

AUTOSUB+: A SOPHISTICATED INNOVATIVE TOOL FOR A SIMPLIFIED OL-HDF PRACTICE

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OBJECTIVES

- The optimization of convective volumes (V_{conv} = Substitution Volume (V_{Subs}) + Ultrafiltration for weigh gain (UF)) delivered in Post ol-HDF (POST) allows to remove the Medium Molecules (MM) and especially those with the highest Molecular Weight (MW).

- Membrane permeability is preserved thanks to automated V_{conv} . The 5008 dialysis machine (Fresenius Medical Care) was, up to the recent provision of its new **CorDiax** version, equipped with a module **AUTOSUB** (AS) enslaving Substitution rate (Q_s) to plasmatic water rate (Q_{pw}).

$$Q_s \text{ (mL/min)} = [Q_b \times (1 - Ht/100) \times (1 - 7 \cdot TP/1000)] - UF$$

with Q_b (mL/min) = blood flow rate; Ht = Hematocrit TP = Total Proteins (g/L)

- Recently **AUTOSUB+** (AS+) uses an innovative technology regulating Q_s according to the harmonic analysis at the venous pressure sensor of the blood pump generated vibrations according to the principle of "la transformée de Fourier". (Fig.1.)

- The aim of our study is to compare V_{conv} obtained with AS versus AS+ in POST.

METHODS

- 24 patients (Age: 73.6 ± 11.9 ; AVF = 19 and Catheter = 5) were included in a monocentric crossover study.

- They were treated during a **240min**/session on the same day of 2 consecutive weeks with 3 different Q_b (mL/min) groups: Q_b300 , Q_b350 and Q_b380 .

- **AS** was set with hematocrit (Ht) given by the **Blood Volume Monitor** and the level of the latest measured Total Proteins (TP).

- Statistical analysis (StatView) was performed with Student's paired test for mean values of AS and AS+.

- Correlation between Ht and TP with the global Filtration Ratio ($FR = V_{conv} / \text{Total Blood Processed}$) was also analysed.

RESULTS

- **No significant difference** between the two methods (AS or AS+) for V_{conv} (Table 1.)

- No correlation between Ht ($34.7 \pm 3.14\%$) and AS or AS+. (Graph 1.)

- The most important correlation between TP and FR with AS versus AS+ explains the less dispersion for V_{conv} values with AS+ (versus AS). (Graph 2.)

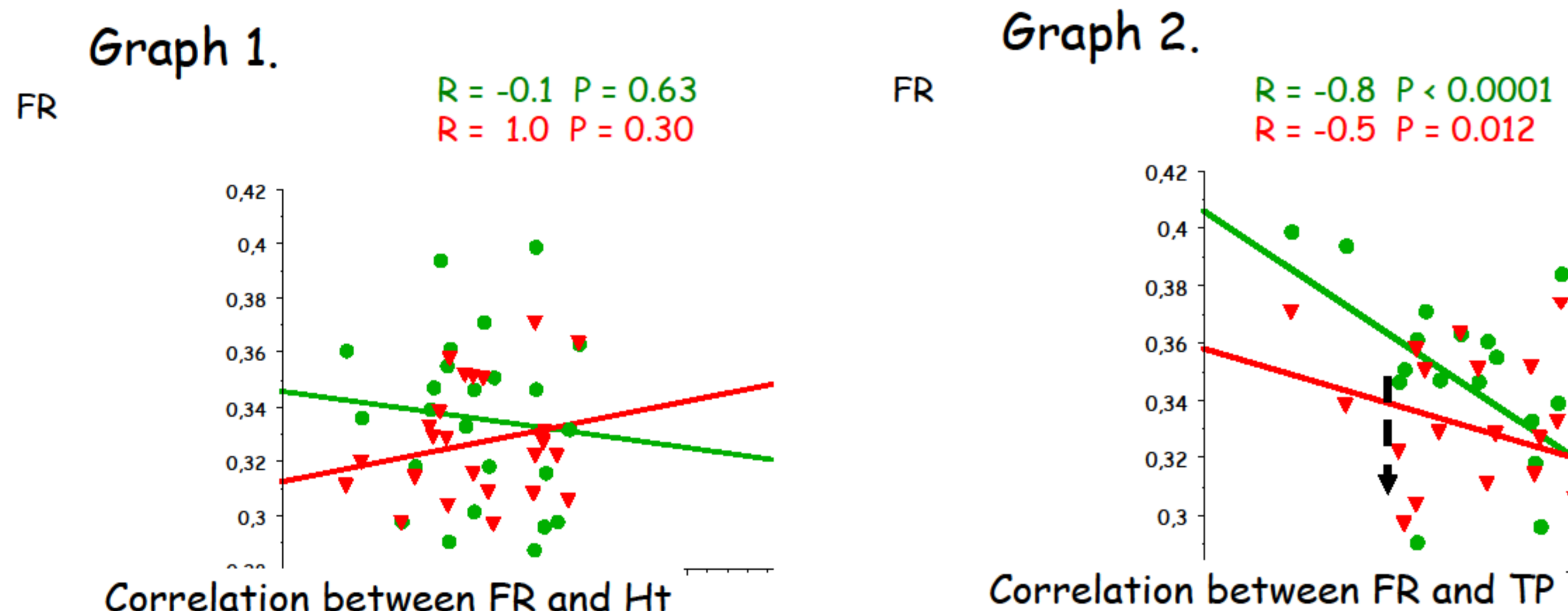
- AS+ is no more dependant on the great variations of TP from one patient to another ($PT = 67 \pm 5.7g/L$).

- The interception of the 2 linear regression curves between TP and FR predicts V_{conv} efficiency more favorable for AS when $TP < 70g/L$ and for AS+ when $TP > 70g/L$

Table 1. Convective Volumes (L) ($V_{conv} = V_{Subs} + UF$)

	Q_b 300 mL/min	Q_b 350 mL/min	Q_b 380 mL/min
AutoSub (AS)	24.8 ± 3.1	27.8 ± 3.0	28.8 ± 2.4
AutoSub+ (AS+)	23.9 ± 1.2	27.2 ± 1.9	28.5 ± 2.1

For AS, UF (L) = 2.5 ± 1.1 and for AS+: UF (L) = 2.6 ± 0.8



FR = Filtration Ratio = $V_{conv} / \text{Total Blood Processed}$
It represents the intensity - and supposed efficacy - of convection for a given Q_b

COMMENTS & CONCLUSIONS

- AS+ using innovative technological approach allows, without any knowledge of Ht and TP, identical V_{conv} to those generated by AS.

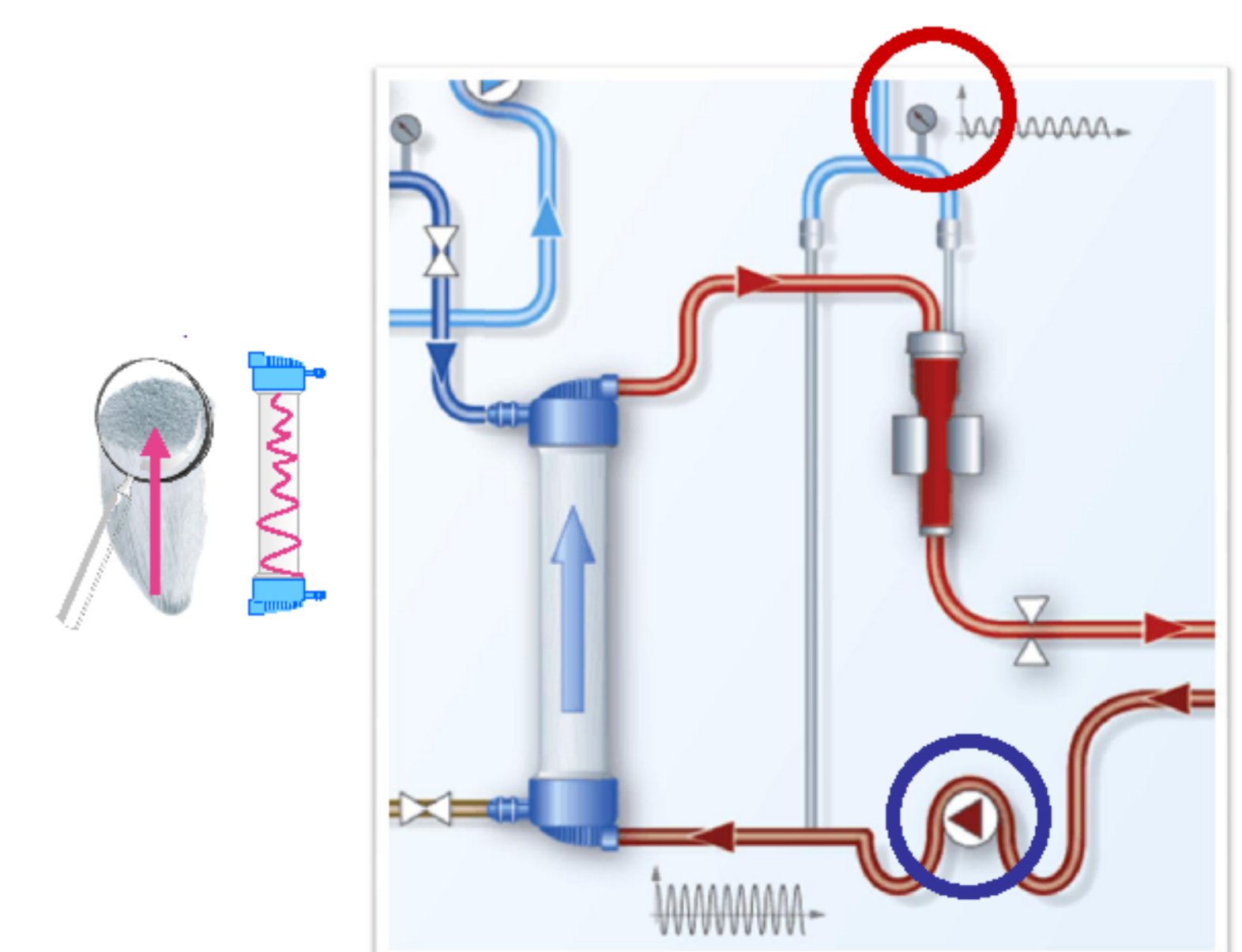
- In practice, using the default values of Ht and TP - instead of current values - decreases the accuracy of AS. In these conditions, optimizing Q_s without any biological value makes AS+ a real innovation in the automation and simplification of ol-HDF.

- This study confirms the relevance of AS to optimize Q_s when it is correctly set with the BVM Ht values and with the latest patient's TP values.

- Finally, AS remains as an effective tool for practicing POST both efficient and safe for those not yet equipped with the 5008 CorDiax machine and its new **AUTOSUB+** tool.

PRINCIPLE OF AUTOSUB +

Fig.1.* **Signal analyses** of pressure pulses



*With the consent of Fresenius Medical Care

