ISSN: 2157-2518
Journal of Carcinogenesis & Mutagenesis

OPEN ACCESS Freely available online

Commentary

Cancer Drug Resistance Mechanisms and their Effects

Besselink Wagner*

Department of Oncology, University of Lausanne, Lausanne, Switzerland

DESCRIPTION

Drug resistance is a major obstacle in the treatment of cancer. Cancer is a complex disease that is caused by the uncontrolled growth and division of abnormal cells in the body. While chemotherapy is one of the most common treatments for cancer, cancer cells have developed mechanisms to resist and evade the effects of these drugs. This article explains the various drug resistance mechanisms and how they contribute to cancer initiation and progression.

The role of cancer genomics

Cancer genomics is the study of the genetic changes that occur in cancer cells. These genetic changes can lead to drug resistance by altering the function of proteins that are involved in drug transport, metabolism and DNA repair. For example, mutations in the genes responsible for drug transport can reduce the uptake of chemotherapy drugs into cancer cells, making them less effective in killing the cancer cells.

Increased drug efflux

One of the most common drug resistance mechanisms is the increased efflux of drugs from cancer cells. This is usually achieved by overexpression of drug efflux pumps, such as the P-glycoprotein (P-gp) pump. These pumps act like a barrier, preventing chemotherapy drugs from entering the cancer cells and reducing their effectiveness.

Altered drug targets

Cancer cells can also develop resistance by altering the targets of chemotherapy drugs. This can occur through mutations in the genes that code for the drug targets, resulting in changes to their structure or function. As a result, the chemotherapy drugs are no longer able to bind to the targets and inhibit their activity, making them ineffective in killing the cancer cells.

Increased DNA repair

Chemotherapy drugs work by damaging the DNA of cancer cells, which leads to their death. However, cancer cells can develop increased DNA repair mechanisms, making them more resistant to the effects of these drugs. This allows them to repair the DNA damage caused by chemotherapy and continue to grow and divide.

Activation of survival pathways

Cancer cells can also activate survival pathways, such as the PI3K/AKT/mTOR pathway, in response to chemotherapy drugs. These pathways help cancer cells to survive and evade the effects of the drugs, leading to drug resistance. Inhibitors of these pathways are currently being studied as potential treatments for drug-resistant cancers.

The role of cancer initiation and progression

Drug resistance mechanisms can also contribute to cancer initiation and progression. As cancer cells develop resistance to chemotherapy drugs, they are able to survive and continue to grow and divide. This can lead to the development of more aggressive and treatment-resistant tumors, making it more difficult to effectively treat the cancer.

Furthermore, drug resistance can also contribute to metastasis, the process by which cancer cells spread to other parts of the body. As cancer cells develop resistance to chemotherapy drugs, they are able to survive and travel to other areas of the body, where they can form new tumors.

CONCLUSION

Drug resistance is a major challenge in the treatment of cancer. Cancer cells have developed various mechanisms to resist the effects of chemotherapy drugs, making them less effective in killing the cancer cells. These mechanisms can also contribute to

Correspondence to: Besselink Wagner, Department of Oncology, University of Lausanne, Lausanne, Switzerland, E-mail: Besselink@wagner.ch

Received: 30-Jul-2024, Manuscript No. JCM-24-26897; **Editor assigned:** 01-Aug-2024, PreQC No. JCM-24-26897 (PQ); **Reviewed:** 15-Aug-2024, QC No. JCM-24-26897; **Revised:** 22-Aug-2024, Manuscript No. JCM-24-26897 (R); **Published:** 30-Aug-2024, DOI: 10.35248/2157-2518.24.S45.002

Citation: Wagner B (2024). Cancer Drug Resistance Mechanisms and their Effects. J Carcinog Mutagen. S45:002.

cancer initiation and progression, making it important for researchers to continue studying and developing new treatments to overcome drug resistance. By understanding the various drug resistance mechanisms, we can work towards finding new and more effective ways to combat cancer and improve patient outcomes.