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TEIXOBACTIN: THE POTENTIAL TO BE A BIG DEAL AGAINST GRAM POSITIVE BACTERIAL INFECTIONS

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INTRODUCTION

The greatest challenge in medicine today, threatening mankind is the resurfacing of previously eradicated deadly bacterial diseases due to the antibiotic resistance.

Approximately 99% of all species in external environments are uncultured (do not grow under laboratory conditions), and are a promising source of new antibiotics.[1] Using a device called the iChip, which makes it possible to study bacteria that cannot normally survive under lab conditions, the researchers discovered a type of Gram negative bacteria***, Eleftheria terrae*** that produce the antibiotic teixobactin. Ling et al.[2] were able to isolate teixobactin by using the tool, the iChip, which was used to screen for compounds from antibiotic-producing soil microorganisms with activity against *Staphylococcus aureus*.

iChip uses an assembly of three (central, top and bottom plates) flat hydrophobic plastic polyoxymethylene plates containing multiple thorough-holes and polycarbonate membranes to compose an array of miniature diffusion chambers.[3]

In a press release on 7th January, 2015, NovoBiotic Pharmaceuticals announced the discovery of teixobactin, a novel antibiotic from a previously uncultured and undescribed soil –bacteria belonging to β-proteobacteria provisionally named *Eleftheria terrae*, using isolation chip (iChip) method,[2, 4] Teixobactin is the first member of a novel class of peptidoglycan synthesis inhibitors.[3]

Teixobactin, is an unusual depsipeptide which contains enduracididine, methyl phenylalanine, and four D-amino acids. It inhibits bacterial cell wall synthesis by binding to a highly conserved motif of lipid II (precursor of peptidoglycan) and lipid III (precursor of cell

wall teichoic acid).The compound is highly potent against a variety of Gram- positive microbes, including methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci (VRE).It also has excellent activity against *Clostridium difficile*, *Streptococcus pneumoniae* as well as *Mycobacterium tuberculosis*. This new antibiotic eliminates these pathogens without producing any detectable resistance. However, it has inherent limitation against Gram negative bacteria.

This compound has been tested in mice with promising results.

To become a drug to treat infections in people, clinical trials will need to be carried out to make sure that the drug is safe and works in patients as well. For this, it will need to be formulated so that the antibiotic remains active when put inside the human body.

Full toxicology tests will also need to be carried out to make sure that it does not give any unpleasant side effects, and experiments will have to be done to determine whether teixobactin interacts with other drugs.

Showing safety in humans would be the next final step, the most important one for converting a promising antibiotic into a real drug. Let the big deal be done.

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