



UNIVERSITY OF GOTHENBURG  
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**Abstract** - Master Thesis Project, the Pharmacy Programme

## **Treating Sepsis & Renal Failure with Activated Carbon -The Capacity to Adsorb Endogenous Compounds**

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Sepsis and renal failure are medical conditions which lack effective treatments. They are both associated with elevated endogenous substances in the blood due to accumulation in renal failure and inflammatory response in sepsis. Extracorporeal treatments used today, such as dialysis and filtration are very expensive and do not remove middle sized molecules (3-15kDa) which has great importance for the inflammatory process in sepsis. Developing treatments which remove endogenous substances are therefore of interest. Activated carbon adsorbs different sizes of molecules and is also cheap. Five different carbons, four polymer based and one from peach stone, with different surface area and pore volume were tried for their adsorptive ability for creatinine (113Da) and urea (60Da) which are uremic toxins, and IL-8 (8kDa) which is a proinflammatory cytokine. The molecules were incubated with the carbons for 24h or 90min with multiple sample-measuring. The concentrations were measured with UV-spectrophotometry for creatinine, a urea nitrogen assay with followed UV-spectrophotometer for measuring urea and an ELISA kit when measuring IL-8. During the 90 min experiment there was a great decrease in IL-8 concentration already after 5min. Creatinine adsorption was significantly lower ( $p < 0.05$ ) to the carbon from peach stone. This carbon has lowest surface area, pore volume, and fewer micropores to where creatinine can adsorb. The amount of urea adsorbed over 24h was very low due to high solubility and nonpolarity of the molecule. A combination of dialysis which removes small nonpolar molecules, and haemoadsorption, which removes middle sized molecules could be the right solution