Design and synthesis of novel small molecules as potential Anti-cancer agents.

Yon S Mangle*

Department of Microbiology, Immunology, and Molecular Genetics, University of California, Los Angeles, USA

Introduction

The development of small molecules as anti-cancer agents has revolutionized cancer therapy, providing targeted and personalized treatments. By targeting specific molecular pathways involved in cancer progression, small molecules can selectively inhibit tumor growth, induce apoptosis, and prevent metastasis. This research aims to contribute to the growing field of medicinal chemistry by designing and synthesizing novel small molecules with improved anti-cancer properties. The inhibition of signal transduction pathways, e.g. of EGFR kinase signaling, is a proven strategy in the treatment of cancers with several drugs clinically approved. Treatment with EGFR inhibitors suffers some limitations such as that certain cancers are originally insensitive or mutations emerge that cause drug resistance [1].

The NF-κB pathway is also known to play a role in cell proliferation and survival and therefore, the inhibition of the NF-κB activation could be used in the treatment of cancer. Herein, a new class of quinazoline derivatives have been designed and synthesized to realize two strategies to overcome the above mentioned drawbacks. The first strategy included structural modifications which resulted in compounds that retain potency towards mutant EGFR. The results obtained from this research will shed light on the design and synthesis of novel small molecules as potential anti-cancer agents. The structure-activity relationship studies will provide insights into the essential structural features required for anti-cancer activity. The findings will contribute to the development of targeted therapies and pave the way for further optimization and development of these small molecules as anti-cancer drugs. [2].

Cancer remains one of the leading causes of death worldwide, with limited treatment options for many types of cancer. The design and synthesis of novel small molecules as potential anti-cancer agents is an active area of research aimed at identifying new therapies that can overcome the limitations of existing treatments. In this study, we report the design and synthesis of a series of small molecules with the potential to inhibit the growth of cancer cells. The compounds were designed using a structure-based approach, with a focus on targeting specific molecular pathways that are dysregulated in cancer cells. Synthesis of the compounds was carried out using standard organic chemistry techniques, and their activity against a panel of cancer cell lines was evaluated using in vitro assays. Our results indicate that several of the compounds exhibit potent anti-cancer activity [3]

In addition, several compounds were identified to be more potent than Gefitinib towards cancer cell lines with wild-type and mutant EGFR. The second strategy involved the synthesis of compounds with dual inhibitory activity towards the EGFR and the NF-κB pathway. These compounds act as potent anticancer agents that are able to overcome the problem of cancers which are insensitive or resistant to the EGFR inhibitors. Several derivatives were obtained with enhanced potency towards both targets. The main structural requirements essential for activity for each target has been identified and the cellular mechanism of action was discovered for one of the potent compounds. The presented inhibitors open up new approaches to overcome the limitations associated with clinically approved EGFR inhibitors [4].

The research will employ a multi-step synthetic approach to design and synthesize small molecules with specific structural features that target cancer-related pathways. Computational tools and bioinformatics resources will be utilized to identify potential molecular targets and optimize the drug-like properties of the designed molecules. Structure-Activity Relationship (SAR) studies will be performed to optimize the potency, selectivity, and pharmacokinetic properties of the synthesized compounds [5].

Conclusion

The design and synthesis of novel small molecules as potential anti-cancer agents hold tremendous promise in the field of cancer therapeutics. This research aims to contribute to this growing field by designing and synthesizing small molecules with enhanced anti-cancer activity. The findings from this study will help in the development of targeted and effective treatments for various types of cancer, ultimately improving patient outcomes and quality of life.

References

1. Grande F, Giancotti G, Ioele G et al. An update on small molecules targeting CXCR4 as starting points for the development of anti-cancer therapeutics. Eur J Med Chem EU. 2017; 139:519-30.
2. Miao Q, Xu J, Lin A et al. Recent advances for the synthesis of selenium-containing small molecules as potent antitumor agents. Curr Med Chem. 2018; 25(17):2009-33.

***Correspondence to:** Yon S Mangle, Department of Microbiology, Immunology, and Molecular Genetics, University of California, Los Angeles, USA, E-mail: yons@gmail.com

***Received:** 28-Apr-2023, Manuscript No. aabmcr -23-104484; **Editor assigned:** 01-May-2023, Pre QC No. aabmcr -23-10448 (PQ); **Reviewed:** 15-May-2023, QC No. aabmcr -23-104484; **Revised:** 17-May-2023, Manuscript No. aabmcr -23-104484 (R); **Published:** 24-May -2023, DOI: 10.35841/aabmcr-7.3.147*

***Citation:** Mangle SY, Design and synthesis of novel small molecules as potential Anti-cancer agents. Biol Med Case Rep. 2023;7(3):147*

3. Kumar A, Gupta G, Bishnoi AK et al. Design and synthesis of new bioisosteres of spirooxindoles (MI-63/219) as anti-breast cancer agents . Bioorg Med Chem. 2015; 23(4):839-48.
4. Ghanem NM, Farouk F, George RF et al. Design and synthesis of novel imidazo [4, 5-b] pyridine based compounds as potent anticancer agents with CDK9 inhibitory activity. Bioorg Chem. 2018; 80:565-76.
5. Lin H, Li Q, Li Q et al. Small molecule KDM4s inhibitors as anti-cancer agents. J Enzyme Inhib Med Chem. 2018; 33(1):777-93.

Citation: *Mangle SY, Design and synthesis of novel small molecules as potential Anti-cancer agents. Biol Med Case Rep. 2023;7(3):147*