

# **Boston Kidney Health Series 2013**

## **Kidney Disease 101: Function, Causes, and Treatment**

Albert Q. Lam, MD

Associate Physician

Division of Renal (Kidney) Medicine

Brigham and Women's Hospital



**BRIGHAM AND  
WOMEN'S HOSPITAL**

A Teaching Affiliate of Harvard Medical School

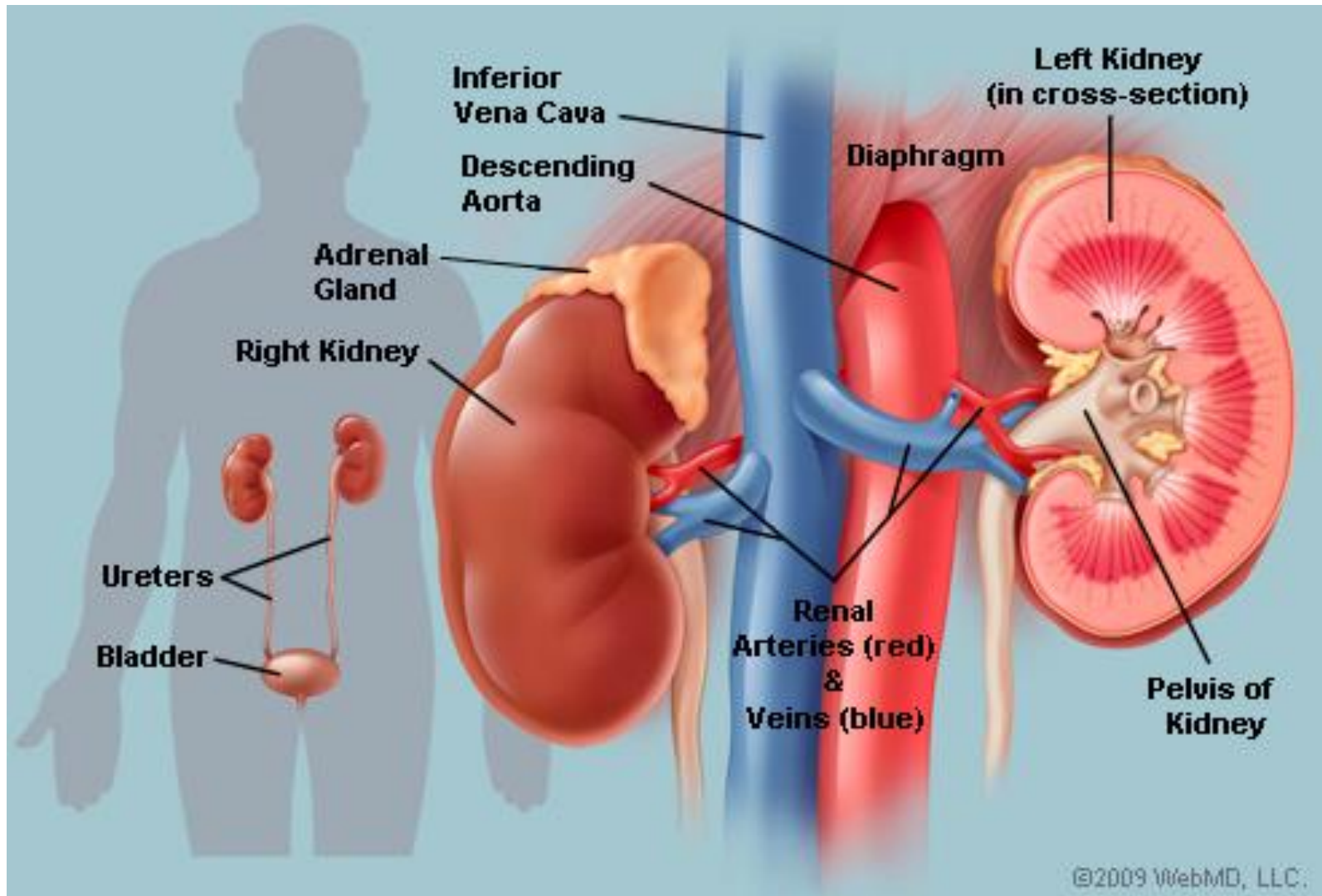
# Disclosures

- None to report

# Introduction

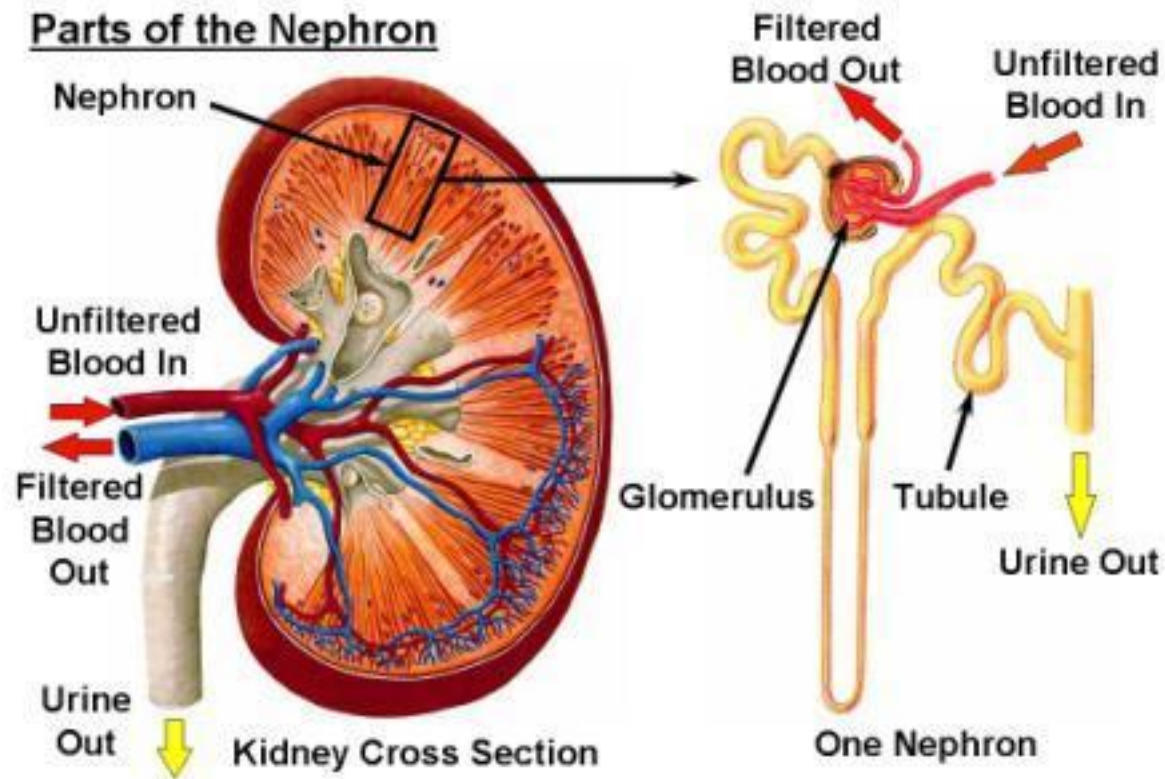
- Kidney anatomy and function
- Chronic kidney disease – a public health problem
- Kidney disease recognition and diagnosis
- Kidney disease treatment and prevention

# Kidneys 101: Anatomy



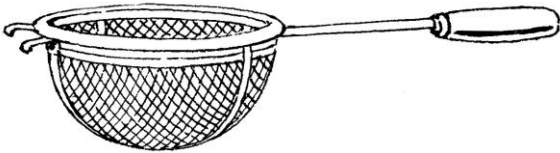
# Kidneys 101: Anatomy

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



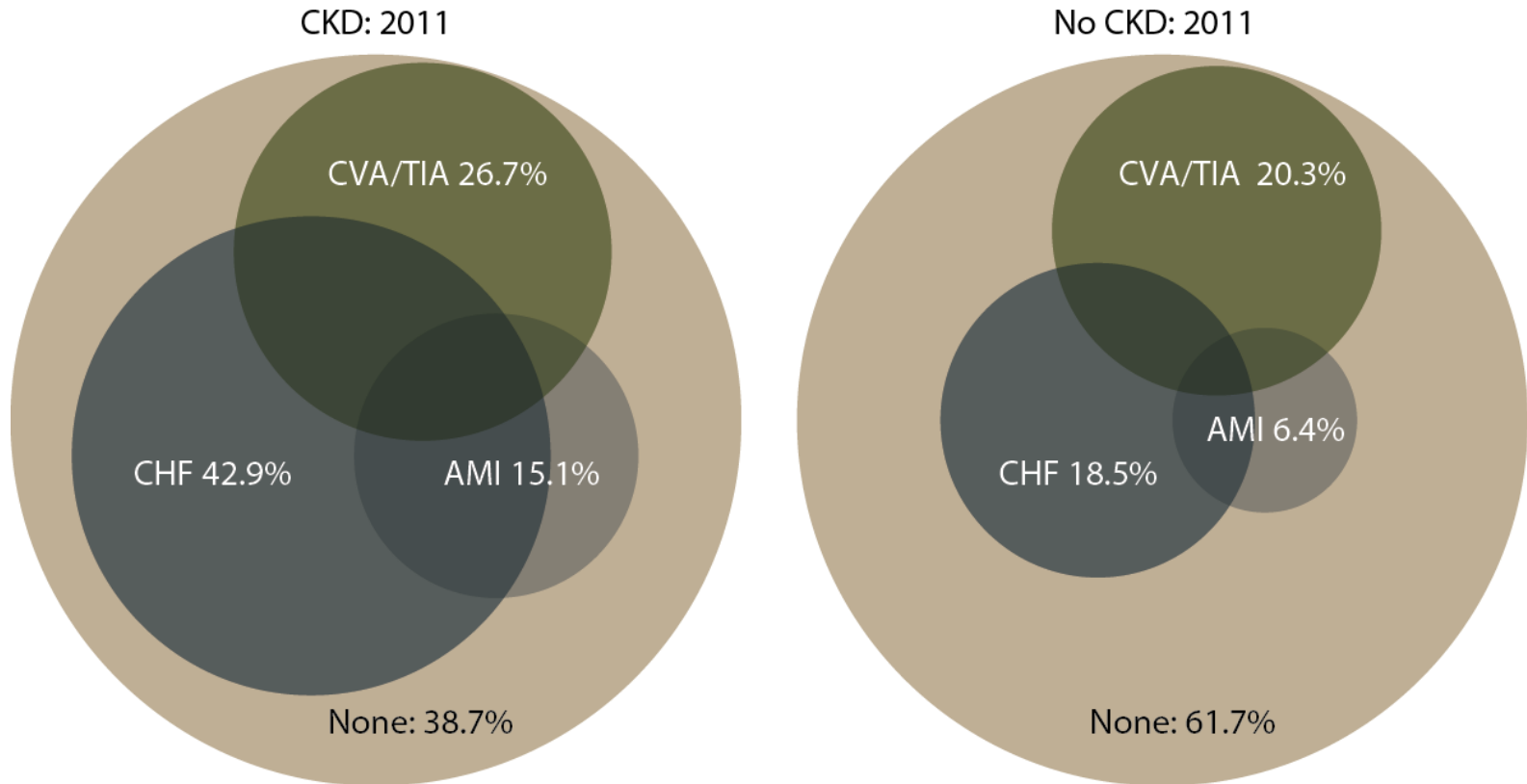
# ***What is chronic kidney disease (CKD)?***

- 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

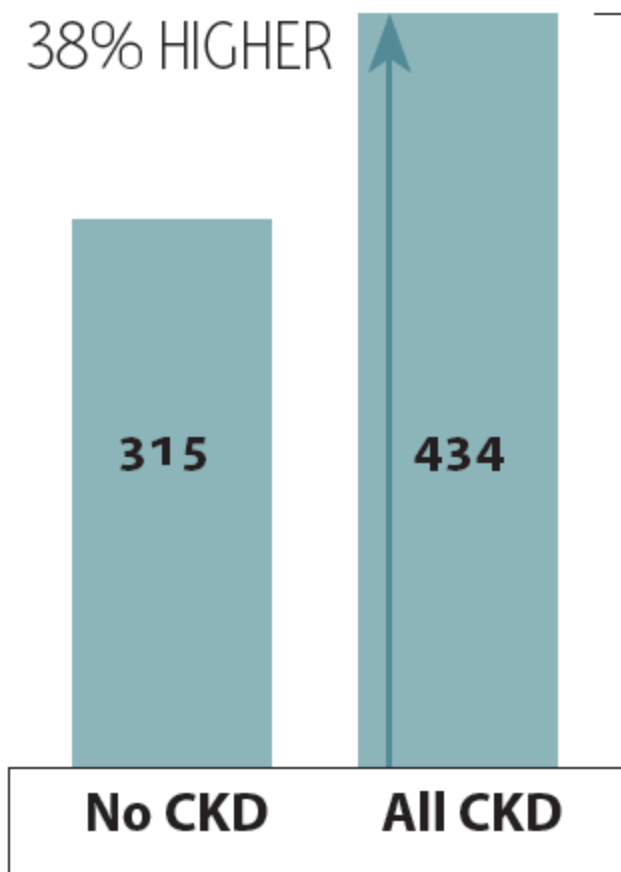
- 26 million Americans are affected by kidney disease
  - As of 2012, 14% of Americans have CKD
  - Affects more than 35% of adults with diabetes
  - Affects more than 20% of adults with hypertension
- CKD costs Medicare \$41 billion per year
  - 17% of Medicare expenditures

# CKD is associated with cardiovascular disease

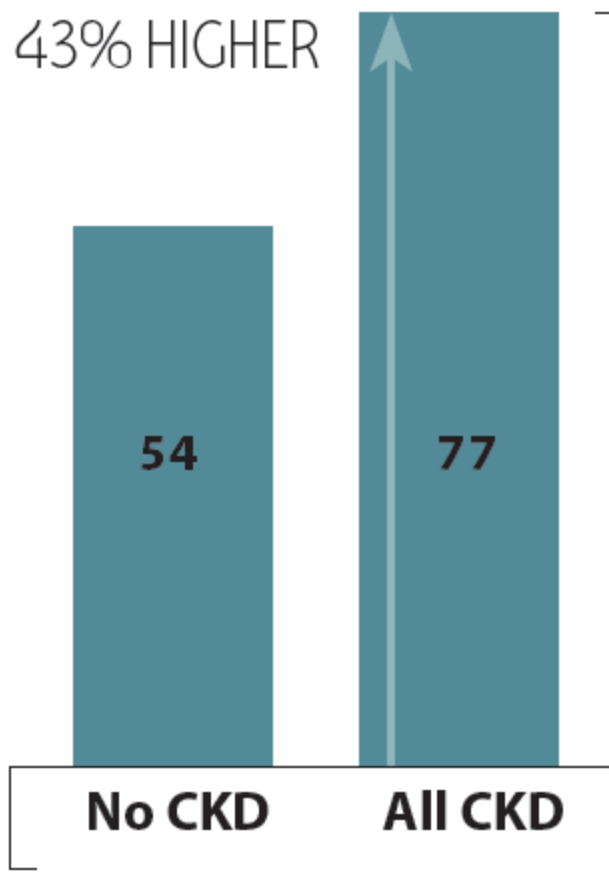


# CKD patients have higher hospitalization and death rates

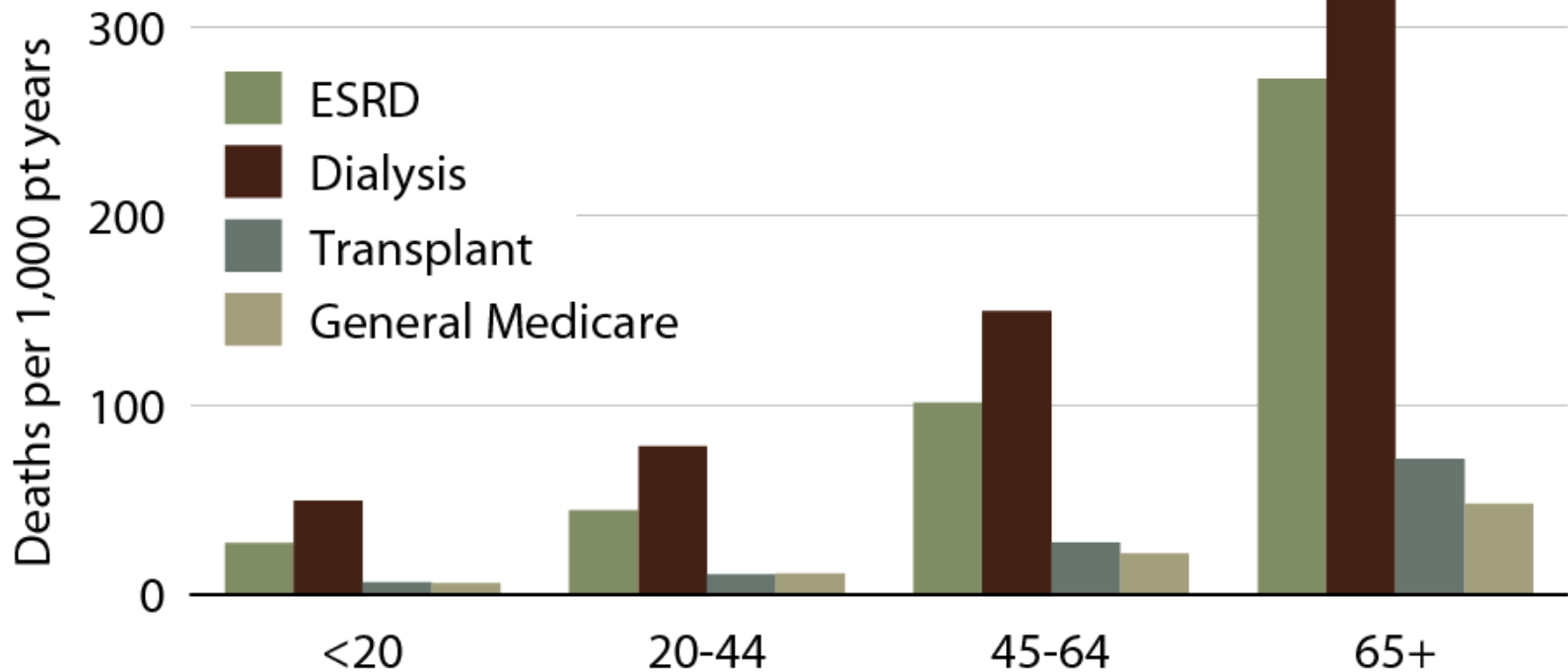
## Hospitalization rates



## Mortality rates

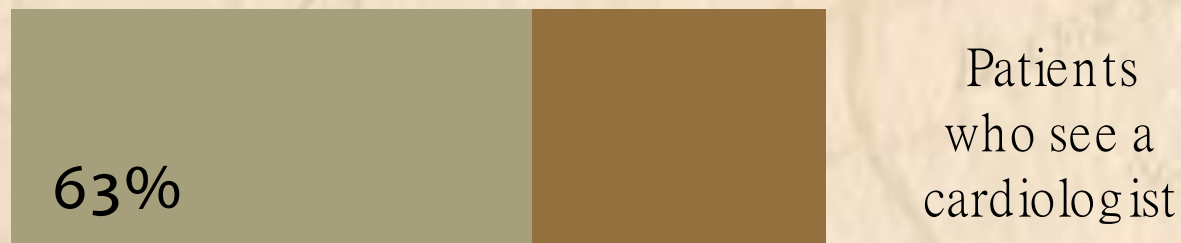


# ESRD patients have higher death rates



# Less than 1/3<sup>rd</sup> 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



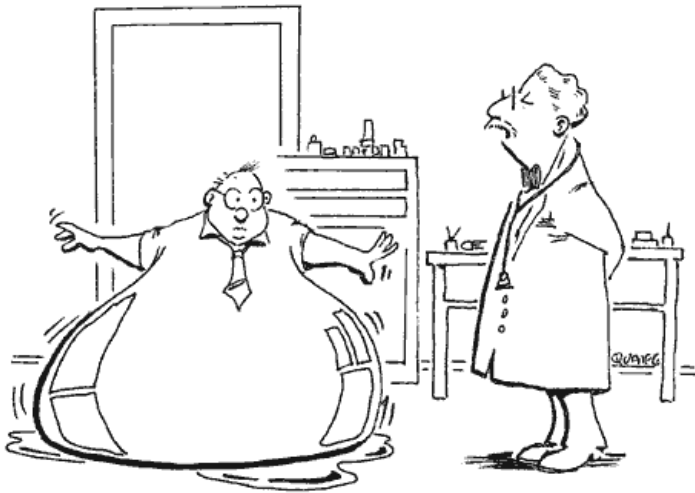
# ***What causes CKD?***

- **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!



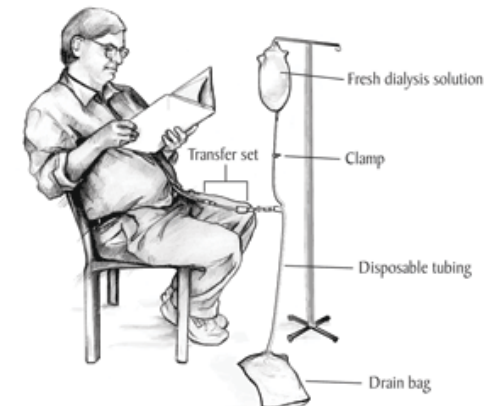
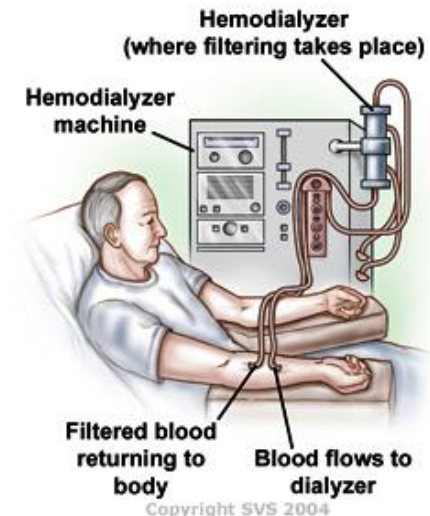
I really feel that you should  
start dialysis immediately!

# ***What are the symptoms of CKD?***

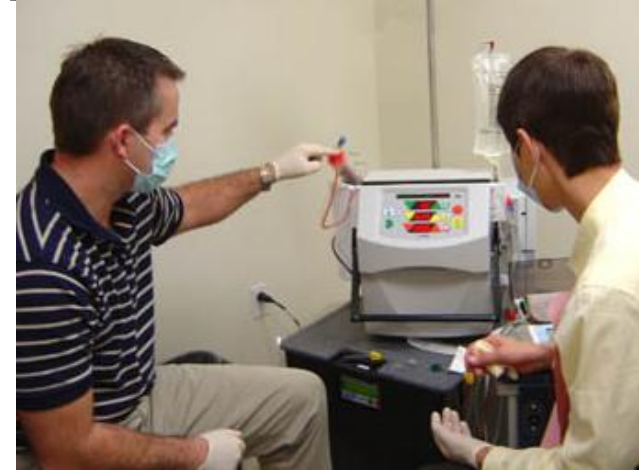
- Fatigue and decreased energy
- Trouble concentrating
- Poor appetite
- Nausea/vomiting
- Swollen feet and ankles
- Itchiness
- Trouble sleeping

# *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

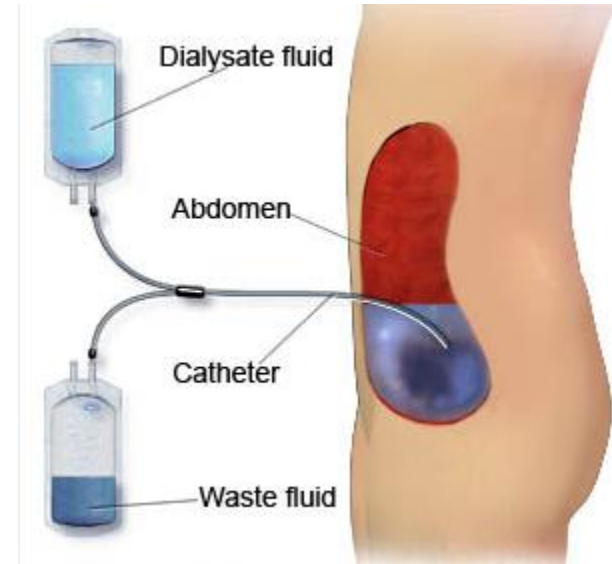


# Treatments for kidney failure (ESRD)



**IN-CENTER  
HEMODIALYSIS**

**HOME  
HEMODIALYSIS**



**PERITONEAL  
DIALYSIS**

<http://trialx.com>

<http://www.lincolndocs.com>

[http://www.ninephrology.com/home\\_dialysis.htm](http://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 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?**