New molecule against MDR *Acinetobacter baumannii* from JNCASR

A new polymer-based antibacterial compound has been found to be highly active against multidrug-resistant *Acinetobacter baumannii*, an organism responsible for a range of life-threatening infections such as pneumonia and meningitis.

Developed by Prof. Jayanta Haldar and his team of researchers at the Antimicrobial Research Laboratory at the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, the compound was synthesized by conjugating an FDA- approved polymer with a naturally occurring amino acid.

The compound showed no toxicity towards human cells despite its excellent antibacterial properties. At 16 µg/mL the molecule could kill both actively-dividing, drug-sensitive and resistant bacteria within 2—4 hours. At the same concentration, the molecule killed dormant, drug-sensitive bacteria within 2 minutes, and dormant, drug-resistant bacteria within 5 minutes.

A. baumannii infections are biofilm-associated and the polymer compound works through its ability to disrupt about 65 per cent of biofilm at concentrations of 64 µg/mL. Biofilms, formed by infecting organisms, provide resistance against host immune responses as well as antibiotics.

The cytoxicity of the compound, tested against human embryonic kidney cell line, showed 100 per cent survival at 8—16 µg/mL concentrations and, at a high concentration of 500 µg/mL, about 80 per cent of cells survived.

It has also been observed that at 1,000 µg/mL, which is several times higher than active concentration, only about 1—3 per cent of human red blood cells were compromised.

A. baumannii did not develop any resistance to the compound when exposed to it for 14 days. In contrast, the bacteria exhibited high levels of resistance against antibiotics like meropenem and even to last resort antibiotics like colistin.

In general, the compound was found capable of disrupting the integrity of both inner and outer bacterial membranes and could kill any type of *A. baumannii* bacteria irrespective of drug sensitivity and resistance. It may have other modes of action as well.

While the efficacy of the compound awaits testing on animal models, in-vitro studies suggest that this class of newly developed polymer has immense potential for development of future therapeutic agents against infectious organisms.