Insufficienza renale cronica

C. Zoccali

It is generally held that that the concept of epidemic is intimately connected to the spreading of infectious diseases

The new definition imposed by the diffusion of chronic diseases (cardiovascular diseases and cancer)

……an epidemic is a concerning public health problem which occurs when new cases of a certain disease in a given human population, and during a given period, substantially exceed what is expected based on recent experience.

Concern that the epidemic may be indeed in an expanding phase …

AJKD **May 2013**

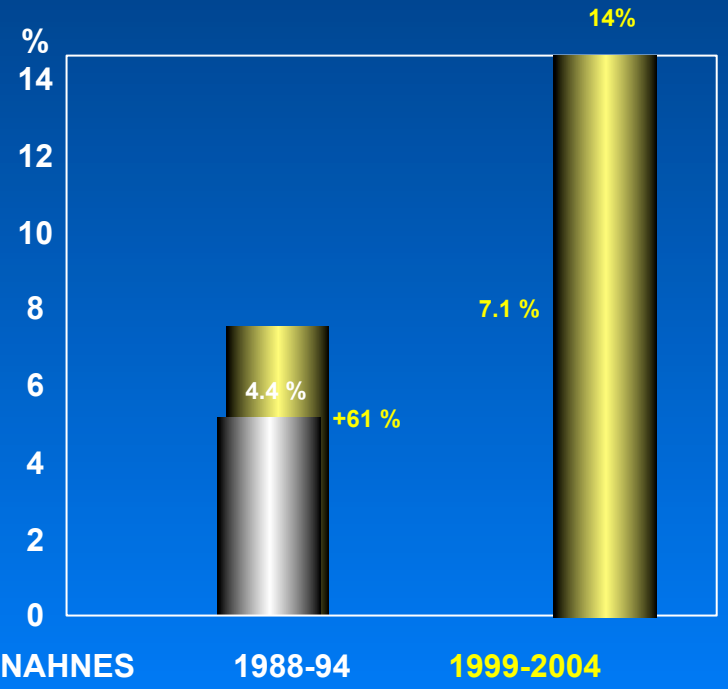
Original Investigation

Trends in the Prevalence of Reduced GFR in the United States: A Comparison of Creatinine- and Cystatin C–Based Estimates

Morgan E. Grams, MD, MHS,[1,2] Stephen P. Juraschek, BA,[1] Elizabeth Selvin, PhD, MPH,[1,3] Meredith C. Foster, ScD, MPH,[1] Lesley A. Inker, MD, MS,[4] John H. Eckfeldt, MD, PhD,[5] Andrew S. Levey, MD,[4] and Josef Coresh, MD, PhD[1,3]

Prevalence of CKD (<60 ml.min^{-1} .1.73 m^2) as estimated by eGFRcr-cys

SIGNS OF RENAL DAMAGE albuminuria

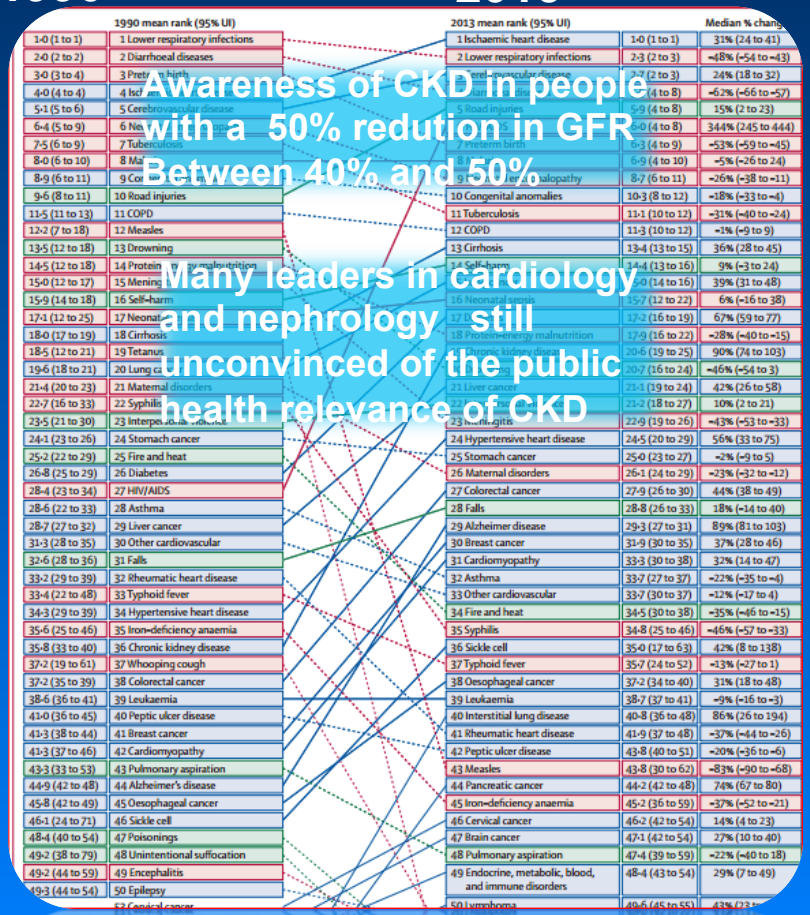


LANCET

Global, regional, and national age–sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013

GBD 2013 Mortality and Causes of Death Collaborators*

1990 2013



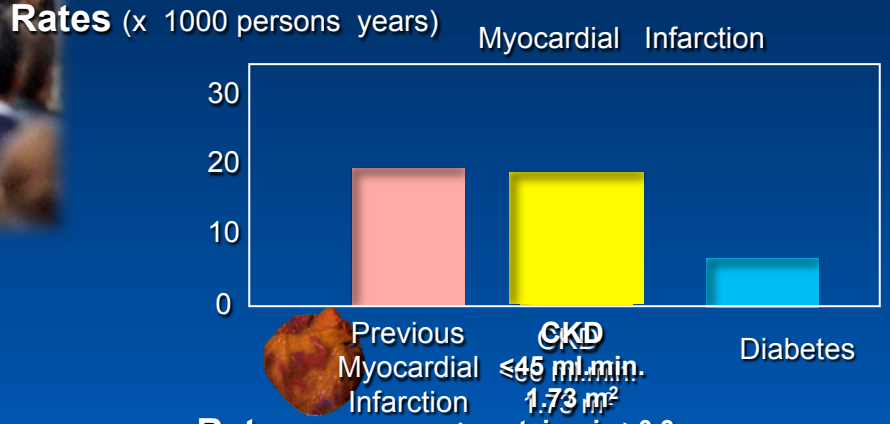
Awareness of CKD in people with a 50% redution in GFR Between 40% and 50%

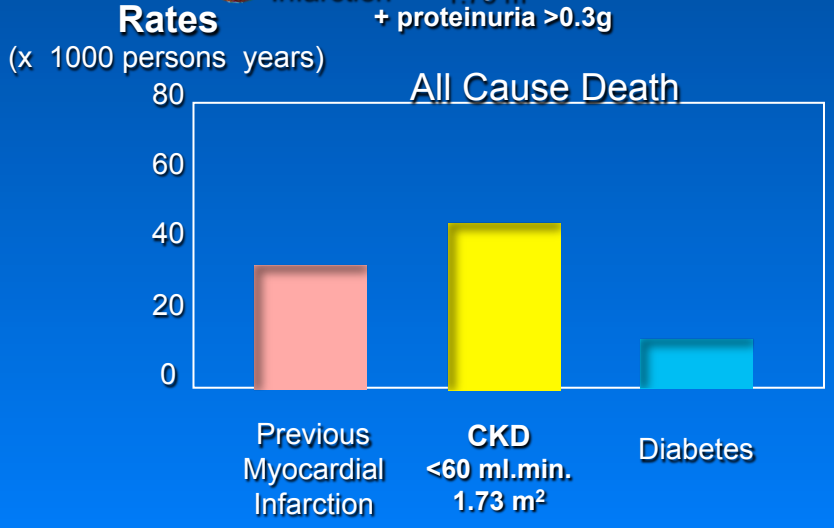
Many leaders in cardiology and nephrology still unconvinced of the public health relevance of CKD

Risk of coronary events in people with chronic kidney disease compared with those with diabetes: a population-level cohort study

September 2012

Marcello Tonelli, Paul Muntner, Anita Lloyd, Braden J Manns, Scott Klarenbach, Neesh Pannu, Matthew T James, Brenda R Hemmelgarn, for the Alberta Kidney Disease Network





CKD qualifies as "risk equivalent"

AJKD 2013; 62: 245-252

Lifetime Incidence of CKD Stages 3-5 in the United States

Morgan E. Grams, MD, MHS,[1,2] Eric K.H. Chow, MS,[3] Dorry L. Segev, MD, PhD,[2,3] and Josef Coresh, MD, PhD[1,2,4]

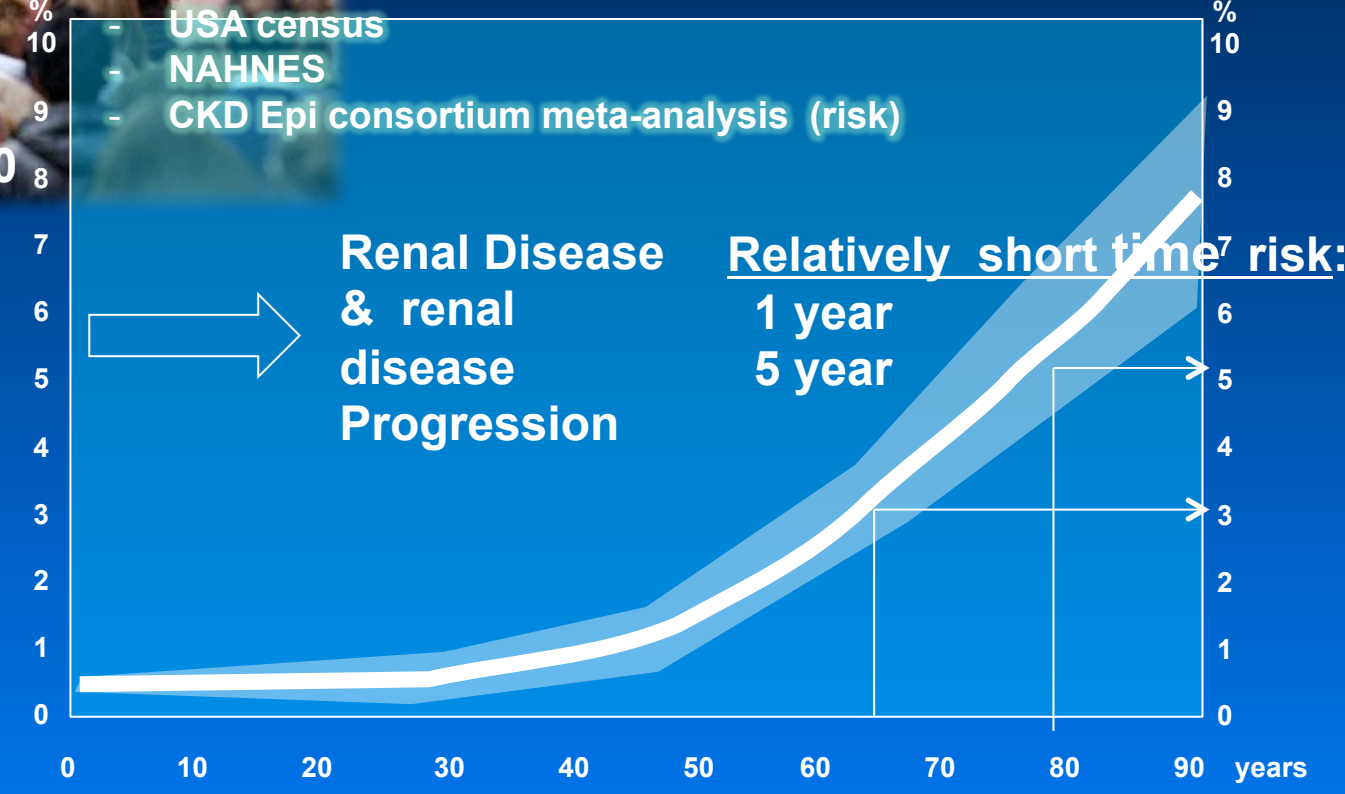
Before 2000

creatinine

albuminuria

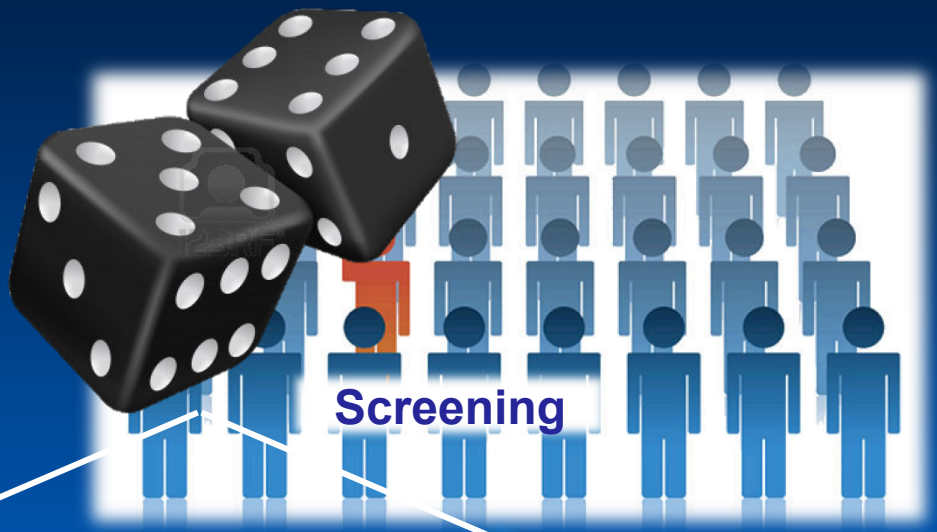
Estimates by Markov Modelling applied to:

- USA census
- NAHNES
- CKD Epi consortium meta-analysis (risk)



…when a disease is pervasive …

Screening should be cost effective



Screening and treatment policy

No Screening

Follow up

No such trial for CKD

Hard End-Points: death and disability

Clinical Therapeutics

An albuminuria-based screening and treatment policy

Cost-Effectiveness of Screening for Albuminuria with Subsequent Fosinopril Treatment to Prevent Cardiovascular Events: A Pharmacoeconomic Analysis Linked to the Prevention of REnal and Vascular ENdstage Disease (PREVEND) Study and the Prevention of REnal and Vascular ENdstage Disease Intervention Trial (PREVEND IT)*

Jarir Atthobari, MD[1]; Folkert W. Asselbergs, MD[2]; Cornelis Boersma, MSc[1]; Robin de Vries, MSc[1]; Hans L. Hillege, PhD[3]; Wiek H. van Gilst, PhD[2]; Ron T. Gansevoort, PhD[4]; Paul E. de Jong, PhD[4]; Lolkje T.W. de Jong-van den Berg, PhD[1]; and Maarten J. Postma, PhD[1]; for the PREVEND IT Study Group

2006;28:432-444

Urine tubes shipped to the laboratory together with a simple questionnaire

screening of 40856 individuals

9966 subjects with albuminuria >10 mg/d

864 with albuminuria and NORMOTENSIVE or WITH STAGE 1 HTN and

The cost-effectiveness of this policy was ~ $ 23.000 / life-year

much limited power

peculiar Country / Health context

YET

Proof of concept that screening may be cost effective

Fosinopril Placebo

Fosinopril Pravastatin

Pravastatin Placebo

Placebo Placebo

CV events over 4 years

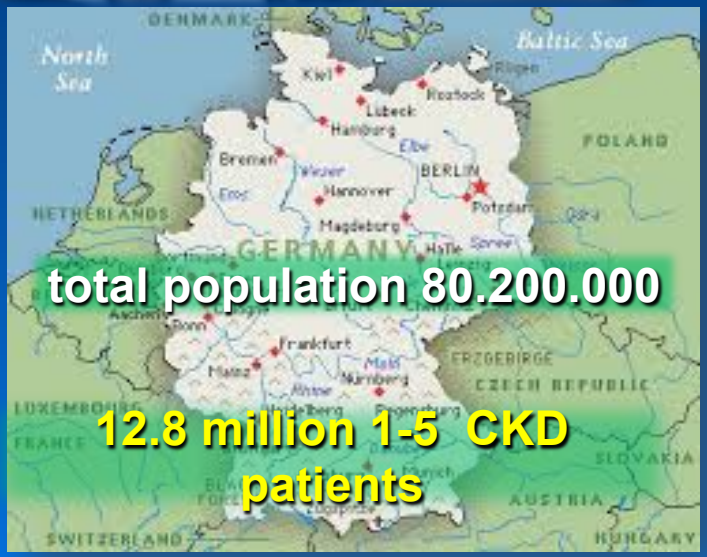
3.9%

6.5%,

Risk Reduction -40%

Screening remains an open question…

Which is the life-time burden of ESKD and cost of cardiovascular disease in patients with established CKD?



European Heart Journal (2006) 27, 1245–1250
doi:10.1093/eurheartj/ehi880

Clinical research
Prevention and epidemiology

Monica Augsburgh Study

Chronic kidney disease and risk of incident myocardial infarction and all-cause and cardiovascular disease mortality in middle-aged men and women from the general population

Christa Meisinger[1,2*], Angela Döring[2], and Hannelore Löwel[2] for the KORA Study Group

[1] Central Hospital of Augsburg, MONICA/KORA Myocardial Infarction Registry, Stenglinstr. 2, D-86156 Augsburg, Germany; and [2] GSF National Research Center for Environment and Health, Institute of Epidemiology, Neuherberg, Germany

Received 24 November 2005; revised 24 February 2006; accepted 23 March 2006; online publish-ahead-of-print 12 April 2006

CKD (GFR<60 ml/min) in MONICA Augsburg: 16%

Excess number of Myocardial Infarctions in CKD (GFR<60 ml/min) patients as compared to individual without CKD:

8770 per million population

112 256 myocardial infarctions/year attributable to CKD

myocardial infarction cost in the German HS :
13 000 EU/year (real cost)

Reinhold T J Public Health 2011; 19: 579-86

MI due to CKD : 1 459 328 000 EU/ year

Allowance for classical risk factors (~20%)

MI: 1 167 463 000 EU / year

Prevalence and Cardiovascular Risk Profile of Chronic Kidney Disease In Italy: Results of the 2008-2012 National Health Examination Survey

CARHES

ndt Nephrology Dialysis Transplantation

2015

total population 61.100.000

1.833million 1-5 CKD patients

CKD (GFR<60 ml/min) CARHES: 3%

Excess number of Myocardial Infarctions in CKD (GFR<60 ml/min) patients as compared to individual without CKD:

8770 per million population

16.050 myocardial infarctions/year attributable to CKD

? myocardial infarction cost in the Italian HS : ? 10 000 EU/year (real cost)

MI due to CKD : 160 050 000 EU/ year

Much less than in Germany but still a considerable proportion (about 10%) of the overall cost of MI in Italy

Allowance for classical risk factors (~20%)

MI: 128.040.000 EU / year

S & C

CKD is a prevalent condition in the general population and fresh data indicate that CKD is a truly epidemic problem.

The risk for CV disease and death in CKD is of the same order of that by Myocardial Infarction, which qualifies CKD as a «risk equivalent».

The economic burden of cardiovascular disease in predialysis CKD in a 61 million residents like Italy is about 120 000 000 EU (about 10% of the overall burden of MI).

Large scale, concerted efforts of prevention of shared risk factors conducive to CKD and CV disease is the most rationale approach to tackle the problem of CKD and related CV cormobidities and to slow the rate of growth of health care costs .

SIGNS OF RENAL DAMAGE
albuminuria

16 March 1999 Volume 130 Number 6

Annals of Internal Medicine

1999 MDRD-186

A More Accurate Method To Estimate Glomerular Filtration Rate from Serum Creatinine: A New Prediction Equation

Andrew S. Levey, MD; Juan P. Bosch, MD; Julia Breyer Lewis, MD; Tom Greene, PhD; Nancy Rogers, MS; and David Roth, MD, for the Modification of Diet in Renal Disease Study Group*

American Journal Kidney Disease
K-DOQI

Clinical Practice Guidelines for Chronic Kidney Disease Evaluation, Classification and Stratification

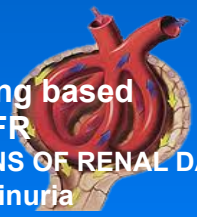
February 2002 Supplement

Model evidence for stages

Normal ⇨ ⇑ Risk ⇨ Kidney damage ⇨ ⇓ GFR ⇨ Kidney failure ⇨ Death

ACTION PLAN TO COUNTER THE EPIDEMIC

Screening Treatment ⇨ ⇨ Dialysis and transplantation



Staging based on GFR
& SIGNS OF RENAL DAMAGE
albuminuria

link with Cardiovascular Risk

accurate study of the risk of evolving to the End Stage Phase

Prevalence of CKD

SIGNS OF RENAL DAMAGE
albuminuria

16 March 1999 Volume 130 Number 6

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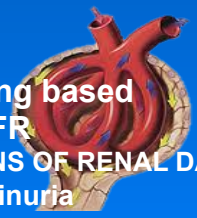
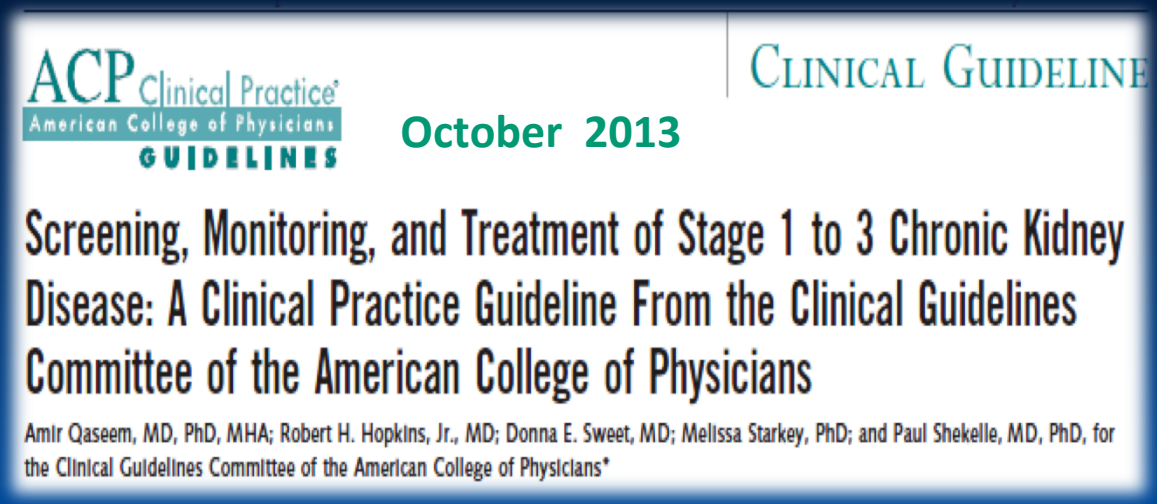


Staging based on GFR
& SIGNS OF RENAL DAMAGE
albuminuria

link with Cardiovascular Risk

risk of evolving to the End Stage Phase

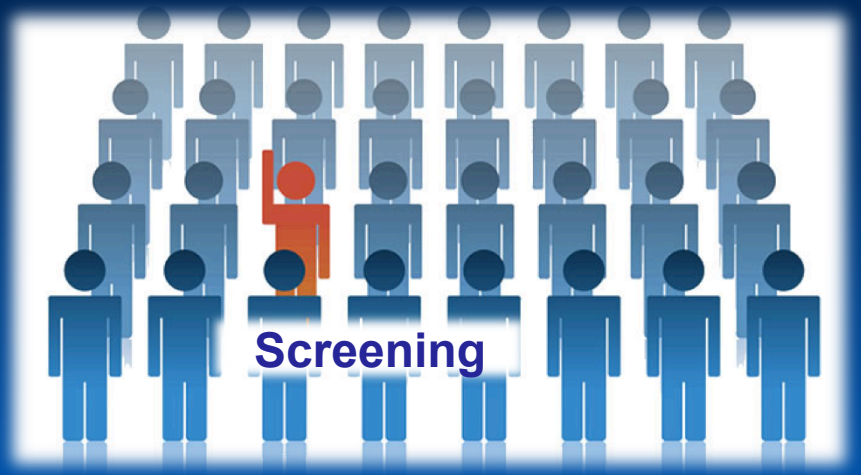


ACP recommends <u>against</u> screening for CKD in asymptomatic adults without risk factors for CKD.

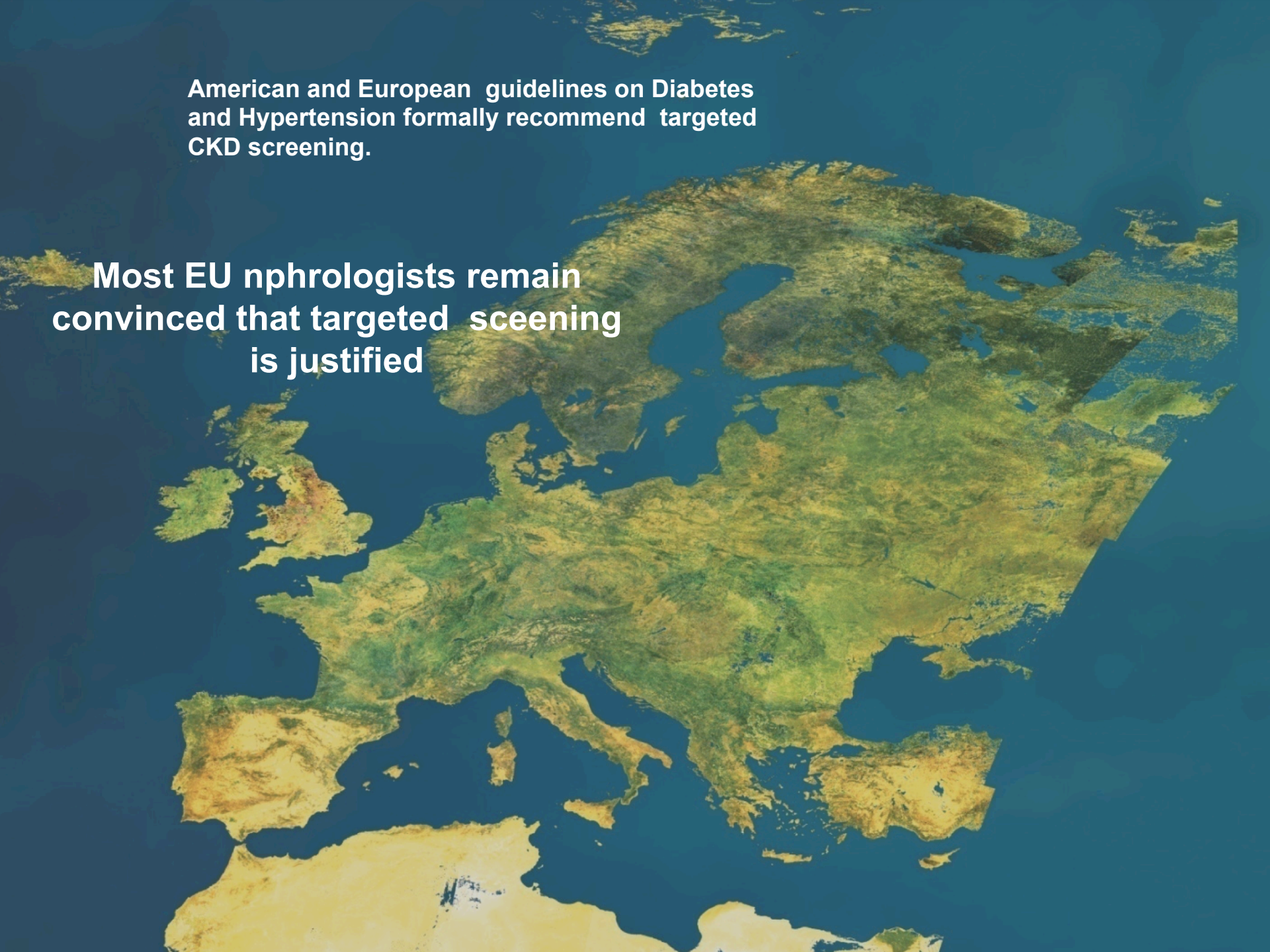
ACP <u>does not recommend screening</u> for CKD in asymptomatic adults with risk factors (diabetes, Hypertension and CV disease).

……..No evidence of Cost-Effectiveness of Screening policies…….

Modelling existing data

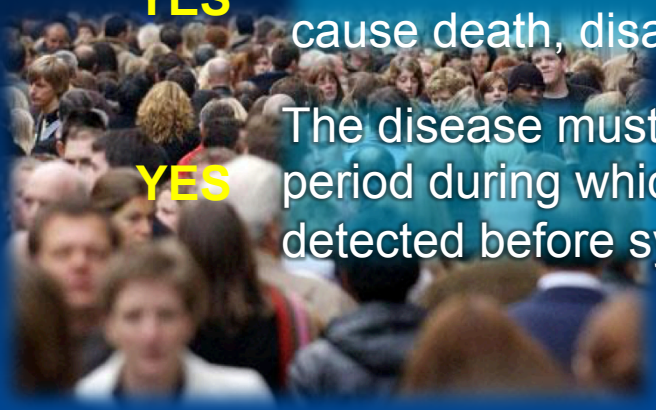


American and European guidelines on Diabetes and Hypertension formally recommend targeted CKD screening.



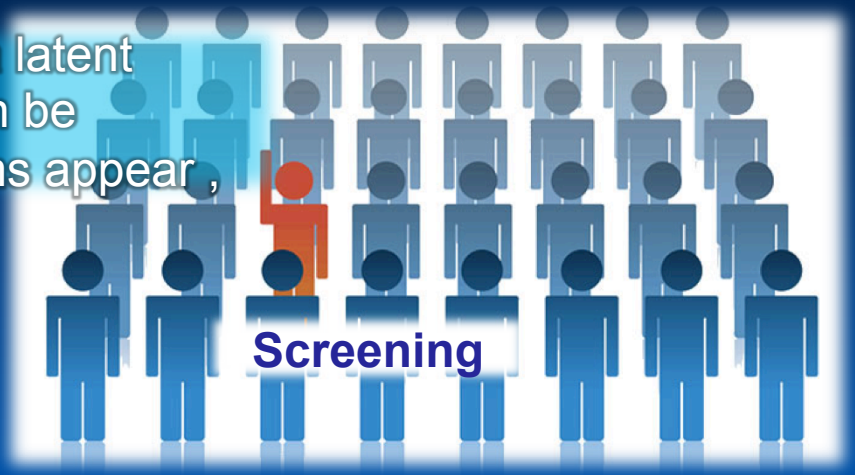
Most EU nphrologists remain convinced that targeted sceening is justified

Criteria for deciding whether a screening programme should be instituted



YES The disease should be serious (e.g. cause death, disability, or discomfort)

YES The disease must have a latent period during which it can be detected before symptoms appear ,



effective, acceptable, and safe treatment should be available

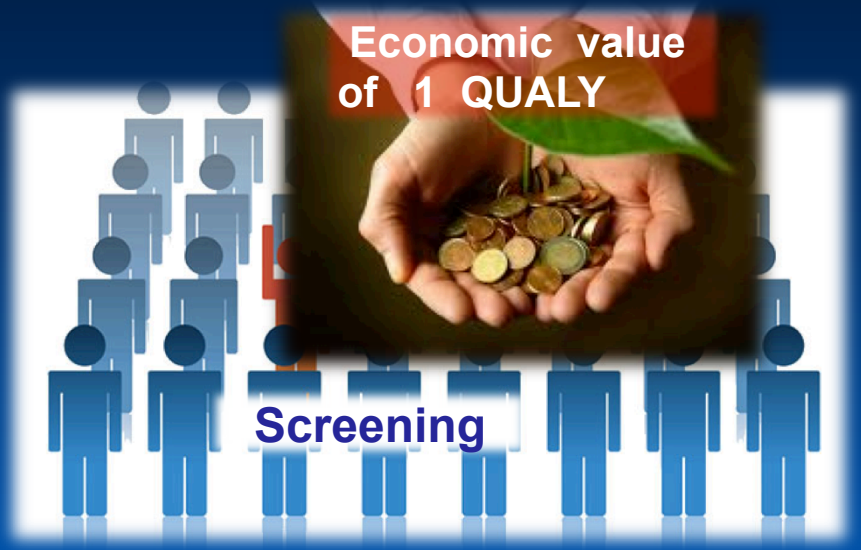
Early treatment should be more effective than later

Simple and cheap

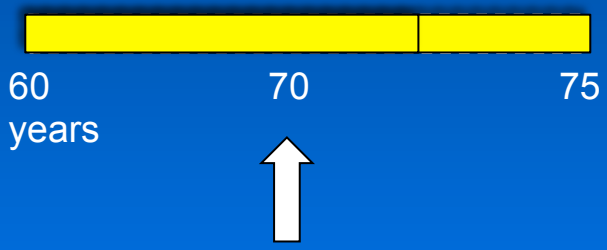
Reliable.

Cost-Effectiveness arithmetic

Quality Adjusted Life Year (QALY)



1 after a CV event =0.50 QUALY



USA 1 QUALY : $ 50,000

Great Britain 1 QUALY :
$ 20,000-$30.000 ,
exceptionally ~ $60.000

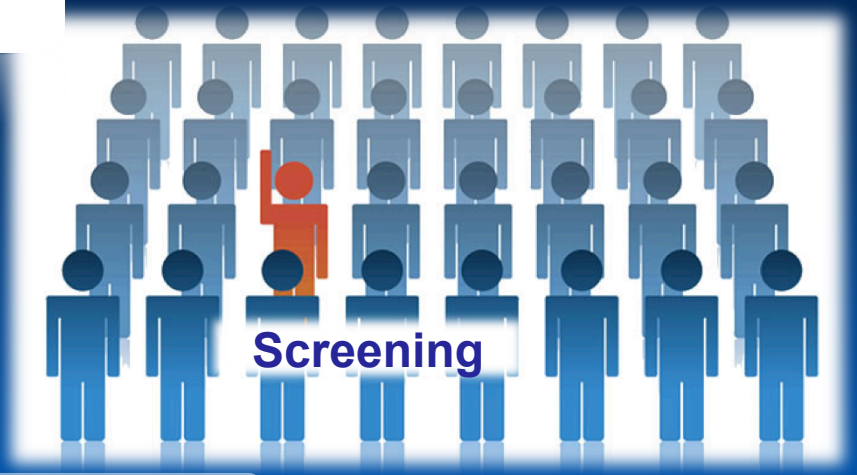
Spain 1 QUALY :
<EU 30.000 «affordable»

AJKD 2010; 55: 463-473

A Health Policy Model of CKD: 2. The Cost-Effectiveness of Microalbuminuria Screening

Thomas J. Hoerger, PhD,[1] John S. Wittenborn, BS,[1] Joel E. Segel, BA,[1] Nilka R. Burrows, MPH, MT,[2] Kumiko Imai, PhD,[3] Paul Eggers, PhD,[4] Meda E. Pavkov, MD, PhD,[2] Regina Jordan, MPH,[2] Susan M. Hailpern, DrPH, MS,[2] Anton C. Schoolwerth, MD, MSHA,[5] and Desmond E. Williams, MD, PhD,[2] on behalf of the Centers for Disease Control and Prevention CKD Initiative

Cost Effectiveness of Screening (microsimulation modelling)



albuminuria

\+

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Health Care costs

eGFR + albuminuria

False positive

Standard care

GFR ≤ 60 ml.min^{-1}.1.73m^2

GFR ≥ 60 ml.min^{-1}.1.73m^2

Establish the cause of CKD (nephrologist)

ACE or angiotensin II antagonists

AJKD 2010; 55: 463-473

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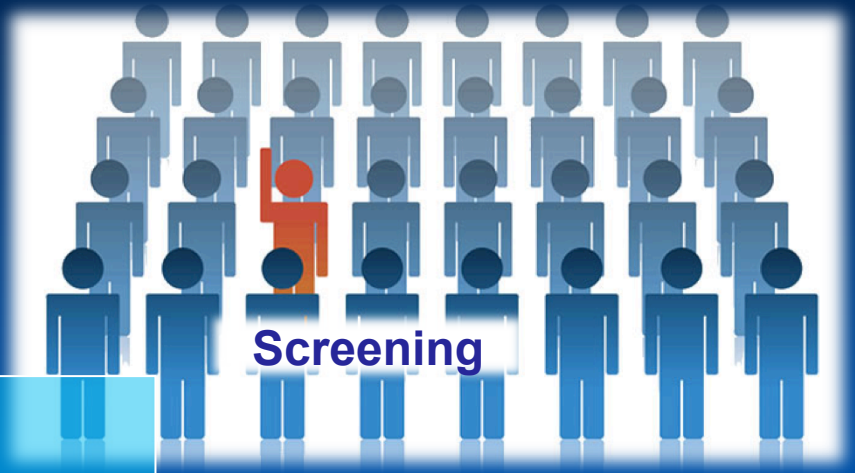

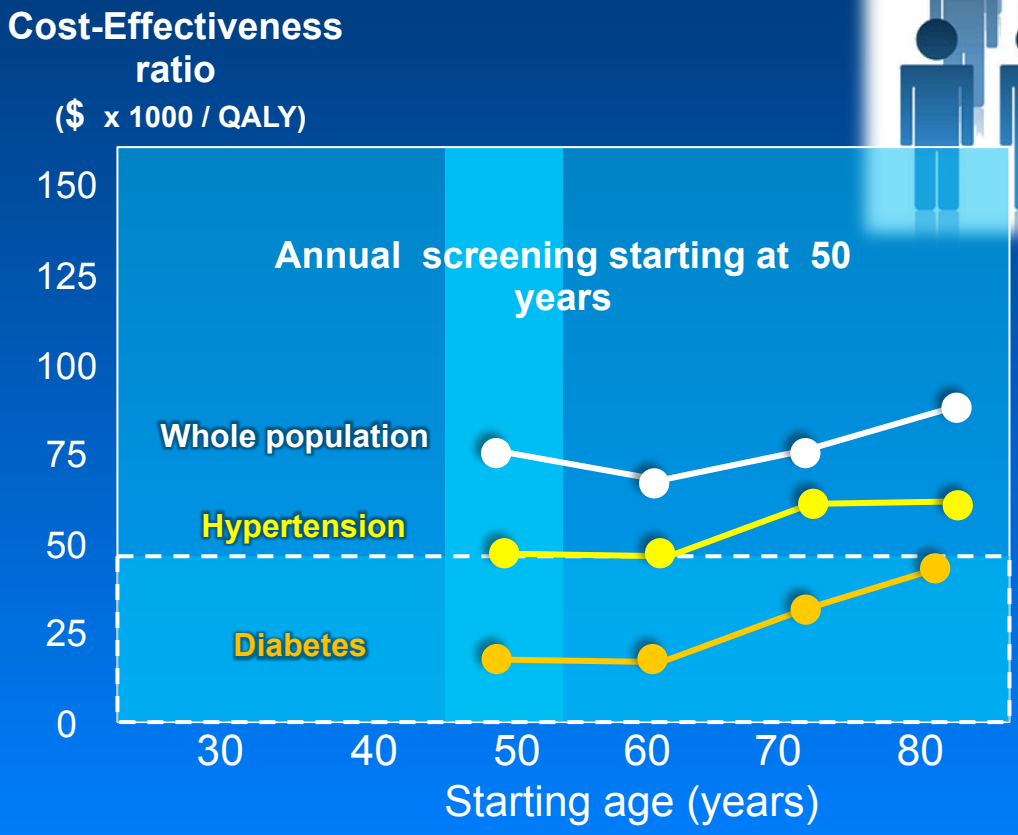

Annual screening cost Effective in Diabetic Patients

Bi annual screening cost effective in Hypertensives