

## INTRODUCTION AND AIM

Since ESHOL study (Maduell F, JASN 2013) was published, OnLine HemoDialFiltration Post-Dilution (OL-HDF) has become the gold standard to perform chronic hemodialysis. Due to this study, **total convective volume (= ultrafiltration rate + substitution volume)** is also wished to reach 25L or more per session to improve patients' survival.

In our dialysis center, above 90% of the patients benefit from HDF realized with 4 types of HDF machines (AK-200 Ultra, ARTIS, 5008 and 5008-CORDIAX) for which automatic devices control substitution volumes (Ultra-control® for AK200 Ultra and ARTIS, Autosub® for 5008 and Autosub plus® for 5008 CORDIAX).

We wondered if these machines and devices could deliver the same performances, consequently we decided to conduct a retrospective and monocentric study to compare total convective volume and also dialysis dose.

## PATIENTS AND METHODS

Univariate and multivariate analyses were conducted on patients who had undergone at least ten 4-hour OL-HDF post-dilution sessions during the first 9 months in 2013 and models used only the first 70 sessions. All patients had complete data for all covariates that were designated as either case-mix factors (age, gender) or dialysis-specific factors (weight, biological and dialysis parameters: substitution volume, ultra-filtration rate, on line dialysance (K and Kt) and biological Kt/V recorded on DIALOG7 Software) that hence were time-dependent. Associations between total convective volumes or Kt parameters and device type were estimated by using generalized linear regression (SAS PROC Mixed; SAS Institute, Cary, NC) with an unstructured covariance structure. Before model development, we verified Gaussian distributions of continuous variables. To verify model assumptions, we performed routine regression diagnostics that assessed normality, linearity, homogeneity of variance, and influence. Model results are summarized by using parameter estimates and 95% CIs. All P reported are 2 sided, and statistical significance is defined as P less than 0.05. All statistical analyses were performed using SAS (version 9.3).

## RESULTS

### PATIENTS AND SESSIONS:

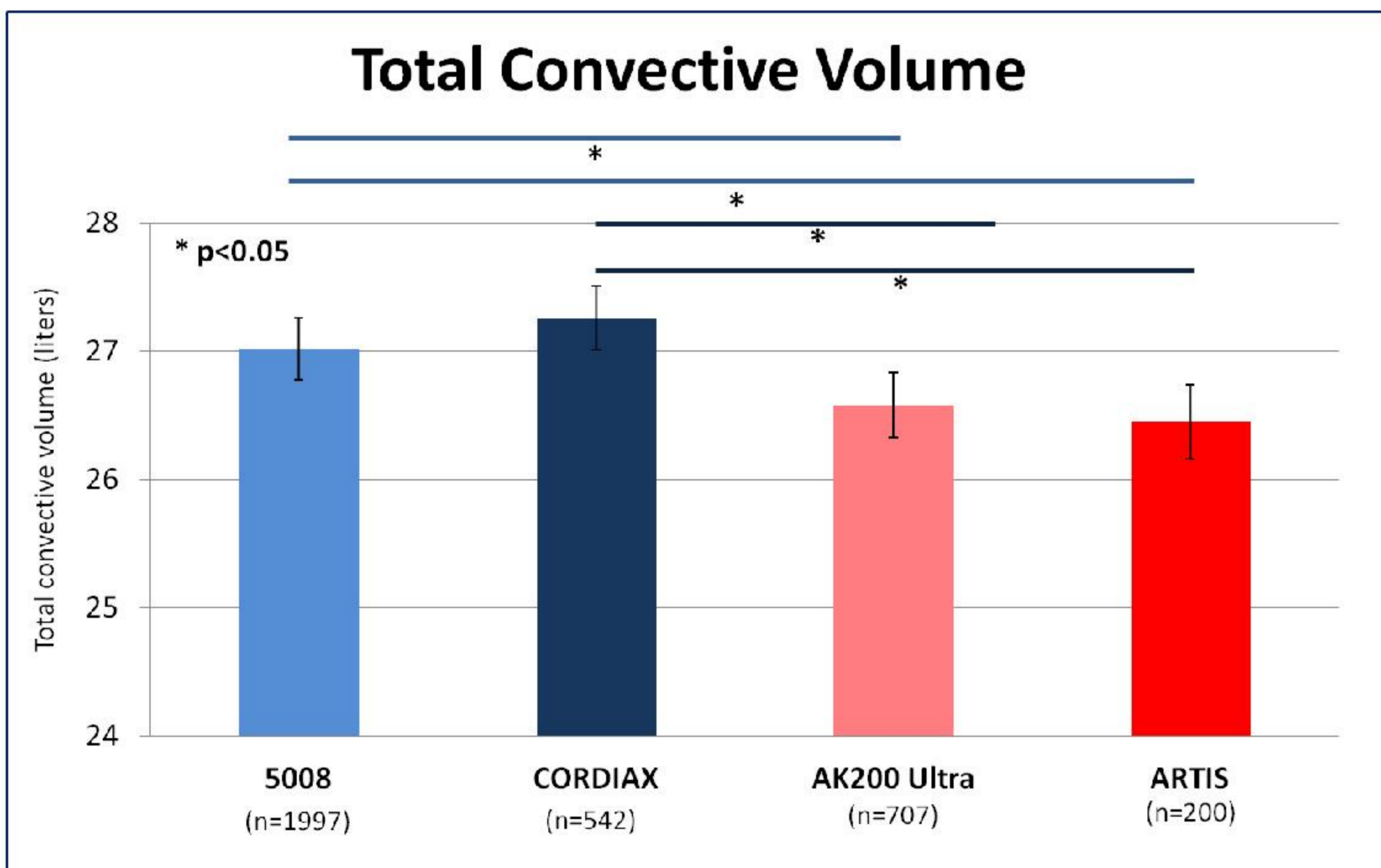
62 patients (40 male) aged  $74 \pm 13$  years were included. Their biological characteristics were: protidemia  $66.8 \pm 5.4$ g/l, albuminemia  $37.9 \pm 4.8$ g/l, hematocrit  $35.4 \pm 3.7\%$ .

4 different hemodiafilters have been used during the study period (Elisio®, TS SL®, VitaPES® and FX100®). The choice of filters did not depend on dialysis machine. Mean blood flow rate ( $Q_b$ ) was  $332 \pm 26.7$ ml/min and dialysate flow ( $Q_d$ ) rate was always 600 ml/min.

3446 sessions from were analyzed (1997 sessions with 5008, 542 with 5008 CORDIAX, 707 with AK200 Ultra and 200 with ARTIS).

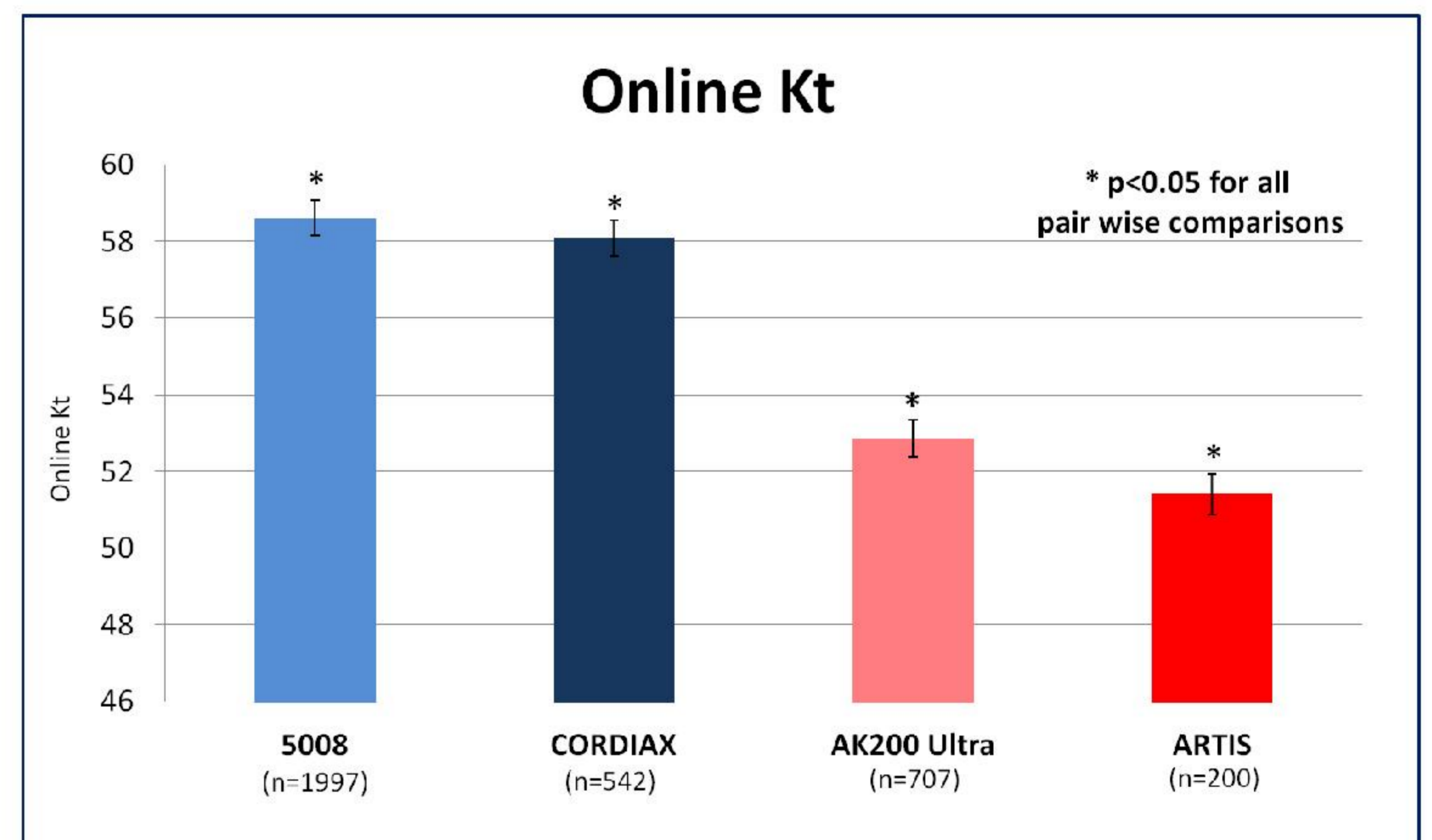
### CONVECTIVE VOLUMES:

Total convective volumes (least squared mean  $\pm$  SEM) were  $27.02 \pm 0.24$ ,  $27.26 \pm 0.25$ ,  $26.58 \pm 0.25$  and  $26.45 \pm 0.29$  for 5008, 5008 CORDIAX, AK200 Ultra and ARTIS respectively; Hochberg's adjusted p-values were all statistically significant for pair-wise comparisons except between AK200 Ultra ARTIS ( $p = 0.9889$ ) and between CORDIAX and 5008 ( $p = 0.1252$ ).



### ONLINE DIALYSANCE:

Online Kt figures were quite similar with least squared mean  $\pm$  SEM being  $58.61 \pm 0.45$ ,  $58.08 \pm 0.47$ ,  $52.86 \pm 0.48$  and  $51.41 \pm 0.54$  for 5008, 5008 CORDIAX, AK200 Ultra and ARTIS, respectively; all p-values statistically significant for pair-wise comparisons. Multivariate analyses confirmed these results when comparing 5008 or 5008 CORDIAX to AK200 or ARTIS.



### BIOLOGICAL DATA:

These results were confirmed by comparing biological Kt/V (Daugirdas 2) of the last 10 patients switched from AK200 Ultra to 5008. The Kt/V value always improved and raised from 1.52 to 1.68.

## DISCUSSION AND CONCLUSION

These retrospective and monocentric data show lower total convective volume for patients treated with Artis® dialysis machine AK-200 ultra® compared to 5008® and 5008 Cordiax® but all the convective volumes obtained were above 25 l.

Dialysis dose were also worse when treatment is delivered by Artis® or by AK-200®

We wondered how to explain these results. Multivariate analysis eliminate the potential role of hemodiafilters (type and surface), blood flow rate, ultrafiltration rate, protidemia, albuminemia and hematocrit.

The only difference between Fresenius and Gambro dialysis machine is the dialysate flow rate.  $Q_d=600$ ml/min is always prescribed in our center but with AK 200 Ultra and ARTIS substitution volume is subtracted from  $Q_d$  contrary to 5008 and 5008 CORDIAX. It represents a real  $Q_d=500$ ml/min for AK 200 Ultra and ARTIS and 600ml/min for 5008 and 5008 CORDIAX.

Nevertheless, it has never been demonstrated that the euration of small or middle molecules in OL-HDF POST is improved by the upraise of  $Q_d$ , particularly when above 500ml/min. Such demonstration should be performed in order to explain our results.

Although the quality of treatment is significantly better with 5008 and 5008 CORDIAX, all the automated devices delivered dialysis sessions which remained above current recommendations ( $Kt > 45$  and Total convective volume  $> 21$ L).