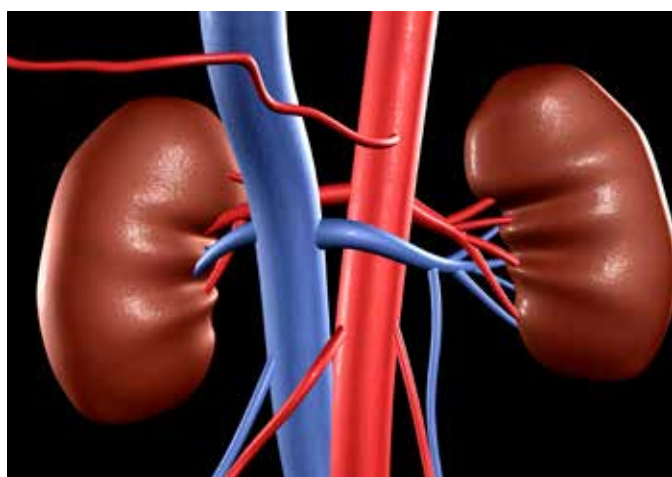


# UNDERSTANDING WHAT IT MEANS TO HAVE PROTEIN IN YOUR URINE





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## Understanding What It Means to Have Protein in Your Urine

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The kidneys are best known for making urine. This rather simple description does not tell the whole story. This brochure describes other important functions of the kidneys; including keeping protein in the blood and not letting any of the protein in the liquid (plasma) part of blood escape into the urine.

“Proteinuria” is when kidneys allow proteins to appear in the urine and be lost from the body. Proteinuria is almost never normal, but it can be normal - rarely - in some healthy, active children or young adults.

The kidneys are paired organs located on either side of the backbone. They are located at the level of the lowest part of the rib cage. They are the size of an adult fist (4.5 – 5 inches in length). Together the two kidneys receive a quarter of the blood that is pumped from the heart every minute. This large blood flow is needed in order for the kidneys to do one of the kidneys’ main jobs:

- remove waste products in the blood every day
- keep the body in balance by eliminating the extra fluids and salts we consume on a regular basis.

Proteinuria is when kidneys allow proteins to appear in the urine and be lost from the body. Proteinuria is almost never normal, but it can be normal - rarely - in some healthy, active children or young adults.

## What is proteinuria and why is it important?

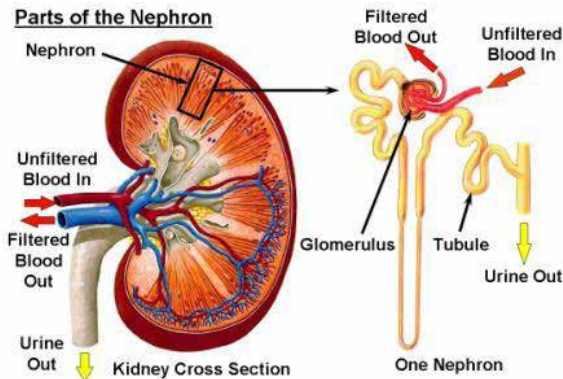
Protein is an important part of our diet. Proteins are the body's building blocks. All of our organs, including the skin, muscles, hair and nails, are built from proteins. Many hormones are also proteins. The immune, digestive, and nervous systems all rely on proteins to work correctly. When protein leaks from the blood into the urine, there is less protein in the blood available for our bodies to work normally. *Therefore, proteinuria is a warning sign that something is wrong with the kidneys.*

Albumin is a specific protein found in the blood. The blood plasma contains an average of 40 grams per liter. Normal albumin levels in the urine are about 7 milligrams per liter or less. Albumin levels can increase greatly when the kidneys are not working at their best. That amount can be as much as 3000 milligrams per day or higher. This can cause the blood levels of albumin to decrease. "Nephrotic Syndrome" is when urine albumin is greater than 3000 milligrams per day accompanied by a low blood plasma albumin level of less than 35grams per liter.

The albumin in urine in kidney disease (albuminuria) can be joined by a large amount of other proteins normally present in blood plasma. Occasionally a large amount of an abnormal protein will build up in the blood and

spillover into urine, even though the kidney are normal. Even small amounts of albuminuria or proteinuria is linked to an increased risk of developing heart and blood vessel disease.

Laboratory testing is the only way to find out how much protein you have in your urine.



*courtesy UNC Health Care Kidney Center*

## What can cause protein (or albumin) to leak from the kidneys?

Each kidney is made up of roughly one million microscopic filtration units which are called glomeruli. They can be damaged in a way that allows free passage of protein (including albumin) from blood into the urine. Many diseases can cause protein leakage into the urine, including “nephritis”, diabetes, and hypertension. There are at least three ways that protein can get into the urine. Leakage of protein through the glomeruli (kidney filters) is the most common cause.



## What are the symptoms or signs of proteinuria?

Most people do not notice any symptoms of proteinuria. If you do have symptoms, they might include:

- Swelling in feet by evening, around the eyes when awakening, or increasing girth from swelling inside the abdomen.
- Frothy or foamy urine
- Recent weight change

Laboratory testing is the only way to find out how much protein you have in your urine.

## Who should have their urine routinely tested for proteinuria?

If you answer yes to any of the following conditions, you should talk to your doctor about being tested for proteinuria (or albuminuria).

- people with kidney function known to be less than 50% of normal for age
- people with diabetes (Type 1 or 2)
- people with high blood pressure (hypertension)

- people with heart and blood vessel (cardiovascular) disease (ischaemic heart disease, chronic heart failure, peripheral arterial disease and cerebral vascular disease)
- people with complex diseases which may involve the kidneys - for example, systemic lupus erythematosus (a disease where a person's immune system attacks and injures the body's own organs and tissues)
- people with a family history of kidney failure or a family history of inherited kidney disease
- people found to have blood in their urine.

If it is not found or treated, proteinuria may remain stable for many months or years. It could also lead to kidney failure...

## Managing Diabetes and High Blood Pressure with Proteinuria

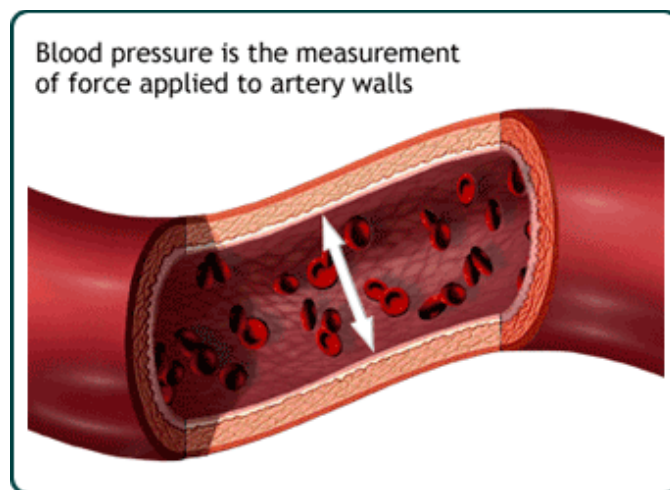
### Diabetes

Diabetes is the number one cause of end-stage kidney disease (ESKD) in the United States. ESKD is when the kidneys are not able to work well enough to maintain day-to-day life. In both type 1 and type 2 diabetes, small amounts of protein may appear in the urine. This is one of the first signs of kidney damage. This is called microalbuminuria. As the kidneys worsen, more albumin in the urine appears, and microalbuminuria becomes full-fledged proteinuria.

## High Blood Pressure

Like a vicious cycle, hypertension is both a cause for chronic kidney disease (CKD) and a result of CKD. Proteinuria in a person with high blood pressure increases the risk that kidney function will worsen in the future. If the high blood pressure is not controlled, the person can progress to full kidney failure.

A person in kidney failure requires kidney replacement therapy (dialysis or kidney transplantation). African Americans are more likely than Caucasians to have high blood pressure and to develop kidney problems from it. This is possible even when their blood pressure is only a little higher than normal. In fact, African Americans are six times more likely than Caucasians to develop hypertension-related kidney failure.



*Courtesy Centers for Disease Control and Prevention*



## Treatment

If you have diabetes, high blood pressure, or both, it is important that you try to get your blood glucose and blood pressure to levels that are more normal.

With diabetes, talk to your doctor about how you should test your blood glucose and hemoglobin. If you have high blood pressure, you may also be given medications to control the blood pressure. Your doctor may also give you a diuretic, or “water pill.” Diuretics help you urinate and get rid of extra fluid in your body. Your doctor may give you more than one medication to control your diabetes or blood pressure. If you have diabetes and high blood pressure but no proteinuria, your doctor may prescribe a medicine to lower your blood pressure.

The Kidney Disease Improving Global Outcomes Clinical Practice Guideline (KDIGO) recommends patients with albuminuria should strive to have a blood pressure less than or equal to 130/80. People who have high blood pressure and proteinuria but not diabetes may also benefit from taking specific classes of anti-hypertension medications. They are called “ACE inhibitors” or “ARB’s.” As of 2014, the blood pressure level recommended for this group of people is at least below 140/90mmHg. To maintain this target, you may need to take a combination of two or more blood pressure medicines. Your doctor

Several health organizations recommend that people at risk of developing kidney disease should be regularly checked for proteinuria, so that kidney disease can be detected and treated before it has progressed.



may also prescribe a diuretic, in addition to your ACE inhibitor or ARB. Diuretics help improve high blood pressure by helping you urinate more excess salt and water from your body.

In addition to blood glucose, Hemoglobin A1c and blood pressure control, your doctor may recommend restricting dietary salt and protein. Your doctor may refer you to a registered dietitian to help you develop and follow a healthy eating plan.

In addition to diabetes, another cause of proteinuria is glomerulonephritis. Glomerulonephritis is the term used to describe a group of diseases that damage the part of the kidney that filters blood. There are several types of glomerular disease that cause proteinuria. If protein loss is large enough or increasing, your doctor may recommend a kidney biopsy to help determine the diagnosis. Treatment may include chemotherapeutic medicines or other immunosuppressive medications.

## **What affect will this disease have on my day to day living?**

## **What happens if I let the disease go untreated?**

If it is not found or treated, proteinuria may remain stable for many months or years. It could also lead to kidney failure, especially if:

- Proteinuria is associated with uncontrolled high blood pressure.
- There is a lot of protein in the urine (more than 1 gm/day). The higher the proteinuria, the greater the risk of kidney failure.

People with proteinuria are also at risk of cardiovascular disease.

### Questions to Ask Your Doctor

1. What is the probable cause or causes of my proteinuria?
2. What can we do about it? What are my treatment options? What are the risks and benefits of each treatment option?
3. What should I expect in the future? How serious is my proteinuria and how will it affect my life? What is the short-term and long-term prognosis for my kidney disease?
4. How will I know if the medication is working?

If you have diabetes, high blood pressure, or both, it is important that you try to get your blood glucose and blood pressure to levels that are more normal.

## Points to Remember

- Proteinuria is when urine contains too much protein.
- There are different kinds of protein that can be found in the urine. The term albuminuria means a specific kind of blood stream protein, called albumin, is found in the urine.
- Proteinuria may be a sign that your kidneys are damaged and that you are at risk of developing progressive kidney disease.
- Several health organizations recommend that people at risk of developing kidney disease should be regularly checked for proteinuria, so that kidney disease can be detected and treated before it has progressed.
- You may have proteinuria without noticing any signs or symptoms. Laboratory testing is the only way to find out how much protein you have in your urine.
- If you have diabetes or hypertension, or both, the first goal of treatment will be to control your blood glucose and blood pressure.
- If you have any questions please speak to your doctor.

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## Glossary

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**Access Site** - The site on your body where blood is removed and returned during dialysis.

**A1C test:** A common blood test used to diagnose type 1 and type 2 diabetes and then to gauge how well you're managing your diabetes. It gives an estimate of average blood sugars for three months preceding the blood test.

**Albumin:** A protein made by the liver. A serum albumin test measures the amount of this protein in the clear liquid portion of the blood.

**Angiotensin-converting enzyme (ACE) inhibitors:** ACE inhibitors prevent an enzyme in your body from producing angiotensin II. Angiotensin II is a substance in your body that affects your cardiovascular system by narrowing your blood vessels. It also releasing hormones that can raise your blood pressure.

**Angiotensin II receptor blockers (ARBs):** Like ACE inhibitors, ARB's decrease the effect angiotensin hormone has on causing high blood pressure. While ACE inhibitors decrease the production of angiotensin, ARB's blocks the action of angiotensin. ACEI's and ARB's may be used alone or combined with other medicine—often a diuretic—to treat high blood pressure.

**Diuretics:** Sometimes called water pills, help rid your body of salt (sodium) and water.

**Glomeruli (plural; glomerulus – singular):** Microscopic clusters of looping blood vessels. There are approximately one million glomeruli in each kidney. The glomeruli work

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## Glossary

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to filter the blood. Normal blood filtration by the kidneys allows waste products to leave the blood and enter the urine, while preventing protein and other important substances in the blood from entering the urine. In this way, the body keeps important substances while allowing the excretion of waste products and extra water in the urine.

**Glomerulonephritis:** Inflammation of the tiny filters in your kidneys (glomeruli). Glomeruli filter excess fluid, electrolytes, waste from your bloodstream, and pass them into your urine. Also called glomerular disease, glomerulonephritis can be acute — a sudden attack of inflammation — or chronic — coming on gradually.

**Kidney biopsy:** A medical procedure done by a clinician (nephrologist, radiologist, or surgeon) that removes a tiny piece of kidney tissue to examine under a microscope for signs of damage or disease.

**Nephritis:** Inflammation of the kidney, which causes impaired kidney function.

**Nephrotic syndrome:** A kidney disorder that causes your kidneys to leak more than 3 grams of protein each day into your urine.

**Registered dietitian:** A food and nutrition expert. This professional translates the science of nutrition into practical solutions for healthy living.



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