Bacterial adhesion to orthopaedic implant materials and a novel oxygen plasma modified PEEK surface

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**THIS PAPER** provides a greater level of understanding about how bacteria adhere to medical implants composed of PEEK and Ti using a pre-operative contamination model. Machined, injection moulded and oxygen plasma treated samples of PEEK were studied to assess the effects of topography and surface chemistry on bacterial adhesion. Clinically isolated and laboratory strains of *Staphylococcus aureus* and a laboratory strain of *Staphylococcus epidermidis* were used during the assessment.

The experimental data showed that bacterial adhesion was higher on machined surfaces compared to moulded surfaces (significantly with two bacterial strains). The *S. aureus* JAR and *S. epidermidis* RP12 adhered to Ti in a higher density than to the moulded PEEK surface. Conversely, *S. aureus* V8189-94 adhered to moulded PEEK at a higher density than Ti, demonstrating differences in bacterial adhesion across strains. In the pre-operative model, treating PEEK with plasma to increase osseointegration did not affect bacterial adhesion, however, introducing a pre-conditioning film significantly increased bacterial adhesion to the plasma treated PEEK samples.

The authors concluded that surface roughness has a greater effect on bacterial adhesion than surface chemistry. However, some bacterial strains are affected to a greater degree by surface chemistry.

**Invibio Commentary**

Infection remains a concern in the field of orthopaedics, especially within the reconstruction, trauma and cranio-maxillo-facial implant markets. Increasing our understanding of how materials and bacteria interact will further our abilities to tackle this issue.

Invibio works closely with researchers across many disciplines around the world to investigate how cells interact with our PEEK-OPTIMA® polymers, both *in vivo* and *in vitro*, providing us with a wealth of information about our material portfolio. Greater understanding of the interaction of PEEK-OPTIMA with tissue will also enable us to develop new technologies that support the body’s healing response and provide the potential for better long-term clinical outcomes.

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