

New membrane for portable artificial kidney

Assistant professor Akbar Asadi (Biobased Chemistry and Technology) has developed a new membrane that can absorb urea. That reduces the use of water in dialysis treatments and paves the way for a portable dialysis device.

Kidney patients have to visit the hospital three to four times a week for dialysis. The dialysis equipment weighs about 100 kilos and uses large amounts of water to filter the toxic substances out of the blood. Hospitals need large water treatment systems to purify that water for reuse. That is the main reason why it has not been possible to date to develop a portable dialysis device.

Water

Dialysis uses two membranes. The first membrane removes toxic substances such as urea from the blood and dissolves them in water on the other side of the membrane. The second membrane separates the toxic substances from the water, allowing a small amount of water to be recirculated in the system.

Asadi's project focuses on the second membrane. Utrecht University Medical Centre has developed beads that can absorb urea based on polystyrene polymers. 'Using this absorbent material, we want to develop a membrane with a large surface area,' explains Asadi. 'Then not much water is needed and the blood can be purified more quickly.'

Simple method

The biochemist can make the membranes in the lab quite easily using what is termed the phase inversion process. 'We dissolve the polymer in an organic solvent,' says Asadi. 'Then we pour the solution onto a plate to create a thin film. Finally, we place the plate in water, which causes the membrane to solidify.' This initial project, which is funded by a grant from the EWUU alliance (Eindhoven University of Technology, WUR, Utrecht University and Utrecht Medical Centre), aims to demonstrate the proof of principle. After that, they will apply for a larger grant. ss



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A portable dialysis device would improve the quality of life of kidney patients considerably.