

12TH GLOBAL NEPHROLOGISTS ANNUAL MEETING

June 26-28, 2017 London, UK

Concepts of wearable artificial kidney development

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The work is devoted to results of dialysis regeneration methods investigation. The aim of the work is to construct a wearable artificial kidney that carries out prolonged continuous peritoneal dialysis. The dialysis fluid is recirculated through an extracorporeal circuit, which undergoes regeneration. Several activated carbons and hemosorbents were evaluated as potential sorption material. Three methods of urea elimination were aprobated: Immobilized urease, electrooxidation and thermal degradation. As a result, a prototype of a wearable artificial kidney was assembled. Its regeneration unit is based on electrolysis and gives opportunity to reach the urea elimination rate up to 1.2 g/h; creatine and uric acid elimination rates both equals to 0.3 mg/h (*in vitro* experinents). Along with that it is possible to keep concentration of sodium, chlorine and calcium ions in the range of 10% deviation from the starting value. The prototype of WAK is designed as a backpack and weights about 3.5 kg. In vivo experiment showed that the prototype carries out its functions, gives opportunity to eliminate exeeded fluid from peritoneal cavity and doesn't affect blood pH during dialysis.

Biography

Nikolai A Bazaev has completed his PhD and currently works as a Senior Scientist in National Research University of Electronic Technology, Department of Biomedical Systems. He has published more than 10 papers in reputed journals. He is an actual member of ESAO since 2016, member of ERA-EDTA since 2017. He works on two scientific projects: Development of a wearable artificial kidney, and development of a noninvasive glucometer.

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