ISSN: 2155-9597
Journal of Bacteriology & Parasitology

OPEN ACCESS Freely available online

Short Communication

Discovery and Development of Streptomycin: Its Challenges and Limitations

Ramesh Chatterjee*

Department of Dermatology, Employees' State Insurance Corporation Medical College and Hospital, Haryana, India

DESCRIPTION

Streptomycin is a remarkable antibiotic that revolutionized the treatment of Tuberculosis (TB) and marked the beginning of the antibiotic era. The discovery of Streptomycin was a result of Waksman's systematic study of soil microbes. Streptomycin is produced by the bacterium *Streptomyces griseus*, found in soil. Waksman and his team were investigating these microbes in the hope of finding compounds that could combat bacterial infections. After extensive testing, Streptomycin showed potent antibacterial properties against *Mycobacterium tuberculosis*, the bacterium responsible for TB [1].

Streptomycin belongs to the class of antibiotics known as aminoglycosides. It works by inhibiting protein synthesis in bacteria. Specifically, it binds to the bacterial ribosomes, disrupting the process of protein production, which is important for the survival and growth of the bacteria [2,3]. This mechanism makes it effective against a wide range of bacteria, including those causing tuberculosis, plague, and other serious infections.

The introduction of Streptomycin was a game-changer in the field of medicine. Prior to its discovery, TB was a dreaded disease with no reliable cure. Patients had limited treatment options, often involving prolonged bed rest, and the outcomes were usually bleak. Streptomycin brought hope to millions of people suffering from TB and other bacterial infections [4-6].

Its effectiveness against TB led to a significant decrease in mortality rates and marked the beginning of effective treatment for this disease. Streptomycin, in combination with other antibiotics, became a cornerstone in the treatment of tuberculosis and helped in the development of combination therapy approaches for combating bacterial infections [7].

Despite its effectiveness, Streptomycin has limitations and challenges. Over time, bacteria can develop resistance to this antibiotic, making it less effective in treating certain infections. The emergence of antibiotic resistance is a significant concern in healthcare, leading to the need for the development of new antibiotics and the implementation of strategies to prevent the spread of resistant bacteria.

Additionally, Streptomycin is known to have side effects, including potential damage to the kidneys and ears [8]. This has led to the careful consideration of its use and the need for monitoring patients undergoing Streptomycin treatment.

Streptomycin's discovery and subsequent success paved the way for further exploration and understanding of antibiotics. It encouraged scientists to delve deeper into the microbial world, searching for more compounds with antibacterial properties [9]. This led to the discovery of numerous other antibiotics, expanding the arsenal of medicines available to combat bacterial infections.

The discovery of Streptomycin also highlighted the importance of interdisciplinary research, combining microbiology, biochemistry, and medicine. It underscored the potential of natural products, such as those derived from soil microbes, in the development of life-saving drugs [10].

While newer antibiotics have been developed since the discovery of Streptomycin, it remains an important antibiotic in the treatment of certain bacterial infections. Its historical significance and impact on medicine continue to be recognized, and it serves as a reminder of the pivotal role antibiotics play in healthcare.

Streptomycin stands as a monumental achievement in the history of medicine. Its discovery revolutionized the treatment of tuberculosis and laid the groundwork for the development of subsequent antibiotics. Despite its limitations, Streptomycin remains a symbol of scientific innovation and a testament to the power of discovery in improving human health.

REFERENCES

1. Abad JP, Amils R. Location of the streptomycin ribosomal binding site explains its pleiotropic effects on protein biosynthesis. J Mol Biol. 1994;235(4):1251-1260.

Correspondence to: Ramesh Chatterjee, Department of Dermatology, Employees' State Insurance Corporation Medical College and Hospital, Haryana, India, E-mail: weramesh@gmail.com

Received: 29-Sep-2023, Manuscript No. JBP-23-24303; **Editor assigned:** 02-Oct-2023, PreQC No. JBP-23-24303 (PQ); **Reviewed:** 16-Oct-2023, QC No. JBP-23-24303; **Revised:** 23-Oct-2023, Manuscript No. JBP-23-24303 (R); **Published:** 30-Oct-2023, DOI: 10.35248/2155-9597.23.S24.075.

Citation: Chatterjee R (2023) Discovery and Development of Streptomycin: Its Challenges and Limitations. J Bacteriol Parasitol. S24:075.

Copyright: © 2023 Chatterjee R. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

2. Carter AP, Clemons WM, Brodersen DE, Morgan-Warren RJ, Wimberly BT, Ramakrishnan V. Functional insights from the structure of the 30S ribosomal subunit and its interactions with antibiotics. Nature. 2000;407(6802):340-348.
3. Demirci H, Murphy IV F, Murphy E, Gregory ST, Dahlberg AE, Jogl G. A structural basis for streptomycin-induced misreading of the genetic code. Nat Commun. 2013;4(1):1355.
4. Finken M, Kirschner P, Meier A, Wrede A, Böttger EC. Molecular basis of streptomycin resistance in mycobacterium tuberculosis: Alterations of the ribosomal protein S12 gene and point mutations within a functional 16S ribosomal RNA pseudoknot. Mol Microbiol. 1993;9(6):1239-1246.
5. Stark H, Rodnina MV, Wieden HJ, Zemlin F, Wintermeyer W, Van Heel M. Ribosome interactions of aminoacyl-tRNA and elongation factor Tu in the codon-recognition complex. Nat Struct Biol. 2002;9(11):849-854.
6. Yusupov MM, Yusupova GZ, Baucom A, Lieberman K, Earnest TN, Cate JH. Crystal structure of the ribosome at 5.5 A resolution. Science. 2001;292(5518):883-896.
7. Demirci H, Wang L, Murphy FV, Murphy EL, Carr JF, Blanchard SC. The central role of protein S12 in organizing the structure of the decoding site of the ribosome. RNA. 2013;19(12):1791-1801.
8. Timms AR, Steingrimsdottir H, Lehmann AR, Bridges BA. Mutant sequences in the rpsL gene of *Escherichia coli* B/r: mechanistic implications for spontaneous and ultraviolet light mutagenesis. Mol Gen Genet. 1992;232:89-96.
9. Hosaka T, Tamehiro N, Chumpolkulwong N, Hori-Takemoto C, Shirouzu M, Yokoyama S. The novel mutation K87E in ribosomal protein S12 enhances protein synthesis activity during the late growth phase in *Escherichia coli*. Mol Genet Genomics. 2004;271:317-324.
10. Sreevatsan S, Pan X, Stockbauer KE, Williams DL, Kreiswirth BN, Musser JM. Characterization of rpsL and rrs mutations in streptomycin-resistant mycobacterium tuberculosis isolates from diverse geographic localities. Antimicrob Agents Chemother. 1996;40(4):1024-1026.