

## Key Session 1

### [O1] EXPERIMENTAL STUDIES ON INFECTION AFTER OSTEOSYNTHESIS

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Device-related bone infection is one of the most distressing complications of the surgical fixation of fractures. Despite best practice in medical and surgical interventions, the rate of infection remains stubbornly persistent, and current estimates indicate that treatment failure rates are also significant. The problem is recognized not only by the clinical community tasked with preventing and treating these infections, but also by the scientific and industrial sectors tasked with providing innovations that will improve the care of these patients.

As we approach the limit of the effectiveness of current techniques, novel approaches to infection management assume great importance. Preclinical *in vivo* models offer the possibility of reproducible, controlled conditions in which to study this problem and test novel interventions. In order to do so effectively however, certain critical features must be accurately recapitulated in the chosen preclinical model. In the case of orthopaedic device-related bone infection, these critical features include the implant constructs used and resultant biomechanical stability, the duration of the infection, the inclusion of device exchange in treatment protocols, as well as local antibiotic depots as traditionally used in staged exchange protocols.

In this talk, the opportunities provided by experimental preclinical *in vivo* studies will be described as they pertain to device-related bone infection. These include: the ability to control immunological responses in murine models; the importance of biomechanics in fracture models of infection; the ability to perform high-resolution CT imaging in living infected bone; a newly developed model for two-stage exchange of infected hardware; and finally a series of experiments deciphering the role played by local (bone cements and hydrogels) and systemic antibiotics alone and in combination in the treatment of infection. Extrapolation to the clinic is a challenge for such studies, but the aforementioned studies highlight what can be achieved with appropriate model selection.