artificial joints (Gbejuade et al. 2015), and prosthesis (Silverstein and Donatucci 2003). The most common biofilm-forming pathogens are *Candida albicans*, *Enterococcus faecalis*, *Escherichia coli*, *Klebsiella pneumoniae*, *Mycobacterium* sp., *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Streptococcus viridans, Proteus mirabilis*, and *Pseudomonas aeruginosa* (Donlan 2001b; Kumar et al. 2017).

Biofilm-related diseases are particularly chronic, slowly developing infections but are characterized as persistent and progressive due to the ability to resist the elements of the host organism's defense system and the effects of the available antimicrobial agents (Lewis 2007). It is believed that the chronic character of biofilm infections could be associated with a subpopulation of cells located inside them, known as "persistent" (Maisonneuve and Gerdes 2014). These cells have the ability to survive the prolonged action of antimicrobials, which allows their dispersion to other organ systems, acting as sources for new infections (Lewis 2012; Maisonneuve and Gerdes 2014).

The peculiarities described about biofilms represent a critical and alarming picture for the clinical community and for the medical industry, and considerable efforts are being made to identify new approaches that can establish the basis of anti-biofilm therapies that are efficiently better than existing treatments (Markowska et al. 2013). This chapter reports the current options for the treatment of infections caused by pathogenic biofilms, such as conventional antibiotics, as well as the alternatives developed for future anti-biofilm treatments based on scientific perspective.

Note: "Antibiotics" were here defined as pharmaceutically formulated and medically administered substances". Furthermore "Antimicrobials" was defined here as a class of substances that may or may not be regulated as drugs.

20.2 Antibiotic Therapy for the Treatment of Pathogenic Biofilms

20.2.1 Monotherapy

As described earlier, treatment options to combat pathogenic biofilm infections are limited. This can be attributed to the insufficient delivery of the desired concentration of the treatment agent to the target microbial cells within the biofilm since the microorganisms organized in biofilms have an architecture and an environment that provide for the increase of microbial resistance to the conventional antibiotics (Wu et al. 2015). In addition, the limited treatment of infections associated with pathogenic biofilms can also be attributed to the fact that antibiotics currently available for clinical treatment have been developed to combat infections caused by planktonic microorganisms rather than biofilms (Bjarnsholt et al. 2013; Hancock 2015).