Blood Purification

Letter to the Editor

Blood Purif 2024;53:229–230
DOI: 10.1159/000534824

Received: September 19, 2023
Accepted: October 23, 2023
Published online: October 31, 2023

Acid-Free Biocompatible Hemodiafiltration

Marco Marano

Unit of Nephrology and Dialysis, Maria Rosaria Clinic, Pompeii, Italy

In bicarbonate dialysis (BD), 2–4 mmol/L of acetic acid are added to dialysate to maintain salts in their soluble form. After giving up the hydrogen ion, the acetate anion diffuses into the bloodstream, increasing blood acetate concentration up to 0.3 mmol/L [1]. In acetate-dialysis, acetate concentration was much higher, ranging between 4 mmol/L and 10 mmol/L, and 1 out of 11 patients was unable to metabolize such acetate overload so experiencing "acetate intolerance" which included vascular instability with intradialytic hypotension (IH). Although the mechanisms of acetate-related hypotension are varied, the different rates at which patients metabolize acetate load from dialysate account for the higher blood acetate levels in intolerant patients, which in turn cause vascular instability. However, given the magnitude of such figures, it seems unlikely that this can happen also during BD. In fact, when dialyzed against bicarbonate dialysate containing 8 mmol/L acetate, no symptom arises, specifically hypotension does not occur [2].

Acetate-free biofiltration (AFB) was claimed to reduce IH with respect to BD [3] and to on-line hemodiafiltration (HDF) [4]. If, at current concentrations, acetate is not responsible for hemodynamic instability and IH, then the absence of acetate in AFB cannot justify the improved hemodynamic tolerance of the technique. As a distinctive characteristic AFB has carbon dioxide (CO_2)-free dialysate which avoids the CO_2 overload that instead occurs in BD [5] and HDF [6]. This unique feature is due to the lack of acid in the dialysate because is just the acid that generates CO_2 by reacting with bicarbonate.

Acetic acid is commonly used in BD and HDF, but by replacing it with citric acid or hydrochloride acid, the same reaction occurs, still leading to CO_2 overload. Citrate-based treatments, despite being acetate-free, show increased partial pressure of CO_2 in blood exiting the extracorporeal circuit and are associated with hemodynamic instability [7]. Cardiac output and peripheral vascular resistance do not change by replacing acetic with citric acid [8], but a significant decrease in IH incidence occurs if acid is removed by dialysate: patients receiving HDF with acetate-free chloride-based dialysate improved their hemodynamic stability during 3-month period of AFB [9]. Taken all together, these evidence suggest that hemodynamic tolerance is not related to acetate anion but to the lack of acid, regardless of what it is.

The lack of acid and the CO_2-free dialysate make AFB a suitable technique for patients unable to handle CO_2 overload but also for patients at risk of IH. The new insights in pathophysiology of AFB depict the technique very differently than we knew. To underline this novelty, it is not enough to replace the term "acetate" with "acid," as I already suggested [10]. Here, I would propose to use the new label "acid-free biocompatible hemodiafiltration." The term biocompatible should not be intended as behavior of the

karger@karger.com
www.karger.com/bpu

Correspondence to:
Marco Marano, marano965@gmail.com; marco.marano@mariarosaria.it

Karger

filter membrane but as the ability of dialysis technique to be in contact with a living system with fewer adverse effects. Being a convective-diffusive treatment, the word "hemodiafiltration" is also appropriate.

Conflict of Interest Statement

The author has no conflicts of interest to declare.

Funding Sources

This study was not supported by any sponsor or funder.

Author Contributions

Marco Marano conceived the study, drafted the paper, and approved the current version.

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