

THE MECHANISMS OF BACTERIAL ADHESION

Assaad Tradie J. M., Barannyk M. O.

National University of Pharmacy, Kharkiv, Ukraine

jabertradie@gmail.com

Introduction: The phenomenon of bacterial adhesion is an important phenomenon for those working within the pharmaceutical and healthcare sectors to consider. The way in which bacterial cells adhere to surfaces, or within communities, is of great importance to pharmaceutical microbiologists.

General mechanisms of adhesion: According Benjamin E. Russ, adhesion is the binding force between two different materials, whereas cohesion is the binding force between two similar materials. When two materials are brought into contact with each other, the surface molecules interact, giving rise to attractive forces that may be physical and chemical (e.g. adsorption, covalent bonding or van der Waals forces).

Physical bonding: Physical bond consist four types of theory: mechanical interlocking, diffusion theory, adsorption and electrostatic. Adsorption theory is a form of adhesive bonding involving the attraction between the molecules of an adhesive and a surface material. The bonding of an adhesive to an object or a surface is the sum of a number of mechanical, physical, and chemical forces that overlap and influence one another. As it is not possible to separate these forces from one another, we distinguish between mechanical interlocking, caused by the mechanical anchoring of the adhesive in the pores and the uneven parts of the surface, electrostatic forces, as regard to the difference in electro negativities of adhering materials, and the other adhesion mechanisms dealing with intermolecular and chemical bonding forces that occur at the interfaces of heterogeneous systems.

Chemical bonding: is a form of adhesive bonding involving a reaction that results in covalent bonds between the molecules of the adhesive and the surface material. The chemical bonding mechanism suggests that primary chemical bonds may form across the interface. In chemical bond consist two category of bond which is primary and secondary bond. Chemical bonds are strong and make a significant contribution to the intrinsic adhesion in some cases.

Conclusions: The study of mechanisms of bacterial adhesion is very important for pharmacy, its help the pharmacist to know the principles reactions with the bacteria. The surface binding is concern for cleaning and disinfection, the way in which bacteria may form a biofilm community within the pipework of a water system, or in relation to binding to a product formulation. Outside of the pharmaceutical environment, the binding of microbial cells to human host cells is important to areas including dentistry and medical implants, grafts, intravenous lines, drains, stents, and catheters.