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# LABORATORY AND INSTRUMENTAL DIAGNOSIS OF RENAL FAILURE AND PREVENTIVE MEASURES

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**Abstract** Renal failure is a serious clinical condition characterized by the inability of the kidneys to maintain normal metabolic, fluid, and electrolyte balance. Early detection using laboratory and instrumental diagnostic methods is essential to prevent disease progression and complications. This article discusses modern laboratory and instrumental techniques for diagnosing renal failure and outlines key preventive strategies to reduce its incidence and severity.



**Introduction**

Renal failure, also known as kidney failure, occurs when the kidneys lose their ability to adequately filter waste products and excess fluids from the blood. It may present as acute kidney injury (AKI) or chronic kidney disease (CKD). Due to its asymptomatic nature in early stages, laboratory and instrumental examinations play a crucial role in early diagnosis, monitoring, and prevention.

**Laboratory Diagnosis**

1. Serum Creatinine and Blood Urea Nitrogen (BUN)

Serum creatinine and BUN are primary indicators of kidney function. Elevated levels suggest impaired glomerular filtration. Creatinine is particularly useful for estimating renal function over time.[1]

2. Glomerular Filtration Rate (GFR)

Estimated GFR (eGFR) is the most reliable indicator of kidney function. A persistent reduction in eGFR below 60 mL/min/1.73 m² indicates chronic kidney disease.[2]

3. Urinalysis

Urinalysis provides valuable information on kidney damage. Findings may include:

Proteinuria

Hematuria

Presence of casts and abnormal sediments[3]

4. Electrolyte and Acid-Base Assessment

Renal failure often leads to electrolyte imbalances such as hyperkalemia, hyponatremia, and metabolic acidosis, which can be detected through blood tests.

5. Additional Laboratory Tests

Serum albumin and lipid profile

Complete blood count (CBC) for detecting anemia of chronic kidney disease

Parathyroid hormone (PTH) levels in advanced CKD [4]

Instrumental Diagnosis

1. Ultrasound Examination

Renal ultrasound is the first-line imaging modality. It assesses kidney size, structure, and obstruction. Small, shrunken kidneys suggest chronic renal failure.

2. Computed Tomography (CT) and Magnetic Resonance Imaging (MRI)

CT and MRI provide detailed anatomical information and are useful for detecting tumors, stones, or vascular abnormalities. Contrast-enhanced studies should be used cautiously.[5]

3. Renal Biopsy

Renal biopsy is an invasive but definitive diagnostic tool used to determine the underlying cause of renal failure, especially in glomerular diseases.

4. Nuclear Medicine Studies

Radionuclide imaging evaluates renal perfusion, function, and differential kidney function.

Preventive Measures

1. Primary Prevention

Early detection and treatment of hypertension and diabetes

Adequate hydration and healthy lifestyle

Avoidance of nephrotoxic drugs and substances

2. Secondary Prevention

Regular monitoring of kidney function in high-risk individuals

Dietary modifications, including reduced salt and protein intake

Management of infections and urinary tract obstructions [6]

3. Tertiary Prevention

Slowing disease progression through pharmacological therapy

Timely referral to a nephrologist

Preparation for renal replacement therapy (dialysis or transplantation) [7]

Conclusion

Laboratory and instrumental diagnostic methods are essential for the early detection and management of renal failure. Combined with effective preventive measures, these approaches can significantly reduce disease progression and improve patient outcomes. Public health strategies focusing on early screening and education are critical in combating the growing burden of renal failure.

**REFERENCES:**

1. KDIGO Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. *Kidney International Supplements.* 2013.
2. Brenner BM, Rector FC. *The Kidney.* 10th Edition. Elsevier, 2016.
3. Levey AS, et al. Chronic kidney disease. *The Lancet.* 2012;379(9811):165–180.
4. National Kidney Foundation. KDOQI Clinical Practice Guidelines.
5. Makhamatov U. Anemia Disease and Rational Nutrition in it. – 2023.

6. Maxamatov U., To‘lkinov I., Xabibullayeva M. Eating Habits in Hematological Diseases. – 2023.
7. Maxamatov U. S. Treatment of Triggeral Helmintosis in Children and Adolescents Using Folk Medicine. – 2023.