by the pituitary gland, such as estrogen, which is a tumor-stimulating hormone, while excessive exposure to the hormone that causes endometrial cancer

And also some types of parasites such as *Schistosoma haematobium* (*S. haematobium*), whose eggs collect in the portal vein and bladder, causing bladder cancer

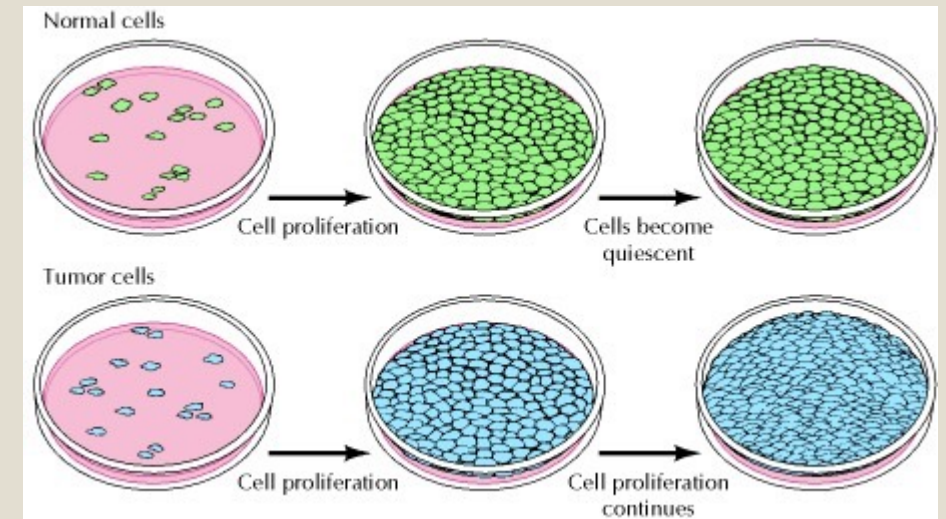
Also some types of viruses that may have a cause in a specific number of types of cancer, such as HIV(Blackadar, 2016).



Properties of Cancer Cells:

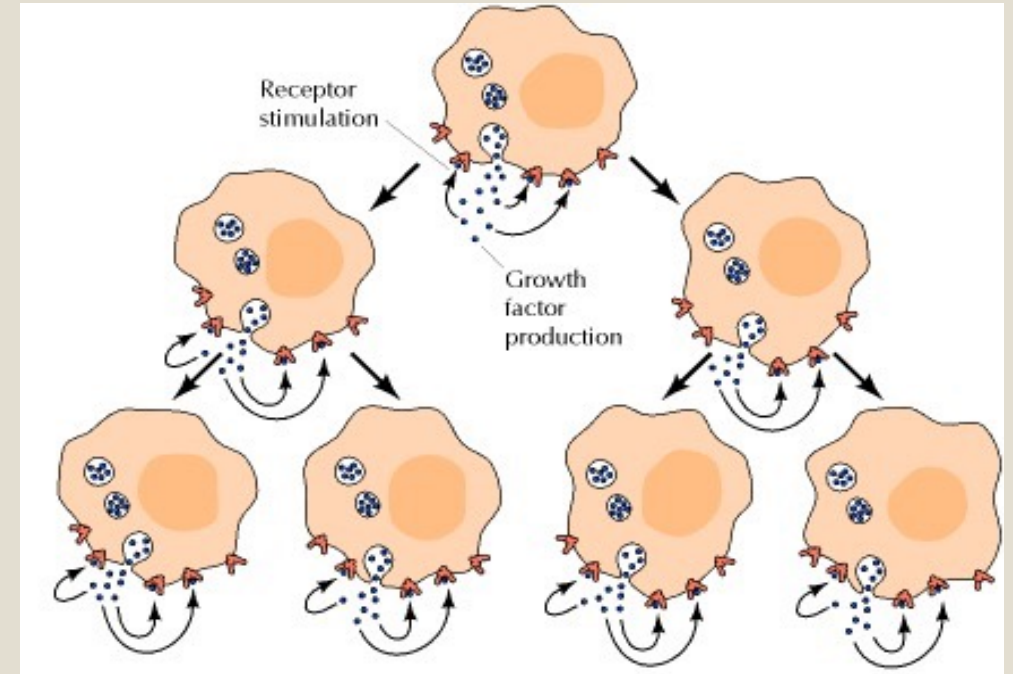
The behavior of cancer cells and their distinction from normal cells shows abnormalities in many aspects, such as abnormalities in the mechanisms that regulate the proliferation of normal cells, abnormalities in differentiation and survival. These behaviors or characteristics are:

1- Normal cells remain to a specific range of density and stop in the G₀ phase of the cell cycle while cancer cells are not sensitive to density-dependent excitatory regulation and do not respond to cellular signals that stop normal cells from proliferating and entering G₀ as they inactivate tumor suppressor genes such as Rb.



2- Cancer cells do not require growth factors, but rather they produce their own growth factors that stimulate their proliferation, which is called (**autocrine growth stimulation**), where tumor genes such as myc and ras are activated, and the cancer cell system, as it is less dependent on growth factors, results in abnormalities in cell signaling systems.

3- Cancer cells are also less adhesion compared to normal cells due to decreased expression of molecules responsible for cell adhesion such as loss of adhesion to epithelial cells, which causes tumor stimulation and as a result of loss of adhesion also cancer cells can invade and spread and affect their morphology because they are less attached to neighboring cells ([Sinauer, 2000](#)).

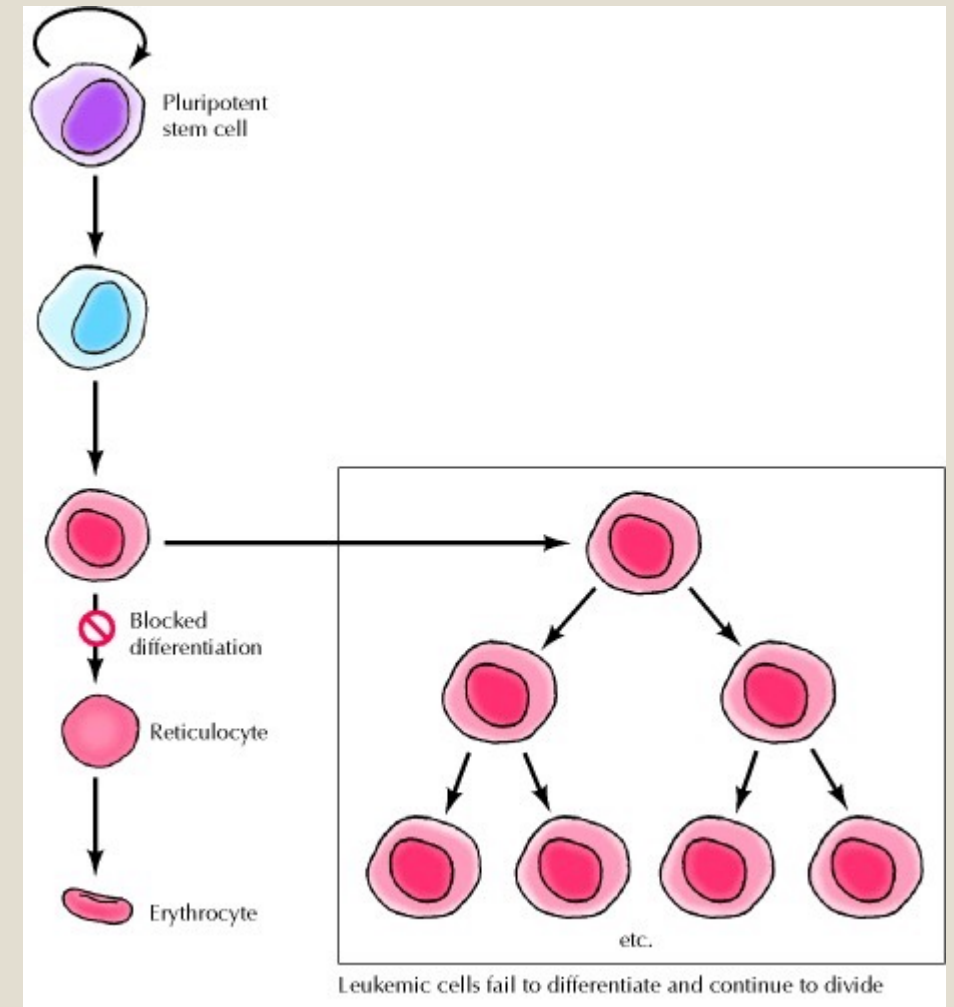


4- Cancer cells secrete substances such as metastasis that break down and digest components of the extracellular matrix, allowing them to invade neighboring normal cells and tissues.

5- Cancer cells act by the growth factors they secrete to form new blood vessels to support the growth and nourishment of cancer cells and provide them with nutrients and oxygen(Keibler *et al.*, 2016).

6- All normal cells begin their formation as a stem cell that undergoes many divisions until they differentiate and reach a specific cell type and then the division stops, while cancer cells fail in the process of differentiation as they are arrested in the early stages of division, which results in their high ability to spread like leukemia cells.

7- Many cancer cells fail to undergo programmed cell death and respond to normal environmental signals and thus have a longer survival period, therefore, we see resistance of cancer cells to radiotherapy and chemotherapy, which works on DNA damage(Sinauer, 2000).



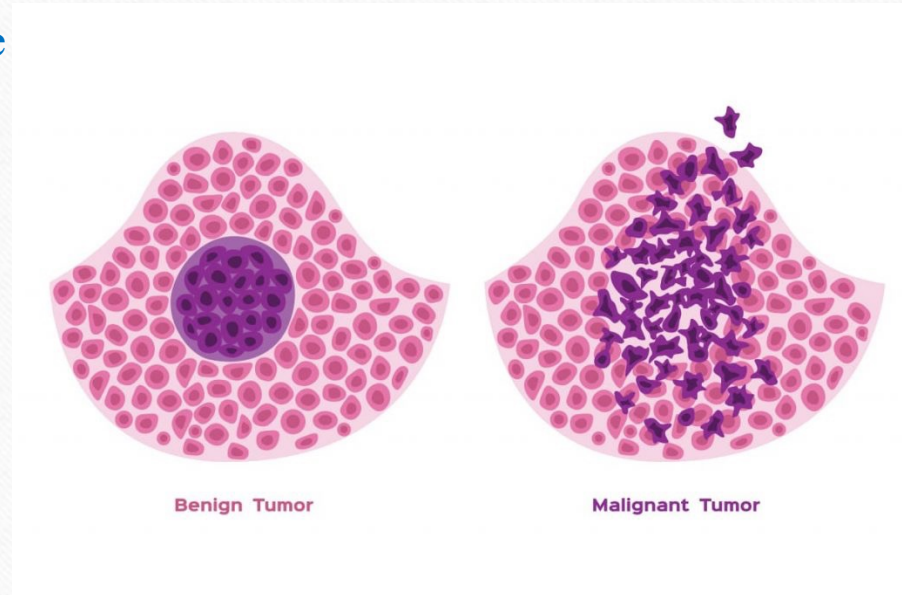
Types of cancer cell:

Any different cell of the body can result in cancer when reproducing abnormally, and each cancer cell differs in its behavior and response to treatment. Therefore, these cells were classified according to several dependencies.

Types of cancer cells according to their proliferation:

- **Benign tumors:** Any abnormal proliferation confined to its site and does not invade and spread

- **Malignant tumors:** is any abnormal proliferation capable of invading and spreading throughout the body through blood vessels or lymphatics, and it is considered under the name of cancer



Types of cancer cells according to their type: Cancer is called here according to the organs or tissues in which the cancer was formed, and it contains more than 100 types of cancer. It is classified according to the type of cell in which it was formed / **epithelial cell or squamous cell**

1. **Carcinoma :**

It is the most common type formed in the epithelial cells that cover the internal and external surfaces of the body

- **Adenocarcinoma :**

It is a cancer that forms in the epithelial cells responsible for the production of fluids such as mucus

- **Basal cell carcinoma:**

It is a cancer that forms in the squamous cell that lines many important organs such as the stomach, intestines, lungs and kidneys.

- **Transitional and cell carcinoma :**

A cancer that forms in the epithelial cells, a so-called transitional epithelial (cancer of the lining of the bladder and ureter).

- **Sarcomas:**

Cancers that form in soft tissues such as muscle, fat, blood vessels and lymph, and fibrous tissues such as (tendons and ligaments) and bones.



- **Osteosarcoma**

Bone and soft tissue cancers such as leiomyosarcoma and liposarcoma.

1. **Leukemia:**

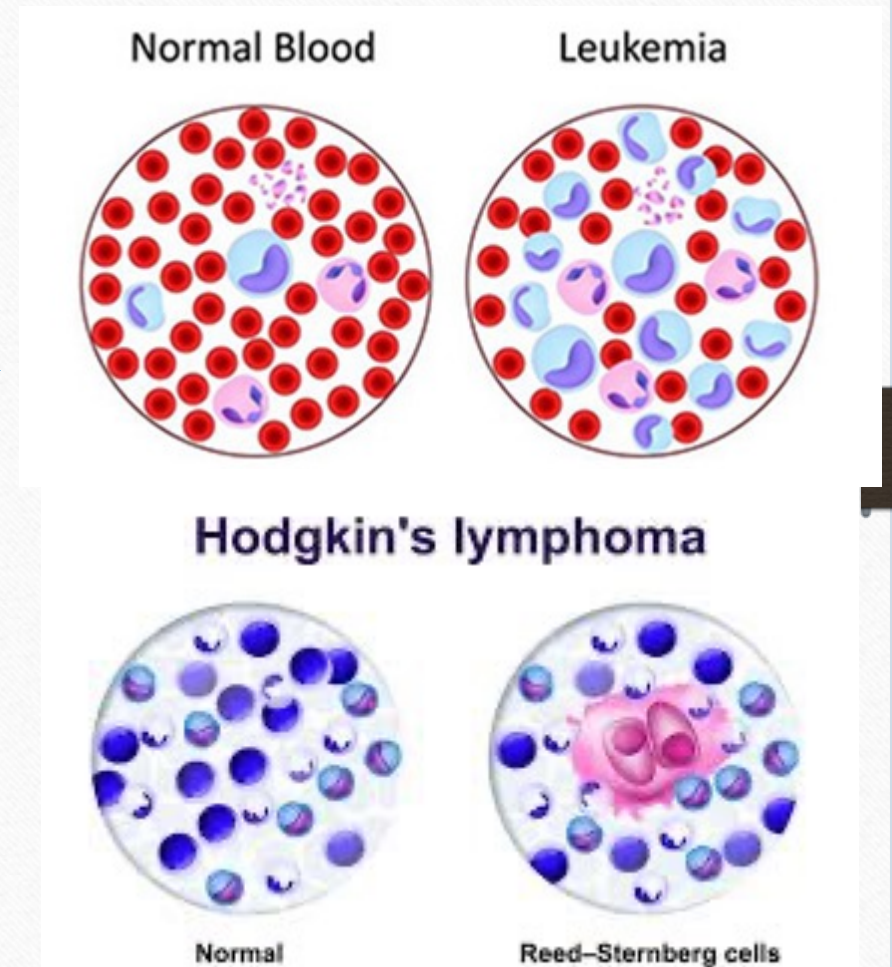
Cancer that forms in the blood and bone marrow is called (leukemia), which is the opposite of what was previously mentioned in that it is not solid and its mechanism lies in the accumulation of a huge number of white blood cells in the blood and bone marrow, which results in a decrease in the level of blood cells and difficulty in accessing oxygen.

2. **Lymphoma:**

It is a cancer that begins in the lymphocytes (**T and B cells**), which are defensive cells of the lymphatic immune system. In the case of cancer, these cells accumulate abnormally, whether in the lymph nodes or lymphatic vessels.

There are two main types of lymphoma:

Hodgkin lymphoma (**T cell**) and Non-Hodgkin lymphoma (**B cell**).



- Melanoma:

It is a cancer that arises in cells that specialize to become pigment cells, which are the cells responsible for the production of melanin (National Cancer Institute, 2021).

