

LS20-079 - Closing the Loop in Hemodialysis: A Precision Medicine Approach

Abstract

Fluid status and blood pressure (BP) are deranged in a variety of health disorders including kidney disease. Hemodialysis (HD) for kidney failure can inform human fluid and BP research in general. We previously identified patient clusters based on bioimpedance spectroscopy-derived fluid overload (BIS), BP, gender, comorbidities; we incorporated absolute blood volume (ABV) measurements by intradialytic blood volume monitoring (BVM) in response to dialysate bolus into clinical routine; and we analyzed the details of the renin-angiotensin system (RAS). Aiming at improving patient outcomes far beyond kidney failure, we propose a 3-step project: (1) Developing an algorithm for ABV determination (N=98 patients); (2) A precision medicine registry combining BIS, 24h-ambulatory BP, ABV, focusing on RAS fingerprinting and dialysate/urinary proteomics, with qualitative patient interviews and hard clinical outcomes (N=200); (3) An interventional cross-over RCT, using the clustering developed from (1) & (2) and applying algorithm-assisted HD therapy in clinically challenging patients (fluid and BP extremes) based on BIS, BP, BVM/ABV, RAS, controlled by patient choice (N=50). Representing precision medicine per se, our approach closes the loop on BIS and BVM/ABV, offering an automated tool for HD patients in general. The precision clustering (including proteomics) will also generate pathophysiological knowledge on BP (high and low) and fluid (overload and depletion) beyond HD.

Scientific disciplines:

Nephrology (40%) | Medical diagnostics (40%) | Medical biochemistry (20%)

Keywords:

absolute blood volume, ambulatory blood pressure, renin-angiotensin system, continuous bioimpedance spectroscopy, patient perspectives

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Status: Ongoing (01.06.2021 - 31.05.2025)

Further links to the persons involved and to the project can be found under

<https://www.wwtf.at/funding/programmes/ls/LS20-079/>