

BIOFILM FORMATION IN TRAUMA AND ORTHOPAEDIC SURGERY: CURRENT CONCEPTS FOR TREATMENT AND FUTURE DIRECTIONS

Gerrolt Jukema

Head Department of Trauma Surgery, VU University Medical Centre, Amsterdam, Netherlands

Biofilm formation on biomaterials is a major problem in trauma and orthopaedic surgery. Bacteria adhering to prosthetic material can form a biofilm composed of a complex extracellular polysaccharide matrix in which they then become embedded. The matrix prevents antibiotic penetration and as a result protects bacteria against antibiotics. Once infected, the implant often must be removed. Temporary implantation of antibiotic beads is sometimes necessary. The importance of biofilm formation was not acknowledged until 30 years ago, when the successful effects of penicillin and other antibiotics were complicated by the increasing antibiotic resistance of bacteria. During the last decade, the role of topical negative pressure therapy is discussed as an adjunct how far biofilmformation can be influenced by this treatment option especially by the newest so called negative pressure instillation therapy mode, in which the open cell foam is instilled by an antiseptic polyhexanide solution. Furthermore today there are different treatment options for biofilm formation, e.g. maggot debridement therapy. In 1931, William Baer, an orthopaedic surgeon at Johns Hopkins Hospital in Baltimore, introduced maggot débridement therapy (MDT) around the same time that Fleming discovered penicillin, but MDT was supplanted because of the discovery of antibiotics. Baer successfully used MDT for treatment of children with severe osteomyelitis. Interest in MDT for wound healing was renewed in the 1980s, because the antibiotic resistance of bacteria increased rapidly and antibiotic therapy and surgical treatment of wounds did not suffice in some cases. Currently maggots of *Lucilia sericata* are widely used, have successful healing effects, and were approved by the US FDA in 2004. Research to discover the underlying mechanisms of action by which maggots reduce bacterial infections including prevention and reduction of biofilmformation could provide us new treatment possibilities for severe, infected wounds