

Medical biofilms: The killer

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EDITORIAL

ARTICLE INFO

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DOI: 10.20885/JKKI.Vol10.Iss3.art2

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Biofilms are the leading cause of infections and capable to kill thousands of people around the world. According to National Institute of Health, biofilms make up to 80% of the total number of microbial infections in human including endocarditis, cystic fibrosis, periodontitis, rhinosinusitis, non-healing chronic wounds, osteomyelitis, meningitis, and kidney infections. They also have a capability to attach in medical devices such as pacemakers, contact lens, artificial hips, catheters, heart valve replacements, artificial joints and other surgical implants. This capability increases the implantable device-related infections.¹

Due to their unique structure, biofilm can protect themselves from any hazard substances including antiseptic and antibiotic as well as from physical stress by covering microorganism using extracellular matrix which is consisting of biomolecules such as complex polysaccharides, proteins, lipids and extracellular DNA. This physical structure can confer resistance by exclusion of biocides from the microorganism community and prevents the access of antibiotics to the microorganism cells embedded in the community.

As a community, biofilms also make a social interaction process between cells by secretion of small signalling molecules which is known as autoinducers. This interaction process has been known as Quorum sensing (QS).² Autoinducers secreted into the environment will gradually increase in concentration as the microorganism population grows. This process gives many profits to microorganism in host colonization, creation of biofilms, defense against competitors, and adaptation to changing environments. Indeed, pathogenic microorganism in biofilms exploit QS process to trigger virulence and create antibiotic resistance.

Many strategies to control biofilms have been implied ranging from conventional approaches such as removing the indwelling medical equipment followed by replacement with new ones and combating by antibiotics to novel approaches such as using a synergistic effect of antimicrobial photodynamic therapy and various antimicrobial and antibiofilm combination, coating surgical implants, and developing antibiofilm through medical plants.³ The principal of antibiotic therapy in order to treat biofilms is antibiotic should be validly selected on the basis of sensitivity and the capacity to penetrate properly through the biofilm matrix.⁴ Well-known the stages of biofilm in clinical conditions might be help to overcome biofilm by using antibiotics.

Which is the best strategies? Unfortunately, until now there is still no information about the significant reduce of biofilm-related infections. Each strategy to control biofilm still has limitation. The removal of the implant or other medical devices could increase a trauma to the patient and the cost of treatment. Exploring new antibiotics from natural product is still lack and takes times to get a new lead compound. However, it is argue to keep 'on the way' in order to find the best solutions. More actions need to be involved to control and combat biofilms.

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