of these factors varied greatly among patients, they are unsuitable as direct indicators for MMF dose adjustment; however, these factors could be used to indicate that further drug monitoring is required.

Pippa Murdie

Original article van Hest RM *et al.* (2006) Explaining variability in mycophenolic acid exposure to optimize mycophenolate mofetil dosing: a population pharmacokinetic meta-analysis of mycophenolic acid in renal transplant recipients. *J Am Soc Nephrol* **17:** 871–880

Cystatin-C-based estimation of GFR in patients with liver cirrhosis

Using serum creatinine or creatinine clearance values overestimates glomerular filtration rate (GFR) in patients with liver cirrhosis. Cystatin C has previously been shown to be more precise than creatinine in GFR monitoring and could therefore be a better marker of renal function in these patients. Pöge *et al*. compared the accuracy of the Hoek and Larsson cystatin-C-based formulas in predicting GFR with the accuracy of the creatinine-based Modification of Diet in Renal Disease and Cockcroft–Gault equations; all four equations were developed using data from patients without liver cirrhosis.

In this retrospective analysis of 44 cirrhotic patients (30 male, median age 52.9 years), serum creatinine and cystatin C were measured and GFR was calculated using each of the four equations. Compared with the true GFR (determined using the inulin clearance technique), all equations overestimated GFR, with median overestimations ranging from 105% to 154% ($P<0.0001$). Precision was better, and bias was less, for rates estimated using the cystatin-C-based equations than for GFR estimated using the creatinine-based equations. Correlation with inulin clearance and accuracy were slightly better with the cystatin-C-based formulas than with either of the creatinine-based equations.

So, estimates of GFR based on cystatin C are superior to those based on creatinine, but still overestimate GFR in patients with liver disease. As such, the authors recommend that inulin clearance be used to assess renal function until more-reliable formulas can be developed using data from cirrhotic patients. Basing these equations on a serum parameter such as cystatin C will preclude the introduction of inaccuracies due to errors in urine collection.

Kate Matthews

Original article Pöge U *et al.* (2006) Calculation of glomerular filtration rate based on cystatin C in cirrhotic patients. *Nephrol Dial Transplant* **21:** 660–664

Histologic variants of FSGS show different clinical features

A standardized classification system has been devised to group focal segmental glomerulosclerosis (FSGS) variants into five categories based on histologic features. Thomas *et al.* used the Glomerular Disease Collaborative Network patient registry to investigate whether these subgroups represent distinct pathologic variants with different clinical outcomes.

The registry contains patient data from time of renal-biopsy-based diagnosis to onset of end-stage renal disease or death. In total, 197 patients from the registry were included in this evaluation—22 with collapsing FSGS, 34 with tip lesion FSGS, 6 with cellular FSGS (not included in statistical comparisons), 52 with perihilar FSGS and 83 with FSGS not otherwise specified.

Common features of each variant were nephrotic syndrome, hypertension and renal insufficiency, but some other characteristics were shown to be variant-specific. For example, patients with collapsing FSGS usually had severe nephrotic syndrome and substantial renal insufficiency, and the worst 1-year and 3-year survival rates of all the variants. Tip lesion FSGS was associated with severe nephrotic syndrome, but patients with this variant had the highest remission rate (50%) and highest 3-year survival rate (76%). Hypertension was most common in patients with perihilar FSGS and FSGS not otherwise specified. The majority of patients with collapsing FSGS were African American (91%); only 15% of those with tip lesion FSGS, however, were in this ethnic group.

The authors conclude that FSGS does indeed encompass a range of distinct disease variants with different demographics, clinical symptoms and outcomes. Recognition of these variants will enable treatments to be tailored to the individual.

Rebecca Ireland

Original article Thomas DB *et al.* (2006) Clinical and pathologic characteristics of focal segmental glomerulosclerosis pathologic variants. *Kidney Int* **69:** 920–926

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