



**Danbury Hospital**  
**Department of Pathology & Laboratory Medicine**  
**Technically Speaking**

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## **Reporting Estimated Glomerular Filtration Rate (GFR)**

*Salvador F. Sena, Ph.D.*

*Associate Medical Director, Clinical Chemistry*

The Danbury Hospital Laboratory is now reporting an **estimated glomerular filtration rate (GFR)** with serum creatinine results. This in accordance with the current recommendations of the National Kidney Disease Education Program (NKDEP) initiative of the National Institutes of Health (NIH) and the Kidney Disease Outcomes Quality Initiative (NKDOQI).

Chronic kidney disease (CKD) is a growing epidemic in the United States and kidney failure is a significant public health problem. There are over 20 million people in the U.S. with CKD, a figure that is expected to double by 2010. Despite evidence that kidney failure may be substantially delayed or even prevented if kidney disease is detected early, only a fraction of individuals at high risk or in the early stages are currently being diagnosed and managed appropriately. Use of an estimating or prediction equation to estimate GFR from serum creatinine is recommended and should be employed for people with CKD and those at risk (diabetes, hypertension, and family history of kidney failure). The recommended equation to use is the MDRD (Modification of Diet in Renal Dialysis) equation, which estimates GFR from the patient's serum creatinine concentration, age, sex and race:

$$\text{GFR} = 186 \times (S_{cr})^{-1.154} \times (\text{Age})^{-0.203} \times (0.742 \text{ if female}) \times (1.210 \text{ if African American})$$

*(GFR = glomerular filtration rate in mL/min/1.73m<sup>2</sup>, S<sub>cr</sub> = serum creatinine in mg/dL, age in years)*

According to NKDEP recommendations, the primary reasons for using the MDRD equation to estimate GFR, as opposed to other methods, are as follows:

- GFR and creatinine clearance are poorly inferred from the serum creatinine alone. *[This is mainly because these are related inversely and non-linearly to serum creatinine and the effects of age and sex, and to a lesser extent race, on creatinine production further cloud interpretation].*
- Creatinine is more often measured than urinary albumin in practice. *[At present, adherence to guidelines for annual urinary albumin testing in diabetes is poor. Serum creatinine is more often measured than urinary albumin and if a depressed GFR is noted, the provider must confront CKD even if at a later stage than microalbuminuria.]*
- Measurement of kidney function (GFR or creatinine clearance) is essential once albuminuria is discovered.
- The MDRD equation is the most thoroughly validated equation and is superior to other methods of approximating GFR.

- Nephrologists routinely use an estimating equation for GFR already. *[This is because routine laboratory reference (“normal”) limits for serum creatinine are relatively crude; therefore nephrology specialists either explicitly apply an equation or estimate GFR based on experience. Primary care providers and other specialists should also have this information.]*
- The MDRD equation does not require weight as a variable. *[The equation yields a GFR normalized to 1.73 m<sup>2</sup> body surface area.]*

### **Reporting GFR Values**

Our laboratory information system will automatically calculate the estimated GFR value from the serum creatinine result and the patient’s age and sex and report it as a footnote under the serum creatinine result. Since race is a variable that is not always available, the estimated GFR values for both African Americans and non-African Americans will be reported. The MDRD equation has not been validated in children. It is only useful for patients with stable renal function and should not be used with acutely ill patients. Therefore, estimated GFR will be reported only for adult outpatients. Also, the MDRD equation has been most extensively evaluated in people with some degree of renal insufficiency and is most accurate at estimating GFR below 60 mL/min/1.73m<sup>2</sup>, where quantification of GFR has more clinical implications than above this level. Consequently, when estimated GFR values are above 60 mL/min/1.73m<sup>2</sup>, they should be considered as simply “greater than 60” and the value should not be used as an absolute indicator of GFR. Sample reports appear below:

#### **Sample report for 63-year-old woman:**

Creatinine = 1.8 mg/dL

GFR estimate = 30 mL/min/1.73 m<sup>2</sup> if non-African American

GFR estimate = 37 mL/min/1.73 m<sup>2</sup> if African American

*GFR estimated by MDRD equation is not reliable at GFR >60*

*GFR 30-59: moderate; stage 3 chronic kidney disease*

*GFR 15-29: severe; stage 4 chronic kidney disease*

*GFR <15: kidney failure*

#### **Sample report for 55-year-old man**

Creatinine = 1.1 mg/dL

GFR estimate = 74 mL/min/1.73m<sup>2</sup> if non-African American

GFR estimate = 89 mL/min/1.73m<sup>2</sup> if African American

*GFR estimated by MDRD equation is not reliable at GFR >60*

*GFR 30-59: moderate; stage 3 chronic kidney disease*

*GFR 15-29: severe; stage 4 chronic kidney disease*

*GFR <15: kidney failure*

Questions about GFR estimates may be directed to Dr. Salvador Sena at ext. 7622 or Dr. Jack Wolk at ext. 7551.

### **References**

1. National Kidney Disease Education Program (NKDEP) initiative of the National Institutes of Health, NIH Publication No. 03-5350, March 2003. See <http://www.nkdep.nih.gov>
2. Levey AS, Coresh J, Balk E, et al. National Kidney Disease Foundation practice guidelines for chronic kidney disease: evaluation, classification and stratification. *Ann Int Med* 2003;139:137-47.