Leveraging Drug Repurposing: A Strategic Approach to Combat Bacterial Infections.

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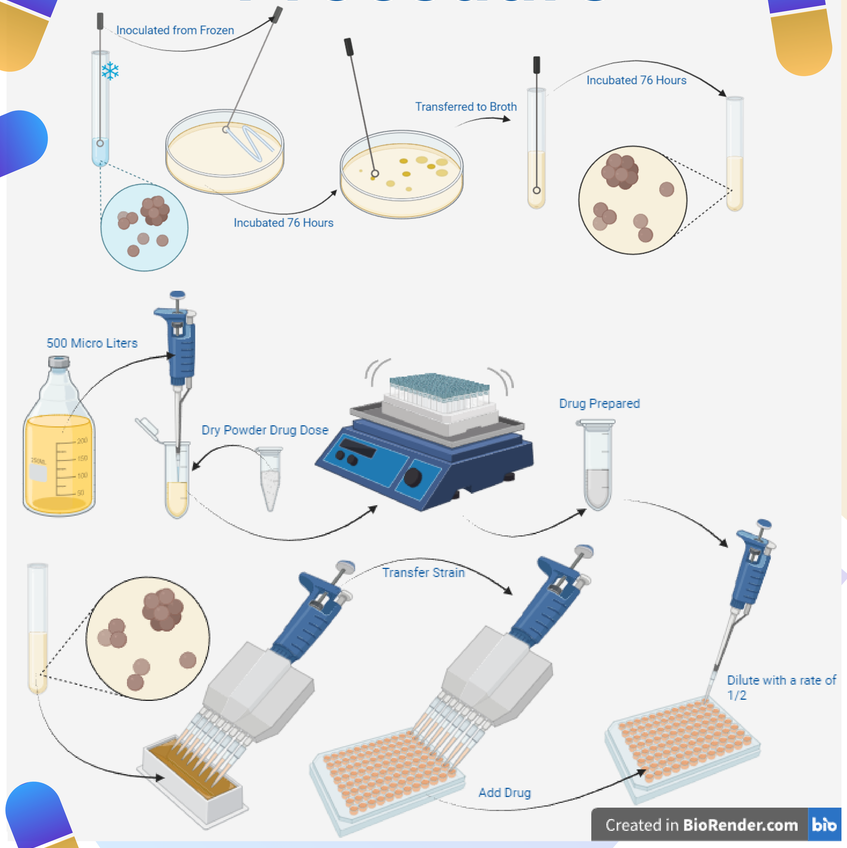
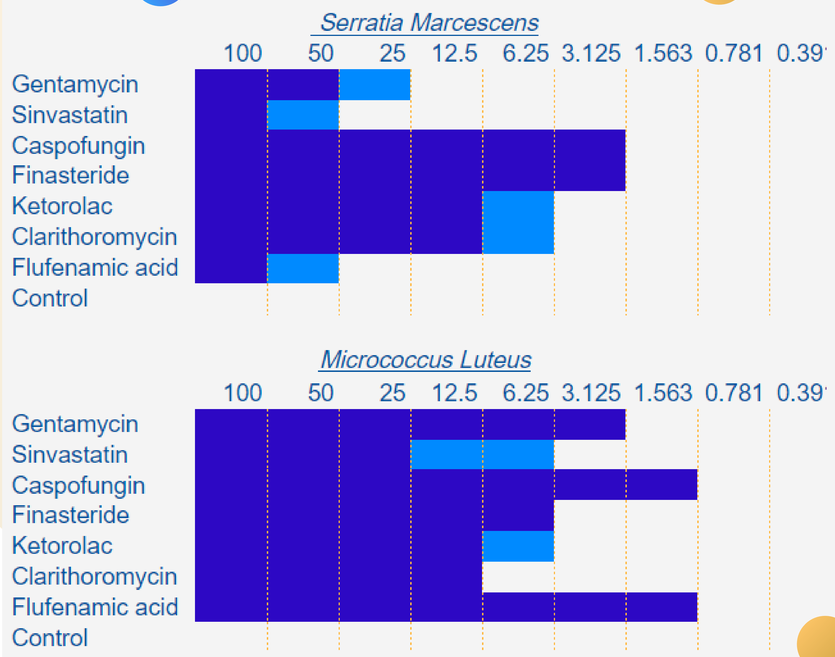
Abstract

The emergence of antibiotic resistant bacterial strains poses a critical threat to global public health, necessitating innovative strategies to address this challenge. Drug repurposing, the process of identifying new therapeutic uses for existing drugs, has emerged as a promising approach to accelerate the development of effective treatments for bacterial infections. This research aims to highlight the importance of drug repurposing in the context of bacterial infections in an effort to emphasize the various advantages it offers over traditional drug discovery methods. We have selected 6 drugs that are not infrequently used to treat infections (including gentamycin sulfate, simvastatin, caspofungin, finasteride, ketorolac and clarithromycin) and tested their efficacy as antibacterial agents using four bacterial strains (*Escherichia, Serratia, Micrococcus* and *Bacillus*) as target model systems. We performed a comprehensive high throughput screening using a 96 well microplate approach and determined the Minimum Inhibitory Concentration (MIC) of bacterial growth. Our results indicate that Finasteride and Ketorolac are effective against the gram-negative bacteria Escherichia and Serratia, whereas Caspofungin and Clarithromycin are the most effective against the gram-positive Micrococcus and Bacillus. These results shed light into future perspectives of antimicrobial agents and possible treatments for fastidious infections. Embracing drug repurposing as a complementary strategy to traditional drug discovery efforts holds tremendous potential in the fight against bacterial infections.

Procedure



Results



Key:

MIC 90

MIC 50

The MIC 90 is used to define the concentration of drug needed to inhibit 90% of the Bacterial population. Like wise the MIC 50 is the concentration needed to inhibit 50% of the population.

Background

Drugs

Gentamycin Sulfate - Treat aerobic infections
Simvastatin - Treat high cholesterol
Caspofungin - Treat Fungal Infections
Finasteride - Treat BHP / Hair Loss
Ketorolac - Niche NSAID
Clarithromycin - Niche Antibiotic
Flufenamic Acid - Moderate Pain Relief

Microbes

Serratia Marcescens - Gram-negative bacteria
Micrococcus Luteus - Gram-positive bacteria

Further Research

Further research concerning this project can branch into several different new methodologies. The first being to use multiple different types of microbes, not just bacteria. Such examples are E-coli, Bacillus Cereus and Yeast. Tests such as these can provide better perspectives on the effect of the drugs. Another method to further our research would be to introduce the mixing and compounding of the drugs and examine their effects on the microbes. Drug re-purposing is not typically a focus when medicine is mentioned. This is due to drug re-purposing not usually being rewarded when counteracting disease, leading to the practice falling away from modern practice

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