Abstract

Charles University, Faculty of Pharmacy in Hradec Králové

Department of Pharmaceutical Technology

Supervisor: PharmDr. Ondřej Holas Ph.D.

Consultant: doc. PharmDr. Ivona Pávková Ph.D.

Student: Gabriela Čermáková

Title of Thesis: Basic *in vitro* testing of silver nanoparticles

This thesis focuses on basic *in vitro* testing of the efficacy of silver nanoparticles (AgNP) of 10 nm (AgNP10) and 30 nm (AgNP30) against the infectious agent *Francisella tularensis* (*F. tularensis)*. The aim was to assess the potential of AgNP as a possible therapeutic strategy against tularaemia and to evaluate the efficacy associated with different nanoparticle sizes. AgNP were prepared by a chemical reduction method.

The sensitivity of bacterium *F. tularensis* influenced by AgNP10 or AgNP30 was tested by the microdilution method to determine the inhibitory concentration (IC). Testing AgNP10 in the concentration range of 5-30 μg/ml based on multiple experiments was able to determine IC_{100}, which corresponds to a concentration of 20 μg/ml. For AgNP30, the IC_{100} could not be accurately determined due to time and technological problems. During testing, it was necessary to verify the stability of AgNP in different culture media. The results obtained led to the identification of a suitable medium for susceptibility testing of *F. tularensis*, which was the BHI medium. Before the testing of AgNP, bacterial colonies in other experiments were influenced by antibiotics as part of other experiments to introduce the method for determining IC and verify the inhibitory effect of selected antibiotics on *F. tularensis*. Another aim of this thesis was to determine the cell viability of primary mouse bone marrow-derived macrophages cells after AgNP10 and AgNP30 using the MTS proliferation assay. Both AgNP10 and AgNP30 diluted with the medium at 1:1 and 1:10 had a significant negative effect on cell proliferation and AgNP showed the lowest toxicity at 1:100 dilution. Cell proliferation was slightly more inhibited by AgNP10 than AgNP30. The results will be used for follow-up studies in the project.