Leti Developing Miniaturized Sensors for Artificial Kidney that Provides Improved Dialysis

CEA-Leti

Portable Renal-Care System Fits in Carrier that Is Worn on Patient's Side

CEA-Leti and nine partners in the NEPHRON+ project are developing an artificial kidney that would provide a major improvement in treating patients with chronic kidney failure.

The goal is a next-generation, integrated system that allows real-time, continuous, multiparametric monitoring of the patient and the device via sensors developed by Leti and its partners. The continuous data collection will allow early detection of device anomalies and a trend analysis on the health status of the patient, which would be used to improve treatment.

The renal-care system, contained in a rectangular holder that is worn on the patient's side, offers improved blood filtering and allows patients to avoid required periodic dialysis treatments.

"NEPHRON+ presents an ideal system for dialysis outside a hospital or clinic because it improves blood clearance and provides ongoing monitoring of the device and patients, who would gain a level of freedom and convenience they don't have today," said Gilles Marchand, head of Leti's materials and interfaces chemistry laboratory "This system is another primary example of Leti's continuing innovation in sensors and our commitment to turning technological advances into real products."

Leti's contribution also will include the design, development and the integration of the electrochemical platform in the artificial kidney.

Leti focused on miniaturizing the sensors to embed them in the device, as well as improving the electronic board that converts the sensor electrical signals in a ready-to-use concentration. To achieve this, researchers developed an electrochemical platform including five biocompatible ionic selective electrodes (ISE) able to monitor ion concentrations, as well as a reference electrode, a temperature sensor and an EPROM to store parameters (calibration curves).

Leti's partners in the project are Exodus S.A. (coordinator), CSEM, TNO, Nierstichting Nederland, IMST GmbH, Nanodialysis BV, Danube University Krems, University Medical Center Ultecht and OFFIS EV.

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