CHAPTER 15

Potential of biosurfactants as antiadhesive biological coating

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15.1 Introduction

Most pathogens that cause biofilms formation in the natural environment have been structured to be less sensitive to drugs, as revealed by Janek et al. (2012). Several laboratories have been synthesizing new molecules to prevent the development of biofilms (Zhao & Liu, 2010). Adhesion has been regarded as the initial phase of biofilm formation, and this can be the best time for the effect of antibiofilm and anti-adhesive molecules. Microbial biosurfactants (BSs) are found to be potential molecules with anti-adhesive and antimicrobial properties and sometimes penetrate and eliminate mature biofilms (Abdalsadiq et al., 2018). Microbial BSs ranging from lower molecular mass, such as lipopeptides (LPs), glycolipids (GLs), rhamnolipids (RLs), and sophorolipids (SLs), to higher molecular mass, including protein, lipoproteins, and lipopolysaccharides (LPS), can bind to interfaces and prevent the adhesion of pathogens to various surfaces (Das et al., 2009). They can serve as a substitute for synthetic surface-active agents and may be utilized as effective and safe therapeutic agents owing to their lower toxicity, higher biodegradability, and effectiveness at high pH values and temperatures (Haddaji et al., 2022). These BS compounds may be used to coat implant surfaces and preserve biocompatibility because of their lower toxicity. The BSs' amphiphilic structure can affect the adhesion between pathogens and surfaces, inhibiting the bacteria adhesion processes. It is also capable of modifying the permeability of the cell membrane, resulting in the loss of metabolites that later make the cell lyse Table 15.1 (Rodrigues & Teixeira, 2010).

Microbial adhesion and biofilm development on medical instruments are well-known activities that have significant economic and medical consequences. In recent years, the application of permanent or temporary prosthetic instruments fabricated from polymeric biomaterials has significantly increased. Rodrigues (2011) reported that more than five million medical implants are utilized annually within the United States alone. It has also been stated that medical instruments have contributed to about 60%–70% of hospital-acquired infections, especially in severally ill patients. Biofilm

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