CKD for the PCP

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MedNet21
Center for Continuing Medical Education

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Wexner Medical Center

Disclosures

- None

The Ohio State University
Wexner Medical Center

Outline

- CKD prevalence
- Is CKD a risk factor?
- CKD basics
- Decided to refer? What to do next?
  - CKD work-up
  - Things to AVOID
  - Things that we follow
  - Treatments
- New Treatments

USRDS

(b) Trends in percentage in KDIGO CKD risk categories, 2003-2018

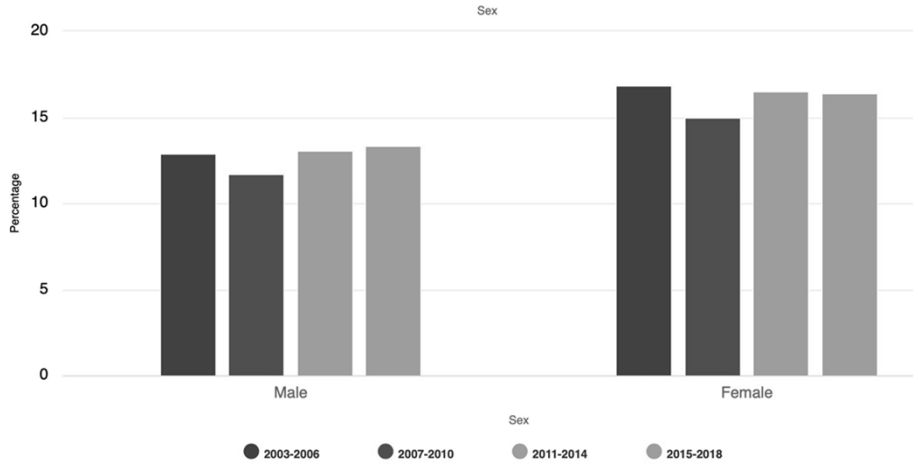
	2003-2006	2007-2010	2011-2014	2015-2018
Low risk	85.1	86.6	85.2	85.1
Moderately high risk	10.9	9.5	10.8	10.9
High risk	2.7	2.5	2.6	2.7
Very high risk	1.3	1.4	1.5	1.3
Total	100	100	100	100

2020 *USRDS Annual Data Report: Epidemiology of kidney disease in the US. NIH, NIDDK*

The Ohio State University Wexner Medical Center

USRDS

Prevalence of CKD in adults within sex, 2003-2018



Data Source: 2020 United States Renal Data System Annual Data Report

2020 *USRDS Annual Data Report: Epidemiology of kidney disease in the US. NIH, NIDDK*

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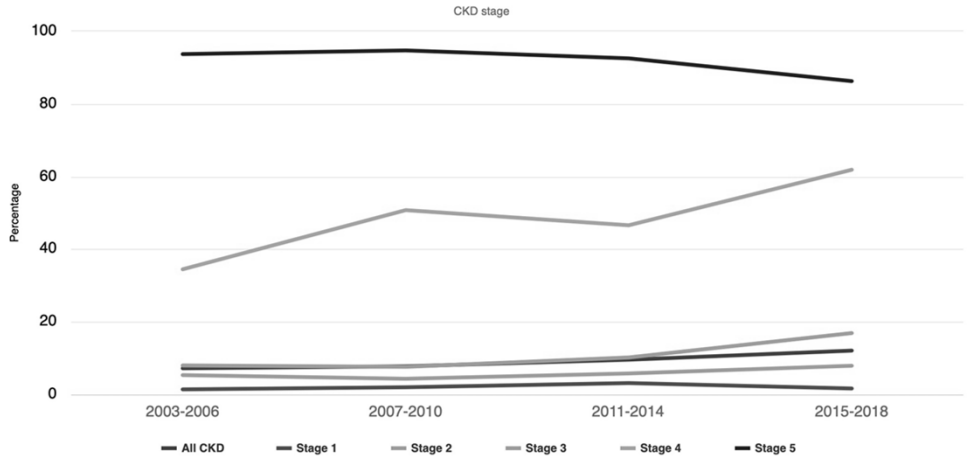
Figure 1.11 Percentage of U.S. adults with CKD aware of their kidney disease, 2003-2018



Data Source: 2020 United States Renal Data System Annual Data Report

2020 *USRDS Annual Data Report: Epidemiology of kidney disease in the US. NIH, NIDDK*

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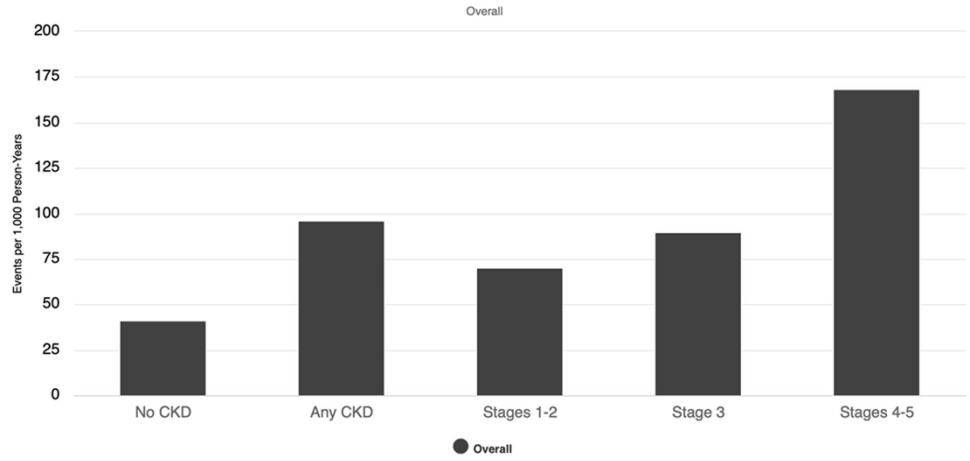
Figure 3.1 Adjusted all-cause mortality in Medicare beneficiaries aged ≥66 years, by CKD status and stage, 2018

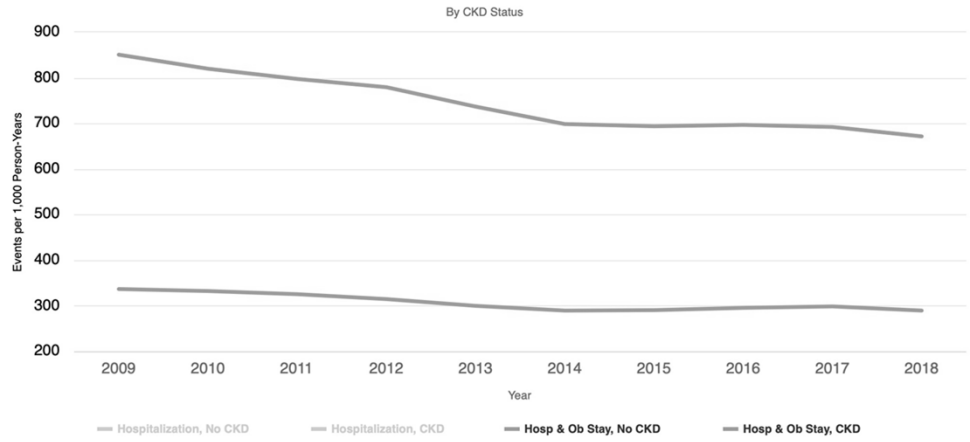


Data Source: 2020 United States Renal Data System Annual Data Report

2020 *USRDS Annual Data Report: Epidemiology of kidney disease in the US. NIH, NIDDK*

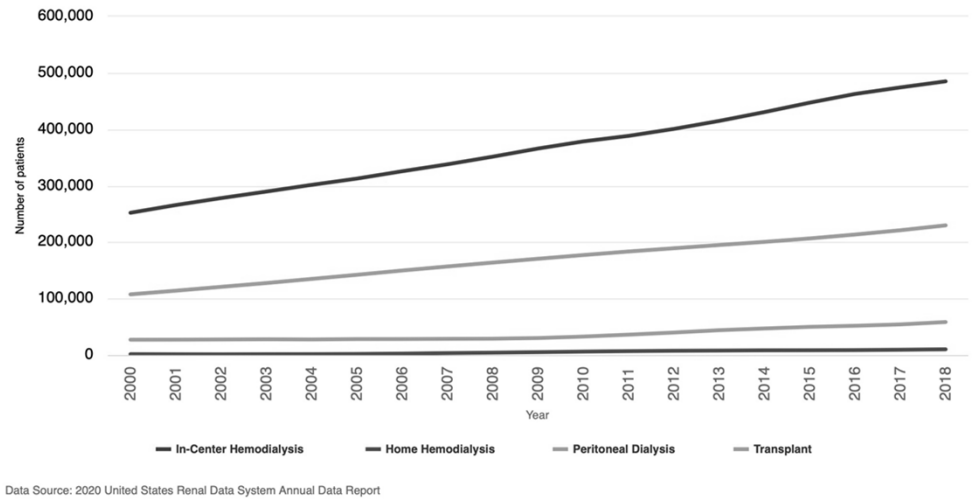
USRDS

Figure 3.5 Adjusted rates of all-cause hospitalization and observation stays for Medicare beneficiaries aged ≥66 years, by CKD status and stage, 2009-2018.



Data Source: 2020 United States Renal Data System Annual Data Report

2020 *USRDS Annual Data Report: Epidemiology of kidney disease in the US. NIH, NIDDK*



2020 *USRDS Annual Data Report: Epidemiology of kidney disease in the US. NIH, NIDDK*

CKD Basics

CKD Heat-map

Prognosis of CKD by GFR and albuminuria category

Prognosis of CKD by GFR and Albuminuria Categories: KDIGO 2012

GFR categories (ml/min/ 1.73 m2)	Description and range			Persistent albuminuria categories Description and range		
				A_1	A_2	A_3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30-300 mg/g 3-30 mg/mmol	>300 mg/g >30 mg/mmol
	G1	Normal or high	≥90			
	G2	Mildly decreased	60-89			
	G3a	Mildly to moderately decreased	45-59			
	G3b	Moderately to severely decreased	30-44			
	G4	Severely decreased	15-29			
	G5	Kidney failure	<15			

Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red, very high risk.

Source: Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. Kidney Int Suppls. 2013;3:1-150.

CKD Heat-map

Table 1.1 Percentage of adults in the U.S. in KDGIO CKD risk categories, 2003-2018

(a) Percentage by eGFR and ACR, 2015-2018

eGFR Categories	A1: Normal to mildly increased (ACR <30 mg/g)	A2: Moderately increased (ACR 30-299 mg/g)	A3: Severely increased (ACR ≥300 mg/g)	Total
G1: Normal or high (eGFR ≥90ml/min/1.73m²)	53.5	4.1	0.58	58.3
G2: Mildly decreased (eGFR 60-89 ml/min/1.73m²)	31.5	2.9	0.43	34.8
G3a: Mildly to moderately decreased (eGFR 45-59 ml/min/1.73m²)	3.9	0.84	0.27	5.0
G3b: Moderately to severely decreased (eGFR 30-44 ml/min/1.73m²)	0.88	0.40	0.17	1.5
G4: Severely decreased (eGFR 15-29 ml/min/1.73m²)	0.11	0.09	0.17	0.37
G5: Kidney failure (eGFR <15 ml/min/1.73m²)	0.01	0.01	0.09	0.11
Total	90.0	8.3	1.7	100

2020 *USRDS Annual Data Report: Epidemiology of kidney disease in the US. NIH, NIDDK*

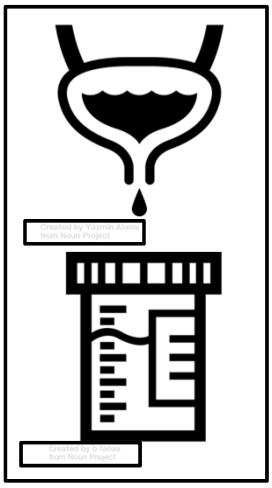
What is Creatinine?!

Metabolic by-product mainly produced by muscles

In steady-state; production = excretion

Is a serum Cr of 1.5mg/dL normal?

What should I order?



CKD work-up

- Chemistry
  - Rule out DM-2
- Urine analysis with microscopic evaluation
  - Blood is a red flag
- Protein: Urine albumin to creatinine
- Renal US
  - Look for structural abnormalities, bladder obstruction, etc…

CKD work-up

- Chemistry
- Urine
- Protein
- Ultrasound

CKD Heat-map

Prognosis of CKD by GFR and albuminuria category

Prognosis of CKD by GFR and Albuminuria Categories: KDIGO 2012

GFR categories (ml/min/ 1.73 m2)Description and range				Persistent albuminuria categories Description and range		
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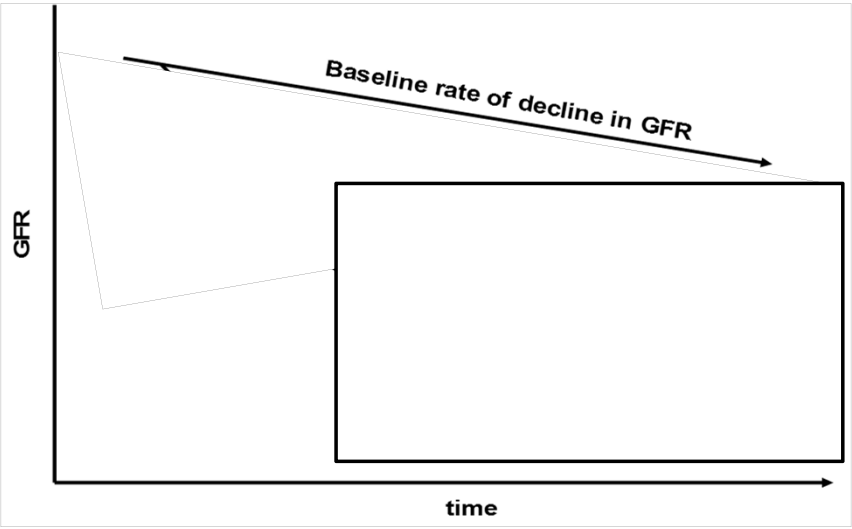
Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red, very high risk.

Source: Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. Kidney Int Suppls. 2013;3:1-150.

CKD work-up - Management

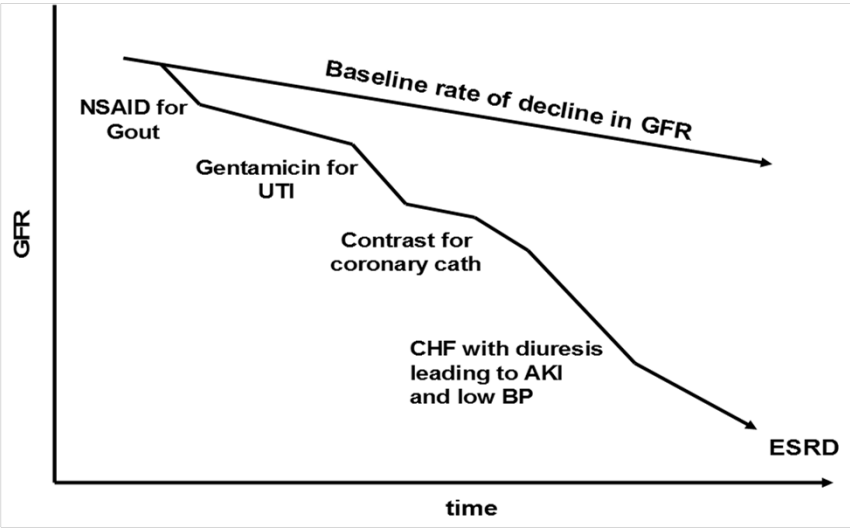
- Review medications: "*We are Medicine!*"
  - NSAID's, NSAID's, and *NSAID's*!
  - Avoid dual RAAS blockade
  - Preferably avoid PPI's
- Maximize DM control
- Maximize BP control
- Appropriate dosing of medications

CKD progression: biology vs "us"?



Fink, et al, AJKD, 2009

CKD progression: biology vs "us"?



Fink, et al, AJKD, 2009

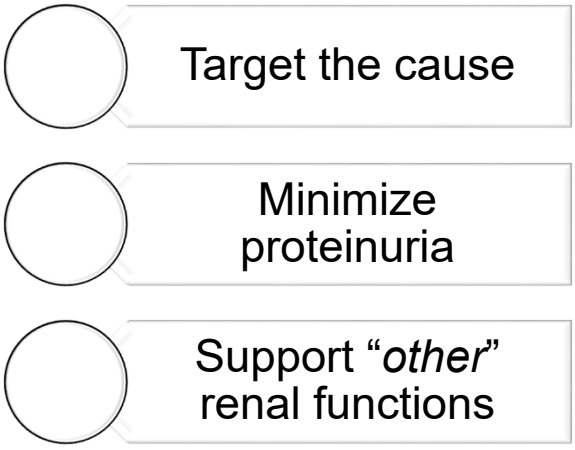
Things that *Nephrologists* will follow

- **Excretory functions:**
  - Remove from the body
    - Toxic and waste products
    - Excess water
  - Maintain the balance of
    - Various electrolytes
- **Endocrine functions**:
  - Erythropoietin
  - Active Vitamin D
    - Bone metabolism
  - Renin
    - BP control

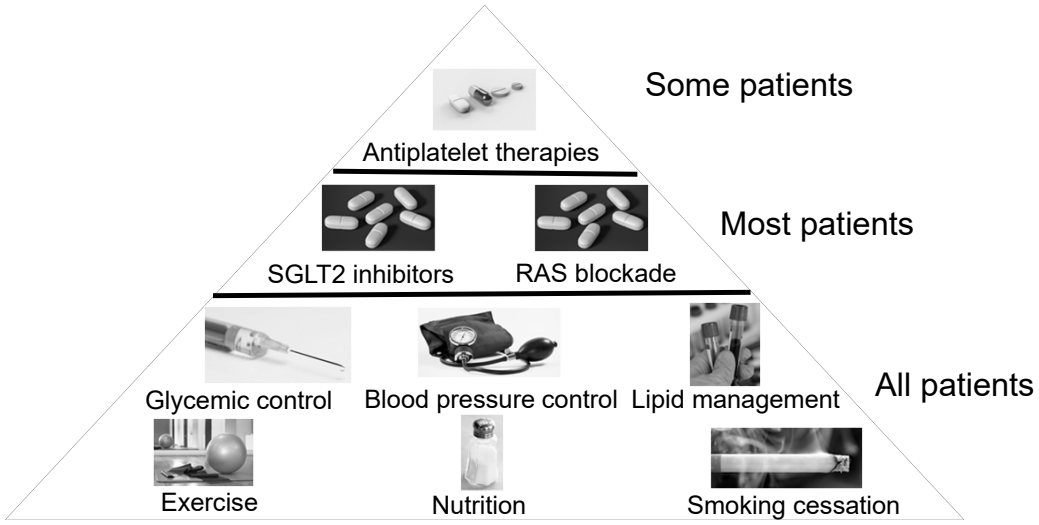
Things that *Nephrologists* will follow

- CKD Etiology–
- HTN– rule out secondary causes
- Anemia–
- Bone mineral disease– Ca, PO4, PTH and Vit D
- Acidosis–

Treatments



Executive summary of 2020 KDIGO DM Management in CKD Guideline

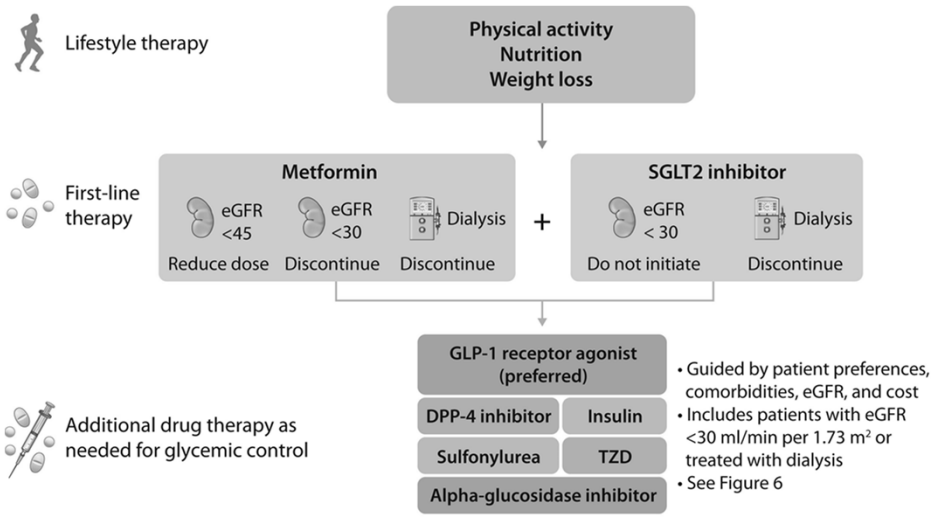


Kidney International 2020 98839-848DOI: (10.1016/j.kint.2020.06.024)

Figure 2

Executive summary of 2020 KDIGO DM Management in CKD Guideline			**Primary outcome**		**Kidney outcomes**			
Drug	**Trial**	**Kidney-related eligibility criteria**	**Primary outcome**	**Effect on primary outcome**	**Effect on albuminuria or albuminuria-containing composite outcome**	**Effect on GFR loss**	**Adverse effects**	
SGLT2 inhibitors								
Empagliflozin	EMPA-REG OUTCOME	eGFR ≥30 ml/min per 1.73 m^2	MACE		⇩	⇩⇩	⇩⇩	Genital mycotic infections, DKA
Canagliflozin	CANVAS trials CREDENCE	eGFR ≥30 ml/min per 1.73 m^2	MACE		⇩	⇩⇩	⇩⇩	Genital mycotic infections, DKA, amputation
		ACR >300 mg/g [30 mg/mmol] and eGFR 30–90 ml/min per 1.73 m^2	Progression of CKD[b]		⇩⇩	⇩⇩	⇩⇩	Genital mycotic infections, DKA
Dapagliflozin	DECLARE-TIMI 58	CrCl ≥60 ml/min	Dual primary outcomes: MACE and the composite of hospitalization for heart failure or CV death[c]		⇔/⇩	⇩	⇩⇩	Genital mycotic infections, DKA

Executive summary of 2020 KDIGO DM Management in CKD Guideline

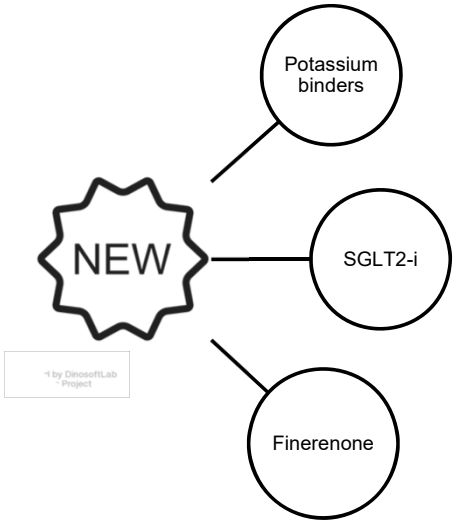


Kidney International 2020 98839-848DOI: (10.1016/j.kint.2020.06.024)

New kids on the block!

28 |

New Therapies

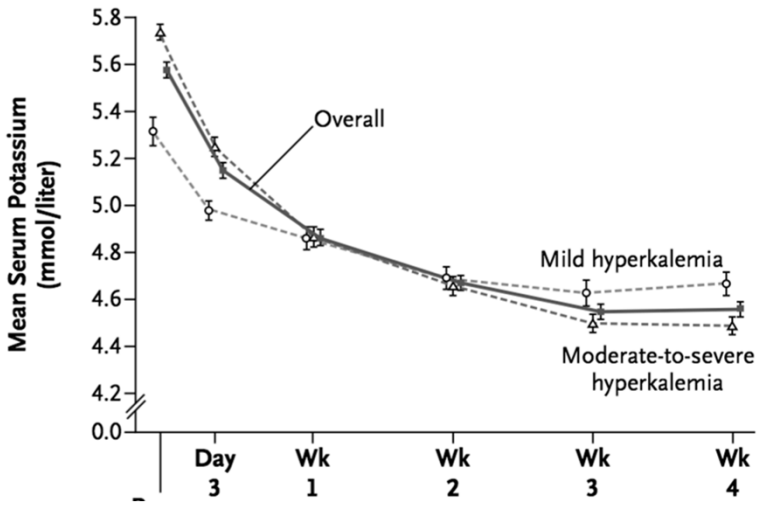


The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 15, 2015 VOL. 372 NO. 3

Patiromer in Patients with Kidney Disease and Hyperkalemia Receiving RAAS Inhibitors

Matthew R. Weir, M.D., George L. Bakris, M.D., David A. Bushinsky, M.D., Martha R. Mayo, Pharm.D., Dahlia Garza, M.D., Yuri Stasiv, Ph.D., Janet Wittes, Ph.D., Heidi Christ-Schmidt, M.S.E., Lance Berman, M.D., and Bertram Pitt, M.D., for the OPAL-HK Investigators*

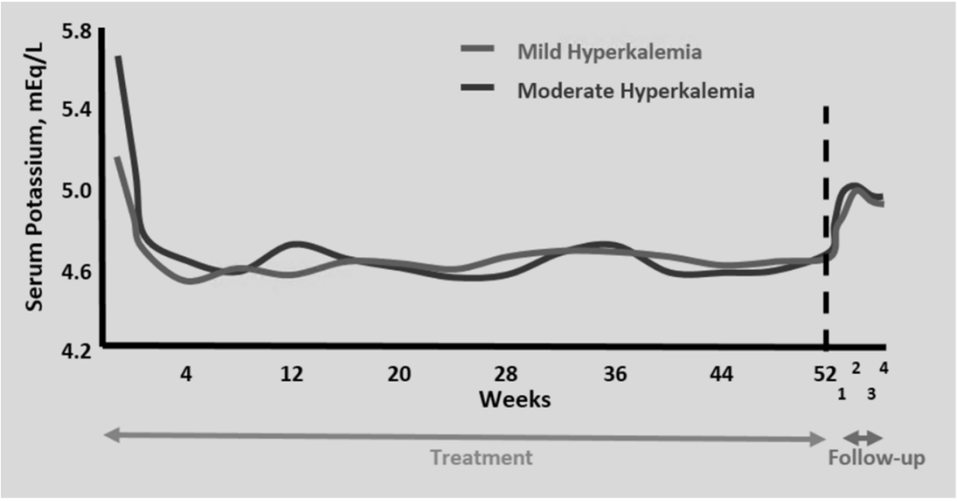


- The effect was sustained over 4 weeks
- Well tolerated

Effect of Patiromer on Serum Potassium Level in Patients With Hyperkalemia and Diabetic Kidney Disease

The AMETHYST-DN Randomized Clinical Trial

Bakris GL, et. al.



JAMA. 2015;314(2):151-161. doi:10.1001/jama.2015.7446

The NEW ENGLAND JOURNAL of MEDICINE

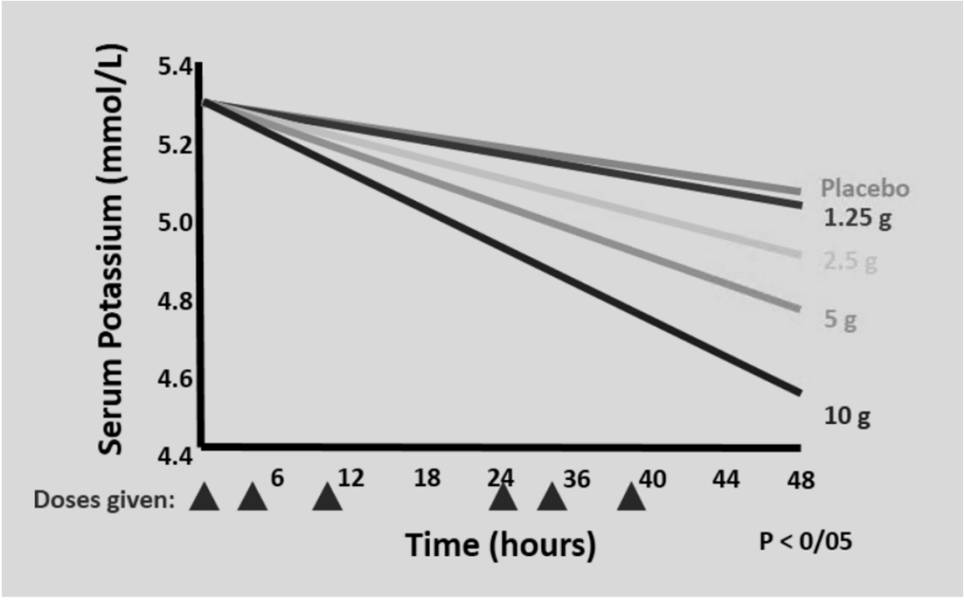
ORIGINAL ARTICLE

Sodium Zirconium Cyclosilicate in Hyperkalemia

David K. Packham, M.B., B.S., M.D., Henrik S. Rasmussen, M.D., Ph.D., Philip T. Lavin, Ph.D., Mohamed A. El-Shahawy, M.D., M.P.H., Simon D. Roger, M.D., Geoffrey Block, M.D., Wajeh Qunibi, M.D., Pablo Pergola, M.D., Ph.D., and Bhupinder Singh, M.D.

January 15, 2015 N Engl J Med 2015; 372:222-231

Sodium Zirconium Cyclosilicate in Hyperkalemia



January 15, 2015 N Engl J Med 2015; 372:222-231

Lokelma approved in the US for the treatment of adults with hyperkalaemia

PUBLISHED
18 May 2018

Lokelma provides rapid and sustained potassium control for patients in a condition with high unmet need

The US Food and Drug Administration (FDA) has approved *Lokelma* (sodium zirconium cyclosilicate), formerly ZS-9, for the treatment of adults with hyperkalaemia,[1] a serious condition characterised by elevated potassium levels in the blood associated with cardiovascular, renal and metabolic diseases.[2]

The risk of hyperkalaemia increases significantly for patients with chronic kidney disease (CKD) and for those who take common medications for heart failure (HF), such as renin-angiotensin-aldosterone system (RAAS) inhibitors, which can increase potassium in the blood.[2,3] To help prevent the recurrence of hyperkalaemia, RAAS-inhibitor therapy is often modified or discontinued, which can compromise cardio-renal outcomes and increase the risk of death.[3,4]

Editorial commentary

EDITORIAL A Cor

A New Era for the Treatment of Hyperkalemia?

Julie R. Ingelfinger, M.D.
N Engl J Med 2015; 372:275-277 | January 15, 2015 | DOI: 10.1056/NEJMe1414112

In Focus

The Colon as the Potassium Target: Entering the Colonic Age of Hyperkalemia Treatment?

Daniel Batlle *, Khaled Boobés, Kiran G. Manjee

Division of Nephrology & Hypertension, Northwestern University, Feinberg School of Medicine, Chicago, IL 60611, United States

Patiromer for Hyperkalemia in Diabetic CKD: A New Kid on the Block

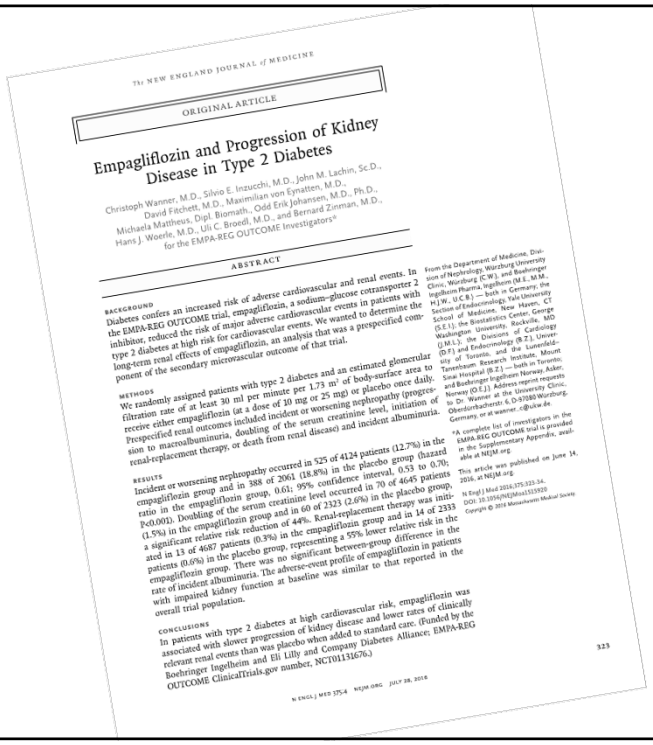
Pranav S. Garimella, MD, MPH
Tufts Medical Center, Boston, Massachusetts
Bertrand L. Jaber, MD, MS
St Elizabeth's Medical Center, Boston, Massachusetts

*"Given the gastro- intestinal side effects, unpleasant taste, and risk for colonic necrosis with sodium polystyrene sulfonate, its days as the primary treatment option for hyperkalemia are likely **numbered**."*

Comparison

- Patiromer
  - Exchanges Ca for K
  - Can cause low Mg
  - On market since 2015
  - Binds K in the colon
  - Can be used in ESRD
  - Cost: $700-800/month
- ZS-9
  - Exchanges Na for K
  - Can cause edema
  - On market since 2019
  - Binds K throughout the GI tract
  - Can be used in ESRD
  - Cost: $600-700/month

SGLT2- inhibitors



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Empagliflozin and Progression of Kidney Disease in Type 2 Diabetes

Christoph Wanner, M.D., Silvio E. Inzucchi, M.D., John M. Lachin, Sc.D., David Fitchett, M.D., Maximilian von Eynatten, M.D., Michaela Mattheus, Dipl. Biomath., Odd Erik Johansen, M.D., Ph.D., Hans J. Woerle, M.D., Uli C. Broedl, M.D., and Bernard Zinman, M.D., for the EMPA-REG OUTCOME Investigators*

ABSTRACT

BACKGROUND
Diabetes confers an increased risk of adverse cardiovascular and renal events. In the EMPA-REG OUTCOME trial, empagliflozin, a sodium–glucose cotransporter 2 inhibitor, reduced the risk of major adverse cardiovascular events in patients with type 2 diabetes at high risk for cardiovascular events. We wanted to determine the long-term renal effects of empagliflozin, an analysis that was a prespecified component of the secondary microvascular outcome of that trial.

METHODS
We randomly assigned patients with type 2 diabetes and an estimated glomerular filtration rate of at least 30 ml per minute per 1.73 m² of body-surface area to receive either empagliflozin (at a dose of 10 mg or 25 mg) or placebo once daily. Prespecified renal outcomes included incident or worsening nephropathy (progression to macroalbuminuria, doubling of the serum creatinine level, initiation of renal-replacement therapy, or death from renal disease) and incident albuminuria.

RESULTS
Incident or worsening nephropathy occurred in 525 of 4124 patients (12.7%) in the empagliflozin group and in 388 of 2061 (18.8%) in the placebo group (hazard ratio in the empagliflozin group, 0.61; 95% confidence interval, 0.53 to 0.70; P<0.001). Doubling of the serum creatinine level occurred in 70 of 4645 patients (1.5%) in the empagliflozin group and in 60 of 2323 (2.6%) in the placebo group, a significant relative risk reduction of 44%. Renal-replacement therapy was initiated in 13 of 4687 patients (0.3%) in the empagliflozin group and in 14 of 2333 patients (0.6%) in the placebo group, representing a 55% lower relative risk in the empagliflozin group. There was no significant between-group difference in the rate of incident albuminuria. The adverse-event profile of empagliflozin in patients with impaired kidney function at baseline was similar to that reported in the overall trial population.

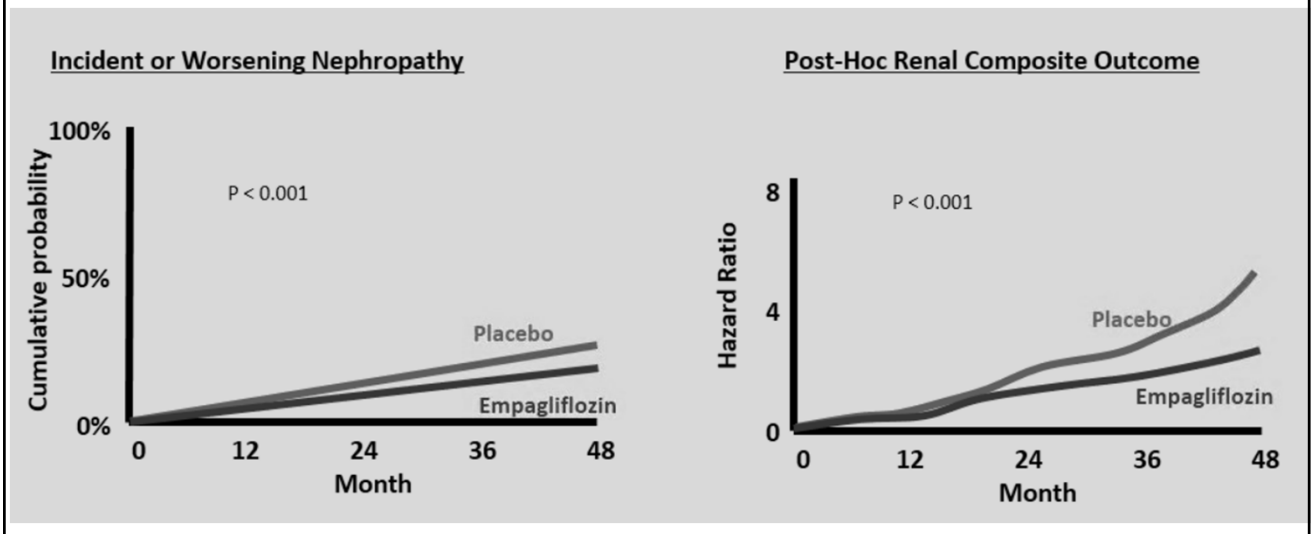
CONCLUSIONS
In patients with type 2 diabetes at high cardiovascular risk, empagliflozin was associated with slower progression of kidney disease and lower rates of clinically relevant renal events than was placebo when added to standard care. (Funded by the Boehringer Ingelheim and Eli Lilly and Company Diabetes Alliance; EMPA-REG OUTCOME ClinicalTrials.gov number, NCT01131676.)

From the Department of Medicine, Division of Nephrology, Würzburg University Clinic, Würzburg (C.W.), and Boehringer Ingelheim Pharma, Ingelheim (M.E., M.M., H.J.W., U.C.B.) — both in Germany; the Section of Endocrinology, Yale University School of Medicine, New Haven, CT (S.E.I.); the Biostatistics Center, George Washington University, Rockville, MD (J.M.L.); the Divisions of Cardiology (D.F.) and Endocrinology (B.Z.), University of Toronto, and the Lunenfeld–Tanenbaum Research Institute, Mount Sinai Hospital (B.Z.) — both in Toronto; and Boehringer Ingelheim Norway, Asker, Norway (O.E.J.). Address reprint requests to Dr. Wanner at the University Clinic, Oberdürrbacherstr. 6, D-97080 Würzburg, Germany, or at wanner_c@ukw.de.

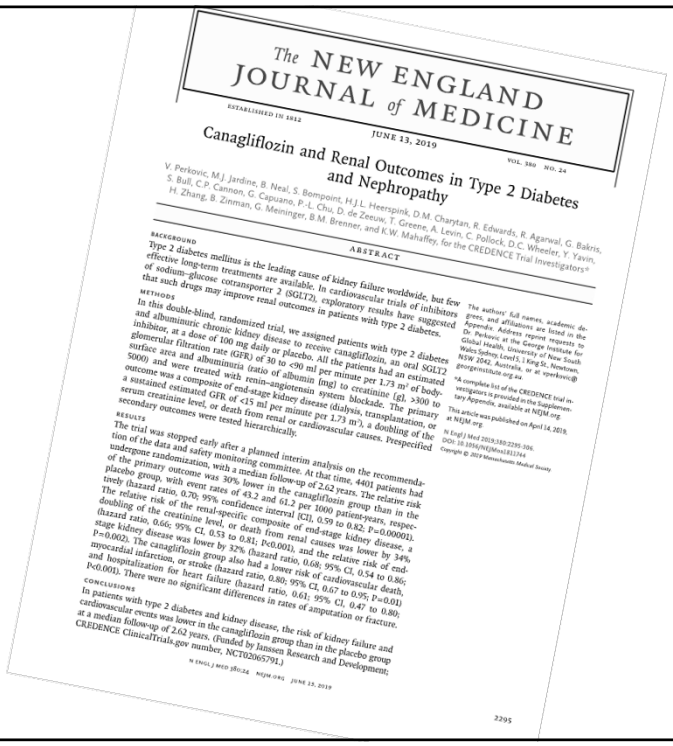
*A complete list of investigators in the EMPA-REG OUTCOME trial is provided in the Supplementary Appendix, available at NEJM.org.

This article was published on June 14, 2016, at NEJM.org.

N Engl J Med 2016;375:323-34.
DOI: 10.1056/NEJMoa1515920



Wanner C et al. N Engl J Med 2016;375:323-334.



The NEW ENGLAND JOURNAL of MEDICINE
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Canagliflozin and Renal Outcomes in Type 2 Diabetes and Nephropathy

V. Perkovic, M.J. Jardine, B. Neal, S. Bompoint, H.J.L. Heerspink, D.M. Charytan, R. Edwards, R. Agarwal, G. Bakris, S. Bull, C.P. Cannon, G. Capuano, P.-L. Chu, D. de Zeeuw, T. Greene, A. Levin, C. Pollock, D.C. Wheeler, Y. Yavin, H. Zhang, B. Zinman, G. Meininger, B.M. Brenner, and K.W. Mahaffey, for the CREDENCE Trial Investigators*

ABSTRACT

BACKGROUND

Type 2 diabetes mellitus is the leading cause of kidney failure worldwide, but few effective long-term treatments are available. In cardiovascular trials of inhibitors of sodium–glucose cotransporter 2 (SGLT2), exploratory results have suggested that such drugs may improve renal outcomes in patients with type 2 diabetes.

METHODS

In this double-blind, randomized trial, we assigned patients with type 2 diabetes and albuminuric chronic kidney disease to receive canagliflozin, an oral SGLT2 inhibitor, at a dose of 100 mg daily or placebo. All the patients had an estimated glomerular filtration rate (GFR) of 30 to <90 ml per minute per 1.73 m² of body-surface area and albuminuria (ratio of albumin (mg) to creatinine (g), >300 to 5000) and were treated with renin–angiotensin system blockade. The primary outcome was a composite of end-stage kidney disease (dialysis, transplantation, or a sustained estimated GFR of <15 ml per minute per 1.73 m²), a doubling of the serum creatinine level, or death from renal or cardiovascular causes. Prespecified secondary outcomes were tested hierarchically.

RESULTS

The trial was stopped early after a planned interim analysis on the recommendation of the data and safety monitoring committee. At that time, 4401 patients had undergone randomization, with a median follow-up of 2.62 years. The relative risk of the primary outcome was 30% lower in the canagliflozin group than in the placebo group, with event rates of 43.2 and 61.2 per 1000 patient-years, respectively (hazard ratio, 0.70; 95% confidence interval [CI], 0.59 to 0.82; P=0.00001). The relative risk of the renal-specific composite of end-stage kidney disease, a doubling of the creatinine level, or death from renal causes was lower by 34% (hazard ratio, 0.66; 95% CI, 0.53 to 0.81; P<0.001), and the relative risk of end-stage kidney disease was lower by 32% (hazard ratio, 0.68; 95% CI, 0.54 to 0.86; P=0.002). The canagliflozin group also had a lower risk of cardiovascular death, myocardial infarction, or stroke (hazard ratio, 0.80; 95% CI, 0.67 to 0.95; P=0.01) and hospitalization for heart failure (hazard ratio, 0.61; 95% CI, 0.47 to 0.80; P<0.001). There were no significant differences in rates of amputation or fracture.

CONCLUSIONS

In patients with type 2 diabetes and kidney disease, the risk of kidney failure and cardiovascular events was lower in the canagliflozin group than in the placebo group at a median follow-up of 2.62 years. (Funded by Janssen Research and Development; CREDENCE ClinicalTrials.gov number, NCT02065791.)

The authors' full names, academic degrees, and affiliations are listed in the Appendix. Address reprint requests to Dr. Perkovic at the George Institute for Global Health, University of New South Wales Sydney, Level 5, 1 King St., Newtown, NSW 2042, Australia, or at vperkovic@georginstitute.org.au.

*A complete list of the CREDENCE trial investigators is provided in the Supplementary Appendix, available at NEJM.org.

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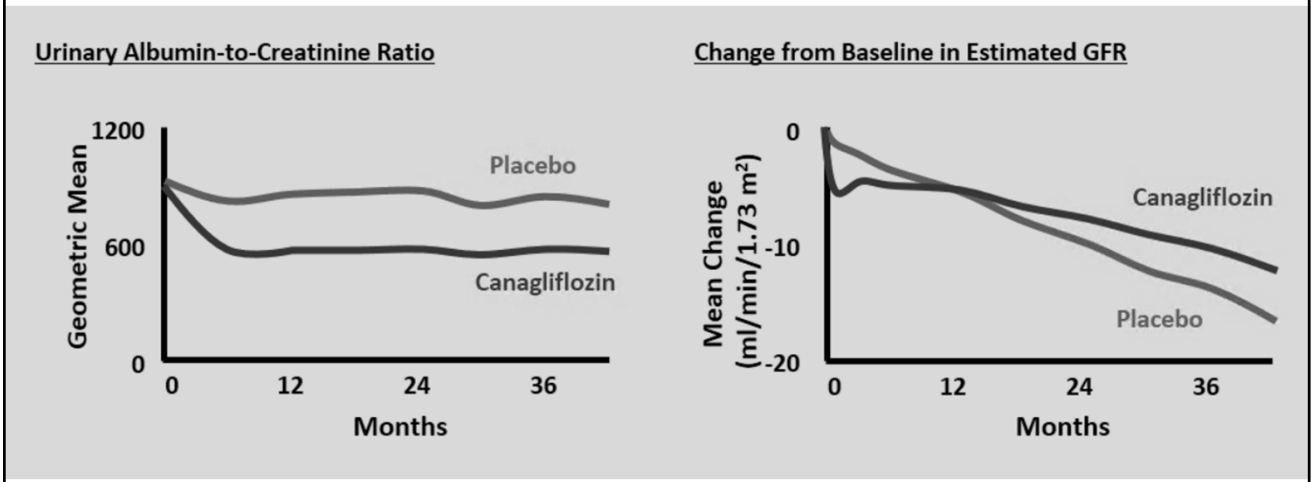
N Engl J Med 2019;380:2295-306.
DOI: 10.1056/NEJMoa1811744



V Perkovic et al. N Engl J Med 2019;380:2295-2306.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Dapagliflozin in Patients with Chronic Kidney Disease

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ABSTRACT

BACKGROUND
Patients with chronic kidney disease have a high risk of adverse kidney and cardiovascular outcomes. The effect of dapagliflozin in patients with chronic kidney disease, with or without type 2 diabetes, is not known.

METHODS
We randomly assigned 4304 participants with an estimated glomerular filtration rate (GFR) of 25 to 75 ml per minute per 1.73 m² of body-surface area and a urinary albumin-to-creatinine ratio (with albumin measured in milligrams and creatinine measured in grams) of 200 to 5000 to receive dapagliflozin (10 mg once daily) or placebo. The primary outcome was a composite of a sustained decline in the estimated GFR of at least 50%, end-stage kidney disease, or death from renal or cardiovascular causes.

RESULTS
The independent data monitoring committee recommended stopping the trial because of efficacy. Over a median of 2.4 years, a primary outcome event occurred in 197 of 2152 participants (9.2%) in the dapagliflozin group and 312 of 2152 participants (14.5%) in the placebo group (hazard ratio, 0.61; 95% confidence interval [CI], 0.51 to 0.72; P<0.001; number needed to treat to prevent one primary outcome event, 19 [95% CI, 15 to 27]). The hazard ratio for the composite of a sustained decline in the estimated GFR of at least 50%, end-stage kidney disease, or death from renal causes was 0.56 (95% CI, 0.45 to 0.68; P<0.001), and the hazard ratio for the composite of death from cardiovascular causes or hospitalization for heart failure was 0.71 (95% CI, 0.55 to 0.92; P=0.009). Death occurred in 101 participants (4.7%) in the dapagliflozin group and 146 participants (6.8%) in the placebo group (hazard ratio, 0.69; 95% CI, 0.53 to 0.88; P=0.004). The effects of dapagliflozin were similar in participants with type 2 diabetes and in those without type 2 diabetes. The known safety profile of dapagliflozin was confirmed.

CONCLUSIONS
Among patients with chronic kidney disease, regardless of the presence or absence of diabetes, the risk of a composite of a sustained decline in the estimated GFR of at least 50%, end-stage kidney disease, or death from renal or cardiovascular causes was significantly lower with dapagliflozin than with placebo. (Funded by AstraZeneca; DAPA-CKD ClinicalTrials.gov number, NCT03036150.)

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*A complete list of DAPA-CKD committee members and investigators is provided in the Supplementary Appendix, available at NEJM.org.

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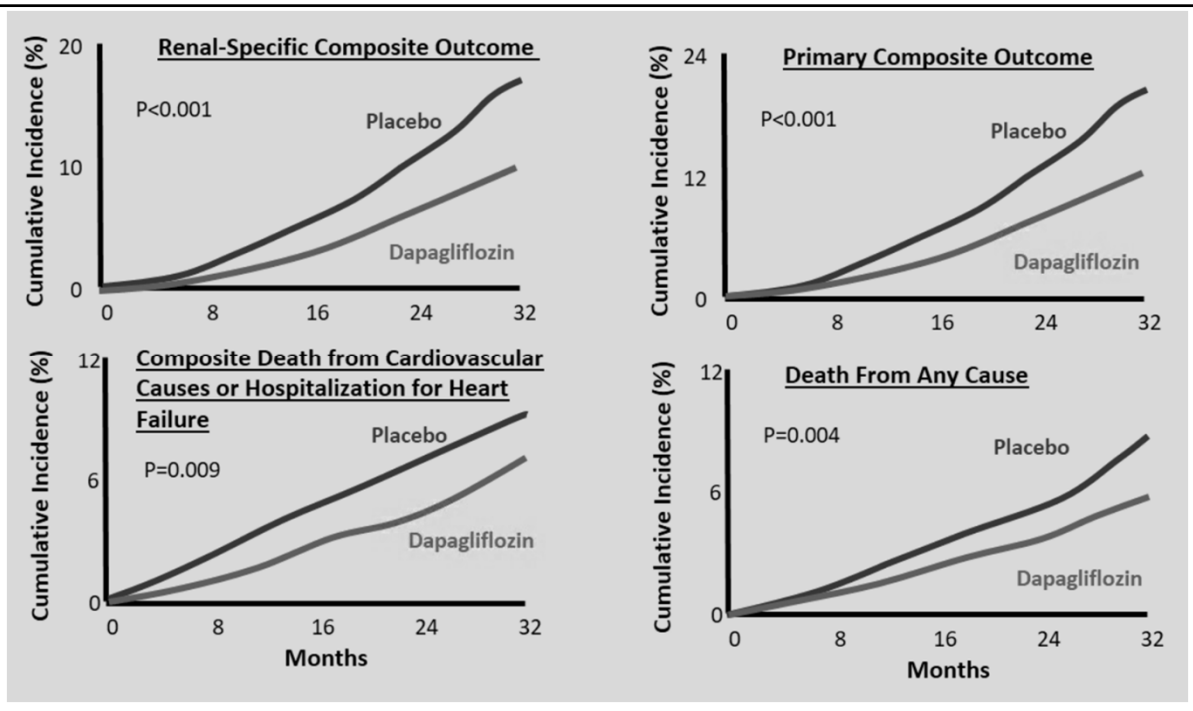
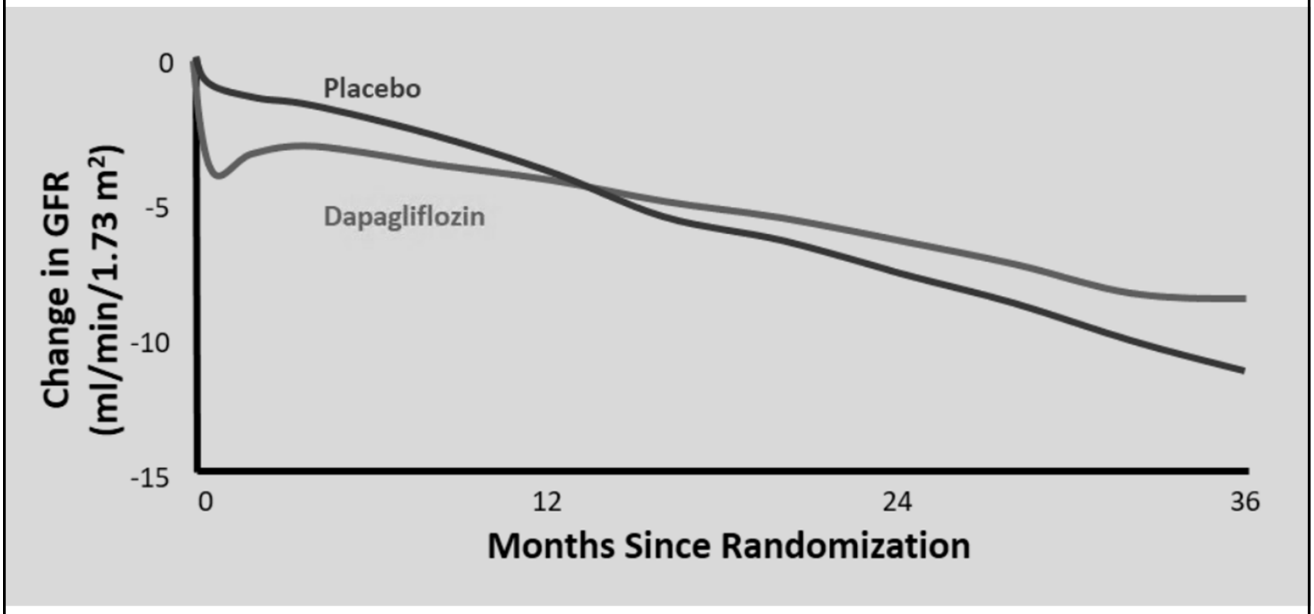
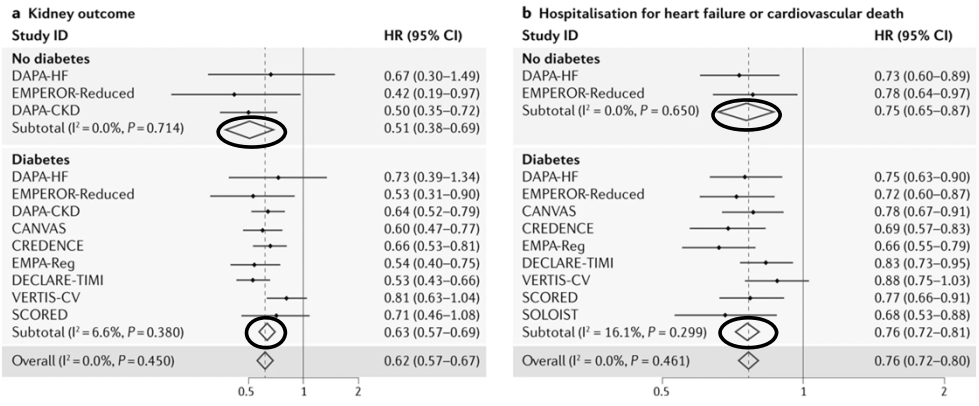


Heerspink HJL et al. N Engl J Med 2020;383:1436-1446



Heerspink HJL et al. N Engl J Med 2020;383:1436-1446

SGLT2-Inhibitors



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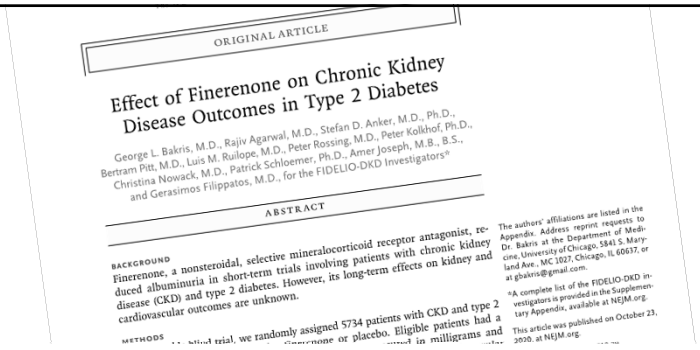
Finerenone



ORIGINAL ARTICLE

Effect of Finerenone on Chronic Kidney Disease Outcomes in Type 2 Diabetes

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*A complete list of the FIDELIO-DKD investigators is provided in the Supplementary Appendix, available at NEJM.org.

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ABSTRACT

BACKGROUND

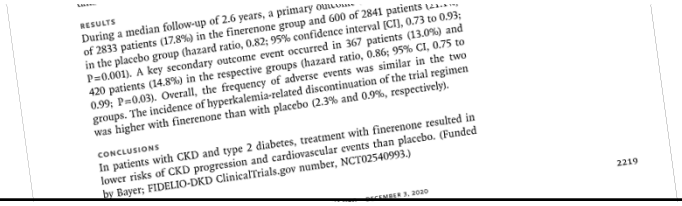
Finerenone, a nonsteroidal, selective mineralocorticoid receptor antagonist, reduced albuminuria in short-term trials involving patients with chronic kidney disease (CKD) and type 2 diabetes. However, its long-term effects on kidney and cardiovascular outcomes are unknown.

METHODS

... blind trial, we randomly assigned 5734 patients with CKD and type 2 ... finerenone or placebo. Eligible patients had a ... urinary albumin–to–creatinine ratio of 30 to 5000 mg per gram and an estimated glomerular filtration rate (eGFR) of 25 to 90 ml per minute per 1.73 m² of body-surface area if they were receiving the maximum labeled dose of an angiotensin-converting-enzyme inhibitor or angiotensin-receptor blocker, or an eGFR of 60 to 90 ml per minute per 1.73 m² if they were receiving a submaximal dose. The primary composite outcome was the time to kidney failure, a sustained decrease in the eGFR of at least 40% from baseline over a period of at least 4 months, or death from renal causes. The key secondary composite outcome was the time to death from cardiovascular causes, nonfatal myocardial infarction, nonfatal stroke, or hospitalization for heart failure.

CONCLUSIONS

In patients with CKD and type 2 diabetes, treatment with finerenone resulted in lower risks of CKD progression and cardiovascular events than placebo. (Funded by Bayer; FIDELIO-DKD ClinicalTrials.gov number, NCT02540993.)



RESULTS

During a median follow-up of 2.6 years, a primary outcome ... of 2833 patients (17.8%) in the finerenone group and 600 of 2841 patients (21.1%) in the placebo group (hazard ratio, 0.82; 95% confidence interval [CI], 0.73 to 0.93; P=0.001). A key secondary outcome event occurred in 367 patients (13.0%) and 420 patients (14.8%) in the respective groups (hazard ratio, 0.86; 95% CI, 0.75 to 0.99; P=0.03). Overall, the frequency of adverse events was similar in the two groups. The incidence of hyperkalemia-related discontinuation of the trial regimen was higher with finerenone than with placebo (2.3% and 0.9%, respectively).

CONCLUSIONS

In patients with CKD and type 2 diabetes, treatment with finerenone resulted in lower risks of CKD progression and cardiovascular events than placebo. (Funded by Bayer; FIDELIO-DKD ClinicalTrials.gov number, NCT02540993.)

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In Summary…

- CKD is *common*
- CKD = ***higher*** risk

- CKD basics.
  - Heat map
  - Decided to refer?
    - CKD work-up- Chemistry, UA with micro, UPC, renal US
    - *Avoid* **NSAIDs**

- New Treatments are available:
  - K binders
  - ***SGLT2-I***
  - ***Finerenone***