Letters to the Editor

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Cystatin C blood level as a risk factor for death after heart surgery

We read with interest the manuscript of Ledoux *et al.*[1] entitled 'Cystatin C blood level as a risk factor for death after heart surgery' in the last issue of European Heart Journal. In this study they showed that glomerular filtration rate (GFR) estimated from cystatin C but not from creatinine was an independent risk fact or for hospital morbidity/mortality and for 1-year mortality.

One accepted limitation of cystatin C as a marker of GFR is that it requires a conversion formula which transforms cystatin C (expressed as mg/L) to GFR (expressed as mL/min).[2] Since several commercial systems for measuring serum and plasma cystatin C are available, this could cause problems.[3,4] Effectively, different cystatin C-based prediction equations for GFR have to be used according to assay methods used to achieve maximal diagnostic performance.[5–7]

In this study, Ledoux *et al.*[1] used the particle-enhanced nephelometric immunoassay (PENIA) method (Dade Behring, Marburg, Germany) and the following formula to transform cystatin C plasma levels, expressed as mg/L, to GFR expressed as mL/min:

$$\text{GFR} = 84.69 \times \text{Plasma cystatin C}^{-1.68} \times 0.948 \text{ (if female)} \quad (1)$$

Unfortunately, this formula must be used when the particle-enhanced turbidimetric immunoassay (PETIA) method is used.[5] When the PENIA method is used to measure cystatin C plasma level, as was the case in this study, it is more accurate to apply the following formula to convert cystatin C plasma levels to GFR values:[2,7]

$$\text{GFR} = 66.8 \times \text{Plasma cystatin C}^{-1.3} \quad (2)$$

These two conversion formulae are not interchangeable and can lead to significant differences in calculated GFR ranging from +40 to −25% as shown in *Table 1*.

It would be of great interest to know whether the results and the conclusion of this study would be similar when using the alternate formula to calculate GFR from cystatin plasma level.

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Table 1 Comparison between values of glomerular filtration rate (GFR) obtained from values of cystatin C, chosen arbitrarily as example, using the particle-enhanced turbidimetric immunoassay (PETIA) method formula [Eq. (1)] and the particle-enhanced nephelometric immunoassay (PENIA) method formula [Eq. (2)]

Cystatin C (mg/L)	GFR (mL/min) PETIA method formula	GFR (mL/min) PENIA method formula	Differences between the two methods (%)
0.8	123.2	89.3	38.0
1.0	92.3	71.4	29.3
1.1	72.2	59.0	22.3
1.5	42.9	39.4	8.7
2.0	26.4	27.1	−2.6
4.0	8.2	11.0	−25.1

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Cystatin C blood level as a risk factor for death after heart surgery: reply

We thank Dr Lambermont *et al.* for their comments on the GFR estimation from the serum cystatin C level. The issue raised by these authors is indeed of some interest. However, we think that they did not focus on the right problem. It is correct that, as for serum creatinine measurement, different methods exist for the measurement of serum Cystatin C. However it has been shown that agreement between particle enhanced nephelometric immunoassay (PENIA) and particle enhanced turbidimetric immunoassay (PETIA) methods is good.[1] There are to date at least 10 published equations for GFR estimation from cystatin C. These equations lead to GFR estimations that vary not only according to the used assay. As other authors already pointed,[2] we think that the discrepancy (*Table 1*) between these published equations is due, for a large part, to the patients casemix differences, to the use of different gold