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Development of a Salmonella Infection Model in Zebrafish Embryos

J. Buck[1], S. Sieber[1], D. Witzigmann[1,2], M. Voigt[3], J. Schupp[4], I. Lieberwirth[5], A.Tüttenberg[4], D. Buhmann[1], M. Helm[3], J. Huwyler[1]

[1] *Department of Pharmaceutical Sciences, Division of Pharmaceutical Technology, and Biocenter, University of Basel, 4056 Basel, Switzerland*
[2] *Department of Biochemistry & Molecular Biology, Life Science Institute, University of British Columbia, 2350 Vancouver BC, V6T 1Z3, Canada*
[3] *Institute of Pharmacy and Biochemistry, Johannes Gutenberg University, 55126 Mainz, Germany*
[4] *Department of Dermatology, University Medical Center of the Johannes Gutenberg-University Mainz, 55131 Mainz, Germany*
[5] *Max Planck Institute for Polymer Research, 55128 Mainz, Germany*

Introduction: Infections caused by Salmonella cost millions of lives across the world every year [1]. Whereas systemic infections can usually be controlled using standard antibiotics, complete eradication is often difficult since Salmonella are able to reside within immune cells such as macrophages. These macrophages can act as a reservoir for salmonella from which they can escape and reinitiate the infection after antibiotics treatment is terminated [2]. Moreover, several antibiotics (e.g. tobramycin) show poor uptake into macrophages [3]. To this end, novel antibiotics formulation approaches (e.g. nanoparticles) are required in order to reach and eradicate Salmonella persistent in macrophages.
Aim: In this study, we developed an *in vivo* Salmonella infection model using zebrafish embryos.
Methods: We injected varying amounts of Salmonella at different zebrafish sites and assessed Salmonella biodistribution (i.e. uptake into macrophages) and survival of infected zebrafish embryos.
Results: We developed a Salmonella infection model in zebrafish embryos and treated the infected zebrafish embryos with newly designed antibiotics-loaded nanoparticles (i.e. liposomes) that are being taken up by macrophages. Treatment of zebrafish embryos with antibiotics-loaded nanoparticles resulted in an increased survival rate.
Conclusion: We successfully implemented a Salmonella infection model in zebrafish opening the opportunity to determine the *in vivo* efficacy of antibiotics-loaded nanoparticles and free antibiotics. This infection model is currently used in a research project aiming to deliver tobramycin to infected macrophages within zebrafish embryos.

Keywords: nanoparticles, targeted drug delivery, antibiotics, infectious diseases, animal model development

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