

## Screening for Chronic Kidney Disease

**Microalbumuria** - Your kidneys are designed to keep all your proteins in your body. The earliest sign that your kidneys are sick is the leaking of protein into your urine. Your doctor can order a special urine test to determine if you are leaking protein into your urine.

**Serum creatinine** - A simple blood test that measures the amount of muscle break down products in your blood. The higher the number the more likely you have CKD

**eGFR** - A computer generated number that takes your blood creatinine level and using your age, race and sex, gives you a percent function of your kidneys. A number below 60 could mean that you have CKD. Your doctor will order other tests and/or ask you to see a Nephrologist (a doctor who has special knowledge in treating medical kidney disease)

## How to protect your kidneys

If your doctor determines that you do have chronic kidney disease (CKD) there are treatments that can help to slow or stop the decline of your kidney function. The treatments include:

**Blood Sugar Control** -If you are a diabetic keep your glycohemoglobin (HbA1c) close to 7.0

**Blood Pressure Control** - Control your blood pressure to less than 130/80

### Medications - ACEI/ARB

ACEI means Angiotensin-Converting Enzyme Inhibitor

ARB means Angiotensin Receptor Blocker

These are fancy medical terms that describe how two very similar medications help control blood pressure. In addition to lowering your blood pressure to protect your kidneys, they seem to have a direct effect on the kidneys to preserve kidney function. It is recommended that diabetics with protein in their urine take either an ACEI or ARB.

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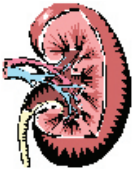
a partnership for the future of health care



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This material was prepared by HealthInsight, the Medicare Quality Improvement Organization for Nevada and Utah, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy. 9SOW-NV-2009-7.3-040

## Chronic Kidney Disease (CKD)



*“Don’t let this Quiet Disease catch you”*

The kidneys play a central and vital role in keeping us healthy. You can think of the kidneys as the thermostat that keeps us comfortable. When the kidneys get sick the body gets out of whack and many of our vital functions go haywire.

## Are you at RISK for Kidney Disease? Take the quiz

DO YOU HAVE?	Yes
High blood pressure	<input type="checkbox"/>
Diabetes	<input type="checkbox"/>
Family history of kidney disease	<input type="checkbox"/>
Heart Disease	<input type="checkbox"/>
History of acute kidney failure	<input type="checkbox"/>
A disease like lupus	<input type="checkbox"/>

ARE YOU?	Yes
Over the age of 60	<input type="checkbox"/>
Taking medications containing ibuprofen, such as Motrin, Aleve or Advil	<input type="checkbox"/>
A member of an ethnic minority group	<input type="checkbox"/>

If you answered Yes to any of the above - you are at risk for kidney disease.

*Ask your doctor to screen you for chronic kidney disease (CKD)*

Early detection and treatment of kidney disease can slow the decline of your kidney function.

## Normal Kidney Function and Complications that develop in Chronic Kidney Disease

Normal Function	Complication due to kidney disease (CKD)
1. Produce erythropoietin (EPO) which makes red blood cells	Anemia – too few red blood cells
2. Regulate Acid-Base to keep a neutral state	Acidosis – too much acid in the blood
3. Control fluid balance	Congestive Heart Failure (CHF)/Pulmonary edema – water in the legs and lungs
4. Produce active Vitamin D	Secondary hyperparathyroidism – bone and heart problems
5. Regulate sodium (Na), potassium (K), and phosphorus (PO <sub>4</sub> )	Too much K and PO <sub>4</sub> in the blood
6. Regulate blood pressure	Hypertension – high blood pressure
7. Filter waste products in the blood	Uremia – a build up of waste products

### Let's take a closer look at each of the functions and the resulting illnesses

#### 1. Anemia

The kidneys make a hormone called erythropoietin (EPO) which travels to your bone marrow and switches on the production of red blood cells. As the kidney function decreases, the amount of EPO produced decreases and you make fewer red blood cells. Red blood cells are measured by a test called Hemoglobin (Hgb). When your Hgb drops below about 12 you are said to have anemia. Symptoms of anemia include fatigue and shortness of breath. You usually start to notice these symptoms when your Hgb drops below 10 or 11.

#### 2. Acidosis

Your body normally produces acid. One of the jobs of the kidneys is to produce base to buffer the acid and keep the body in a neutral state. As the kidneys get

sicker they are not able to produce enough base and you become acidotic. The symptoms of acidosis can include: tired feeling, headache, shortness of breath, nausea and vomiting, rapid heart beat, low blood pressure and high glucose.

#### 3. Fluid Balance (edema)

Your kidneys are responsible for keeping your fluids in balance. When you are in the hot sun the kidneys retain most of your water and you make very little urine. This keeps you from becoming dehydrated. When you drink a lot of fluids the kidneys make a lot of urine so that you do not retain the extra water. When the kidney function declines they lose the ability to make urine and you retain extra water in your body. You first notice the extra water in your feet when you stand for a long time. As you continue to retain water your legs become progressively more swollen. Finally, the water builds up in your lungs and you become short of breath.

#### 4. Bone Mineral Metabolism (Vitamin D and secondary hyperparathyroidism)

Your kidneys are central to making the active form of Vitamin D. Vitamin D is important in many of your body functions. Vitamin D is very important in the regulation of your parathyroid glands. The parathyroid glands make a chemical called PTH which regulates your blood calcium and has major effects on your bones. When the kidneys fail you can develop bone pain and fractures. Also, calcium can be deposited in places in your body where it is not supposed to be, such as your heart valves and arteries, and might increase the risk of a heart attack.

#### 5. Hyperkalemia (too much potassium) and Hyperphosphatemia (too much phosphate)

Your kidneys regulate the amount of potassium and phosphate in your blood. As the kidney function declines you build up too much potassium and phosphate in your blood. Too much potassium causes muscle weakness and can cause the heart to stop beating. Too much phosphorous interacts with

Vitamin D, calcium and PTH to cause bone and heart problems as described above under “ Bone Mineral Metabolism”.

#### 6. Hypertension

The kidneys help control blood pressure in 2 ways- volume and chemicals. Think of a garden hose. When it is full it has a lot of pressure, but when it is empty there is little pressure. When the kidneys get sick they cannot get rid of water properly. You retain water, which you will see in your legs, and feel in your lungs. The extra water is also in your blood vessels and this causes an increase in your blood pressure.

The kidneys also make chemicals that cause your blood vessels to clamp down, raising your blood pressure.

The combination of too much water and too many blood vessel constricting chemicals causes most patients with CKD to have high blood pressure. This is a vicious cycle because high blood pressure causes more kidney damage, which causes more fluid retention and more blood vessel constricting chemicals, which cause high blood pressure - and so the Merry-Go-Round keeps going around - and the kidneys get sicker.

#### 7. Uremia

The main function of the kidneys is to clear waste products from your blood. As the kidneys fail waste products build up in your body, and when your kidney function is down to about 10-15% you start to notice symptoms, which can include: nausea, vomiting, food does not taste good, fluid in your legs, shortness of breath, itching and problems thinking.

If your kidney function should decline to an eGFR (a measurement of kidney function) of less than 15% for diabetics and less than 10% for other patients, you will need some form of renal replacement therapy. That means you will either need a kidney transplant or dialysis. There are 2 types of dialysis- hemodialysis or peritoneal dialysis.