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IN VITRO ANTIBACTERIAL ACTIVITY OF NELARABINE PHOSPHATE AGAINST SARCINA LUTEA STRAIN

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The increase in prevalence of antimicrobial-resistant bacteria is currently a serious threat, thus there is a need for new classes antimicrobial compounds to combat infections. The recent emergence of clinical isolates resistant to the last monotherapy against this bacterium, the cephalosporins, illustrates the need for new antionococcal agents. Here we have characterised a new modified nucleotide of antimicrobials based on the compound nelarabine that exhibit robust activity against *sarcina lutea* in vitro. Nelarabine phosphate inhibits the growth of a broad range of *Sarcina lutea* isolates.

Keywords: Nelarabine phosphate , resazurin, antibacterial activity, Lutea.

The advent of antibiotics had improved mankind's health status and quality of life tremendously. However, overuse and misuse of antibiotics had resulted in increased development and occurrence of bacterial resistance against commercially available antibiotics. Therefore, the search for novel antibiotics of natural origins, particularly from marine resources and plants has been undertaken persistently. One of the promising classes of antimicrobial compounds are derivatives of the components of nucleic acids: nucleosides, nucleotides, as well as their analogues. These molecules are involved in a large number of biological processes, including, for example, the storage of genetic information, gene expression, energy metabolism and cell signaling. These processes are vital for all living organisms, including bacteria. Nucleoside analogues are one of the most important classes of drugs used in the clinic. The most common use of nucleoside analogues as antiviral and antitumor agents. However, recently there is more and more data on their effectiveness against microorganisms [1].

At the moment, the inhibitory activity of nucleosides has been detected both among those isolated from natural sources and among synthetic analogues . Antimicrobial properties have also been found in already known nucleosides that have been used or are being used to treat other diseases [2]. There is not much data on clinical trials of nucleosides as antibacterial drugs. In this regard, their research can be an important step to start using them as full-fledged antibiotics. Structural modification of antimicrobial drugs to which resistance has developed has been proven to be an effective means of extending the lifespan of antifungal agents such as the azoles , antiviral agents such as the nonnucleoside reverse transcriptase inhibitors, and various antibacterial agents including β -lactams and quinolones. It is not surprising then that, in response to antimicrobial resistance, major pharmaceutical companies have tended to concentrate their efforts on improving antimicrobial agents in established classes.

However, with the portfolio of chemotherapeutics currently available, it has been acknowledged that researchers are getting close to the end game in terms of parent structure alterations. A call has therefore been made for the development of new classes of drugs that work on different target sites to those in current use [3].

Most of the currently used classes of antibiotics were discovered before the 70s of the last century . Such a low activity in the search for new antimicrobial compounds can be explained by the high monetary and time costs for bringing the drug to the market, as well as a limited set of methods for identifying leading compounds . In addition, the vast majority of existing antibiotics exhibit significant cytotoxicity, which limits the possibilities of their use. It is obvious that there is an urgent need to create new classes of antibiotics that will act on new targets and have activity against resistant strains of microorganisms [4].

The resazurin-based turbidometric (TB) assay was first used to quantify bacterial content in milk by Pesch and Simmert in 1929. Resazurin (7-Hydroxy-3H-phenoxazin-3-one 10-oxide) is a blue dye which can be irreversibly reduced to a pink and highly red fluorescent substance, resorufin by oxidoreductase within viable cells. The resorufin can be further reduced to a colorless and non-fluorescent molecule, hydroresorufin. In light of the simplicity and high-throughput of the resazurin-based TB assay, it has been employed in many studies as an antibacterial screening assay however, these studies only involved screening of antimicrobial activity of phytochemicals.

However, the current review intends to focus on the significance of Nelarabine phosphate as antimicrobial agents based on resazurin along with clinical and *in vitro* applications of pyrimidine derivatives to facilitate the development of more potent as well as effective antimicrobial agents [5].

In short, the resazurin-based Nelarabine phosphate assay is a simple, reliable and feasible screening assay in assessing the antibacterial activity of modified nucleotides. This assay evidently demonstrated the antibacterial activity of Nelarabine phosphate against *Lutea*.

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