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IIT Roorkee develops a technique to reverse antibiotic resistance

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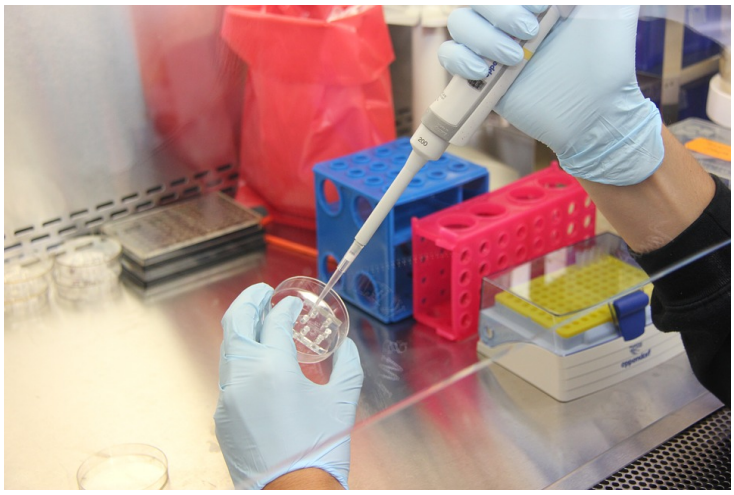

Researchers from the Department of Biotechnology at Indian Institute of technology Roorkee have developed a technique which will reverse drug resistance and enable the existing antibiotics to effectively kill the bacteria. The study published in International Journal of Antimicrobial Agents.

According to the study, the molecule developed to be effective against multi-drug resistant clinical strains of Acinetobacter baumannii, one of the most prevalent pathogens, which have developed strategies to counter the existing antibiotics especially fluoroquinolones.

Drug Resistant Bacteria use a system called efflux pumps that act as tiny motors to expel out the antibiotic from the cellular interior, thereby preventing the drug from reaching its target and helping the bacteria to survive even in the presence of antibiotic.

The team led by Dr. Ranjana Pathania of the Department of Biotechnology at IIT Roorkee have discovered a novel molecule which inhibits the efflux of antibiotics leading to effective build-up of antibiotic inside the cell and subsequent cell death. The molecule discovered by the team has been named ‘IITR08027’ and it disrupts the proton gradient that is responsible for energizing the pumps. The team has shown that the molecule when used in combination with fluoroquinolones allows the antibiotic to kill the bacterial cells, thereby effectively tackling the antibiotic resistance problem.

According to the team, this general mode of action of IITR08027 and the inhibition technique of efflux can be used against other bacteria which express efflux pumps and adopt a similar mechanism of expelling antibiotics from the cell.

Elaborating about her research Dr Ranjana said, “Antibiotic resistance in bacterial pathogens has been one of the major issues that plagues the health care sector today. According to an estimate, about 1,900 people die every day due to antibiotic resistant infections, which amounts to about 70,000 deaths per year. Discovering a new antibiotic or drug, to counter the resistant bacteria will be a time taking process, due to which the team wanted to come up with a technique, which could restore the efficacy and effectiveness of the existing antibiotics and medications like ciprofloxacin or nor?oxacin.”

“Since this molecule rejuvenates the activity of fluoroquinolones against resistant bacterial pathogens, its clinical use of could be a medically as well as an economically beneficial move. Moreover, this molecule has a very low cell toxicity which makes it an ideal candidate to enter pre-clinical trial phase for toxicity and efficacy in animal models”, she added.