

## Urea Nitrogen

### UREA AND UREA NITROGEN

Urea is a waste product from the breakdown of proteins within the body. It is usually removed from the body by the kidneys. Urea levels can be assayed by measuring the whole urea molecule or just the nitrogen component, which is known as urea nitrogen or blood urea nitrogen (BUN). Measurements of urea in a blood sample are useful for the evaluation of kidney function and metabolic health. Urea levels are commonly measured in conjunction with creatinine to assess renal function (1).

### UREA PRODUCTION AND REMOVAL

When the liver metabolizes proteins in the body, it produces ammonia, which contains nitrogen. This nitrogen combines with other molecules (e.g. carbon, hydrogen, oxygen) to form urea. This urea is transported in the blood to the kidneys, where it is usually filtered from the blood, and excreted from the body in urine (2).

### Blood Urea and Urea Nitrogen Reference Ranges

Blood urea levels vary by age and gender. This table shows the serum/plasma ranges obtained from the Alinity c Urea Nitrogen package insert (3).

	Urea Nitrogen (mg/dL)	Urea (mmol/L)
1 – 3 years	5.1 – 16.8	1.8 – 6.0
4 – 13 years	7.0 – 16.8	2.5 – 6.0
14 – 19 years	8.4 – 21.0	3.0 – 7.5
Adult Male < 50 years	8.9 – 20.6	3.2 – 7.4
Adult Male > 50 years	8.4 – 25.7	3.0 – 9.2
Adult Female < 50 years	7.0 – 18.7	2.5 – 6.7
Adult Female > 50 years	9.8 – 20.1	3.5 – 7.2

### PURPOSE OF A BLOOD UREA NITROGEN TEST

When the kidney is not functioning properly, urea can accumulate in the blood. Hence, a blood urea nitrogen test is 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 (2).

### ABNORMAL BLOOD UREA NITROGEN

Kidney damage and reduced kidney function inhibit the removal of urea from the blood and result in high blood urea nitrogen levels. Various other factors can also result in elevated blood urea nitrogen, including dehydration (4), urinary tract obstruction (2), congestive heart failure (5), shock and stress, severe burns, and gastrointestinal bleeding (6).

Reduced urea in the blood is rare, but may indicate liver disease, malnutrition or overhydration. However, additional tests will be required to determine the cause of a low blood urea nitrogen result (7).

### 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 (8).

### 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 Urea Nitrogen assay on the Alinity ci series analyzer. This assay measures blood urea levels using enzymatic (urease) methodology.

### TEST INTERPRETATION

This assay will provide an accurate urea nitrogen level for the tested blood specimen. High 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 urea nitrogen levels.

### DISCLAIMERS/LIMITATIONS

These results should be interpreted in conjunction with other laboratory and clinical information.

Additional testing is recommended if urea levels are inconsistent with clinical evidence.

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

Interferences from medication or endogenous substances may affect results.

Borderline high values may occur after recent ingestion of a high protein meal.

Low urea levels occur during normal pregnancy, with intravenous fluids, and with some antibiotics.

## REFERENCES

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