Control of Biofilm-embedded Organisms

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Technology description

Publications: 1. Role of antibiofilm-antimicrobial agents in controlling device-related infections. Aslam S, Darouiche RO. Int J Artif Organs. 2011 Sep;34(9):752-8. 2. Mechanical integrity of hemodialysis catheters after exposure to a novel catheter lock solution. Aslam S, Darouiche RO. Infect Control Hosp Epidemiol. 2010 Nov;31(11):1124-9. 3. Pilot trial of N-acetylcysteine and tigecycline as a catheter-lock solution for treatment of hemodialysis catheter-associated bacteremia. Aslam S, Trautner BW, Ramanathan V, Darouiche RO. Infect Control Hosp Epidemiol. 2008 Sep;29(9):894-7.
Biofilm is a defensive layer naturally formed by microorganisms and it prevents the penetration of antimicrobial agents to kill the embedded microorganisms. NIH has estimated that up to 80% of human infections are biofilm related. Biofilm was also found in approximately 60% to 80% chronic wounds, posing a great challenge to chronic wound management in high risk populations such as diabetic patients and patients with indwelling medical devices. Baylor College of Medicine is seeking individuals interested in commercializing a novel biofilm disruption technology for medical devices developed by Dr. Rabih Darouiche. The invention employs antimicrobial and mucolytic biofilm penetrating agents, such as N-acetylcysteine (NAC) and its derivatives, to substantially prevent and remove biofilm from the surface of medical devices, including but not limited to adhesives, bandages, fabrics and catheters. This technology provides a promising solution to facilitate wound healing and better management for medical device associated infections in a wide range of clinical applications. In one proof-of-concept study, Dr. Darouiche and colleagues conducted a pilot clinical trial using a NAC-containing catheter-lock solution for the treatment of hemodialysis catheter┬┐associated bacteremia. 83% of the patients were successfully treated and 86% treated catheters did not yield the original infecting pathogen on culture, demonstrating the efficacy of this technology in a real clinical setting. In addition, the NAC-containing catheter-lock solution did not impair the mechanical integrity or increase the propensity for fracture of hemodialysis catheters. At high concentrations, NAC possesses a broad-spectrum antimicrobial activity against a variety of gram-positive and gram-negative bacteria, including multi-resistant organisms.

Advantages

- NAC is a clinically-approved, safe, and low-cost compound. For example, high dose NAC is commonly used to treat acetaminophen overdose in both adults and children. - Substantially removes biofilm, prevents its growth from the surface of medical devices, permits disruption of biofilm, and allows

penetration of other antifungal/antimicrobial agents. - Provides anti-biofilm coating methods for medical devices. - Validated safety and efficacy by a successful human clinical trial and other studies.

Institution

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