Confronting Racial and Ethnic Disparities in Cardiometabolic Disease

Supported by the American College of Cardiology in collaboration with the National Minority Quality Forum and the Association of Black Cardiologists

Supported in part by educational grants from Arbor Pharmaceuticals and Merck & Co.

CME Information & Faculty Disclosures

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Announcements

- The session is being videotaped. Please turn off all cell phones and pagers.
- ARS keypads are provided on the table for use during the symposium.
- During the panel discussion, please use the Question Cards located on each table.
- Complete and return a CME Evaluation Form at the conclusion of the symposium.

Introductions/Opening Remarks

Laurence S. Sperling, MD, FACC
Chairman of ACC Cardiometabolic Working Group
Chairman of the US National Cardiometabolic Alliance
Professor of Medicine (Cardiology)
Professor of Global Health
Director-Center for Heart Disease Prevention
Emory University
Atlanta, Georgia

Agenda

- Introductions/Opening Remarks
- Epidemiological Profiles of Racial and Ethnic Disparities in Cardiometabolic Disease
- Systems Approaches and Priorities for Prevention in At-Risk Populations
- Strategies to Combat the "Triple Threat"
- Prevalence, Trends, and Medical Treatment: Racial and Ethnic Group Differences in Cardiometabolic Disease
  - Hypertension and Heart Failure in African Americans
  - Diabetes and Metabolic Syndrome in African Americans
  - Ethnic Disparities in Asian-Americans
- Unique Racial and Ethnic Aspects of Cardiorenal Syndrome and Associated Cardiovascular Disease
- Panel Discussion and Q & A
- Adjournment

Case Study

- Maria H. is a 53 year old Black Female
- Originally from San Juan, Puerto Rico. She currently lives in Bronx, New York
- Asymptomatic NY Yankees fan
  - Non smoker
  - History of gestational diabetes
  - Wt 155 lbs.
  - Waist circumference=38 inches
  - BP 154/72 mm Hg
  - TC 192 mg/dl
  - TG 150 mg/dl
  - HDL 42 mg/dl
  - LDL 120 mg/dl
  - Fasting BG 110 mg/dl

Case Study, continued

- Maria H. works at a local daycare center
- Has 3 adult-aged children
- Speaks primarily Spanish
- Eats traditional diet, although sometimes American fast food
- Has just purchased her first iPhone

ARS QUESTION 1

What is the recommended initial diagnostic test?

A. hs-CRP

B. Coronary calcium score

C. C-IMT

D. Stress echo

E. The initial diagnosis is evident (metabolic syndrome)

ARS QUESTION 2

What is 10-year ACC/AHA Pooled cohort ASCVD risk ?

A. Low (3%)

B. Intermediate (6-7%)

C. High (15%)

ARS QUESTION 3

What is ACC/AHA Pooled cohort lifetime ASCVD risk ?

A. Low (7%)

B. Intermediate (20%)

C. High (40%)

ARS

ARS QUESTION 4

What is the likelihood of developing future diabetes without intervention?

A. 5-10%

B. 10-20%

C. > 50%

D. Unlikely

ARS

ARS QUESTION 5

All of the initial approaches to care are reasonable except which of the following?

A. Metformin
B. Cardiosmart 2.0
C. Culturally appropriate comprehensive lifestyle management
D. Community-center Coach approach

Epidemiological Profiles of Racial and Ethnic Disparities in Cardiometabolic Disease

The Cost of Diabetes

Laurence S. Sperling, MD, FACC

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About the

National Minority Quality Forum

A DC-based, research and education organization that publishes the National Health Index (NHI)

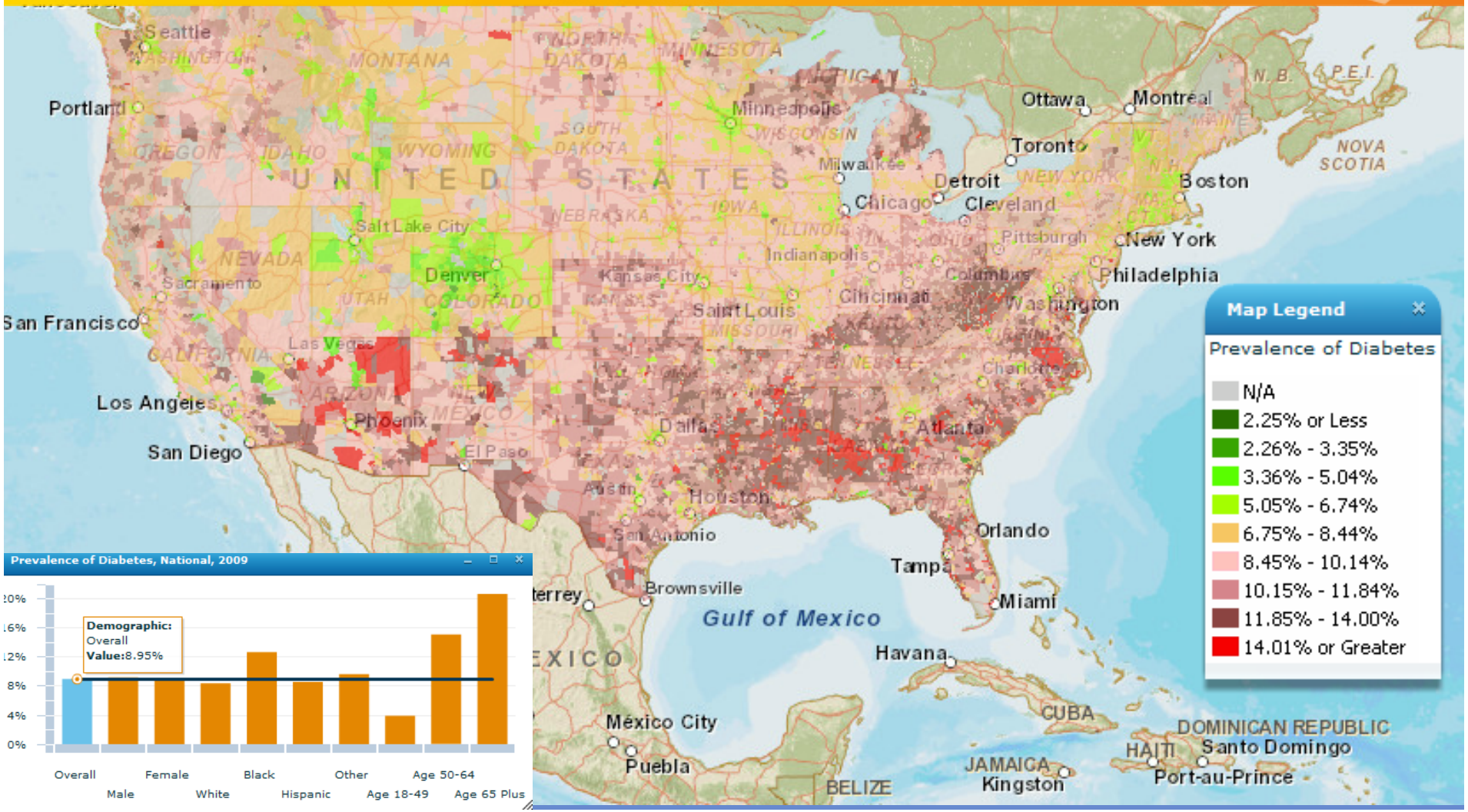
The NHI is a comprehensive database comprised of over **800 million** patient records to define disease prevalence, costs, and outcomes at the zip code level.

It is used to inform, support, and catalyze advocacy, educational, marketing, and public relations activities

NATIONAL Minority Quality Forum

National Health Index

National Profile of Diabetes



U.S. Inpatient Stays

Year	Total	White	Black	Hispanic	Other
2000	5,162,749	3,590,716	822,075	507,507	242,450
2001	5,488,901	3,801,519	868,365	560,940	258,078
2002	5,810,954	3,939,739	975,100	588,183	307,932
2003	6,124,741	4,070,132	1,011,072	723,553	319,983
2004	6,246,483	4,182,506	1,072,500	662,623	328,853
2005	6,462,927	4,475,178	939,167	702,079	346,503
2006	6,925,737	4,601,829	1,129,683	813,448	380,778
2007	7,246,358	4,843,991	1,190,936	779,891	431,540
2008	7,676,182	5,276,150	1,200,807	727,061	472,164

US Cost Per Inpatient Stay

Year	Cost per Inpatient Stay	Total Cost
2001	$7,976	$44,072,894,941
2002	$8,620	$50,423,077,300
2003	$8,908	$54,928,695,627
2004	$9,370	$58,934,529,008
2005	$9,688	$63,128,659,539
2006	$10,137	$70,682,430,002
2007	$10,554	$77,017,193,475
2008	$11,054	$85,411,208,953

All-Cause Diabetes Emergency Room Visits

Year	Total	White	Black	Hispanic	Other
2006	9,531,036	6,083,308	1,613,744	1,302,808	531,177
2007	10,435,963	6,784,412	1,758,463	1,275,205	617,882
2008	11,266,598	7,809,657	1,966,945	943,411	546,585

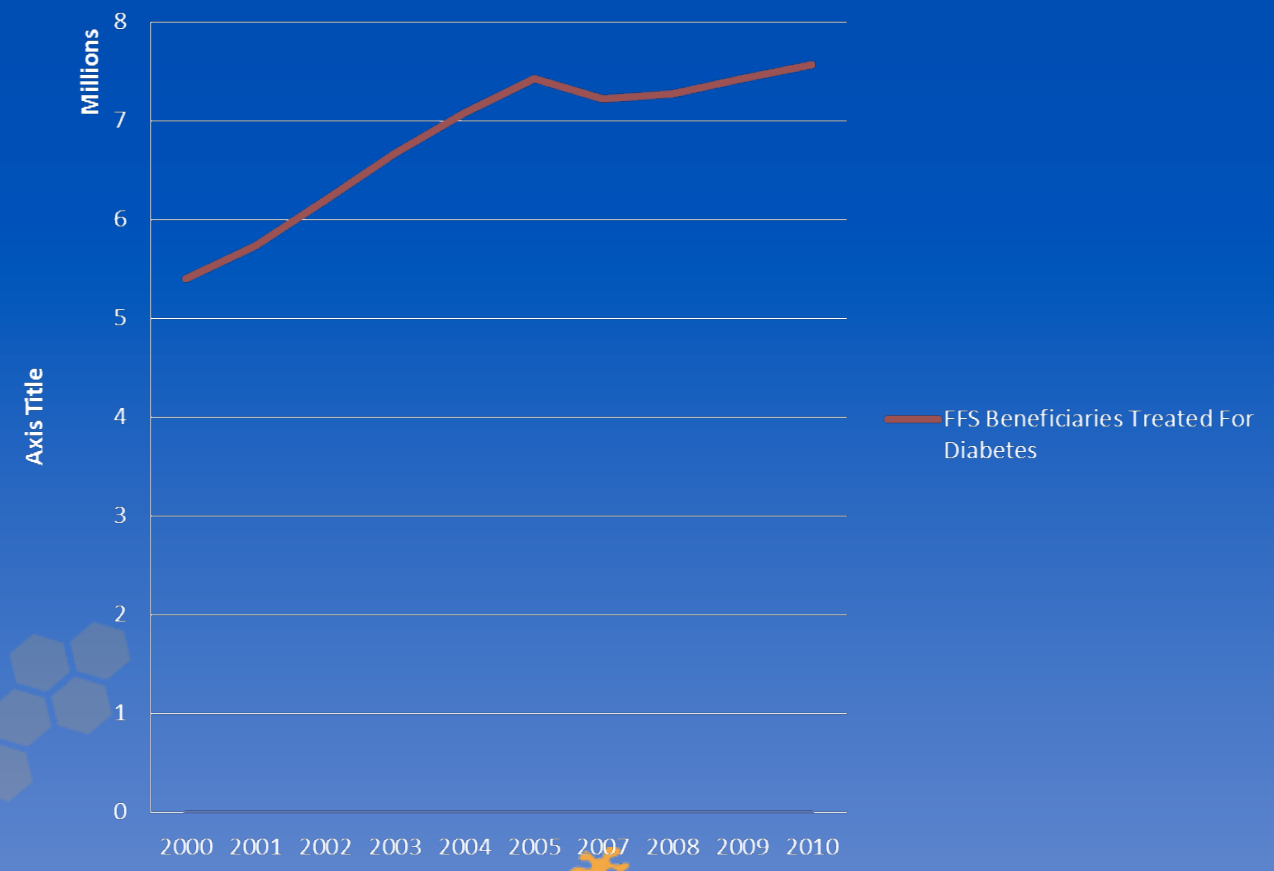
All-Cause Diabetes Hospital Encounters

Year	Total	White	Black	Hispanic	Other
2006	11,874,772	7,760,615	1,967,627	1,489,937	656,594
2007	12,674,545	8,372,852	2,105,587	1,443,179	752,927
2008	13,591,909	9,376,749	2,233,586	1,222,416	759,158

National HEALTH Index

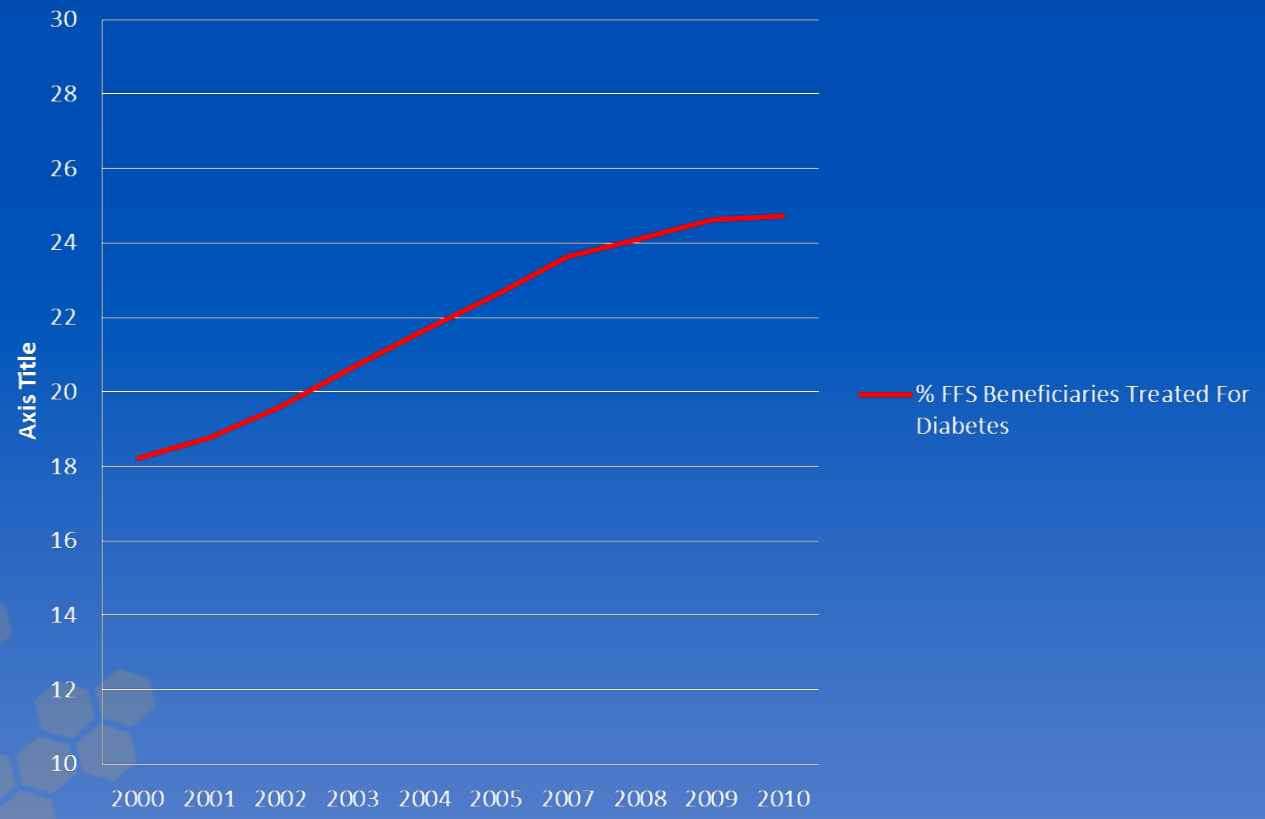
The Cost of Diabetes in the Medicare Program

Number of Medicare Fee-for-Service Diabetes Beneficiaries 2000-2010



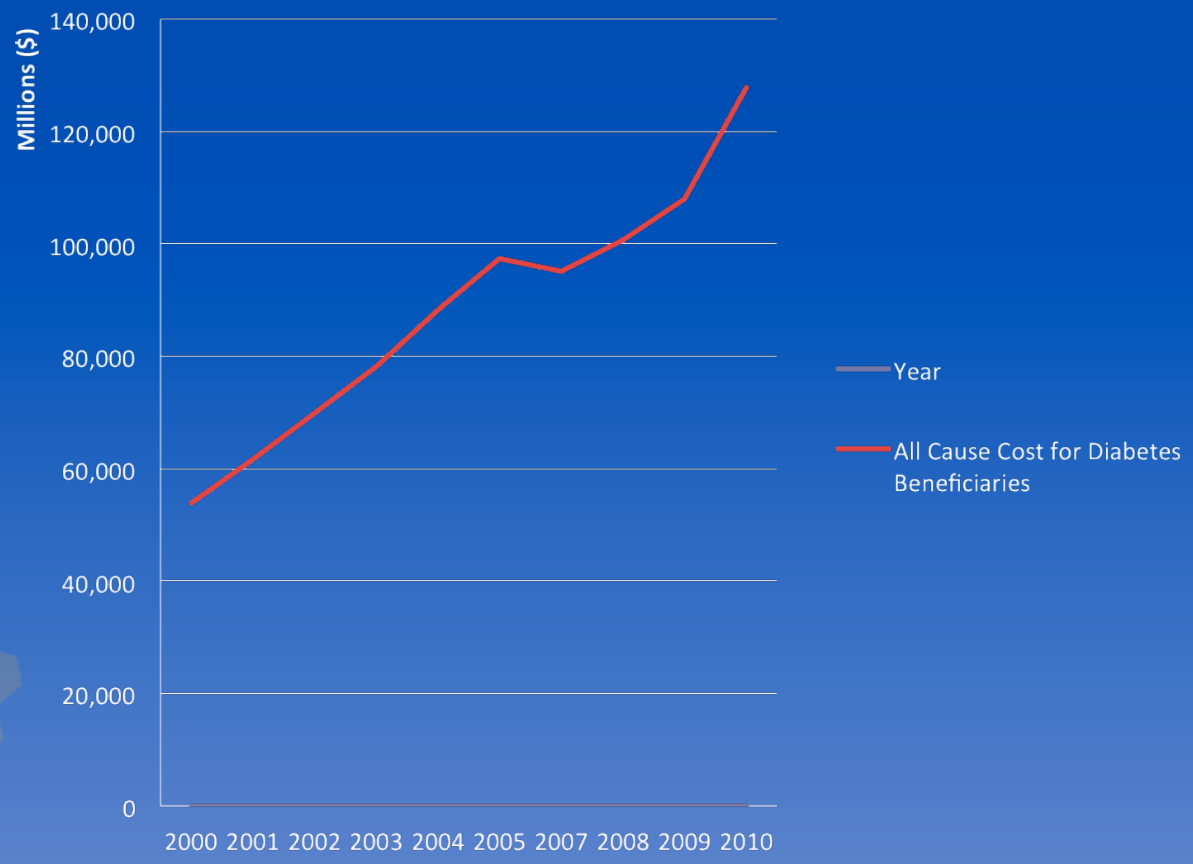
National HEALTH Index

Percent of Medicare Fee-for-Service Beneficiaries Treated for Diabetes 2000-2010



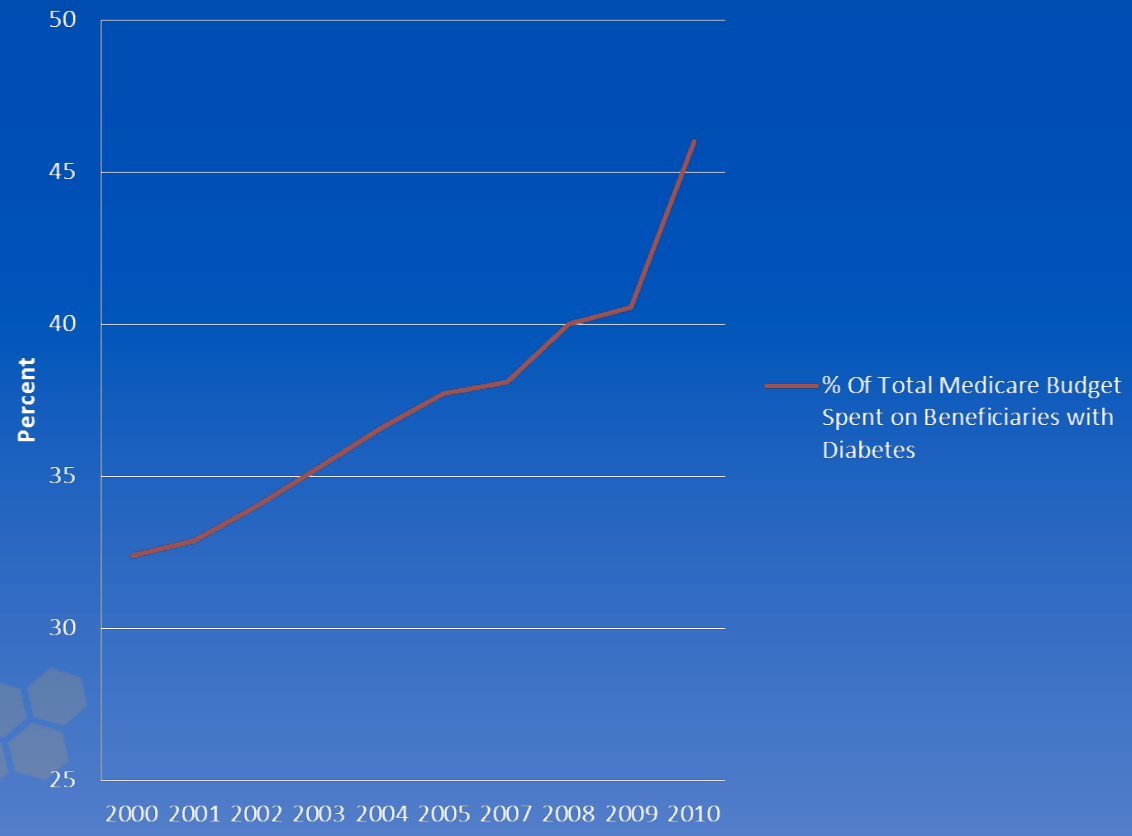
National HEALTH Index

Annual All-Cause Cost of Care for Diabetes Beneficiaries 2000-2010



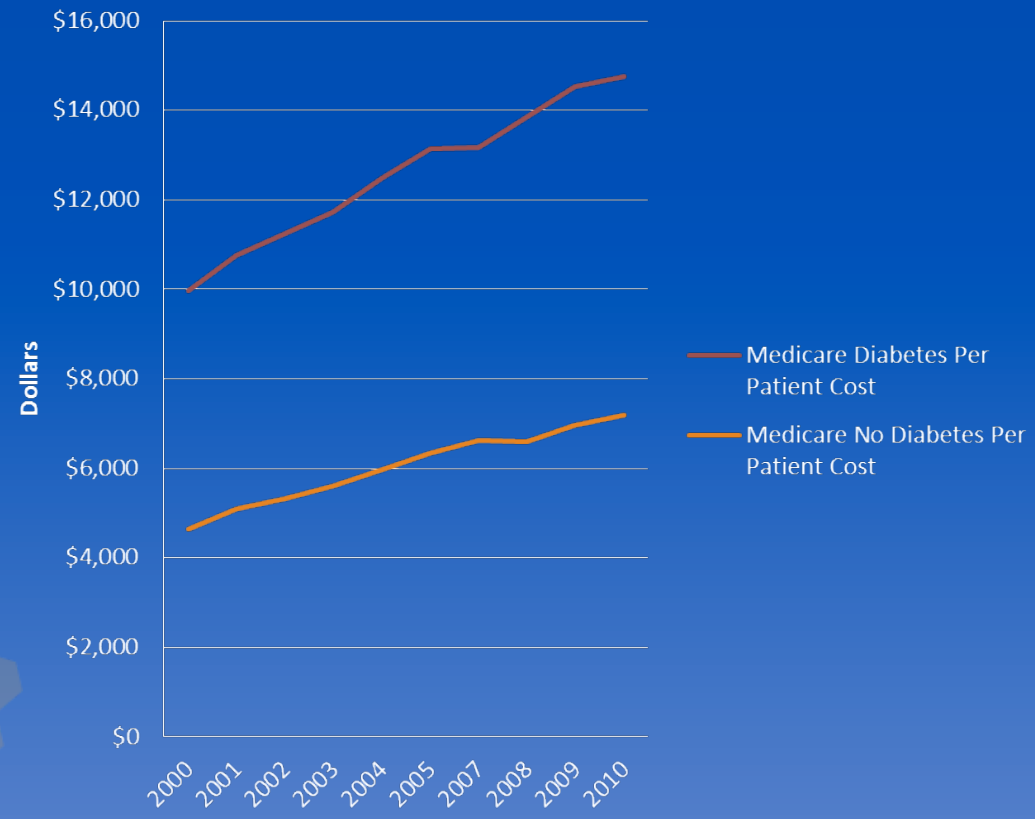
National HEALTH Index

Percent of Medicare Budget Spent on Beneficiaries with Diabetes 2000-2010



National HEALTH Index

Average Diabetes Per Patient Cost Vs. Non-Diabetes Per Patient Cost 2000-2010



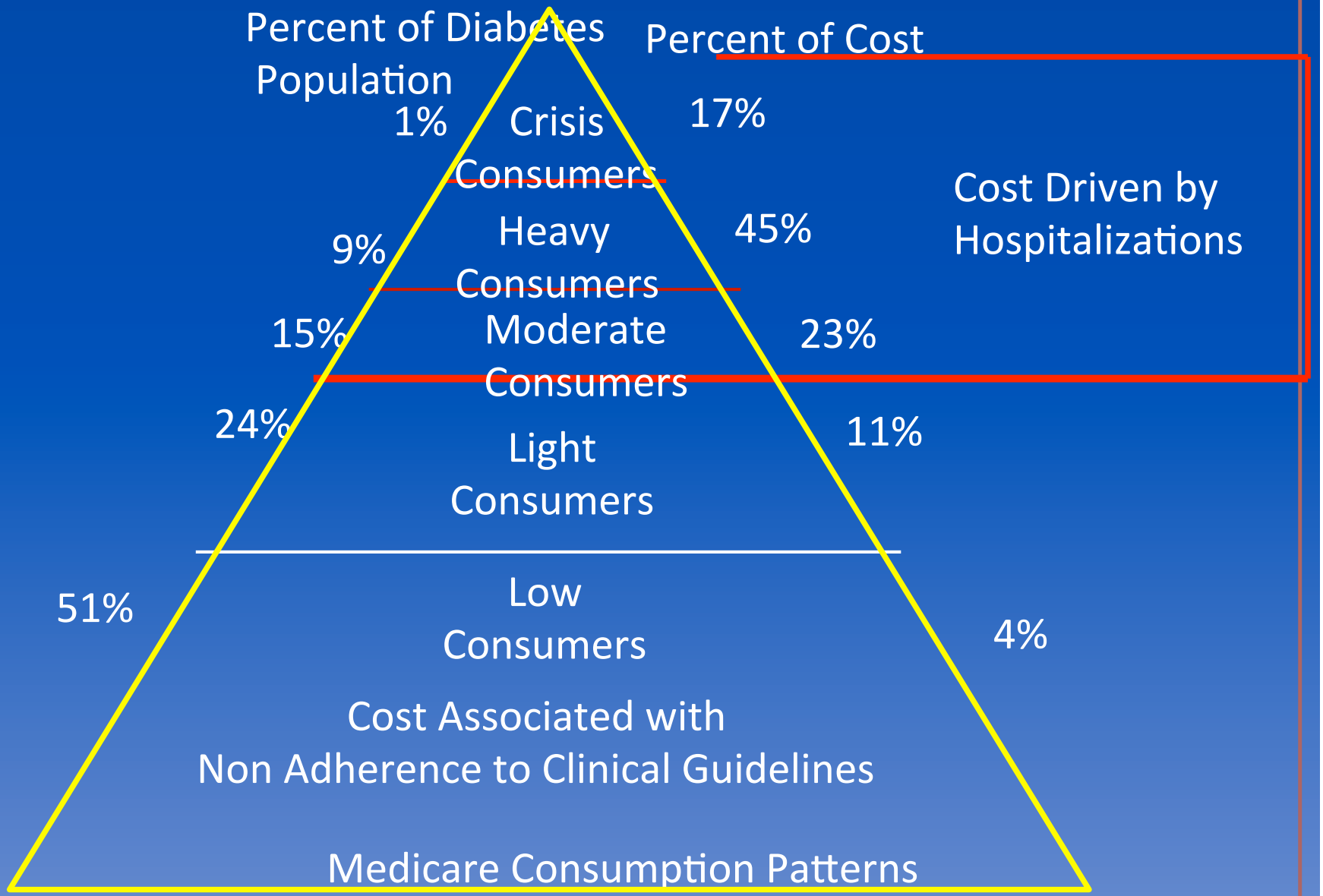
National HEALTH Index

Medicare Per Diabetes Beneficiary Hospitalizations

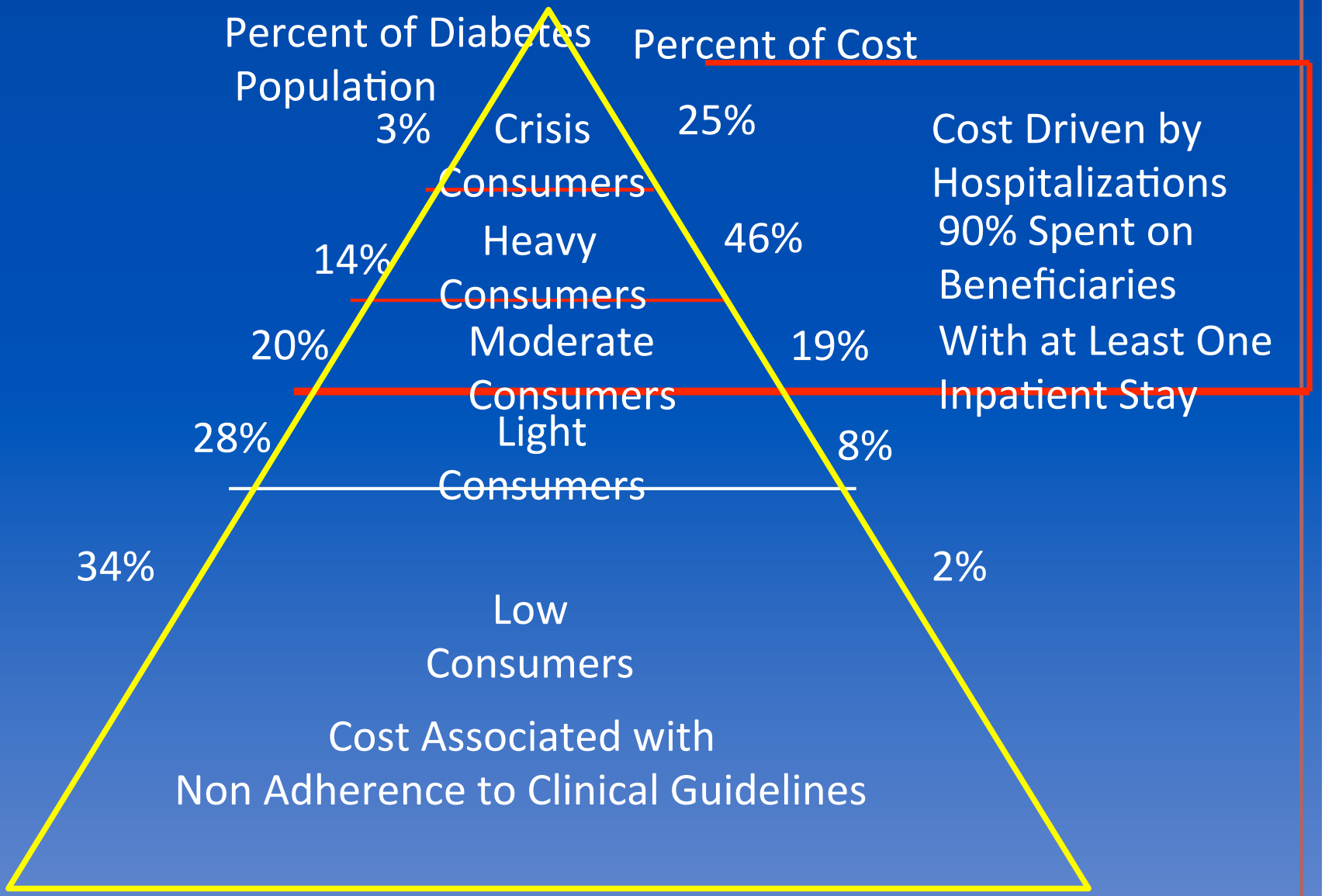
Number of Beneficiary Zip Codes	Number of Hospitalizations Per Hundred Diabetes Beneficiaries
11,971	76%
2,840	34%
Year	Number of Hospitalizations Per Hundred Diabetes Beneficiaries
2000	68%
2005	64%
2010	60%

National HEALTH Index

The Medicare Acute Care Pyramid



The Diabetes Acute Care Pyramid



The Cost of Diabetes

There is a Growing Imperative
That We Reduce Diabetes-Related
Hospitalizations

National HEALTH Index

Prevalence, Trends and Medical Treatment: Racial and Ethnic Group Differences in Cardiometabolic Disease

Keith C. Ferdinand, MD

Professor of Clinical Medicine

Tulane University School of Medicine

Chair, National Forum for Heart Disease and Stroke Prevention

New Orleans, Louisiana

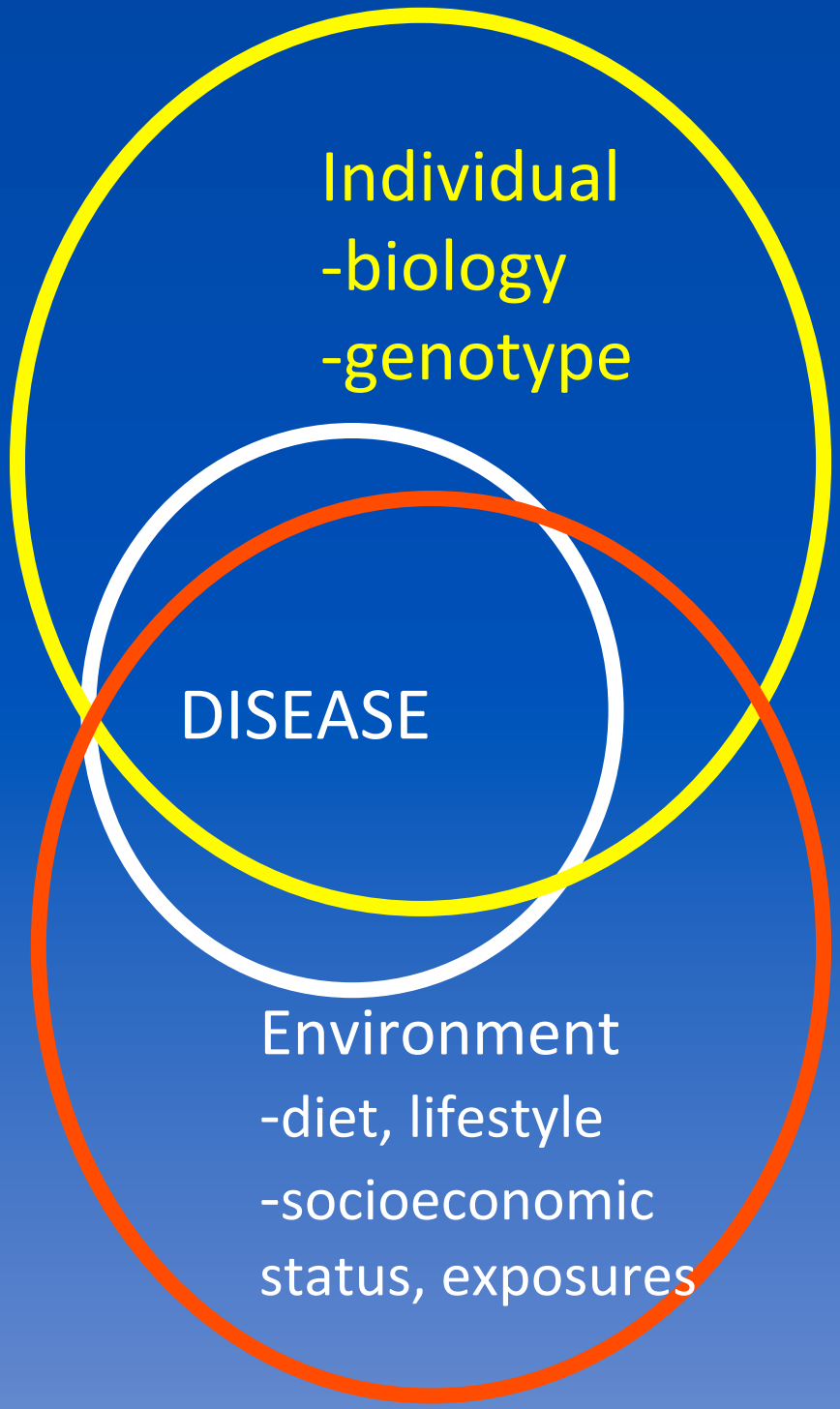
Agenda

- Hypertension and Heart Failure in African Americans
- Diabetes and Metabolic Syndrome in African Americans
- Ethnic Disparities in Asian-Americans (Japanese, Filipino, South Asian)

Introduction

- Health, life expectancy, and care improved dramatically for Americans over last century
- Distribution of benefits did not occur equitably
  - Mortality gap between black & white unchanged since 1960[1]
- Large portion of disparity due to CVD[2]
- Racial/ethnic minorities at higher risk for HTN, DM, obesity, MI, stroke, CKD, and CV mortality, especially premature cardiac death

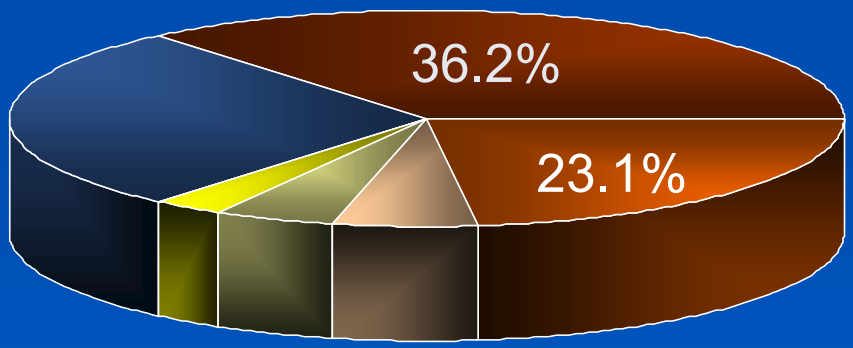
1. Smedley et al [eds]. Unequal treatment: Confronting racial and ethnic disparities in health care. National Academies Press, 2002.
2. Wong et al. NEJM 2002;347:1585-92



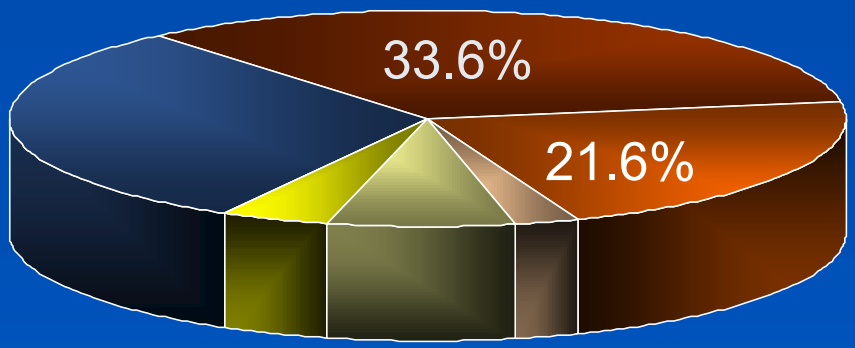
"Race"
is a crude
proxy.

Leading Causes of Death by Race

White

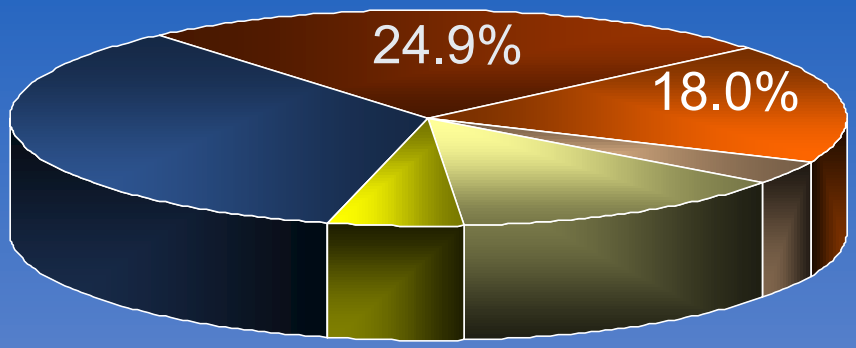


Black

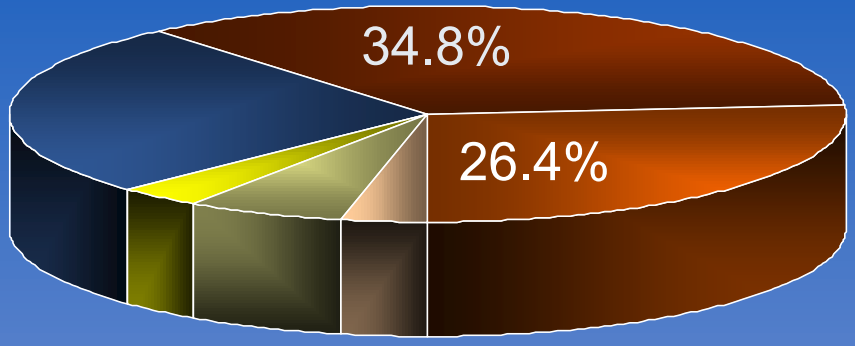


CVD Cancer Pulmonary Disease Accidents/Homicides Diabetes Other

Native American

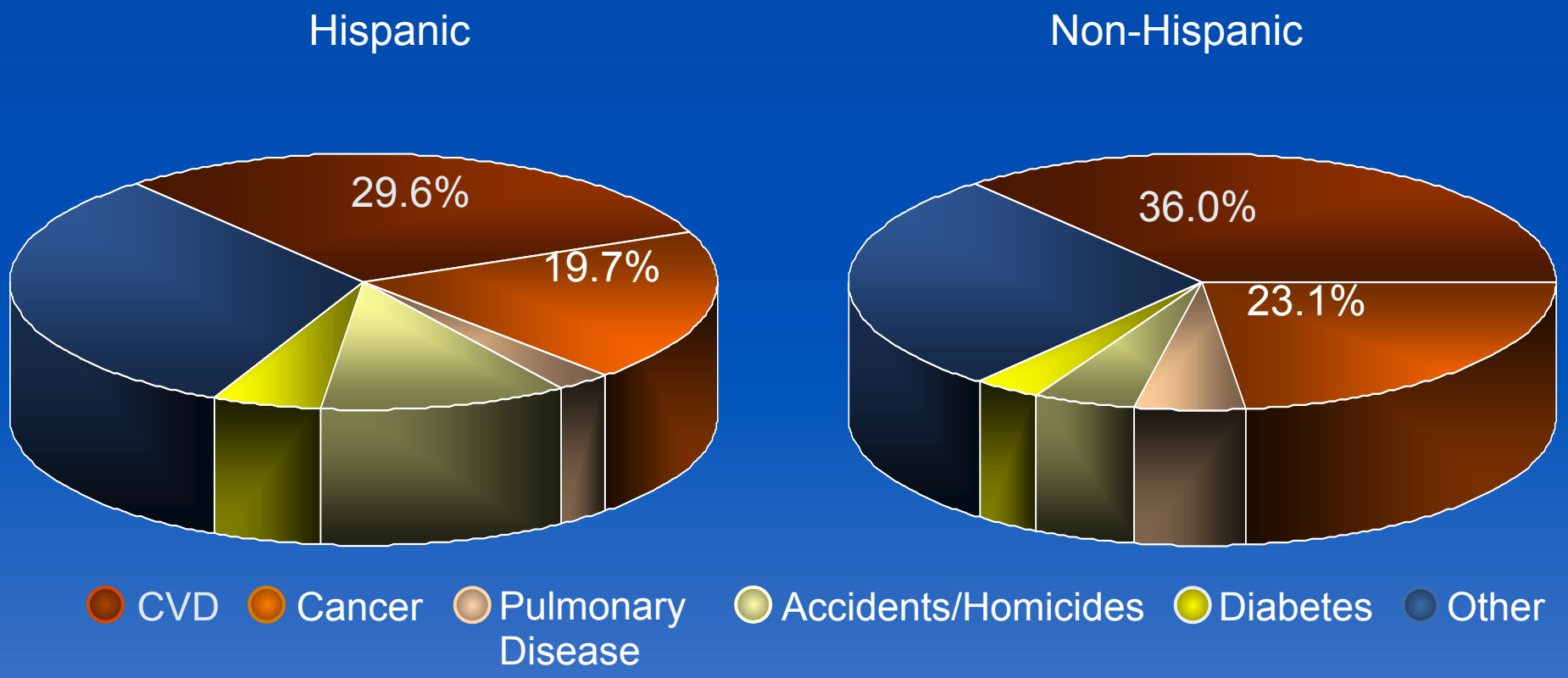


Asian



National Vital Statistics Reports. 2003;52(9):Table E; http://www.cdc.gov/nchs/data/nvsr/nvsr52/nvsr52_09.pdf.

Leading Causes of Death in Hispanic Ethnicity



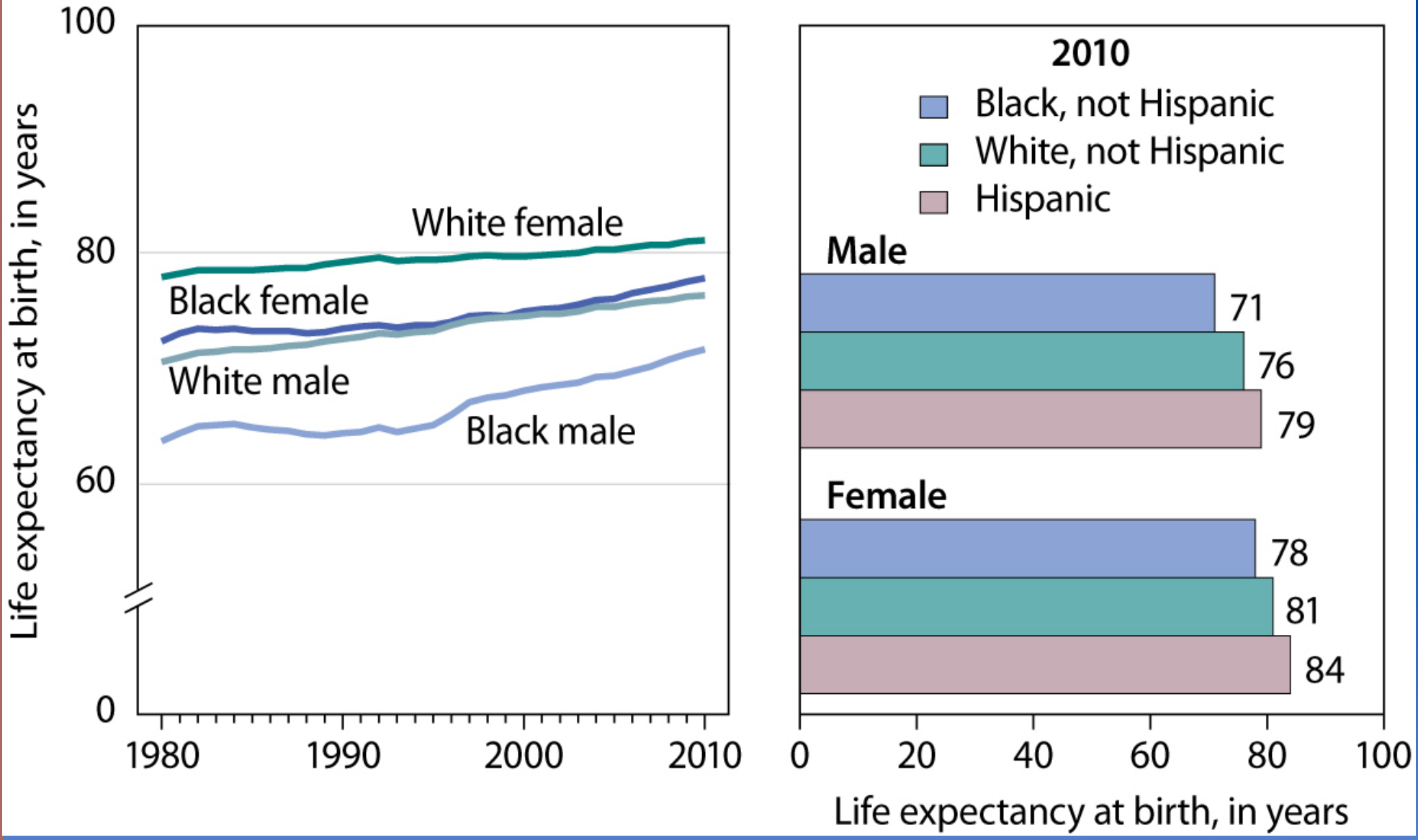
National Vital Statistics Reports. 2003;52(9):Table F; http://www.cdc.gov/nchs/data/nvsr/nvsr52/nvsr52_09.pdf.

Heart Disease & Stroke Mortality Disparities

- Black men & women much more likely to die of heart disease & stroke vs. whites
- CHD & stroke not only leading U.S. causes of death, but also account for largest proportion of inequality in life expectancy between whites and blacks
- Despite existence of low-cost, highly effective preventive treatment

MMWR. 2011;60:1.

Life Expectancy at Birth



CDC/NCHS, Health, United States, 2012, Figure 1. Data from the National Vital Statistics System.

Agenda

- Hypertension and Heart Failure in African Americans
- Diabetes and Metabolic Syndrome in African Americans
- Ethnic Disparities in Asian-Americans (Japanese, Filipino, South Asian)

Unique Aspects of BP in Blacks

- Premature onset
- Increased incidence of target organ damage, including LVH ,heart failure, impaired renal function, and CKD/ end-stage renal disease, retinopathy
- Hypertension prevalence in the U.S. among the highest in the world
- Compared with whites, blacks develop HTN at an earlier age and average BPs much higher

Flack et al. Hypertension. 2010;56:780-800; Ferdinand KC, Ferdinand DP. Expert Rev Cardiovasc Ther. 2008;10:1357-66.

Antihypertensive Therapy in African Americans

- Monotherapy BP-lowering may be more effective with thiazides and long-acting CCBs vs. BB, ACEIs, or ARBs
- For all patients, including blacks, thiazides effective as initial therapy and well tolerated
- As first-line therapy in blacks, diuretics reduce BP, stroke, HF, and overall CVD
- If additional agents needed, thiazides & CCBs increase efficacy of BB, ACEIs, & ARBs

Flack et al. Hypertension. 2010;56:780-800; Ferdinand KC, Ferdinand DP. Expert Rev Cardiovasc Ther. 2008;10:1357-66.

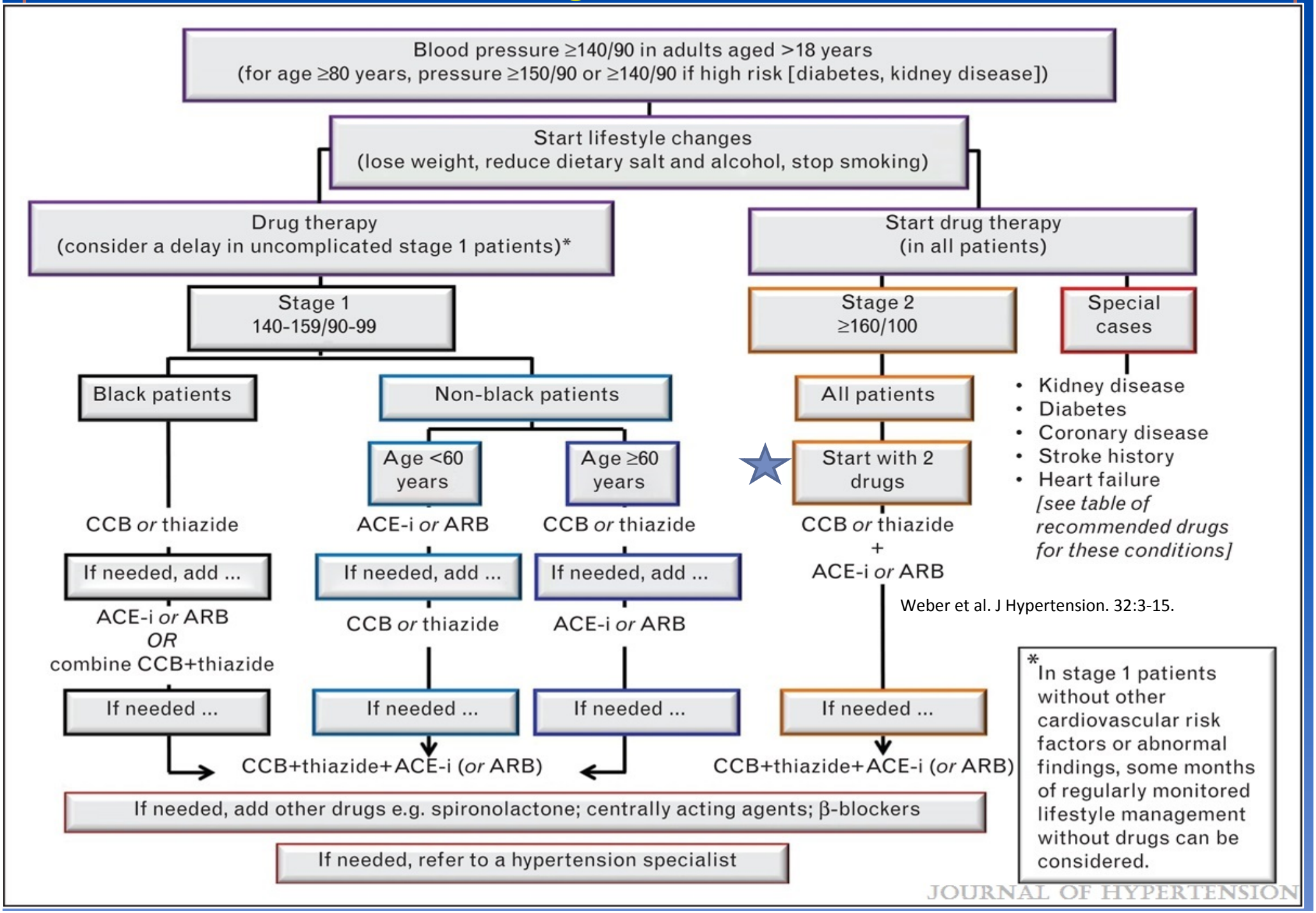
BP Control Usually Requires Combination Therapy

2014 Guideline Titration Strategy

1. Maximize first medication before adding second
2. Add second medication before reaching maximum dose of first medication
3. Start with 2 medication classes separately or in fixed-dose combination

James et al. JAMA. 2014;311:507-20

2013 ASH/ISH Algorithm Weber, JCH 2013



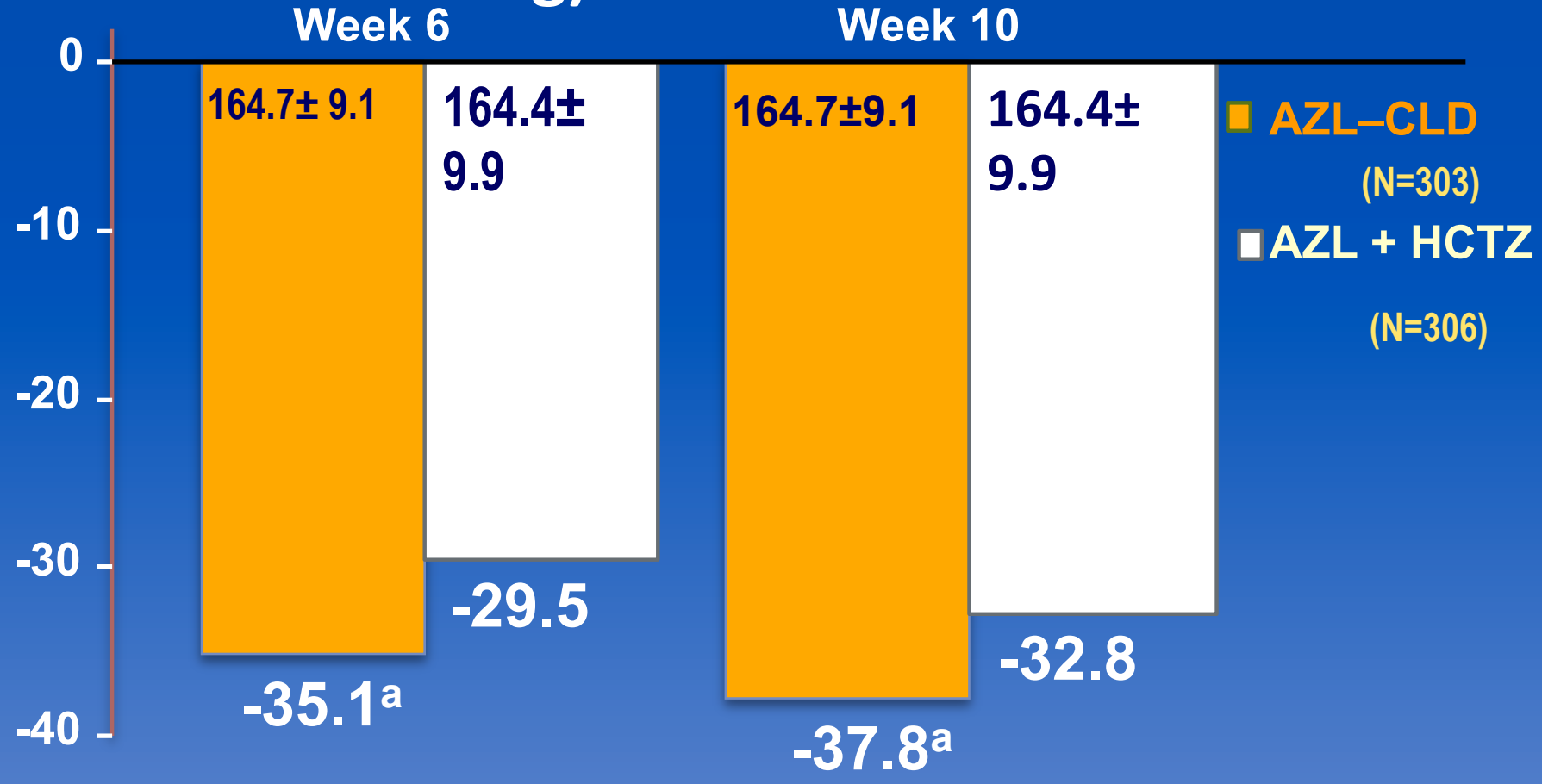
Weber et al. J Hypertension. 32:3-15.

AHA: Treatment of Resistant Hypertension

- Withdrawal or down titration interfering substances
- Use adequate long-acting thiazide, preferably chlorthalidone
- Combine different mechanisms
- Recommended triple regimen of
  - ACE inhibitor or ARB
  - Calcium channel blocker
  - Thiazide diuretic

Primary Efficacy Endpoint

Change in Trough Sitting Clinic SBP (mm Hg) at 6 and 10 weeks



a P<0.001

Bakris et.al. Am J Medicine 2012;125:1229

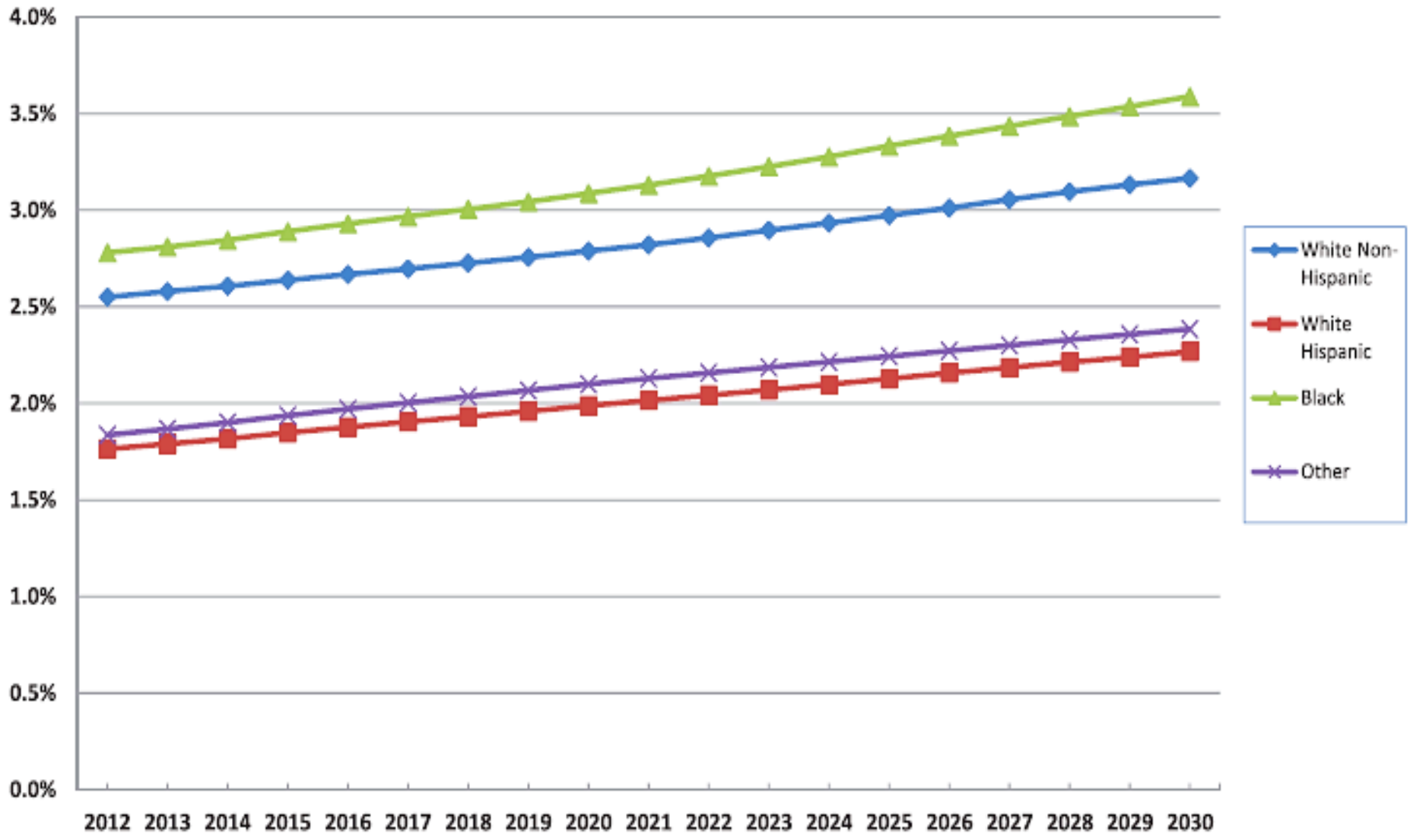
Adherence as Main Problem in Hypertension Treatment

Potential Value of Single-Pill Combinations

- **Greater convenience**
  - Less pill burden for patients vs taking pills separately
- **Fewer titration steps**
  - In appropriate patients, beginning treatment with SPCs (approved for first-line use) may help reduce added steps of titrations, add-ons, or switches that delay achievement of BP goal vs starting with monotherapy
- **Improved long-term adherence**

Chobanian et al. Hypertension. 2003;42:1206-52.

Projected Heart Failure: Race/Ethnicity 2012-2030



Heidenreich et al. Circ Heart Fail. 2013;6:606-19.

Manifestations of Heart Failure in African American Patients

- Prevalence of HF higher in African Americans than in Caucasians
- HF has more malignant natural history in African Americans
- Occurs at an earlier age[1]
- Associated with more advanced LV disease at diagnosis[1]

1. Yancy. J Card Fail. 2000;6:183-86.
2. Yancy. J Card Fail. 2003;9:S210-S215.

Manifestations of Heart Failure in African American Patients

- Differing etiology in African Americans
  - More likely associated with a history of hypertension[1]
  - Incidence of MI is consistently lower[1]
- Worse prognosis in African Americans
  - Higher rate of hospitalization than in Caucasian patients[2]
  - Higher mortality rate than in Caucasians[2]

1. Yancy. J Card Fail. 2000;6:183-86.
2. Yancy. J Card Fail. 2003;9:S210-S215.

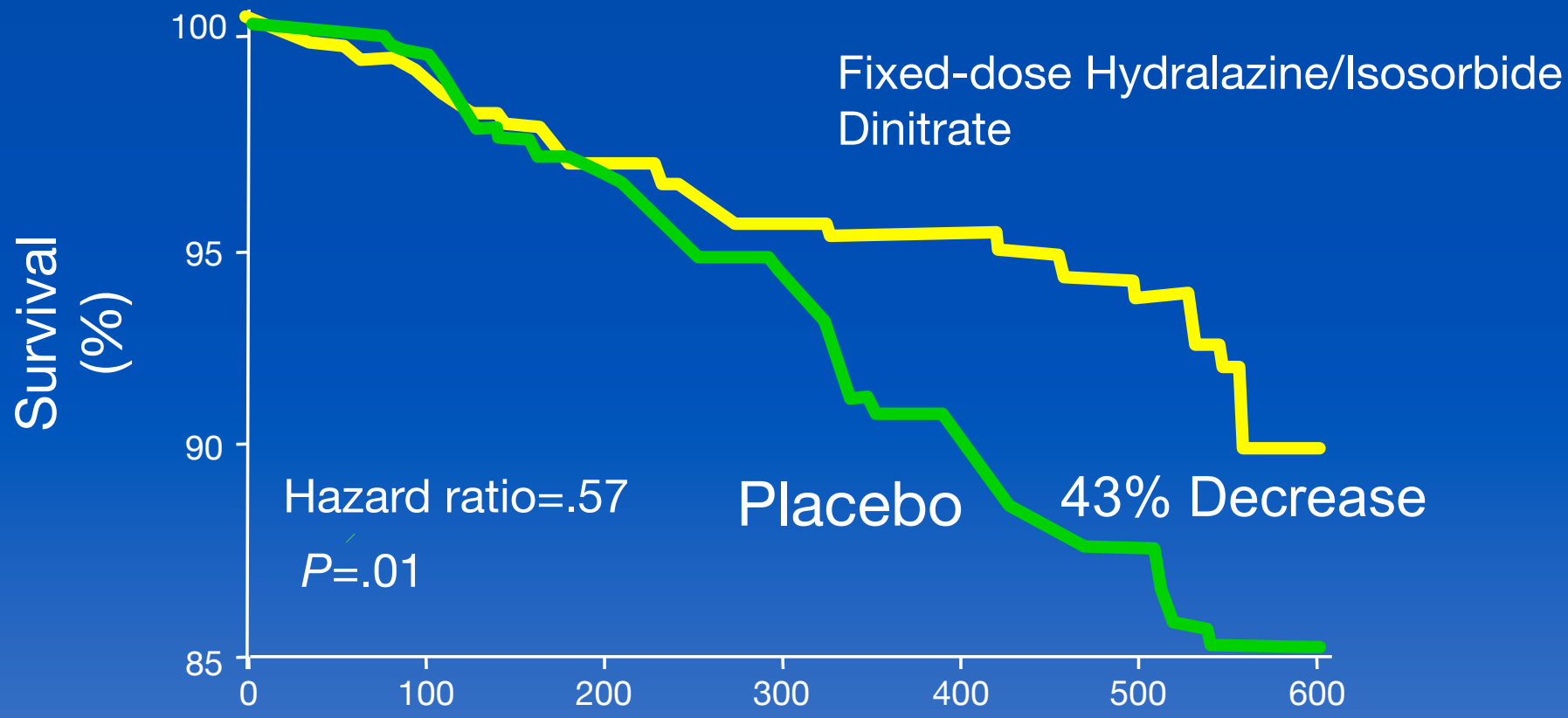
The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 NOVEMBER 11, 2004 VOL. 351 NO. 20

Combination of Isosorbide Dinitrate and Hydralazine in Blacks with Heart Failure

Anne L. Taylor, M.D., Susan Ziesche, R.N., Clyde Yancy, M.D., Peter Carson, M.D., Ralph D'Agostino, Jr., Ph.D., Keith Ferdinand, M.D., Malcolm Taylor, M.D., Kirkwood Adams, M.D., Michael Sabolinski, M.D., Manuel Worcel, M.D., and Jay N. Cohn, M.D., for the African-American Heart Failure Trial Investigators*

A-HeFT: All-Cause Mortality



Fixed-dose I/H	518	463	407	359			
	313	251	13				
Placebo	532	466	401	340	285	232	24

Taylor et al. N Engl J Med. 2004;351:2049-57.

Agenda

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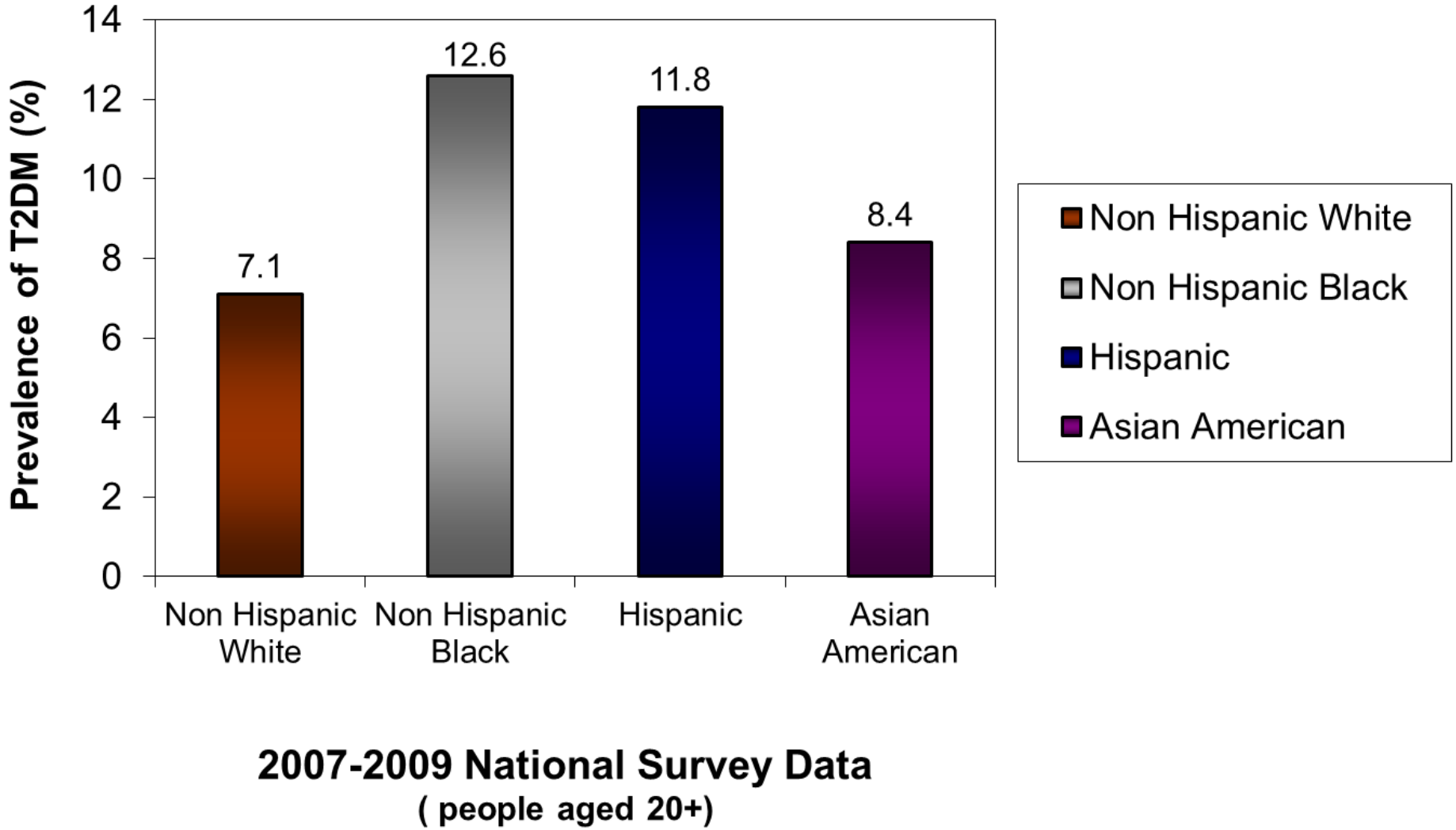
- Diabetes and Metabolic Syndrome in African Americans
- Ethnic Disparities in Asian-Americans (Japanese, Filipino, South Asian)

Prevalence T2DM by Race/Ethnicity

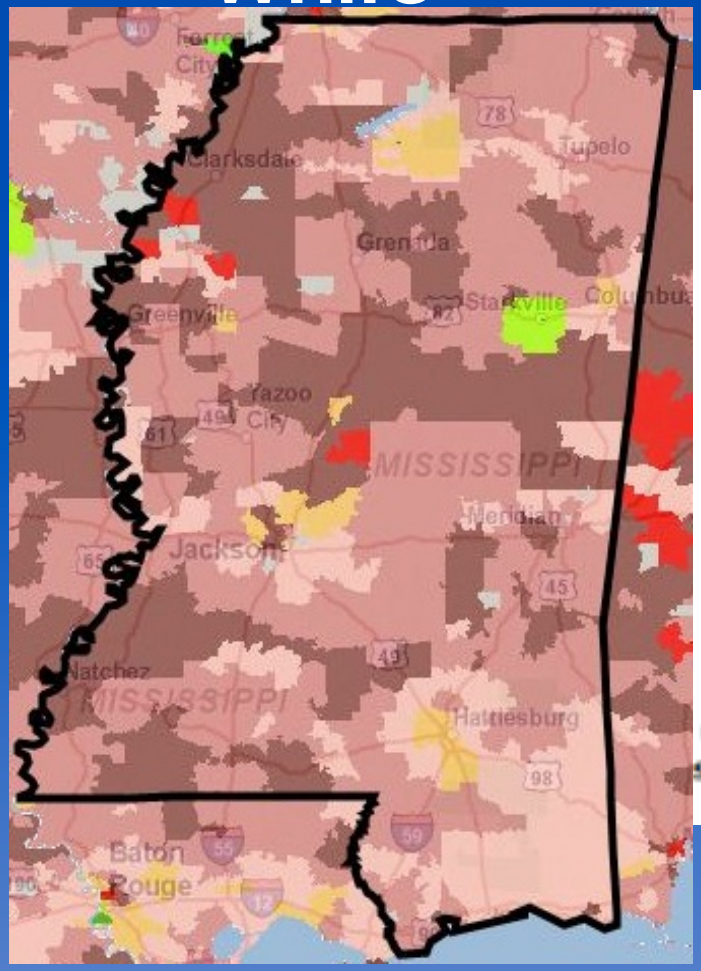


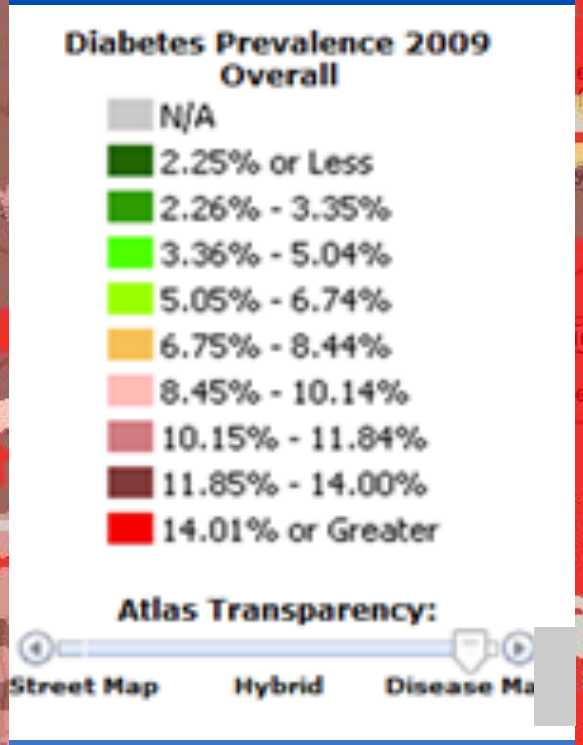
2007-2009 National Survey Data
(people aged 20+)

National Diabetes Fact Sheet, CDC, 2011 www.cdc.gov/diabetes/pubs/factsheet11.htm
care.diabetesjournals.org/content/34/Supplement_1/S11.full

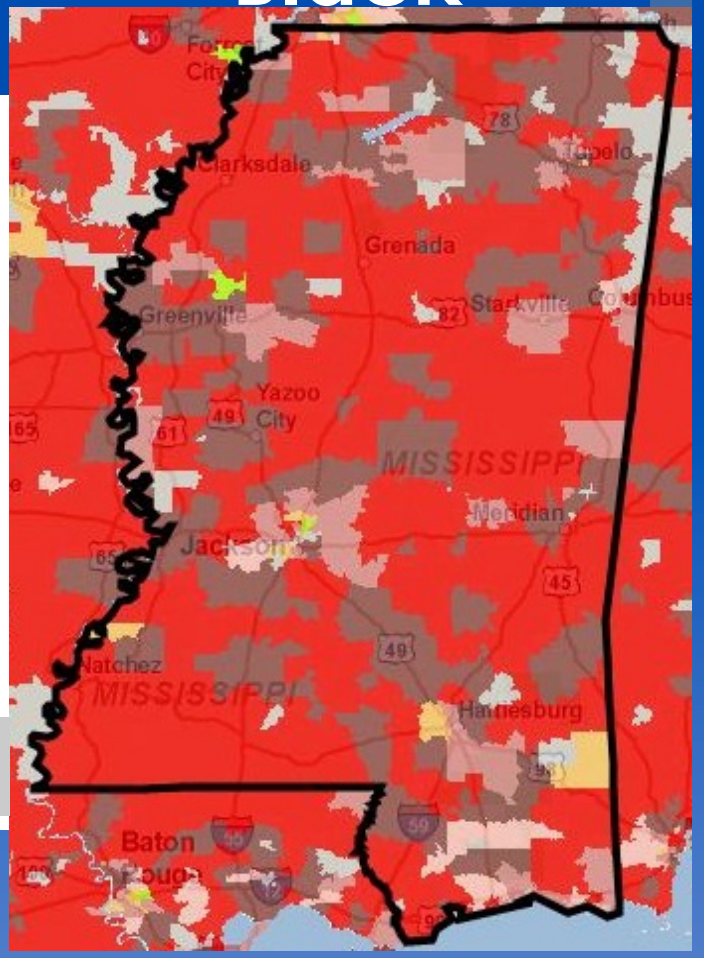
MS Diabetes Rate by Race/Ethnicity

White



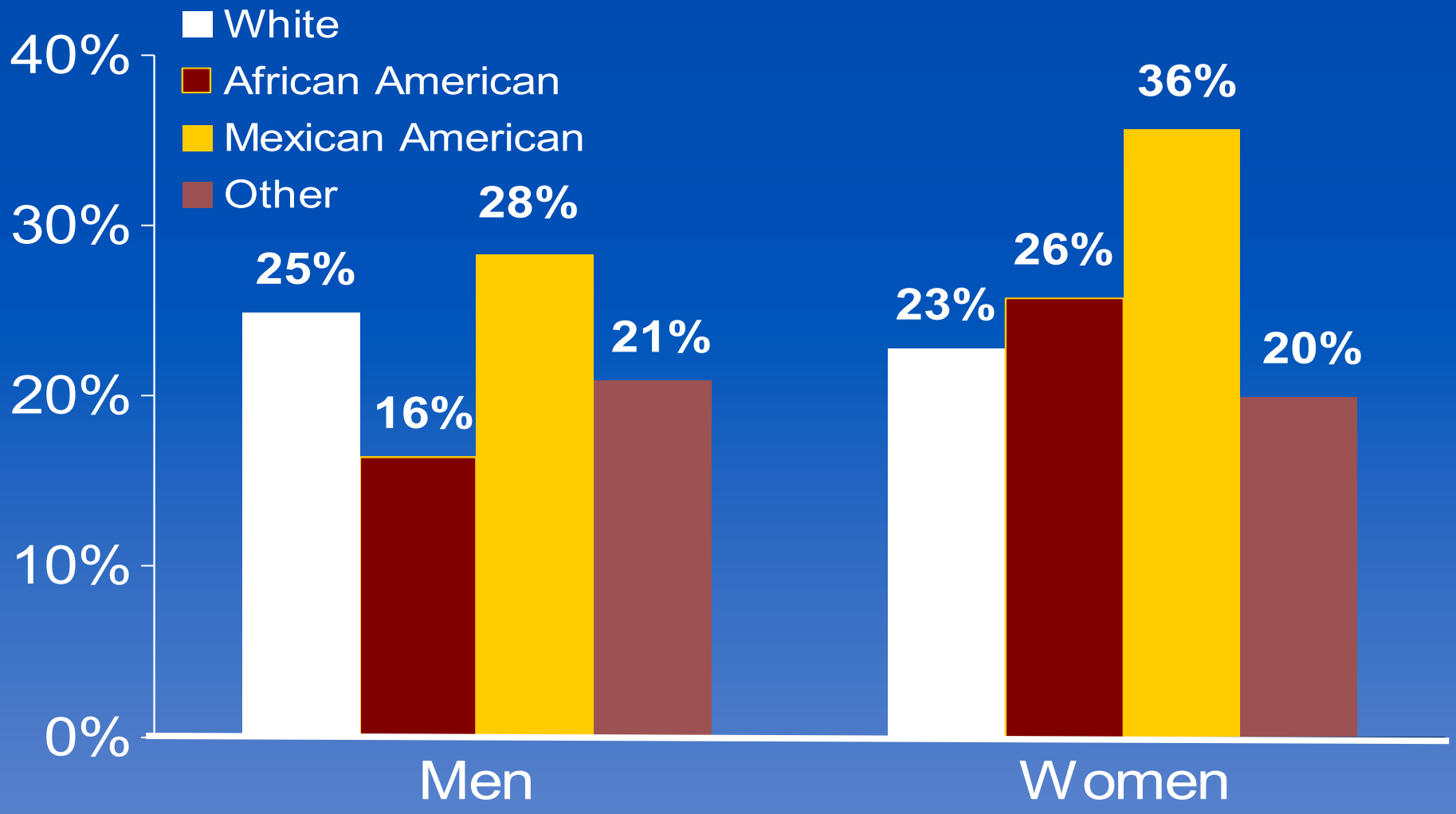


Black



http://maps.z-atlas.com/CVDAtlas/Atlas.aspx

National Health & Nutrition Examination Survey III (NHANES): Prevalence NCEP MetS by Sex and Race/Ethnicity



Ford et al JAMA 2002;287:356-9

TG and HDL-C Axis in Blacks

- NHANES: blacks have lower TG and higher HDL-C and thus the prevalence of metabolic syndrome lower in blacks vs. whites
- Also, black vs. white Canadians and London-based African Caribbeans vs. whites.
- Racial difference also true in children and more prominent in men than women.
- Considering higher stroke and MI than whites, favorable lipid profile of low TG and high HDL-C in blacks both surprising and paradoxical.

Yu et al. Metabol Synd & Rel Dis 2012:10:77-82

METABOLIC SYNDROME AND RELATED DISORDERS
Volume 10, Number 2, 2012

Pp. 77–82
DOI: 10.1089/met.2011.0108

ORIGINAL ARTICLES

The Triglyceride Paradox in People of African Descent

Sophia S.K. Yu, B.S.,[1] Dar … and Anne E. Sumner, M.D.[1]

The widespread use of TG levels to predict insulin resistance, CVD and T2DM needs re-evaluation

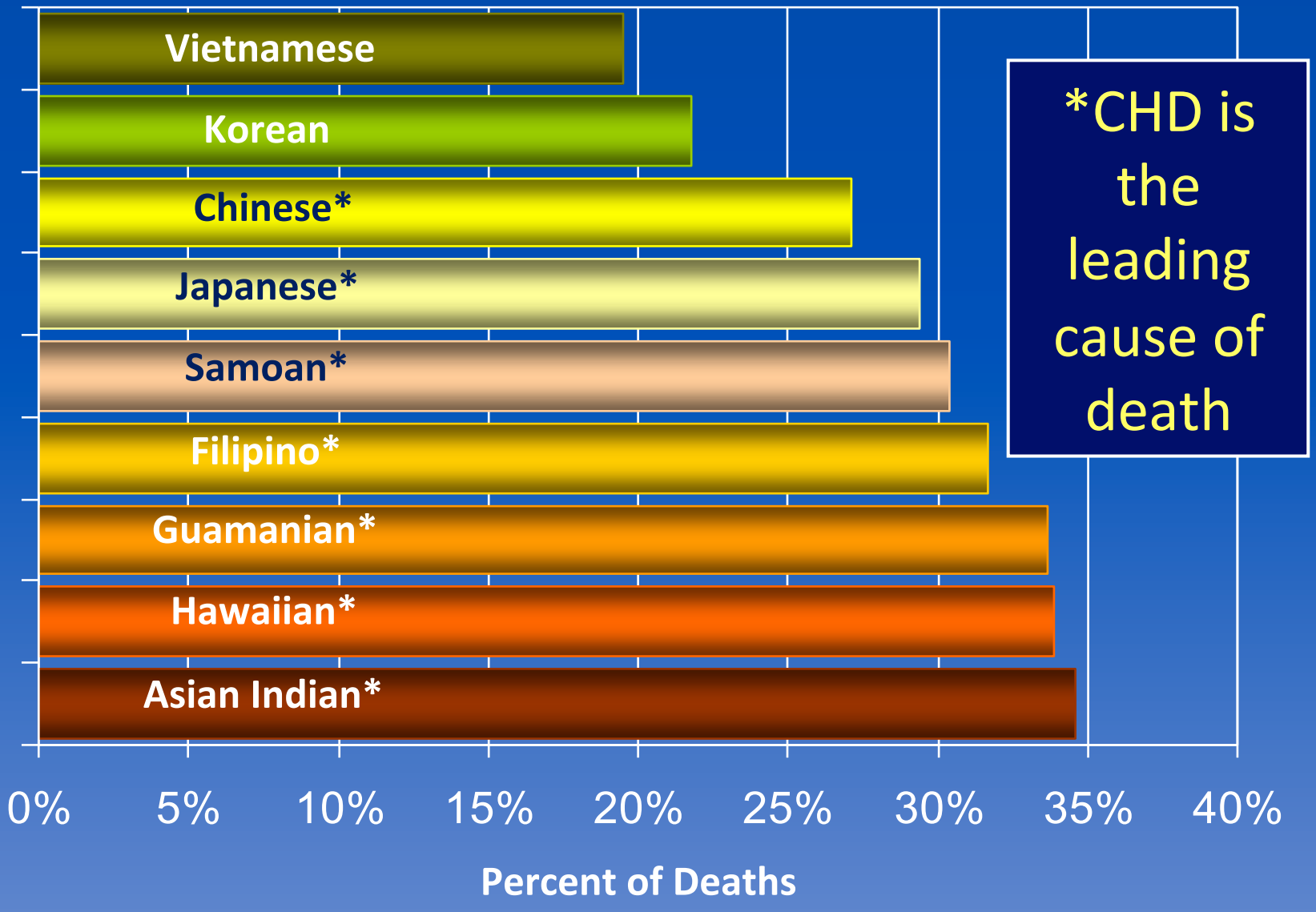
Abstract

Even though insulin resist … es (T2D) are associated with hypertriglyceridemia, blac … ide (TG) levels. This is often called a lipid paradox. Mo … lead to hypertriglyceridemia have been intensively expl … mal in the presence of insulin resistance have received lit … the early detection of insulin-resistant conditions often u … insulin resistance, CVD, and T2D are not usually associa … ent; therefore, the widespread use of TG levels to predict … es on black–white differences in: (1) the lipid profile acr … of TG-based screening tests, specifically the metabolic s … riglycerdemic waist and TG/high-density lipoprotein ch … low TG to be normal even in the presence of insulin resi … ysiology varies by race could lead to better diagnostic te …

Agenda

- Hypertension and Heart Failure in African Americans
- Diabetes and Metabolic Syndrome in African Americans
- Ethnic Disparities in Asian-Americans (Japanese, Filipino, South Asian)

CHD as Cause of Death in Asians



National Vital Statistics System, CDC, NCHS

South Asians and CAD

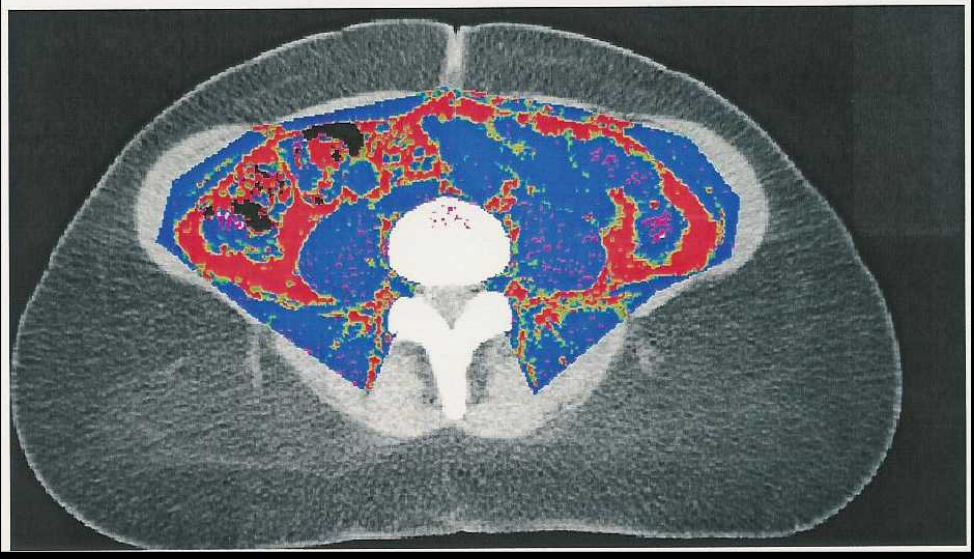
- Rapidly growing segment of US population
- Elevated CAD incidence in young adults
- High CAD risk vs. whites, with equivalent risk factors
  - higher prevalence insulin resistance, metabolic syndrome/DM
  - elevated CRP
  - lipoprotein (a) levels

McKeigue & Sevak. Coronary heart disease in South Asian communities. London: Health Education Authority, 1994. Anand et al. Lancet 2000;356:279-84. Anand et al. Arterioscler Thromb Vasc Biol. 2004; 24:1509-1515.

Visceral adipose tissue by computed tomography
African American vs Filipina women

SUBJECT CODE: HASAAW092
AGE: 62
SEX: F
WEIGHT (LBS): 160
SUBJECT INITIALS: PC
DATE OF EXAM: 02/06/2002
VISCERAL FAT (CM3): 25.4
SUBCUTANEOUS FAT (CM3): 221.4
RATIO VF/SF: 0.13

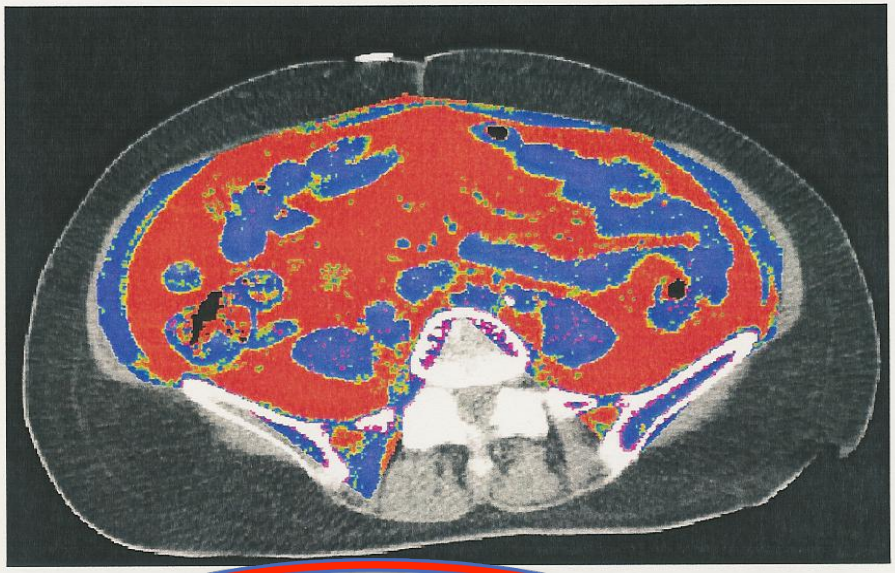
African-American



BMI=25 kg/m^2,
Height: 5'7", Weight: 160 lbs
VAT: 25.4cm^3

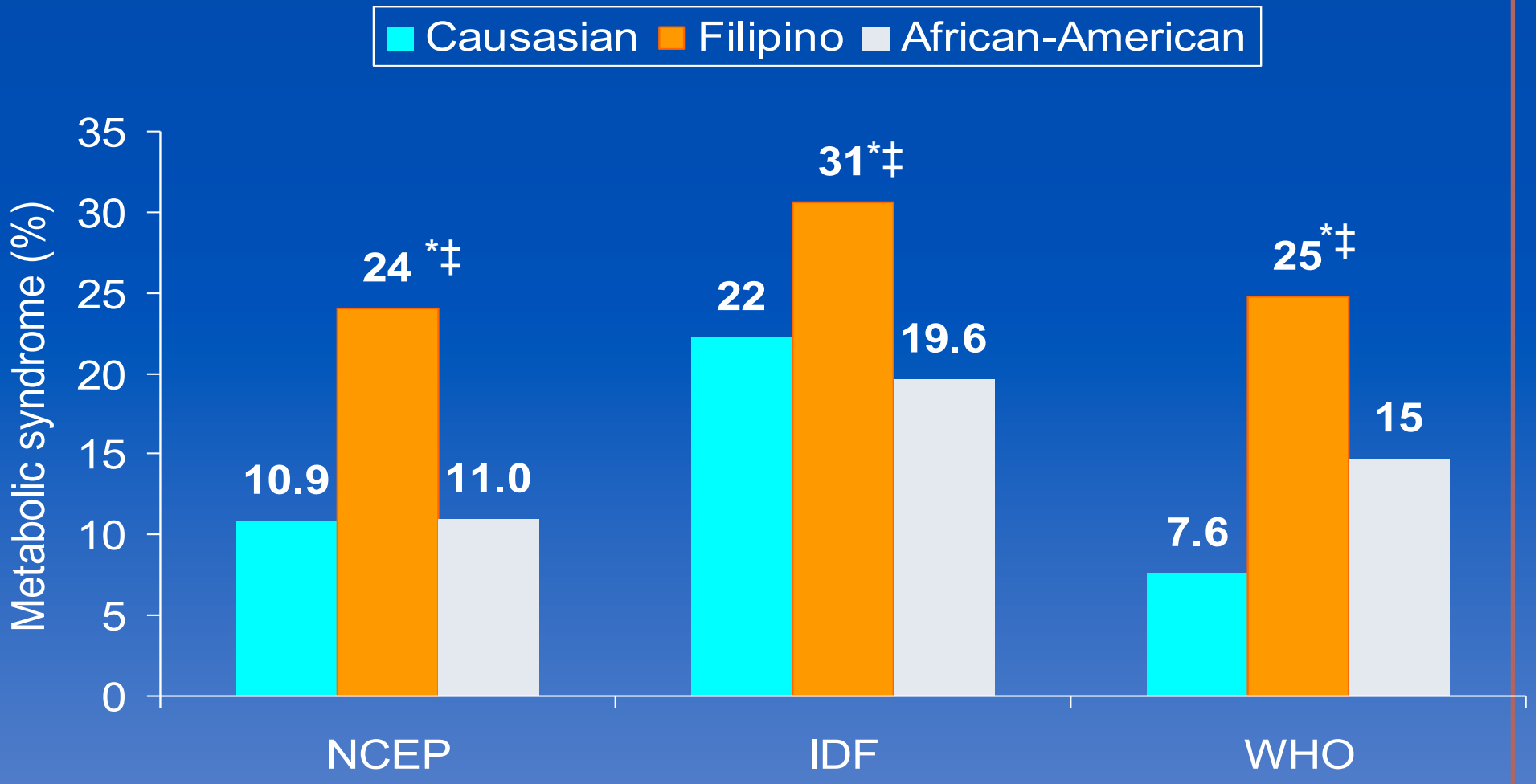
SUBJECT CODE: FIRBOO215
AGE: 69
SEX: F
WEIGHT (LBS): 115
SUBJECT INITIALS: RM
DATE OF EXAM: 12/11/2001
VISCERAL FAT (CM3): 84
SUBCUTANEOUS FAT (CM3): 125
RATIO VF/SF: 67

Filipina



BMI=20 kg/m^2
Height: 5'4", Weight: 115 lbs
VAT: 84.0 cm^3

MetS by NCEP, IDF and WHO criteria in women without CVD and type 2 DM

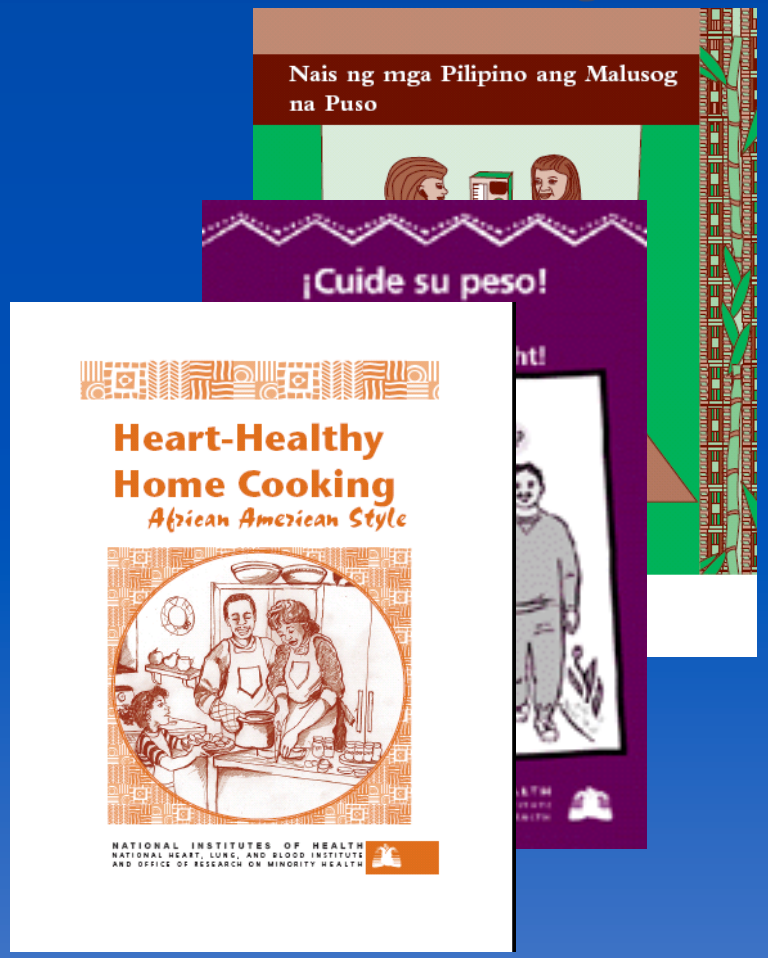


Araneta. *Diab Care*. 2002; 495:494-99

Araneta. 42nd Annual Meeting European Diabetes Epidemiology Group, Cambridge, UK 2007

What Is Being Done: Health Literacy

- Particularly challenging in racial-ethnic healthcare disparity
- Almost half (48%) of patients with hypertension or diabetes had inadequate health literacy
  - Less knowledge of their disease, important lifestyle modifications, and essential self-management skills



- Multicultural & multilingual patient tools can be valuable in this area

US Dept of HHS Office of Minority Health http://www.omhrc.gov/

https://www.nhlbi.nih.gov/files/docs/resources/heart/filipino_manual.pdf

Conclusions

- MetS, T2DM, and CVD disparities by race and ethnicity
  - Exist
  - Are sizeable
  - Are likely multifactorial
  - Are preventable
- Promising initiatives linking improved quality to minimizing disparities in treatment underway

ARS QUESTION 7
Case Study, continued

In consideration of her apparent African ancestry which component of the MetS may be lower than expected despite her diagnosis?

A. Blood pressure
B. HDL-C
C. Triglycerides
D. Fasting glucose
E. Not relevant since she is Spanish

Triglyceride Paradox

The answer is TG. The lower than expected TG has been seen in multiple cohort studies including not only African Americans, but also Afro Caribbeans, and blacks from Canada, U.K. and West Africa. Although lifestyle greatly impacts the development of MetS, African ancestry has been associated with lower than expected TG and higher than expected HDL-C, probably due to more active lipoprotein lipase in blacks, regardless of language and geography.*

METABOLIC SYNDROME AND RELATED DISORDERS
Volume 10, Number 2, 2012

Pp. 77–82
DOI: 10.1089/met.2011.0108

ORIGINAL ARTICLES

The Triglyceride Paradox in People of African Descent

Sophia S.K. Yu, B.S.,[1] Darleen C. Castillo, B.S.,[1] Amber B. Courville, Ph.D., R.D.,[2] and Anne E. Sumner, M.D.[1]

Abstract

Even though insulin resistance, cardiovascular disease (CVD), and type 2 diabetes (T2D) are associated with hypertriglyceridemia, blacks with these conditions usually have normal triglyceride (TG) levels. This is often called a lipid paradox. More precisely, it is a "TG paradox." The pathways that lead to hypertriglyceridemia have been intensively explored. Yet, the pathways that allow TG levels to be normal in the presence of insulin resistance have received little attention and this is problematic. Tests designed for the early detection of insulin-resistant conditions often use elevated TG levels as a diagnostic criterion. However, insulin resistance, CVD, and T2D are not usually associated with hypertriglyceridemia in people of African descent; therefore, the widespread use of TG levels to predict these conditions needs re-evaluation. This review focuses on black–white differences in: (1) the lipid profile across North America, Europe, and Africa; (2) the efficacy of TG-based screening tests, specifically the metabolic syndrome and its two abbreviated versions, the hypertriglycerdemic waist and TG/high-density lipoprotein cholesterol (HDL-C) ratio; and (3) the mechanisms that allow TG to be normal even in the presence of insulin resistance. Overall, a broader understanding of how TG physiology varies by race could lead to better diagnostic tests and improved health outcomes.

Unique Racial/Ethnic Aspects of Cardiorenal Metabolic Syndrome and Associated CVD

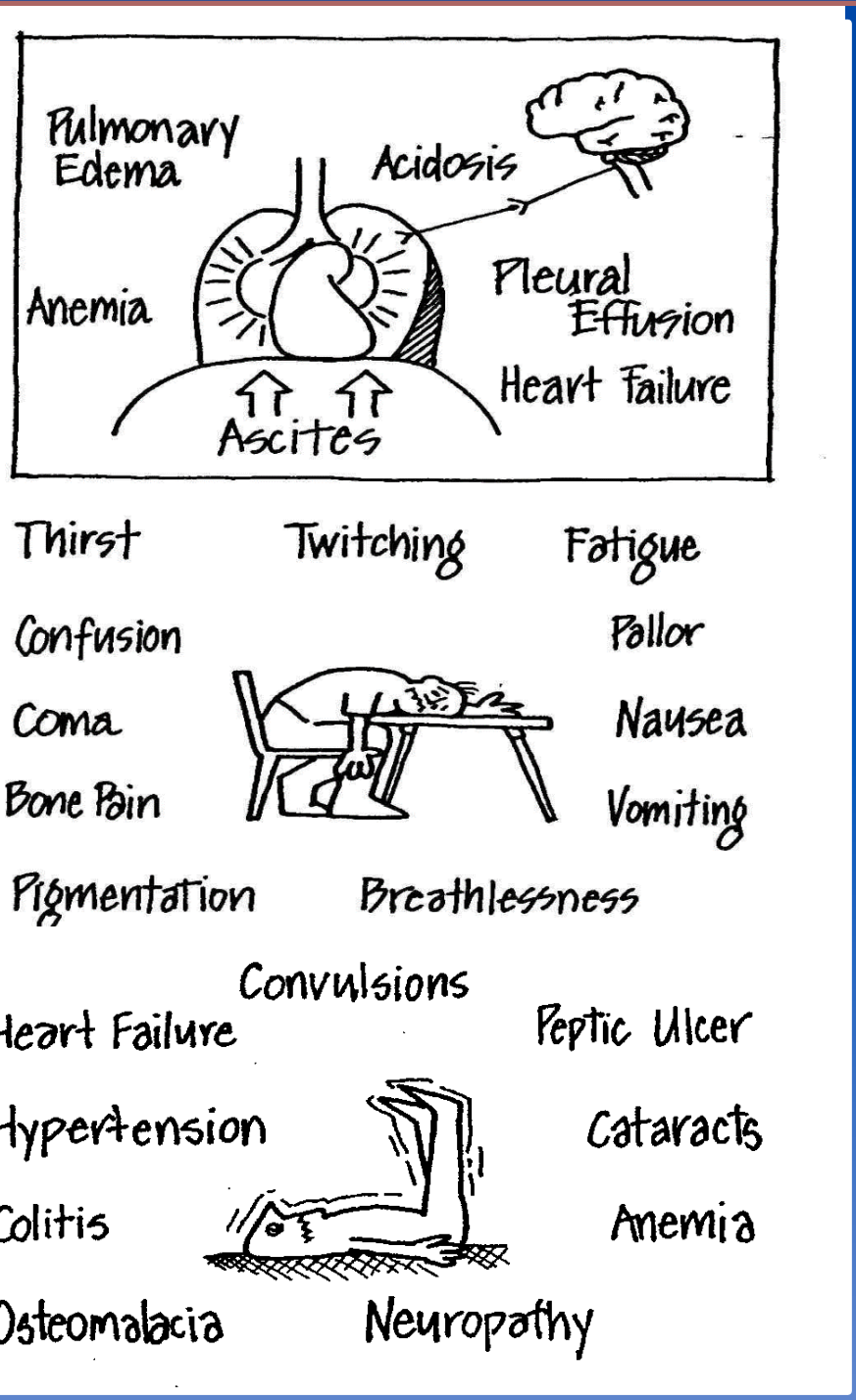
Kris Vijay, MD, FACP, FACC
Vice President, Scottsdale CV Center
Chair, Scientific Research Committee
Scottsdale Healthcare
Professor of Medicine, University of Arizona
Scottsdale, Arizona

Outline

- Epidemiology of CKD
- Ethnicity and CKD
- CKD Classification
- CKD-CVD Intersection
- Vascular Classification in CKD
- Arrhythmia and Renal disease
- A Comprehensive CVD prevention model in CKD

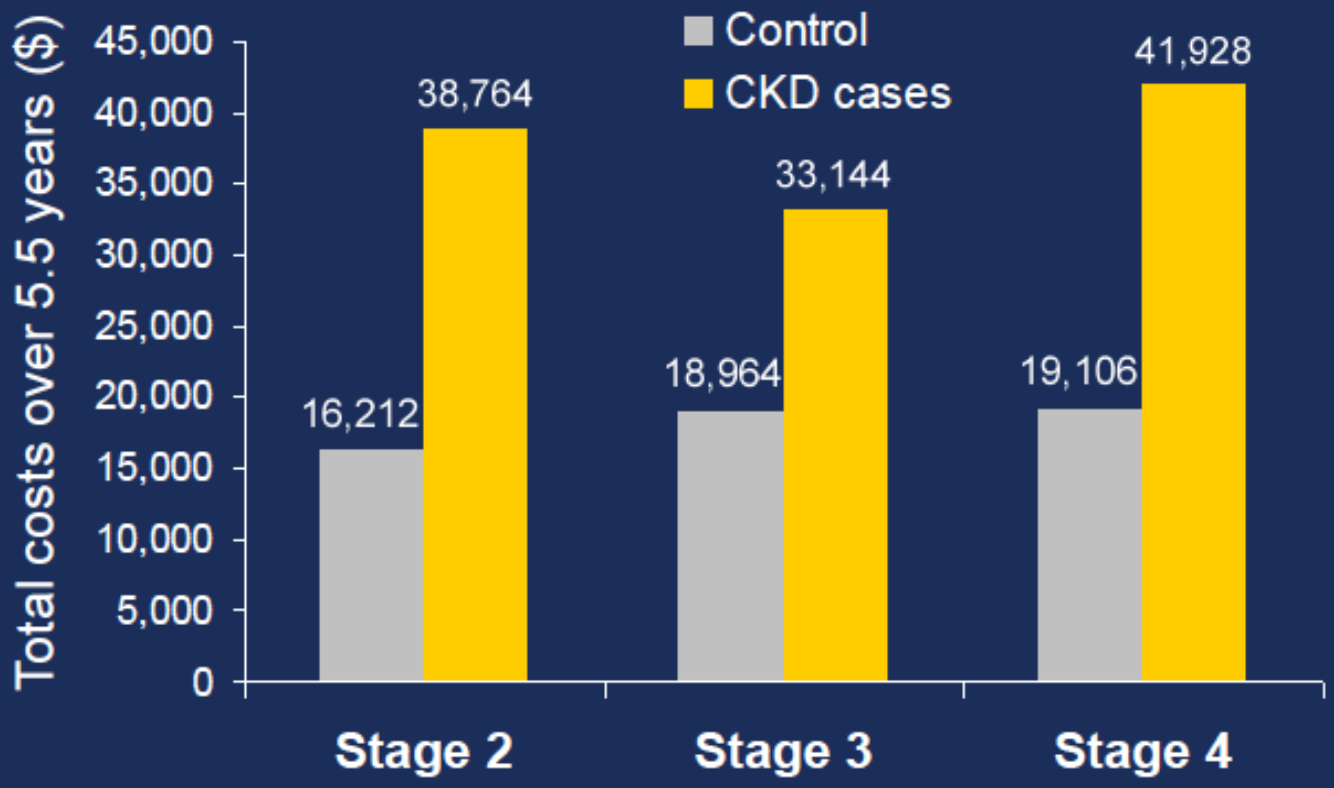
Burden of ESRD (CKD 5-6)

- 400,000 on dialysis in USA by 2010 and now 0.5 M and 2 M worldwide
- costs: $28 billion in 2010 + individual, family, community
- increased mortality
  5 year 35%, 20%/year,
- increased hospitalization
  14 days/patient/year
- 10-20 fold increase in CVD



Medical care costs for CKD and associated co-morbidities are significant

Total medical care costs for patients with CKD* and their controls (age- and gender-matched) over a period of 5.5 years



Total medical care costs per year		
	Controls	CKD
Stage 2	$3473	$7050
Stage 3	$3448	$6026
Stage 4	$2947	$7623

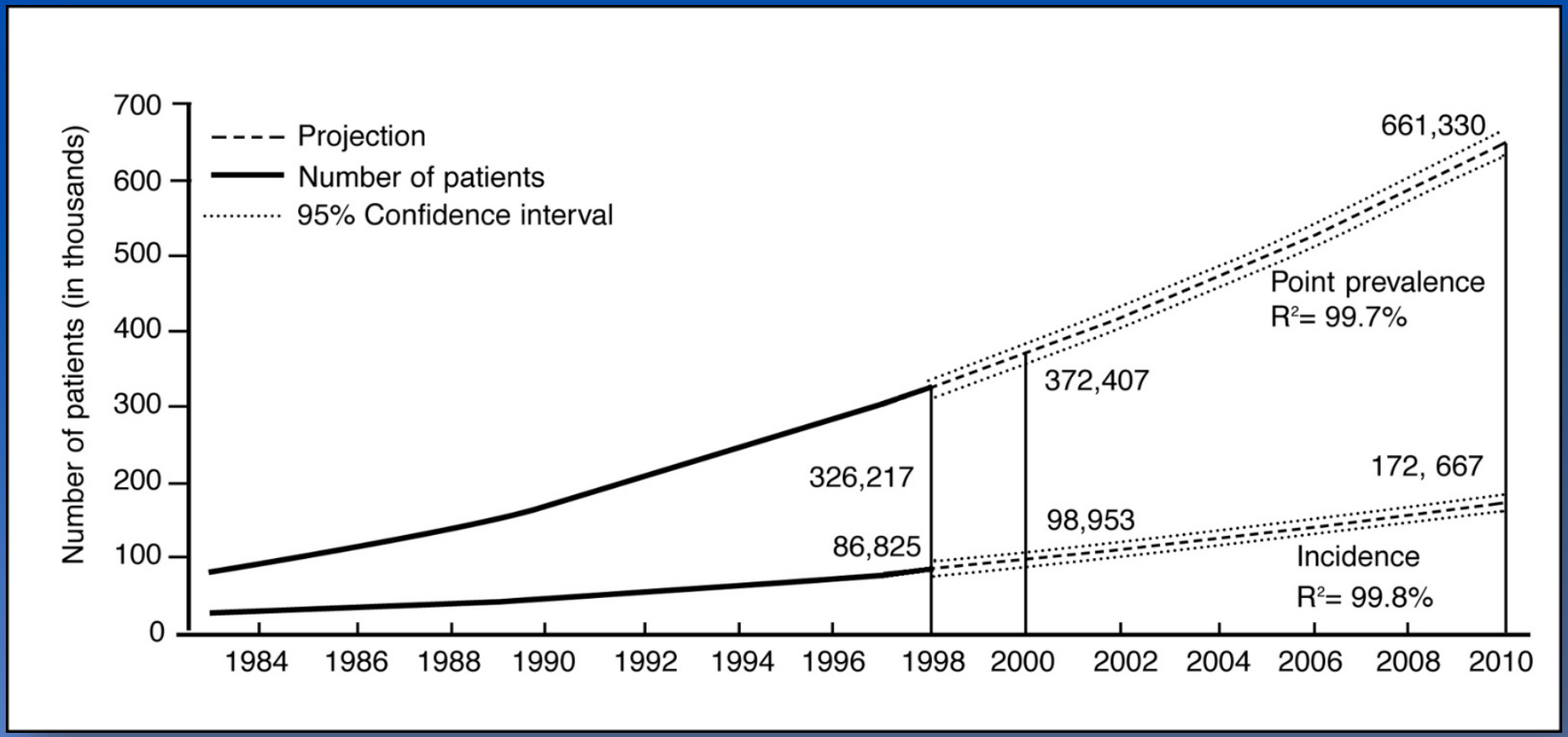
A retrospective study from 1996 up to 66 months of an HMO cohort (n=13,796) comparing direct health care costs and resource use of patients with CKD to a group without CKD.

Smith D, et al J Am Soc Nephrol 2004;15:1300–1306

Prevalence (%) of CKD in the NHANES population within age, gender, race/ethnicity, & risk factor categories

	All CKD		eGFR <60 ml/min/1.73 m²		ACR ≥30 mg/g	
	1988–1994	2005–2010	1988–1994	2005–2010	1988–1994	2005–2010
20-39	5.1	5.7	0.1	0.2	5.0	5.7
40-59	8.4	9.1	1.3	2.2	7.7	7.6
60+	32.2	35.0	19.5	24.1	18.3	18.4
Male	10.2	12.1	4.1	5.6	7.4	8.6
Female	14.2	15.8	5.6	7.7	10.2	10.2
Non-Hispanic white	12.3	14.3	5.5	7.9	8.2	8.6
Non-Hispanic black/Af Am	14.5	16.0	4.1	6.2	12.7	12.6
Other	10.5	11.9	2.2	2.6	9.2	10.6
Diabetes	43.1	40.1	15.6	19.3	36.3	29.9
Self-reported diabetes	42.7	41.6	16.4	20.4	35.9	30.8
Hypertension	22.2	23.2	10.4	12.9	15.4	14.8
Self-reported hypertension	25.3	26.8	12.9	15.6	17.1	16.7
CVD	25.4	40.8	14.5	27.9	16.6	24.3
BMI ≥30	16.6	16.8	6.2	7.4	12.3	11.7
All	12.3	14.0	4.9	6.7	8.8	9.4

Incidence and Prevalence of End-Stage Renal Disease in the US



Chronic kidney disease is a growing epidemic where Stage 3 patients make up the greater majority of those affected

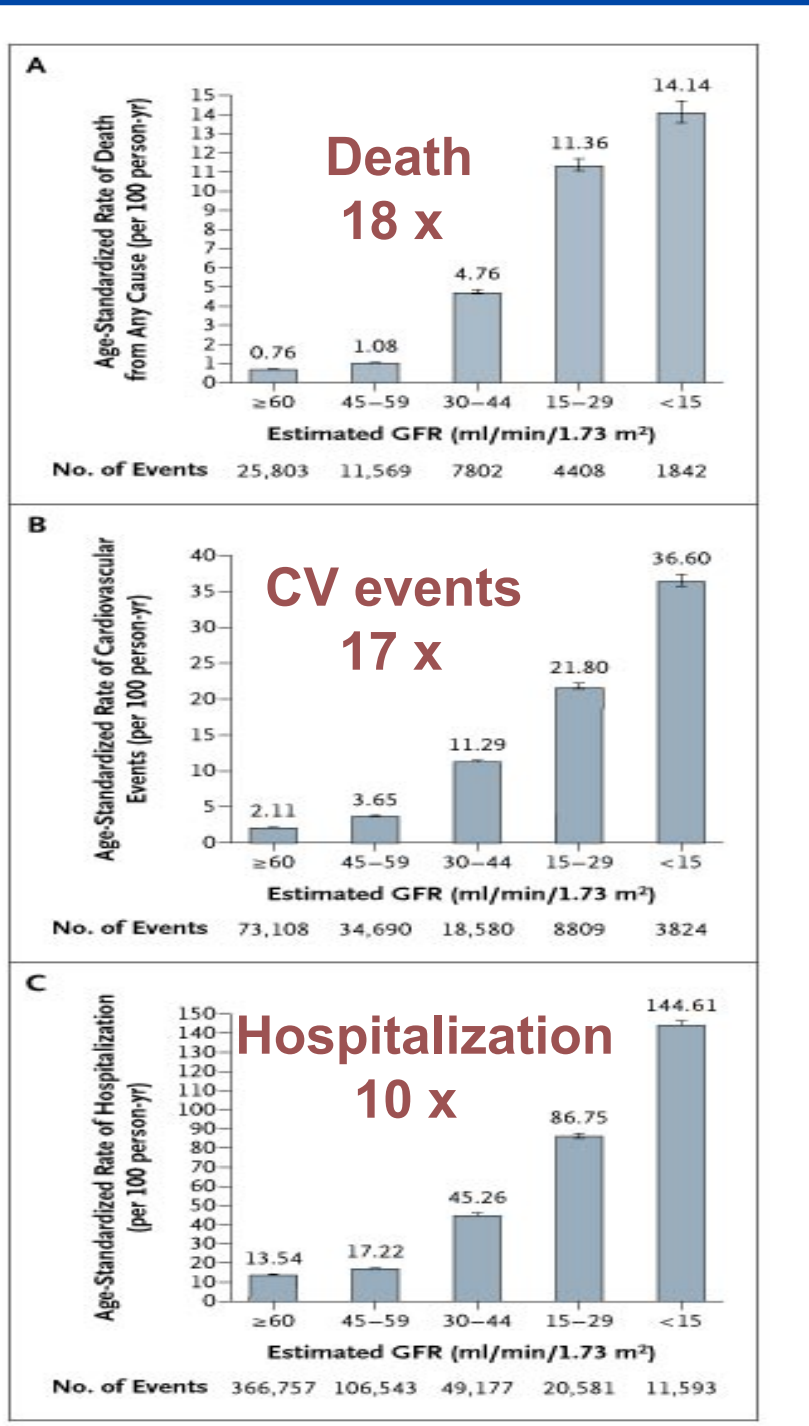
CKD stage	US CKD population[1] (~26 million)	eGFR (mL/min/1.73 m^2)
1	3.6 million	≥90 and evidence of kidney damage
2	6.5 million	60–89 and evidence of kidney damage
3	15.5 million	30–59
4	700,000	15–29
5	336,000[2]	<15 or dialysis

eGFR, Estimated Glomerular Filtration Rate.

1. Coresh J, et al. JAMA 2007;298:2038–2047;
2. US Renal Data System. USRDS 2006 Annual Data Report: Atlas of End-Stage Renal Disease in the United States. Bethesda, MD.

Burden of CKD

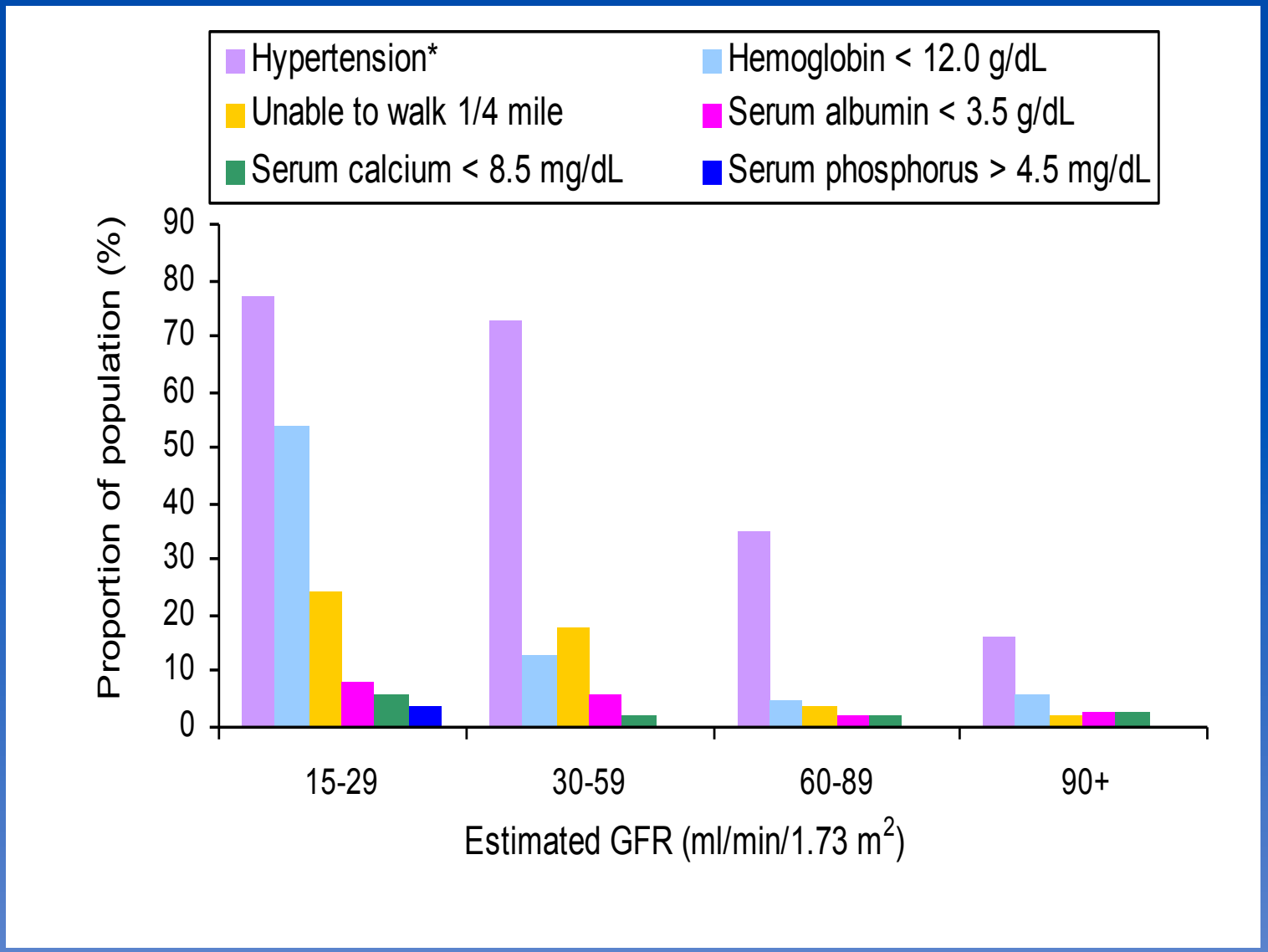
- Reduced GFR and/or proteinuria are independent risk factors for CVD



Age-Standardized Rates of Death from Any Cause (Panel A), Cardiovascular Events (Panel B), and Hospitalization (Panel C), According to the Estimated GFR among 1,120,295 Ambulatory Adults

Go et al. N Engl J Med. 2004;351:1296-1305

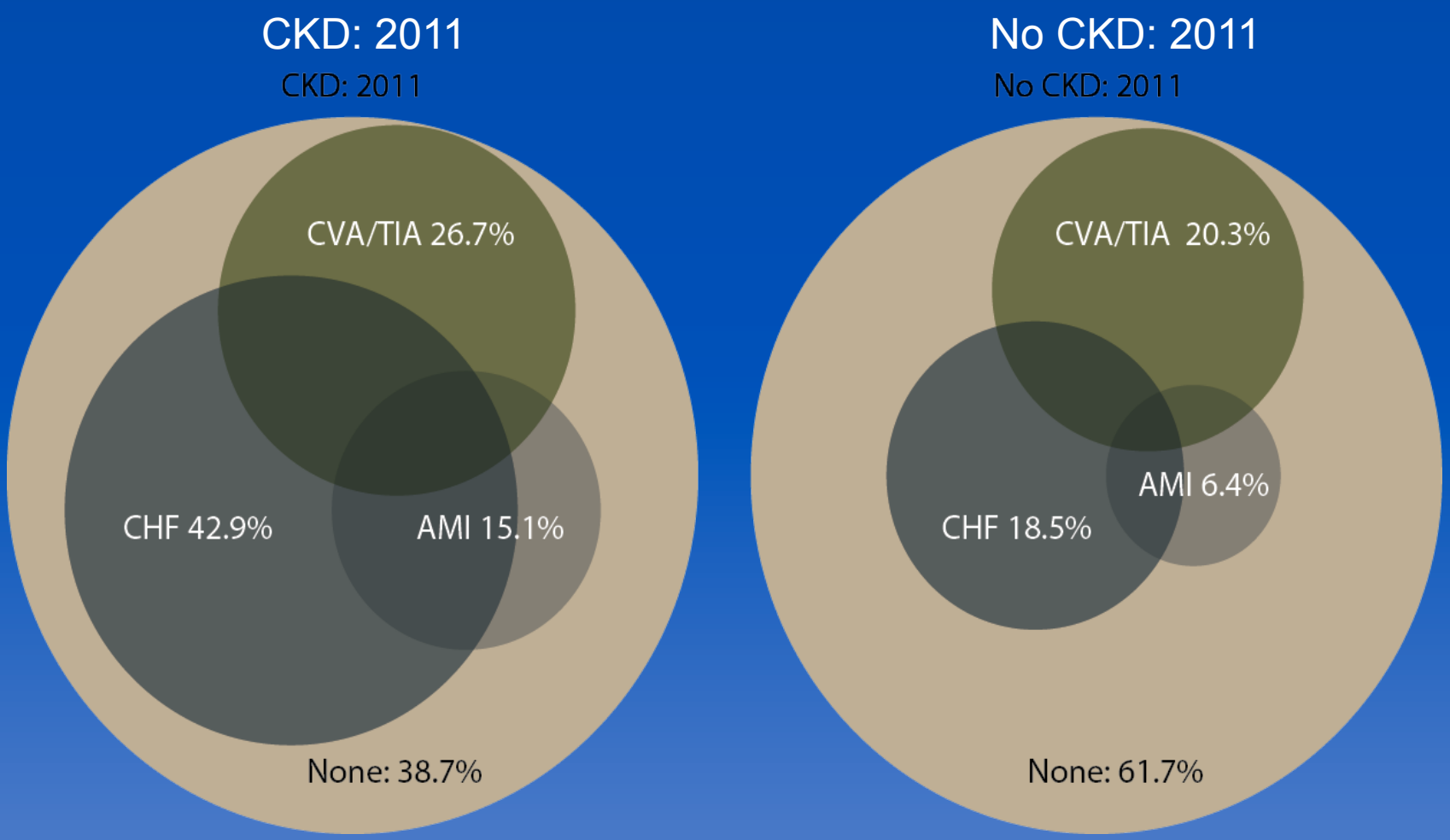
Prevalence of Abnormalities at each Level of GFR



*>140/90 or antihypertensive medication

p-trend < 0.001 for each abnormality

Cardiovascular Disease in Patients With or Without CKD, 2011 USRDS



December 31, 2011 point prevalent Medicare enrollees with CVD, age 66 & older, with fee-for-service coverage for the entire calendar year.

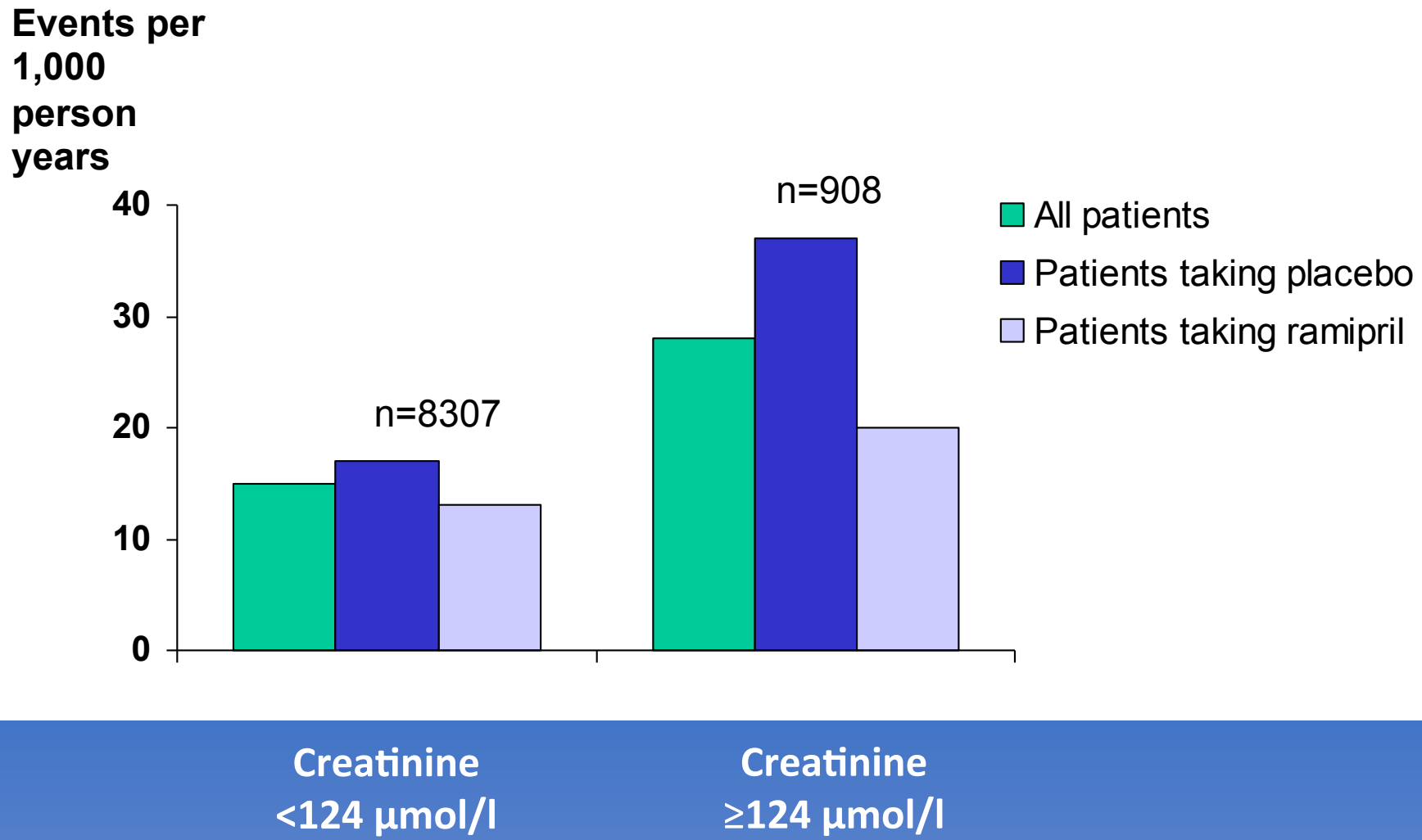
CKD Outcomes: Mortality and Dialysis

Stage	GFR (ml/min)	RRT	Death
2	60-89	1.1%	19.5%
3	30-59	1.3%	24.3%
4	15-29	19.9%	45.7%

27,998 CKD patients followed for 5 years

Keith. AIM 2004;164:659-63

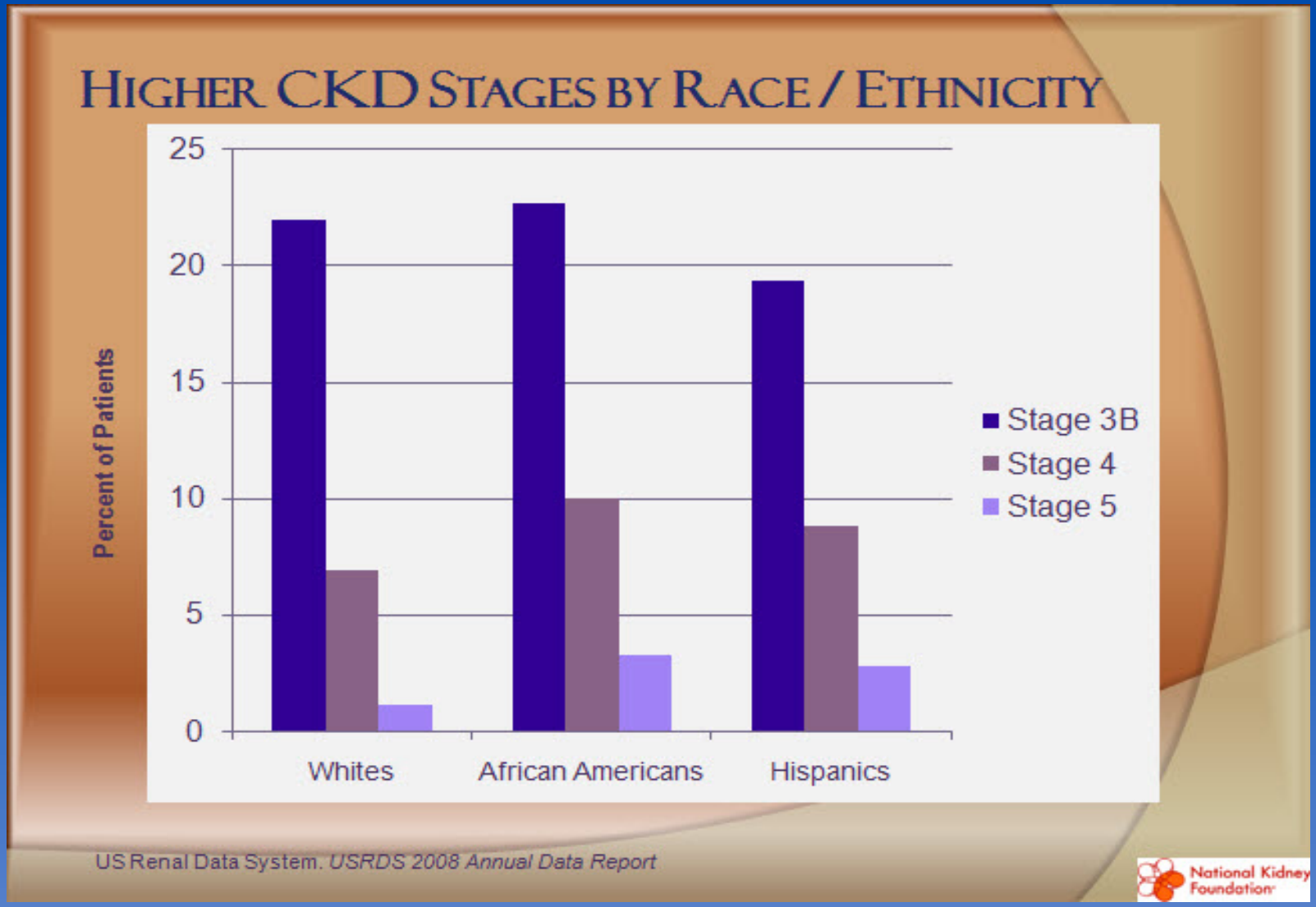
CKD Predicts CV Events: HOPE Study



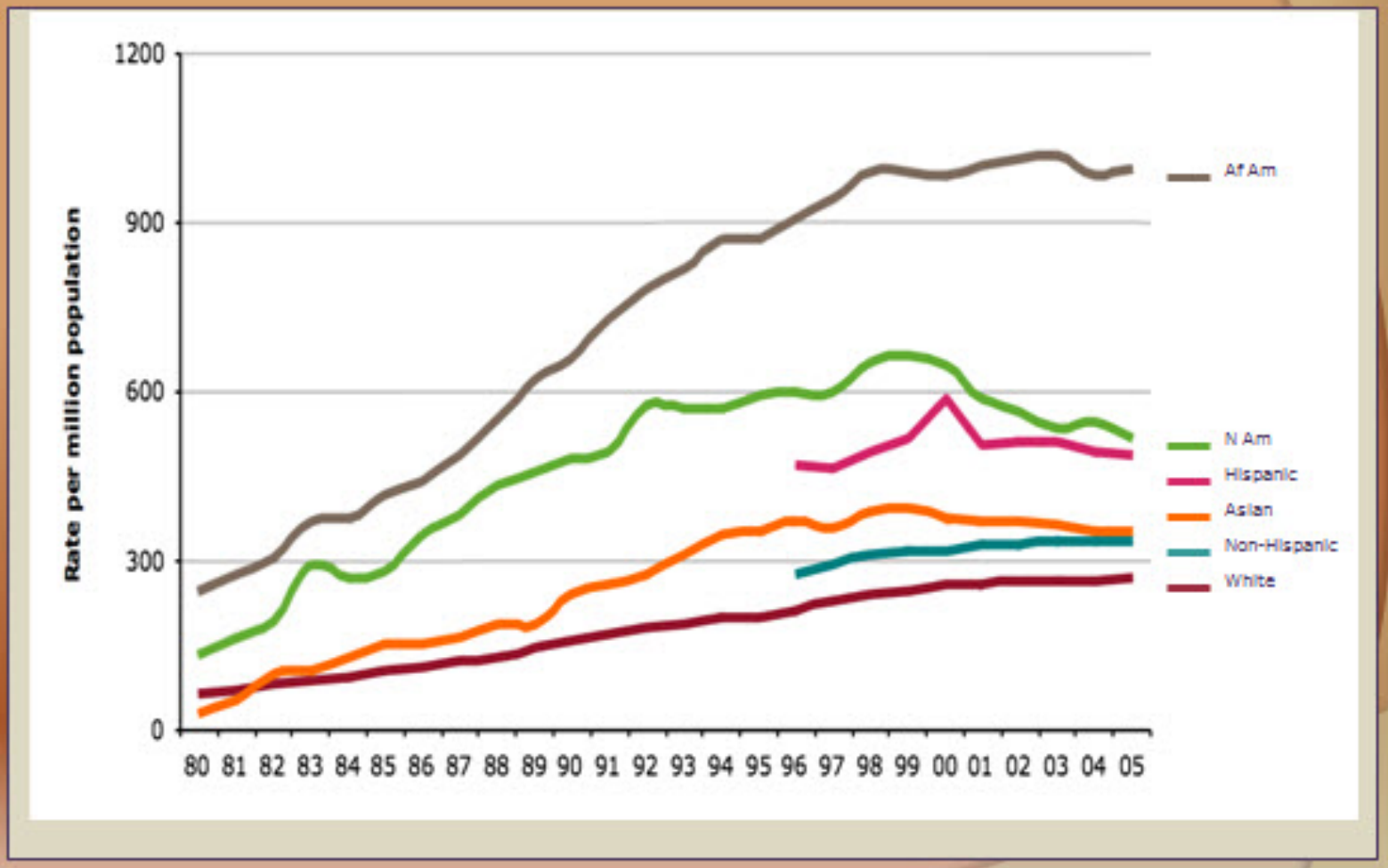
HOPE=Heart Outcomes and Prevention Evaluation study

Mann et al. Ann Intern Med 2001;134:629–36

CKD by Race


HIGHER CKD STAGES BY RACE / ETHNICITY
Percent of Patients
25
20
15
10
5
0
Whites
African Americans
Hispanics
Stage 3B
Stage 4
Stage 5
US Renal Data System. USRDS 2008 Annual Data Report
National Kidney Foundation

Incidence of ESRD Varies Widely By Race And Ethnicity



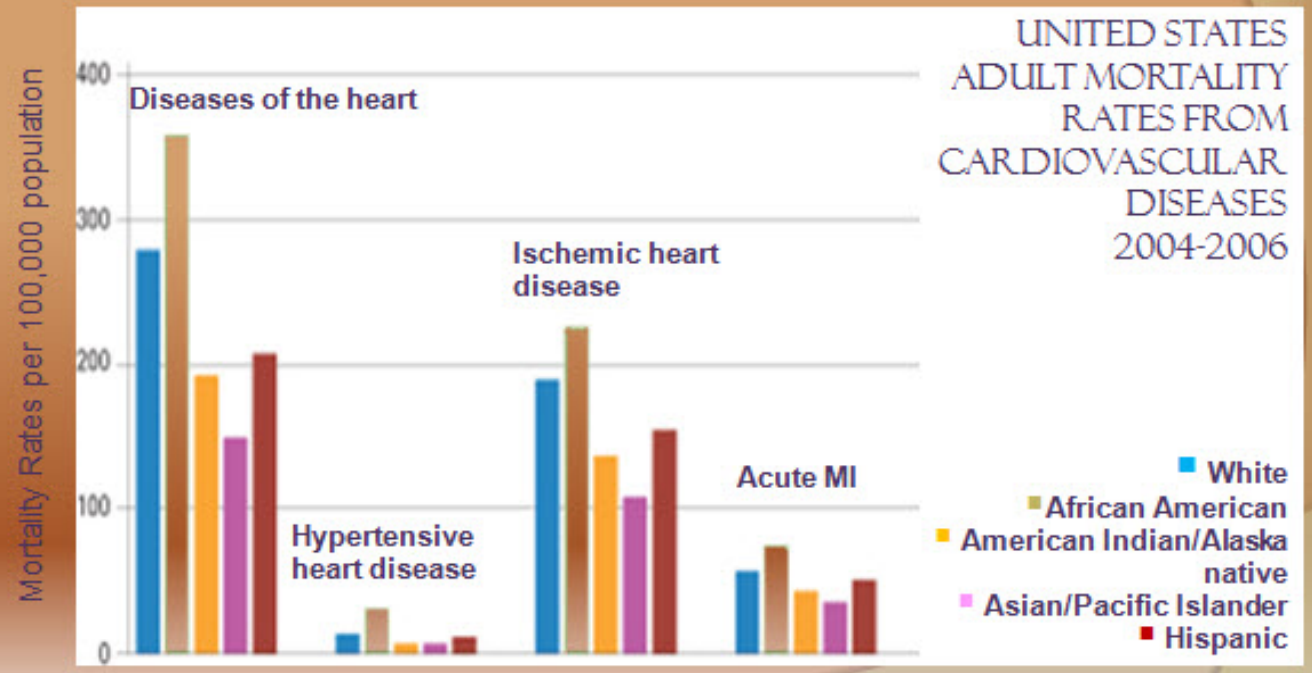
Incident ESRD patients; rates adjusted for age & gender.

US Renal Data System. *USRDS 2007 Annual Data Report:*

National Kidney Foundation®

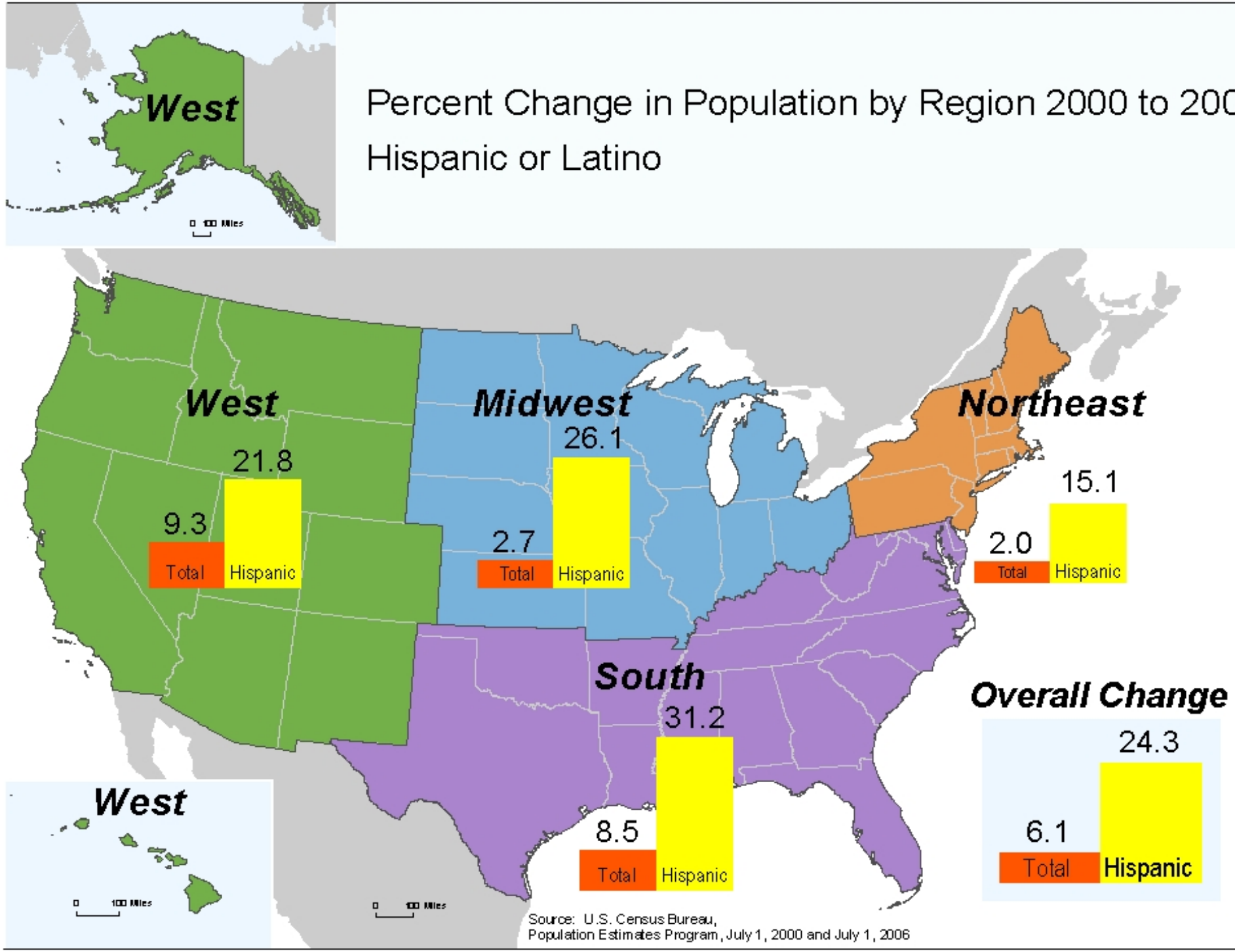
Blacks and CVD

African Americans Have Higher Rates of Death From All Forms of CVD



Source: National Partnership for Action to End Health Disparities; 2010.
Available at: http://minorityhealth.hhs.gov/

National Kidney Foundation


West
0 100 Miles
Percent Change in Population by Region 2000 to 2006
Hispanic or Latino
West
21.8
9.3
Total
Hispanic
Midwest
26.1
2.7
Total
Hispanic
Northeast
15.1
2.0
Total
Hispanic
South
31.2
8.5
Total
Hispanic
Overall Change
24.3
6.1
Total
Hispanic
West
0 100 Miles
0 100 Miles
Source: U.S. Census Bureau,
Population Estimates Program, July 1, 2000 and July 1, 2006

Classification of CKD

- It is recommended that CKD be classified by:
  - Cause
  - GFR category
  - Albuminuria category
- This is collectively referred to as “CGA Staging”
- Represents a revision of the previous KDOQI CKD guidelines, which included staging only by level of GFR

CGA Staging

Cause

Assign cause of CKD based on presence or absence of systemic disease and the location within the kidney of observed or presumed pathologic-anatomic findings

	Examples of systemic diseases or conditions affecting the kidney	Examples of primary kidney diseases (absence of systemic diseases affecting the kidney)
Glomerular disease	Diabetes, systemic autoimmune diseases, systemic infections, drugs, neoplasia (including amyloidosis)	Diffuse, focal or cresentic proliferative glomerulonephritis; focal and segmental glomerulosclerosis; membranous nephropathy; minimal change disease
Tubulointerstitial disease	Systemic infections, autoimmune, sarcoidoisis, drugs, urate, environmental toxins (lead, aristolochic acid), neoplasia (myeloma)	Urinary-tract infections, stones, obstruction
Vascular disease	Atherosclerosis, hypertension, ischemia, cholesterol emboli, systemic vasculitis, thrombotic microangiopathy, systemic sclerosis	ANCA-associated renal liimited vasculitis; fibromuscular dysplasia
Cystic and congenital disease	Polycystic kidney disease, Alport's syndrome, Fabry's disease	Renal dysplasia, medullary cystic disease, podocytopathies

Abbreviations: ANCA, antineutrophil cytoplasmic antibody; CKD, chronic kidney disease, GN, glomerulonephritis
Genetic diseases are not considered separately because some diseases in each category are now recognized as having genetic determinants.
*Note that there are many different ways in which to classify CKD. This method of separating systemic diseases and primary kidney diseases is only one, proposed by the KDIGO Work Group, to aid in conceptual approach.

CGA Staging

GFR

Assign GFR categories

GFR category	GFR (ml/min/1.73 m^2)	Terms
G1	≥90	Normal or high
G2	60-89	Mildly decreased*
G3a	45-59	Mildly to moderately decreased
G3b	30-44	Moderately to severely decreased
G4	15-29	Severely decreased
G5	<15	Kidney failure

Abbreviations: CKD, chronic kidney disease; GFR, glomerular filtration rate.
*Relative to young adult level
In the absence of evidence of kidney damage, neither GFR category G1 nor G2 fulfill the criteria for CKD.

CGA Staging

Albuminuria

Assign albuminuria† categories

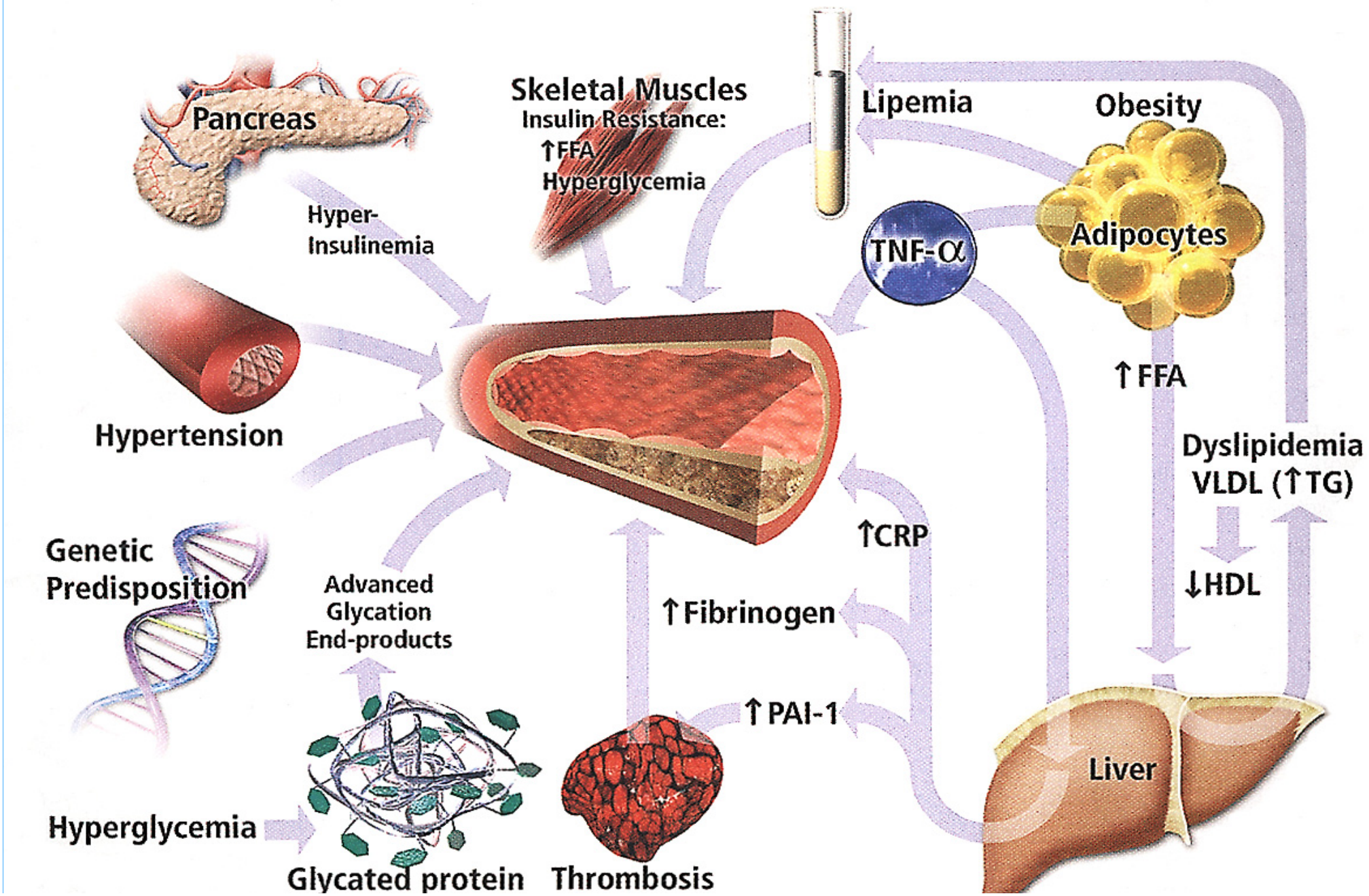
Category	AER	ACR (Approximate equivalent)		Terms
	(mg/24h)	(mg/mmol)	(mg/g)	
A1	<30	<3	<30	Normal to mildly increased
A2	30-300	3-30	30-300	Moderately increased*
A3	>300	>30	>300	Severely increased**

Abbreviations: AER, albumin excretion rate; ACR, albumin-to-creatinine ratio; CKD, chronic kidney disease
*Relative to young adult level.
**Including nephrotic syndrome (albumin excretion usually >2200 mg/24 hours [ACR >2220 mg/g; >220 mg/mmol])

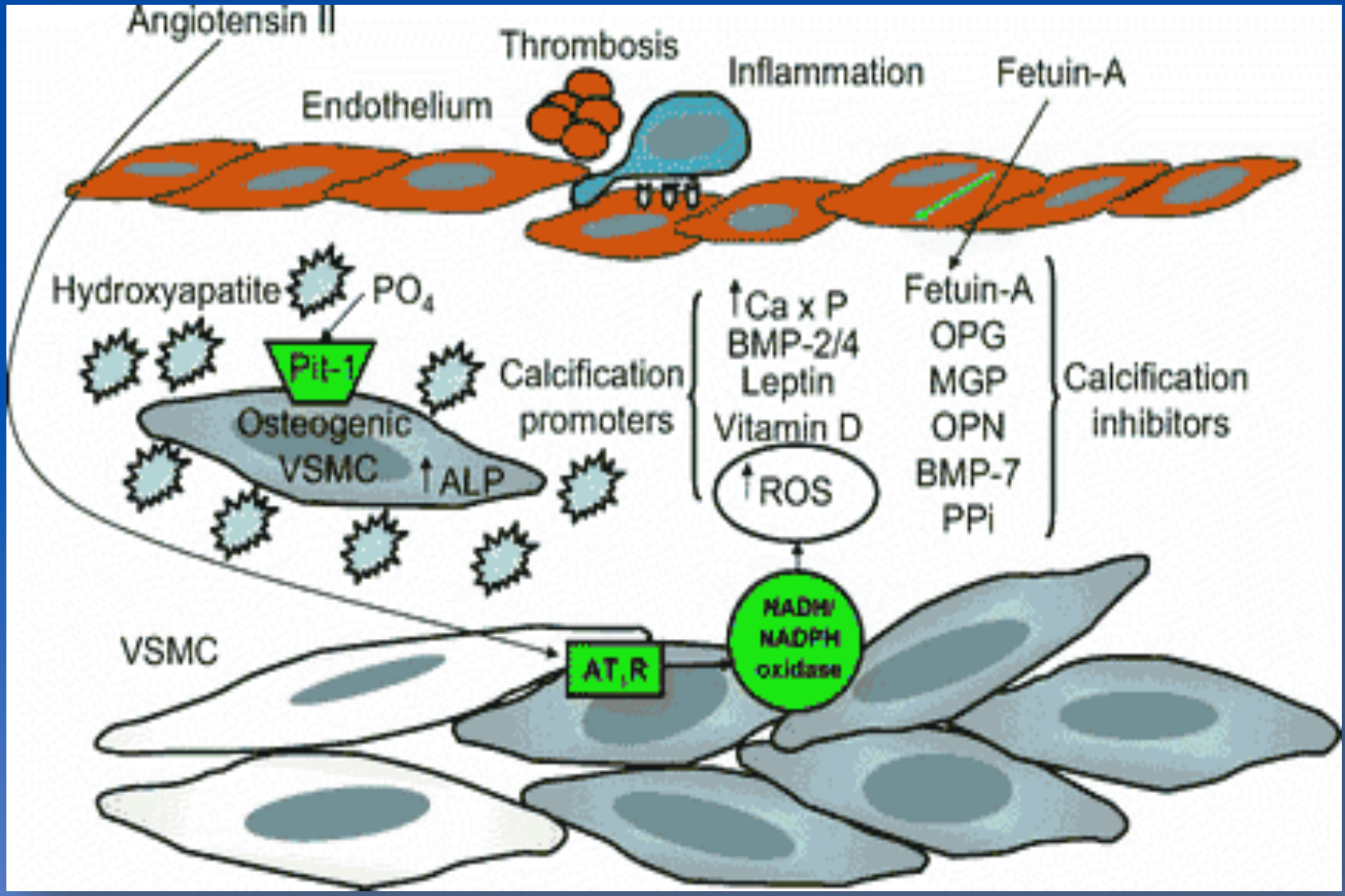
†Note that where albuminuria measurement is not available, urine reagent strip results can be substituted

National Kidney Foundation™

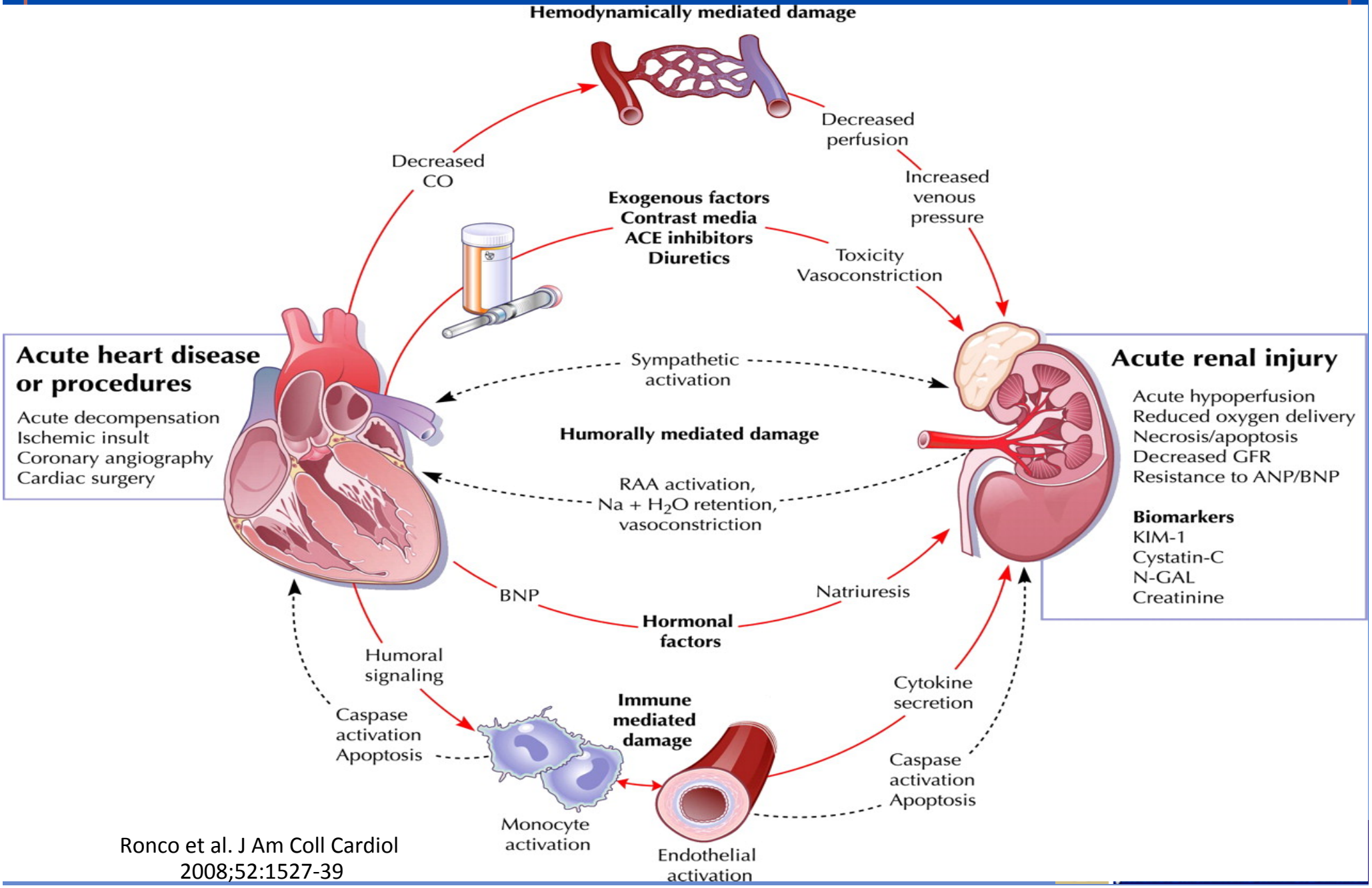
Mechanisms of CV Disease in Diabetes



Cardiovascular Renal Link

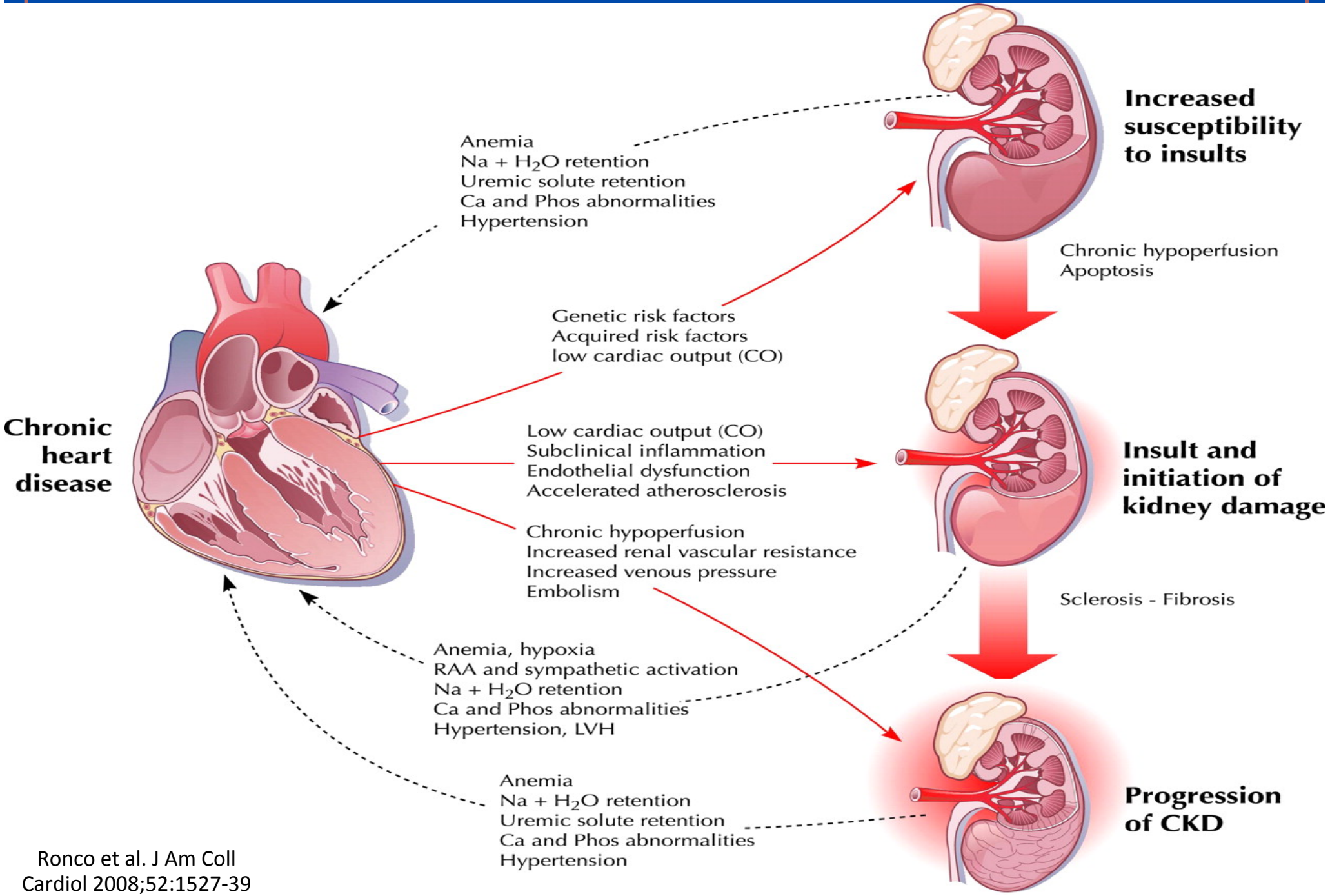


Cardiorenal Syndrome (CRS) Type 1



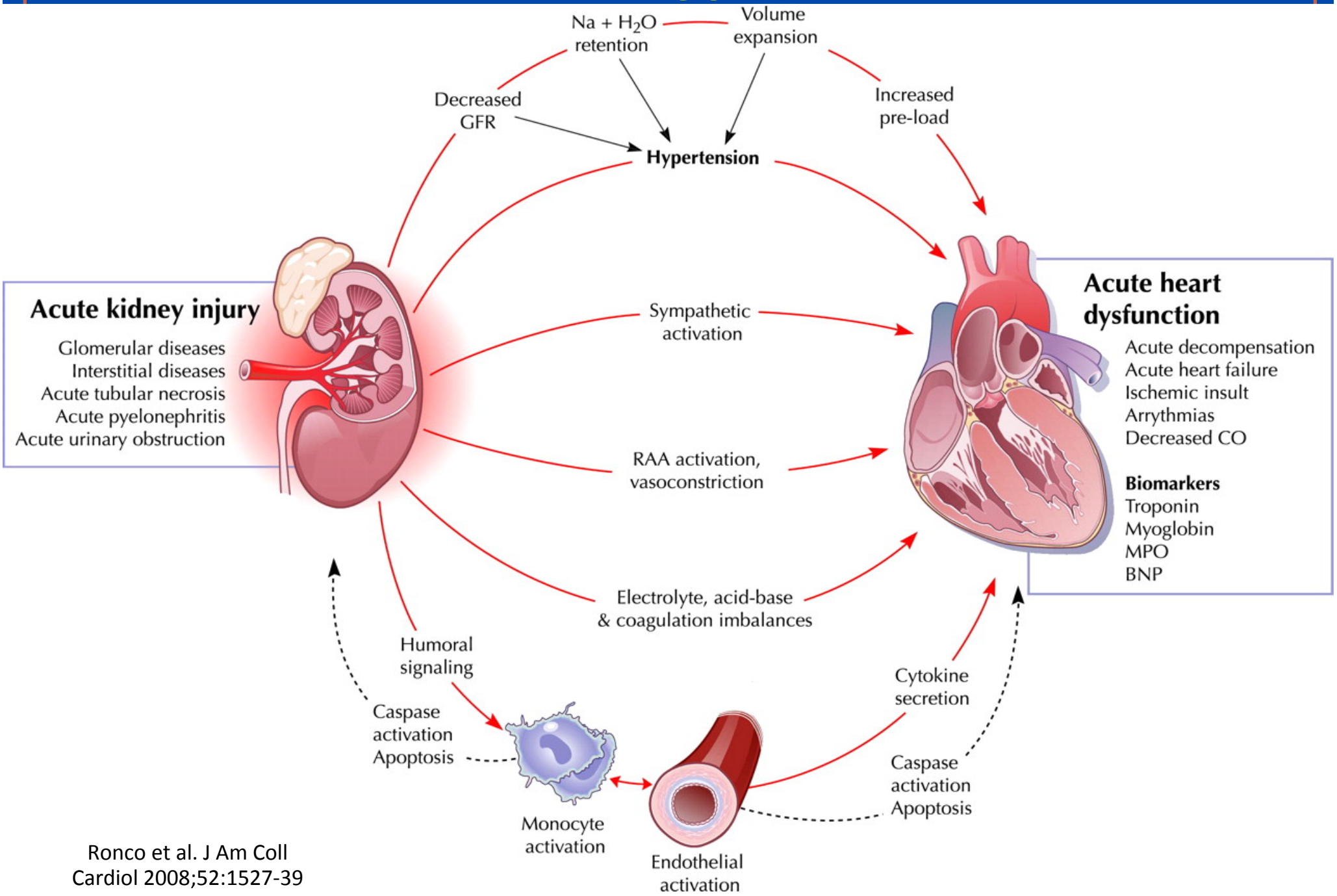
Ronco et al. J Am Coll Cardiol 2008;52:1527-39

CRS Type 2



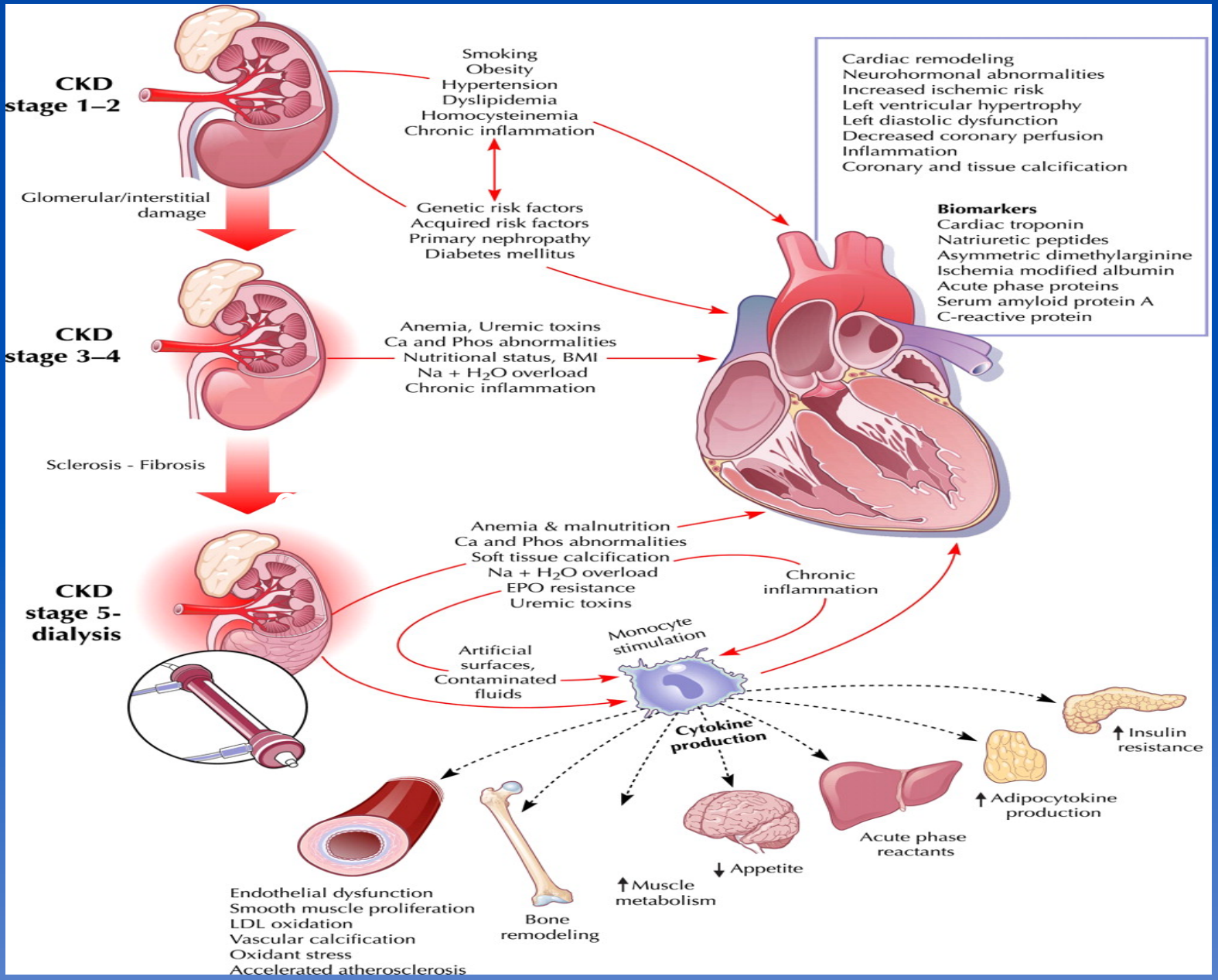
Ronco et al. J Am Coll Cardiol 2008;52:1527-39

CRS Type 3



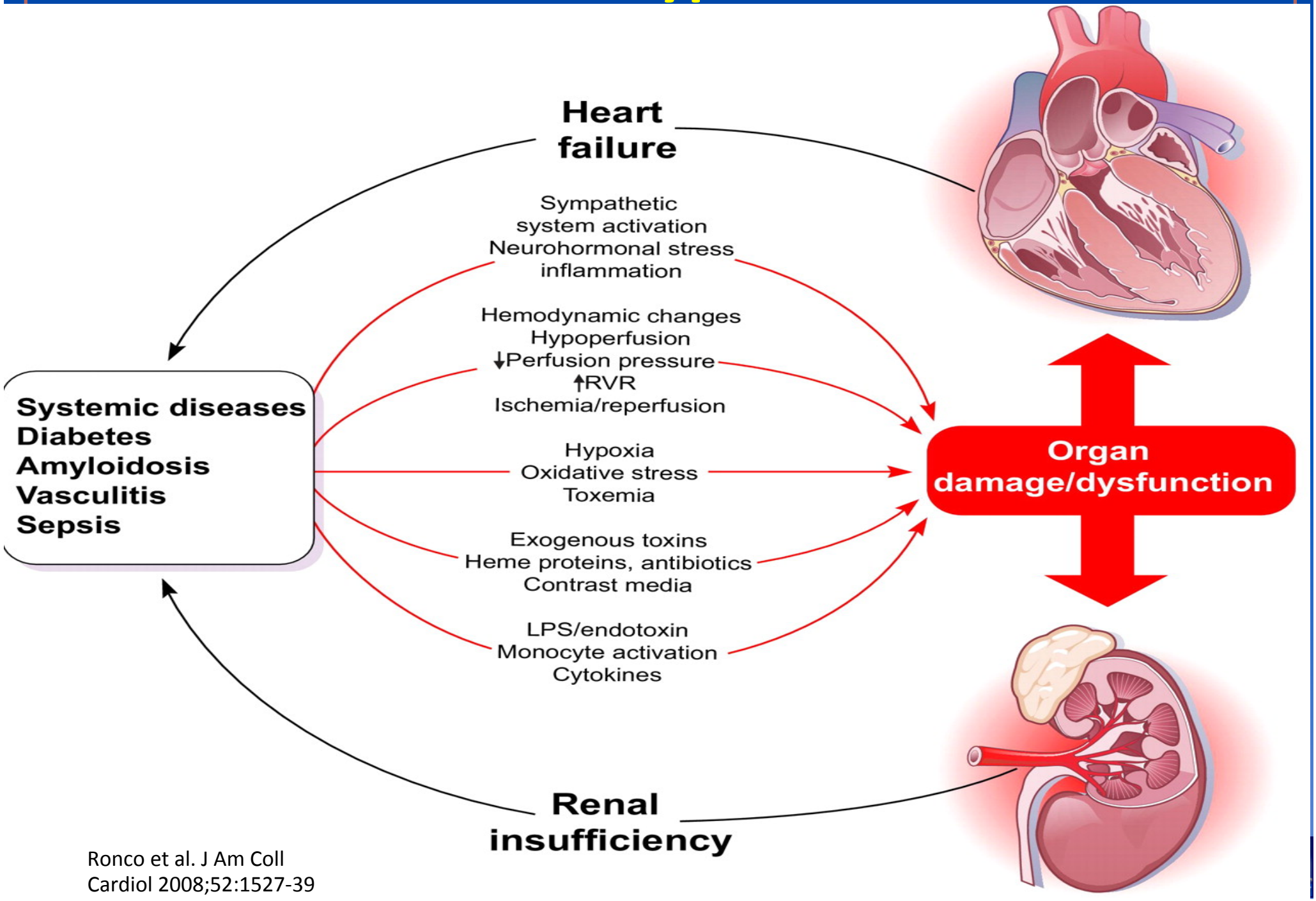
Ronco et al. J Am Coll Cardiol 2008;52:1527-39

CRS 4



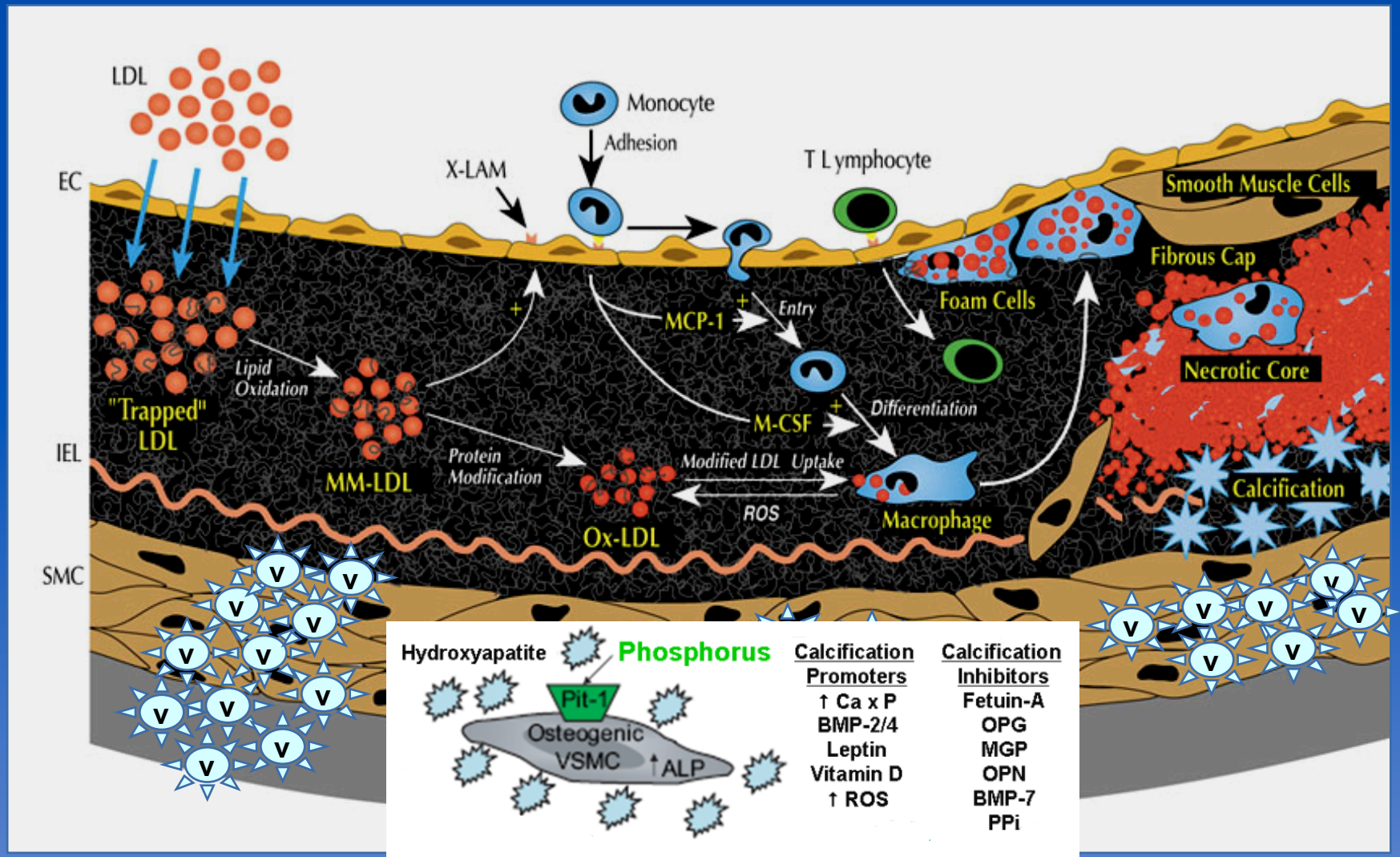
Ronco et al. J Am Coll Cardiol 2008;52:1527-39

CRS Type 5



Ronco et al. J Am Coll Cardiol 2008;52:1527-39

Pathogenesis of Atherosclerotic Calcification



McCullough et al. J Nephrol. 2004;17:205-15;
Schiffrin et al. Circulation. 2007;116:85-97.

BMP = bone morphogenetic protein; MCP-1 = monocyte chemoattractant protein-1; MGP = matrix Gla protein; OPG = osteoprotegerin; OPN = osteopontin; ROS = reactive oxygen species.

"Calcification Paradox"

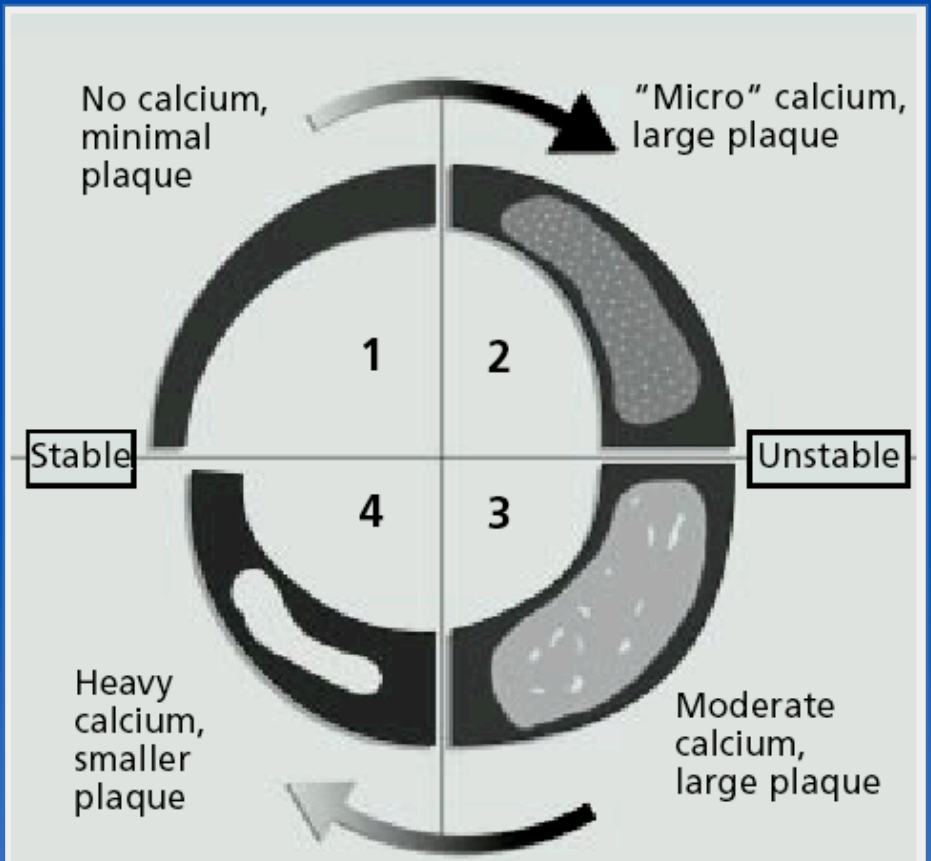
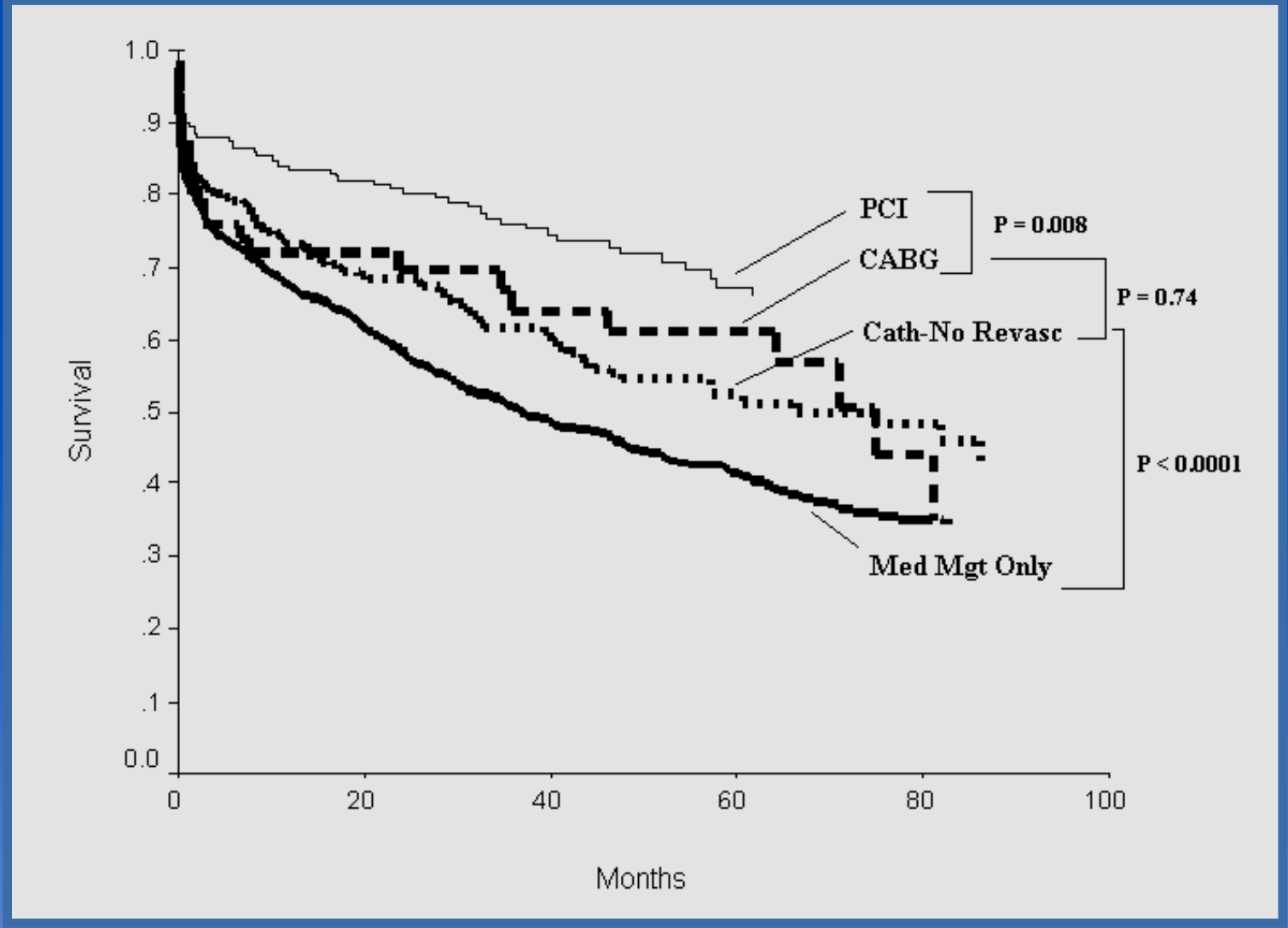


FIGURE 2. Atherosclerotic lesion development and the role of calcification. Different phases of plaque development are shown in the four quadrants, indicating temporal development. Calcium's role in lesion instability is complex and incompletely understood.

1. Cohen A, et al. Aortic plaque morphology and vascular events: a follow-up study in patients with ischemic stroke. FAPS Investigators. French Study of Aortic Plaques in Stroke. Circulation. 1997 Dec 2;96(11):3838-41.
2. Bonifacio DL, et al. Coronary calcification and interventional outcomes in dialysis patients. J Cardiovasc Risk 2001; 8: 133-7.
3. Beckman JA, et al. Relationship of clinical presentation and calcification of culprit coronary artery stenoses. Arterioscler Thromb Vasc Biol. 2001 Oct;21(10):1618-22.
4. Nicholls SJ, et al. Coronary artery calcification and changes in atheroma burden in response to established medical therapies. J Am Coll Cardiol. 2007 Jan 16;49(2):263-70.
5. Meijs MF, et al, Comparison of frequency of calcified versus non-calcified coronary lesions by computed tomographic angiography in patients with stable versus unstable angina pectoris. Am J Cardiol. 2009 Aug 1;104(3): 305-11.

*Schoenhagen, Tuzcu. Cleve Clin J Med 2002;69 suppl 3:S12-20.

Invasive vs. Conservative Treatment in ACS for CKD Patients



Keeley et al. Am J Cardiol. 2003;92:509-14.

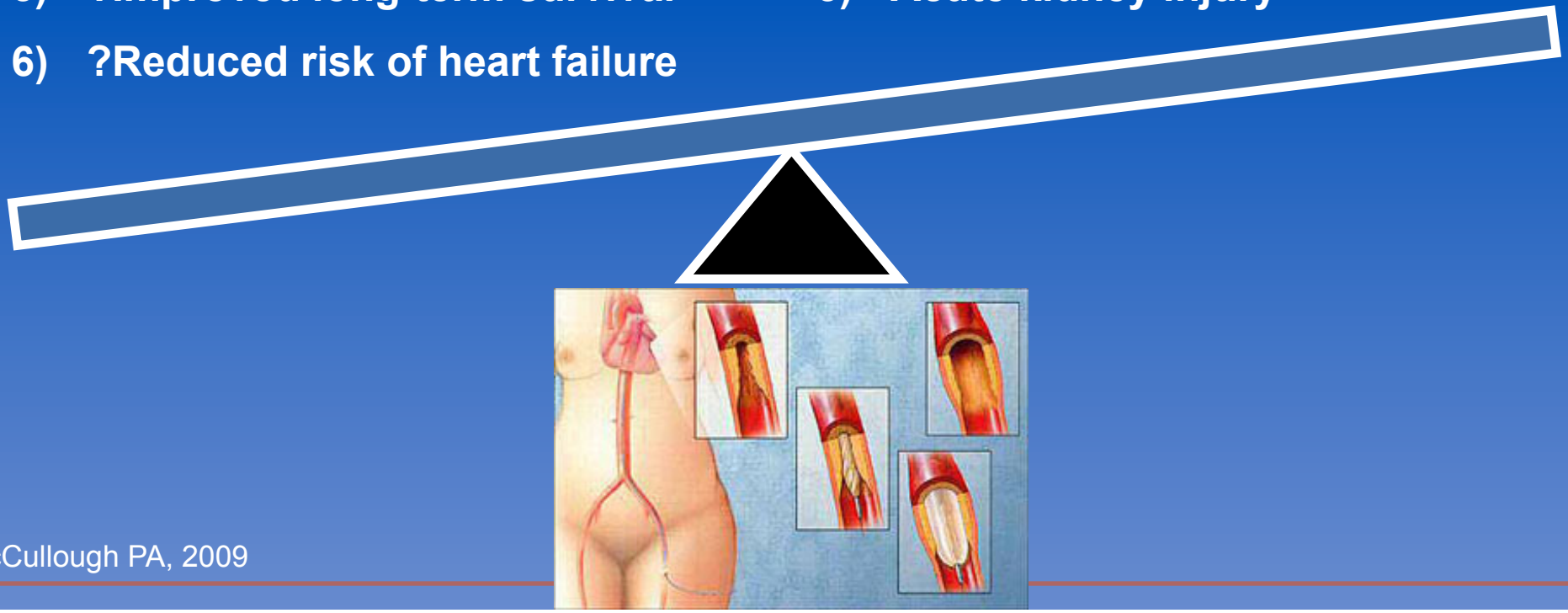
Risks and Benefits of Urgent PCI in CKD Patients with ACS

Benefits

1) Reperfusion in ACS
2) ↓In hospital death
3) ↓Recurrent MI
4) ↓Rehospitalization for ACS
5) ?Improved long-term survival
6) ?Reduced risk of heart failure

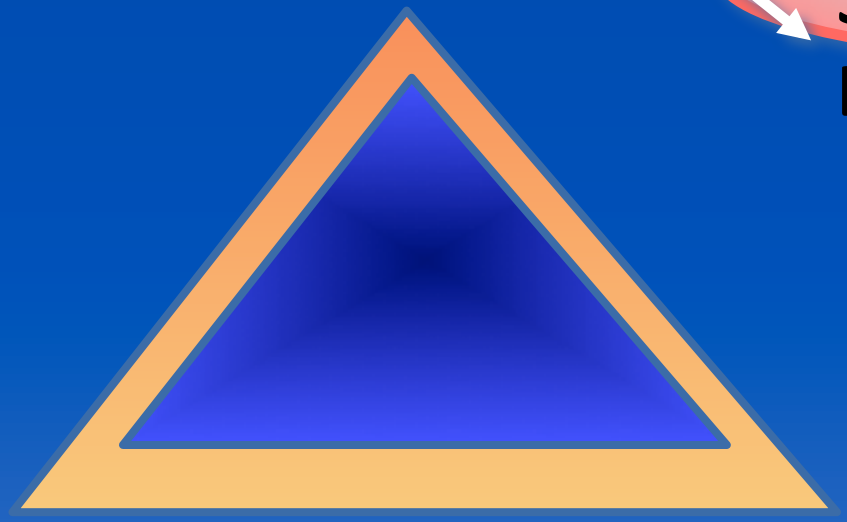
Risks

1) Lower rates of procedural success
2) Bleeding complications
3) Stent thrombosis
4) Restenosis
5) Acute kidney injury



McCullough PA, 2009

Pathophysiology of Sudden Death in CKD/ESRD



Substrate

- Ischemia
- Scar/fibrosis/ LVH

Modulating factors

- Autonomic NS
- Electrolytes Anemia

Triggers

- AF PVCs
- Acute Ischemia Hemodynamic Δ Sepsis

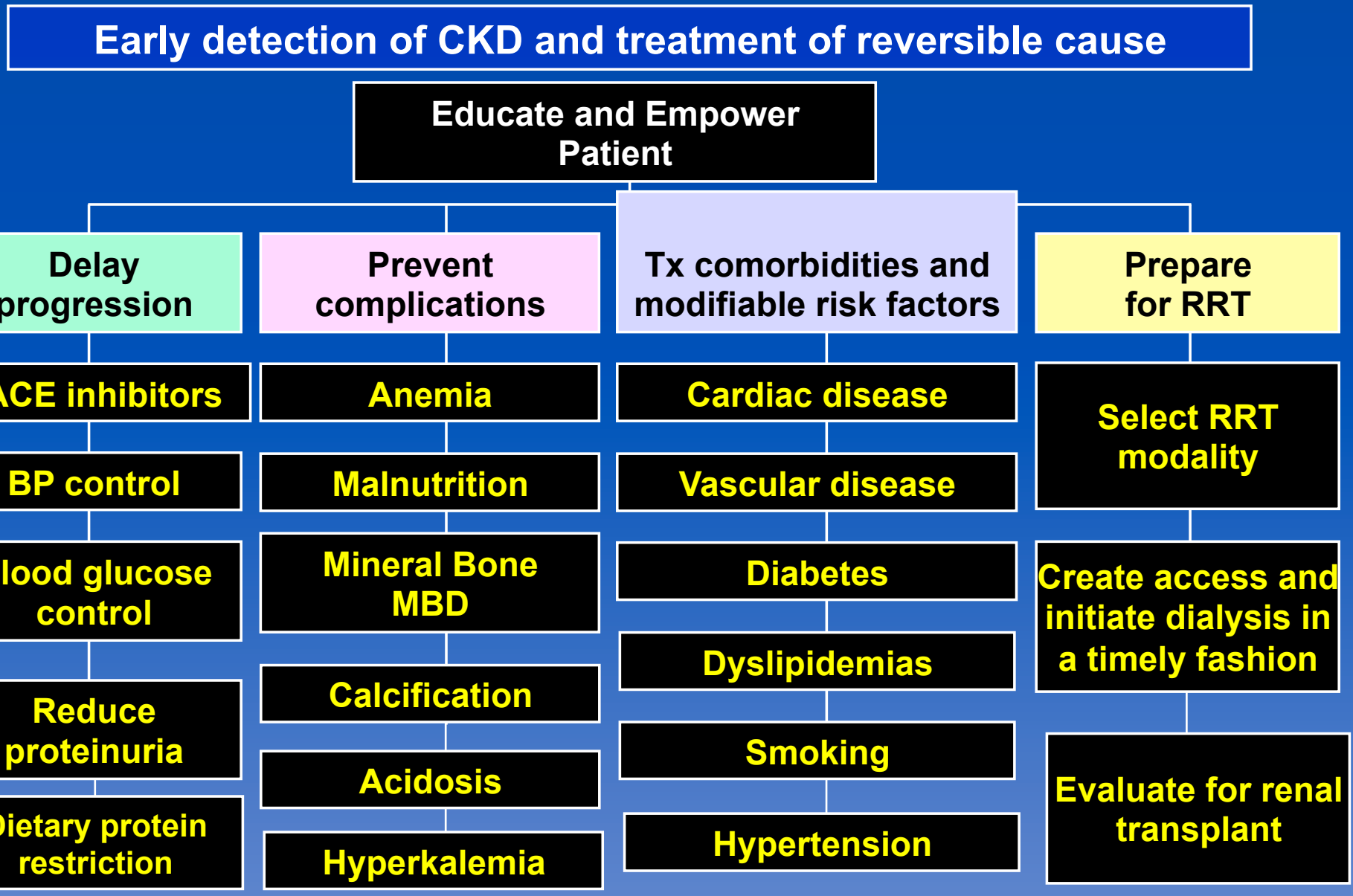
Adapted from Coumal, Courtesy Gersh B, 2008

Sudden Death in Dialysis Unit

- 400 reported arrests over a nine-month period from US cohort of > 77,000 hemodialysis patients
- Cardiac arrest rate was 400 out of 5,744,708, corresponding to a rate of 7 per 100,000 hemodialysis sessions
- More frequent during Monday dialysis sessions than on other days of the week
- Twice as likely to have been dialyzed against a 0 or 1.0 mEq/L potassium dialysate on the day of cardiac arrest (17.1 vs. 8.8%)
- Cardiac arrest patients were older (66.3±12.9 vs. 60.2±15.4 years), had diabetes (61.8 vs. 46.8%), and using catheter for vascular access (34.1 vs. 27.8%)
- 16% of patients had drop in systolic pressure of 30 mm Hg or more prior to the arrest
- 60% of patients died within 48 hours of the arrest, including 13% while in the dialysis unit

Karnik et al. Kidney Int. 2001;60:350-7.

Components of a Comprehensive CKD Care Plan



Adapted from Pereira B. Kidney Int. 2000;57:351–65.

Conclusions

- CVD is ubiquitous among patients with CKD and ESRD and CKD is a risk factor for CVD
- Myocardial disease such as LVH and Diastolic HF is very common in CKD
- Ethnic minorities have a higher rate of CKD and ESRD
- Valvular diseases such as aortic calcification, aortic stenosis, mitral annular calcification, as well as aortic root disease are common
- Coronary revascularization may be beneficial
  - prior to renal transplant
  - in response to ACS
  - Electively for severe angina but no outcomes benefit
- Standard ICD implantation criteria apply, devices work, but survival in CKD/ESRD less

Case Study, continued

- Maria H. develops symptoms of DOE and lower extremity edema prompting an ER visit and hospital admission
- An echo is notable for an EF of 55%, stage II diastolic dysfunction, and mild concentric LVH
- Her serum creatinine on admission is 1.6 mg/dl , and there is evidence of moderate microalbuminuria

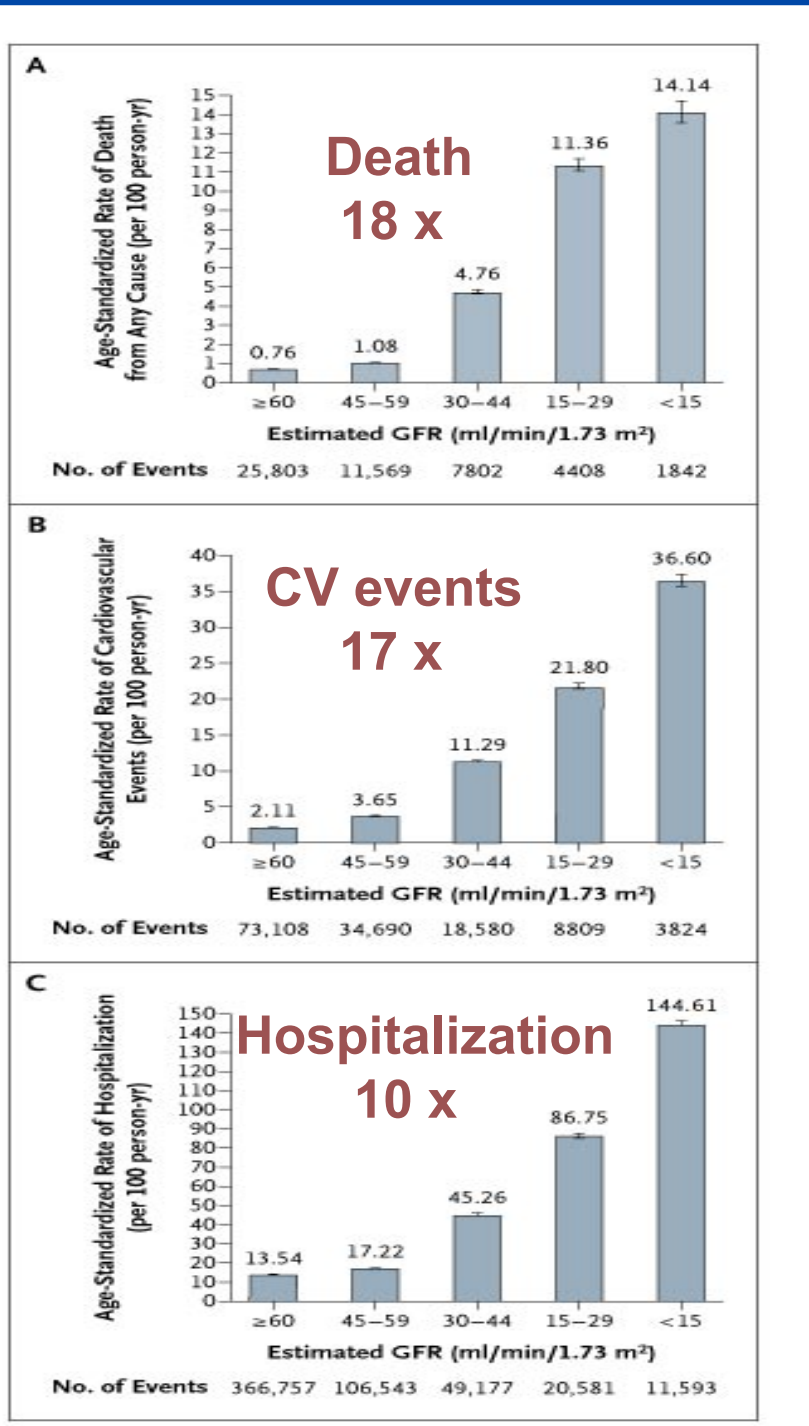
ARS Question 8
Case Study, continued

According to a Million patient study from Kaiser, compared to subjects with no CKD, Maria, with diastolic CHF and progressive CKD has a risk for hospitalization and death that is:

A. 3 fold and 2 fold respectively
B. 10 fold and 18 fold respectively
C. Unchanged
D. Dependent on systolic heart failure

Burden of CKD

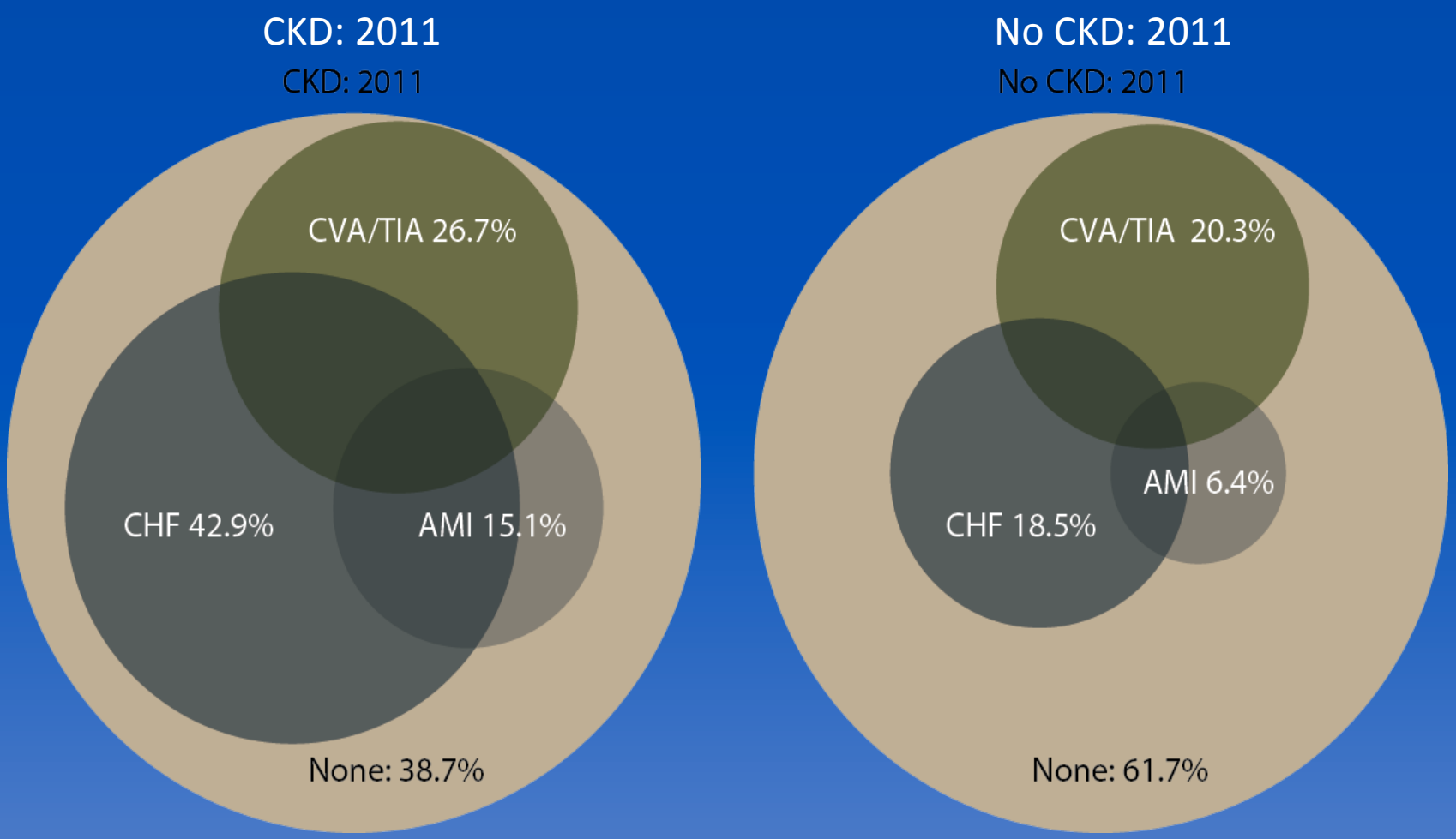
- Reduced GFR and/oproteinuria are independent risk factors for CVD



Age-Standardized Rates of Death from Any Cause (Panel A), Cardiovascular Events (Panel B), and Hospitalization (Panel C), According to the Estimated GFR among 1,120,295 Ambulatory Adults

Go et al. N Engl J Med. 2004;351:1296-1305

Cardiovascular Disease in Patients With or Without CKD, 2011 USRDS



December 31, 2011 point prevalent Medicare enrollees with CVD, age 66 & older, with fee-for-service coverage for the entire calendar year.

Panel Discussion

Questions and Answers

Thank You!

The American College of Cardiology
The Association of Black Cardiologists
The National Minority Quality Forum

Confronting Racial and Ethnic Disparities in Cardiometabolic Disease

Keith C. Ferdinand, MD
JoAnne M. Foody, MD
Gary A. Puckrein, PhD
Laurence S. Sperling, MD
Kris Vijay, MD

ARS QUESTION 1

What is the recommended initial diagnostic test?

A. hs-CRP

B. Coronary calcium score

C. C-IMT

D. Stress echo

E. The initial diagnosis is evident (metabolic syndrome)

ARS

ARS QUESTION 2

What is 10-year ACC/AHA Pooled cohort ASCVD risk ?

A. Low (3%)

B. Intermediate (6-7%)

C. High (15%)

ARS QUESTION 3

What is ACC/AHA Pooled cohort lifetime ASCVD risk ?

A. Low (7%)

B. Intermediate (20%)

C. High (40%)

ARS

ARS QUESTION 4

What is the likelihood of developing future diabetes without intervention?

A. 5-10%

B. 10-20%

C. > 50%

D. Unlikely

ARS QUESTION 5

All of the initial approaches to care are reasonable except which of the following?

A. Metformin
B. Cardiosmart 2.0
C. Culturally appropriate comprehensive lifestyle management
D. Community-center Coach approach

ARS

ARS QUESTION 6
A Case for Shared Decision Making

The patient asks if there are any further medical options or if it is necessary for him to have a percutaneous intervention. In addition to making an evidence-based recommendation, what else do you need to consider?

A. Patient's preferences for treatment
B. Patient's values
C. Personal context
D. All of the above

ARS QUESTION 7
Case Study, continued

In consideration of her apparent African ancestry which component of the MetS may be lower than expected despite her diagnosis?

A. Blood pressure
B. HDL-C
C. Triglycerides
D. Fasting glucose
E. Not relevant since she is Spanish

ARS

ARS Question 8
Case Study, continued

According to a Million patient study from Kaiser, compared to subjects with no CKD, Maria, with diastolic CHF and progressive CKD has a risk for hospitalization and death that is:

A. 3 fold and 2 fold respectively
B. 10 fold and 18 fold respectively
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