New antibiotic a game-changer in the fight against antimicrobial resistance

By ACSH Staff — January 8, 2015

A new antibiotic has been discovered that has been found to treat many common bacterial infections. Incredibly, no resistance has been detected so far. The research was published this week in the journal *Nature*.

Antibiotics are discovered in a variety of places. Penicillin came from moldy bread. The first member of the cephalosporin class was discovered in a sewer in Sardinia (and you thought your job was bad). Erythromycin comes from a class of bacteria called actinomyces. Tetracycline was originally isolated from a fungus that grows in soil. Many of today’s drugs were first isolated from a wide variety of natural products, such as plants and marine organisms.

But it is something derived from soil that has hit paydirt, and it is all over the news a novel new antibiotic called Teixobactin, was isolated from soil. This was done by a very clever new method which has implications that reach far beyond this one new drug. It could open up the field of natural products research the discovery of drugs from living organisms by permitting scientists to get their hands on a huge variety of natural products that they have thus far been unable to access. This new method is being proclaimed as a game-changer for the discovery of new drugs, and rightfully so.

This is because about 99 percent of soil microbes are unculturable they will not grow in laboratories. However, researchers from Northeastern University in Boston led by Drs. Kim Lewis and Slava Epstein developed an electronic chip called an iChip that will allow for the microbes to be isolated from soil, and grown in the lab under conditions that simulate their natural environment. Using this technique, the researchers have been able to screen 10,000 bacteria, previously unculturable, including *Eleftheria terrae*-- the source from which Teixobactin was extracted.

As we have written about many times, antibiotic resistance is a devastating global public health crisis. The World Health Organization classified antimicrobial resistance as a serious threat for every region of the world. Dr. Kim Lewis, Director of the Antimicrobial Discovery Centre and lead researcher said, Apart from the immediate implementation, there is also I think a paradigm shift in our minds because we have been operating on the basis that resistance development is
inevitable and that we have to focus on introducing drugs faster than resistance. Resistance is not believed to develop for Teixobactin for at least 30 years.

ACSH’s Dr. Josh Bloom, a former researcher in the antibiotic area says, Wow. This looks almost too good to be true. The potency of Teixobactin against a panel of different bacteria is amazing. It works at concentrations that are far lower than those of many other antibiotics, which means less drug will be needed, which minimizes toxicity.

He adds, Not only will less drug be required, but they couldn’t even find evidence of toxicity at levels above what would be considered above normal for other antibiotics. But, it gets even better. It is hardly news that bacterial resistance is the reason why current antibiotics are failing to kill bacteria that they once did. Yet, Teixobactin operates by a different mechanism that seems to make the generation of resistant mutants more difficult.

Even when the group tried to generate bacteria that were resistant to the drug, they were unable to do so, which is nothing short of astounding.

Saving the best for last, Teixobactin works in mice that were infected with Streptococcus pneumoniae. It reduced the number of bacteria in the lungs of the mice by 1 million fold. And, unlike in some other animal models, mouse models of bacterial infection are quite predictive of efficacy in humans.

Dr. Bloom comments, The only knock against Teixobactin is that it only kills gram positive bacteria, not the tougher gram negative variety. This will limit its utility, but this is still mighty impressive.