

Welcome to this lesson on Cancer and Homeostasis. In this lesson today, we will be discussing what cancer is, what causes cancer, how it's treated, and various types of cancer, as well as defining how it affects homeostasis of the body. So cancer is the uncontrolled cell division, which can form a tumor and lead to metastasis.

So normally, cells divide at a rate to replace old cells and to maintain homeostasis. And this is controlled by the cell's DNA. But when DNA become mutated, it can cause these cells to divide uncontrollably. So basically what happens is a cell will start to divide uncontrollably and it will form this mass of abnormal cells called a tumor.

And then sometimes, some of the cells in this tumor can actually break off. So they might break off from the tumor, and then they will float down the bloodstream and maybe plant themselves somewhere else in the body. So basically, it's the spread of cancer throughout the body. And we call that metastasis.

And cancer can be caused by inheritance. So sometimes, certain types of cancer, you have a higher risk of getting that cancer if somebody else in your family has had that cancer. So inheritance can play a role.

Viruses can sometimes lead to cancers. Chemical carcinogens can lead to cancers. And chemical carcinogens are basically just cancer-causing agents.

So, for example, smoking is a carcinogen. It's something that could lead to cancer. Radiation and suppression of the immune system are some other factors that can contribute to cancer as well.

So an oncogene is a gene that does not respond to normal controls that regulate the division of a cell. So normally, our cells have this regulated cell division and DNA is what is regulating that division. It's controlling the cell division.

But sometimes, a certain gene doesn't respond to those normal controls. And so, basically, it will start to divide uncontrollably. But an oncogene in itself does not cause cancer.

In order for cancer to develop, it requires the mutations of at least one tumor suppressor gene. So we have these tumor suppressor genes, which basically what they do is help to prevent cancer by slowing or stopping cell growth. So let's say we have an oncogene that's not responding to normal controls and the cells are starting to divide very rapidly as we talked about up here.

Our tumor suppressor genes will normally help to stop that by slowing or stopping the cell growth or division; however, if one of these tumor suppressor genes is mutated, it's not going to be able to do its job and it's not going to be able to stop or slow cell growth or division. So then that's when we end up forming tumors and then

the cancer is allowed to grow.

Angiogenin is a growth factor secreted by cancer cells that causes more blood vessels to grow around the tumor. And what this does is it supplies a tumor with oxygen and nutrients to grow. So this is a way in which tumors can grow more quickly, because they have access to the nutrients that are delivered by the blood vessels.

And cell-mediated immune responses work to attack cancer cells. So this is a part of our immune system that works on these abnormal cancer cells. So cell-mediated immune responses respond to invaders inside cells or they respond to cancerous or abnormal cells.

So cytotoxic T cells and NK cells are a part of cell-mediated immune responses. Cytotoxic T cells will cause apoptosis of irregular cells, which is the programmed cell death. So it will basically target these cells, and then those cells will eventually be killed. And then NK cells attack and kill irregular cells. So these two cells play a large role in attacking and taking care of abnormal cancerous cells.

So let's take a look at this page here. So treatment of cancer generally involves chemotherapy, radiation, and surgery. So these are three common treatments of cancer, and there's research currently being done on angiogenin.

So if you remember, angiogenin is that growth factor that's secreted by cancer cells that supplies those blood vessels to the tumor. So basically, this research is being done on angiogenin to try and figure out a way that it would not be able to be secreted or produced by those cancerous cells. So if angiogenin wasn't secreted, then basically the blood vessels wouldn't grow around the tumor and then the tumor would not be supplied with nutrients it needed. And effectively, the tumor would end up starving. So research is currently being done on drugs that would block those effects of that angiogenin.

So let's take a look at some common types of cancers. Melanoma is one type of cancer and it's a skin cancer. So melanocytes are cells that are found in the deepest layer of the epidermis that can be affected by things like UV light or UV radiation. And then if they're exposed to that UV light or UV radiation, the DNA within them can become mutated and then cause certain types of skin cancers. So melanoma is one of the types of skin cancers.

Lymphoma is cancer of the lymphatic system. Adenocarcinoma is cancer of gland tissues. Leukemia is cancer of the bone marrow. And sarcoma is cancer of connective tissues. So a common example is bone.

So these are some various different types of cancers, some common types. There are many, many other different types of cancers that can develop in the body, but these are just a few examples of ones that you may be familiar with. So this lesson has been an overview on cancer and homeostasis.