Intensive Care Med (2009) 35:1492
DOI 10.1007/s00134-009-1497-1

Massimo Meco
Silvia Cirri

Comment on: "An assessment of the accuracy of renal blood flow estimation by doppler ultrasound" by Wan et al.

Accepted: 9 March 2009
Published online: 7 May 2009

An author's reply to this comment is available at: doi:10.1007/s00134-009-1498-0.

Dear Sir: Reference is made to the article by Wan et al. [1] published in your journal.

In this article, the authors state that—in view of one of their experimental model—the doppler-ultrasound-based estimation of renal blood flow (RBF) shows high variation coefficients, low correlation, limited reproducibility and poor accuracy in the measurement of RBF.

We have some comments on this article:

(1) In the "Material and methods" section, there is a mistake since they state that RBF was measured in millimeters per minute. We believe they meant milliliters per minute.
(2) The formula used by the authors was RBF = $\pi \times$ (renal artery diameter/2) $\times$ mean velocity $\times$ 60. The equation is wrong since in the equation, instead of the ray, the area of the renal artery should have been considered. To obtain the area of the renal artery, the ray of the renal artery should be square elevated $(RAD/2)^2$.
(3) The equation for the correct RBF measurement (2, 3, 4) anticipates the use of the time-averaged mean velocity (V_m= velocity time integral/time of spectral trace in seconds) thus becoming RBF = $V_m \times 3.14r^2 \times 60$.
(4) Another validated equation for the calculation of RBF is VTI (velocity time integral) $\times$ $3.14r^2$ $\times$ HR (heart rate).
(5) In both the above-mentioned equations, HR is always taken into consideration. This datum cannot be omitted since it is crucial and essential being the blood flow directly proportional to HR.
(6) The equation used by Wan et al. [1] does not take into account HR at all. The correct formulation of the used equation in this study should have been RBF=VTI $\times$ $3.14r^2$ $\times$ HR.
(7) To our knowledge, the above-mentioned methodological limitations negatively affect all the study and do not justify the conclusions reached by the authors.

References

1. Wan L, Yang N, Hiew CY, Schelleman A, Johnson L, May C, Bellomo R (2008) An assessment of the accuracy of renal blood flow estimation by doppler ultrasound. Intensive Care Med 34:1503–1510
2. Greene ER, Venters MD, Avasthi PS, Conn R, Janke RW (1981) Noninvasive characterization of renal artery blood flow. Kidney Int 20:523–529
3. Quarto di Palo F, Rivolta R, Elli A, Rescalli S, Castagnone D (1993) Colour Doppler recording of renal blood flow in kidney grafts. Transplant Proc 25:2602
4. Quarto Di Palo F, Rivolta R, Elli A, Rescalli S, Castagnone D (1994) Noninvasive haemodynamic evaluation of renal graft rejection. Transplant Proc 26:2630–2631

M. Meco (✉) · S. Cirri
Department of Cardiovascular Surgery, Sant'Ambrogio Hospital, Via Faravelli 16, 20171 Milan, Italy
e-mail: massimo.meco@fastwebnet.it
Tel.: +390-2-4400806
Fax: +390-2-331271

S. Cirri
Centro Malan, IRCCS San Donato Hospital, San Donato Milanese, Italy