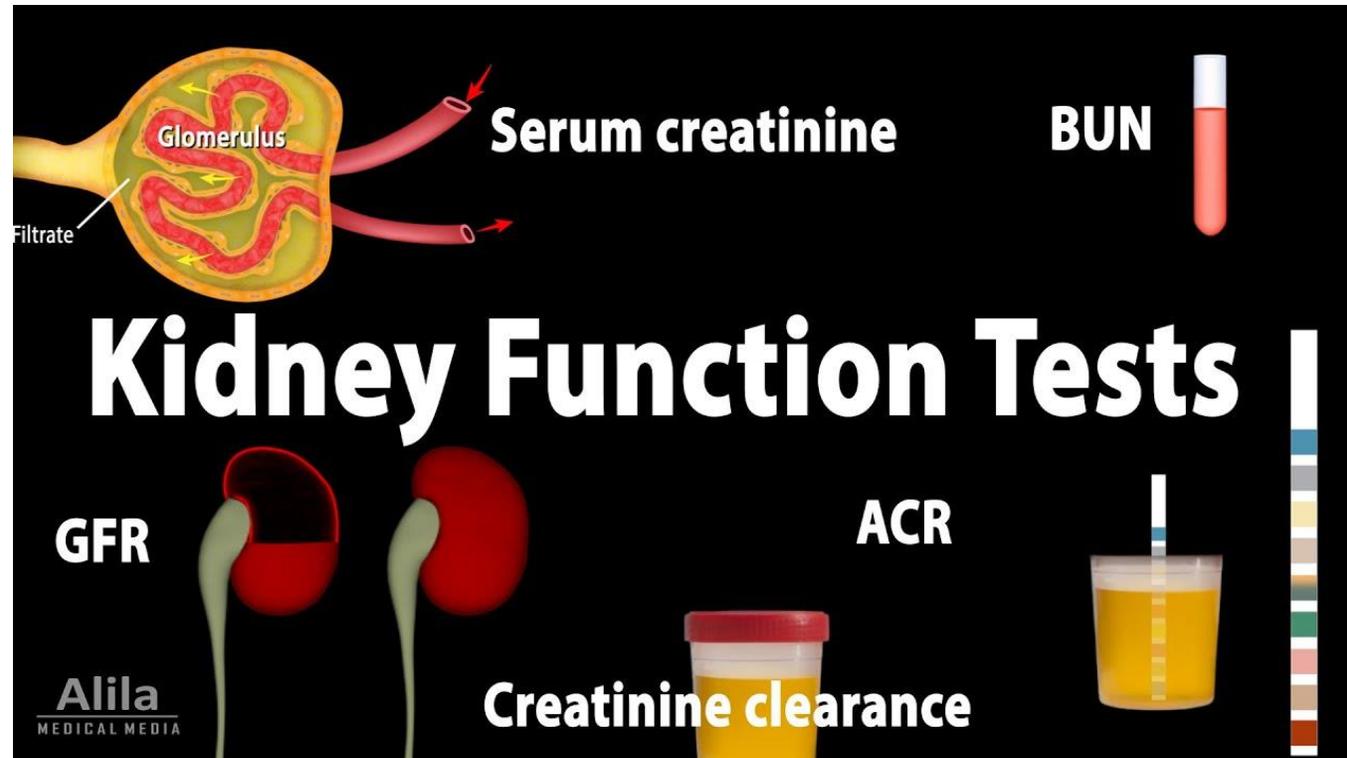




# SO, WHAT DOES THAT LAB MEAN?

KIDNEY FUNCTION PANEL AND  
BRIEF URINALYSIS

# WHAT DOES THAT LAB MEAN AND WHY DO I HAVE THE NUMBERS I HAVE? A CLOSER LOOK AT OUR KIDNEY FUNCTION.....



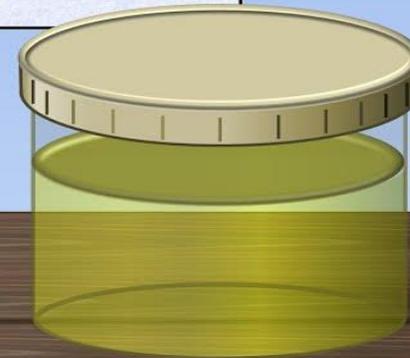
# WHAT DOES THAT LAB MEAN AND A BRIEF LOOK AT URINALYSIS

## The Interpretation of a Urinalysis

### An Introduction and Gross Inspection

Date/Time: 4/30/2013 22:35  
Source: Urine, indwelling catheter

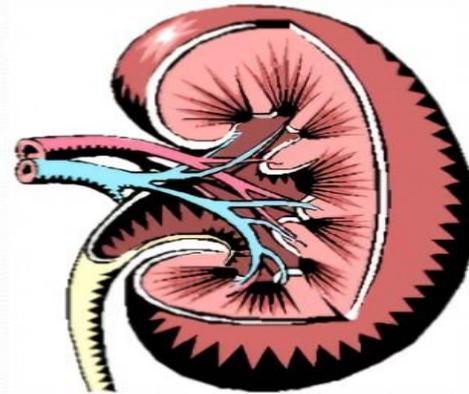
Color	Yellow	Normal
Turbidity	Clear	Yellow
Specific Gravity	1.034	Clear
pH	6.0	1.001-1.035
Glucose	2+	4.5-8.0
Bilirubin	Negative	Negative
Blood	Negative	Negative
Protein	Trace	Negative
Leukocyte Est.	1+	Negative



# WHAT DOES THE KIDNEY DO? WHY IS KIDNEY FUNCTION IMPORTANT ABOUT FLUID BALANCE AND EXCRETION OF WASTE PRODUCTS FROM OUR SYSTEM?

## FUNCTIONS OF KIDNEY-

- Fluid balance.
- Removal of waste products from the blood.
- Maintaining normal blood pressure by balancing electrolyte such as Na & K.
- Regulating bone mineralization.
- Production of RBC's.



# A MORE SCHEMATIC IMAGE OF THE BASICS OF KIDNEY FUNCTION

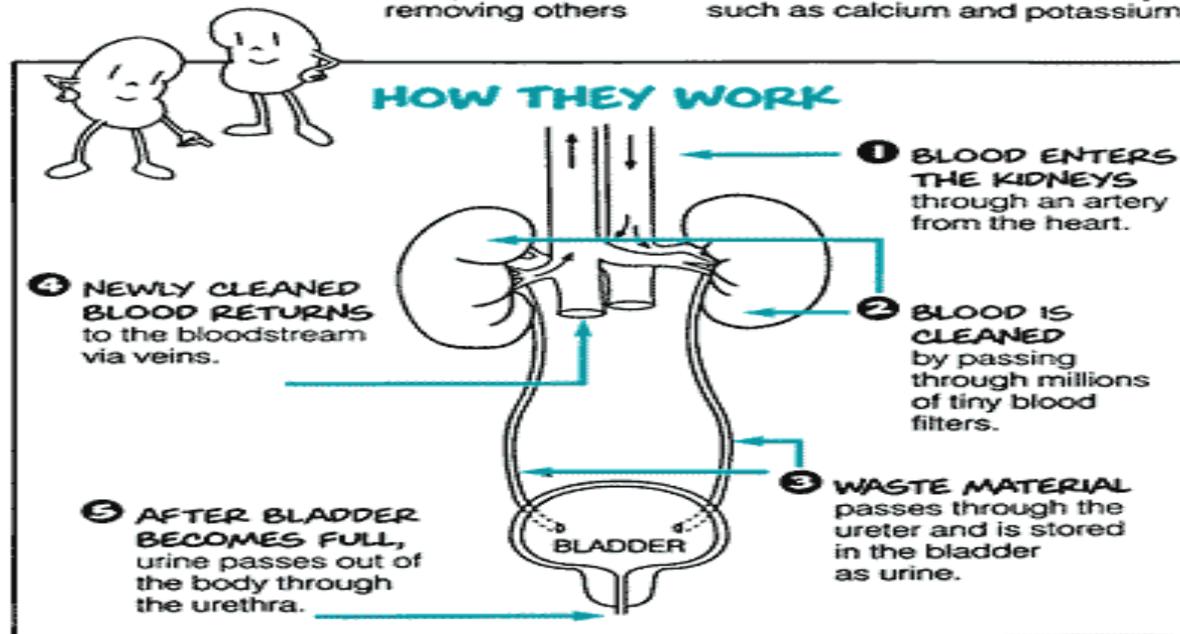
## THE KIDNEYS ARE 2 OF YOUR MOST IMPORTANT ORGANS

They perform many vital functions. For example, kidneys:

**HELP REMOVE WASTE**  
and excess fluid

**FILTER THE BLOOD,**  
keeping some  
compounds,  
removing others

**HELP REGULATE BLOOD PRESSURE,**  
red blood cells, and the amount  
of certain nutrients in the body,  
such as calcium and potassium.



# WATER CONSUMPTION AND KIDNEY FUNCTION AND EXCRETION

- The kidney is the key organ of water homeostasis. It is able to retain or eliminate water, to regulate total body water and its concentration. However, renal capacity to manage excess fluid exceeds its ability to save water during dehydration. Thus, becoming slightly dehydrated is not uncommon. (Lends credence to the idea that water is an essential nutrient because it cannot be stored)
- Despite many studies that have attempted to detect the early clinical impact of dehydration, it remains difficult to separate the status of "optimal hydration" from that of "slight dehydration." One can assume that not only should "drinking enough fluid" provide adequate fluid to restore or maintain total body water, it also should dilute urinary wastes enough to reduce the risk of urinary tract infection and renal lithiasis. This point appears particularly critical in (a) SFV drinker adults and (b) those who eat a large amount of proteinated food each day since the resulting increase in urine osmotic load does not produce fluid intake adjustment in the absence of dedicated renal feedback, resulting in an increased risk of stone formation. (SFV is small fluid volume drinkers)

# WATER CONSUMPTION AND KIDNEY FUNCTION AND EXCRETION

- The answer to the classic question of "how much should we drink?" still remains controversial. However, it appears that "drinking enough" means drinking a volume that eliminates urinary wastes safely; this volume is greater than the usual recommendation "to drink to avoid thirst and becoming clinically dehydrated." In fact, urine concentration may be an early and efficient measurement to assess optimal hydration, because it reflects the body's water balance. Hydration status is optimal when urine is isotonic or slightly hypotonic and tend to be negative when urine is concentrated.

## WHAT IS MEASURED IN A RENAL FUNCTION PANEL?

- **Sodium**: Sodium is another electrolyte that comes from your diet, and the amount of sodium in the body is largely controlled by the kidneys.
- **Chloride**: Chloride is an electrolyte that works in conjunction with other electrolytes to carry out various functions, including preserving a healthy balance of fluids.
- **Potassium**: Potassium is a type of electrolyte. Electrolytes are minerals that enable acid-base balance, healthy fluid levels, and proper functioning of muscles and nerves. Potassium comes from your diet and is found throughout the body.
- **Calcium**: Calcium is a mineral that is vital for the bones, muscles, cardiovascular system, and nervous system. The main source of calcium is your diet, and the body stores calcium in the bones.
- **Glucose**: Also known as blood sugar, glucose provides energy for the body. Excess glucose in the blood, though, can be a sign of metabolic problems like diabetes.

## WHAT IS MEASURED IN A RENAL FUNCTION PANEL (CONTINUED)

- **Creatinine**: Creatinine is a waste byproduct that is consistently formed as a result of normal muscle activity. The kidneys remove creatinine from the blood so that it can be carried out of the body in urine.
- **Blood urea nitrogen (BUN)**: Urea nitrogen, sometimes just called urea, is a waste product from protein activity. Like creatinine, it is removed from the blood by the kidneys and cleared from the body in urine.
- **BUN-to-creatinine ratio**: In some cases, comparing the amounts of the waste products BUN and creatinine can provide information about whether abnormal levels are being caused by problems in the kidneys or another part of the body.
- **Phosphorus**: Phosphorus is an essential mineral for your bones, teeth, nervous system, and muscles. Phosphorus comes primarily from the foods and drinks that you consume.

# WHAT ARE YOUR TYPICAL REFERENCE RANGES FOR THE RFP?

**Renal Function Panel**  
**Know Your Numbers**



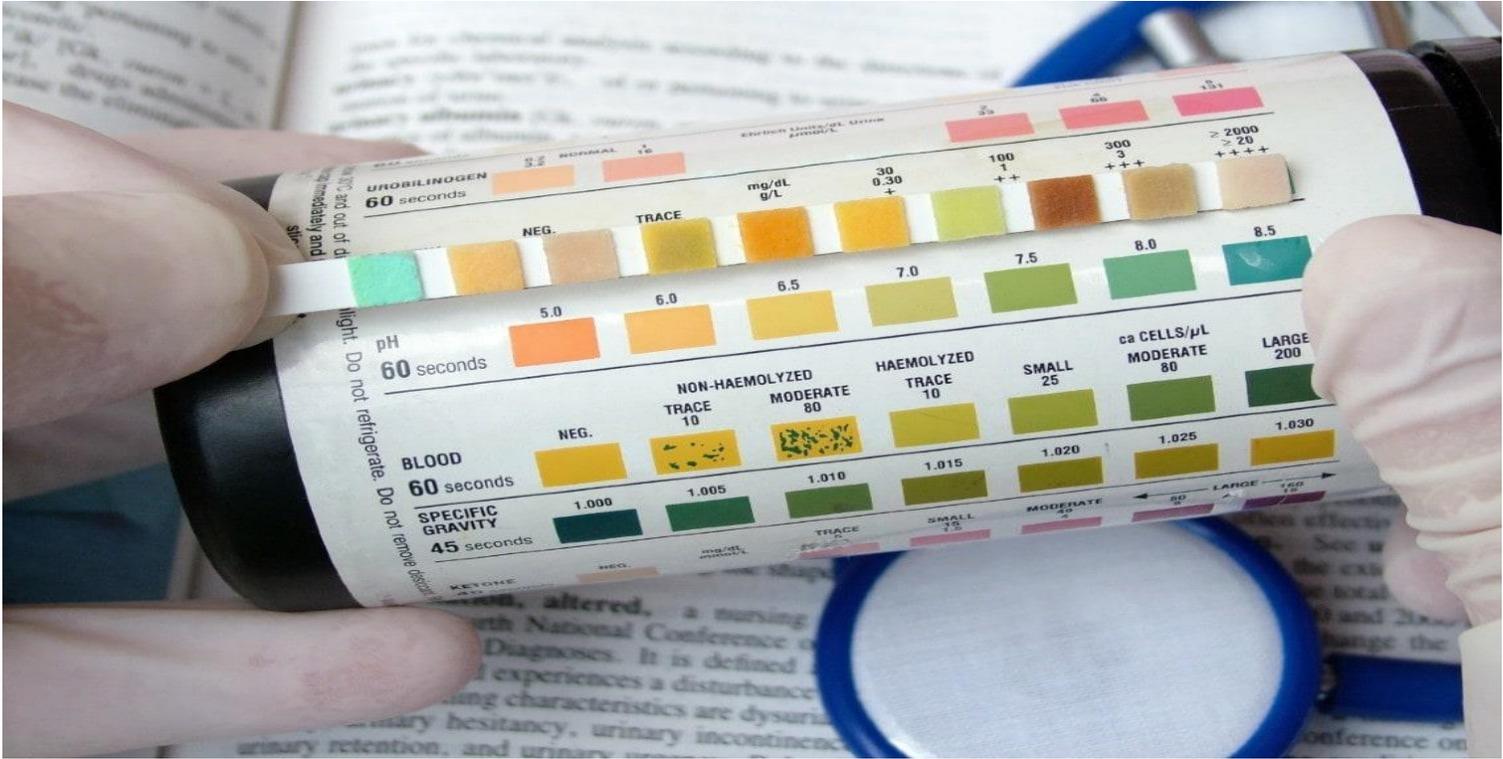
Sodium 135 - 145 mEq/L  
Potassium 3.0 - 5.0 mEq/L  
Chloride 98 - 107 mEq/L  
Bicarbonate 20 - 29 mEq/L  
Phosphorus 2.5 - 4.5 mg/dL  
Calcium 8.5 - 10.2 mg/dL  
Glucose 70 - 100 mg/dL fasting  
<200 mg/dL non-fasting  
Blood Urea Nitrogen 7 - 20 mg/dL  
Creatinine Adult Males: 0.6 - 1.2 mg/dL  
Adult Females: 0.5 - 1.1 mg/dL  
Albumin 3.4 - 5.0 mg/dL  
eGFR >60  
Anion Gap 8 - 16 mEq/L  
Urea-Creatinine Ratio 6 - 22

[www.PlantPoweredKidneys.com](http://www.PlantPoweredKidneys.com)

# URINALYSIS REFERENCE RANGE AND NORMAL VALUES

<b>Measurements</b>	<b>Values</b>	<b>Reference range</b>
Color	Yellow	Yellow
Appearance	Clear	Clear
Specific gravity (g/mL)	1.023	1.005-1.030
PH	5.5	5.0-8.0
Protein (mg/dL)	Negative	Negative
Glucose (mg/dL)	>1000	Negative
Clinitest (%)	2	Negative
Ketones (mg/dL)	Negative	Negative
Bilirubin	Negative	Negative
Blood	Trace	Negative
Nitrite	Negative	Negative
Urobilinogene (EU/dL)	0.2	0.2-1.0
Leuk. Esterase	Negative	Negative
RBC/HPF	4	0-4
WBC/HPF	3	0-4

# THE WAY WE USED TO MEASURE URINALYSIS AT THE BEDSIDE



## QUICK REFERENCE TO URINALYSIS:

- We look for color, clarity, and odor and amount, as the first part of inspection and interpretation.
- Dark urine can mean dehydration. sp. Gravity identifies the hydration status of a person, 1.001-1.035.
- Red/brown color in the urine may indicate bleeding or kidney stones
- Cloudy appearance may indicate infection or protein in the urine
- Odors that are sweet(DM) or of a strong ammonia(bact.) may indicate the spilling of glucose or bacterial growth
- The presence of bilirubin in the urine might indicate liver disease and/or gallstones which can block proper drainage If urine is more acidic and with a lower pH there may be ketoacidosis present, esp. in poorly controlled diabetes.

# HYDRATION/DEHYDRATION AND ITS EFFECT ON THE KIDNEYS

- 
- Can dehydration affect your [kidneys](#)? The answer is yes.
- Water helps remove wastes from your blood in the form of urine. Water also helps keep your blood vessels open so that blood with important nutrients can travel freely to your kidneys. But if you become dehydrated, then it's harder for this delivery system to work. Mild dehydration can make you feel tired, and it can also impair normal body functions. Severe dehydration can lead to kidney damage, so it's important to drink enough when you work or exercise very hard, and especially in warm and humid weather. Some studies have shown that frequent dehydration, even if it's mild, may lead to permanent kidney damage.
- Water loss can be due to many factors, such as poorly controlled diabetes, producing extra losses in the urine, vomiting, diarrhea, and perspiration. So dehydration occurs when we lose an excess amount of this important body water.

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# HYDRATION/DEHYDRATION AND ITS EFFECT ON THE KIDNEYS

- Dehydration can cause a build-up of wastes and acids in the body, and it can clog the kidneys with muscle proteins (myoglobin). All these things can hurt the kidneys. Dehydration can also contribute to the formation of kidney stones and urinary tract infections, both of which can lead to kidney damage if not treated quickly. Kidney stones form less easily when you have enough water to prevent stone-forming crystals from sticking together. Water helps dissolve antibiotics used for urinary tract infections, thus making them more effective. Water also helps you make more urine to flush out germs.



# HYDRATION/DEHYDRATION AND ITS EFFECTS ON THE KIDNEYS

- You can get a rough idea about how well you're hydrated by looking at your urine. If it's a very dark yellow, that may mean you may need more water. But if it's always very dark, then you should check with your healthcare professional to see if something like a certain drug is changing the color of your urine, and not your hydration status. There is no set rule about the amount of water everyone should drink. We all have different needs for water depending on differences in age, climate, exercise intensity, as well as states of pregnancy, breastfeeding, and illness. If you have [kidney failure](#), or low kidney function, then you may need to restrict your water and [fluid intake](#). All questions and concerns about dehydration and water intake should be discussed with your healthcare professional.

## IS THERE ANYTHING ELSE THAT CAN AFFECT RFP RESULTS?

- **Medications:** NSAIDs: damage the kidneys by decreasing blood flow to kidneys by the effect of blocking prostaglandins. Prostaglandins are dilators of blood vessels and allow oxygen and proper blood flow to the kidney.
- Diuretics: Are associated with low BP and increased urine output and leading to some dehydration, which is also linked to acute kidney injury.
- Antibiotics: Vancomycin, for example, is known to be toxic to the kidney except in narrow parameters of therapy in regard to treatment of infection.
- ACE inhibitors: Lisinopril, for example, metabolized in the kidney, are useful in the treatment of CHF and HTN, but these medications are also associated with kidney damage, especially if the person is dehydrated. Poor kidney function means poor metabolism of the drug.



## WHAT ELSE CAN AFFECT NORMAL KIDNEY FUNCTION?

- Iodinated radiocontrast: “iodinated radiocontrast” refers to any contrast dyes used in diagnostic testing, such as a CT scan. Iodinated radiocontrast agents are one of the most common causes of kidney injury among hospitalized patients, occurring within 24 to 48 hours after receiving an IV contrast injection.
- Alcohol: Alcohol has the potential to damage both kidneys and liver. Dehydration is the operative effect, thereby making the kidney less effective as a cleansing and balancing organ.
- Laxatives: Oral sodium phosphate and magnesium citrate laxatives are contraindicated in patients with acute or chronic kidney failure. These particular laxatives can make existing kidney function worse.
- Any other drug known to raise blood pressure, whether legal or illegal(cocaine, meth, ecstasy, e.g.)



## WRAP UP!

- Dehydration is one of several factors that should be considered when inaccurate blood test results are suspected
- it is possible for [dehydration to skew the results of a cholesterol test](#). This is attributed to the fact that dehydration can cause blood volume to decrease, leading to a drop in blood pressure and blood flow. When this occurs, it increases the risk of cholesterol accumulation in the arteries.
- Electrolytes are minerals found in body tissues and fluids in the form of dissolved salts, and are responsible for maintaining a healthy water balance. A typical electrolyte panel measures sodium, potassium, chloride, and bicarbonate. Any condition that affects the amount of fluid in the body—including dehydration—can cause an electrolyte imbalance.



## CONTINUED.....

- Two of the most common tests for evaluating kidney function and diagnosing kidney disease are the blood urea nitrogen (BUN) test and creatinine test. Both tests measure the amount of waste product in the blood; higher volumes of BUN and creatinine indicate that the kidneys are not working properly. Dehydration is known to reduce blood flow to the kidneys and elevate creatinine and BUN levels in the blood.
- A complete blood count (CBC) test evaluates the overall health of the blood cells circulating in the body. Hematocrit is one component of the CBC test that can be skewed as a result of dehydration. This test measures the proportion of blood that is made up of red blood cells (RBCs); as the volume of fluid in the blood drops, the proportion of RBCs rises.

## RESOURCES: INTERNET SOURCES

[14 Symptoms of Kidney Disease \(veryhealthy.life\)](#)

[14 Common Causes of Kidney Disease \(simplyhealth.today\)](#)

[Diet & Nutrition | DaVita Kidney Care](#)

[Chapter 11 Excretion Lesson 3 - The 2 functions of kidneys and Kidney... \(slideshare.net\)](#)

[16 Symptoms of Kidney Disease \(stayhealthy.fit\)](#)

[Tests to Measure Kidney Function, Damage and Detect Abnormalities | National Kidney Foundation](#)

[8 Early Warning Signs Your Kidneys Aren't Working As Well As They Should - Save Our Bones](#)

[Explaining Your Kidney Test Results: A Tool for Clinical Use | NIDDK \(nih.gov\)](#)

[Understanding Your Lab Values | National Kidney Foundation](#)

[16 Symptoms of Kidney Disease \(stayhealthy.fit\)](#)

## RESOURCES CONTINUED:

- [Your Kidneys & How They Work | NIDDK \(nih.gov\)](#)
- [How does the kidney regulate fluid and electrolyte balance? \(treehozz.com\)](#)
- [Overview of Electrolytes - Hormonal and Metabolic Disorders - MSD Manual Consumer Version \(msdmanuals.com\)](#)
- [Effects of Water Consumption on Kidney Function and Excretio... : Nutrition Today \(lww.com\)](#)
- [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4874113/](#)
- [https://www.kidney.org/content/6-tips-be-water-wise-healthy-kidneys](#)
- [https://www.sciencedirect.com/science/article/pii/S0085253815479207](#)
- [https://www.revistanefrologia.com/en-doctor-how-much-should-i-articulo-X2013251414054906](#)
- [https://jasn.asnjournals.org/content/19/6/1041](#)



## MORE RESOURCES.....

- [Effect of dehydration on blood tests - Ashraf - 2017 - Practical Diabetes - Wiley Online Library](#)
- [Effects of Drinking More Water Remain Unclear for Patients with Kidney Disease | CardioSmart – American College of Cardiology](#)
- [Dehydration Affects Blood Pressure and Lab Blood Test Results](#)
- [Kidney Function Tests: Purpose, Types, and Procedure](#)
- [Renal Panel | Labcorp](#)
- <https://www.nursingtimes.net/clinical-archive/continence/urinalysis-how-to-interpret-results-07-06-2016/>



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