ABSTRACT

Charles University

Faculty of Pharmacy in Hradec Králové

Department of Biochemical Sciences

Candidate: Bc. Andrea Vernerová

Supervisor: Ing. Petra Matoušková, Ph.D.

Title of diploma thesis: Determination of selected microRNA - potential cardiotoxicity biomarkers

Cardiotoxicity is adverse reaction of chemotherapy that causes damage to the heart. Monitoring of potential biomarkers of cardiotoxicity could have a positive effect on the elimination of drugs´ toxicity on heart tissue. Therefore, at present, interest in the potential microRNA (miRNA) as biomarkers for cardiotoxicity is rising. MiRNA is very stable short noncoding RNA that has the ability to post-transcriptionally regulate gene expression. From bioinformatic analyses miRNAs are able to regulate more than half of human genes. Various studies have shown miRNAs to be much more specific and rapid diagnostic biomarkers in comparison with troponins. MiRNAs as biomarkers are not established in routine clinical practice yet. So far, all studies of miRNAs are in the process of search and methods optimization.

In my thesis selected miRNAs for detection of doxorubicin (DOX) cardiotoxicity *in vivo* in mouse cardiac tissue samples and *in vitro* on rat cardiomyocytes were investigated. RNA isolation from biological samples and reverse transcription, using Stem-loop RT primer, was performed. Primers were designed for the quantitative determination of selected miRNAs using real-time PCR. The levels of expression of monitored miRNAs were compared to a control group of samples that were not affected by DOX. Significant changes in expression of selected miRNAs were detected. When comparing murine and rat samples elevated expression of various miRNAs after DOX treatment were found.