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### A NEW BLOCKBUSTER ENTRY IN THE ARSENAL OF ANTIBIOTICS: TEIXOBACTIN

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**Abstract:** For the first time in 30 yrs, a new drug has come with new hopes to combat against bacterial resistance. The drug was discovered by researchers of Northeastern University and NovoBiotic Pharmaceuticals and the preclinical studies on animals have been published in the Nature in Jan 2015. Teixobactin is obtained from a gram negative bacterium known as *Elephtheria terrae*. It was isolated from a special iCHIP technique which is one of its own kinds. It is highly active against already resistant bacteria like MRSA and even superbugs. It acts by inhibiting cell wall formation and no resistance has been declared till now against teixobactin. This outstanding drug is undergoing preclinical toxicological studies and hasn't been tried in human participants till date. It will take around 5-6 years to hit the market.

**Keywords:** Teixobactin, Antibiotic resistance, *Elephtheria terrae*.



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## INTRODUCTION

Teixobactin has been knocked as a new antibiotic after waiting for almost 30 years. The most important characteristic of teixobactin is that is that it has ability to kill pathogens without detectable resistance which is drawing everyone's attention, as antimicrobial resistance has become a global problem now a days.<sup>[1]</sup>

### Discovery of teixobactin

This new antibiotic has been discovered in January 2015 by researchers of Northeastern University and NovoBiotic Pharmaceuticals. It was obtained from the so called 'pile of dirt' containing Gram negative bacterium *Elephtheria terrae*. It was isolated employing iChip technique.<sup>[1,5,7]</sup> Its Molecular formula<sup>[7]</sup> is  $C_{58}H_{95}N_{15}O_{15}$  and its chemical structure has been elaborated in Figure 1.

Almost 10,000 strains of bacteria were isolated by researchers out of which teixobactin is the most promising candidate. Other twenty five candidate drugs can be tried in treating cancer because of having severe toxicities.<sup>[2]</sup>

### Spectrum of activity

Teixobactin is active against gram positive bacteria and superbugs including MRSA, *Cl.difficile*, enterococci and also active against *M. tuberculosis* and *B. Anthracis*.<sup>[3,4]</sup>

### Mechanism of action

Its mechanism of action is unique as it doesnot target protein in the cell wall. It acts by inhibiting cell wall synthesis in the gram positive bacteria. It inhibits formation of teichoic acid and peptidoglycan by binding to motif of lipid II and lipid III, respectively. Cell wall deficient forms of bacteria will be produced that ultimately results in death of the bacteria.<sup>[2]</sup>

### Antimicrobial resistance

According to WHO, "Antimicrobial resistance (AMR) is resistance of a microorganism to an antimicrobial drug that was originally effective for treatment of infections caused by it."<sup>[3]</sup>

Potential use of any therapeutic agent is drastically compromised by rising development of resistance.

More than 20,000 potential resistance genes (r genes) of nearly 400 different types has been recognized so far.<sup>[4]</sup>

Apart from genetic origin, antibiotics also have suggested to be evolved as another way of intra- and inter-domain communication in various ecosystems.<sup>[5]</sup>

Till now no resistance is found against teixobactin by the researchers of Northeastern University and NovoBiotic Pharmaceuticals.<sup>[2]</sup>

After Bedaquiline (Sirturo) it can be used to treat MDR-TB because it can kill *M. tuberculosis* as found by Lewis and his colleagues.

It has been tested in animal species and has cleared animal toxicity studies. According to Lewis, it will take around 5-6 years and hundreds of millions of dollars to come in the market.<sup>[6-7]</sup>

## CONCLUSION

However, the drug has been found to possess huge potential to treat fatal resistant infections in animals, it will be studied further in animal species for about two more years to be tried in human participants. It should undergo exhaustive preclinical toxicological studies to explore further new possibilities against resistant bacteria.

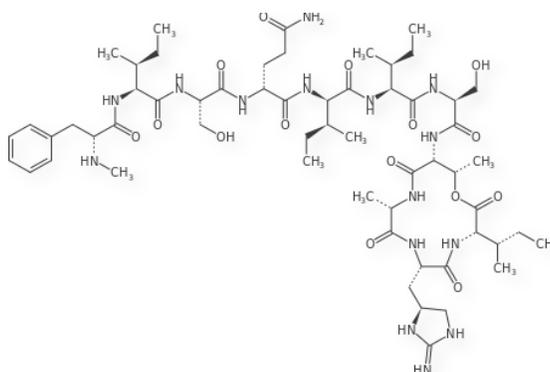
Lets hope for the best results and keep our fingers crossed till teixobactin hit the market in upcoming 5-6 years when scenario of bacterial resistance is going to be worsen.

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**Figure 1: Chemical structure of teixobactin**



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