

Plasma Therapy: An Alternative to Antibiotics?



Cold plasma jets could be a safe, effective alternative to antibiotics to treat multi-drug resistant infections, says a study published in the January issue of the *Journal of Medical Microbiology*.

The team of Russian and German researchers showed that a ten-minute treatment with low-temperature plasma was not only able to kill drug-resistant bacteria causing wound infections in rats but also increased the rate of wound healing. The findings suggest that cold plasmas might be a promising method to treat chronic wound infections where other approaches fail.

The team from the Gamaleya Institute of Epidemiology and Microbiology in Moscow tested a low-temperature plasma torch against bacterial species including *Pseudomonas aeruginosa* and *Staphylococcus aureus*. These species are common culprits of chronic wound infections and are able to resist the action of antibiotics because they can grow together in protective layers called biofilms. The scientists showed not only that plasma was lethal to up to 99% of bacteria in laboratory-grown biofilms after five minutes, but also that plasma killed about 90 % of the bacteria (on average) infecting skin wounds in rats after ten minutes. Plasmas are known as the fourth state of matter after solids, liquids and gases and are formed when high-energy processes strip atoms of their electrons to produce ionized gas flows at high temperature. They have an increasing number of technical and medical applications and hot plasmas are already used to disinfect surgical instruments.

Dr Svetlana Ermolaeva who conducted the research explained that the recent development of cold plasmas with temperatures of 35-40°C makes the technology an attractive option for treating infections. "Cold plasmas are able to kill bacteria by damaging microbial DNA and surface structures without being harmful to human tissues. Importantly we have shown that plasma is able to kill bacteria growing in biofilms in wounds, although thicker biofilms show some resistance to treatment." Plasma technology could eventually represent a better alternative to antibiotics, according to Dr Ermolaeva. "Our work demonstrates that plasma is effective against pathogenic bacteria with multiple-antibiotic resistance -- not just in Petri dishes but in actual infected wounds," she said. "Another huge advantage to plasma therapy is that it is non-specific, meaning it is much harder for bacteria to develop resistance. It's a method that is contact free, painless and does not contribute to chemical contamination of the environment."

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Journal Reference:

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