

Poster: strategies to reduce animal numbers for testing biologicals

Use of *in vivo* bioluminescence imaging for the investigation of bacterial infection courses and heterologous gene expression of bacterial vectors with small groups of mice

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The elucidation of complex bacterial pathogenicity mechanisms and the testing of antimicrobials often necessitates experimental infection of model animals. In addition, the evaluation of novel live attenuated bacterial vectors for vaccination and therapy requires careful analysis of the safety and efficacy profile of the recombinant microorganisms in the mammalian host. The mouse is an important animal model for infectious disease research and testing of biological medicines. The course of bacterial colonization is followed conventionally by plating of organ homogenates from infected animals at consecutive time points. For this approach several animals have to be sacrificed for analysis at each time point. Similarly, large numbers of mice are needed for the conventional determination of inducible gene expression profiles of bacterial vectors for therapeutic factors. Here, we have used *in vivo* bioluminescence imaging in order to follow the colonization course of light-emitting strains of *Escherichia coli* and attenuated *Salmonella enterica* serovar *Typhimurium* in tumor bearing mice. This method allows the analysis of bacterial colonization during the whole infection course in the same small group of living mice. Additionally, we have used this method to investigate the kinetics of induced transgene expression in bacteria residing in tumors of living mice. In both applications, *in vivo* bioluminescence imaging was suited to reduce considerably the number of experimental animals as compared to the conventional approach.

Keywords: in vivo bioluminescence imaging, bacteria, bacterial vectors, inducible gene expression