



National Kidney Foundation™

of OHIO

GFR Awareness Campaign An NKF-Ohio Initiative - 2006

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Kidney Disease in the US

What's the BIG Problem?

**And What Good is Early Intervention in
Chronic Kidney Disease?**

Answers:

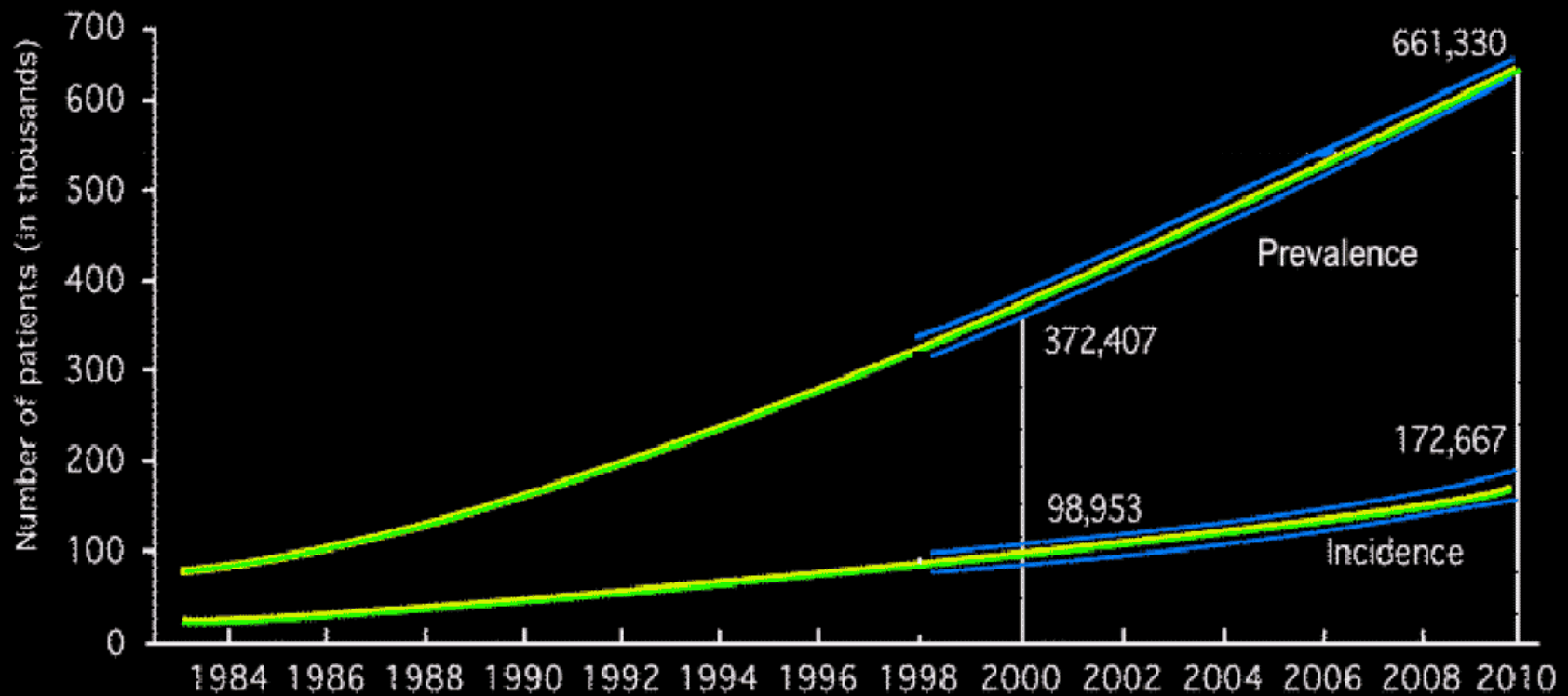
(And the Reasons for a National Kidney Disease Education Program)

- 1) Kidney failure is an increasing public health problem
(A 20 million people problem)
- 2) Economical, effective testing and therapy exist
- 3) Testing and therapy are inadequately applied

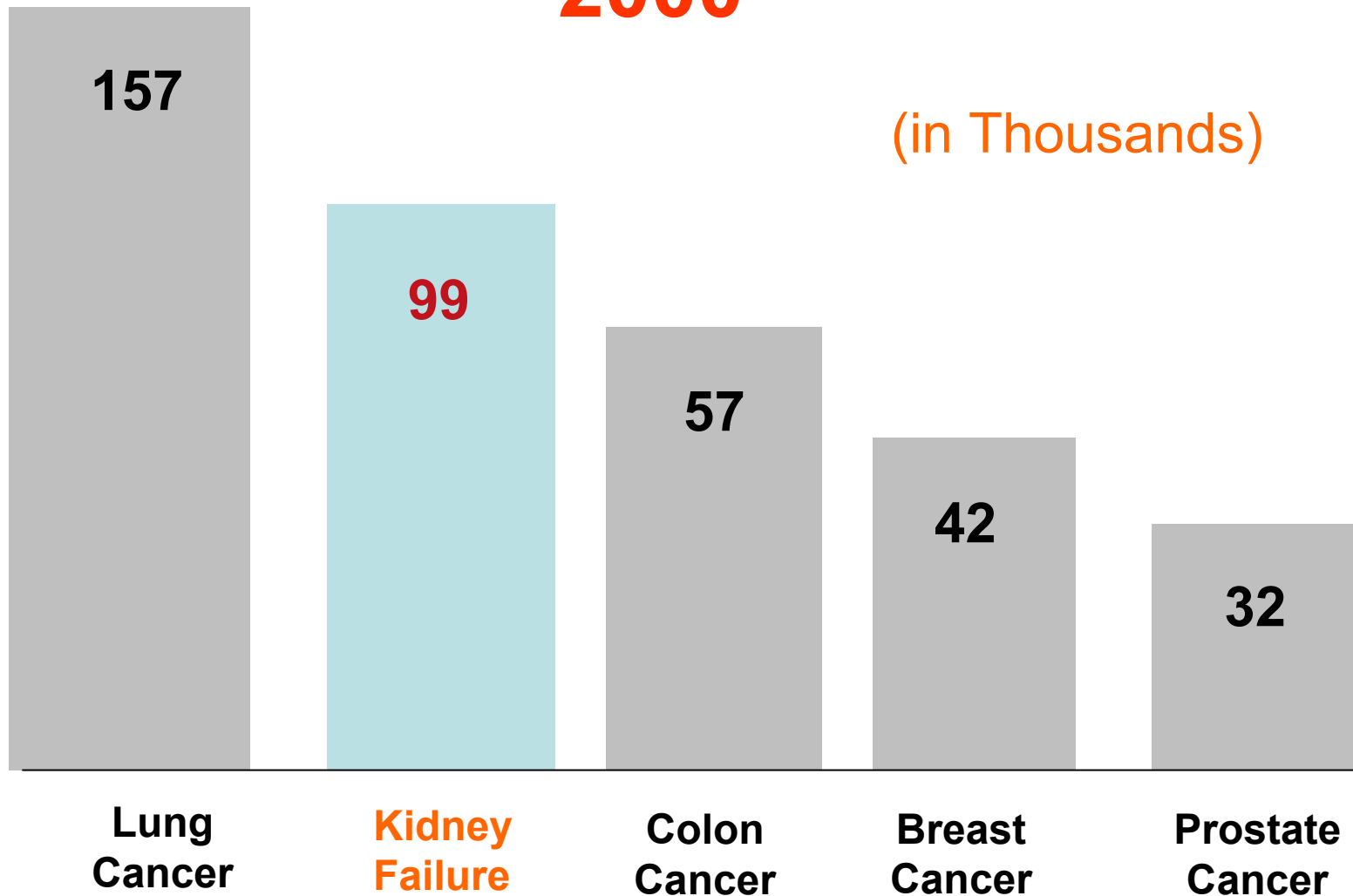
Objectives

- Understand the significance of the increasing incidence of chronic kidney disease in the US
- Understand the value of the new NKF classification of the 5 stages of CKD
- Define the best method available to the primary care physician to assess kidney function – the calculated glomerular filtration rate (cGFR) – and the application of the cGFR to the care of patients
- List the actions that the NKF-Ohio will take to educate the public and medical professionals about the value of GFR testing.

Kidney Failure Is a Rapidly Growing Problem



Kidney Failure Compared to Cancer Deaths in the U.S. in 2000*

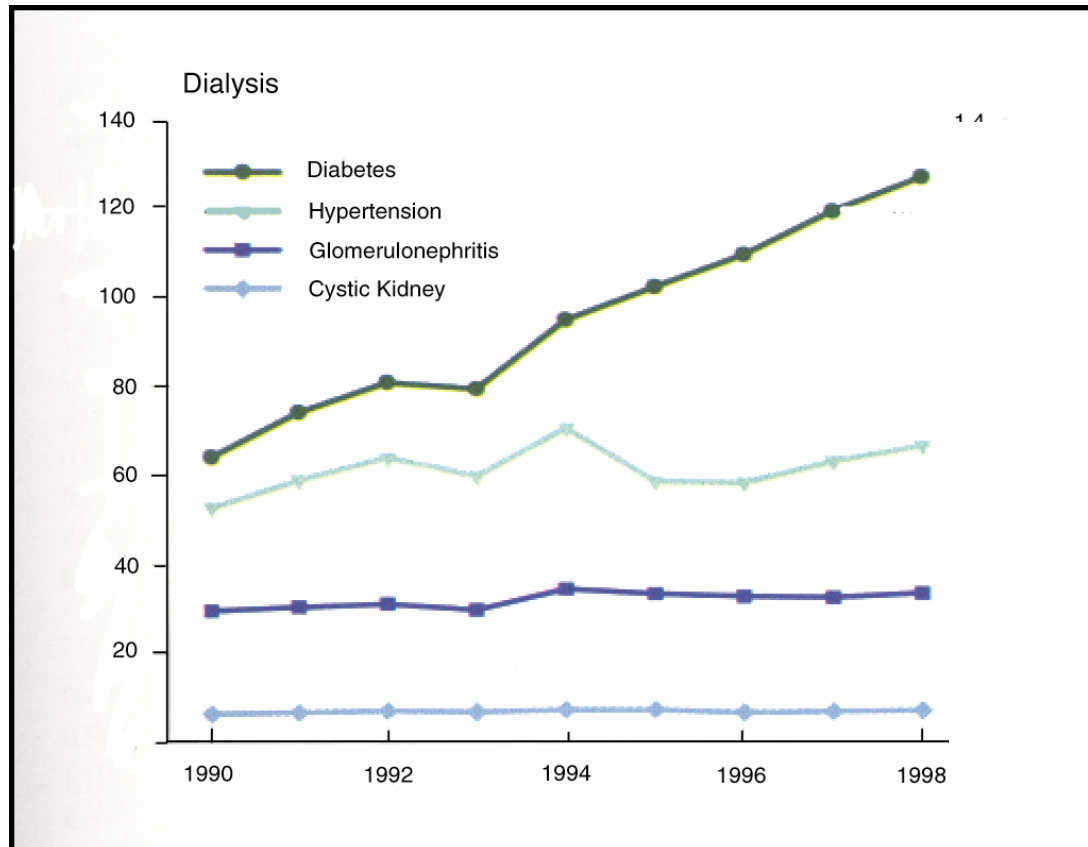


Prevalence of Renal Insufficiency in U.S. (NHANES)

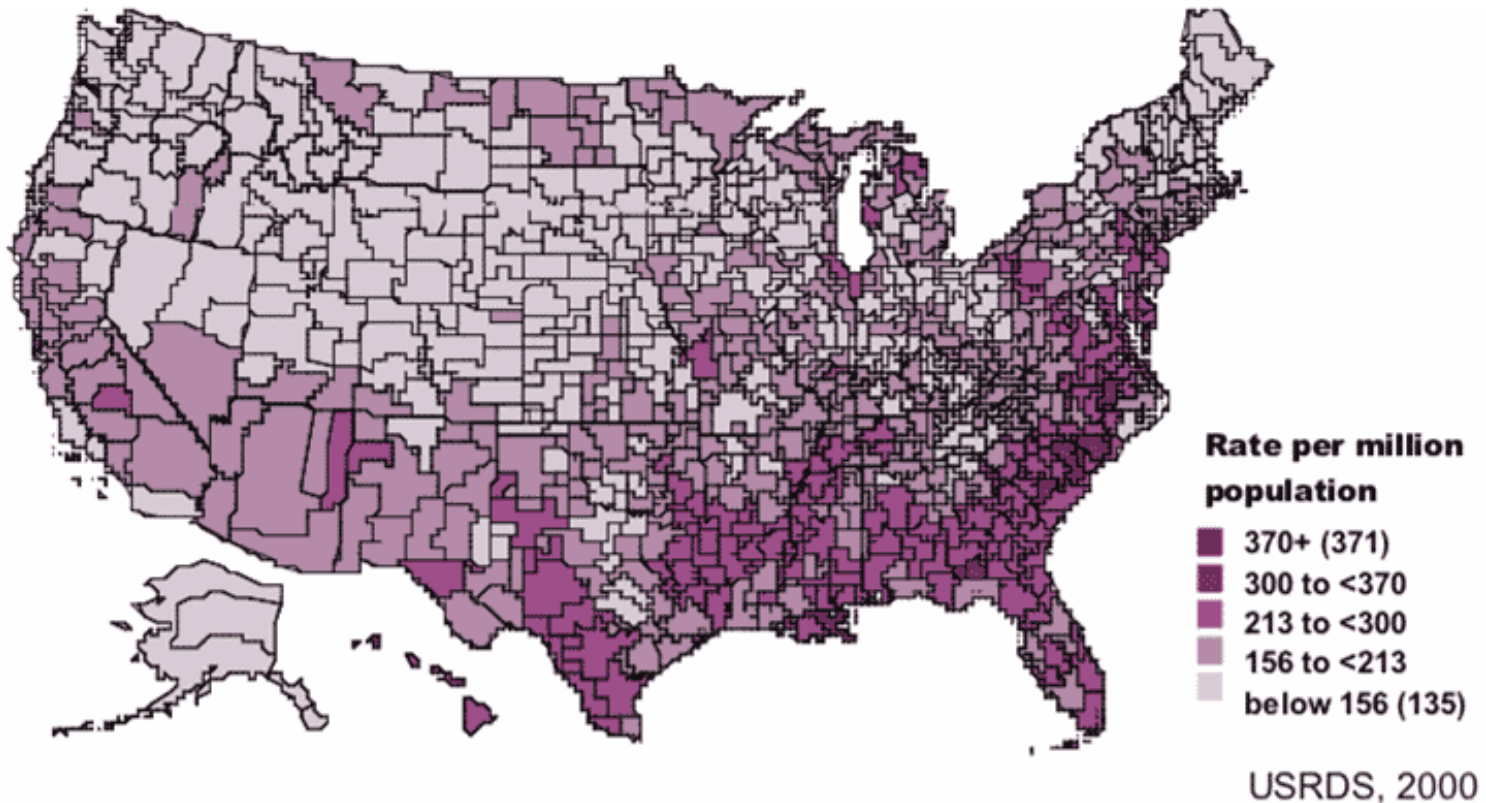
GFR (ml/min/1.73 m²)	59-30	29-15	< 15
Number of People	7.6 Million	360,000	> 300,000

More than 8 million Americans have substantial kidney impairment and 10 million more have albuminuria.

Incident Rates by Primary Diagnosis (per million population, unadjusted)

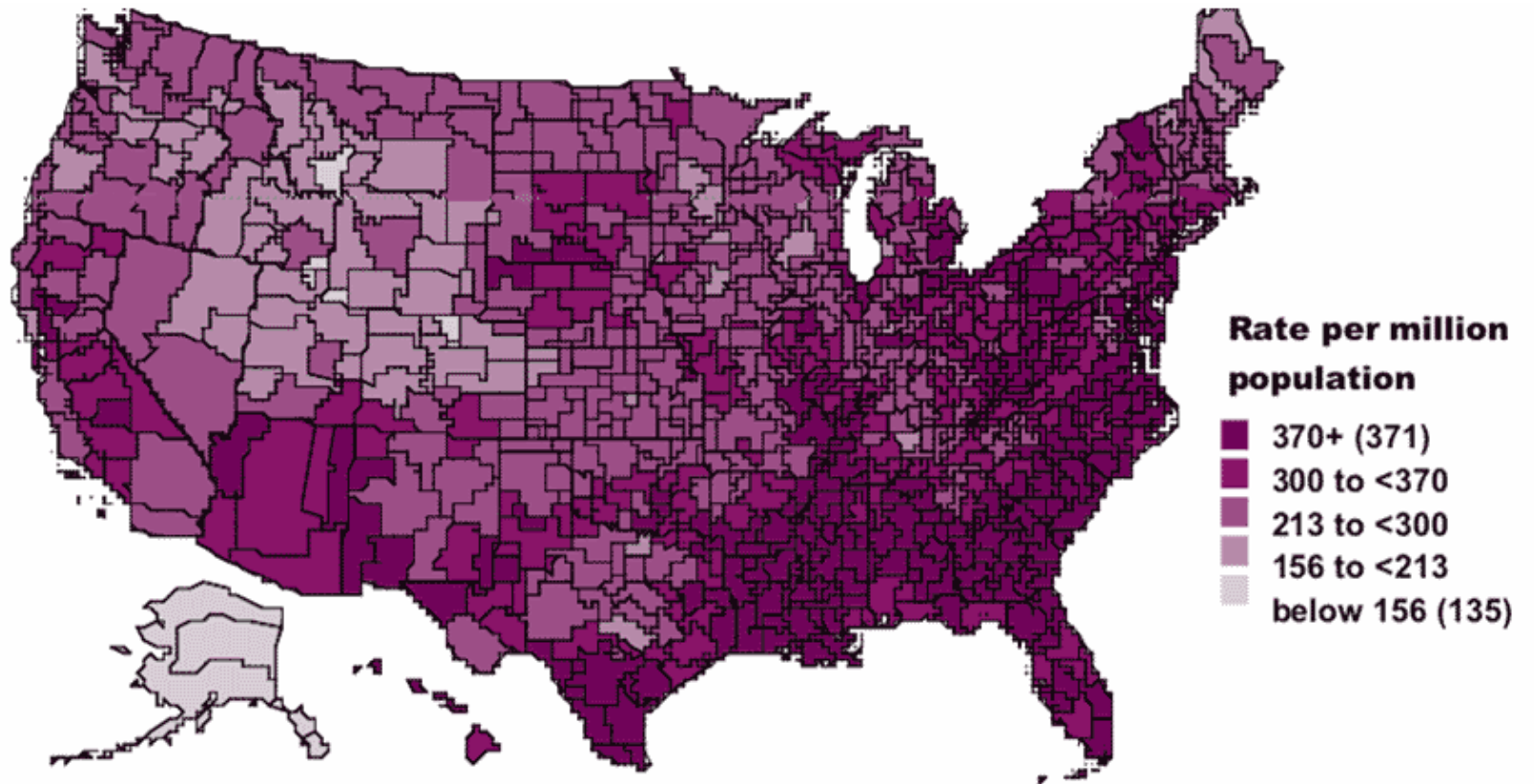


Incidence of Kidney Failure per million population (1990) HSA, unadjusted



Incidence of Kidney Failure

per million population, 2000, by HSA, unadjusted



USRDS, 2000

The Risk of Kidney Failure Is Not Uniform

Relative risks compared to Whites:

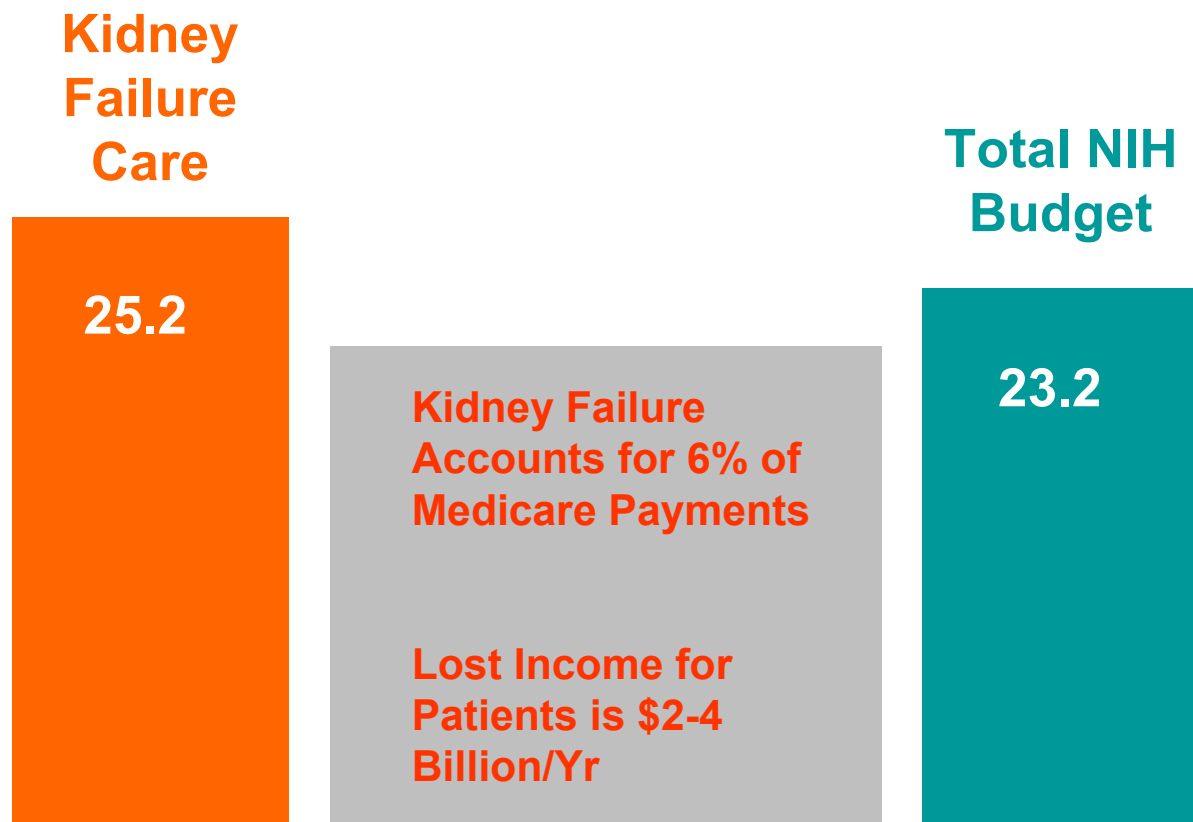
African Americans **4.45 X**

Native Americans **3.57 X**

Asians **1.59 X**

Costs of Kidney Failure are High

(in \$billions for 2002)



CVD Is Linked to CKD

- Risk of CVD is increased 1.4 – 2.05 times with creatinine $>1.4 - 1.5$ mg/dl
- Risk of CVD is increased 1.5 – 3.5 times with microalbuminuria
- Annual mortality from CVD is increased 10 – 100 times with kidney failure
- First year CVD mortality (17%) is 5 times kidney failure incidence (3.5%) after diagnosis of CKD + diabetes

Flack, et al., 1993, Levey, et al., 1998, Jensen, et al., 2000, Ruilope, et al., 2001, Mann, et al., 2001, Collins, et al., 2002

Treatment To Prevent Progression of CKD to Kidney Failure

- Intensive glycemic control lessens progression from microalbuminuria in type 1 diabetes (DCCT, 1993)
- Antihypertensive therapy with ACE Inhibitors lessens proteinuria and progression Meta-Analyses
 - Giatras, et al., } 1997
 - Psait, et al., } 2000
 - Jafar, et al., } 2001
- Low protein diets lessen progression
 - Fouque, et al., } 1992
 - Pedrini, et al., } 1996
 - Kasiske, et al., } 1998

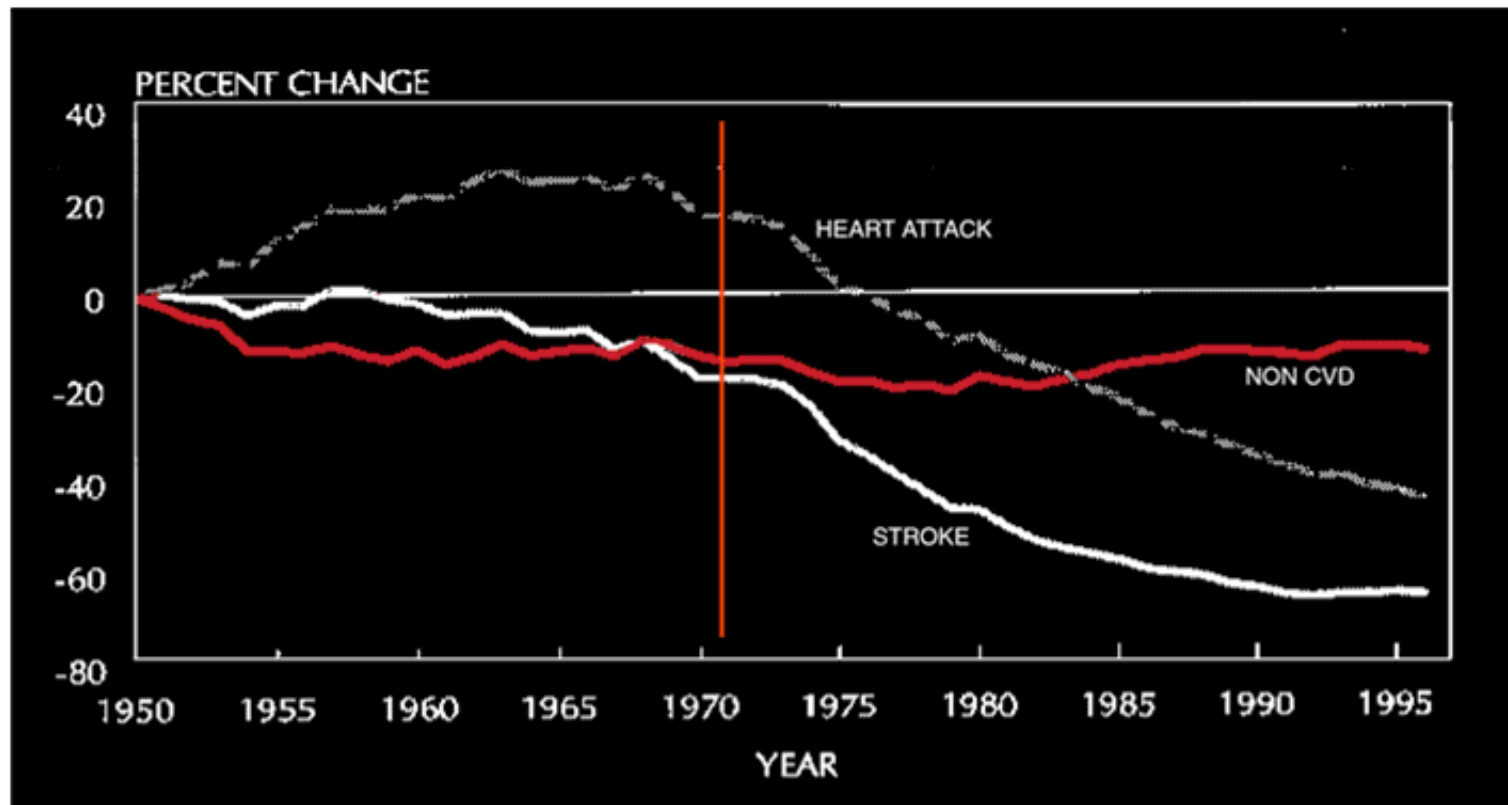
CKD Is Not Being Recognized or Treated

- Only 10% of Medicare beneficiaries with diabetes receive annual urine albumin tests
- Patients are referred late to a nephrologist, especially African American men
- Less than 1/3 of people with identified CKD get an ACE Inhibitor

Is “System Level” Action Necessary?

- Universal medical coverage?
- Disease management teams?
- Improved reimbursement for prevention?
- Other?

Age-Adjusted Cardiovascular Death Is Declining



Parallels Between Hypertension in 1972 and Kidney Disease in 2003

- Recent documentation of effective therapy
- Treatment of a silent disease to reduce risk for a disastrous outcome
- Simple screening
- Advantages for patients, physicians, industry

Who To Test for Chronic Kidney Disease

Regular testing of people at risk

- Diabetes
- Hypertension
- Relative with kidney failure

As part of routine health maintenance testing

How To Test for Chronic Kidney Disease

- “Spot” urine albumin to creatinine ratio
- Estimate GFR from serum creatinine using the MDRD prediction equation

Note:

24 hour urine collections are NOT needed
Diabetics: should be tested once a year
Others at risk: less frequently as long as normal

Who Should Be Treated for **Chronic Kidney Disease**

- Diabetics with urine albumin/creatinine ratios more than 30mg albumin/1 gram creatinine
- Non-diabetics with urine albumin/creatinine ratios more than 300mg albumin/1 gram creatinine

or

- Non-diabetics with estimated GFR less than 60 ml/min/1.73m²

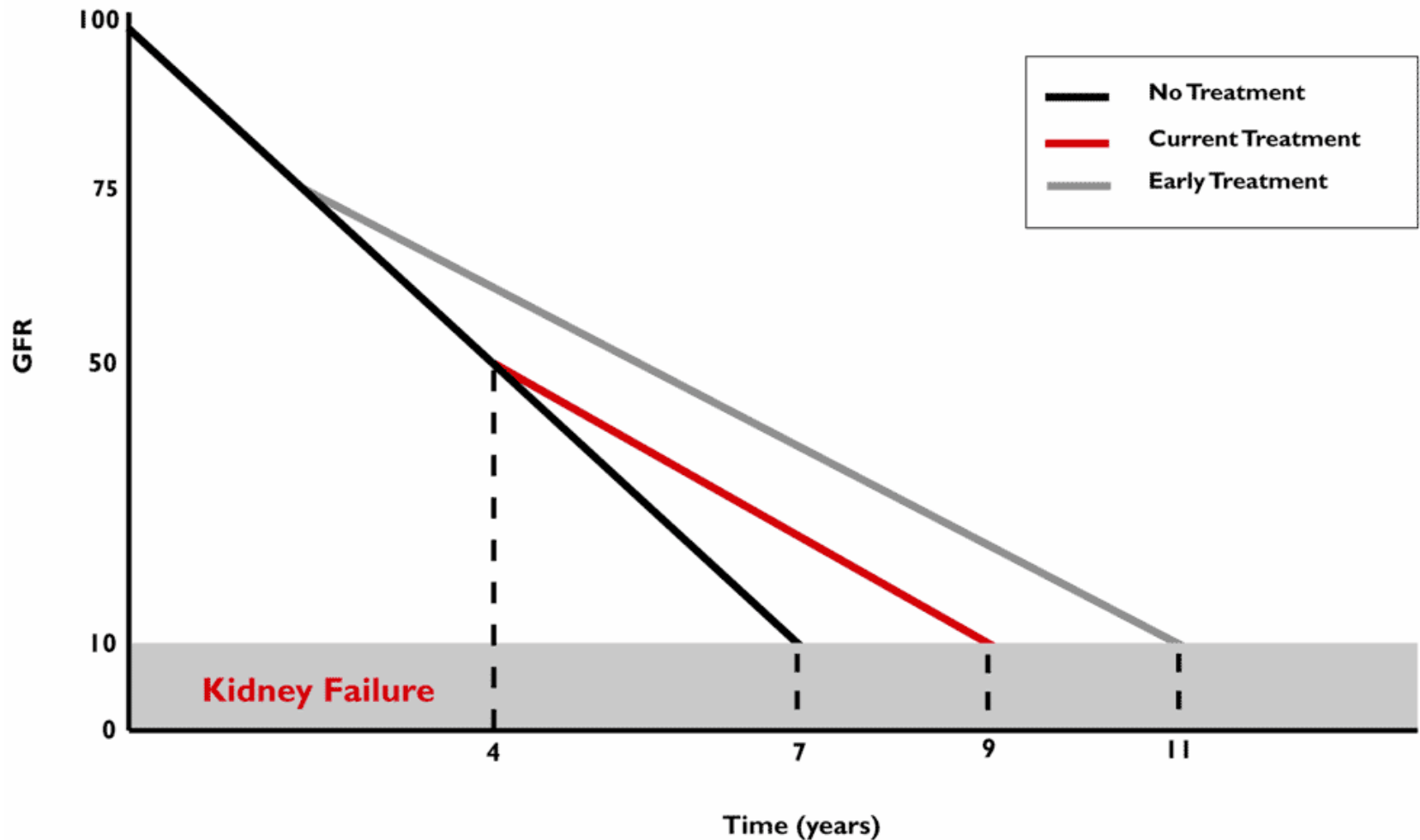
How To Treat for Chronic Kidney Disease

1. Maintain blood pressure less than 130/80 mm Hg
2. Use an ACE Inhibitor or ARB
3. More than one drug is usually required and a diuretic should be part of the regimen

How To Treat for Chronic Kidney **Disease** (continued)

4. Consult a nephrologist early
5. Refer to dietician for a reduced protein diet
6. Team with the nephrologist for care if GFR is less than 30 ml/min/1.73m²
7. Monitor hemoglobin and phosphorous with treatment as needed
8. Treat cardiovascular risk, especially smoking and hypercholesterolemia

Early Treatment Makes a Difference



Primary Care Physician Must Be Engaged

1. 7.6 million people with GFR 30-60
ml/min/1.73m²

2. About 4,500 full-time nephrologists

3. Nearly 2,000 new patients per nephrologist

Therefore, 7 new patients per day per nephrologist

Primary Care Physicians Think Treatment of CKD Works

Is Therapy Moderately, to Very Effective for

- Diabetic CKD? 95% Yes
- Hypertensive CKD? 95% Yes

At What Level of Creatinine Does a 65-Year-Old Diabetic, Hypertensive 50 Kg White Woman Have CKD?

77% Said:

Creatinine > 1.5 mg / dl

Actually a Creatinine of 1.5 means

$$\text{GFR} = 37 \text{ ml/min} / 1.73 \text{ m}^2$$

$$\text{C}_{\text{creat}} = 30 \text{ ml/ min}$$

Currently, Therapy is Effective, But Imperfect

“ . . . we estimate that this reduction (in rate of progression) corresponds to an average delay of two years in the need for dialysis or transplantation.”

Brenner, et al., 2001

Why GFR?

- Glomerular
- Filtration
- Rate

*The rate that the kidneys
filter blood of toxins*

How do we measure the ability of the glomeruli to filter?

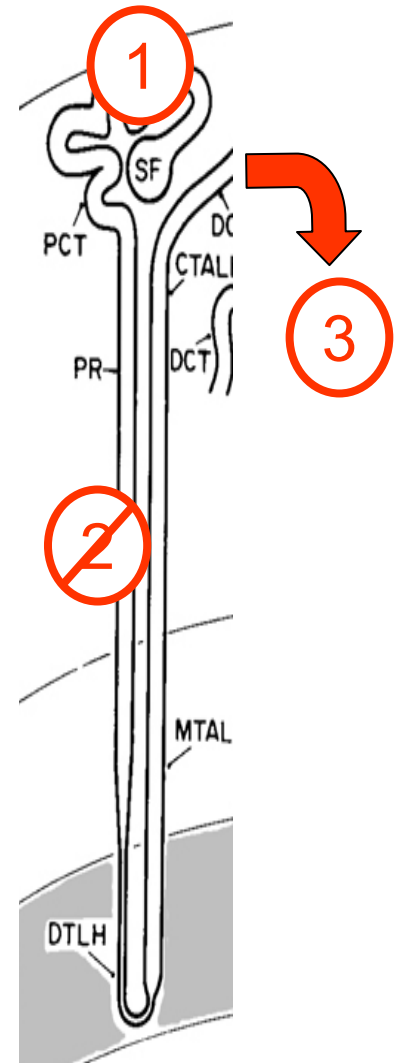
Answer:

Measure a substance in the blood and/or urine that is filtered by the glomeruli.

1. The substance must be freely filtered
2. The substance must not be resorbed by the tubules back into the circulation
3. The substance must not be difficult to measure by chemistry tests

Metabolism byproduct: Creatinine, cystatin C

Man-made compounds: iothalamate, inulin



Glomerular Filtration Rate (GFR)

GFR is the nephrologist's tool to classify kidney health

Creatinine is freely filtered by the glomerulus.
It is not resorbed back into the bloodstream by the tubules.

Creatinine is a metabolism product of skeletal muscle
(Achilles heal of it use: muscle mass varies with gender, age, health, race, etc.)

The serum creatinine level indicates how well the kidneys are filtering. Since muscle mass differs between patients, blood creatinine levels cannot be used to compare GFR's between patients

Glomerular Filtration Rate (GFR)

Methods of measuring GFR using creatinine:

Blood creatinine levels – inaccurate if used alone

Timed urine collections (24-hour urine) in which the amount of creatinine in the urine adjusts for muscle mass.
Often inaccurate due to incomplete collection.

Equations using anthropometric data
(age, gender, race, kidney function):

Cockcroft-Gault formula

MDRD formula

MDRD

Modification of Diet in Renal Disease Trial

Over 500 patients were recruited. GFR measured by iothalamate and close assessment of anthropometric measurements over the course of 5 years.

The following equation was developed to assess GFR:

$$\text{GFR} = 186 \times (\text{PCr})^{-1.154} \times (\text{age})^{-0.203} \times (0.742 \text{ if female}) \times (1.210 \text{ if black})$$

This equation correlates well with GFR measurements made by iothalamate (research tools) and is superior to using:

- Blood creatinine levels
- 24-hour urine collections
- Cockcroft-Gault formula

Its validity in very young, very old, and those with normal kidney function is still being assessed.

It is very useful in identifying patients with $\text{GFR} < 60 \text{ ml/min}$.

Glomerular Filtration Rate (GFR): GFR Calculators

NKF Web site

www.Kidney.org/KLS/professionals/gfr_calculators

NKF of Ohio dedicated GFR website

www.kidneyscore.org

NKDEP Web site

www.NKDEP.nih.gov/professionals/GFR_calculators

Using GFR to Stage Chronic Kidney Disease

Stages of CKD and Clinical Action Plans

<u>Stage</u>	<u>Description</u>	<u>GFR</u>	<u>Clinical Action Plan</u>
1	Kidney damage with normal or ↑ GFR	≥90	Diagnosis and treatment, slow progression, CVD risk reduction
2	Kidney damage with mild ↓ GFR	60-89	Estimating progression
3	Moderate ↓ GFR	30-59	Evaluating and treating complications
4	Severe ↓ GFR	15-29	Preparation for kidney replacement Rx
5	Kidney Failure	<15	Kidney replacement therapy (if uremia present and patient desirable)

National Kidney Foundation. K/DOQI Clinical Practice Guidelines for Chronic Kidney Disease: Evaluation, Classification and Stratification

GFR Case 1

- A 64 yo AA women was noted to have HTN (BP 158/94) and 2+ protein on UA. Serum chemistries include Cr 1.9. RUS is normal and repeat serum Cr is 1.9.
- Her GFR is _____
- Her CKD Stage is _____

GFR Case 1

- GFR = 34 ml/min/1.73M²
- CKD Stage = 3

GFR Case 2

- A 38 yo healthy C male was noted to have a serum Cr of 1.4 on routine pre-insurance studies. His BP is 130/78 and UA normal.
- Repeat Cr is 1.5.
- Her GFR is _____
- Her CKD Stage is _____
- Other useful studies include _____

GFR Case 2

- GFR = 62, 57 ml/min/1.73M²
- CKD Stage = 3 (barely)
- RUS – polycystic kidneys

GFR Case 3

- A 12 yo healthy C girl was noted to have persistent 2+ non-orthostatic proteinuria on UA. She had a past history of 2 UTI's as an infant. Her height is 140 cm. Her BP and exam is normal. Her serum Cr is 1.1
- Repeat Cr is 1.1.
- Her GFR is _____
- Her CKD Stage is _____
- Other useful studies include _____

GFR Case 3

- GFR = 70 ml/min/1.73M²
- CKD Stage = 2
- RUS – Small right kidney with upper pole scars; no hydronephrosis

GFR Awareness Campaign

Education and Action Campaign

- Laboratory Reports
- Physician Awareness
- Public Awareness
- Media Efforts
- Public Policy

Laboratory Reports – Goals and Actions

- Expressing routine creatinine as calculated GFR on each lab report
- Providing normal ranges for GFR on each lab report
- National effort – NKDEP
- NKF-Ohio - we have contacted all labs in state
- Several prominent labs (OSUMC, Liking Memorial, Lima Memorial, Fairfield Memorial) have adopted this practice

Suggestions for Laboratories

MDRD EQUATION

In adults, the best equation for estimating glomerular filtration rate (GFR) from serum creatinine is the MDRD equation.^{1, 2}

$$\text{GFR (ml/min/1.73m}^2\text{)} = 186 \times (\text{P}_{\text{Cr}})^{-1.154} \times (\text{Age})^{-0.203} \times (0.742 \text{ if female}) \times (1.210 \text{ if African American})$$

The equation requires 4 variables:

- serum creatinine
- age
- sex
- African American or not

Since a patient's race is often not available to clinical laboratories, a good alternative is to report estimated GFR values for both African Americans and non-African Americans (see Sample Reports below). Note that the equation **does not require weight** because the result is reported normalized to 1.73m² body surface area, which is an accepted average adult surface area.

REPORTING VALUES

We presently recommend reporting values above 60 ml/min/1.73m² merely as "above 60 ml/min/1.73m²" not as an exact number such as 92 ml/min/1.73m². For values below 60 ml/min/1.73m², the report should give the numerical estimate such as "32 ml/min/1.73m²" (see Sample Reports below).

There are 3 reasons for this recommendation:

1. The equation has been most extensively evaluated in people with some degree of renal insufficiency.
2. Inter-laboratory differences in calibration of the creatinine assay have their greatest impact in the near normal range and therefore lead to greater inaccuracies.³
3. Quantification of GFR below 60 ml/min/1.73m² has more clinical implications than above that level.

SAMPLE REPORTS

55-year old man	Normal Range for GFR estimate for Age and Sex			
Serum creatinine = 1.1 mg/dl	Age (year)	Men GFR (ml/min/1.73 m ²)		
Estimated GFR greater than 60 ml/min/1.73m ²		Mean	-2 SD	+2 SD
	50-59	93	56	130

60-year old woman	Normal Range for GFR estimate for Age and Sex			
Serum creatinine = 1.8 mg/dl	Age (year)	Women GFR (ml/min/1.73 m ²)		
Estimated GFR = 31 ml/min/1.73m ² if non-African American		Mean	-2 SD	+2 SD
Estimated GFR = 37 ml/min/1.73m ² if African American	60-69	75	45	104

60-year old man	Normal Range for GFR estimate for Age and Sex			
Serum creatinine = 1.4 mg/dl	Age (year)	Men GFR (ml/min/1.73 m ²)		
Estimated GFR = 55 ml/min/1.73m ² if non-African American		Mean	-2 SD	+2 SD
Estimated GFR greater than 60 ml/min/1.73m ² if African American	60-69	81	49	113

**Laboratory Reports
with Calculated GFR**

Physician GFR Awareness - Goals

- Understanding Significance of GFR and Value of Early Detection of CKD
- Assessing GFR in Patients
- Intervening in CKD

Physician GFR Awareness - Actions

- Pocket Guide to Calculate GFR
- Survey of primary care MD's – baseline level of understanding
- Dr. Tony Roberto (OSU School of Communications) studying most effective strategy to educate MD's – high threat versus informational
- Further efforts to educate primary care physicians:
 - Interpreting GFR
 - Value of Early Detection of CKD
 - Intervening in CKD

Public GFR Awareness - Goals

- Understanding Significance of GFR and Kidney Health
- Understanding the Value of Early Detection of CKD

Public GFR Awareness - Actions

- Concept of Kidney Score (Calculated GFR)
- Dr. Patricia West (and students) (OSU Fisher School of Business) focus group work
 - AA – focus on family, need for simple concept (score)
 - C/Hispanic – grab people's attention, message linked back to kidney
- Clinic Surveys to define level of awareness in community
- Preparation of pamphlets, posters, web site, radio/TV ads that educate public about Kidney Score and appropriate next steps

Public GFR Awareness – Positive Brochure



Knowing your Kidney Score is simple. It could save your life.

About NKF of Ohio
The National Kidney Foundation of Ohio is one of 51 affiliates of the National Kidney Foundation, a non-for-profit, tax-exempt, national voluntary health agency. Its activities are governed by voluntary board of trustees.

Our mission is to prevent kidney and urinary tract diseases, improve the health and well-being of individuals and families affected by these diseases, and increase the availability of all organs for transplantation. All programs are made possible through the cash and in-kind support from a generous public.

This initiative is made possible by the support of:
Abbott Labs
Aetna
Falmigan, Inc.
Fisher College of Business
The Ohio State University

One in nine Americans suffer from chronic kidney disease. Most don't know it.

Early detection saves up to 60,000 lives each year. Including yours.



For more: www.kidneyscore.org

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info@nkdfohio.org
www.kidneyscore.org
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Ask your doctor for your Kidney Score.

National Kidney Foundation

Public GFR Awareness – Positive Brochure

You can protect yourself and your family with early detection. It's simple, effective and could save your life.

You and your doctor can work together to protect your kidney health.

What your kidneys do for you.

Your kidneys keep you alive and healthy. They regulate your blood pressure, promote strong bones, and control the production of red blood cells.

Keeping your kidneys healthy will enhance your overall health.

What is kidney disease?

Chronic Kidney Disease occurs when your kidneys aren't doing their job. There are many serious health problems such as

- high blood pressure
- organ damage
- early death

What is your kidney score?

Your kidney score is calculated using a simple test. Any time you have routine blood work done your doctor can compute your score. A normal kidney score is 100.

If your kidney score 70 or lower, you may have chronic kidney disease.

Kidney disease can change your life.

Most of the 20 million people who have the disease don't know they have it. These individuals are at risk of needing dialysis or a kidney transplant.

Today, there are more than 70,000 people waiting for a kidney transplant. Every day about 15 people die waiting.

However, if discovered early you and your doctor can prevent the progression of the kidney disease to kidney failure.

Kidney disease can happen to you.

Twenty million Americans have chronic kidney disease and another 20 million are at risk. In fact, the number of kidney patients has doubled each of the past two decades.

Anyone can get it. However, some people are at greater risk, including people who have

- diabetes
- high blood pressure
- a family history of chronic kidney disease

If you are African American, Hispanic, or Native American your chance of getting kidney disease may be four times greater than the general population.

Kidney disease is more common than you think.

Getting your kidney score is simple and effective.

You and your doctor can work together to promote your health. Your doctor can compute your kidney score as part of a routine blood test with no additional off or on expense. It's the best way to promote kidney health.

It's up to you.

You can keep kidney disease from killing you. It's easy, ask your doctor for your kidney score.



Kidney disease is a silent killer. Knowing is living.

Public GFR Awareness – Negative Message

Not knowing your kidney score could kill you. It's simple. Ask your doctor.

One in nine Americans suffer from chronic kidney disease. Most don't know it.

60,000 Americans die each year from kidney failure. It could be you.

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For more: www.kidneyscore.org

Public GFR Awareness – Negative Message

Not knowing your kidney score puts you and your family at risk. Getting it is simple, effective, and could save your life.

Untreated kidney disease can lead to kidney failure and death.

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Media Efforts - Goals

- Improving the Awareness of GFR and Kidney Health by the Public
- Increasing Public Understanding of the Value of Early Detection of CKD

Media Efforts - Action

- Depends on Funding
 - Fundraising
 - Grants submitted to Columbus Medical Association, Columbus Foundation, Harry C Moores, OSU Collaborative Education Grant
- Focused TV Radio Ads, print ads, TV/Radio appearances

Public Policy - Goals

- Require Laboratories to Include Calculated GFR in reports
- Improved Funding and Emphasis on Early Detection of CKD
- Increased Funding for Therapies to Prevent and Treat CKD

Public Policy - Actions

- Engagement with supportive legislators (Ray Miller D-Columbus) [member of the Black Caucus, Chairman of the Ohio Commission on Minority Health]
- Collaborative efforts with Public Agencies Ohio Department of Health (Preventative Health)

Future Needs

- Better Therapies
- Better Markers / Surrogates of Disease
- Better Utilization of Testing and Therapies

GFR Awareness for Ohio



**You Have The Power To
Prevent Kidney Disease**

Next Steps

- Support initiative by raising money
- Support initiative by spending money –
working on **GFR Awareness Campaign**

GFR Awareness Information

GFR Awareness – www.Kidneyscore.org

**NKF-Ohio Web site
www.NKFofOhio.org**

**NKDEP Web site
www.NKDEP.nih.gov/professionals/GFR_calculators**

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