

## Introduction

- End-stage renal disease (ESRD) patients on dialysis are dependent on the dialysis procedure to control fluid status and electrolyte concentrations, and the composition of the dialysate is critical to this process.
- In recent years, higher dialysate sodium concentrations have been used in an attempt to reduce the frequency of dialysis-associated symptoms and intradialytic hypotension, which have become more common as dialysis times have decreased.<sup>1,2</sup>
- Consequently, dialysis patients in the US frequently undergo dialysis against a dialysate that results in net diffusive movement of sodium into the patient. This can contribute to interdialytic weight gain, thirst, and hypertension.<sup>2</sup>
- Individual patients may have stable predialysis serum sodium concentrations over time, and data suggest that tailoring the dialysate sodium concentration to the patient's serum sodium "set point" may decrease the magnitude of interdialytic weight gain and improve blood pressure and volume control.<sup>2-5</sup>
- Little information is available, however, on the number of measurements needed to reliably determine the serum sodium set point for an individual patient.

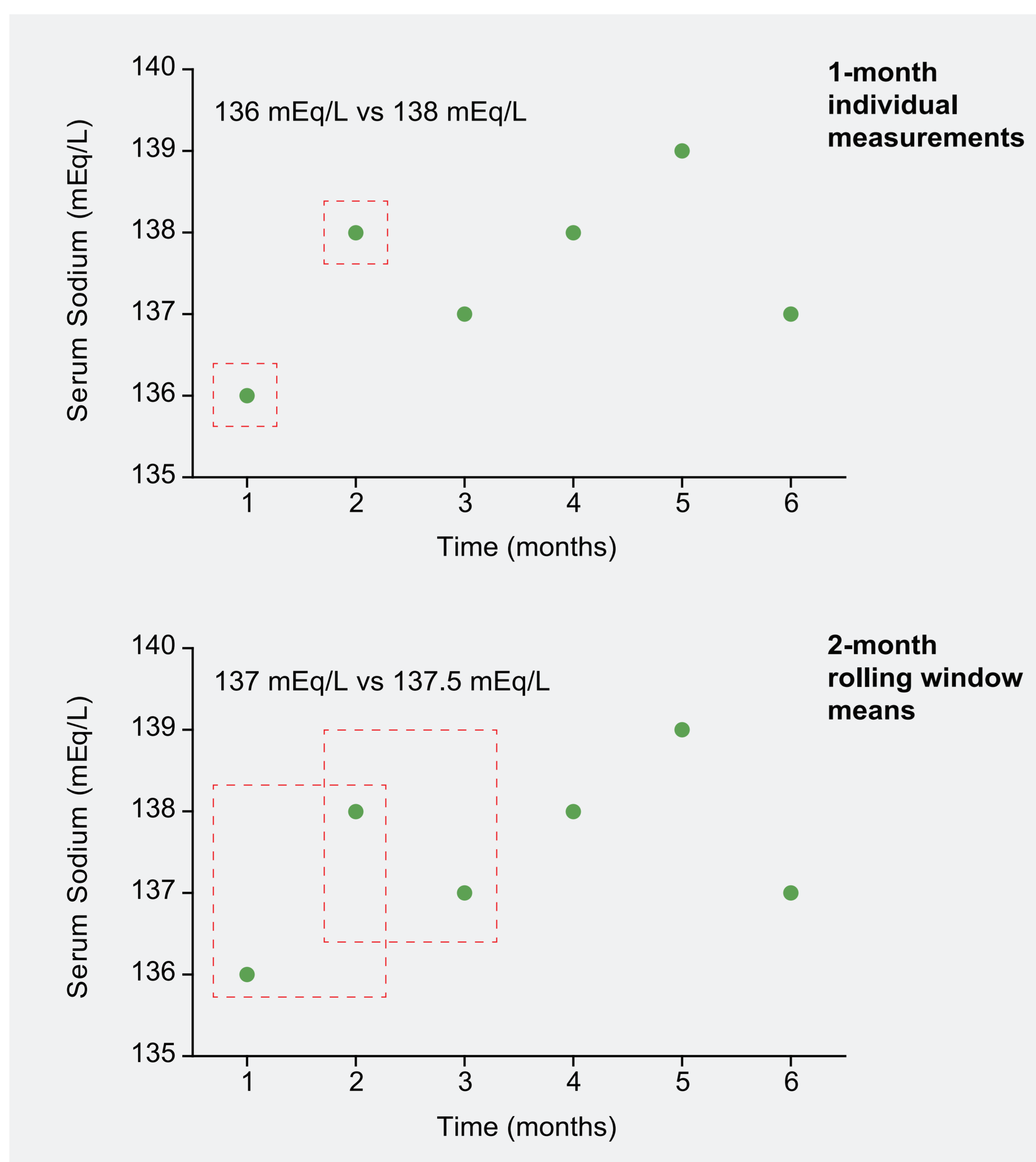
## Objective

The aim of this study was to establish the number of same-patient serum sodium measurements needed to estimate a reliable homeostatic set point.

## Methods

- We conducted a retrospective analysis of all pre-dialysis serum sodium measurements taken from 10,413 randomly selected in-center hemodialysis patients treated by a large dialysis organization in the US.
- Dialysate sodium was kept constant over the 6-month study period, January–June 2012.
- For each patient, serum sodium was considered by individual measurements and as 2-month, 3-month, 4-month and 5-month rolling window means (Figure 1).
- Intra-class correlation coefficient (<0.5 = weak, 0.5-0.8 = moderate, >0.8 = strong) was used to evaluate the reproducibility of each measure over 6 months.

Figure 1. Measurement of Serum Sodium Concentration



Data shown for 1 hypothetical patient. Intra-class correlation compares the correspondence within a single patient to the correspondence among patients.

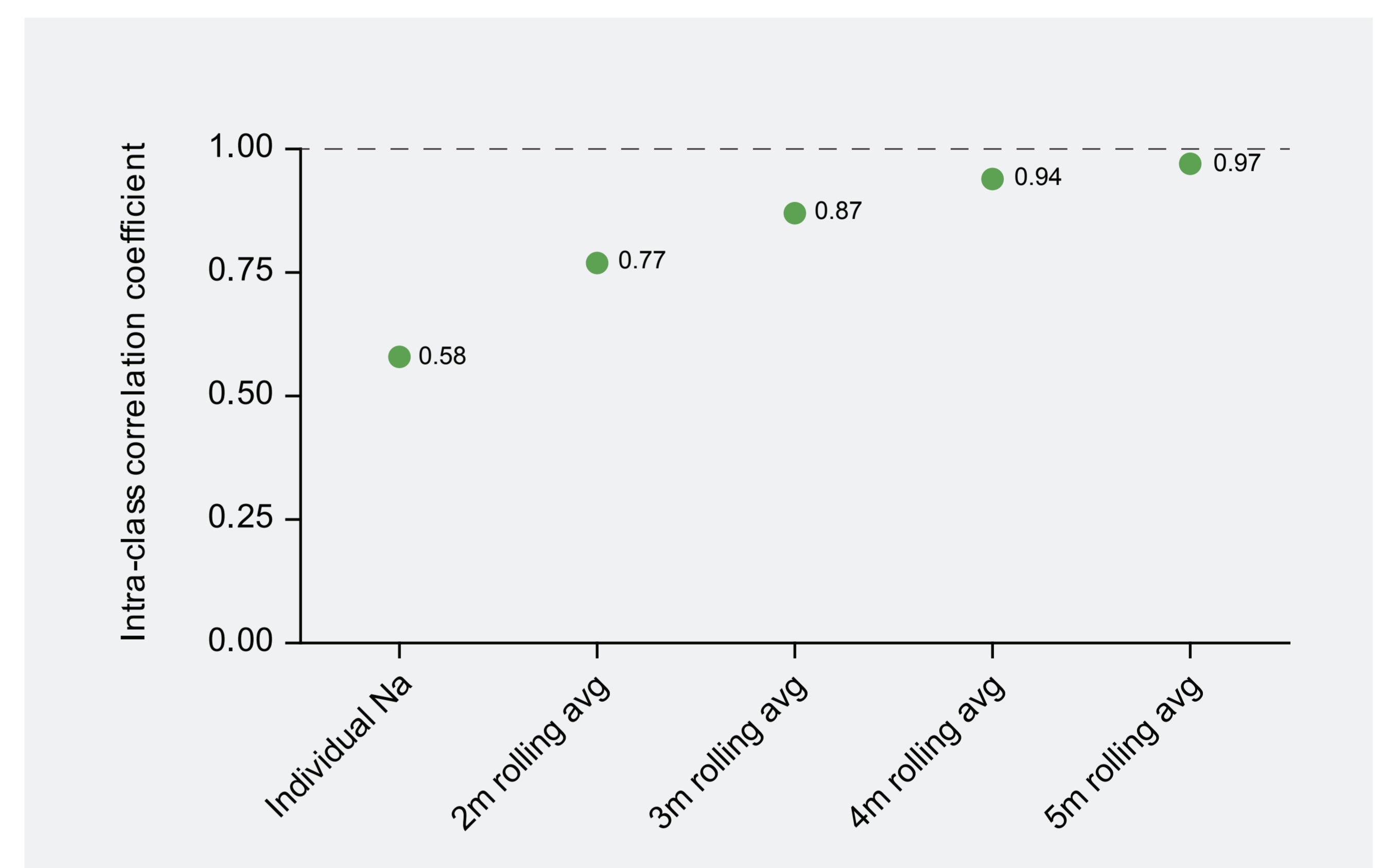
## Results

- A total of 55,540 individual serum sodium measurements from 10,413 patients were included in the analysis. Patient characteristics are shown in Table 1.
- The median (p25, p75) number of sodium measurements per patient was 6 (6, 6) over the 6-month study period.
- The mean serum sodium concentration for the cohort was 137.9 mEq/L.
- Intra-class correlation coefficient was incrementally higher for rolling windows of longer duration. Incremental gains in intra-class correlation were comparatively less for windows of >3 months in duration (Figure 2).

Table 1. Patient Characteristics (N = 10,413)

	Mean ± SD
Age (years)	59.64 ± 14.53
Vintage (years)	7.15 ± 4.19
BMI	27.53 ± 7.17
	%
Gender (% male)	55.9%
Race/Ethnicity	
African American	43.6%
Asian, Pacific Islander	4.0%
Hispanic	17.7%
Native American	1.0%
White	30.6%
Diabetic	40.6%

Figure 2. Reproducibility of Serum Sodium Measurements



## Conclusions

- Measurement of predialysis serum sodium is reliably reproducible when evaluated over rolling windows as short as 2 to 3 months.
- Evaluation over longer intervals may yield incremental improvements in reliability; however, the clinical utility is offset by the consequent delay in decision making.
- To tailor dialysate sodium to serum sodium in hemodialysis patients, clinicians and researchers should consider using 2- or 3-month sampling windows to determine the serum sodium set point.

## References

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