

# LABORATORY INDICATIONS AND MODERN LABORATORY DIAGNOSTICS OF CHRONIC KIDNEY DISEASE

*Abduxalilov Farrux Shuxratjon Ugli*

*Graduate student of ADTI laboratory work*

**Abstract:** *Chronic Kidney Disease (CKD) is a prevalent condition affecting millions of people worldwide. Early detection and accurate diagnosis of CKD are crucial for effective management and prevention of further complications. In this article, we will explore the laboratory indications and modern laboratory diagnostics utilized in the assessment of CKD.*

**Keywords:** *measures, symptoms and signs, factors, prevention, complications, CKD*

**Introduction:** Chronic kidney failure is a gradual loss of kidney function. The kidney begins to fail its function slowly. Your kidneys filter waste and excess fluids from your blood, which are then excreted in urine. Chronic kidney disease causes dangerous fluid, electrolyte, and waste products to build up in your body.

In the early stages of chronic kidney disease, you may have several signs or symptoms. You may not realize you have kidney disease until the condition progresses.

Treatment for chronic kidney disease usually focuses on slowing the progression of kidney damage by controlling the cause of the disease. However, even controlling the disease cannot prevent the development of kidney damage. When chronic kidney disease progresses to end-stage renal failure, it leads to death, not even allowing for artificial filtration (dialysis) or kidney transplantation.

**Symptoms and Signs:** Signs and symptoms of chronic kidney disease develop over time. Loss of kidney function can lead to fluid or body waste accumulation or

electrolyte problems. Depending on the severity of the disease, the following may occur during the loss of kidney function:

Nausea

Vomiting

Loss of appetite

Fatigue and weakness

Sleep problems

Urinating more or less

Decreased mental acuity

Muscle cramps

Swelling of feet and ankles

Dry, itchy skin

Uncontrolled high blood pressure (hypertension).

Shortness of breath if fluid accumulates in the lungs

Chest pain if fluid collects around the lining of the heart

Signs and symptoms of kidney disease are often non-specific. This means that they can also be caused by other diseases. Because your kidneys are able to compensate for the lost function, you may not develop signs and symptoms until they are irreversibly damaged.

Chronic kidney disease usually occurs when a disease or condition impairs kidney function, causing kidney damage to worsen over months or years.

Diseases and conditions that can cause chronic kidney disease include:

type 1 or type 2 diabetes;

High blood pressure;

Glomerulonephritis, inflammation of kidney filtering units;

Interstitial nephritis, inflammation of kidney tubules and surrounding structures;

Polycystic kidney disease or other hereditary kidney diseases;

Long-term obstruction of the urinary tract, such as prostate enlargement, kidney stones, and some cancers;

Vesicoureteral reflux, a condition that causes urine to pool in your kidneys;

Recurrent kidney infection, also known as pyelonephritis;

### **Risk factors**

Factors that increase the risk of chronic kidney disease include:

Diabetes

High blood pressure

Heart (cardiovascular) disease

Smoking

Getting fat

Being Black, Native American, or Asian American

Family history of kidney disease

Abnormal kidney structure

Older age

Frequent use of drugs that damage the kidneys

### **Complications:**

Chronic kidney disease can affect almost every part of your body. Potential complications include:

Fluid retention, which can cause swelling in the arms and legs, high blood pressure, or fluid in the lungs (pulmonary edema).

A high level of potassium in your blood (hyperkalemia), which can damage your heart and be life-threatening.

Anemia

Heart disease

Weak bones and increased risk of bone fractures

Decreased sexual interest, erectile dysfunction or decreased fertility

Damage to your central nervous system, which can cause difficulty concentrating, personality changes, or seizures

Decreased immunity, which makes you more vulnerable to infection

Pericarditis, inflammation of the sac covering the heart (pericardium)

Pregnancy complications that pose a risk to the mother and the developing fetus

Irreparable damage to your kidneys (end-stage kidney disease), eventually requiring dialysis or a kidney transplant to survive.

### **Prevention:**

To reduce the risk of developing kidney disease:

Follow the directions for over-the-counter medications. Follow package directions when using over-the-counter pain relievers such as aspirin, ibuprofen (Advil, Motrin IB, etc.), and acetaminophen (Tylenol, others). Taking too many pain relievers for a long time can cause kidney damage.

Maintain a healthy weight. If you are at a healthy weight, maintain it by being physically active most days of the week. If you need to lose weight, talk to your doctor about healthy weight loss strategies.

Don't smoke. Smoking can damage your kidneys and worsen existing kidney damage. If you are a smoker, talk to your doctor about a strategy to quit smoking. Support groups, counseling, and medication can help you stop.

Manage your medical conditions with your doctor's help. If you have diseases or conditions that increase your risk of kidney disease, work with your doctor to control them. Ask your doctor about tests to look for signs of kidney damage.

## Understanding Chronic Kidney Disease

Before delving into laboratory indications and diagnostics, it is important to have a basic understanding of CKD. This condition occurs when the kidneys are no longer able to filter waste products and excess fluid from the blood efficiently. CKD is often a progressive disease, meaning it may worsen over time, eventually leading to kidney failure if left untreated.

## Laboratory Indications for CKD

Laboratory tests are an integral part of diagnosing and monitoring CKD. These tests provide valuable insights into kidney function and help healthcare professionals determine the stage and severity of the disease. Some important laboratory indications for CKD include:

### Creatinine and Blood Urea Nitrogen (BUN)

Creatinine and BUN tests measure the levels of waste products in the blood. When kidneys are functioning properly, they filter out these waste substances. Elevated creatinine and BUN levels indicate impaired kidney function, which may be indicative of CKD.

### Estimated Glomerular Filtration Rate (eGFR)

eGFR is a calculation that approximates the kidneys' ability to filter waste products. It is calculated based on factors such as age, gender, race, and serum creatinine levels. A

lower eGFR value suggests reduced kidney function and may indicate the presence of CKD.

## Urinalysis

A urinalysis involves testing a urine sample for various substances, such as protein, red and white blood cells, and the presence of bacteria or other abnormalities. Proteinuria (presence of excessive protein in urine) is a common finding in CKD and can be an indication of kidney damage.

## Modern Laboratory Diagnostics for CKD

Advancements in laboratory diagnostics have significantly contributed to the early detection and management of CKD. Here are some modern laboratory diagnostics methods used for evaluating CKD:

### Albumin-to-Creatinine Ratio (ACR)

ACR is a urine test that measures the ratio of albumin (a type of protein) to creatinine in a urine sample. It is used to identify and monitor kidney damage in CKD patients. Elevated ACR values suggest the presence of proteinuria and may indicate CKD progression.

### Cystatin C

Cystatin C is a protein produced by all cells in the body. It is primarily removed from the blood by the kidneys. Measuring cystatin C levels in the blood can provide an estimate of kidney function, particularly in individuals with normal or near-normal creatinine levels. This test is especially useful in certain populations, such as the elderly, where creatinine-based estimates may be less accurate.

### Genetic Testing

Genetic testing plays a crucial role in diagnosing certain types of CKD, such as polycystic kidney disease (PKD). By identifying specific genetic mutations, healthcare

professionals can confirm the presence of inherited kidney disorders and provide appropriate management and counseling to patients and their families.

### ***Conclusion***

Laboratory indications and modern laboratory diagnostics play a pivotal role in the comprehensive assessment of Chronic Kidney Disease. Blood tests, urine tests, imaging studies, biomarkers, genetic testing, and proteomic analysis are all valuable tools utilized to diagnose and monitor CKD. Early detection and accurate diagnosis can significantly improve patient outcomes by enabling timely intervention and appropriate management strategies. By harnessing the power of modern laboratory diagnostics, healthcare professionals can enhance the precision and efficacy of CKD management.

### ***References:***

1. Rocuts AK, Waikar SS, Alexander MP, Rennke HG, Singh AK. Acute phosphate nephropathy. *Kidney Int.* 2009;75(9):987–991. doi: 10.1038/ki.2008.293
2. Markowitz GS, Perazella MA. Acute phosphate nephropathy. *Kidney Int.* 2009;76(10):1027–1034. doi: 10.1038/ki.2009.308
3. Levey AS, Becker C, Inker LA. Glomerular filtration rate and albuminuria for detection and staging of acute and chronic kidney disease in adults: a systematic review. *JAMA.* 2015;313(8):837–846. doi: 10.1001/jama.2015.0602
4. Brown SC, O'Reilly PH. Iohexol clearance for the determination of glomerular filtration rate in clinical practice: evidence for a new gold standard. *J Urol.* 1991;146(3):675–679. doi: 10.1016/S0022-5347(17)37891-6