



Relationship of Biofilm Formation in Microbes to MDR and Pigment Formation

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Many of the Gram positive and gram negative microbes are found to be highly virulent and the microorganisms that are highly potent form biofilms in environment and human hosts. Most of the Enterococcus and *P. aeruginosa* are able to cause serious infections and *P. aeruginosa* has found to be second prevalent bacteria in the environment and one of the opportunistic pathogen that causes serious infections like bacteremia, Respiratory infections and so many serious infections in immunocompromised individuals.

Many biofilm forming bacteria show MDR to most of the antimicrobial drugs and show resistance to most of the beta lactum antibiotics due to expression of beta lactamase gene in their cells. Biofilms are heterogeneous with Exopolysaccharides, DNA and Proteins and most of the biofilm forming bacteria also express gelatinase enzyme an important virulence factor required to form biofilms.

Most of the bacteria that can able to form biofilms can confer Multi drug resistance in bacteria especially to methicillin and various beta lactum antibiotics proven in the case of *S. aureus*. Bacteria that cannot able to form Biofilm associate with the biofilm forming bacteria and can take the selective advantage of resistance to antibiotics.

However Biofilm formation does not confer positive effect with respect to over expression of MDR genes or Pigment formation or virulence genes but required for the virulence and pathogenicity associated with the bacteria. Bacteria found in environment and clinical specimens harbour MDR genes and serves as source of MDR genes spread among the bacteria.

Biofilms confer selective advantage over bacteria in survival due to exposure to low oxygen concentration and nutrients in the centre of biofilm and exposure to toxins produced by the bacteria

and low penetration and exposure to antimicrobial agents. Quorum sensing is another most important contributor for virulence and pathogenicity seen in Bacteria as it is a major factor required for Biofilm formation by bacteria. Bacteria communicate with each other and required for coordinating synthesis of various toxins and pathogenic proteins by the bacteria through phenomenon called quorum sensing and so acts as an important contributor for virulence and pathogenicity in biofilm forming bacteria.

So by conclusion all virulent pathogens form Biofilms but formation of Biofilms does not confer virulence or MDR in bacteria but much insights and research in correlation of Biofilm formation and pathogenicity is till required to prevent the spread of MDR conferring bacteria for the effective treatment against bacterial infections.