



**Golden  
Rules**  
OF KIDNEY CARE



KIDNEY SPECIALISTS  
OF SOUTHERN NEVADA

# Introduction

## CKD Clinic

An intensive personalized approach to kidney care.

## Program Goals

- ✓ Improve & preserve kidney function
- ✓ Slow progression of kidney disease
- ✓ Reduce medical complications associated with kidney disease
- ✓ Preparation for dialysis or transplantation

PUTS YOU AT THE  
**CENTER**  
OF YOUR CARE



## Meet your CKD team:

- Your nephrologist
- Nurse practitioner
- Registered dietician
- Medical assistant
- Your coordinator



# The Kidneys

## Kidney Facts

Weigh about 4 ounces each.

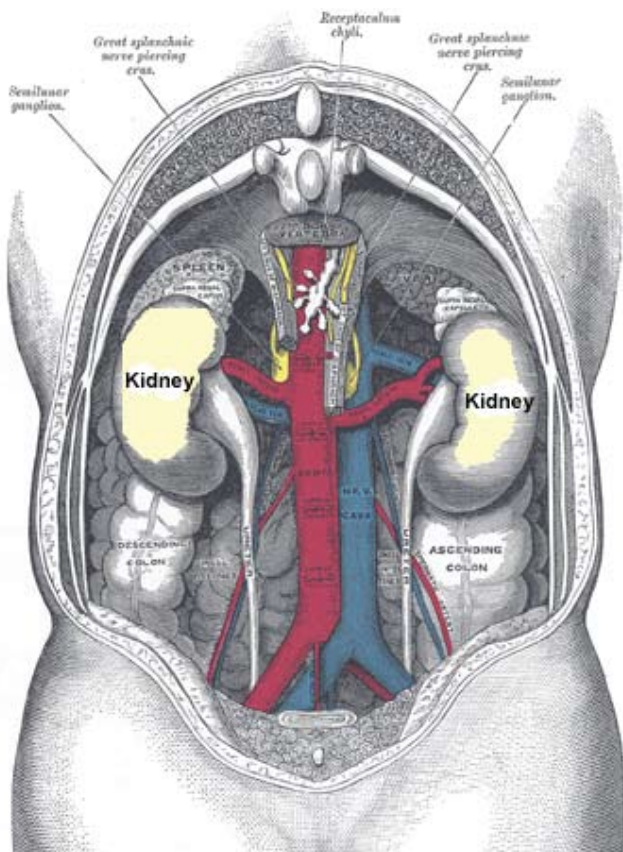


Each is approximately the size of your fist.

Each contains about 1 million nephrons.



They have 140 miles of tubules.



This is a reproduction of a lithograph plate from **Gray's Anatomy**. This image is in the public domain because its copyright has expired.

The filtering unit of the kidney is called the nephron. Within the nephron, blood is filtered through a network of vessels called the glomeruli. Extra water and wastes pass into the tubules and become urine. Urine then travels from the kidney down the ureter to the bladder where it is stored until eliminated.



# What the Kidneys Do

- ✓ Filter blood and remove waste
- ✓ Balance body fluid
- ✓ Produce erythropoietin (EPO), a hormone needed to make red blood cells
- ✓ Produce renin, an enzyme to help control blood pressure
- ✓ Activate vitamin D to maintain healthy bones



The kidneys are like 'worker bees' & they do much more than just produce urine. Kidneys filter & clean all of your blood every 5 minutes. About 200 quarts of fluid are filtered & returned to the body every 24 hours. Only about 2 quarts are eliminated as urine.

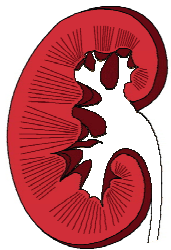
# When They Don't Work

- ✗ Changes in urination: urinating at night, less often, in smaller amounts, darker in color, foamy, blood in urine or difficulty producing
- ✗ Swelling in legs, ankles, feet, face or hands
- ✗ Bad taste in mouth or food tastes different
- ✗ Fatigue
- ✗ Itching
- ✗ Nausea & vomiting
- ✗ Shortness of breath
- ✗ Feeling cold/chilled
- ✗ Dizziness & trouble concentrating

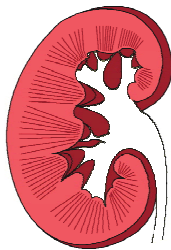


# How Do I Know if My Kidneys Are Working?

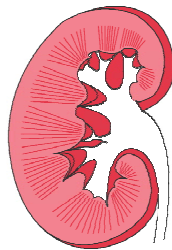
Creatinine is a waste product made by muscles, released into your blood & filtered by your kidneys. When kidney function declines so does the ability to filter creatinine correctly. Therefore, creatinine levels measure basic kidney function. The measured outcome is assigned a number known as the estimated glomerular filtration rate (eGFR).



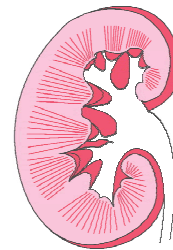
Normal/Stage 1  
GFR >90



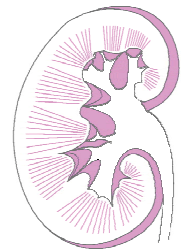
Stage 2  
Mild Reduction  
GFR 60-89



Stage 3  
Moderate Reduction  
GFR 30-59



Stage 4  
Severe Reduction  
GFR 15-29



Stage 5  
Kidney Failure  
GFR < 15

## At Risk

- Diabetics
- African-American
- High blood pressure
- Family history of kidney disease
- Advanced age



# Monitoring Chronic Kidney Disease (CKD)

## Common Lab Tests

Kidneys are important to the balance of these substances:

- Creatinine—a waste product of muscle activity
- Blood Urea Nitrogen (BUN)—a waste product of protein breakdown
- Sodium, Potassium, Chloride & Bicarbonate—electrolytes which are essential to life
- Hemoglobin & Hematocrit—red blood cell count used to determine anemia
- Calcium, Phosphorus, iPTH & Vitamin D—important to healthy bones & heart

### At each visit report the following:

- All medications: prescribed, OTC, vitamins, herbals & supplements
- Record of blood pressures & blood sugars
- Weakness, dizziness, confusion
- Breathing difficulties
- Swelling
- Decrease in appetite
- Nausea or vomiting
- Abnormal bleeding
- Fatigue
- Sleeplessness





# Causes of CKD

#1

## Diabetes Mellitus

It causes nearly 40-50% of new CKD cases each year. In diabetics, the body does not produce enough insulin or use it properly. Insulin is an enzyme needed for cells to convert glucose to energy. Without insulin, sugar remains in the bloodstream, causing damage to blood vessels. Damaged blood vessels in the kidneys cause abnormal leakage of protein into the urine.

#2

## High Blood Pressure

Is the second leading cause of CKD. It causes damage to blood vessels throughout the body. This pressure & stress within the blood vessels in the kidneys can damage the nephrons. This damage activates renin production, resulting in fluid overload, increased blood pressure & nephron loss.

#3

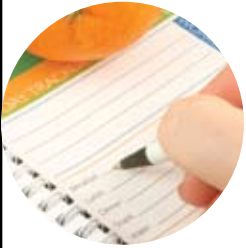
## Glomerulonephritis

Disease of the kidneys in which the kidneys' filtering units become inflamed. They slowly lose their ability to filter fluid & waste. If not treated this can lead to scarring, loss of kidney function, high blood pressure & kidney failure.



# Why Diet is Important

Protecting & prolonging kidney function is our goal and yours. Proper diet & nutrition is an important part of kidney care.



## Keep a food diary

This gives dieticians a snapshot of your eating patterns.

## Limit protein

Too much protein can harm your kidneys. Proper balance is essential.



## Limit your sodium

Excess sodium can increase fluid, swell body tissue & elevate blood pressure.

## Limit your potassium

It can control smooth muscle, but it can also change muscle function, namely heart muscle.



## Maintain a balance of calcium & phosphorus

The correct balance is required for bone health and to prevent calcium deposits in blood vessels.





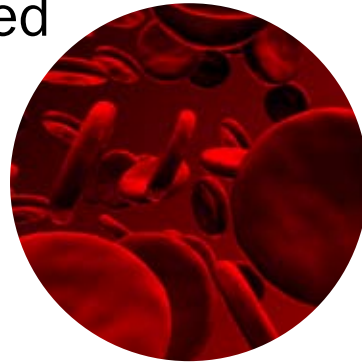
# Anemia

Normal kidneys produce the hormone EPO needed to stimulate bone marrow to make red blood cells. In contrast, unhealthy kidneys cannot make enough EPO. Fewer red blood cells result in anemia.

## Symptoms

Untreated, anemia forces the heart to work harder to get needed oxygen to the body. Over time, the heart muscle becomes damaged & heart disease develops.

- Feeling weak, fatigued or tired
- Shortness of breath
- Dizziness
- Rapid heart rate
- Pale skin
- Inability to think clearly



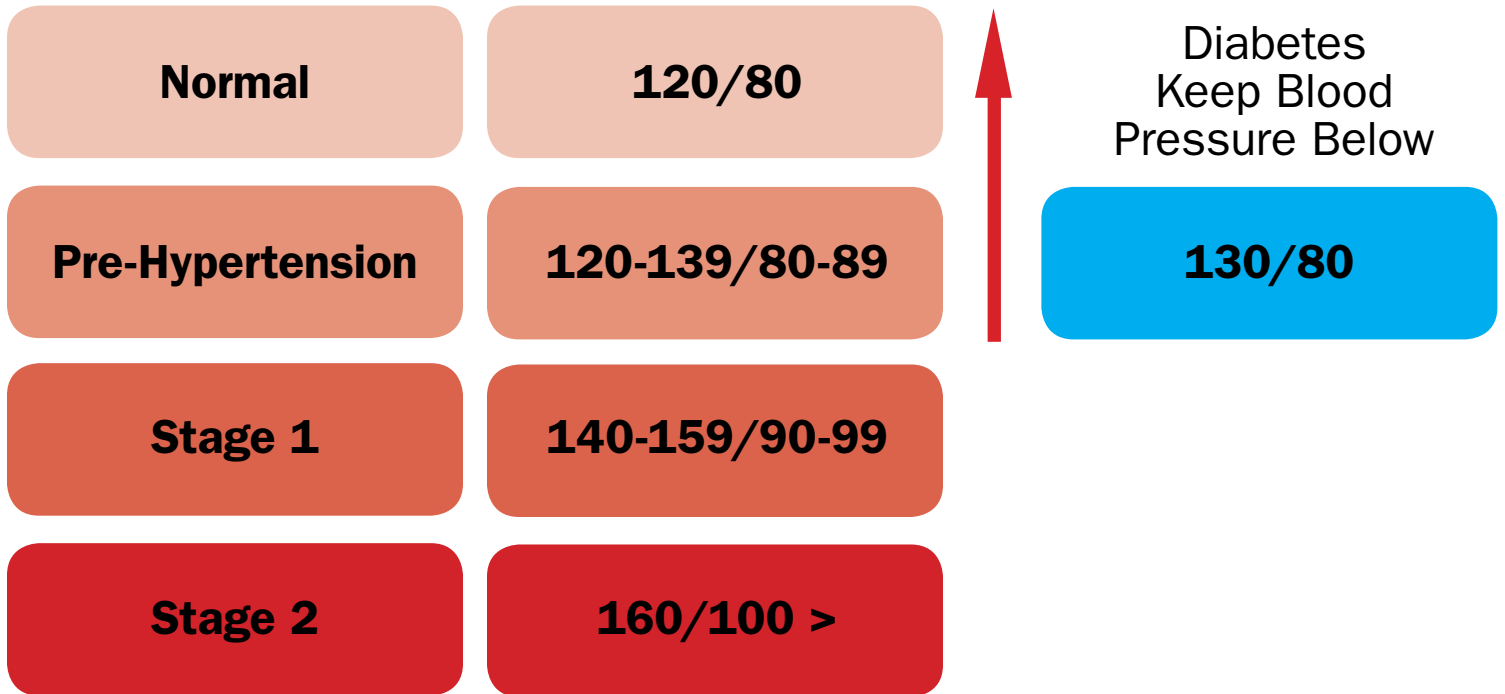
## Treatment

Anemia is treated with synthetic erythropoietin injections and/or oral iron, or infusions of intravenous iron. These injections are administered at the KSS clinic. Blood values are monitored & medication doses adjusted to correct anemia.



# High Blood Pressure

American Heart Association  
Blood Pressure Guidelines



## Medication

Angiotensin Converting Enzyme inhibitor (ACEi)

Angiotensin Receptor Blocker (ARB)

These medications both help decrease the pressure in the glomerulus, which reduces protein loss & slows the progression of kidney dysfunction.



## Other Contributors

Smoking—If you smoke, please quit.

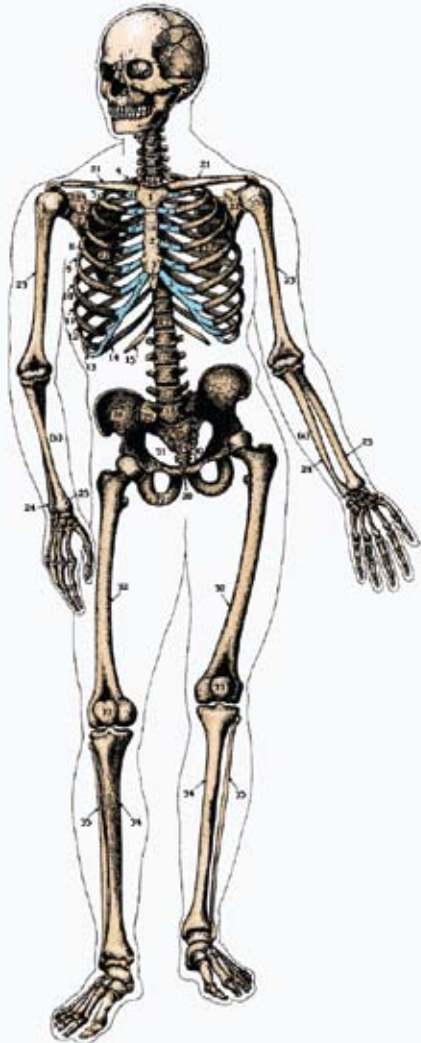
Sodium—Reduce your intake & monitor.



# Bone Disease

## Calcium & Phosphorus

Calcium and phosphorus work closely together to build and maintain strong bones and teeth.



## Renal Osteodystrophy

This form of bone disease is caused by an increase in parathyroid hormone (PTH) & secondary hyperparathyroidism. Left untreated:

- Weak, brittle bones
- Joint pain
- Itchy skin
- Major organs (heart, blood vessels) can develop calcifications (hard deposits)
- Death

Abundant in foods, dietary adjustments may be required for phosphorus intake & phosphorus binders may be prescribed. Additionally, vitamin D supplements may be required to maintain strong bones & keep the parathyroid functioning normally.



# Acidosis

Many CKD patients develop metabolic acidosis as a result of a reduced ability to eliminate the hydrogen waste of protein.

Acidosis is connected with worsening bone disease. It can increase the breakdown of skeletal muscles & decrease protein production. This may contribute to a protein malnourished state in people with CKD.

## Metabolic Acidosis Symptoms:

- ✓ Headache
- ✓ Lack of energy
- ✓ Sleepiness
- ✓ Rapid, shallow breathing
- ✓ Nausea & vomiting
- ✓ Diarrhea
- ✓ Dehydration
- ✓ Loss of appetite
- ✓ Fruity smelling breath
- ✓ Disorientation
- ✓ Loss of consciousness

## Testing & Treatment

A blood bicarbonate level (CO<sub>2</sub>) <22 mEq/L indicates a need to treat the metabolic acidosis.

Treatment begins with sodium bicarbonate or sodium citrate. Because of the sodium in the treatment, a diuretic (water pill) may be added.



# Cardiovascular Disease

Also called heart disease, cardiovascular disease involves the heart or blood vessels and contributes to heart attack & stroke. CKD patients are more likely to develop CV disease than others & it is the most common cause of death for CKD patients.



## Contributors

Anemia makes the heart work harder to supply oxygen to organs. High blood pressure stresses both heart & blood vessels. Bone disease can lead to hardening of heart & blood vessels. Diabetes can damage the entire body, including the heart.

## Additional Complications

- ♥ Elevated blood lipids (fats) are common in patients with diabetes, high blood pressure & CKD. These lipids contribute to blood vessel plaque.
- ♥ Left ventricular hypertrophy (LVH) can occur due to stress of increased fluid levels, high blood pressure, anemia & narrowed, hardened vessels.
- ♥ Enlargement of the lower left chamber of the heart occurs as it pumps blood to the body. Slowing the progression of CKD can reduce CV risk.

## Testing & Treatment

Maintain BP <130/80  
Maintain hemoglobin >10.0  
Reduce protein in the urine  
Treat high lipids  
Control blood sugar levels

