

Removal evaluation of a new dialyzers with medium cut-off membrane (MCO Theranova®) in HD treatments

Ugo Teatini[§], Giorgio Romei Longhena[§]

[§]Renal Unit ASST Rhodense, Garbagnate, Italy

OBJECTIVES

The high-flux dialyzers in standard hemodialysis offer numerous benefits for ESRD patients, such as, increasing the uremic toxins removal in a wide spectrum. New dialyzers with a medium cut-off membrane (MCO, Theranova®, Baxter), designed to further expand the removal of medium molecules in standard HD (Figure 1), represent an innovative way to remove uremic toxins, called **eXpanded HemoDialysis (HDx)**.

AIM: This study was addressed to evaluate the removal efficacy of HDx, enabled by Theranova®, on Reduction Rate (RR) of uremic toxins in comparison with our data achieved with three different types of online postdilution HDF treatments [1].

METHODS

The Theranova® 400 dialyzers (1.7 m²) were assessed in standard HD by measuring pre and post-HD samples of: Urea, creatinine, beta2-m, myoglobin, hemoglobin, albumin and total serum protein. Data from two routine monthly surveys on each of the 8 stable HD patients (M/F 6/2) were collected. Data are reported as mean ± standard deviation (SD).

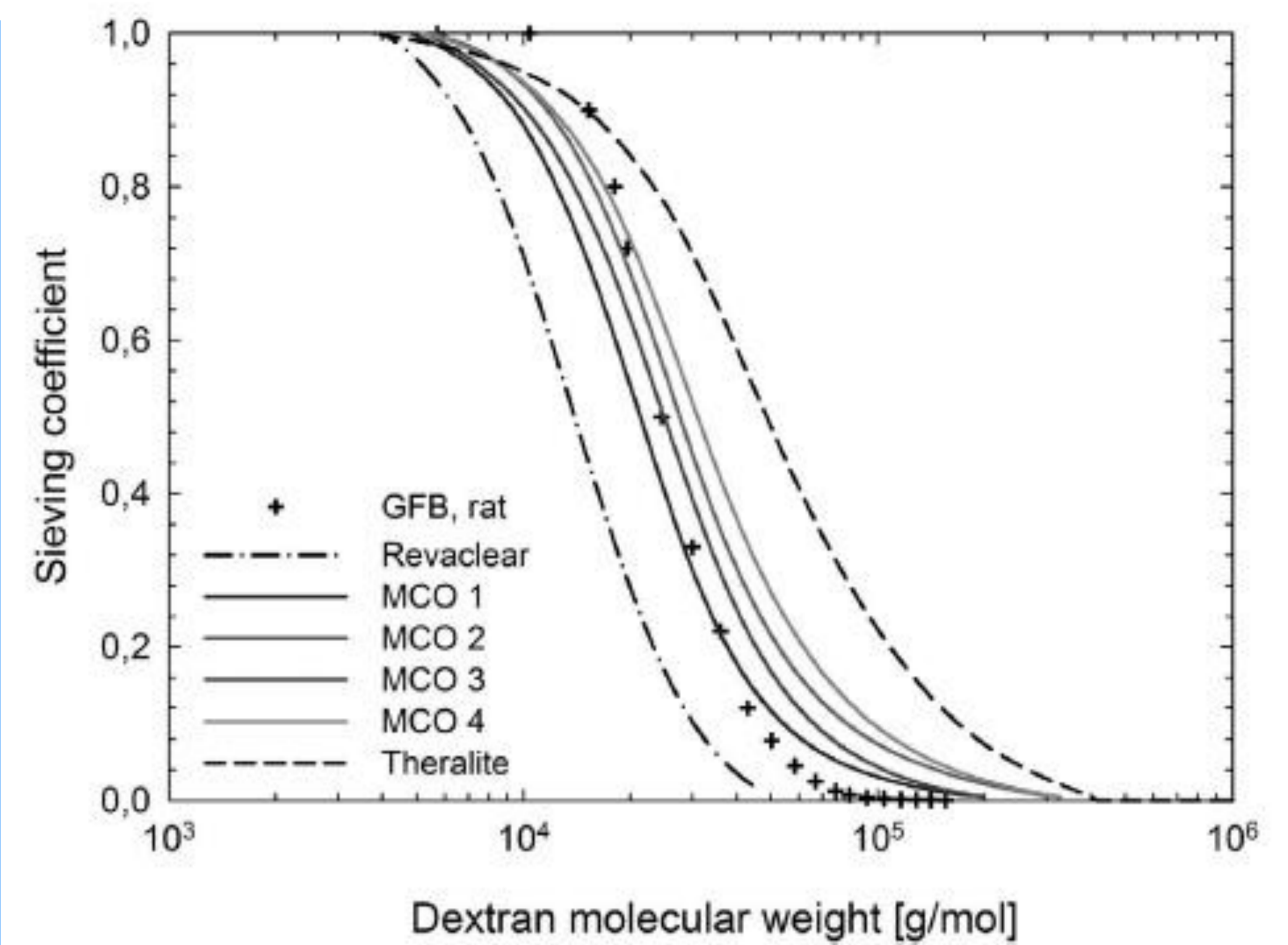


Figure 1: Characteristic in vitro dextran sieving curves measured in aqueous solution for different types of membranes: Revaclear, MCO1 (Theranova) and Theralite (graph derived by Boschetti de Fierro et al [2]).

RESULTS

	Urea (mg/dl)	Creatinine (mg/dl)	Beta2-m (mg/l)	Myoglobin (mg/l)	Hb (g/dl)	Total Protein (g/dl)
Pre-dialysis	136,8±25,8	9,5±1,3	31,7±6,7	175,8±56,9	11,8±1,1	6,8±0,3
Post-dialysis	40,8±11	3,6±0,8	9,5±2,9	79,4±29,1	13,0±1,1	7,8±0,6

Table 1: Pre and post-HD value of several uremic toxins (Urea 60 Da, Creatinine 113 Da, Beta2-m 11.818 Da e Myoglobin 17.600 Da) measured in HDx treatments with Theranova 400

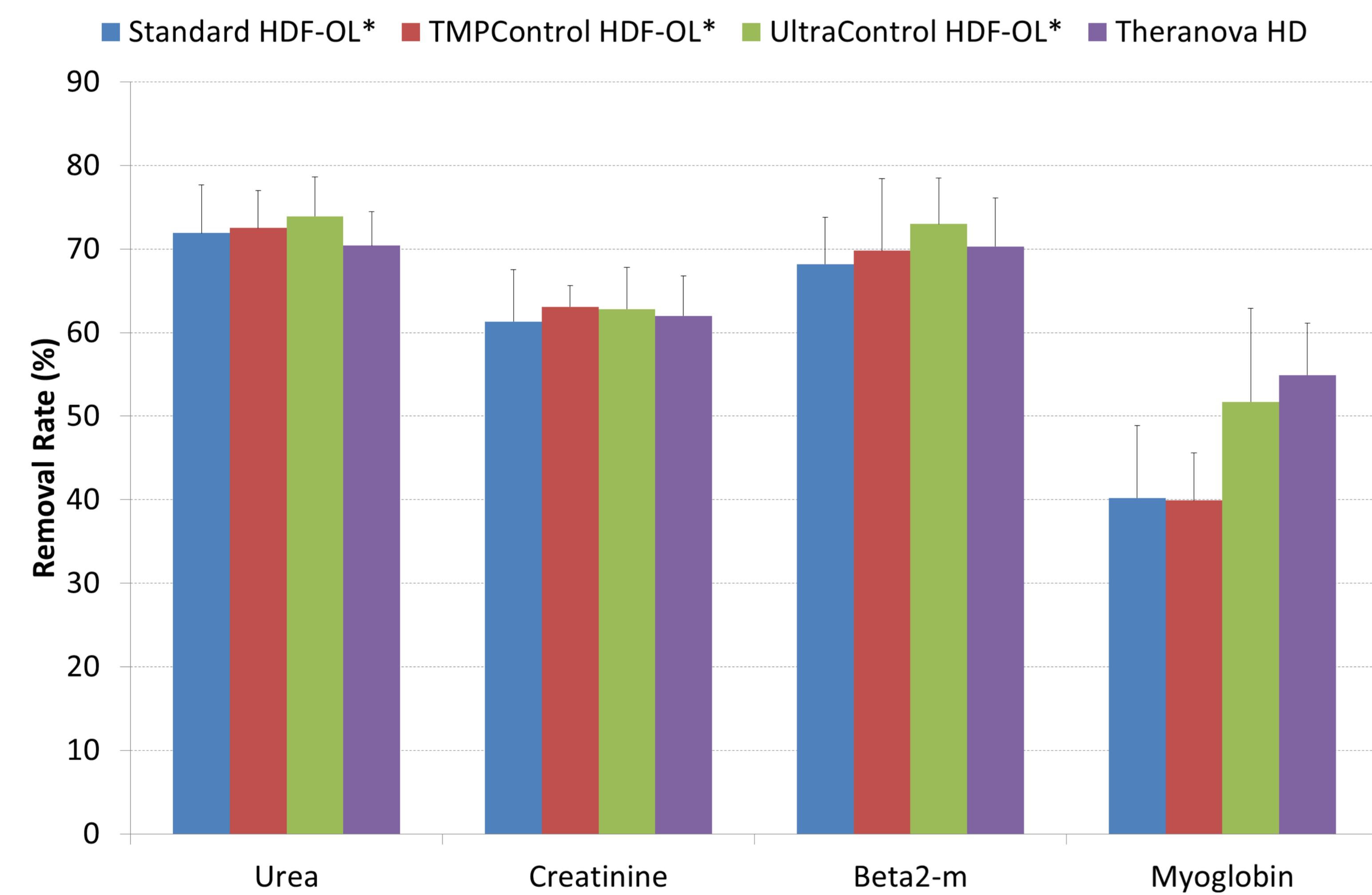


Figure 2: Removal rate (%) of several uremic toxins (Urea 60 Da, Creatinine 113 Da, Beta2-m 11.818 Da e Myoglobin (17.600 Da) measured in HDx and HDF online treatments (data derived by Teatini et al [1])

Theranova® was well accepted by all the patients and no adverse events were reported. The main results, reported in table 1, showed a high removal rate for all the uremic toxins analyzed. The albumin level was measured before and after the study protocol without changes (3,83±0,3 vs and 3,83±0,3 g/dl, p=0,999).

Comparing our results obtained with the Theranova® filter in HD with data in our previous study [2] on infusion management mode in HDF postdilution (see Figure 2), we achieved similar RR(%) for small and light-medium molecules and slightly superior to HDF-OL for medium molecular with higher molecular weight, such as myoglobin (17.600 Da). The dialytic setup of the treatments evaluated are reported in table 2.

Treatments	Treatment Time (min)	Qb (ml/min)	Infusion Volume (L)	Surface Dialyzer (m ²)	Pts (n)
Standard HDF-OL*	220,0±14,7	298,3±14,6	10,5±1,7	2,1	12
TMPControl HDF-OL*	219,8±14,8	297,5±16,0	16,2±1,9	2,1	12
UltraControl HDF-OL*	220,3±14,6	298,8±28,3	20,0±1,6	2,1	12
Theranova HD	218,0±15,0	300,0±0,0	-	1,7	8

Table 2: Dialytic setup of HDx and HDF treatments (data derived by Teatini et al [1])

CONCLUSIONS

Expanded HD (HDx), enabled by Theranova 400® dialyzer, offers high removal rate for both small and medium-sized molecules (beta2-m, myoglobin), comparable to those achieved in high-volume HDF treatments, without changing in albumin level. It's worth to note that our results with Theranova® were obtained with a low surface area (1.7 vs 2.1 m²) than our previous study in HDF online.

REFERENCES

- U. Teatini et al. Evaluation of a New Online Hemodiafiltration Mode with Automated Pressure Control of Convection. Blood Purification 2011;31:259-267
- A. Boschetti-de-Fierro et al. MCO Membranes: Enhanced Selectivity in High-Flux Class. Sci. Rep. 5, 18448