

**Title: Wearable artificial kidney - back to the future: a review**

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Although the burden of end stage renal disease is worldwide expanding, current dialytic options are unsatisfactory, mainly due to their intermittent character. Benefits of continuous treatments on rates of complications and mortality are clearly demonstrated, and a miniaturization of dialysis devices would allow delivery of continuous treatment without limiting patient's freedom. Miniaturization poses several technical challenges, in terms of dialysis membranes, dialysate regeneration, vascular access, patient monitoring, power sources and pumping systems. First attempts in the creation of a portable/wearable artificial kidney (WAK) for hemodialysis (HD) date back to the seventies, but technology later needed to be refined with development of dialysate regeneration modules based on sorbents and enzymes. These advances paved the way to first, short-term validations in humans obtaining promising results in terms of safety and effectiveness but needing further confirmations. WAK have also been proposed to enhance the efficacy of peritoneal dialysis (PD), circumventing the problems of a direct access to blood system and continuous anticoagulation, main bottlenecks for a widespread use in HD. Dialysis market is presently offering some options for portable/home devices, but no WAK is marketed. Hot topics in recent researches on under development WAKs have been the selectivity and regenerability of sorbents and a reappraisal of electro-oxidation for urea elimination. Furthermore, promising, although preliminary, advances have been made in the development of implantable devices, most promising consisting in a combination of sorbents and a scaffold with renal epithelial cells.

**Biography**

Francesco Fontana, MD, is currently terminating his training in Nephrology at University of Modena and Reggio Emilia, Modena, Italy. In 2014 he attended an internship at the Instituto de Fisiologia Molecular, Instituto de Nutricion, Mexico City, Mexico. In 2015 he entered as a PhD student the Doctorate School of Clinical and Experimental Medicine at University of Modena and Reggio Emilia. His research interests focused on hemorheology in kidney transplantation and dialysis, acute kidney injury (AKI) models in rats and AKI – chronic kidney disease transition, biocompatibility and clinical aspects of miniaturized devices for chronic dialysis.