

REMOVAL OF LOW AND MIDDLE MOLECULAR WEIGHT TOXINS BY ACTIVATED CARBON MATERIALS

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Introduction. Haemoperfusion (HP), or blood purification via adsorption, has been introduced almost at the same time as haemodialysis in 1960s. HP compared to dialysis does not introduce any substances into the body and only removes the target molecules. Here, we research properties of activated carbon (AC) materials for HP purposes, which can efficiently adsorb substances in a broad range of molecular weights. Removing these substances individually, e.g., by selective antibodies is prohibitively expensive and inefficient due to their short life-time in blood circulation. And, dialysis and ultrafiltration are unable to remove these low and middle molecular weight (LMW, MMW) substances efficiently. Here, we assess adsorption of uremic toxins: p-cresyl sulfate, indoxyl sulfate, and urea.

Methods. Physio-chemical properties of (AC) monoliths from rice husk were investigated. Adsorbics was used as a control material. The adsorption characteristics of the carbon materials prepared from rice husk were assessed for their adsorptive capacity for a range of biological toxins using PBS solution. An ELISA assay was used to determine the concentration of p-cresyl sulfate and indoxyl sulfate.

Results. All AC samples, including Adsorbics, showed great adsorption of p-cresyl sulfate and indoxyl sulfate from the solutions. The majority of these toxins were adsorbed within the first 5 minutes of incubation. This showed instant saturation of AC materials with the toxins. However, adsorption of urea was more gradual, and increased with incubation time.

Conclusion. The tested AC materials showed great adsorption of MMW toxins in comparison to LMW toxins.