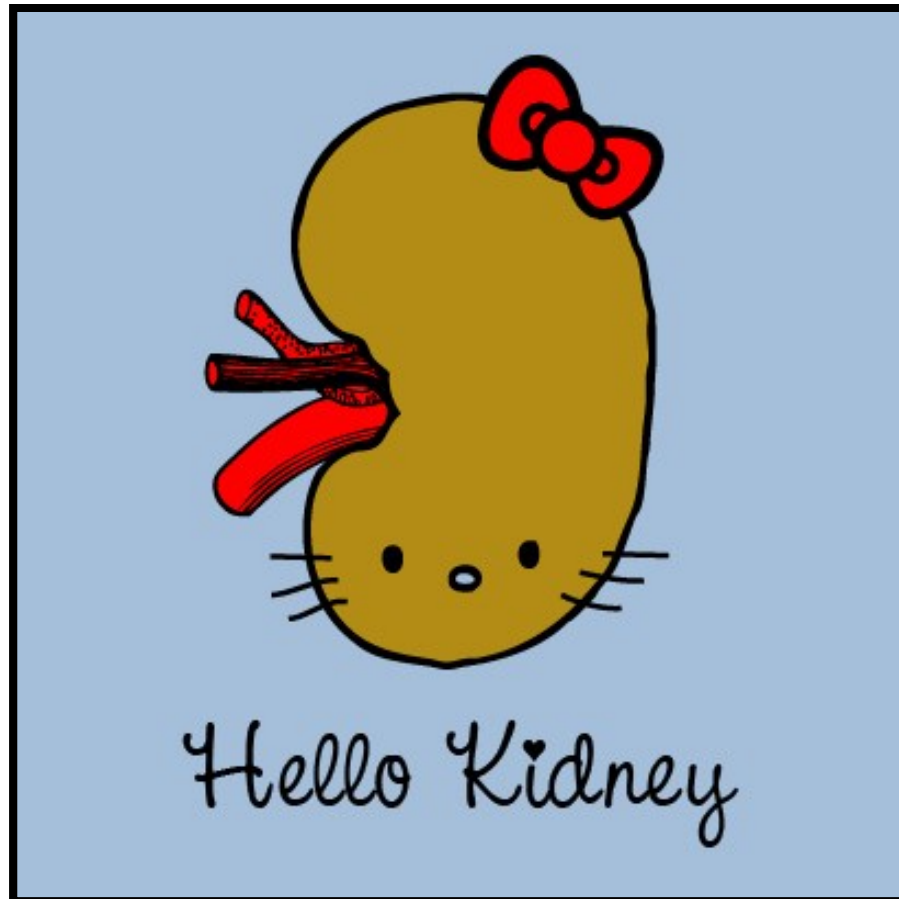


CKD in 2024

New KDIGO Guidelines



Kim Zuber, PAC

Executive Director

American Academy of Nephrology PAs
(AANPA)



Disclosures

I have no relevant relationships with ineligible companies to disclose within the past 24 months



Objectives

- 1) Review the introduction of the race-neutral eGFR calculator
- 2) Discuss the causes, complications and comorbidities of CKD
- 3) Using the 2023 KDIGO CKD guidelines, demonstrate peer-reviewed proven methods to prevent progression of CKD



Kidney Disease Facts

37 million Americans have CKD
15% of the population
1 in 7 Adults

**Every day more than 360
people begin treatment for
kidney failure**

**CKD is the fastest growing
chronic disease**
**And concentrated in the
20-54 y/o!**

**90% of those with CKD do
not know it!**

**We have the ability to slow
progression to kidney failure; IF
we intervene early**



Kidney Disease Facts

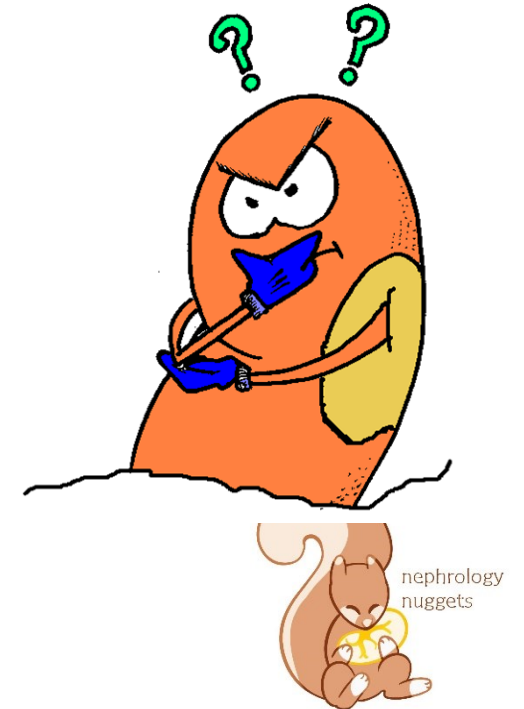
The cost of CKD Stage 1-5 is more than
\$130 BILLION

25% of the Medicare Budget

This is larger than the budget of the NIH
+ NASA + Homeland Security all added
together

How to Slow CKD Progression

- 1) Identify patients
 - A) Check SCr
 - B) Check UACR
- 2) Manage HTN
- 3) Manage DM
 - A) A1C < 7%
 - B) More importantly, no hypoglycemia
- 4) Manage Albuminuria
 - A) Decrease albuminuria by 30%
- 5) Protect the kidneys



Diagnosis of CKD

*Table 1. Criteria for Chronic Kidney Disease**

Markers of kidney damage (≥ 1 for >3 mo)

Albuminuria (AER ≥ 30 mg/d; ACR ≥ 30 mg/g)

Urinary sediment abnormalities

Electrolyte and other abnormalities due to tubular disorders

Abnormalities detected by histology

Structural abnormalities detected by imaging

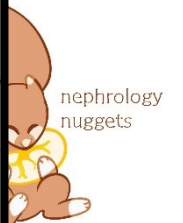
History of kidney transplantation

OR

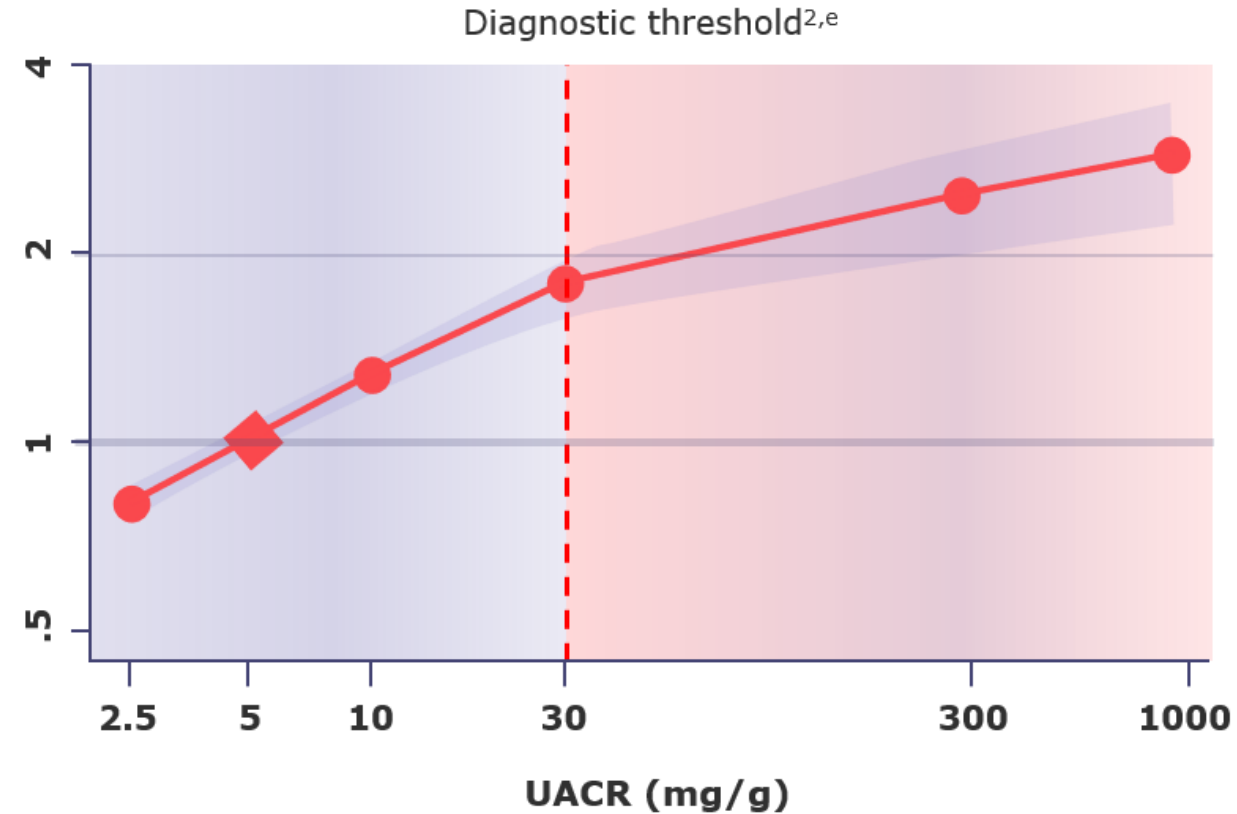
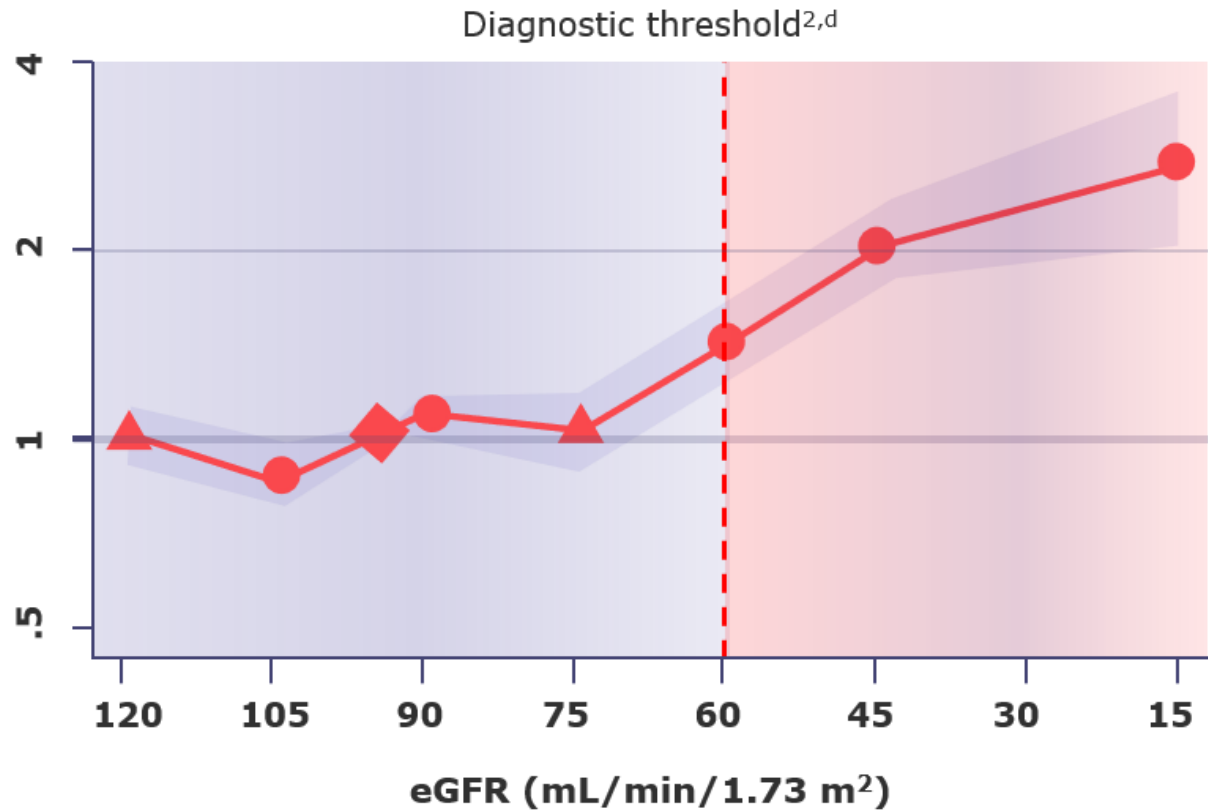
Decreased GFR (for >3 mo)

GFR < 60 mL/min per 1.73 m² (GFR categories G3a–G5)

ACR = albumin–creatinine ratio; AER = albumin excretion rate; GFR = glomerular filtration rate.



For Diagnosis UACR OR eGFR



The UACR will go up BEFORE the eGFR goes down...

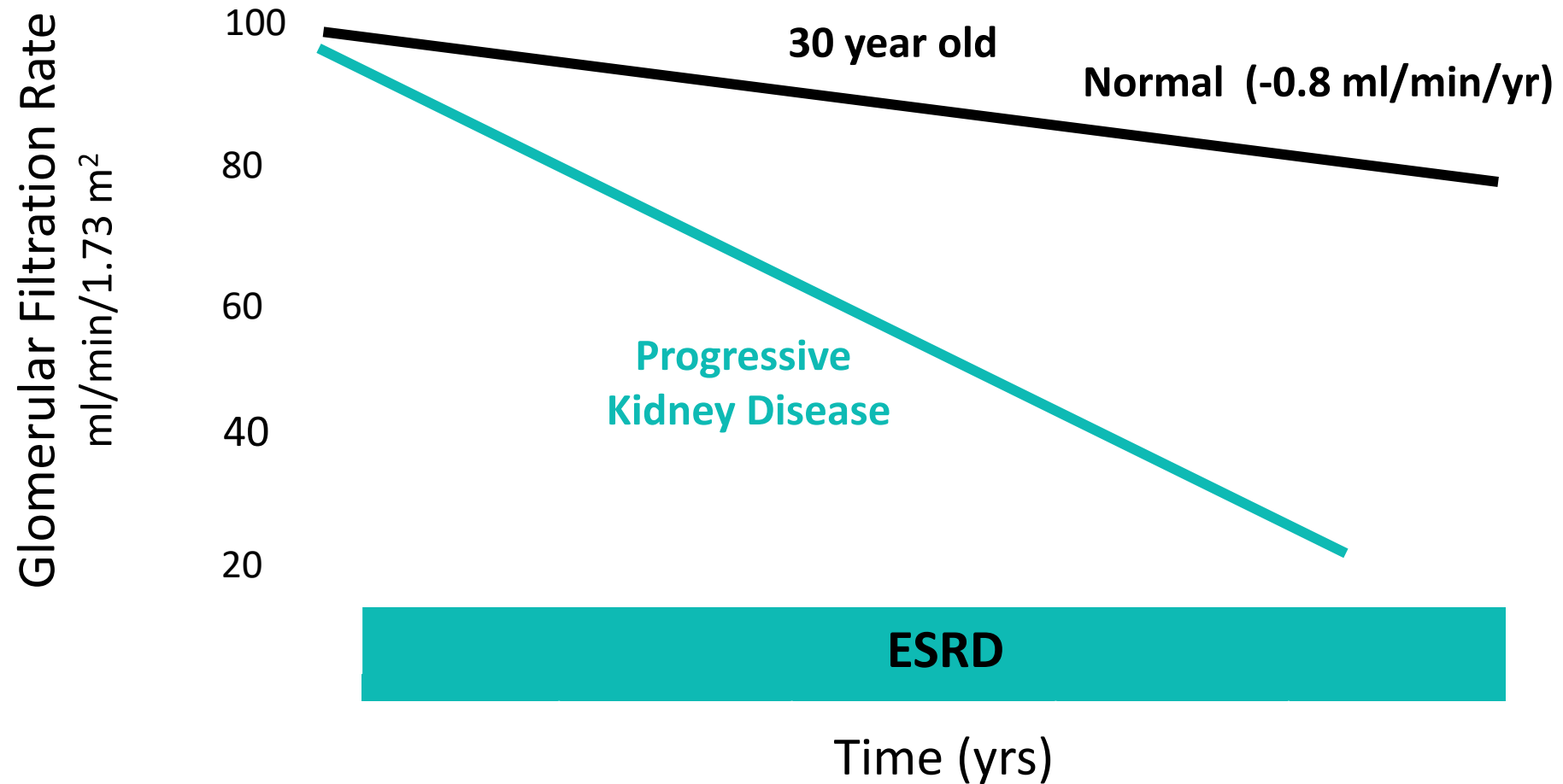


Stages of CKD

Composite ranking for relative risks by GFR and albuminuria (KDIGO 2009)				Albuminuria stages, description and range (mg/g)				
				A1		A2	A3	
				Optimal and high-normal		High	Very high and nephrotic	
				<10	10–29	30–299	300–1999	≥2000
GFR stages, description and range (ml/min per 1.73 m ²)	G1	High and optimal	>105					
			90–104					
	G2	Mild	75–89					
			60–74					
	G3a	Mild-moderate	45–59					
	G3b	Moderate-severe	30–44					
	G4	Severe	15–29					
G5	Kidney failure	<15						



Normal Age Progression of Kidney Function



REVEAL Trial: eGFR decline before and after a CKD Diagnosis

Median annual decline in eGFR
(mL/min/1.73 m²) **significantly
decreased** following a CKD
diagnosis ^a

Before

-3.20

95% CI: -3.38, -3.00

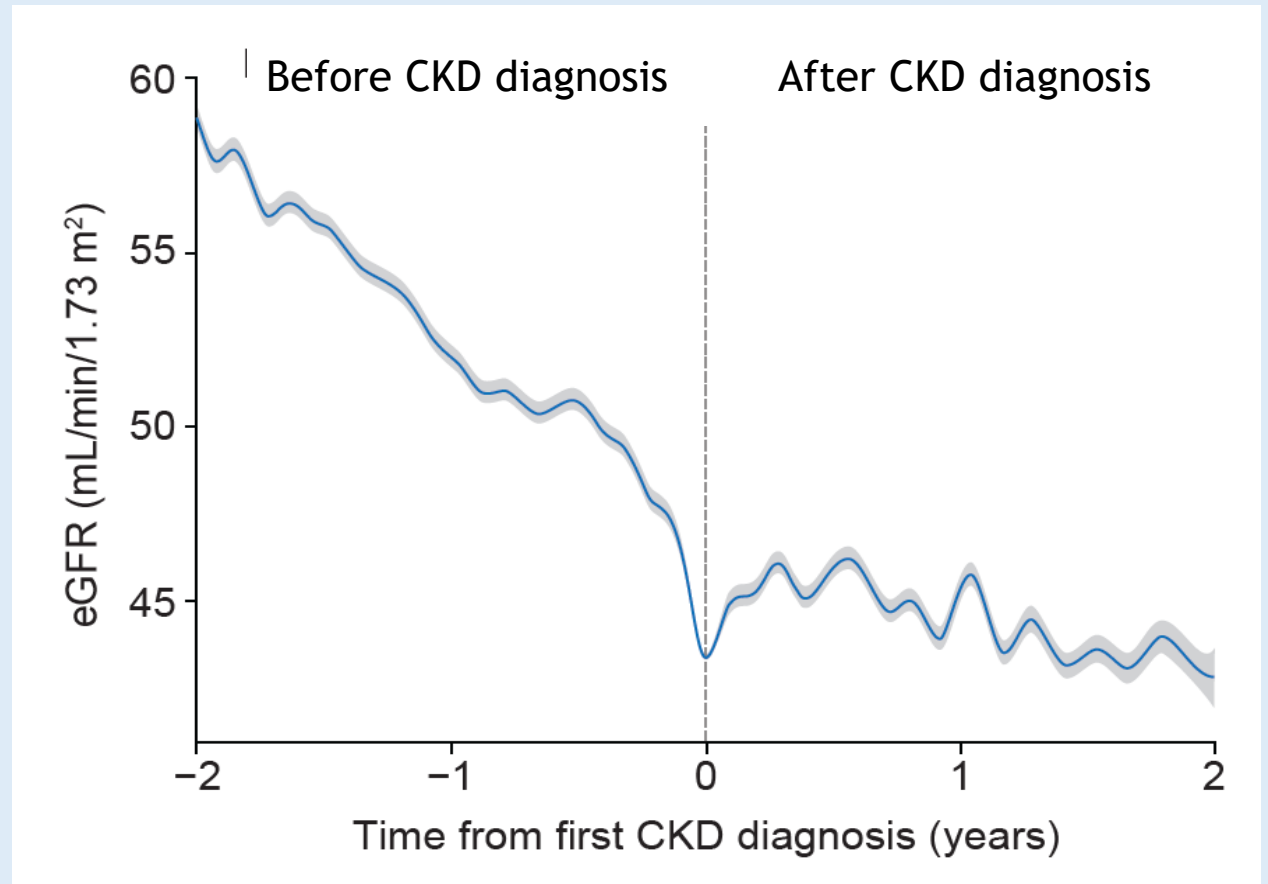
After

-0.74

95% CI: -0.96, -0.53



eGFR trajectories before and after a CKD diagnosis

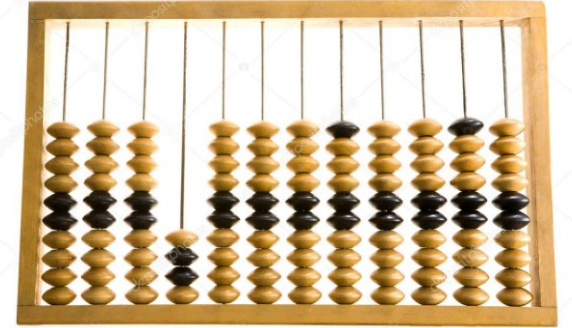


Shaded area represents 95% CIs

eGFR Calculators for Kidney Function

1976 Cockcroft-Gault formula

- Compared 249 White hospitalized males with inulin vs calculator
- Requires age, gender, SCr, weight
- 15% less in females (never confirmed)
- Reports as CrCl, often in FDA package inserts



1999 Modification of Diet in Renal Disease (MDRD) formula

- Compared 1585 CKD patients with iothalamate vs calculator
- Requires age, gender, SCr, BUN, Albumin, race (*Black 1.2 modifier*)
- Adjusted to age, gender, SCr, race in 2000 (*Black 1.2 modifier*)

2012 CKD-EPI formula

- Developed with input from large data bases at NIH (NHANES, AASK)
- Contains 'correction' for race (*Black 1.16x modifier*)



Race-neutral eGFR calculator



Recommendation
equation
The equation ref
immediately ava
consequences th



Recommendation
timely use
decision-m



Encourage
endogeno
racial and



The Task
carefully r

National Kidney Foundation eGFR CALCULATORS

MOBILE APP



ONLINE



ation of the **CKD-EPI creatinine**
e in all laboratories in the U.S.
ing, includes diversity in its development, is
ble performance characteristics and potential
group of individuals.

ate increased, routine, and
confirm eGFR in clinical

R estimation with new
interventions to eliminate

diverse stakeholders and
ate these recommendations

Cynthia Delgado, Mukta Baweja, Deidra
Approach for GFR Estimation: Recomm
Force on Reassessing the Inclusion of R
AJKD DOI: 10.1053/j.ajkd.2021.08.003, JA

Visual Graphic by Edgar Lerma, MD, FASN



JASN
JOURNAL OF THE AMERICAN SOCIETY OF NEPHROLOGY

AJKD
AMERICAN JOURNAL OF KIDNEY DISEASES



phrology
gets

What Changed in the Calculator?

Old formula: CKD-EPI eGFR_{cr} (CKD-EPI) (age, sex, race)

$eGFR = 141 \times \min(Scr/k, 1)^\alpha \times \max(Scr/k, 1)^{-1.209} \times 0.993^{Age} \times 1.018$ [if female] $\times 1.159$ [if black] Where Scr is serum creatinine, k is 0.7 for females and 0.9 for males, α is **-0.329** for females and **-0.411** for males, min indicates the minimum of Scr/ k or 1, and max indicates the maximum of Scr/ k or 1

New formula: eGFR_{cr} (CKD-EPI) refit without race variable

$eGFR = 142 \times \min(Scr/k, 1)^\alpha \times \max(Scr/k, 1)^{-1.200} \times 0.9938^{Age} \times 1.012$ [if female] where Scr is serum creatinine, k is 0.7 for females and 0.9 males, α is **-0.241** for females and **-0.302** for males, min indicates the minimum of Scr/ k or 1, max indicates the maximum of Scr/ k or 1



How do I find CKD?

Go for the obvious!

- **Elderly (60!!!!)**
- Minority
- Hypertension/CVD
- Diabetes
- Family history
- **Female**
 - *Although less likely to go to ESRD!*
- On their medical history!

Go for the less obvious!

Previous AKI
Lupus, sarcoid, amyloid, gout, auto-immune...
Previous donor/Previous transplant
History of stones
History of cancer
History of oophorectomy
History of gout
Smoker (any type)
Soda drinkers
Moms who drank with pregnancy
NACL bingers
Almost any medical condition





Sadie

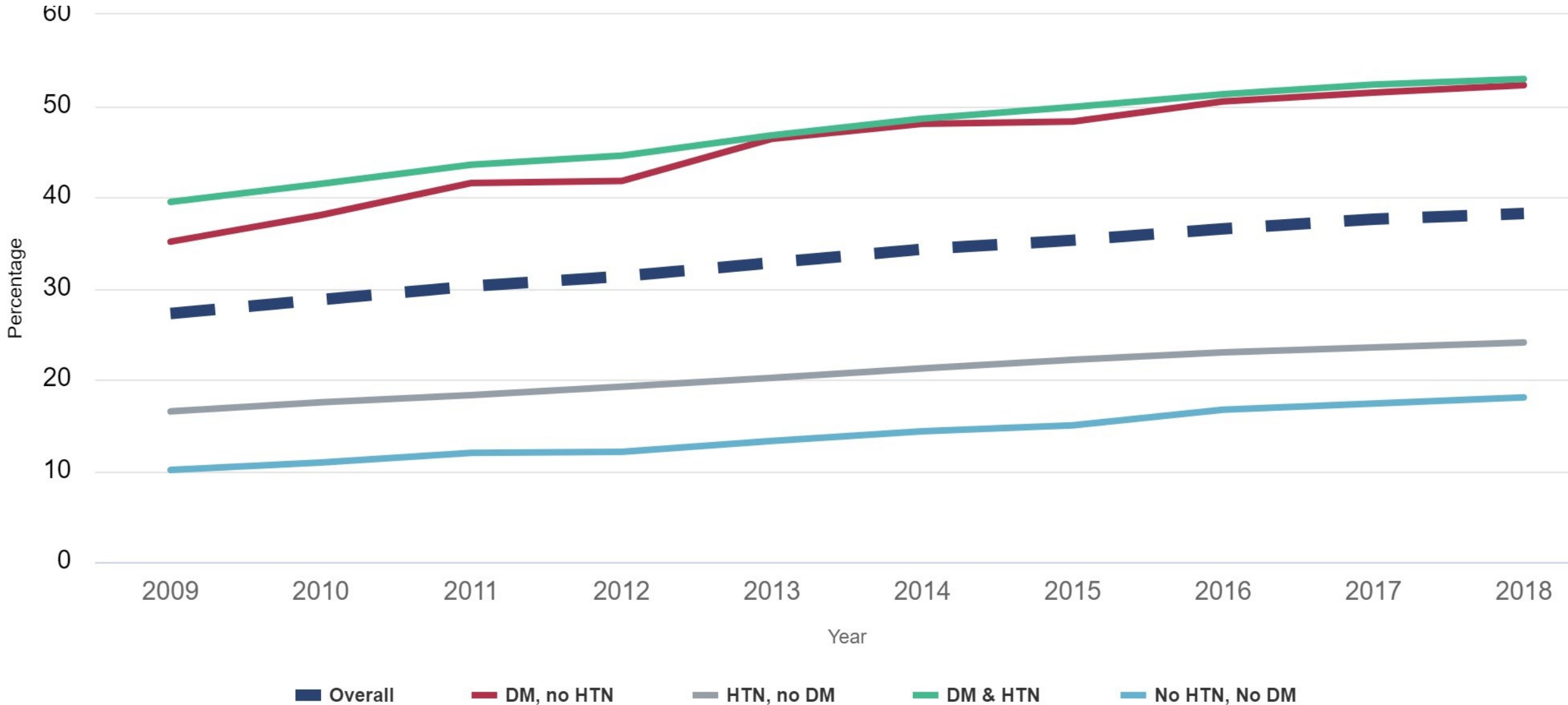
She reports she is 85 y/o, female,
she has diabetes

Labs: eGFR 45ml/min

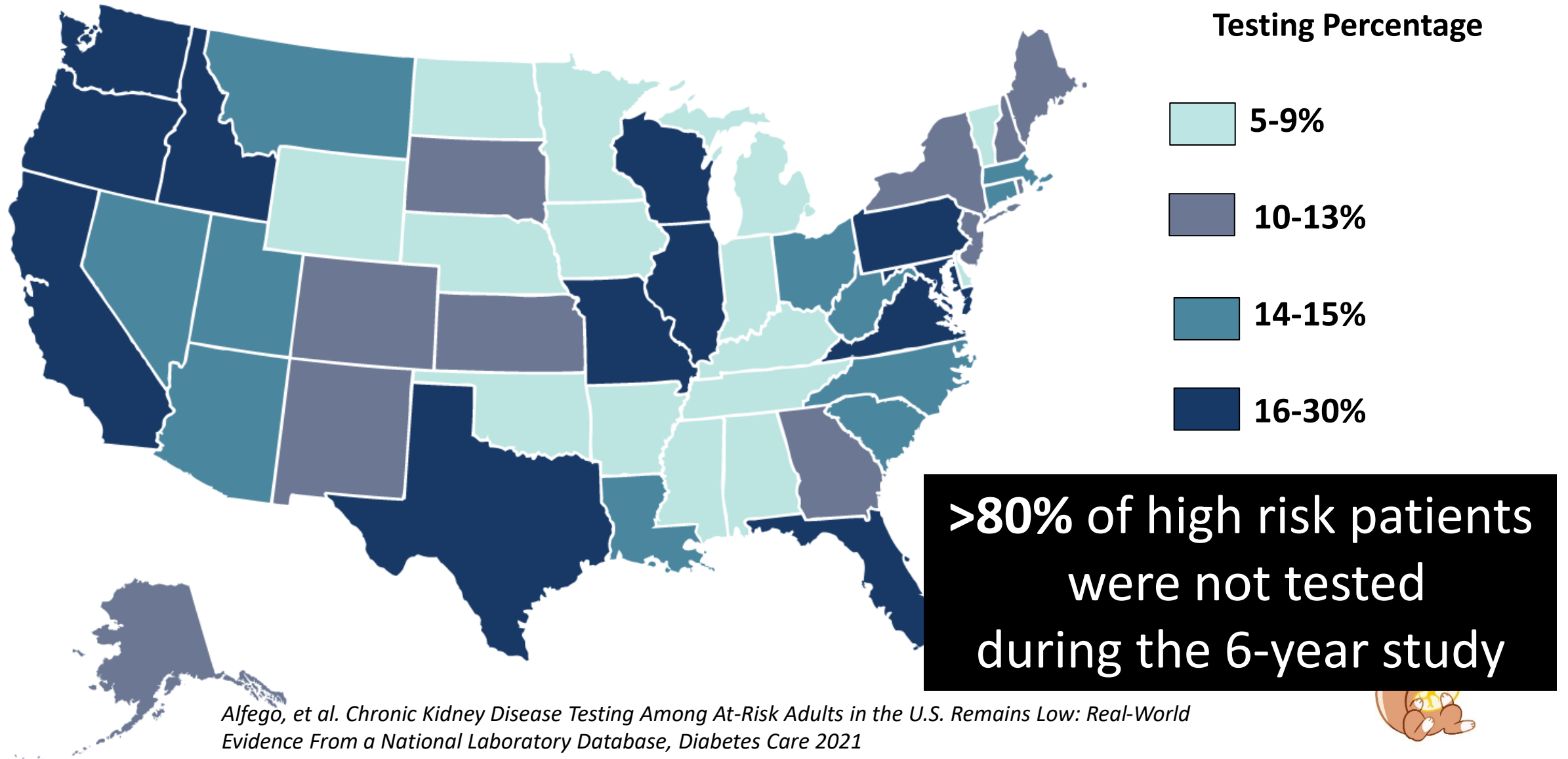
If you lose 1ml/yr above the age of 30,
85-30 means 55 years of GFR loss
100 (*average perfect kidney function*)-55 (*years*)
or expected eGFR is 45ml/min
Will she progress?



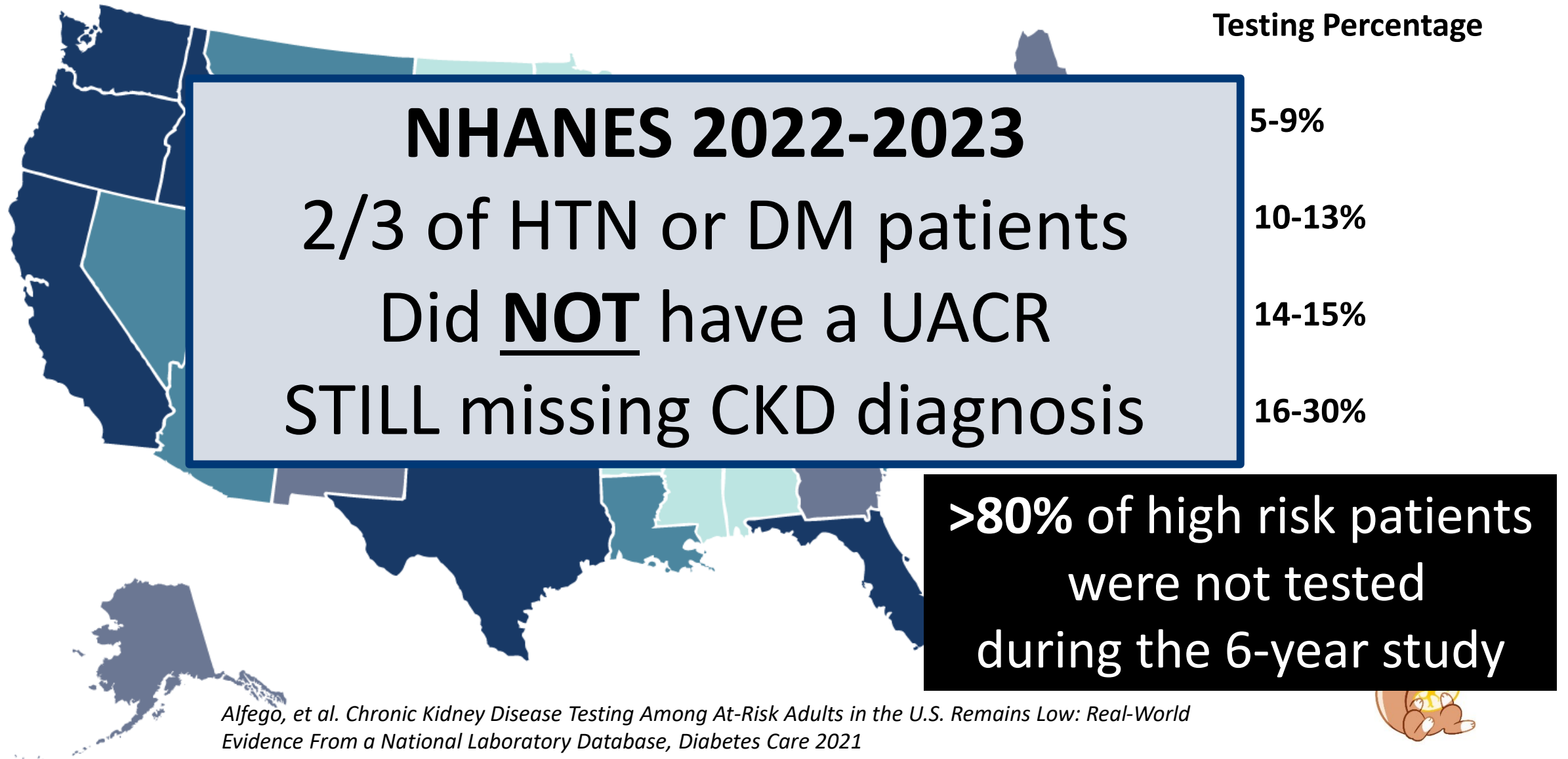
Probability of UACR testing in at-risk Medicare patients



LabCorp: Rates of Testing Patients with DM/HTN 2013 - 2018



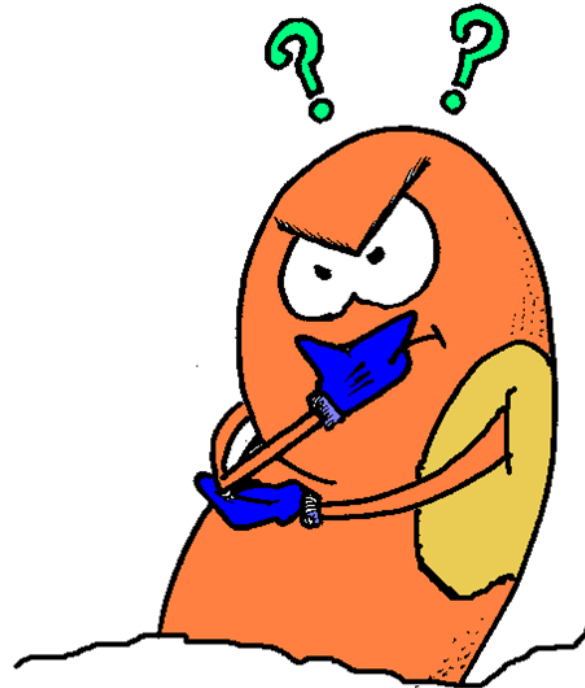
LabCorp: Rates of Testing Patients with DM/HTN 2013 - 2018



What do I order?

Urinary albumin to creatinine ratio
(UACR)

Urine protein to creatinine ratio
(UPCR)



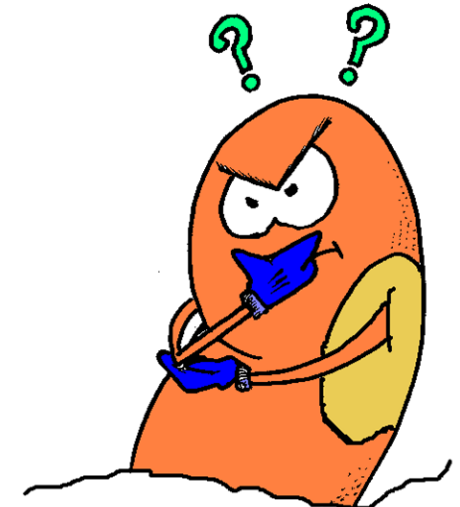
Urine Pearls

- Some labs (Quest, LabCorp) refer to a UACR as 'microalbuminuria'
- **Order a UACR at least 1x/yr to monitor kidney function**
 - For all patients with hypertension
 - For all patients with diabetes
 - For all patients with risk factors
 - Age >60 y/o is a risk factor
 - Home UACR tests!



How to Slow CKD Progression

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- 2) Manage HTN**
- 3) Manage DM
 - A) A1C < 7%
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 - A) Decrease albuminuria by 30%
- 5) Protect the kidneys



Hypertension

The most common comorbidity in CKD is HTN



If HTN doesn't cause your CKD,
your CKD will cause HTN

KDIGO HTN Goals:

- Target SBP 120mm Hg
- Use automatic office cuff X 3
- No DBP goal



Effectiveness of Lifestyle Changes

Modification	Example	Approx Reduction
Physical activity	Aerobic (brisk walking?) >30/day... most days	4-9mmHg
DASH eating plan	Low fat diet rich in fruits, vegetables	8-14mmHg
NACL restriction	Decrease to 2.4gm/day	2-8mm Hg
Moderate ETOH	1 drink/women, 2 drinks/men	2-4mmHg
Weight loss	BMI 18.5-25	5-20mmHg/10kg weight loss
Stress reduction	Practice modality	5mmHg
Quit smoking	Any which way	2-4mmgHg after 1 week

NACL Restriction

Stage of Kidney Disease
= NACL clearance

Tricks:

Pork holidays

No cooking w/NACL

'B' cooking



First Choice: ACEi/ARB

ACEi OR ARB:

First choice in Diabetes and/or CKD

Even in the AA population

Will decrease albuminuria....

Use it even if there is no albuminuria

It doesn't matter ACEi vs ARB

Only 1 or the other due to:

- inc risk of hyperkalemia
- Hypotension
- AKI/failure
- no decrease in mortality



One or the other
NOT BOTH!



Rose



74 y/o routine visit

PMH: PVD, HL, HTN

Meds: metoprolol, HCTZ, amlodipine, ASA, atorvastatin

PE: 168/98, home 150-160s

Labs: SCr 1.2mg/dL, UACR 30mg/dL, eGFR 56mm/min

Add lisinopril for BP/UACR control

F/U labs 2 weeks later, **SCr 1.5mg/dL with K 5.2mEq/L**

What is an acceptable rise in SCr starting an ACEi/ARB?

Acceptable rise in SCr is 20-30%



When do I stop an ACEi/ARB?

The STOP-ACEi trial

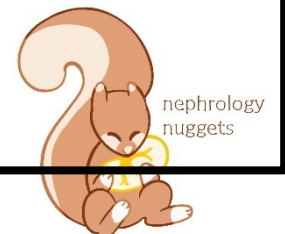
Multicenter UK randomized controlled trial of ACEi/ARB withdrawal in advanced kidney disease

Trial ran 2018-2022

Longer trial time due to pandemic

Should we stop ACEi/ARB to try to save the kidneys???

**Higher death rate from kidney endpoints
If you stop the ACEi/ARB**



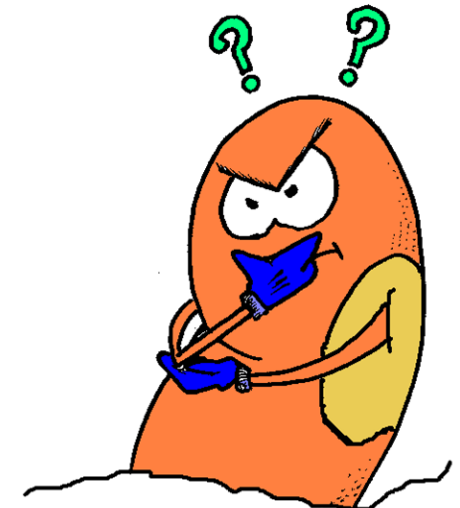
Hypertension Pearls

- NACL restriction is just as effective as medications
- Always tell a patient that it will take 3-4 meds for control;
If it takes fewer, they think you are brilliant
- Start with **ACEi/ARB**, then diuretic (if possible)
- Consider an **SGLT2i** early in the process; It is a diuretic
- CCBs work **VERY** well but not specific for the kidneys
- With cardiovascular disease...ACE/CCB>ACE/diuretic
- Thiazide diuretics do **NOT** work if the eGFR<30ml/min
- **NOTHING works if you cannot afford it**

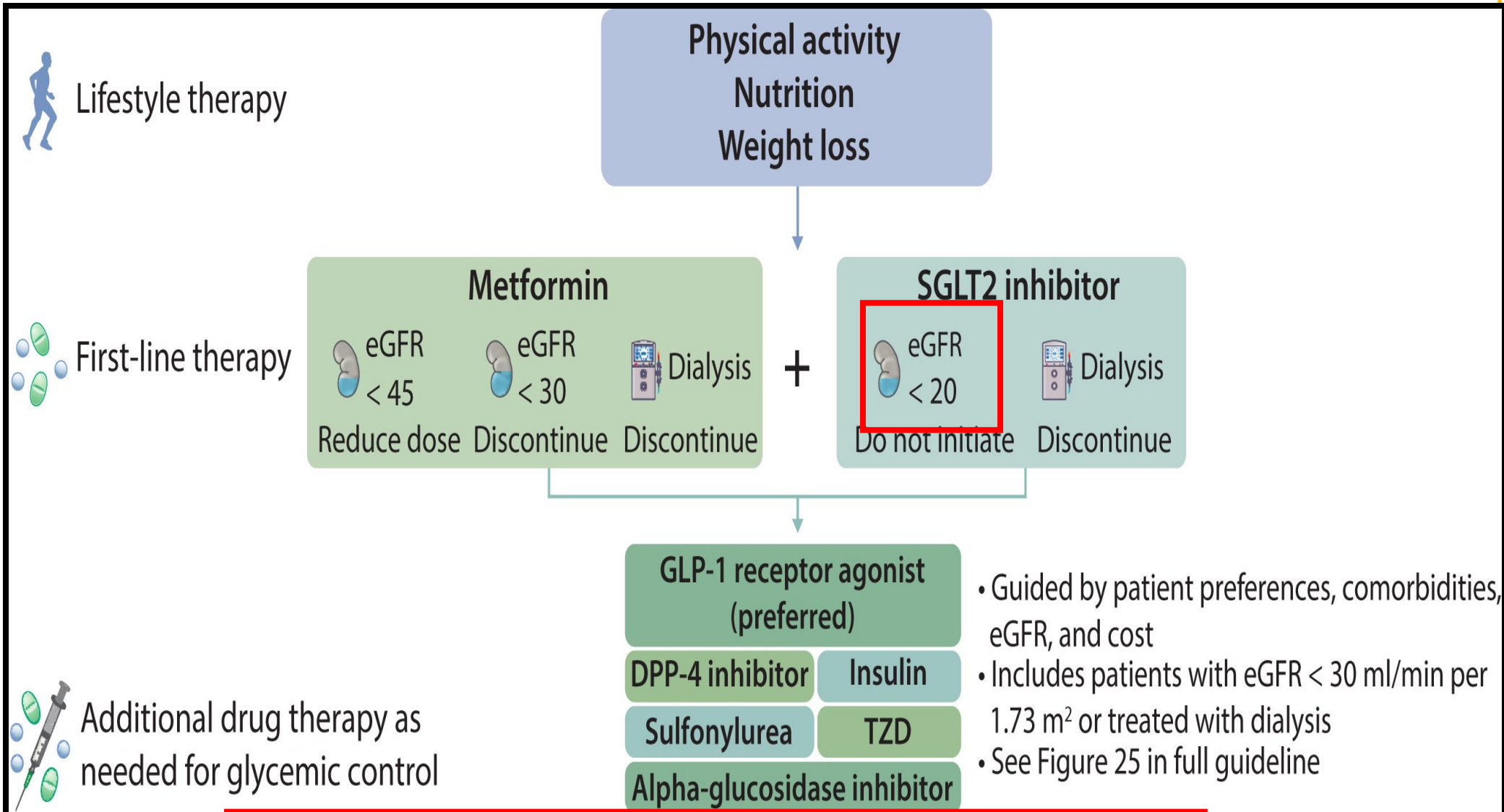


How to Slow CKD Progression

- 1) Identify patients
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 - B) Check UACR
- 2) Manage HTN
- 3) **Manage DM**
 - A) **A1C < 7%**
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2022 KDIGO: Update for DM Treatment in CKD

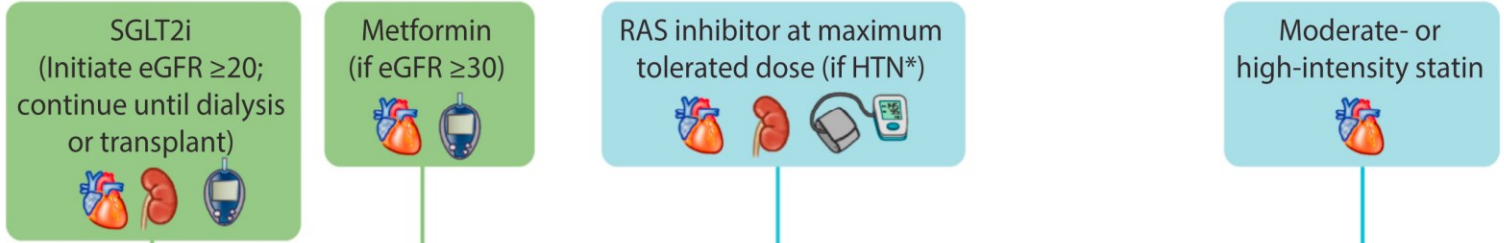


NOTE: Lower eGFR of 20 for starting SGLT2i

Lifestyle



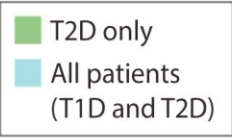
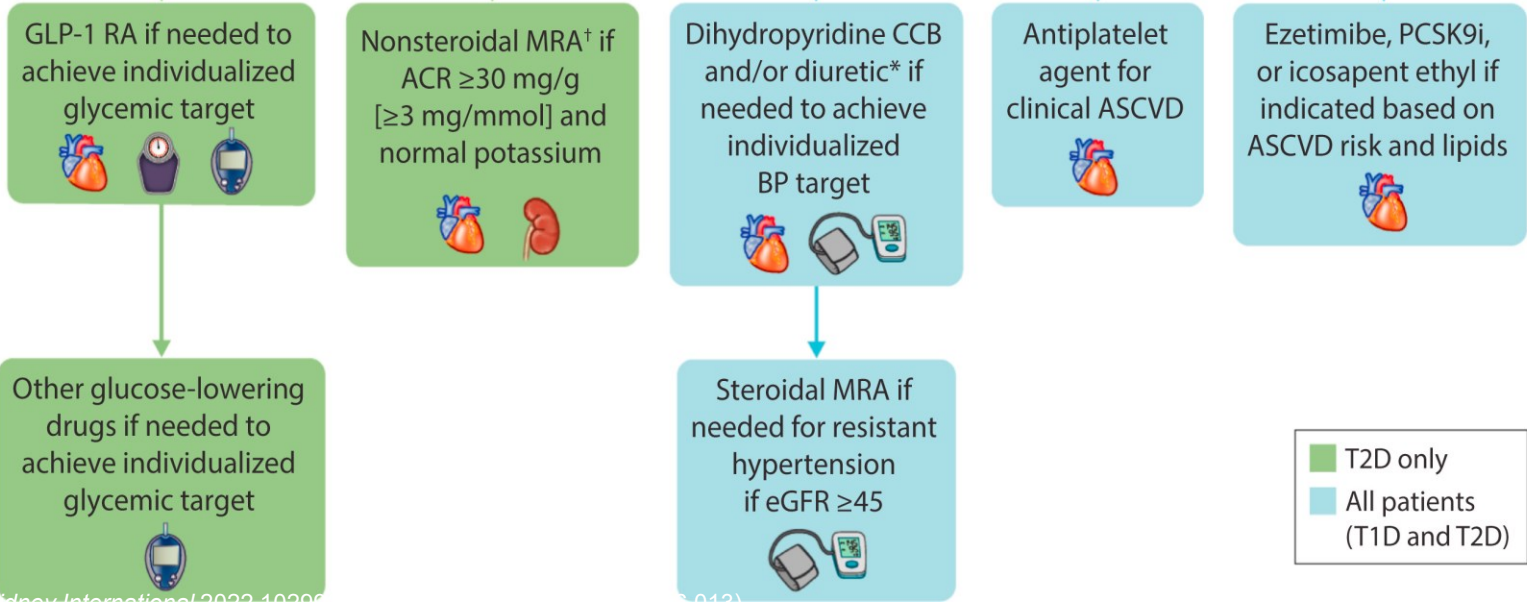
First-line drug therapy



ADA/KDIGO
Oct 2022

Regular reassessment of glycemia, albuminuria, BP, CVD risk, and lipids

Additional risk-based therapy



© 2022 American Diabetes Association. <https://doi.org/10.2337/142906>

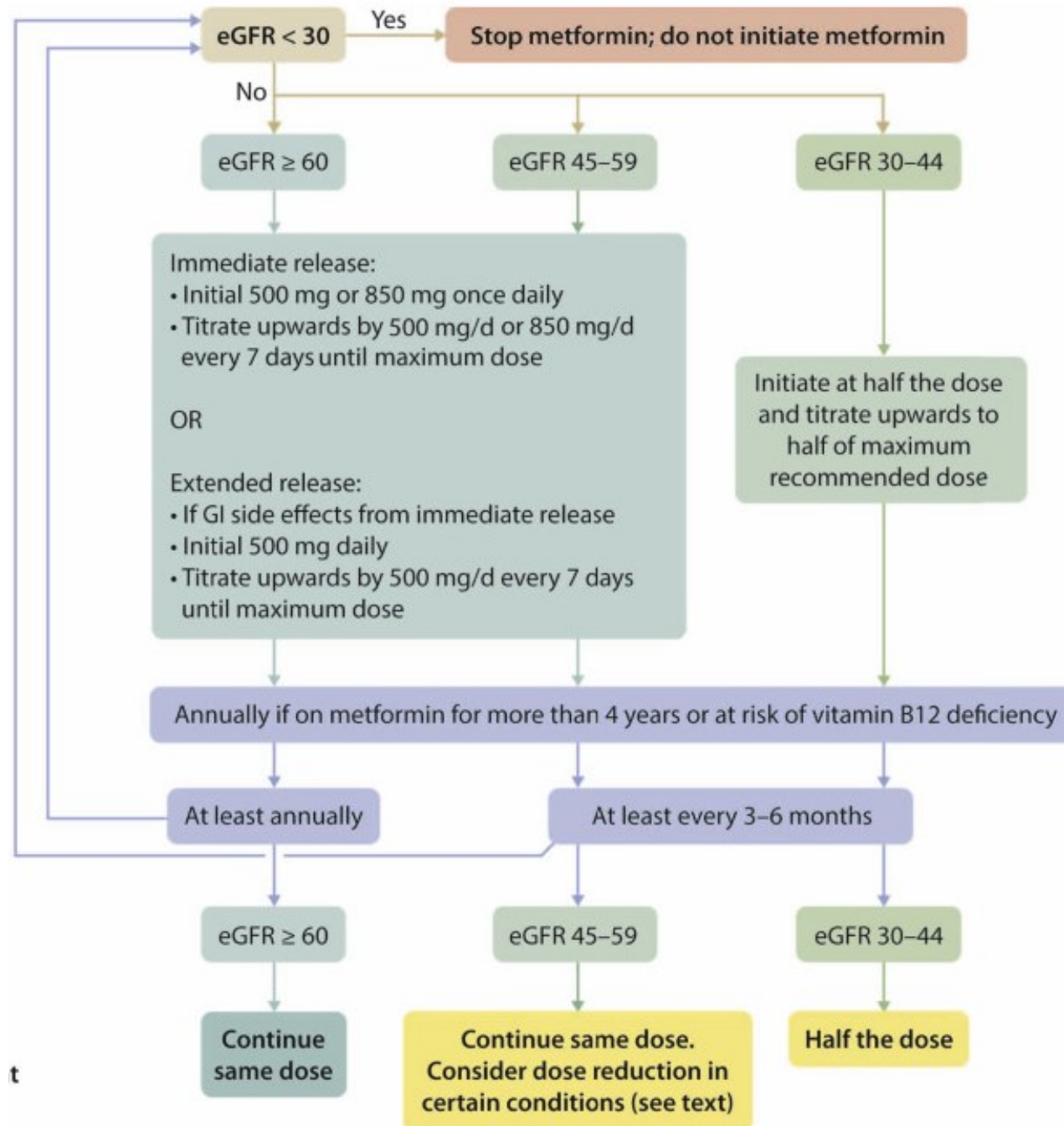
© 2022

Kidney Specific Family Details: Metformin

- This should be the first medication for any DM patient
- Metformin is underutilized in DKD
- It is an older medication and therefore cheap
- Dosing is dependent of side effects (usually GI)
- Decreases CV risks which cause 70% of all CKD deaths
- Often will decrease cholesterol, triglycerides and weight



Metformin Dosing in CKD: Algorithm Format

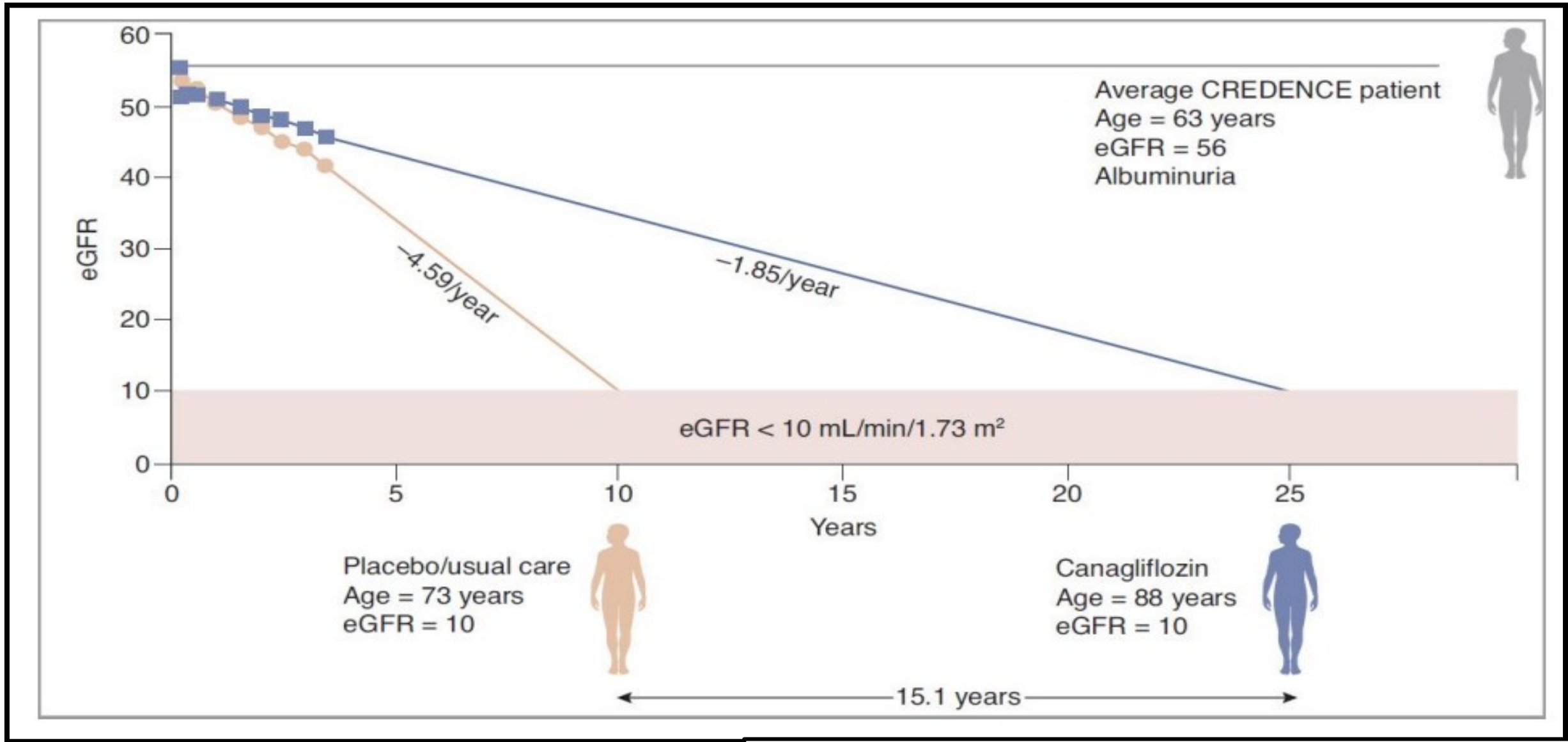


MACE Endpoints for SGLT2i Trials

- 1st trial **EMPA-REG** with kidney as secondary outcome
Protected against Nephropathy! 44% DECREASE in kidney endpoints
Lowered albuminuria, slowed eGFR loss, lowered kidney/CV death
- **CREDESCENCE** enrolled DKD patients for a primary endpoint trial All had UACR>300mg/dL; Stopped early, 43% DECREASE in kidney endpoints
Lowered albuminuria, slowed eGFR loss
- **DAPA CKD** enrolled CKD patients for primary endpoint trial
All had albuminuria but ½ did NOT have diabetes, 39% DECREASE
Lowered albuminuria, slowed eGFR loss, lowered kidney/CV death
- **EMPA-KIDNEY** enrolled CKD patients with and without albuminuria
Trial stopped early but all patients did better with SGLT2i, 28% DECREASE
Those with more albuminuria showed best results

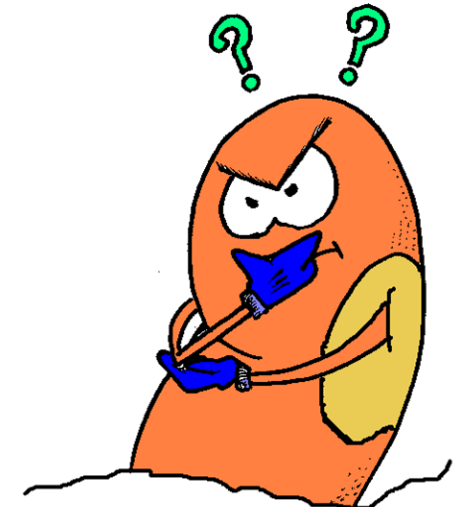


In graphic form; SGLT2i slows CKD progression



How to Slow CKD Progression

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 - A) A1C < 7%
 - B) More importantly, no hypoglycemia
- 4) **Manage Albuminuria**
 - A) Decrease albuminuria by 30%**
- 5) Protect the kidneys



Practical Management Lessons for SGLT2i

- Initially treat with maximum dose of ACE/ARB before adding SGLT2i
SGLT2i can be used up down to an eGFR of 20ml/min
- If patient on loop diuretic, ½ the dose....
(No difference if: ½ number of daily doses or ½ each dose)
- Tell patient to increase fluid (*water*)
- Monitor blood pressure; all SGLT2i are diuretics too!
- There will be a drop in eGFR (inc in SCr) but take a deep breath, step away from EHR and ignore
- The A1C may not decline by much as CKD progresses, however, reno/cardio protection occurs
- SCr bump from RAAS is 4-6w but from SGLT2i is 4-6mo

Even those with a bump in eGFR had better kidney outcomes



Benefits of SGLT2i

- **Slows progression of CKD**

- CRENDENCE: if eGFR 56ml/min, UACR 927mg/dL-slow progression by 2.74ml/min/year
- DAPA-CKD: if eGFR 44ml/min, UACR 930mg/dL-slow progression by 1.8ml/min/year
- EMPA-KIDNEY: for any level of albuminuria, slows progression of CKD
- **EMPA and DAPA are FDA approved for CKD without DM**

- **Reduces albuminuria**

- 30-40% and this is on top of ACE/ARB

- **SBP reduction**

- 4mm Hg

- **Weight reduction**

- 5-6lb (if eGFR>45ml/min)

- **Reduce A1C**

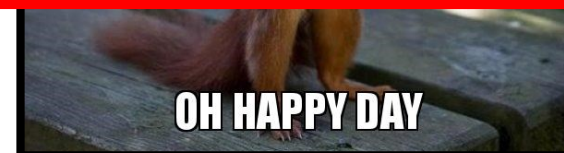
- 0.5-0.8% (if eGFR>45ml/min)

- **Lower uric acid by 10%**

- A 50% lower risk of nephrolithiasis



SGLT2i are for use in CKD
With or without albuminuria, diabetes
SGLT2i medications are CKD medications



SGLT2i and SDOH

- The incidence of ESRD is highest in patients of color and with those with lower socioeconomic status (SES)
- RX for SGLT2i are lowest in:
 - Those with lower SES*
 - Females*
 - Patients of color*
- Among VA patients where medications are free, RX for SGLT2i are lowest in:
 - Females^
 - Patients of color^



SGLT-2 Inhibitors and AKI Hospitalization

- SGLT-2 inhibitors often withheld during AKI among patients hospitalized with acute HF
- Retrospective study of 3305 patients*
 - **Rate of renal recovery not significantly different** between those exposed and unexposed to SGLT-2 inhibitors following AKI (HR 0.94, 95% CI 0.79-1.11, $P=0.46$)
 - SGLT-2 inhibitor exposure associated with **lower risk of 30-day mortality** (HR 0.45, 95% CI 0.23-0.87, $P=0.02$)
- Retrospective study of 10,036 Veterans with AKI restarted on SGLT2i after hospitalization**
 - Post-AKI SGLT2i use was associated with a **reduced risk for progression of CKD** and recurrent AKI

Conclusion: In AKI, including hospitalized patients, restarting or continuing SGLT2i led to decreased mortality and better kidney function



SGLT-2 Inhibitors and AKI Hospitalization

2024 KDIGO Guidelines released 3/14/24

- If medications (metformin, ACEi/ARB and SGLT2i) are discontinued during an acute illness or fasting, a clear plan to restart must be implemented and documented in the medical record
- **Failure to restart these medications may lead to unintentional harm**



FLOW trial – Kidney outcomes with semaglutide in T2DM and CKD

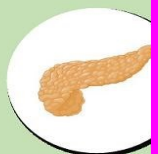
RANDOMIZED, DOUBLE-BLIND, PARALLEL-GROUP, MULTINATIONAL, PHASE 3B TRIAL

Background: GLP-1RAs improve glycaemic control and reduce body weight in patients with T2DM, and reduce the risk of CV events in patients at high CV risk. GLP-1RAs may also have kidney-protective effects, but their benefits on CKD progression remains to be confirmed.

Objectives: FLOW is a randomized kidney outcomes trial designed to assess the treatment effect of semaglutide OW in a population of patients with CKD and T2DM at high risk of kidney disease progression (based on KDIGO classification).

Clinical implications: The FLOW trial will provide evidence on the treatment effect of semaglutide on renal outcomes, potentially expanding treatment options for patients with T2DM to slow the progression of CKD and reduce renal failure.

Study

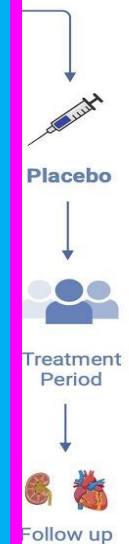


- Adult patients with
- eGFR ≥ 50 to ≤ 75 ml/min/1.73 m²
- UACR >300 to <4000 mg/g
- eGFR <50 ml/min/1.73 m²
- UACR <5000 mg/g



418 study sites

GLP in CKD
Data to be released at
European Nephrology
Meeting 5/23/24



Duration of ≈ 5 y. use.

Primary composite endpoint

- Kidney failure [persistent eGFR <15 ml/min/1.73 m² for at least 4 weeks or initiation of CKRT (dialysis or kidney transplantation)]
- Persistent $\geq 50\%$ reduction in eGFR versus baseline
- Death from kidney failure
- CV death

Semaglutide
(1.0 mg s.c. OW)

+ T2DM and CKD standard of care



Placebo
(1.0 mg s.c. OW)

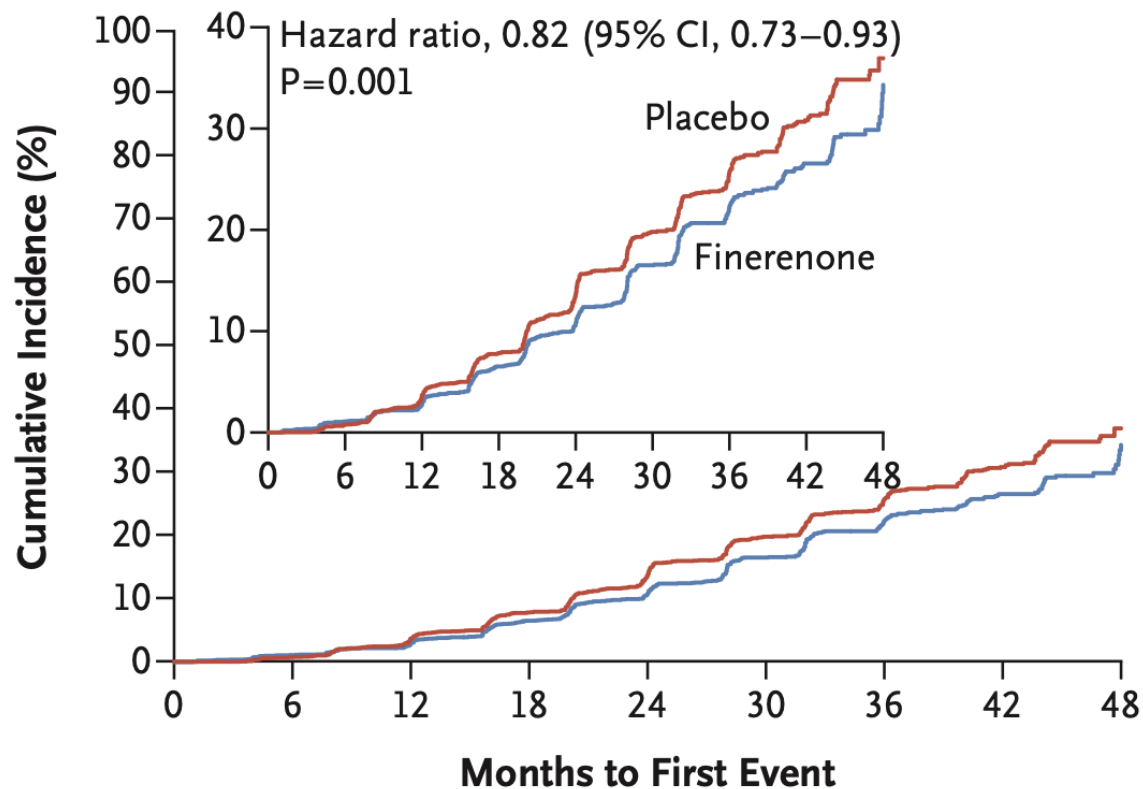
+ T2DM and CKD standard of care



nephrology nuggets

New Kid on the Block- Non-steroidal MRA Finerenone (Kerendia®)

Primary Composite Outcome



Mechanism of Action

Induces conformational change within the mineralocorticoid receptor

Works to decrease inflammation

FDA 7/9/21:

- 1) Reduce the risk of loss of kidney function
- 2) Reduce incidence of kidney failure
- 3) Reduce cardiovascular death
- 4) Reduce non-fatal heart attacks
- 5) Reduce hospitalization for heart failure in adults with CKD and T2DM



Diet Pearls



- Losing weight saves your kidneys
 - Studies show >7 year protection after bypass surgery
- CKD diagnosis helps for Medicare coverage for Bariatric Surgery
- **GLP trials** in analysis at this time; stopped early (Oct 2023) for good outcomes in CKD?!
- If you actually followed the diabetic, kidney, hypertensive, cardiovascular diet, you would only be allowed to eat cardboard
- Mediterranean diet is best, plant protein>animal protein
- High fruit and vegetables can cause hyperkalemia
 - Monitor K with any new diet changes (*and in Jan*)
- **NACL holidays help with HTN and weight loss**



Association of Plant Protein Intake With Risk of Incident CKD: A UK Biobank Study

Study Design



Prospective cohort study



N = 117,809 participants

- eGFR ≥ 60 mL/min/1.73 m²
- UACR <30 mg/g
- No history of CKD



Web-based 24-hour recall questionnaire



Dietary info collected between April 2009-June 2012

Results



Median follow-up:
9.9 years



Incident CKD
N = 3,745 (3.2%)

Plant protein intake (g/kg/day)	CKD Incidence (%)	Adjusted HR (95% CI)
Q1: (<0.27)	1,151 (3.9%)	1.00 (REF)
Q2: (≥ 0.27 and <0.35)	1,007 (3.4%)	0.90 (0.82-0.99)
Q3: (≥ 0.35 and <0.46)	856 (2.9%)	0.83 (0.75-0.92)
Q4: (≥ 0.46)	731 (2.5%)	0.82 (0.73-0.93)
Per 0.1 g/kg/day increase		0.96 (0.93-0.99)

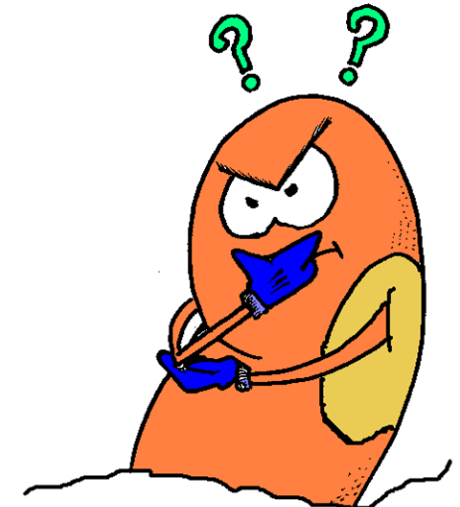
CONCLUSION: In this large, prospective cohort study, greater dietary plant protein intake was associated with a lower risk of incident CKD.

Ga Young Heo, Hee Byung Koh, Hyo Jeong Kim, et al

@AJKDonline | DOI: 10.1053/j.ajkd.2023.05.007

How to Slow CKD Progression

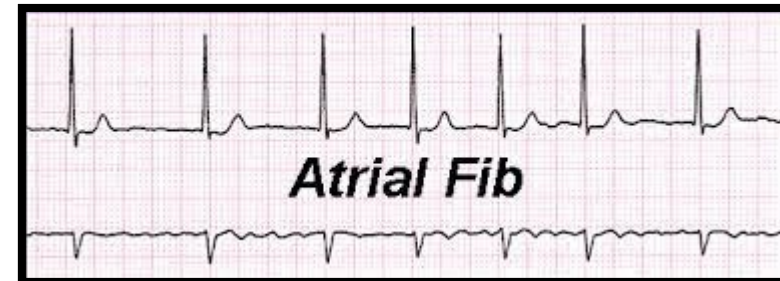
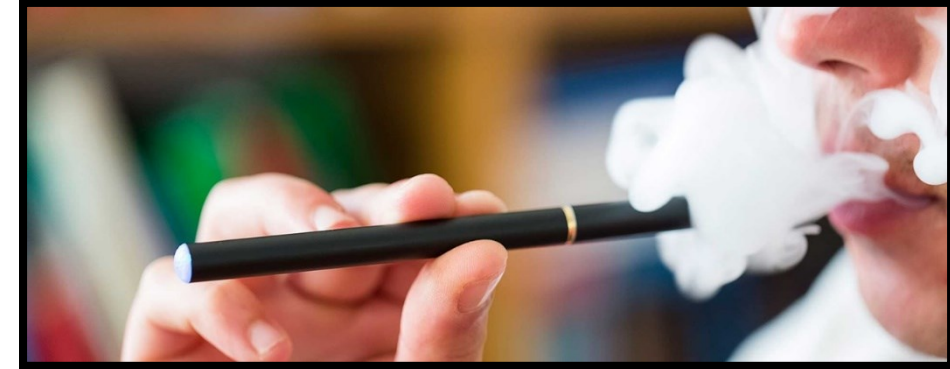
- 1) Identify patients
 - A) Check SCr
 - B) Check UACR
- 2) Manage HTN
- 3) Manage DM
 - A) A1C < 7%
 - B) More importantly, no hypoglycemia
- 4) Manage Albuminuria
 - A) Decrease albuminuria by 30%
- 5) **Protect the kidneys**



Cardiovascular Disease (CVD)



- More than 70% of kidney patients die of CVD
- Statins are underutilized in CKD
- CKD patients are **2-3X** more likely to have atrial fibrillation
 - Take the time to listen with that stethoscope
 - Warfarin vs DOACs is still debated but **KDIGO states to use DOACs**
- Smoking is an issue
 - Including vaping, marijuana and cigarette
 - Oral marijuana is safe in CKD
 - No studies on chewing tobacco



Association between prescribed oral anticoagulants and AKI

Population-based cohort



Ontario, Canada



≥ 66 years



2009-2017



Atrial Fibrillation



n=20,683



Association between oral anticoagulants with acute kidney injury (AKI)



Warfarin
n=2269

Dabigatran
n=2277

Warfarin
n=5363

Rivaroxaban
n=5363

Warfarin
n=8383

Apixaban
n=8217

1.00
Ref

0.65
(0.43-0.79)

1.00
Ref

0.82
(0.70-0.96)

1.00
Ref

0.74
(0.64-0.85)



In subgroup analysis, the lower risk of AKI associated with each DOAC was consistent across each eGFR strata



The risk of AKI was significantly lower among users of each of the DOACs compared to warfarin users who had a percentage of INR ≤56.1%

Conclusion: DOACs were associated with a lower risk of AKI compared to warfarin.

Ziv Harel, Eric McArthur, Nivethika Jeyakumar, et al. *The Risk of Acute Kidney Injury with Oral Anticoagulants in Elderly Adults with Atrial Fibrillation*. CJASN doi: 10.2215/CJN.05920421. Visual Abstract by Edgar Lerma, MD, FASN

KDIGO AND AHA Guidelines for dosing in A Fib

CrCl (ml/min)	Apixaban* (Eliquis®)	Dabigatran (Pradaxa®)	Edoxaban (Savaysa®, Lixiana®)	Rivaroxaban (Xarelto®)
Kidney excretion	27%	80%	50%	36%
>95	2.5 or 5mg bid	150mg bid	60mg qd (contraindicated AHA)	20mg qd
51-95	2.5 or 5mg bid	150mg bid	60mg qd	20mg qd
31-50 <i>Pre-op holds</i>	2.5 or 5mg bid (CrCl>25ml/min) **Hold 48H pre-op	150mg bid or 110mg bid (KDIGO) **Hold 96H pre-op	30mg qd **Hold 48H pre-op	15mg qd **Hold 48H pre-op
15-30	2.5mg bid	75mg bid (AHA)	30mg qd	15mg qd
<15 not on dialysis	2.5 or 5mg bid (AHA) Highest Safety* (KDIGO)	Not recommended	Not recommended	15mg qd (AHA)
<15 on dialysis	1,5 or 5mg bid (AHA) Highest Safety* (KDIGO)	Not recommended	Not recommended	15mg qd (AHA)



*Fu E. Comparative Safety of warfarin or rivaroxaban vs apixaban in advanced CKD, AJKD, Oct 2023, **KDIGO 2024 CKD guidelines

Decrease Smoking Rates



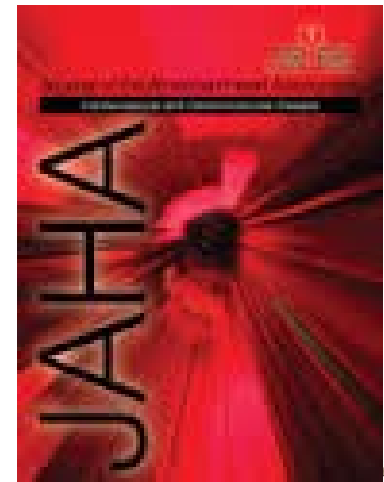
PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Kidney function and tobacco smoke exposure in US adolescents
(Pediatrics May 2013)

For current black smokers there is an 83%↓ kidney function
19 cig/day = ↓75% kidney function
>20 cig/day = ↓97% kidney function
...worse with menthol cigarettes!
(J Am Heart Association, May 2016)

SMOKING or VAPING KILLS NEPHRONS
Marijuana is safe in CKD
As long as it is not smoked or vaped



Hyperlipidemia



CKD = Heart Disease

SHARP Trial: Statins or statins + ezetimibe

Rosuvastatin increases risks of AKI

Fibrates are not recommended in CKD by KDIGO

Uremia affects LDL levels making LDL levels unreliable

When you put a CKD patent on a Statin

FIRE AND FORGET

<http://kdigo.org/home/guidelines/lipids/>

SHARP: The effects of lowering LDL cholesterol with simvastatin plus ezetimibe in patients with CKD (Study of Heart and Renal Protection): a randomised placebo-controlled trial, Lancet 2011, Shin et al. Association of Rosuvastatin Use with Risk of Hematuria and Proteinuria. JASN 2022



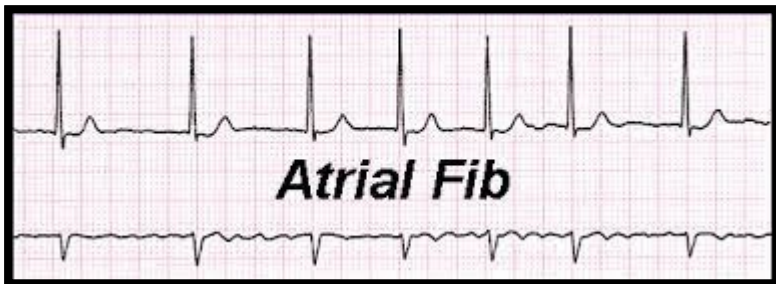
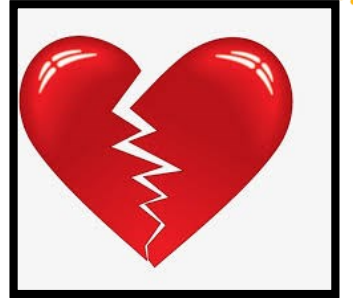
Hyperlipidemia: KDIGO Guidelines

Recommended doses (mg/d) of statins in adults with CKD

Statin	eGFR G1-G2	eGFR G3a-G5, including patients on dialysis or with a kidney transplant
Lovastatin	GP (General public)	nd (not determined)
Fluvastatin	GP	80 ¹
Atorvastatin	GP	20 ²
Rosuvastatin	GP	10 ³
Simvastatin/Ezetmibe	GP	20/10 ⁴
Pravastatin	GP	40
Simvastatin	GP	40
Pitavastatin	GP	2

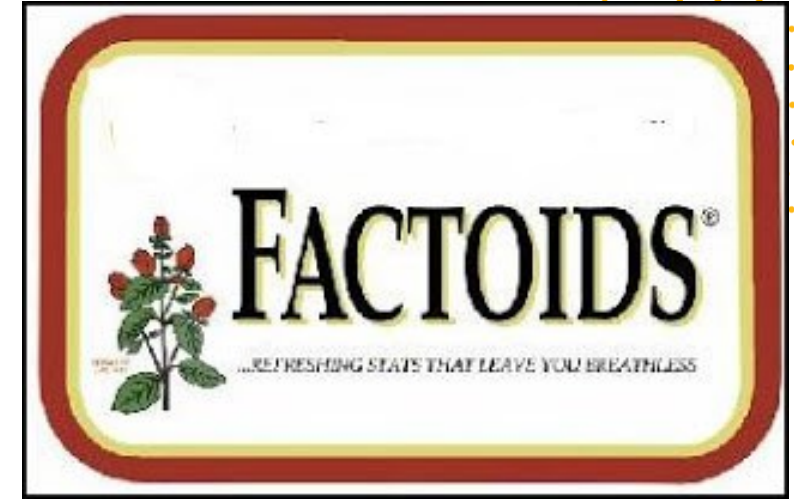
CVD Pearls

- A CKD patient is more likely to die of CVD than kidney failure
- All CKD and DM patients should be on a statin
 - Add Vit D if leg cramps
 - **REAL** rhabdo from statins is <5%
- CKD patients are 2X more likely to have cardiac arrhythmias
 - Mainly a fib
- **All patients with CKD have heart disease**



This and That

- Drinking soda after exercise hurts the kidney
- Sleep (7h/night) is reno-protective
- Bilateral oophorectomy increases CKD risk
 - Increase 7.5% if premenopausal
- Increasing H₂O does not help the kidneys
- Marijuana (oral) does not hurt the kidney and may be helpful in pain
- **ETOH is reno-protective**
- PPIs **DO NOT** cause CKD per Nov 2023 analysis
- As you lose kidney function, you are more likely to have a serious fall
- Untreated Hepatitis C will cause loss of eGFR
- Gut and Dental disease are predictive of CKD





Optimal Follow-up Guidelines for CKD

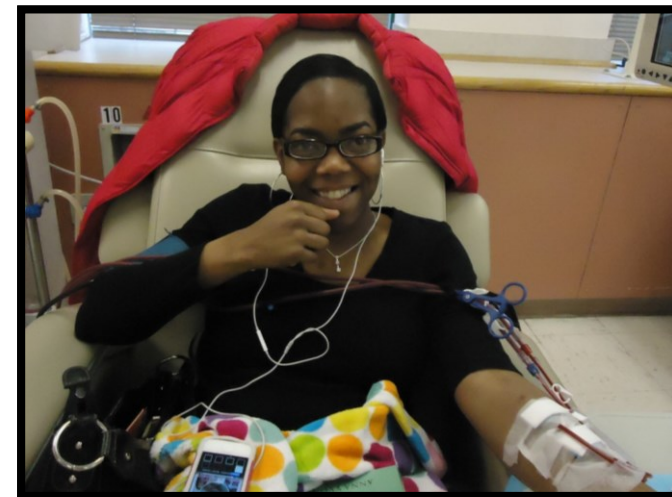
Office visit + Labs



CKD Stage		Follow-up	
3A	6 months		
3B		3.2 months	
4			2 months

The CKD Patient

- 1) Stage by eGFR + UACR
- 2) Monitor UACR; it is predictive of progression
- 3) All CKD patients are cardiac patients
- 4) All patients should be on statins
- 5) All patients should be on RAAS; studies have shown best at higher doses but any dose is important
- 6) All patients should be considered for SGLT2i
- 7) Any patient with albuminuria should be on RAAS + SGLT2i
- 8) Labs 2x/yr for CKD 3a, quarterly for CKD 3b and q6wk for CKD 4, we follow CKD 5 monthly and CKD 5D weekly
- 9) Labs: CBC, A1C (as needed), CMP: Albumin, Ca, CO₂, SCr, Chloride, Glu, PO₄, K, Na, BUN, Vit D (+/-), UACR, Iron indices, Lipid levels, renal ultrasound (+/-)
- 10) Check for a fib, anemia, MBD, acidosis, ***consider birth control***
- 11) Discuss concept of 'normal kidney eating' rather than 'diet'



The Magic Referral

I always hear that your nephrology consultants complain about referrals...

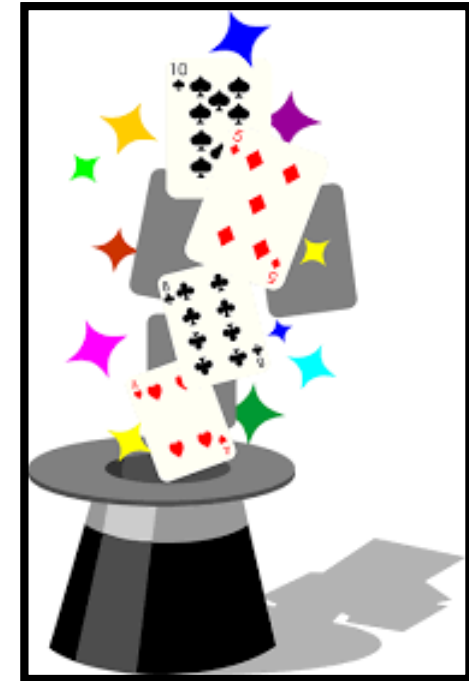
We *are* overwhelmed but...

Start your referral with:

'Per KDIGO Guidelines,

I am referring this patient due to...'

- 1) Uncontrolled HTN
- 2) Stage 4 CKD
- 3) eGFR dropped 25% in 6 months *or*
- 4) SCr increased 25% in 6 months
- 5) Patient request
- 6) Nephrotic range albuminuria or proteinuria



Thank you for helping us care for our CKD Patients!

THANK YOU



Kim Zuber, PAC aanpa1@yahoo.com



References

- 1) Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. *Kidney Int.* 2024;105(4S):S117–S314.
- 2) Kidney Disease: Improving Global Outcomes (KDIGO) Controversies Conference: Trends and perspectives for improving quality of CKD care. *Kidney Int* (2023) 104, 888–903.
- 3) Kidney Disease: Improving Global Outcomes (KDIGO) Controversies Conference: Managing the symptom burden associated with maintenance dialysis. *Kidney Int* (2023)
- 4) Kidney Disease: Improving Global Outcomes (KDIGO) Blood Pressure Work Group. KDIGO 2021 Clinical Practice Guideline for the Management of Blood Pressure in Chronic Kidney Disease. *Kidney Int.* 2021;99(3S):S1–S87.
- 5) Diabetes management in chronic kidney disease: a consensus report by the American Diabetes Association (ADA) and Kidney Disease: Improving Global Outcomes (KDIGO), *Kidney Int* (2022)
- 6) United States Renal Data System. 2023 USRDS Annual Data Report: Epidemiology of kidney disease in the United States. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2023.
- 7) Center for Disease Control and Prevention, Chronic Kidney Disease in the United States 2023 CKD fact sheet
- 8) Bhandari S, Mehta S, Khwaja A, Cleland JGF, et al for STOP ACEi Trial Investigators. Renin-Angiotensin System Inhibition in Advanced Chronic Kidney Disease. *N Engl J Med.* 2022 Dec 1;387(22):2021-2032.
- 9) The EMPA-KIDNEY Collaborative Group, Empagliflozin in Patients with Chronic Kidney Disease *N Engl J Med.* 2023.

