ABSTRACT

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Title of diploma thesis: **Development and characterization of modified polysulfone hemodialysis membranes by means of immobilized neutrophil elastase inhibitors.**

Chronic kidney disease (CKD) is a major health and financial burden, mainly because of the costly renal replacement therapy and treatment associated. The last stage, end-stage renal disease, is associated with high morbidity and mortality rate, generally due to cardiovascular complications. Chronic inflammation is frequently present in CKD patients, which is enhanced by the long term intra-dialytic recurrent contact between blood and hemodialysis (HD) membrane and further contributes to development of atherosclerosis. Contact with the artificial material of HD membranes leads to oxidative stress and neutrophil activation with release of neutrophil serine proteases such as human neutrophil elastase. Patients on HD often present increased level of free neutrophil elastase, decreased intracellular level, and decreased amount of endogenous inhibitor. Development of modified HD membranes by adsorption or incorporation of exogenous synthetic human neutrophil elastase inhibitors (HNEIs) is an approach that might be used to reduce free elastase in blood through contact with the membrane during the HD session. In this thesis we proved that it is possible to produce HNEI-modified polysulfone membranes by coating (adsorption) method with sufficient inhibitory activity to reduce elastase activity in plasma. These biomaterials' biocompatibility showed to be comparable to non-modified HD membranes which is required for applicability as medical devices.

keywords: chronic kidney disease, hemodialysis membranes, neutrophil elastase inhibitors