Patient information: Chronic kidney disease (Beyond the Basics)

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CHRONIC KIDNEY DISEASE OVERVIEW

Chronic kidney disease (CKD, also called kidney failure) is a condition in which the kidneys lose the ability to remove waste and excess water from the bloodstream. As waste and fluids accumulate, other body systems are affected, potentially leading to complications.

The most common causes of chronic kidney disease are diabetes and high blood pressure. In the early stages of CKD, there are no obvious symptoms. The disease can progress to complete kidney failure, also called end stage renal disease. This occurs when kidney function has worsened to the point that dialysis or kidney transplantation is required to maintain life.

The main goal of treatment is to **prevent** progression of CKD to complete kidney failure. The best way to do this is to diagnose and control the underlying cause.

The symptoms, evaluation, and management of chronic kidney disease will be reviewed here. Kidney transplantation, peritoneal dialysis, and hemodialysis are discussed separately. (See "Patient information: Dialysis or kidney transplantation — which is right for me? (Beyond the Basics)" and "Patient information: Hemodialysis (Beyond the Basics)".)

NORMAL KIDNEY FUNCTION

A brief overview of normal kidney function can help in the understanding of chronic kidney disease. The kidneys function to remove wastes and excess water from the blood. These wastes and fluids are combined to form urine (figure 1). Many vital body functions are dependent upon the proper functioning of the kidneys.

In order for this filtering process to occur properly, the blood pressure and blood flow to the kidneys must be adequate. If the arteries leading to the kidney are diseased, the filtering process will be affected. The nephrons (figure 2), including the glomeruli and the tubules, must be healthy, and the path from the nephron to the urethra (figure 3) must not be blocked.

When the kidney filters are working properly, the result is a proper balance of fluids and chemicals in the body. If an imbalance occurs, many critical bodily functions can be affected, possibly producing symptoms associated with kidney disease (see 'Chronic kidney disease complications' below).

CHRONIC KIDNEY DISEASE RISK FACTORS

A number of disorders can increase the risk of developing chronic kidney disease, including:

- Diabetes mellitus
- High blood pressure
- Chronic glomerulonephritis (inflammation of the glomeruli), (see "Patient information: Glomerular disease overview (Beyond the Basics)")
- Polycystic kidney disease (cysts in the kidneys), (see "Patient information: Polycystic kidney disease (Beyond the Basics)").
- A family history of kidney disease

CHRONIC KIDNEY DISEASE COMPLICATIONS

Most people with chronic kidney disease do not have symptoms until the kidney function is severely impaired. The problem is often discovered when blood or urine tests, done for other reasons, show one or more of the abnormalities discussed above.

Even when kidney failure is advanced, most people still make a normal or near-normal amount of urine; this is sometimes confusing. Urine is being formed but it does not contain sufficient amounts of the body's waste products.

With advanced kidney disease, you may develop edema (swelling of the feet, ankles, or legs), of appetite, increased sleepiness, nausea, vomiting, confusion and difficulty thinking. Patients often develop high blood pressure, blood chemistry (electrolyte) abnormalities, anemia (a decrease in red blood cells, which can cause fatigue and other symptoms), and bone disease. (See "Patient information: Edema (swelling) (Beyond the Basics)".)

Uremia — People with advanced kidney failure may develop a group of symptoms referred to as **uremia**. The symptoms of uremia include loss of appetite, nausea, vomiting, swelling around the heart, nerve problems, and changes in mental status, including drowsiness, seizures, or coma.

EVALUATION AND DIAGNOSIS

A healthcare provider may use several tests to diagnose chronic kidney disease and determine if there is a treatable underlying cause. These include the following:

Kidney function tests — The glomerular filtration rate (GFR) gives an approximate measure of the number of functioning nephrons. GFR is used to monitor the severity of kidney impairment. The most common way to estimate the GFR in adults is by measuring the creatinine level in the blood stream and then using this number to calculate an estimated GFR level. This GFR level is often shown on routine blood chemistry lab reports that your doctor obtains.

- A reduction in GFR implies either worsening of the underlying kidney disease or the development of another, occasionally reversible kidney problem.
- An increase in GFR, on the other hand, indicates improvement in kidney function.
- A stable GFR in people with chronic kidney disease implies stable disease.