

The abstract of the project Smart antibiotic

Bacterial infections are the most common infections and every year about 30 thousand people die from bacterial infections and 2 million get infected (which is two times more cases than some diseases, HIV and cancer together) by serious bacterium which can't be destroyed by regular antibiotic so until the next century more and more people can develop resistance and more people can die. Bacterial diseases are usually treated with antibiotics, but because of the resistance of bacteria to antibiotics the bacterial infection progresses, while the antibiotics don't work properly (don't destroy the bacteria).

Description of the project:

The Smart antibiotic project gives an advanced solution to the problem of the resistance of bacteria to antibiotics, by using different methods and techniques. It explains the genetic change of the antibiotic by using the sample from genetic structure of the resistant bacteria.

For that matter, developing an antibiotic with changing the DNA structure of its molecule by using a DNA sample from a resistant bacterium, we can develop a smart antibiotic that can eventually detect bacterial genetic code and destroy its structure. To change the DNA of the antibiotic molecule we must change the DNA of the organism (fungi) from which we have been creating the same antibiotic (for ex. it has been done on *Penicillium notatum*). That way bacterium gets destroyed on the genetic level, it doesn't have the ability for resistance and gets killed easily. This is all done by the procedure called genetic congruence.

Functioning of the project:

The antibiotic has a selective effect and also an advanced mechanism, it doesn't affect the chromosomes of the bacteria (doesn't cause mutations and doesn't create further resistance). The way the antibiotic works depends on genetic code of the bacterium (from which bacterium we have been using the genetic sample), that's also one of the reasons why it has a selective effect. This type of antibiotic can be helpful in many cases, such as systematic infections caused by resistant bacteria, it can prevent further infections, sepsis and even death with small concentration of the antibiotic. Like every other medicine, this type of antibiotic isn't perfect, it also can cause many side-effects, because once this antibiotic gets in the organism it's hard to eliminate it, so it has to be used with different chemicals which can help eliminating it from the body. The antibiotic has an ability to save lives of a few million people every year and prevent the resistance of the bacteria in the next century which can occur in even more than few hundred million people.

Future of the project:

The antibiotic is tested and it can approve better health and lower the resistance of the bacteria in the future, which is predicted to increase until the end of the century. With the help of the pharmaceutical industry it can also be developed in more simple way. By developing this antibiotic, it won't replace other previous generations of antibiotics, because it's only aimed to be for resistance. The costs of massive development in industry are low and companies can afford the money for developing an antibiotic. It can also take some time for testing this antibiotic and figure out the best form of the medicine in which it can be produced, but in the near future we can expect a new, innovative medicine to solve the main problem with the bacterial infection nowadays – resistance of bacteria.