

Boston Kidney Health Series 2015

Kidney Disease 101: Function, Causes, and Treatment

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**BRIGHAM AND
WOMEN'S HOSPITAL**

A Teaching Affiliate of Harvard Medical School

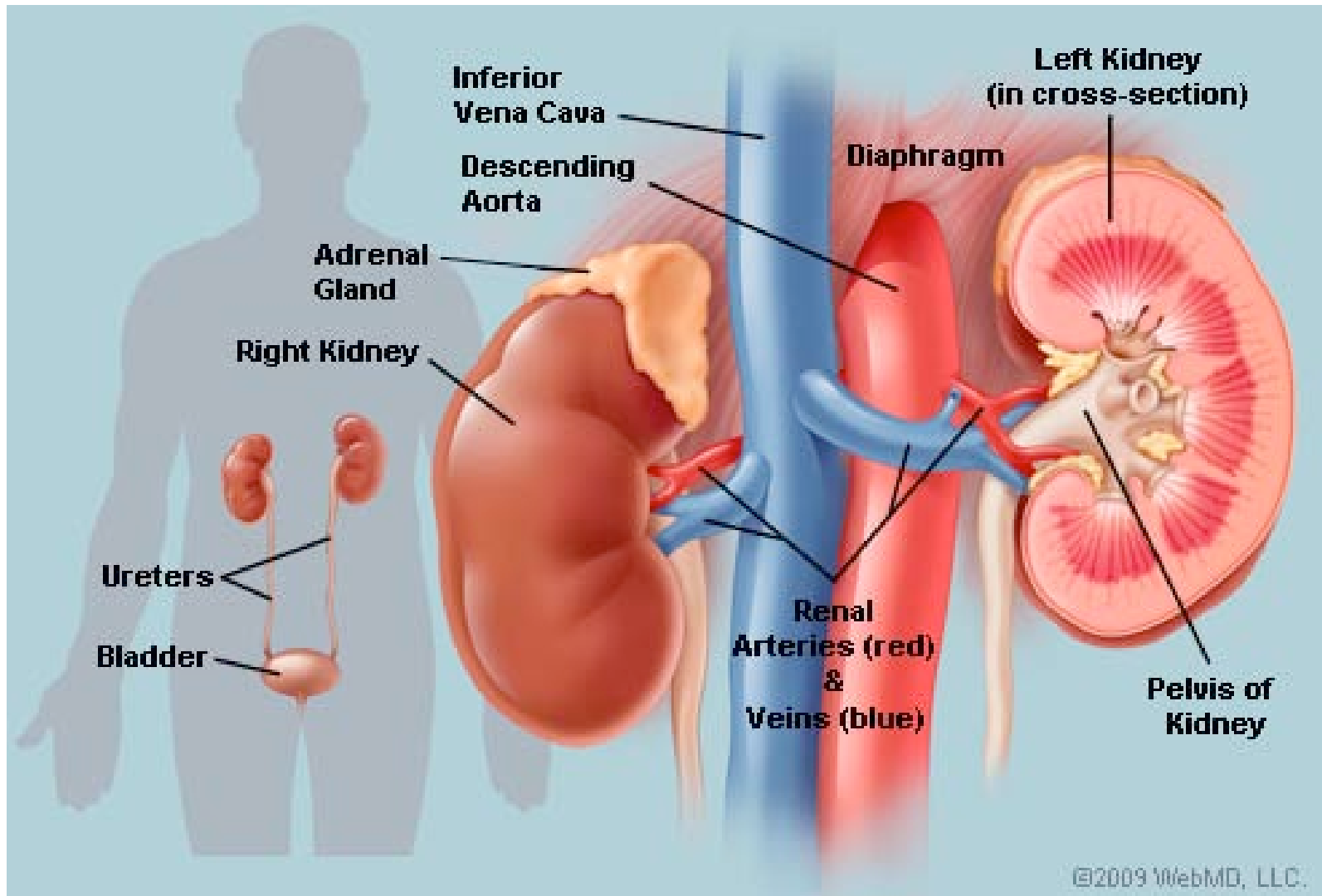
Disclosures

- None to report

Introduction

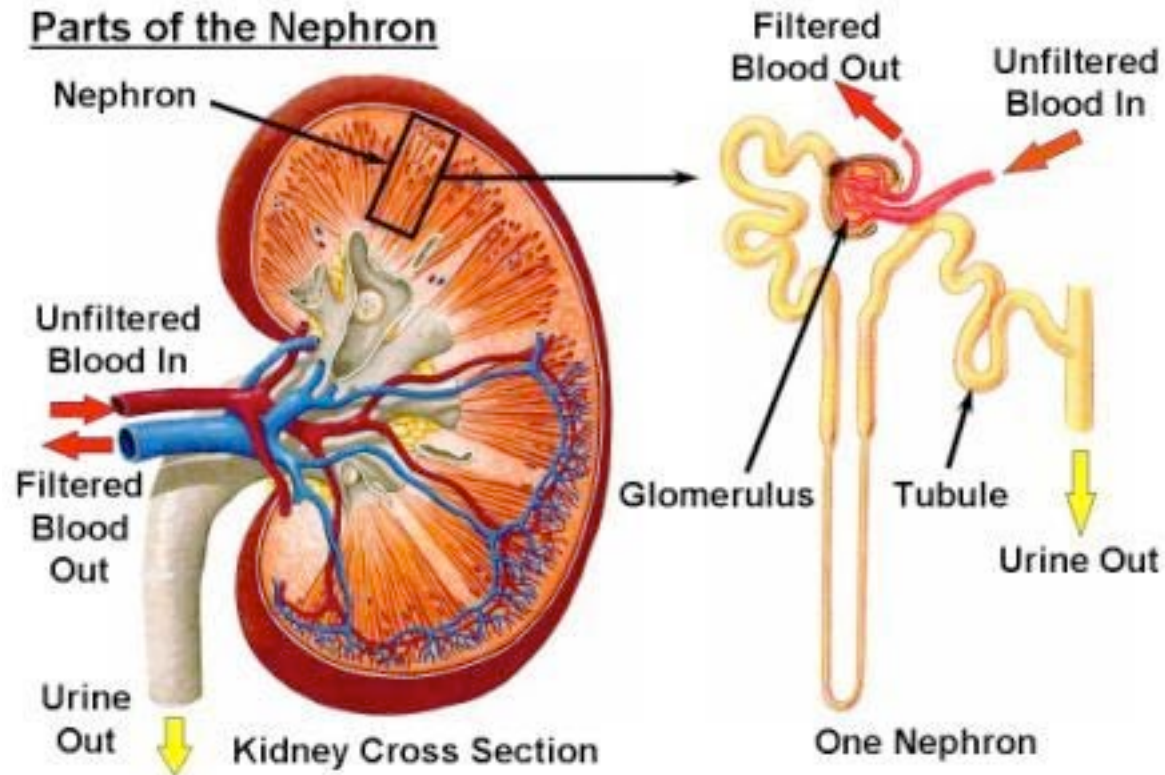
- Kidney anatomy and function
- Chronic kidney disease – a public health problem
- Kidney disease recognition and diagnosis
- Kidney disease treatment and prevention

Kidneys 101: Anatomy



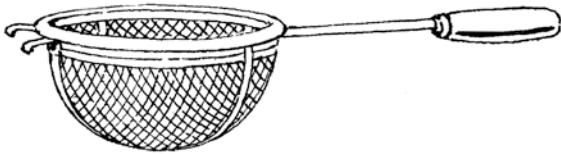
Kidneys 101: Anatomy

The basic unit of the kidney is a **NEPHRON**.



Kidneys 101: Anatomy

A nephron ... simplified.



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How do your kidneys work?

- Eliminate waste products from the body
- Eliminate drugs from the body
- Maintain body fluid, electrolyte, and acid balance
- Produce hormones that:
 - Regulate blood pressure
 - Promote bone health
 - Produce red blood cells

Types of Kidney Disease

- **Acute kidney injury (AKI)**
 - Sudden loss of kidney function occurring over hours to days
 - Can be reversible
- **Chronic kidney disease (CKD)**
 - Kidney damage or loss of kidney function lasting three months or longer
- **End stage renal disease (ESRD)**
 - Total and permanent kidney failure
 - Dialysis or transplant required for survival

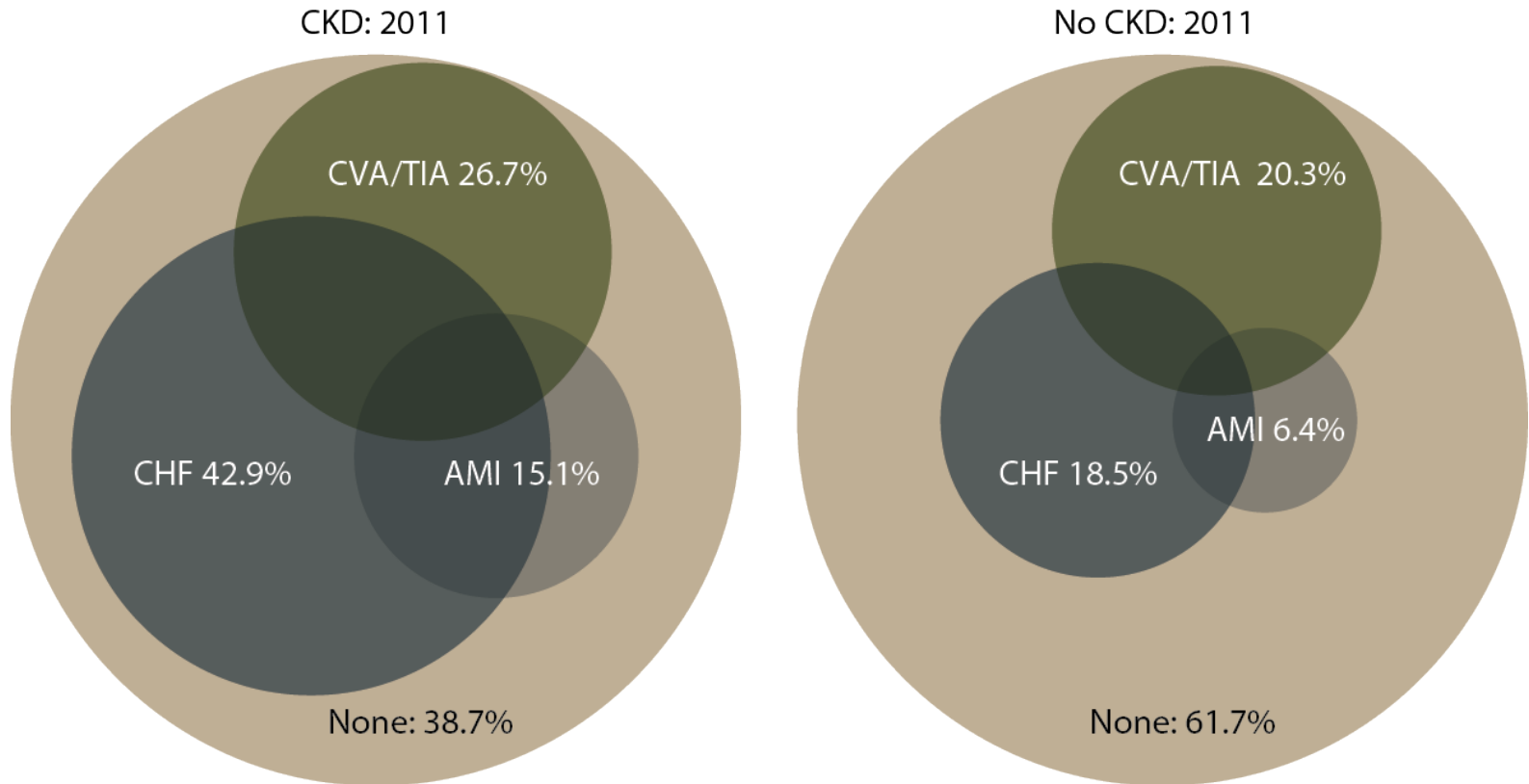
What is chronic kidney disease (CKD)?

- Any condition that damages the kidneys and prevents them from keeping the body healthy (present for 3 months or longer)
- Kidneys lose the ability to get rid of waste products and regulate body fluid
- Associated with complications such as high blood pressure, anemia, bone disease, and poor nutrition

CKD: a major public health problem

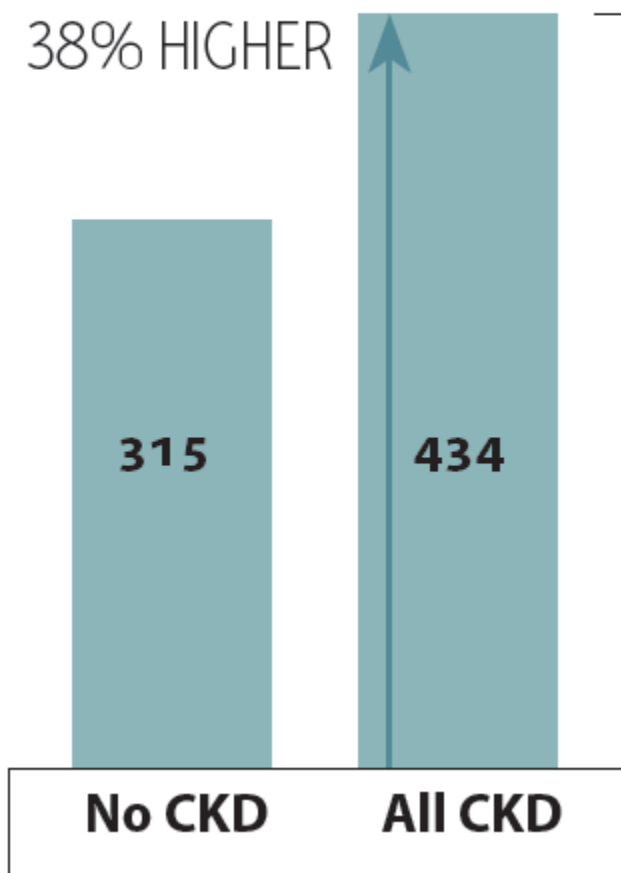
- 26 million Americans are affected by kidney disease
 - As of 2012, 14% of Americans have CKD
 - Affects more than 35% of adults with diabetes
 - Affects more than 20% of adults with hypertension
- CKD costs Medicare \$41 billion per year
 - 17% of Medicare expenditures

CKD is associated with cardiovascular disease

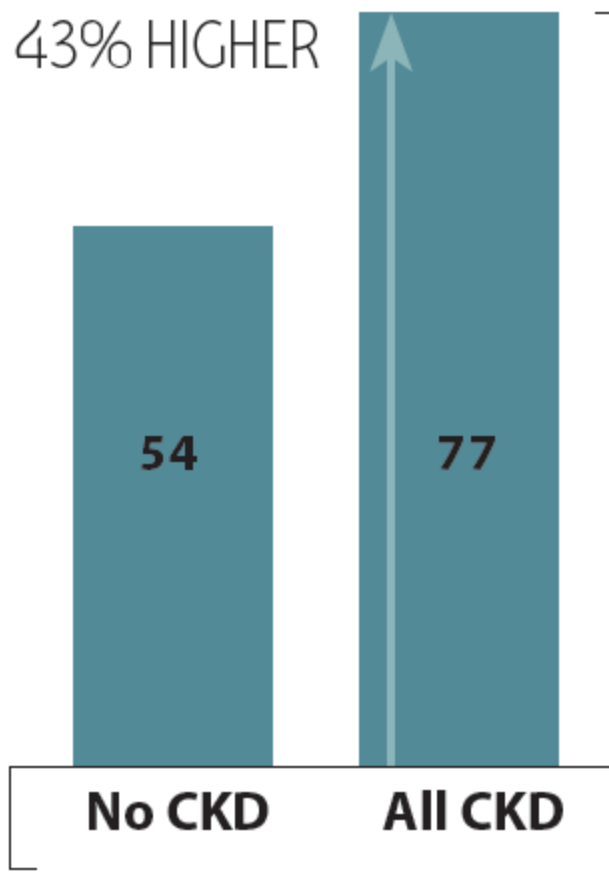


CKD patients have higher hospitalization and death rates

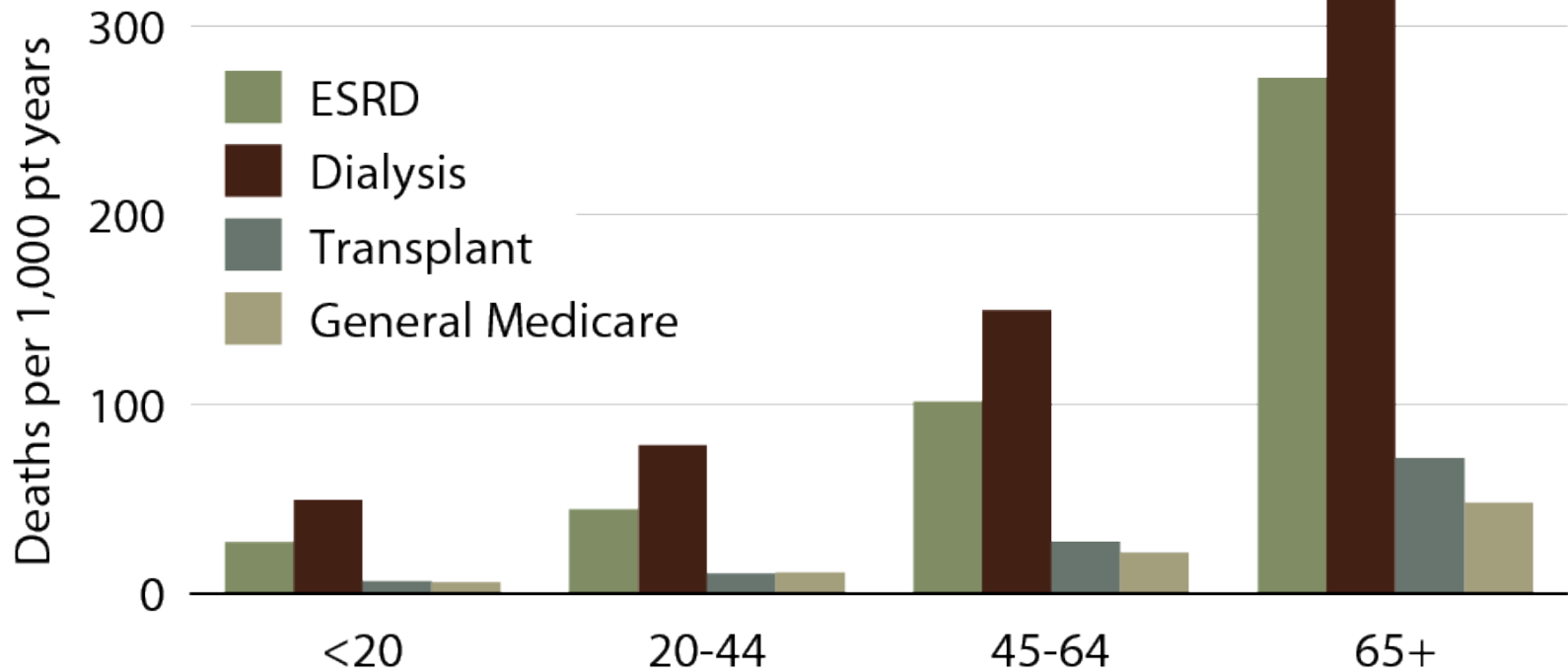
Hospitalization rates



Mortality rates

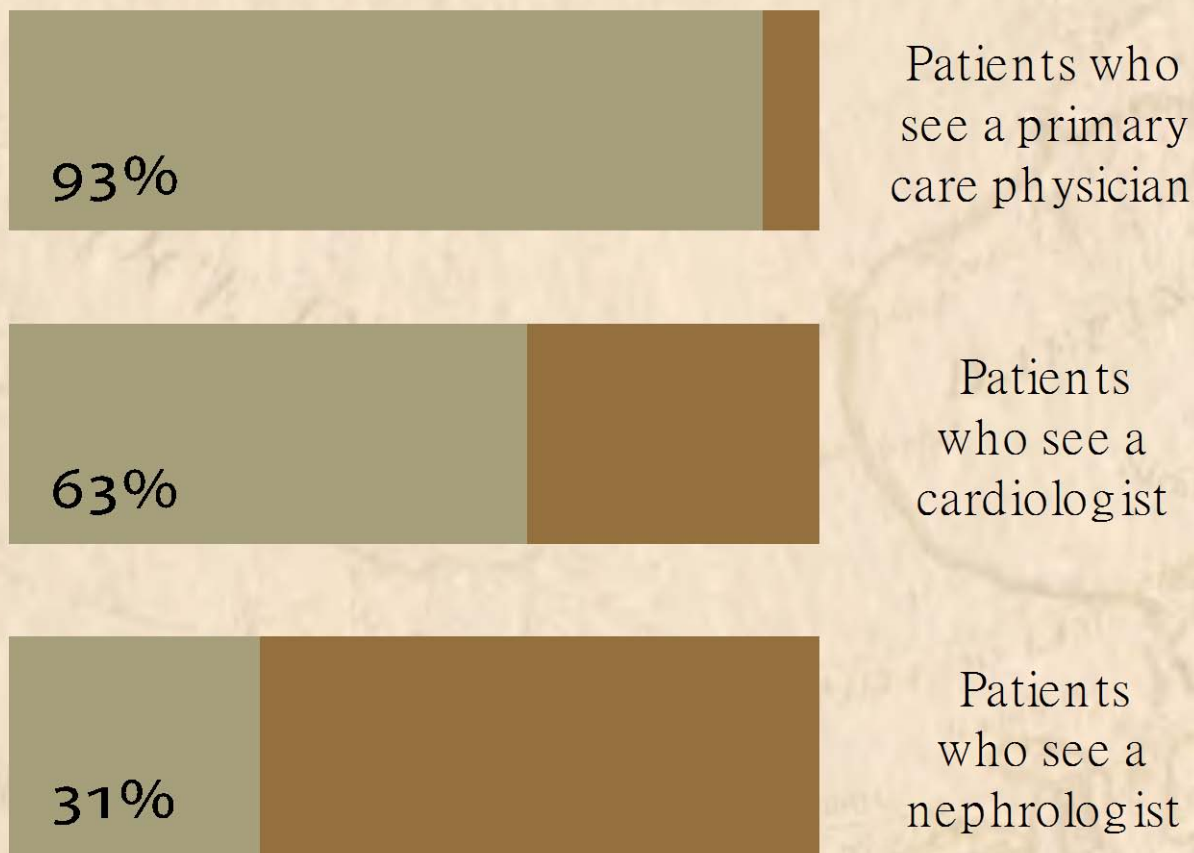


ESRD patients have higher death rates



Less than 1/3rd of CKD patients see a kidney doctor

All CKD



How does my doctor know if I have CKD?

- Blood test for **creatinine**
 - A waste product from muscle breakdown
 - **Normal: 0.7-1.2 mg/dL**
 - Depends on muscle mass
- Determine your **glomerular filtration rate (GFR)**
 - A measure of your kidney function
 - **Normal: 90-120 mL/min**
- Urine test for **protein**
 - A sign of kidney damage, if persistent
 - **Normal: <150 mg/day**

Stages of CKD

Stage	Description	GFR
1	Kidney damage with normal GFR	90 or above
2	Kidney damage with mild decrease in GFR	60-89
3	Moderate decrease in GFR	30-59
4	Severe reduction in GFR	15-29
5	Kidney failure	Less than 15

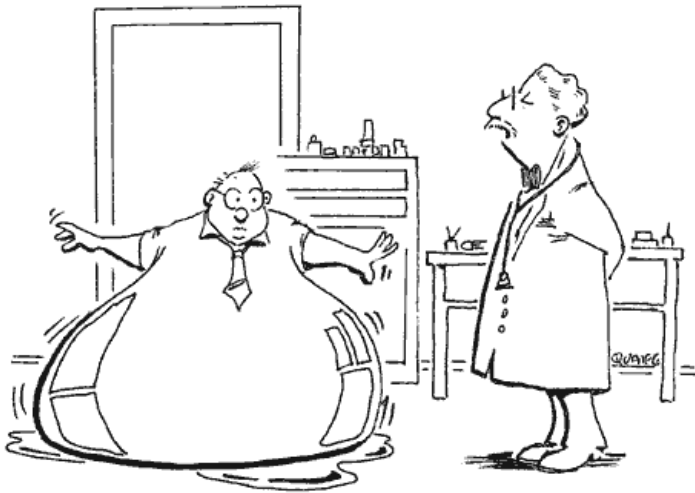
What causes CKD?

- **Diabetes**
- **High blood pressure**
- Other conditions
 - Glomerulonephritis
 - Inherited diseases
 - Congenital (birth) defects
 - Autoimmune disease (lupus)
 - Urinary obstruction
 - Repeated urinary tract infections

What are the symptoms of CKD?

Most patients have no symptoms until kidney disease is advanced.

www.lightersideofdialysis.com



Your tests reveal that
you are retaining fluids!



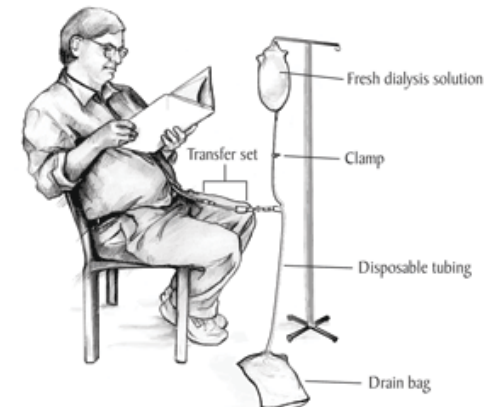
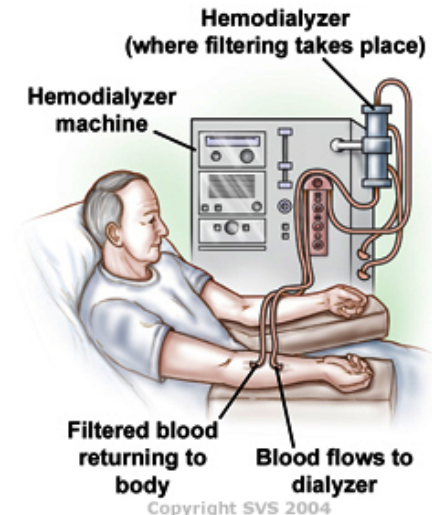
I really feel that you should
start dialysis immediately!

What are the symptoms of CKD?

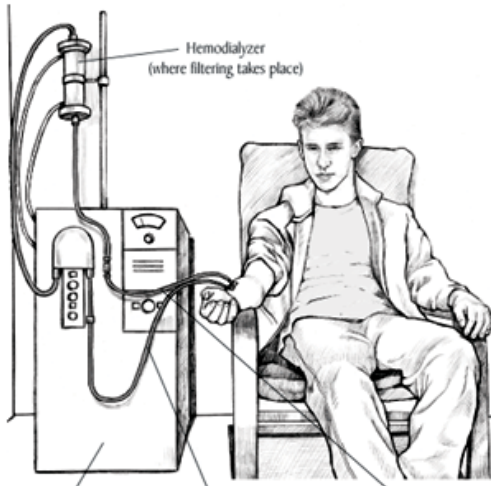
- Fatigue and decreased energy
- Trouble concentrating
- Poor appetite
- Nausea/vomiting
- Swollen feet and ankles
- Itchiness
- Trouble sleeping

What will happen if I have CKD?

- Progression of CKD can lead to kidney failure and the need for **dialysis** or a **kidney transplant**
- **Early detection and treatment are important** to prevent kidneys from getting worse

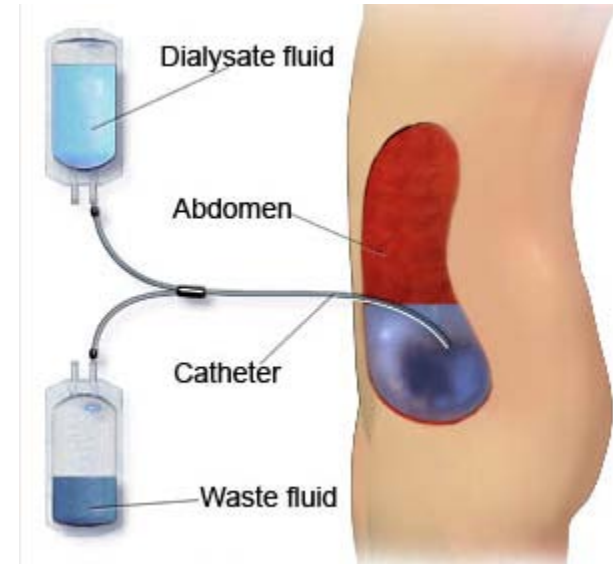


Treatments for kidney failure (ESRD)



**IN-CENTER
HEMODIALYSIS**

**HOME
HEMODIALYSIS**



**PERITONEAL
DIALYSIS**

<http://trialx.com>

<http://www.lincolndocs.com>

http://www.ninephrology.com/home_dialysis.htm

<http://blogs.itb.ac.id/pahlev/2012/03/29/peritoneal-dialysis/>

Can CKD be treated?

- Many kidney diseases can be treated successfully
 - Diabetes
 - High blood pressure
 - Glomerular diseases (immunosuppressants)
- Some causes of kidney disease are unknown and do not have specific treatments
 - More research is needed

8 steps to prevent and treat kidney disease

Step #1:

Visit your physician regularly



8 steps to prevent and treat kidney disease

Step #2:

Take control of your blood pressure

Take control of your blood pressure

- Measure your BP at home regularly
- Your BP goal:
 - **< 140/90** if your doctor says you have no protein in your urine
 - **< 130/80** if your doctor says you have protein in your urine
- You may benefit from taking an ACE inhibitor or angiotensin receptor blocker



8 steps to prevent and treat kidney disease

Step #3:

**If you are diabetic, take control of your
blood sugar levels**

Take control of your blood sugars

- Measure your blood glucose levels at home regularly
- Work with a dietitian or your doctor to create healthy diets that you can follow
- Take your diabetic medications as prescribed
- Alert your doctor if you notice your levels are frequently too high or too low



8 steps to prevent and treat kidney disease

Step #4:

Eat a healthy diet.

***Low salt**

***Heart healthy**



8 steps to prevent and treat kidney disease

Step #5:

Take control of your weight.



8 steps to prevent and treat kidney disease

Step #6:

Stop smoking.



8 steps to prevent and treat kidney disease

Step #7:

Take medications appropriately.



Take medications appropriately

- Make sure your doctor has dosed your medications appropriately for your level of kidney function
- Avoid medications and other agents that are potentially toxic to your kidneys
 - **Non-steroidal anti-inflammatory drugs (NSAIDs)** (e.g. ibuprofen)
 - **Intravenous contrast dye** (CT scans, angiograms)
 - **Herbal remedies** (e.g. aristolochic acid)



8 steps to prevent and treat kidney disease

Step #8:

Get educated. Get prepared. Get active.



Get educated. Get prepared. Get active.

- Learn about your kidneys
- Understand your disease



- Take an active partnership role in the care of your kidneys
 - Engage your doctor (ask questions, get clear answers)
 - Know and understand your treatment plan (e.g. medications, follow-up tests)
 - Recognize when things are not going well or when changes need to be made
- If your kidney disease is advanced, discuss the treatment options with your nephrologist *early*
- *Early preparation is the key to a successful outcome*

What your kidney doctor will do

- Try to determine the cause of your kidney disease and treat if reversible
- Manage the complications of CKD
 - Hypertension
 - Proteinuria (protein in your urine)
 - Anemia
 - Cardiovascular disease
 - Acidosis
 - Bone disease
 - Nutrition
- Educate you and prepare you for the need for dialysis or transplantation

Questions?