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Document Contact	Michelle Alexander: Medical Technologist Lead
Area	Laboratory-Chemistry
Applicability	Dearborn, Taylor, Trenton, Wayne

Chemistry Glomerular Filtration Rate

Document Type: Procedure

I. PURPOSE AND OBJECTIVE:

A. The glomerular filtration rate (GFR) result is a calculation utilizing the CKD-EPI equation which uses three variables: serum creatinine concentration, age of patient, and gender of patient. The limits of the calculation are as follows: patient gender must be known; age must be known; age must be 18 to 105 years; serum creatinine value must be greater than or equal to 0.1 milligrams per deciliter (mg/dL).

B. Although kidney disease cannot be cured, the early detection and management of chronic kidney disease may decrease the risk of complications and prevent kidney failure. Glomerular filtration rate is the most accurate indicator of kidney function in both healthy and diseased patient populations. The glomerular filtration rate is reduced before the onset of symptoms of kidney failure and replacement therapy is indicated when the value is below 15 mL/min/ $1.73m^2$.

II. PROCEDURE:

A. The GFR calculation is based on the following CKD-EPI equation:

1. CKD-EPI Equation: GFR = 142 x min $(S_{cr}/k, 1)^{\alpha}$ x max$(S_{cr}/k, 1)^{-1.200}$ x 0.9938^{Age} x 1.012 (if female)
    a. where:S_{cr} is serum creatinine in mg/dL.
    b. K is 0.7 for females and 0.9 for males.
    c. α is -0.241 for females and -0.302 for males.

d. Min indicates the minimum of S_{cr}/k or 1.

e. Max indicates the maximum of S_{cr}/k or 1.

f. Age (years)

B. Results are reported in mL/min/1.73 m^2.

C. GFR calculations are performed in the Abbott Instrument Manager for downtime purposes.

D. GFR result will be calculated in the LIS.

III. REFERENCE RANGE:

>60 mL/min/1.73 m^2

IV. STAGES OF KIDNEY DISEASE:

A. **G1:** Normal GFR - Greater than 90 mL/min/1.73m^2

B. **G2:** Mildly decreased GFR - 60-89 mL/min/1.73m^2

C. **G3a:** Mildly to moderately decreased GFR - 45-59 mL/min/1.73m^2.

D. **G3b:** Moderately to severely decreased GFR - 30-44 mL/min/1.73m^2.

E. **G4:** Severely decreased GFR - 15-29 mL/min/1.73m^2.

F. **G5:** Kidney failure - GFR less than 15 mL/min/1.73m^2.

Please note that the result is normalized to 1.73 m^2, an accepted average adult Body Surface Area (BSA). Therefore, the result may not be valid for patients with very abnormal body composition (e.g. very muscular patients with a high BSA may have their GFR under-estimated, and the converse for obese patients) and for those with limb amputations (whose low muscle mass would result in an over-estimation of their GFR). eGFR is most useful for patients with stable kidney function.

V. PROCEDURE NOTES:

A. For patients less than 18 years old, a serum Enzymatic Creatinine is assayed and reported along with the comment "GFR not calculated for age < 18 years".

B. For creatinine results that are outside of the instruments analytical measuring range, the GFR will be reported as a comment "Unable to calculate".

C. Because the GFR calculation is very complex, this calculation verification is done using the GFR calculator at the National Kidney Foundation's website, www.kidney.org. This website can also be used for calculations during Instrument Manager downtime.

VI. REFERENCES:

A. American Journal of Kidney Diseases, Vol 39, No. 2, Supplement 1 (February), 2002: pp S76-S110

B. Postgraduate Medicine, Vol 110, No 6, (December), 2001

C. Laboratory Test Directory

Approval Signatures

Step Description	Approver	Date
Medical Director	Jeremy Powers: Chief, Pathology	5/27/2022
Medical Director	Muhammad Arshad: Physician	5/27/2022
Policy and Forms Steering Committee Approval (if needed)	Michelle Alexander: Medical Technologist Lead	5/26/2022
Policy and Forms Steering Committee Approval (if needed)	Gail Juleff: Project Mgr Policy	5/26/2022
	Kimberly Geck: Dir, Lab Operations B	5/26/2022
	Amy Conners: Dir, Lab Operations A	5/23/2022
	Katherine Persinger: Mgr Laboratory	5/23/2022
	Kristen Lafond: Mgr Laboratory	5/2/2022
	Ashley Dingess: Mgr Laboratory	5/2/2022
	Michelle Alexander: Medical Technologist Lead	4/26/2022

Applicability

Dearborn, Taylor, Trenton, Wayne