

Implant Surfaces in Fracture Treatment

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When inserting an implant into the body, protein adsorption occurs within seconds and usually cell adhesion within minutes, followed by either soft-tissue adhesion or matrix adhesion and mineralization. Early soft tissue integration with vascularisation at the tissue-implant interface, without liquid filled capsule formation is desirable, especially for deterrence of infection. While traditionally soft tissue attachment to implants is a design goal, certain osteosynthesis applications require that neighbouring tissues can freely glide over the implant. Such instances include orbital fractures where connective tissues should glide freely and not adhere to the implant surface. In distal radius fractures where tendons have to glide over internal fixation plates, tissue adhesion is undesirable since this prevents normal tissue motion. The intrusion of a plate can produce friction for the gliding tissue and is liable to become a site for tissue adhesion and inflammation. These osteosynthesis applications require the development of surfaces that prevent soft tissue attachment and irritation, allow tissue gliding, but maintain their biocompatible properties. One way to reduce the tissue adhesion would be to reduce surface roughness of the plate in contact with the tissue. With long term or permanent CMF implants osseointegration is vital to their success. In other cases such as plating in paediatric tissue, or areas where aesthetics are important, minimal bone bonding to implants is desirable for the least traumatic explantation. In femoral nailing, minimal bone bonding to implants is desirable for the least traumatic explantation. There is no 'One Surface' for all applications and surfaces even on one implant interacting with different tissues need to be considered as separate entities.

The take home message of this talk is to illustrate some simple examples of controlling tissue adhesion to surfaces which function both *in vitro* and are able to withstand the harsh *in vivo* surroundings.