Chronic Kidney Disease: Definition and Classification

This is the second in a series of 12 brief articles about chronic kidney disease.

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In the past, the absence of a widely accepted definition of chronic kidney disease and the lack of classification of the stages of chronic kidney disease have impaired efforts to diagnose and treat persons with kidney disease early in the course of their illness. The National Kidney Foundation (NKF) has recently published a "Clinical Practice Guideline for Chronic Kidney Disease: Evaluation, Classification, and Stratification." This article will describe the highlights of the NKF Guideline, the purpose of which is to "provide a common language for communication among providers, patients and their families . . . for developing a public health approach to affect care and improve outcomes of chronic kidney disease."

Terminology

- Use "kidney" instead of "renal."
- Chronic Kidney Disease (CKD) replaces "pre-end stage renal disease," "pre-dialysis," or "chronic renal failure."
- End-stage renal disease applies only to patients treated by dialysis or transplantation.

The Definition

Chronic kidney disease is kidney damage for *3 months* as defined by structural or functional abnormalities with or without decreased glomerular filtration rate (GFR), or a GFR of 60 mL/min/1.73 m^2 or less, with or without kidney damage.

The NKF Guideline proposes a definition and classification based on a measure of kidney function, the glomerular filtration rate (GFR). The kidney is usually described as "a filter" and GFR is a measure of the kidneys' ability to filter blood, which can be expressed on a continuous scale. Serum creatinine alone does not provide enough information for diagnosis and classification. GFR can be estimated by using the serum creatinine, the body weight, and age. Pharmacists and physicians are familiar with the Cockcroft-Gault equation, which also accounts for gender, as follows:

$$\text{Estimated GFR} = \frac{(140 - \text{age})\ (\text{body weight in kg})}{72 \times \text{serum creatinine}}$$

Multiply result by 0.85 for women

Various other equations have been developed for estimating GFR. None of the equations have been tested extensively in American Indians and Alaska Natives. The Cockcroft-Gault equation above is simple and can be used in any clinic setting. Once GFR is estimated, the patient's kidney function can be classified, and ultimately tracked over time.

The new guidelines classify the stages of CKD by GFR, as listed in Table 1.

Table 1. Stages of Chronic Kidney Disease and Metabolic Consequences

Stage	Description	GFR (mL/min/1.73 m2)	Metabolic Consequences
1	Kidney damage w/ normal or ↑ GFR	>90	
2	Kidney damage with mild ↓ GFR	60 - 89	• ↑parathyroid hormone (GFR 60 ≈ 80)
3	Moderate ↓GFR	30 - 59	• ↓calcium absorption (GFR<50) • ↓lipoprotein activity • malnutrition • onset of LVH • ↓erythropoietin → anemia
4	Severe ↓GFR	15 - 29	• ↑triglycerides • hyperphosphatemia • metabolic acidosis • potential hyperkalemia
5	Kidney failure	< 15 (or dialysis)	• azotemia

Patients with a GFR between 60 - 89 but *without* markers of CKD are considered to have "decreased GFR." A nephrologist or other provider with special interest in kidney disease should be consulted when the GFR is less than 30 mL/min/1.73 m^2.

What is normal GFR?

"Normal" values vary based on the reference used. GFR varies with age, gender, and body size. The following list provides a point of comparison for "normal" mean GFR.

- For young adults, the normal mean GFR is 120 - 130 mL/min/1.73m^2.
- Adult values are reached by age 2 in children.
- Women have lower GFR values that can be assumed to be 8% lower at all ages.
- After age 20 - 30, the GFR decreases by about 1 mL/min/1.73m^2 per year.
- By age 70, the normal mean GFR is approximately 70 mL/min/1.73 m^2.
- GFR is transiently elevated after a high protein meal.

As the GFR falls to 60 mL/min/1.73 m^2 and below, multiple metabolic complications develop, and additional evaluation is required as part of routine care. Virtually all organ systems can be affected. Initial signs include hypertension and laboratory abnormalities. As the GFR continues to decline, the patient needs to be evaluated for anemia, malnutrition, bone disease, neuropathy, and decreased overall functioning and well-being (see Table 1 for a listing of the metabolic consequences associated with the CKD stages). Upcoming issues of *The IHS Provider* will address these specific topics.