Reviewer's report

Title: Assessment of renal function in mice with unilateral ureteral obstruction using 99mTc-MAG3 dynamic scintigraphy

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Reviewer: Richard Quigg

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This is important work using MAG3 scintigraphy in the unilateral ureteral obstruction model. The data are interesting and compelling. Visually, the data shown in Figure 4 are revealing and the major find of their work.

My main concern relates to their overinterpretation of what these data mean. Basically, glomerular and tubular function in the obstructed kidney quickly decline. There is nothing about perfusion or blood flow that can be derived at all.

With the conclusions modified, this is important work.

The authors need to be cautious about statements relating to what the TACs of MAG3 are actually measuring. MAG3 enters the urine from both glomerular filtration and tubular secretion, and is a reasonable surrogate for hippurate, traditionally used to determine effective renal plasma flow because it is nearly completely removed by both processes in a single pass (MAG3 being protein bound is less of both). The utility of MAG3 only comes about because of water extraction by functioning tubules, thereby concentrating the tracer above background to allow determination of an ROI. The subsequent decay is due to its excretion via normal routes.

In instances where there is altered glomerular filtration and tubular function, there is impairment in the ability of the kidney to extract MAG3, which can bear no relation at all to renal plasma flow.

Thus, the use of "renal function" as in the title is appropriate. But, thereafter the mention of "perfusion," "renal blood flow," "functional blood vessels," is ubiquitous and need to be changed. In the results section discussing figure 4, the passage "indicating that 99mTc-MAG3 is not excreted in these kidneys," which is an accurate statement, is immediately followed by the inaccurate, "profound reduction in renal perfusion."

The authors provide measurements around the MAG3 peak, including the time post injection, slope(s) and magnitude. Other than the time to peak, the other data are overinterpreted. The slope for the "linear" phase may approximately reflect renal plasma flow, but this has several underlying variables. That the derived data actually represent a true "MAG3 concentration" in the kidney is a tremendous stretch. The authors need to report graphically what they are measuring, which are the COI cpm over time, and that alone.
Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

Are you kidding?

I declare that I have no competing interests.