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A Short Note on Molecular oncology

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Editorial

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DESCRIPTION

Molecular oncology is an interdisciplinary medical specialty at the intersection of medicinal chemistry and oncology that focuses on the molecular chemistry of cancer and tumours. Development and application of molecularly targeted therapies is also a priority [1]. Molecular oncology has identified genes that play a role in cancer development. To study biological and clinical phenotypes, the researchers used a variety of techniques including genomics, computational biology, tumour imaging, and in vitro and in vivo functional models [2]. These genes' proteins could be used as targets for new chemotherapy drugs and other cancer treatments, as well as imaging scans. Scientists use a variety of techniques to confirm the role of the novel candidate genes in cancer development [3]. The ultimate goal is to translate these findings into better cancer treatment options for patients.

Many different genes are being studied for potential cancer therapies. The p53 gene and the PTEN gene are two of the most studied [4]. These genes play important roles in regulating the cell cycle and other pathways involved in cellular and genomic integrity. These genes prevent genetically damaged cells from passing on their damage to daughter cells by stopping the cell cycle. The cell cycle may be stopped, and if the damage is severe enough, the p53 and PTEN gene pathways may signal cell death [5,6]. Both the p53 and PTEN genes are tumor suppressors because their pathways regulate the repair of cells that may replicate uncontrollably with damaged genetic material, eventually leading to cancer growth if not controlled. More than half of all human cancers have mutations in these genes. Immune gene therapy is a targeted approach to cancer therapy in which the patient's immune cells and genes are manipulated to produce an anti-tumor response. Immunotherapies come in a variety of forms, such as bone marrow transplants, antibody therapies, and various manipulations of host immune cells to target and kill cancer cells. Cellular receptors, antigens, and cofactor molecules are examples of such cancer-targeting cellular manipulations [7]. Chimeric antigen receptor (CAR) T cell immunotherapy (CAR-T), which may be combined with cytokines and checkpoint inhibitors, is a common type of immune gene therapy. CAR-T therapy involves

reprogramming a patient's natural T cells to express a chimeric antigen receptor. This receptor, which is now present on millions of T cells in the patient, recognizes cancerous cells that express specific antigens. Normally, the T cell antigen receptor is inactive, but when it recognizes a specific cancerous antigen, the physical structure of the T cell changes, allowing the cancer cell to be destroyed. This is a cancer treatment method that works at the cellular and molecular levels. Gene therapy has emerged as a targeted method of treating cancer in recent decades [8]. Gene therapy involves the introduction of foreign genetic sequences into diseased cells in order to alter the expression of cancerous cells with severely damaged genomes. Because cancer cells do not behave like normal cells, the methods for removing them from the body are more complicated. Manipulation of the pathways controlled by specific genes and their regulators is a major area of cancer research [9]. This gene therapy approach has room for improvement. To begin, the antigens of interest expressed on cancer cells may occasionally be expressed on normal body cells as well. This means that when the antigen lacks specificity with only the cancer cell, the body's T cells will attack its own healthy cells rather than the cancer cells. One possible solution to this problem is to include two different antigen receptors on CAR-T cells to increase their specificity. The second issue with CAR-T immunotherapy is that it can result in cytokine release syndrome [10]. This occurs when the immune system produces an excess of pro-inflammatory factors, which can cause unpleasant side effects for the patient such as nausea and a high fever.

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