

# Wearable artificial kidney: Cryo-reclamation of dialysate

Department of Extracorporeal Therapy Systems

*Image by kolibri5 from Pixabay*

## Dialysis

- Water requirement: 200 L / week
- One out of 1000 individuals
- Pure tap water available?
- Can Monday, Wednesday, and Friday be blocked?
- Reduced life expectancy OK?

## Scientific proof already done

Uremic toxins cryo-removal by hand experiments (see chart at right).

## Now we're about to automatize it using a lab demonstrator

Automatic removal by an ice wash column

- wash column (picture top)
- electronics (picture bottom)
- software (underway)
- lab demonstrator (pending)
- worldwide protection (pending, EP 3 272 375 A1)



## Chance: True wearable artificial kidney

### Features

High class dialysis everywhere

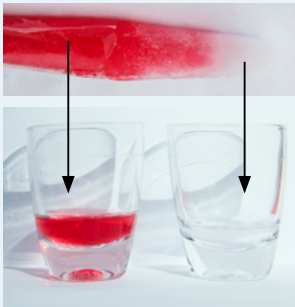
- at home, at work
- during travel / aircraft
- supply by solar panel
- supply by cars
- water independence
- long term survival
- refill 90 s every 2–3 h
- dialysis center water (avoids reverse osmosis)
- Get the 3 days/w occupied by dialysis released

## Challenge & Fortune

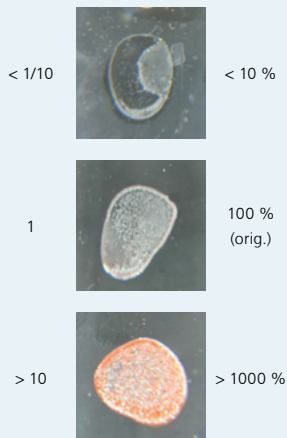
- Participate in a skilled technical development project
- Clinical trials to prove an innovative technology
- Speed up of prototype & series development
- Experienced dialysis project management
- Be the first in market with a truly wearable artificial kidney
- Dialysis will be diversified by this project
- Patents cover US, Canada, Europe, China & west pacific

### Kidney failure needs smart response to water scarceness

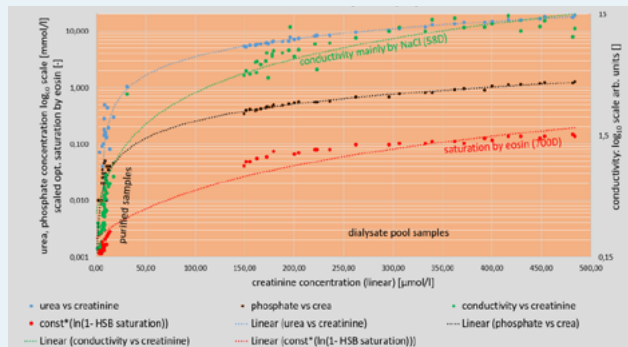
Separation by ice:  
Flavor vs water-ice



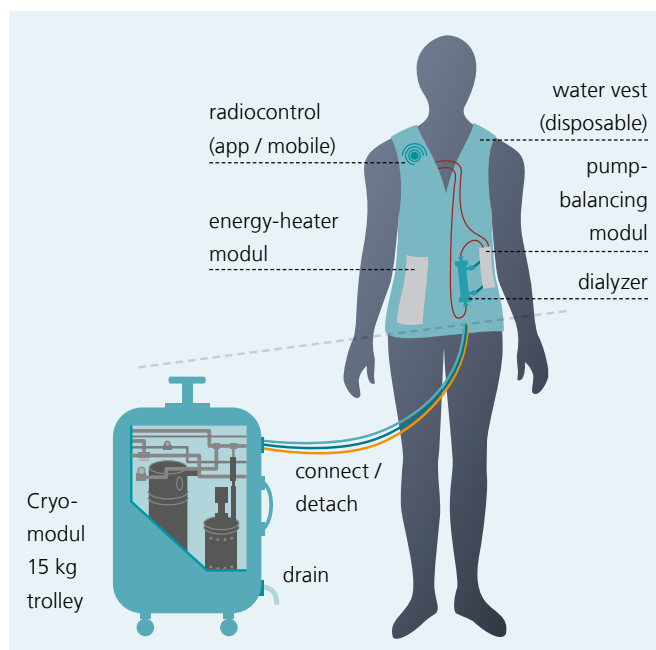
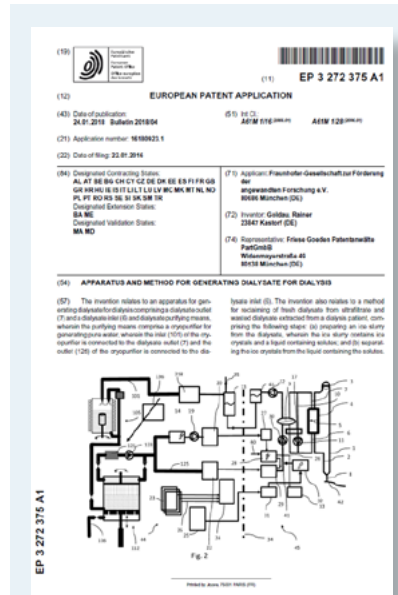
Total uremic toxins content in patient dialysate after single cryo run (purified, original, concentrated from orange stained dry sample)



### Urea, phosphate, conductivity and color saturation (HSB model) vs creatinine: Correlation by 1x cryo-purification



[https://academic.oup.com/ndt/article/33/suppl\\_1/i181/4997537](https://academic.oup.com/ndt/article/33/suppl_1/i181/4997537), Goldau R et al



## Contact

Dr. Rainer Goldau  
Department of Extra-  
corporeal Therapy Systems  
Tel. +49 381 494-2610  
rainer.goldau@  
izi.fraunhofer.de

Fraunhofer Institute  
for Cell Therapy and  
Immunology  
Schillingallee 68  
18057 Rostock  
Germany  
[www.izi.fraunhofer.de](http://www.izi.fraunhofer.de)