

## Creatinine and eGFR

### WHAT IS CREATININE?

Creatinine is a waste product from the breakdown of a compound called creatine. Creatinine is usually removed from the body by the kidneys. Measurements of creatinine levels and estimation of glomerular filtration rate (eGFR) in a blood sample are useful for the evaluation of kidney function, diagnosis and monitoring of acute and chronic renal disease, and to assess the status of renal dialysis patients (1).

### CREATININE PRODUCTION AND REMOVAL

Creatinine is a product that is mainly produced within muscles from the breakdown of a compound called creatine, which is part of the energy production cycle in muscles. Almost all creatinine is filtered from the blood by the kidneys and excreted from the body in the urine (2).

### eGFR

Estimated glomerular filtration rate (eGFR) is calculated from a blood creatinine level, and provides an estimate of how well an individual's kidneys are functioning (1).

### CREATININE AND eGFR REFERENCE RANGES

Creatinine levels vary depending on age, ethnicity, body size and muscle mass. Normal creatinine ranges are 0.72 – 1.25 mg/dL for adult males and 0.57 – 1.11 mg/dL for adult females (3).

Normal GFR is more than 90 for adults. GFR declines with age, even in the absence of kidney disease. Values between 60 and 89 may indicate kidney disease. Values less than 60 for more than 3 months occur during moderate-to-severe chronic kidney disease (3).

These reference ranges were obtained from the Alinity c Creatinine package insert (3) and the National Kidney Foundation (4).

### PURPOSE OF A CREATININE AND eGFR TEST

When the kidney is not functioning properly, creatinine can accumulate in the blood. Hence, creatinine testing and estimation of GFR are useful to detect for kidney damage, evaluate kidney function, determine the effectiveness of dialysis, or in combination with other tests to help diagnose various health conditions (5).

### ABNORMAL CREATININE AND eGFR LEVELS

Kidney damage and reduced kidney function inhibit the removal of creatinine from the blood and result in high creatinine levels and low eGFR levels. Various other factors can also result in elevated blood creatinine, including dehydration (6), kidney obstruction (7), increased protein intake (8), and intense exercise (9).

Reduced creatinine in the blood can be a sign of a muscle disease (e.g. muscular dystrophy), liver disease, or excess water loss (10). Low creatinine levels can also occur during pregnancy, in individuals who have a low muscle mass, or due to certain medications (11).

### SIGNS OF KIDNEY DAMAGE

Often there are no obvious symptoms during the early stages of kidney disease. However, early detection of abnormal kidney function is important, because early treatment usually slows disease progression. Some of the initial symptoms of kidney complications include muscle cramps, nausea, lack of appetite, insomnia, and swelling in the feet and ankles (12).

### TEST PROCEDURE

Correct specimen collection and handling is required for optimal assay performance.

This test requires a blood sample from a finger prick. All supplies for sample collection are provided in this kit. First wash and dry hands. Warm hands aid in blood collection. Clean the finger prick site with the alcohol swab and allow to air dry. Use the provided lancet to puncture the skin in one quick, continuous and deliberate stroke. Wipe away the first drop of blood. Massage hand and finger to increase blood flow to the puncture site. Angle arm and hand downwards to facilitate blood collection on the fingertip. Drip blood onto the blood collection card or into the microtainer tube.

Avoid squeezing or 'milking' the finger excessively. If blood flow stops, perform a second skin puncture on another finger, if more blood is required. Do not touch the fingertip.

Dispose of all sharps safely and return sample to the laboratory in the provided prepaid return shipping envelope.

Upon receipt at the laboratory, the blood sample is analyzed by the fully automated Alinity c Creatinine assay on the Alinity ci series analyzer. This assay measures blood creatinine levels using Jaffe chemistry (kinetic alkaline picrate) methodology and estimates the glomerular filtration rate (eGFR) using the CKD-EPI Creatinine Equation (2009).

### TEST INTERPRETATION

This assay will provide an accurate creatinine level and eGFR for the tested blood specimen. High creatinine and low eGFR levels are indicative of reduced kidney function, but may also be caused by other factors. Additional testing may be required to determine the cause of abnormal blood creatinine and eGFR levels.

### DISCLAIMERS/LIMITATIONS

Low creatinine levels can also occur during pregnancy, in individuals who have a low muscle mass or a diet very low in protein, due to certain medications, or they may be an indication of certain types of severe liver disease.

Elevated creatinine can also be caused by dehydration, increased protein intake (e.g., > 225 g meat in the 24 hours before sample collection), muscle injury, and recent intense exercise.

These results should be interpreted in conjunction with other laboratory and clinical information. Additional testing is recommended if creatinine levels are inconsistent with clinical evidence.

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Antibiotics containing cephalosporin lead to inaccurate results if blood sample is taken within four hours of an antibiotic dose.

## REFERENCES

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