



Section 1: Introduction to Chronic Kidney Disease

Have you been told that you have kidney problems, or that laboratory tests show your kidney function is not normal? Or does your diabetes, hypertension, or another condition put you at high risk for kidney disease? Do you have a kidney transplant that is failing? If so, you may be one of the estimated 8.2 million people in the United States who are at risk for moderate to severe chronic kidney disease (CKD), or kidney failure.

This Life Options document will explain the risk factors for CKD, and symptoms you should report to your doctor. We'll answer some commonly asked questions and tell you what *you* can do to feel your best—and help prevent or slow progression to kidney failure.

When you learn about CKD, you are taking the first step toward an active role in your healthcare. Research suggests that people who are active partners in their care are more likely to live long and well.

What is chronic kidney disease?

Chronic kidney disease, or CKD, is a condition that affects the function of the kidneys, and that may progress over time to kidney failure. When the kidneys fail, dialysis or a kidney transplant is needed to support life—and people can live for decades with dialysis and/or kidney transplants. Many diseases can cause CKD. The most common are diabetes and high blood pressure.

Successful kidney patients say you should remember three things:

ATTITUDE – You can live a good life with kidney disease.

ANSWERS – You need to educate yourself so you can stay as healthy as possible.

ACTION – You and your doctor need to agree on what you should and should not do, and then you need to follow the list as closely as you can.



Section 2: Risk Factors

Risk factors make it more likely that a disease will develop later. There are some risk factors, like age or family history, that you cannot control. But you *can* control other risk factors, and perhaps slow down or even prevent some diseases. For instance, controlling blood pressure and your blood sugar may help your kidneys work longer.

First, know your risk factors for chronic kidney disease (CKD). Then, work with you doctor to prevent or delay kidney failure.

Kidney Risk Factors You Can Change

- ***Diabetes***

Almost 40% of new dialysis patients have diabetes, making it the fastest growing risk factor for kidney disease. *Type 2 diabetes is the number one cause of kidney failure, responsible for more than one of every three new cases.*

What you can do

Kidney disease does not have to happen to people with diabetes—good blood pressure and blood sugar control can help prevent it. Tight control can have big payoffs in reducing the risk for kidney disease.

Type 1 and Type 2 Diabetes

The most common forms of diabetes are now called type 1 and type 2. Type 1 diabetes is failure of the pancreas to make insulin. Type 1 usually occurs in children and/or young people, and insulin injections are needed to treat it. About one in 10 diabetics have type 1. Type 2 diabetes is a condition where the body develops resistance to its own insulin. It usually occurs in adults, and is related to obesity and lack of exercise. Pills and sometimes insulin are used to treat it. Type 2 diabetes accounts for about 90% of all diabetes.

- ***High blood pressure (Hypertension)***

High blood pressure puts more stress on blood vessels throughout the body, including the kidney filters (nephrons). Hypertension is the number two cause of kidney failure. Normal blood pressure is less than 130/85—and this is the target for people who have diabetes, heart disease, or CKD. Weight control, exercise, and medications can control blood pressure—and perhaps prevent or slow the progression from kidney disease to kidney failure.

What you can do

Blood pressure pills must be taken as prescribed to work properly. If you can't afford to buy your blood pressure pills or have side effects, tell your doctor so he or she can suggest other options for you. Certain classes of blood pressure medications, such as ACE-inhibitors, angiotensin receptor blocks (ARBs), or beta blockers, may help protect the kidneys in some cases.



Section 2: Risk Factors *cont.*

● ***Blockages***

Scarring from infections or a malformed lower urinary tract system (birth defect) can force urine to back up into the kidney and damage it. Blood clots or plaques of cholesterol that block the kidney's blood vessels can reduce blood flow to the kidney and cause damage. Repeated kidney stones can block the flow of urine from the kidney and are another kind of obstruction that can damage the kidneys.

What You Can Do

Sometimes blockages can be repaired or opened to help save function in a blocked kidney and kidney stones can be treated. If you know or suspect that you may have a blockage, ask your doctor what can be done about it.

● ***Overuse of painkillers and allergic reactions to antibiotics***

Heavy use of painkillers containing ibuprofen (Advil[®], Motrin[®]), naproxen (Aleve[®]), or acetaminophen (Tylenol[®]) have been linked to interstitial nephritis, a kidney inflammation that can lead to kidney failure. A new study suggests that ordinary use of painkillers (e.g., one pill per day) is not harmful in men who are not at risk for kidney disease. Allergic reactions to, or side effects of, antibiotics like penicillin and vancomycin may also cause nephritis and kidney damage.

What You Can Do

If you routinely take these medications, be sure that your doctor is aware of it—especially if you already have a known kidney problem. When you are taking a new medication, report any new symptoms to your doctor.

● ***Drug abuse***

Use of certain non-prescription drugs, such as heroin or cocaine, can damage the kidneys, and may lead to kidney failure and the need for dialysis.

What You Can Do

If you are using these drugs, know that they can harm your health and seek help to stop taking them. Be honest with your doctor about your medical history—he or she can't help you without knowing the full story.

● ***Inflammation***

Certain illnesses, like glomerulonephritis (inflammation of the filtering units of the kidneys), can damage the kidneys, sometimes enough to cause CKD. Some glomerulonephritis is inherited, and some may be an immune response to infections like strep throat.

What You Can Do

Having a throat culture for bad sore throats, and treating any strep infection, lowers this risk.



Section 2: Risk Factors *cont.*

Kidney Risk Factors You Can't Change—But Should Know About

- ***Family history of kidney disease***

If you have one or more family members who have CKD, are on dialysis, or have a kidney transplant, you may be at higher risk. One inherited disease, polycystic kidney disease, causes large, fluid-filled cysts that eventually crowd out normal kidney tissue. Diabetes and high blood pressure can also run in families. Be aware of your family history and share it with your doctor. This can ensure that you are screened for risk factors regularly and get the care you need.

- ***Premature birth***

About one in five very premature infants (less than 32 weeks gestation) may have calcium deposits in parts of the kidney called nephrons. This is termed nephrocalcinosis. Sometimes, individuals with this condition may go on to develop kidney problems later in life.

- ***Age***

Since kidney function is reduced in older people, the older you are, the greater your risk.

- ***Trauma/accident***

Accidents, injuries, some surgeries, and certain radiocontrast dyes that doctors use to monitor blood flow to your heart and other organs can damage the kidneys or reduce blood flow to the kidneys, causing acute (temporary) kidney failure. Sometimes acute kidney failure will get better, but it may lead to CKD.

- ***Certain diseases***

Having certain diseases puts people at higher risk for kidney disease. These diseases include systemic lupus erythematosus (a connective tissue disease), sickle cell anemia, cancer, AIDS, hepatitis C, and congestive heart failure.



Section 3: 10 Symptoms of Kidney Disease

Many people who have chronic kidney disease don't know it, because the early signs can be very subtle. It can take many years to go from chronic kidney disease (CKD) to kidney failure. Some people with CKD live out their lives without ever reaching kidney failure.

However, for people at any stage of kidney disease, knowledge is power. Knowing the symptoms of kidney disease can help you get the treatment you need to feel your best. If you or someone you know has one or more of the following symptoms of kidney disease, or you are worried about kidney problems, see a doctor for blood and urine tests. Remember, many of the symptoms can be due to reasons other than kidney disease. **The only way to know the cause of your symptoms is to see your doctor.**

Symptoms and why they happen	What patients say about symptoms
<p>1) Changes in urination Kidneys make urine, so when the kidneys are failing, the urine may change. How?</p> <ul style="list-style-type: none"> ● You may have to get up at night to urinate ● Urine may be foamy or bubbly ● You may urinate more often, or in greater amounts than usual, with pale urine ● You may urinate less often, or in smaller amounts than usual, with dark colored urine ● Your urine may contain blood ● You may feel pressure or have difficulty urinating 	<ul style="list-style-type: none"> ● <i>“When you go to use the restroom, you couldn't get it all out. And it would still feel just like tightness down there be so much pressure.”</i> ● <i>“My urine is what I had started noticing. Then frequently going to the bathroom, and get there, nothing's happening. You think, 'Hey, I've got to go to the john,' and you get there: two, three drops.”</i> ● <i>“I started having frequent urination a lot, basically before, because of my diabetes and my high blood pressure. And I used to always wonder how come I have to go to the bathroom so much. I can't ride a bus, you know, too often without having to jump off. But, anyway, at one point about 7 years ago, I started having blood in my urine.”</i> ● <i>“I was passing blood in my urine. It was so dark it looked like grape Kool-Aid®. And when I went to the hospital they thought I was lying about what color it was.”</i>



Section 3: 10 Symptoms of Kidney Disease *cont.*

Symptoms and why they happen	What patients say about symptoms
<p>2) Swelling in the legs, ankles, feet, face, and/or hands Failing kidneys don't remove extra fluid, which builds up in your body.</p>	<ul style="list-style-type: none"> ● <i>“I was out celebrating, and my right hand swelled up. And I didn't understand why it was swelling up. My girlfriend kept trying to get me to go to the hospital, but I didn't want to. I finally blacked out and she drove me to the hospital. The doctor told me that I would have a dye test done to find out about my kidney, and come to find out it was high blood pressure that knocked my kidneys out, and I've been on dialysis ever since.”</i> ● <i>“I remember a lot of swelling in my ankles. My ankles were so big I couldn't get my shoes on.”</i> ● <i>“My sister, her hair started to fall out, she was losing weight, but her face was really puffy, you know, and everything like that, before she found out what was going on with her. Going to work one morning, my left ankle was swollen, real swollen, and I was very exhausted just walking to the bus stop. And I knew then that I had to see a doctor.”</i>
<p>3) Fatigue Healthy kidneys make a hormone called erythropoietin (a-rith'-ro-po'-uh-tin) that tells your body to make oxygen-carrying red blood cells. As the kidneys fail, they make less erythropoietin. With fewer red blood cells to carry oxygen, your muscles and brain become tired very quickly. This condition is called <i>anemia</i>, and it can be treated.</p>	<ul style="list-style-type: none"> ● <i>“I was constantly exhausted and didn't have any pep or anything.”</i> ● <i>“I would sleep a lot. I'd come home from work and get right in that bed.”</i> ● <i>“If I'm in the market or something, I have to stop and rest because my legs kind of give up on me a bit. And I just kind of push myself to do the walking because I want my legs to be strong.”</i> ● <i>“It's just like when you're extremely tired all the time. Fatigued, and you're just drained, even if you didn't do anything, just totally drained.”</i>



Section 3: 10 Symptoms of Kidney Disease *cont.*

Symptoms and why they happen	What patients say about symptoms
<p>4) Skin rash/itching Kidneys remove wastes from the bloodstream. When the kidneys fail, the build-up of wastes in your blood can cause severe itching.</p>	<ul style="list-style-type: none"> ● <i>“It’s not really a skin itch or anything, it’s just right down to the bone. I had to get a brush and dig. My back was just bloody from scratching it so much.”</i> ● <i>“My skin had broke out, I was itching and scratching a lot.”</i>
<p>5) Metallic taste in mouth/ammonia breath A build-up of wastes in the blood (called <i>uremia</i>) can make food taste different and cause bad breath. You may also notice that you stop liking to eat meat, or that you are losing weight because you just don’t feel like eating.</p>	<ul style="list-style-type: none"> ● <i>“Foul taste in your mouth. Almost like you’re drinking iron.”</i> ● <i>“One thing that I noticed was it seemed as though my breath would smell a bit like household ammonia.”</i> ● <i>“You don’t have the appetite you used to have.”</i> ● <i>“Before I started dialysis, I must have lost around about 10 pounds.”</i>
<p>6) Nausea and vomiting A severe build-up of wastes in the blood (<i>uremia</i>) can also cause nausea and vomiting. Loss of appetite can lead to weight loss.</p>	<ul style="list-style-type: none"> ● <i>“I had a lot of itching, and I was nauseated, throwing up all the time. I couldn’t keep anything down in my stomach.”</i> ● <i>“When I got the nausea, I couldn’t eat and I had a hard time taking my blood pressure pills.”</i>
<p>7) Shortness of breath Trouble catching your breath can be related to the kidneys in two ways. First, extra fluid in the body can build up in the lungs. And second, anemia (a shortage of oxygen-carrying red blood cells) can leave your body oxygen-starved and short of breath.</p>	<ul style="list-style-type: none"> ● <i>“At the times when I get the shortness of breath, it’s alarming to me. It just fears me. I think maybe I might fall or something so I usually go sit down for awhile.”</i> ● <i>“I couldn’t sleep at night. I couldn’t catch my breath, like I was drowning or something. And, the bloating, can’t breathe, can’t walk anywhere. It was bad.”</i> ● <i>“You go up a set of stairs and you’re out of breath, or you do work and you get tired and you have to stop.”</i>

**Section 3: 10 Symptoms of Kidney Disease *cont.***

Symptoms and why they happen	What patients say about symptoms
<p>8) Feeling cold Anemia can make you feel cold all the time, even in a warm room.</p>	<ul style="list-style-type: none"> ● <i>“I notice sometimes I get real cold, I get chills.”</i> ● <i>“Sometimes I get real, real cold. It could be hot, and I’d be cold.”</i>
<p>9) Trouble concentrating, dizziness Anemia related to kidney failure means that your brain is not getting enough oxygen. This can lead to memory problems, trouble with concentration, and dizziness.</p>	<ul style="list-style-type: none"> ● <i>“I know I mentioned to my wife that my memory—I couldn’t remember what I did last week, or maybe what I had 2 days ago. I couldn’t really concentrate, because I like to work crossword puzzles, and read a lot.”</i> ● <i>“I was always tired and dizzy.”</i> ● <i>“Well, it got to the point, like, I used to be at work, and all of the sudden I’d start getting dizzy. So I was thinking maybe it was my blood pressure or else diabetes was going bad. That’s what was on my mind.”</i>
<p>10) Leg/flank pain Some people with kidney problems may have pain in the back or side related to the affected kidney. Polycystic kidney disease, which causes large, fluid-filled cysts on the kidneys and sometimes the liver, can cause pain.</p>	<ul style="list-style-type: none"> ● <i>“About 2 years ago, I was constantly going to the bathroom all the time, the lower part of my back was always hurting and I was wondering why... and they diagnosed that kidney problem.”</i> ● <i>“And then you’re having to get up all time through the night, and then you have the side ache, a backache, and you can’t move.”</i> ● <i>“At night, I would get a pain in my side. It was worse than labor pain. And I’d be crying and my husband would get up, everybody, rubbing my legs.”</i>



Section 4: Frequently Asked Questions About CKD

When people are told they have chronic kidney disease (CKD), the first questions they often have are “How long will I live?” and “How well will I live?” This section answers these and other questions about CKD, while also presenting thoughts from patients.

1) What is chronic kidney disease (CKD)?

“About 2 years ago, I was constantly going to the bathroom all the time, you know, the lower part of my back is always hurting and I was wondering why...and so they diagnosed that kidney problem.”

–Dialysis patient

ANSWER:

Chronic kidney disease is permanent kidney damage due to injury or disease. CKD ranges from mild, to severe. If CKD reaches the point of kidney failure, dialysis or a kidney transplant is needed to support life. Since CKD may worsen over time, early diagnosis and treatment can help slow down the damage, depending on the cause of the problem. (See Section 5: Chronic Kidney Disease – What You Can Do) If your doctor says you have a kidney problem, find out the medical name (and spelling) for your diagnosis, if you can. Knowing the name can help you look for more information.

2) How long can I live with chronic kidney disease?

“As of June, 2001, I marked my 30th year on hemodialysis.”

–Dialysis patient for 30 years

ANSWER:

Many people think that if their kidneys fail, they will die immediately. This used to be true 40 years ago when there were not enough dialysis machines to go around and medical knowledge about kidney disease was limited. It is no longer true today. How long you can live with CKD depends on your age, other health problems, and how involved you become in your care. Some people with early CKD never have kidney failure. Others reach kidney failure and live for decades with dialysis or kidney transplants. There are major advances in today’s healthcare—we have better drugs, know more about how to slow down kidney failure, and have technically advanced dialysis machines. But the most important factor is still the individual who has the disease. Research shows that patients who become partners in their care live longer. So, ask questions, and explore with your doctor and care team the best way for you to help manage your disease.



Section 4: Frequently Asked Questions About CKD *cont.*

3) How good will my life be with CKD?

“Think Positive! Always think on the positive end. It could be worse, but it’s not. You know, think of the person who is worse off than you are. Nowadays they’ve got a lot of things that can help you, but it’s your attitude, it’s more your attitude than anything else—how you think about it.” –Dialysis patient

ANSWER:

How good your life can be with CKD depends on you! In the early stages, CKD may have symptoms that are so subtle you don’t even notice them. In later stages, fatigue, itching, loss of appetite, and other symptoms can reduce your quality of life—if you don’t act. How? All of these symptoms can be treated. Learn what to watch for and tell your doctor, so you can get the help you need. You can also keep a good quality of life by following your treatment plan. For example, taking your medications in the right doses at the right times may help slow down your kidney disease. Your quality of life with CKD depends on your attitude, and how you accept the changes and take control of your health and your life.

4) Can I still have a good life if I need dialysis?

*“I had to come to terms with the fact that this was the way things were going to be for the rest of my life. Once I did, I stopped feeling sorry for myself—and decided that I would do everything I could to make the best of my situation.”
–Dialysis patient for 32 years*

*“Start working toward your dream whatever it may be. Ask yourself what you want your life to be, and then make it happen. It’s up to you. It’s in your hand to make it better.”
–Dialysis patient for 30 years*

ANSWER:

Yes, you can live long and live well with dialysis. Many people—even those with family members on dialysis—don’t know that there are several types of dialysis. You can choose a type of treatment that lets you keep doing all or most of the things you value. Some people with CKD put off dialysis as long as they can, because they are afraid. But people who start treatment before they are terribly ill and malnourished do much better. And people who are very sick before they start dialysis are often surprised to find that they feel much better a few weeks or months after starting dialysis. The unknown that you imagine is often much scarier than the reality. Learning as much as you can, and talking to patients who are doing well, will help you see that you can have a good life on dialysis.

**Section 4: Frequently Asked Questions About CKD *cont.*****5) I'm tired all the time. Is there a treatment for fatigue?**

"I've had a job since I've been 13, and at times in my life I've had two or three jobs at one time. And now I just like, I can't hardly get up and go sometimes, you know? It's just hard for me to get up and go. I had one unemployment check in my whole life. So I've always worked. And now I'm not working." –CKD patient

ANSWER:

Even healthy people complain of being tired. But people with CKD can be so exhausted that they fall asleep during the day—even after 8 to 10 hours of sleep at night. One reason for fatigue can be anemia, a shortage of oxygen-carrying red blood cells. People with CKD often have anemia because damaged kidneys make less of a hormone called erythropoietin (epoetin, or EPO). EPO signals the bone marrow to produce new red blood cells. Without a constant supply of new red blood cells, the body has less oxygen—so you are more tired, feel cold, can't concentrate, and are less able to fight disease. Untreated anemia can damage your heart, and heart disease is the leading cause of death for people with CKD. If your fatigue is due to anemia, your doctor may prescribe injections of a synthetic form of EPO.

6) How can I keep my kidneys working as long as possible?

"...It's not written in stone that you're going to have to have dialysis. But, they let you know it's possible. I want the facts, I want the facts. And I want, you know, some options. Don't tell me that this is the only way out." –CKD patient

ANSWER:

There are a number of treatments, including medications and lifestyle changes, that may help keep your kidneys working longer. People can even get transplants before having dialysis, especially if they have a willing living donor. You need to ask your physician exactly what would help *you*. For more information on possible treatments, see *Section 5: Chronic Kidney Disease – What You Can Do*

**Section 4: Frequently Asked Questions About CKD *cont.*****7) Should I keep working?**

“At the job I’ve got now the boss has told me... ‘You work what you can work. When you don’t feel like working, you go home. There’s nothing going to be held against you, you just do it as you can handle it.’ And that makes me feel pretty good.” –CKD patient

ANSWER:

Disability payments may sound like a pretty good deal, but most people find that disability pays much less than working—but your bills don’t go away. Plus, once you get on disability, people worry about finding a job and risking losing their disability. So if you have CKD and you are working, try to keep your job if you can, or find a new one that fits better with your current situation. Work can make you feel like you’re still *you*, even with kidney disease, and that you are still helping to support your family. Work may also be an important part of your social life. If your work offers health insurance, it may be easier for you to get good medical care and pay for medications. If you find that you feel too tired to work, see your doctor! Fatigue can be caused by anemia, which can be treated. Ask your employer if you need an accommodation—more breaks, a different shift time, or energy saving devices to keep your job. You can find helpful information about employment support programs, laws, and resources to help people with disabilities on the Social Security website (<http://www.ssa.gov/work/index2.html>).

**Section 4: Frequently Asked Questions About CKD *cont.*****8) What questions should I ask my doctor?**

“When your doctor is prescribing medication to you, ask him about what you are taking. You know, because a lot of times they just give you stuff, and you take this and go to the drugstore and pick this medication up, and the pharmacist will tell you, ‘Well, did they tell you about the side effects, or did they tell you...?’ And on the little pamphlets, it has all that on there, but your doctor never tells you any of this. So ask them about all that.” –CKD patient

ANSWER:

No two people are alike, so asking questions is the best way to find out about *your* health. On the Life Options website (<http://www.lifeoptions.org>), you can download a *Patient Interest Checklist* that will help you figure out questions. You’ll also find a few basic ideas below, and you can add your own. If you write your questions and show the list to your doctor, you may be more likely to get them answered. Write down the answers, too—or have a family member come along to help you remember the answers.

- 1) What percent of kidney function do I have now?
- 2) What is the cause of my kidney problem?
- 3) What are my lab test results right now?
- 4) What can I do to keep my kidneys working as long as possible?
- 5) What treatment is available for my symptoms? (List symptoms)
- 6) What are the next steps for my treatment?
- 7) Will I eventually need dialysis or a transplant, if so, how long might it be until I do?

**Section 4: Frequently Asked Questions About CKD *cont.*****9) Where can I find more information about chronic kidney disease?**

“I went to the library first. That was my first stop. I went, I just looked in the, you know, they have a computer thing and I just looked up under the kidney disease first, and then I just went and found that list and I just pulled out books I thought would be interesting.”

–CKD patient

ANSWER:

Asking questions and getting them answered—by a healthcare professional or in a book or other reliable source—is a key part of doing well with any chronic disease. Ask your healthcare team to teach you about your condition and to give you any information they have. Never feel shy about coming to a clinic visit with a list of questions—and write down the answers. At the Life Options website (<http://www.lifeoptions.org>), we have a long list of kidney links and many booklets and fact sheets about kidney disease that you can read and/or download. The library is another option. The National Kidney Foundation (NKF), American Association of Kidney Patients (AAKP), and the United Network for Organ Sharing (UNOS) are sources of information and support. Depending on the cause of your kidney problems, there may be another organization to help you—type your diagnosis into a search engine on the Internet to learn more.



Section 5: CKD—What *You* Can Do

Most chronic kidney disease (CKD), is not curable. The good news is that if your doctor finds out early that you have a kidney problem, there may be a number of ways to help slow down the disease, help you feel better, and help you make better medical decisions. What can you do? See the list below.

*“The more informed I was, the better I felt about it. I felt I had some control.”
—CKD patient*

- 1) Know Your Lab Tests**—know the names of the lab tests your doctor orders and what the results mean. Kidney disease is often diagnosed, and always monitored, by measuring levels of substances in the blood or urine. Knowing—and tracking—your lab tests is an important way for you to be involved in your care. Normal lab test ranges vary slightly from one laboratory to another. When you get your results, be sure to ask what the laboratory’s normal range is.

Some common lab tests are listed on pages 16-18.

**Section 5: CKD–What You Can Do *cont.***

Test	What it means	Normal Levels
Measures of Kidney Function		
Serum Creatinine	Creatinine is a waste product that is made when your body breaks down protein you eat and when muscles are injured. A high serum (blood) creatinine level means kidney damage. Creatinine levels may vary somewhat, even when the kidneys work normally. So, your doctor should check your level more than once before diagnosing CKD. Creatinine levels tend to be higher in men and people with large muscles. Measuring creatinine is only the first step to finding your level of kidney function.	The normal serum creatinine range for men is 0.5-1.5 mg/dL. The normal range for women is 0.6-1.2 mg/dL. Medicare pays for dialysis or transplants when the creatinine level is 8.0 mg/dL; and 6.0 mg/dL for people with diabetes.
Creatinine Clearance	Creatinine clearance is a test sometimes used to estimate filtering capacity of the kidneys. The amount of creatinine in your urine is compared to the amount of creatinine in your blood. Your doctor may test your urine by asking you to collect your urine for 24 hours in a special container.	Normal creatinine clearance for healthy men is 97-137 mL/min. Normal creatinine clearance for healthy women is 88-128 mL/min.
Glomerular Filtration Rate (GFR)	GFR is a more accurate way to measure how well your kidneys filter wastes from your blood. Your GFR gives your doctor an idea of the speed at which your kidneys are failing, and whether you are at risk for complications of kidney disease. GFR can be estimated from serum creatinine, using a formula.	Healthy adults have a GFR of about 140*; normal is greater than 90. Children and the elderly usually have lower GFR levels. A GFR less than 15 is kidney failure. <small>*GFR is reported in mL/min/1.73 m²</small>

**Section 5: CKD—What *You Can Do* cont.**

Test	What it means	Normal Levels
Measures of Kidney Function		
Urine Albumin	<p>Inside healthy kidneys, tiny filtering units called nephrons filter out wastes but keep in large molecules, like red blood cells and albumin (protein). Some kidney diseases damage these filters so albumin and other proteins can leak into the urine. Protein—albumin—in the urine can be a sign of kidney disease. Albumin can be measured with a urine dipstick or a 24-hour urine collection to find out how much protein is “spilling” into the urine. Albumin levels can increase with heavy exercise, poor blood sugar control, urinary tract infections, and other illnesses.</p>	<p>In a 24-hour urine sample, a normal level is less than 30 mg/day.</p>
Micro-albuminuria	<p>Microscopic amounts of protein too small to be measured with a standard dipstick test can be an early sign of kidney disease—especially in people with diabetes. Special dipsticks or laboratory tests can find microalbuminuria. The American Diabetes Association guidelines recommend that anyone with type 1 or type 2 diabetes have a test for microalbuminuria at least yearly.</p>	<p>Urine in healthy people contains less than 150 mg/L of albumin.</p>
Blood Urea Nitrogen (BUN)	<p>Blood Urea Nitrogen (BUN) is another measure of wastes (urea) in the blood. Urea is produced from the breakdown of protein already in the body and protein in your diet. A high BUN usually means that kidney function is less than normal, but other factors may affect the BUN level. Bleeding in the intestines, congestive heart failure, and certain medications may make the BUN higher than normal. As BUN rises, symptoms of kidney disease may appear, such as a bad taste in the mouth, poor appetite, nausea, and vomiting. In dialysis, BUN is used to measure whether a person is receiving the correct amount of dialysis. Sometimes a low BUN may also mean that you are not eating enough protein.</p>	<p>The normal BUN level for healthy individuals is 7-20 mg/dL in adults, and 5-18 mg/dL in children.</p> <p>Patients on dialysis have higher BUN levels, usually 40-60 mg/dL. The nephrologist (kidney doctor) and dietitian will help determine whether the BUN is in the correct range.</p>

**Section 5: CKD—What *You Can Do* cont.**

Test	What it means	Normal Levels
Measures of Anemia		
Hematocrit (Hct)	Hematocrit is the percentage of red blood cells in the blood, used to check for anemia. Anemia—a shortage of oxygen-carrying red blood cells—often begins at the early stages of kidney disease. It causes severe fatigue, heart damage, and other health problems. Anemia can be treated.	The normal Hct level for healthy individuals is 40%–50% for men and 36%–44% for women.
Hemoglobin (Hgb)	Hemoglobin is the part of red blood cells that actually carries oxygen. Both hematocrit and hemoglobin levels are measured to check for anemia.	The normal Hgb level for healthy individuals is 14 to 18 g/dL for men and 12 to 16 g/dL for women. The Hct is approximately three times the Hgb level.
Measures of Diabetes Control		
Hemoglobin A1c (HbA1c)	The HbA1c measures your blood sugar control over the last 3 months. According to the National Diabetes Education Program, people with diabetes should have their HbA1c tested at least once every 6 months.	The goal is to keep your HbA1c less than 6.5%.
Glucose	Glucose is blood sugar. It is measured to determine if your body is able to digest and use sugar and carbohydrates correctly. Although high blood glucose levels are mainly found in diabetics, some medications can raise your blood glucose level. Diabetes is diagnosed if the non-fasting blood glucose is higher than 200 mg/dL.	Normal (fasting) glucose levels are 65-110 mg/dL. In people with diabetes, the blood glucose goal <i>before</i> eating is 80-120 mg/dL. <i>After</i> eating, the blood glucose goal is 100-140 mg/dL.
Measures of Diabetes Control		
Albumin	The level of albumin (protein) in the blood is a measure of good nutrition. Research shows that people with kidney disease who become malnourished and do not get enough protein may suffer from many complications. It is especially important for people on low protein diets to have their serum protein levels measured.	Normal serum albumin levels in healthy people are 3.6-5.0 g/dL.



Section 5: CKD—What *You Can Do* *cont.*

- 2) Control Your Blood Pressure.** Keep your blood pressure below 130/85 (adults) with weight loss and exercise, a low sodium/low fat diet, reducing stress, and taking your blood pressure medication correctly. For some patients, the target blood pressure is lower (125/75). Controlling high blood pressure may delay the progression of kidney disease by slowing damage to the kidneys.
- 3) Ask Your Doctor About Certain Medications That May Help Treat Kidney Disease.** ACE (angiotensin converting enzyme) inhibitors are a class of blood pressure medicines that can protect kidney function in some cases (generic names include ramipril, captopril, and enalapril). In some people, ACE inhibitors cause a persistent cough, which stops when the drug is discontinued. This is not a serious side effect of the drug. ARBs (angiotensin receptor blockers) may sometimes be used along with or instead of ACE inhibitors. Calcium channel blockers and beta blockers are other drugs that may help to control blood pressure and protect kidney function.
- 4) Ask Your Doctor About Anemia.** Anemia—a shortage of red blood cells—starts very early in kidney failure. Anemia can cause you to feel tired and worn out, and can damage your heart. Heart disease is the leading cause of death in people with kidney problems. Ask your doctor about medications such as epoetin (EPO) and iron to treat anemia.
- 5) Ask Your Doctor about a Low Protein Diet.** Some doctors believe a diet lower in some proteins can help slow kidney disease. Ask your physician to refer you to a dietitian who specializes in treating those with chronic kidney disease. A dietitian can help you learn how to keep your kidneys healthy longer by eating the right foods. It is important not to adjust your protein intake until you have discussed this with your physician or dietitian.
- 6) Control Your Blood Sugar Levels.** If you have diabetes, stay at a healthy weight, exercise, and take medications as prescribed to keep your blood glucose in the “normal” range. Tight control of blood sugar can help slow the progression of kidney disease. Your HbA1c levels, which measure your blood sugar control over a period of 3 months, should be less than 6.5%.

**Section 5: CKD—What *You Can Do cont.***

- 7) **Quit Smoking.** In people with kidney disease, smoking is linked to an increase in the amount of protein spilled in the urine. In smokers with diabetes, kidney disease may progress twice as fast. Scientists are not sure why this is the case, but if you have kidney disease and you smoke, quitting may help slow down the damage.

- 8) **Avoid Certain Pain Medications.** Ask your doctor or healthcare specialist about certain pain medications. Some over-the-counter pain pills containing ibuprofen, naproxen, and ketoprofen (e.g., Motrin[®] and Advil[®], and Aleve[®]) can affect kidney function. This is especially true if you have kidney, heart, or liver disease or take diuretics (water pills.) Avoid using combinations of these pain medications and caffeine because these combinations can further damage your kidneys.

- 9) **Exercise.** With your doctor's OK, start a regular exercise program to control weight and keep your heart healthy and blood vessels working as well as possible. It is very important to keep your muscles and joints in good working order. Although written for people on dialysis, *Exercise: A Guide for People on Dialysis* (can be downloaded from http://www.lifeoptions.org/combined/materials/pa_print.shtml) provides useful information to help anyone with a chronic illness increase physical activity.