Serum Creatinine: How Reliable?

Deonne Dersch and James McCormack provide an excellent overview of the renal drug dosing dilemmas that we clinicians face today.[1] Their conclusions are rational and will likely hold true should the day arrive when we have a comprehensive validation of the formula for estimated glomerular filtration rate (GFR) against the Cockcroft–Gault equation.

Readers should be aware, however, that even before formulas are used to estimate renal function, the reported serum creatinine may be suspect. In October 2003, laboratories across British Columbia began reporting a modified version of the estimated GFR as derived from the Modification of Diet in Renal Disease (MDRD) equation as a screening tool for kidney disease. This was the first documented instance of an entire region routinely reporting estimated GFR. In March 2004, research was undertaken into the standardization of serum creatinine values across the province.[2] Of 107 laboratories that were asked to measure a reference creatinine standard, only half reported values within 10% of the reference value. Moreover, only 60% of the laboratories reported estimated GFR values within 10% of actual values. Before standardization, the average calibration error across the province resulted in GFR estimates 16.5% greater than actual values.

As a result of standardization, 90% of serum creatinine values now fall within 10% of the reference standard, and the calibration error has dropped to 2.7%. In addition, 87% of estimated GFR values are now within 10% of the GFR estimates calculated from the reference standard. In practical terms, this means that patients are more likely to receive the same drug dosing recommendations whether they are in Victoria or Kelowna. It also means that the staging of kidney disease will be similar across the province.

Until other Canadian laboratories correct serum creatinine values to a reference standard, as is now done in British Columbia, clinicians must consider not only variation related to the formula used but also the measurements upon which all such formulas are based.

Moreover, we do not know if the renal dosing studies referred to in product monographs have used standardized serum creatinine values, nor do we know the variance from such standards. Now that we have access to standardized creatinine values, validated research is needed to reassess the renal dosing recommendations in these monographs.

As Dersch and McCormack suggest, it is the clinical parameters for each particular patient, along with his or her rates and degree of change in renal function, that should guide the dosing of renal drugs. Assessment of factors affecting serum creatinine is essential, particularly in the hospital setting. That being said, researchers should be actively reassessing dosing guidelines based on standardized parameters for estimated GFR. If such research is undertaken, we may one day have faith in serum creatinine measurements, estimated GFR values, and validated dosing recommendations.

References

1. Dersch D, McCormack J. Estimating renal function for drug dosing: rewriting the gospel? *Can J Hosp Pharm* 2008;61(2): 138-143.
2. Komenda P, Beaulieu M, Seccombe S, Levin A. Regional implementation of creatinine measurement standardization. *J Am Soc Nephrol* 2008;19(1):164–169.

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