Letter to the Editor

The unit of Estimated Plasma Volume in Patients with Heart Failure using the Strauss-derived Duarte formula is not liter but dL/g

To the Editor:

We read with great interest the report of Fudim et al investigating the association between measurement and estimation of plasma volume in patients with heart failure (HF).[1] There has been growing evidence regarding the prognostic value of estimated plasma volume (ePVS) in patients with heart failure (HF),[2–4] although head-to-head comparisons between ePVS and actual PV measurements were currently lacking. The authors are to be highly commended for having performed such a comparison with actual plasma volume calculated by means of the isotopic method. Nonetheless, because the moderate correlation observed between measured plasma volume and ePVS could be context specific, other studies performed in different settings, including chronic HF, would be useful.

We would like to emphasize a technical point that might help readers interpreting the extremely interesting data reported by Fudim et al. ePVS calculated with the use of the Strauss-derived Duarte formula is the ratio of hemoglobin and hematocrit; this ratio actually does not provide the actual value of plasma volume but rather yields a value that is an indicator of plasma volume[2] (Fig. 1). The unit of this ratio is dL/g, because hematocrit has no unit and the unit of hemoglobin is usually expressed as g/dL. Consequently, we would suggest not using a liter unit, as suggested in the report of Fudim et al, when referring to ePVS results calculated with the use of the Strauss-derived Duarte formula. Conversely, ePVS calculated with the use of the Kaplan-Hakim formula could indeed be used with a liter unit. We think that this metronomic point is important for the accurate interpretation of the aforementioned report.

Importantly, even if the association between ePVS calculated with the use of the Strauss-derived Duarte formula is not highly associated with actual plasma volume based on the isotopic method, there is evidence for its risk-stratification properties in both chronic and acute settings as well as in different regions of the world.[2,3,5] In addition, ePVS does decrease during the course of HF hospitalization as a result of diuretic use.[3] As a result, ePVS may still be a useful integrative marker of congestion, which may help to improve the management of HF in the near future.

Strauss-derived Duarte formula :

$$\text{ePVS} = (100 - \text{hematocrit (\%)}) \,/\, \text{hemoglobin (g/dL)}$$

Strauss formula:

$$\Delta\text{ePVS} = 100 \times \frac{\text{hemoglobin (g/dL)(before)}}{\text{hemoglobin (after)}} \times \frac{1 - \text{hematocrit (\%)(after)}}{1 - \text{hematocrit (before)}} - 100$$

Fig. 1. Strauss-derived Duarte formula. ePVS, estimated plasma volume status.

Disclosures

None.

N.G., P.R., and O.H. are supported by a public grant overseen by the French National Research Agency (ANR) as part of the second "Investissements d'Avenir" program FIGHT-HF (reference: ANR-15-RHU-0004). M.K. declares no potential conflict of interest.

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https://doi.org/10.1016/j.cardfail.2018.12.002