Department of Pathology & Molecular Medicine
Kingston General Hospital
Phone: 1-613-533-2820
Fax: 1-613-533-2907

Richardson Labs, Rm 201
Queen's University
Kingston, Ontario
K7L 3N6, Canada

eGFR and Chronic Kidney Disease (CKD)

Dr. C. Collier, Dr. T. Toffelmire, Dr. M. Godwin, May 2005

eGFR-MDRD > 90 mL/min/1.73m^2 *Not* consistent with Chronic Kidney Disease (CKD) unless other evidence of kidney damage.

eGFR-MDRD 60 - 89 mL/min/1.73m^2 Consistent with *mild* CKD.

- Suggest repeat testing in 6 to 36 months.
- CKD may present with normal or increased eGFR-MDRD (CKD, Stage 1 or 2), commonly due to diabetes or hypertension. Assess kidney function with urine dipstick screen followed by microscopic analysis if indicated, and albumin excretion ratio if protein negative; also, serum/urine K, Ca, PO_4. If CKD diagnosed, treat to slow progression and reduce CVD risk.
- Consider nephrology referral if there is a *confirmed* 30% increase in serum creatinine.

eGFR-MDRD 30 - 59 mL/min/1.73m^2 Consistent with *moderate* CKD.

- Suggest repeat testing to estimate progression in 3 to 6 months or after any change in medications, medical interventions or clinical status.
- CKD is diagnosed when GFR < 60 mL/min/1.73m^2 for more than 3 months. Treat complications including: diabetes, hyperlipidemia, hypertension, anemia, malnutrition, neuropathy, thrombogenic factors, bone disease, hypoalbuminemia, hypocalcemia/hyperphosphatemia and avoid nephrotoxins (aminoglycosides, NSAIDS, IV/IA radiocontrast study).
- Consider nephrology referral if there is a *confirmed* 30% increase in creatinine, or if the average eGFR-MDRD decreases by more than 10% annually.

eGFR-MDRD 15 - 29 mL/min/1.73m^2 Consistent with *severe* CKD. Consider nephrology referral.

eGFR-MDRD <15 mL/min/1.73m^2 Consistent with kidney failure CKD. Consider urgent nephrology referral.

Additional information:

1. eGFR (eg. Cockcroft-Gault equation) is frequently used for **DRUG DOSING.** Although eGFR-MDRD has not been validated in the literature for drug dosing, it may be useful in conjunction with other tools for estimating renal function for dosing medications. Consult a Pharmacist at KGH (contact Paula Newman) for further information.
2. eGFR-MDRD assumes "**steady state**" . For rapidly changing kidney function, monitor serum creatinine (100% variation/ day = *no* GFR).
3. Creatinine and GFR vary with muscle mass. For example, the MDRD calculation[3] includes a correction of " x 1.21" for "African Americans". MDRD is normalized for average height/weight. Consult nephrologist if patient has abnormal physical considerations.
4. **Less than 18 years**: **eGFR-Schwartz** (mL/min) = 38 (<12y) or 48 (boys>12y) x length (cm)/ serum creatinine (umol/L). If risk of CKD is high, consider a more precise *calculation* of GFR.

Notes:

1. Serum creatinine may be included as part of risk testing for diseases such as diabetes, hypertension or hyperlipidemias. Testing frequency will vary from a few repeats per year to a few per decade for normal patients. Simultaneous monitoring of serum creatinine and serum urea is not recommended.
2. The upper reporting limit is >60 mL/min/1.73m^2 because the error of measurement associated with low creatinine concentrations is translated into wide confidence limits for high eGFRs due to the indirect and logarithmic association between the two paramenters.
3. Serum creatinine is a test with "marked individuality", meaning the CVi <<CVg (within individual biological variation << between individual variation). Due to its small CVi, it is better to monitor serial results and use population reference ranges. A 20% change in serum creatinine represents a real change in value (RCV), while a 30% change is highly significant. For eGFR, an average change over several samples of 10% annually is clinically significant.
4. Serum creatinine assay-dependent false increases (false decrease in eGFR-MDRD) may occur with acetoacetate, ascorbic acid, fructose, pyruvate, cephalosporins, creatine, proline (avoid hyper-alimentation fluid contamination), chronic lidocaine administration; false decreases (false increase in eGFR-MDRD) may occur with bilirubin. In vivo inhibition of creatinine secretion occurs with cimetidine or trimethoprim.