Microbial biofilms play an essential role in several infectious diseases and are defined as extensive communities of sessile organisms irreversibly associated with a surface, encased within a polysaccharide-rich extracellular matrix (ECM), and exhibiting enhanced resistance to antimicrobial drugs. Forming a biofilm provides the microbes protection from environmental stresses due to contaminants, nutritional depletion, or imbalances, but is dangerous to human health due to their inherent robustness and elevated resistance.

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References:


Abstract:

Microbial biofilms play an essential role in several infectious diseases and are defined as extensive communities of sessile organisms irreversibly associated with a surface, encased within a polysaccharide-rich extracellular matrix (ECM), and exhibiting enhanced resistance to antimicrobial drugs. Forming a biofilm provides the microbes protection from environmental stresses due to contaminants, nutritional depletion, or imbalances, but is dangerous to human health due to their inherent robustness and elevated resistance. The use of indwelling medical devices (e.g., central venous catheters, CVCs) in current therapeutic practice is associated with 80-90% of hospital-acquired bloodstream and deep tissue infections. Most cases of catheter-related bloodstream infections (CRBSIs) involve colonization of microorganisms on catheter surfaces where they form a biofilm. Additionally,
Microbial biofilms play an essential role in several infectious diseases. Fusarium solani and F. oxysporum were the causative organisms of the 2005/2006 outbreak of contact lens-associated fungal keratitis in the United States, Europe, the UK, and Singapore, and these infections involved formation of biofilms on contact lens. Fungal biofilm formation is studied using a number of techniques, involving the use of a wide variety of substrates and growth conditions. In vitro techniques involving the use of confocal scanning laser/scanning electron microscopy, metabolic activity assay, dry weight measurements, and antifungal susceptibility assays are increasingly used by investigators to quantify and evaluate biofilm morphology. However, there are not many in vivo models used to validate biofilm-associated infections. In this protocol, we describe a clinically relevant rabbit model of C. albicans biofilm-associated catheter infection to evaluate the morphology, topography, and architecture of fungal biofilms. We also describe a murine model of contact lens-associated Fusarium keratitis. Evaluation of the formation of fungal biofilms on catheters in vivo, their analysis using scanning electron microscopy (SEM) and quantitative catheter culture (QCC), and treatment of biofilms using antimicrobial lock therapy can be completed in ~20-25 days using the described methods. The rabbit model has utility in evaluating the efficacy of lock solutions. In addition, the murine model of contact lens-associated Fusarium keratitis enables characterizing/comparing the formation of Fusarium biofilms on contact lenses in vitro and determining their role in vivo.

Other intravenous and vascular access resources that may be of interest (External links – IVTEAM has no responsibility for content).