Alteration of Biological Function

The human body is composed of a large variety of cells. A cell constitutes the most basic component of life. These cells make us who we are, give us our characteristics, and provide us with life. Without these cells, human life would cease to exist. These cells grow old just as we do and need to divide and replicate to continue performing their jobs at an optimal level. Cells undergo a process called mitosis in which they replicate and divide two create one new cell from the original cell. The original cell’s DNA and cellular components are passed onto the new generation. Mitosis will continue to occur until energy storage is depleted or the body sends a signal telling this process to halt.

Mitosis is incredibly beneficial to humans. Our bodies are repaired when injured by, in part, this process. We continue to grow and develop due to mitosis until the brain sends down a signal telling the responsible cells to stop. We are able to help others in need due to this process of being able to create more blood cells. We are heavily reliant on mitosis being able to occur to be able to live our everyday lives the way we do.

This process can turn detrimental under certain conditions. Not all cells replicate and divide with the original cell’s DNA and cellular components. Our cells may constantly be replicating and dividing, but they are also undergoing many different stimuli due to our surroundings. Our body was made by adaptations to the environment, but sometimes we cannot always keep up with the world around us. That is when cell replication and division can provide more harm than benefit. The cell is doing its job in undergoing mitosis, but it is doing this with an alteration one of its cellular components. Multiple alterations occur on the original cell components during its time of working in our body and defense mechanisms do not always catch these changes. These changes can cause cancer. The cellular process that helps us can quickly switch to become life threatening.

Mutations

An alteration to a cell or its components is considered a mutation. It is important to note that not all mutations that occur to a cell are considered to cause cancer (Nature, 2015). Many mutations to a cell are considered silent as they have no effect on the cell. Often times, the body catches these mutations. This is important as we have cancer causing cells caught and destroyed multiple times a day due to defense mechanisms. Usually, our body can detect native cells from non-native cells, with the non-native cells being the cells that are mutated (CTCA, 2017). Our immune system works great at this, until the precancerous cells adapt to survive. This cell does not know that it is causing harm to the human, but acts as a regular cell and wants to do its job of replicating and dividing just like the cells surrounding it.

Once these cells are able to bypass our immune defense system, they may undergo adaptations that deregulates protein expression. This leads to an increase in cell mitosis as it has all the nutrients it needs to complete this cycle multiple times. This entire situation creates a mass of cells that are mutated in various forms to create a tumor (Cancer, 2015). Heavily mutated cells, or cancer cells are also able to utilize the immune systems response beneficially by tricking our immune cells to help the tumors to grow and proliferate (CTCA, 2015). Now that we understand the mechanisms behind cancer initiation and growth, we need to address what causes cancer.

Causes

The saying “everything causes cancer” is commonly thrown around in an attempt to make it acceptable to continue using products or etc. that normally cause cancer. Sometimes though it has nothing to do with our environment and everything to do with ourselves and past generations. Some genetic alterations that cause cancer can also be passed down not only from mitosis, but meiosis. Our parents or grand-parents DNA or genetic alterations can get passed down from germ cells, sperm and egg to inflict future generations (Cancer, 2015). In this aspect, there was no way for a person to prevent what was passed down to them from previous generations. Tests and genetic markers are available to help people determine whether or not they are likely to be inflicted with cancer.

We can also obtain cancer from environmental factors. Repeated exposure to certain stimuli or environments can cause repetitive damage to cells causing cell damage and proliferation. Certain factors include exposure to chemicals in tobacco smoke and ultraviolet rays to the sun (Cancer, 2015). One could be exposed to these factors through a variety of occasions. Tobacco smoke can, of course, cause cancer in people who smoke themselves. Unfortunately, it can also affect the people they are around. Second-hand smoke occurs when someone who does not directly smoke, but still inhales the smoke during multiple exposures. This can also cause cancer in the person who did not smoke. Ultraviolet rays do not indirectly cause anyone cancer. Ultraviolet rays can come from the sun. Having the skin exposed to these rays over a number of times without protection like clothing or sunblock can cause cell damage. This idea is almost ironic as exposure to ultraviolet rays also helps in vitamin D absorption, meaning it only causes cancer depending on amount of exposure.

Treatments

The best form of treatment is prevention. It is very hard to get rid of cancerous cells when you take into perspective that our immune defense mechanisms are not able to tell them apart from our healthy cells. Using a treatment to target cells may become life threatening if not monitored as we need the healthy cells to survive. Cancer cells are also continuously adapting to overcome hurdles that are intended to stop its growth.

Some of those affected by cancer may be able to detect it before it spreads to other parts of the body. If caught when the cancer is localized to one region, the person may be able to undergo surgery to have the tumor removed from their body (NCI, n.d.). This is a simple and relatively inexpensive way to combat cancer when compared to other alternatives.

Surgery alone may not be enough to entirely get rid of the cancer cells or mass. Surgery may be combined with other cancer treatments to get rid of the cancer. Such combinations include radiation therapy, chemotherapy, immunotherapy, and many other options. Other treatments may not require the combination with surgery and may be able to get rid of the cancer on its own.

Radiation therapy is one form of treatment that uses strong amounts of radiation to kill cancer cells and shrink tumors. (cancer.gov, n.d.) Radiation is defined as energy released in the form of a particle or electromagnetic waves (NIH, n.d.) Radiation typically damages cells, but when dealing with cancer cells that is exactly what we want to happen to them. If enough damage is done on the cells then they will die due to effects on their DNA caused by the radiation. Unfortunately, radiation therapy cannot differentiate between cancer cells and healthy noncancerous cells and in the process of treatment may also damage healthy cells. This form of treatment may not be right for every patient, and many factors will be included to decide the appropriate method to treat one’s cancer.

Another treatment method commonly used today is chemotherapy. Chemotherapy uses medications to kill cancer cells. This form of treatment is often combined with other treatments like radiation in order to effectively get rid of the cancer. When chemotherapy cannot stop the cancer cells completely it can often slow the growth of the cancer cells which grow and divide rapidly. This is beneficial when the tumor or cancer growth may be causing the patient severe pain or other complications. Chemotherapy specializes in targeting cells that grow and divide very quick. This is great for getting rid of cancer, but cancer cells are not the only cells in the human body that grow and divide quickly. Cells like those responsible for hair growth and cells that make up the lining of the stomach also tend to grow and divide rapidly. This leaves these cells at risk for being killed or having their growth halted by chemotherapy treatment. Effects on these normal healthy cells are not long term, and will go away once chemotherapy treatment has ended.

Radiation, chemotherapy, and surgery are common treatment methods in fighting cancer, but there are many more choices available. Researchers are always looking for better treatment methods as current standard treatments often have serious side effects that can affect the quality of life the patient has when fighting cancer.

Due to the circumstances, cancer will continue to affect humans until better treatment methods are found. Cancer cells continue to evolve to survive in these conditions that normally would hinder their growth or kill them altogether, and the cure has yet to be found. Humans are finding a way around this obstacle and prevention is becoming a very important aspect in fighting cancer. More people are becoming educated on what all causes cancer, what cancer really is, and who all it can affect. Education is the key to helping people understand what this devastating disease is and what we can control about it.

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