ABSTRACT

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Title of diploma thesis: Determination of selected biomarkers of nephrotoxicity in urine and Plasma

The discovery and development of novel biomarkers, that can be used for diagnosis of kidney damage earlier and more accurately, are needed for the effective prediction of drug-induced nephrotoxicity. Mechanisms of drug-induced nephrotoxicity include changes in glomerular hemodynamics, tubular cell cytotoxicity, inflammation, crystalline nephropathy, etc. Detection at initial stage of damage using sensitive and specific biomarkers belongs between one of the most important strategies in the treatment of acute kidney injury and renal failure. Although some these biomarkers do not show specificity and sensitivity, several promising biomarker candidates have been established recently to evaluate nephrotoxicity, e.g. selected KIM-1, cystatin C and NGAL. The advantages of these biomarkers compared to traditionally used biomarkers are higher sensitivity, specificity, just mentioned early diagnosis and non-invasiveness (the possibility of determination levels of the biomarkers from blood or urine).

The aim of this diploma thesis was to determine level of selected biomarkers KIM-1, cystatin C and NGAL in rat urine and plasma. The evaluation was performed using analytical ELISA method. This method has been introduced and optimized in our laboratory conditions. Our results showed positive correlation of increasing level of selected biomarkers and increasing kidney damage, i.e. higher concentrations of gentamicin applied to rats. We observed elevated urinary and plasma levels of mentioned biomarkers even at low nephrotoxic doses of gentamicin. On the other hand, these biomarkers were detected at minimal concentrations in control rats with healthy kidneys.