

### Rapid Fire Papers 2

#### [O43] THE INFLUENCE OF TITANIUM AND STEEL FRACTURE FIXATION PLATES WITH DIFFERENT SURFACE TOPOGRAPHIES ON INFECTION RATES IN A RABBIT FRACTURE MODEL

Willem-Jan Metsemakers<sup>1</sup>, Tanja Schmid<sup>2</sup>, Stefan Zeiter<sup>2</sup>, Manuela Ernst<sup>2</sup>, Iris Keller<sup>2</sup>, Nicolo Cosmelli<sup>2</sup>, Daniel Arens<sup>2</sup>, Fintan Moriarty<sup>2</sup>, Geoff Richards<sup>2</sup>

<sup>1</sup>University Hospitals Leuven, Leuven, Belgium

<sup>2</sup>Ao Research Institute, Davos, Switzerland

**Aim:** The aim of this study was to define the role of implant material and surface topography on infection susceptibility in a preclinical in vivo model incorporating appropriate fracture biomechanics and bone healing.

**Method:** The implants included in this experimental study were composed of: standard Electropolished Stainless Steel (EPSS), standard titanium (Ti-S), roughened stainless steel (RSS) and surface polished titanium (Ti-P). In an in vivo study, a rabbit humeral fracture model was used. Each rabbit received one of three Staphylococcus aureus inocula, aimed at determining the infection rate at a low, medium and high dose of bacteria. Outcome measures were quantification of bacteria on the implant and in the surrounding tissues, and determination of the infectious dose 50 (ID50).

**Results:** Of the 72 rabbits eventually included in the in vivo study, 50 developed an infection. The ID50 was found to be: EPSS  $3.89 \times 10^3$  colony forming units (CFU); RSS  $8.23 \times 10^3$  CFU; Ti-S  $5.66 \times 10^3$  CFU; Ti-P  $3.41 \times 10^3$  CFU. Significantly lower bacterial counts were found on the Ti-S implants samples compared with RSS implants ( $p < 0.001$ ) at the high inoculum. Similarly, lower bacterial counts were found in the bone samples of animals in the Ti-S group in comparison with both RSS and EPSS groups, again at the high inoculation dose ( $p < 0.005$ ).

**Conclusions:** In a preclinical in vivo model incorporating fracture biomechanics through an osteotomy, we could not identify any significant differences in susceptibility to infection when comparing titanium and steel implants with conventional (as currently used in the clinics) or modified topographies. The finding that Ti-S has a lower bacterial burden compared to both EPSS and RSS, but only when using a high bacterial inoculum, is interesting and indicates that the material (or its surface) may not influence the infection risk, but rather the infection severity. Furthermore, polished titanium implants with potential to reduce complications associated with tissue adherence, are not expected to affect the infection rate, or influence implant stability as shown in this fracture model.