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THE MAIN REASONS WHY CANCER IS SO DIFFICULT TO TREATMENT

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Author AAD designed the study, performed and wrote the first draft of the manuscript. Author WIY managed the literature searches. Both authors read and approved the final manuscript.

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Letter to the Editor

ABSTRACT

Cancer is one of the major causes of death worldwide globally. Around one in six deaths are caused by cancer in 2018 alone. Cancer killed 9.6 million people worldwide. Although cancer has been detected since the 18th century, we still don't have a universal treatment for this deadly disease. Despite significant advances, the current approach to combating cancer treatment remains on-going. The goal of this report is to find out why cancer is so difficult to treat.

Why is cancer so difficult to treat?

Treating cancer isn't easy because it ultimately involves fighting our own body. Under the influence of the environment genetics and unhealthy lifestyle, some cells break out of control. These cells start growing and multiply quickly while carrying a genetic mutation that allows them to divide uncontrollably. Eventually, they become tumors and start invading different tissues and organs. Cancer cells turn into hidden enemies within us. Newly formed cancer cells create an entire microenvironment around themselves. They trick healthy cells into forming blood vessels in this new environment. These vessels are then used to feed cancer cells and help them grow. This process of blood vessel formation is called angiogenesis. The new blood vessels support cancer cells by providing them with oxygen and nutrients [1,2].

Another dangerous property of cancer cells is their ability to escape from the immune system. They do so by targeting T-cells that are tasked with killing infected and cancerous cells. Cancer cells target T-cells and deactivate them, this allows them to become hidden from the immune response. On the other hand, cancer cells can mimic healthy cells and stay unrecognized by the immune system. This means that researchers need to find new ways to target cancer cells without affecting healthy ones since both become strikingly similar [3].

Another challenge comes from cancer cells developing drug resistance over time. Cancer cells can adapt to drugs and learn to block their activity or eject them out of the cell. Most drugs need to undergo some changes within the cell to be activated. These drugs utilize chemical pathways that happen inside the cell. However, cancer cells can shut down these pathways. Even worse, they can evolve to change their molecular properties which these drugs target. As a result cancer treatments need to constantly evolve finding new targets and evading the tumor's protective mechanisms [4].

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Another reason why dealing with cancer is hard, that tumors come in so many different types. Sometimes cancer cells within the same tumors are also different from each other. There are 4 stages of cancer progression. Stage four is the most aggressive where tumors become incredibly hard to treat. During this stage of cancer, cells migrate from the original site to other parts of the body. This process is called metastasis because cancer cells are good at hiding from the immune system. They charge their cellular structure and escape through the lymphatic system. Eventually, they colonize new tissues within the body. Once cancer cells have traveled it becomes hard to predict where they will end up. This makes early diagnosis of cancer a difficult task [5,6].

When cancer cells spread to new parts of the body, they form new tumors that have different properties from the site where they originated. The original and the second tumors can be very different from each other even on a genetic level. These massive variations between different types of tumors make it difficult to create a universal cancer drug instead. Each type of cancer requires different treatment approaches. That is why diagnosing cancer early and preventing its movement can substantially improve the treatment. These factors make cancer a complicated malady to treat [7,8].

Additionally, all available drugs are unlikely to kill every cancerous cell in a specific region. Evolving targeted therapeutics is helpful but is improbable to be universally applicable because of several key biological differences of cancerous cell growth [5].

Scientists are also training our immune cells to seek out and destroy tumors with more efficiency. Not to mention newly developed diagnostic tests that allow detecting multiple types of cancers up to 4 years in advance. All these innovations will eventually help us improve our chances of survival from cancer. Despite its convoluted nature, cancer will eventually be defeated. It's just a matter of time, knowledge, and technological innovation [9,10].

Last June, the immunotherapy drug pembrolizumab (Keytruda) has been approved by Food and Drug Administration (FDA) to treat solid tumors such as lung, kidney, stomach, liver, bladder, skin cancers, and some types of lymphoma [11].

CONCLUSIONS

Despite significant advances, the current approach to combating cancer treatment remains on-going. Nevertheless, cancer research is constantly developing, it is finding new ways to distinguish between healthy and cancerous cells and target them selectively while also avoiding devastating side effects.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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