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What every non-nephrologist needs to know about chronic kidney disease

PRESENTED TO:
SMH CARDIOLOGY FOR THE PRACTITIONER DAY 2025

Dualities of Interest

- **Research**
  - Alexion, Amgen, Astra-Zeneca, Bayer, Boehringer Ingelheim, GSK, Janssen, Lilly, Novartis, Otsuka
- **Advisor**
  - Alnylam, Astra-Zeneca, Bayer, Boehringer Ingelheim, GSK, Janssen, Medtronic, Novartis, Otsuka
- **Continuing Education Events**
  - Alexion, Astra-Zeneca, Bayer, Boehringer Ingelheim, GSK, Janssen, Medtronic, Novartis, Otsuka

Overview

1. Who Has Kidney Disease?
2. The Cardiorenal Link
3. Predicting Dialysis
4. Saving the Heart & Kidneys

Question 1:

Where are your kidneys?

Overview

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Who has CKD?

Who has CKD?

Two Tests

Test 1:

Serum Creatinine /eGFR

Test 1:

eGFR ≈

% normal renal function

Test 2:

Random

Urine

uACR

Persistent

↑ uACR,

↓ eGFR

Or Both

= CKD

Question 2:

Do you have CKD?

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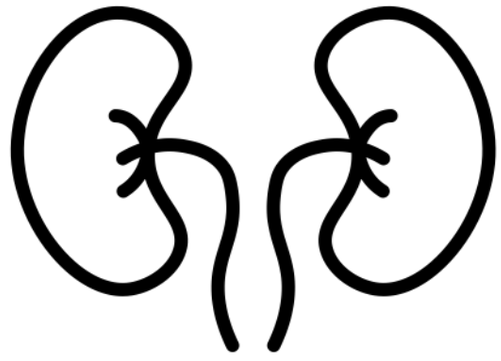
Cardiorenal Link

♡ & 

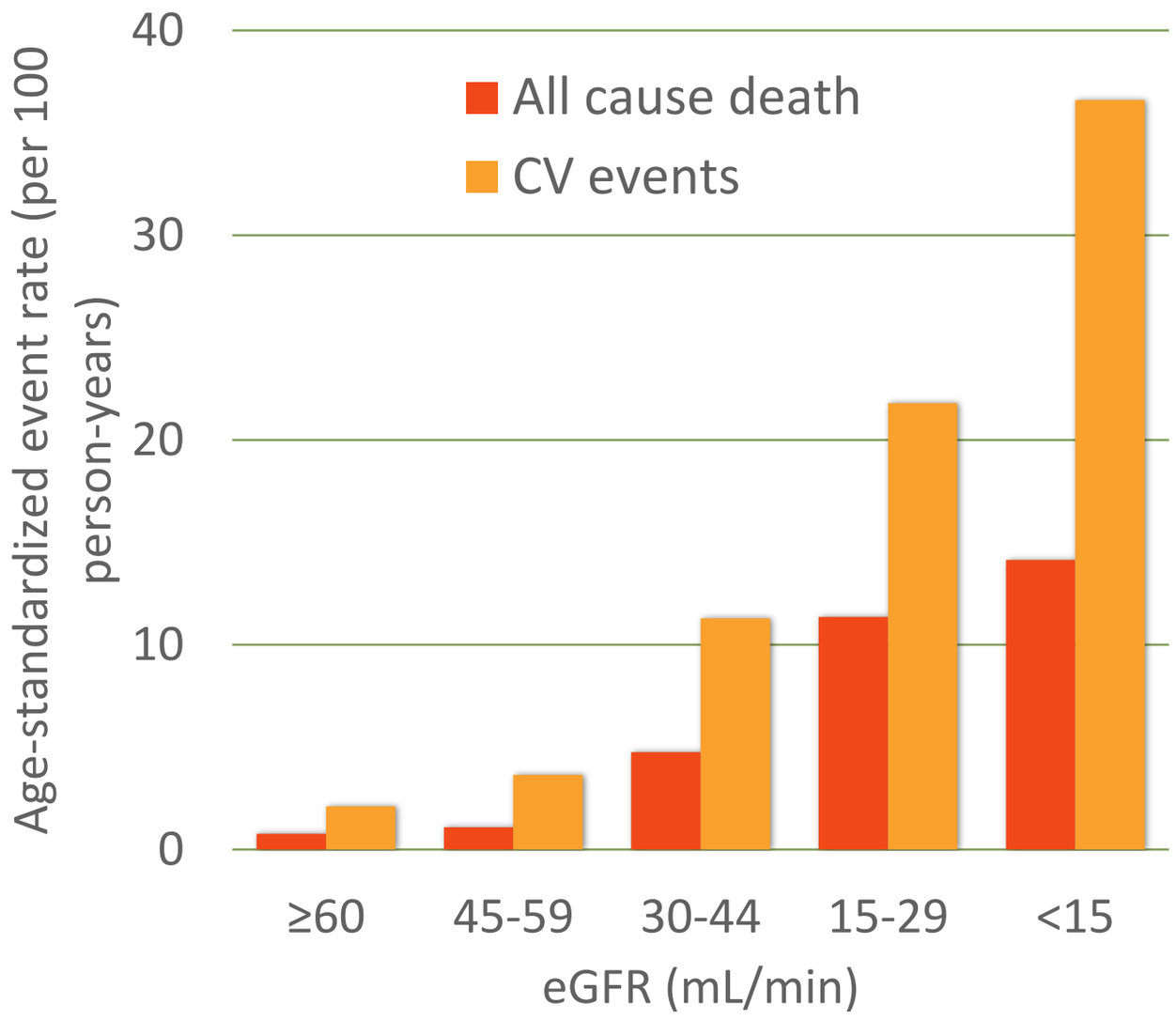
Cardiorenal Link

- People with CV disease are at high risk for CKD and vice versa
- Many common risk factors
- Many common causative pathways
- Many shared therapeutic strategies

eGFR

GFR Predicts CV Events

- **Cardiorenal Link**
- The lower the eGFR, the higher the CV event rate and the shorter the survival
- Kaiser Permanente Renal Registry
  - n=1,120,295
  - All members age>20, not on dialysis or with a kidney transplant
  - Median f/u 2.8 years



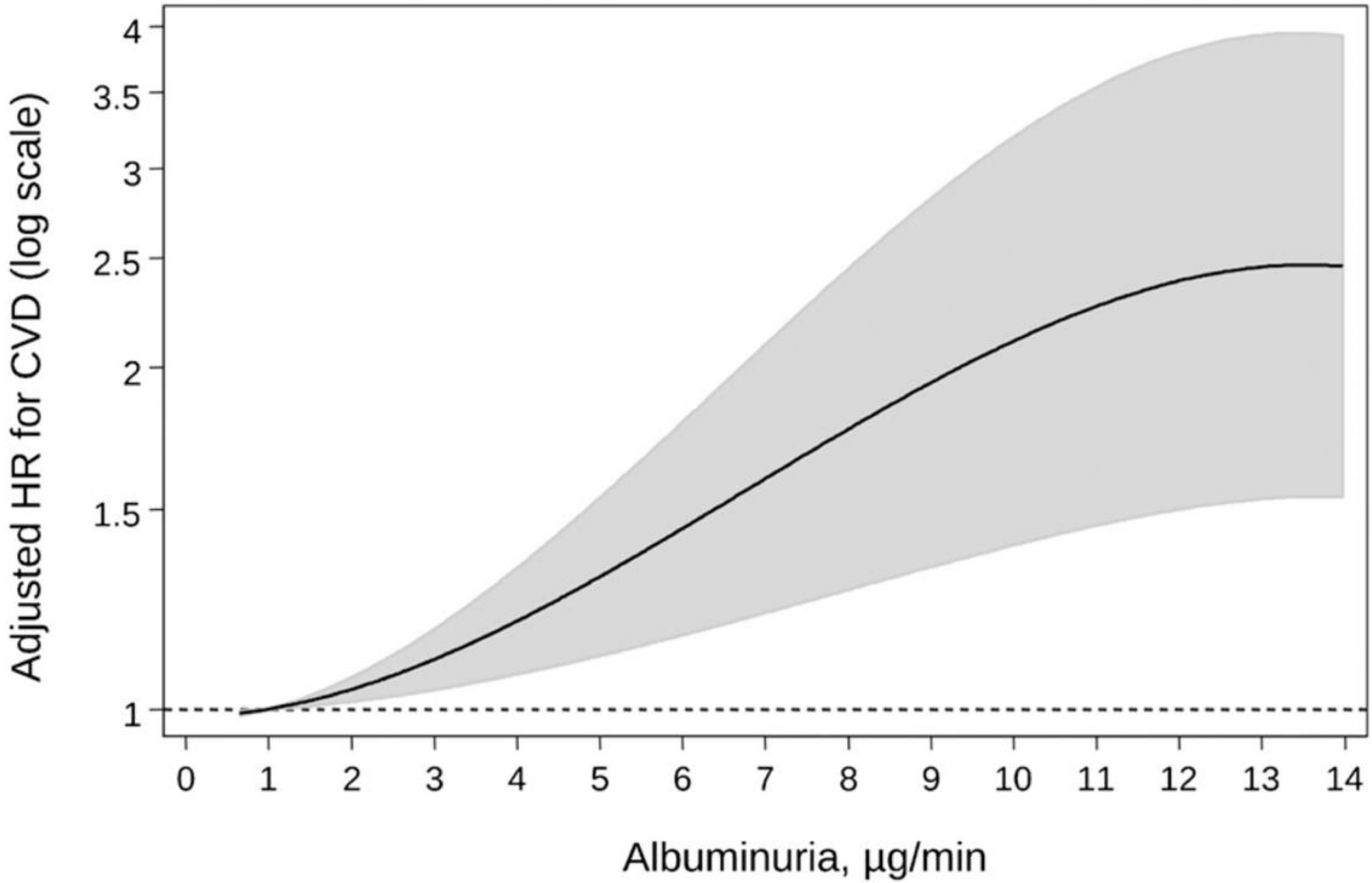
Go AS, et al, NEJM 2004;351(13):1296-1305

uACR

uACR

CV

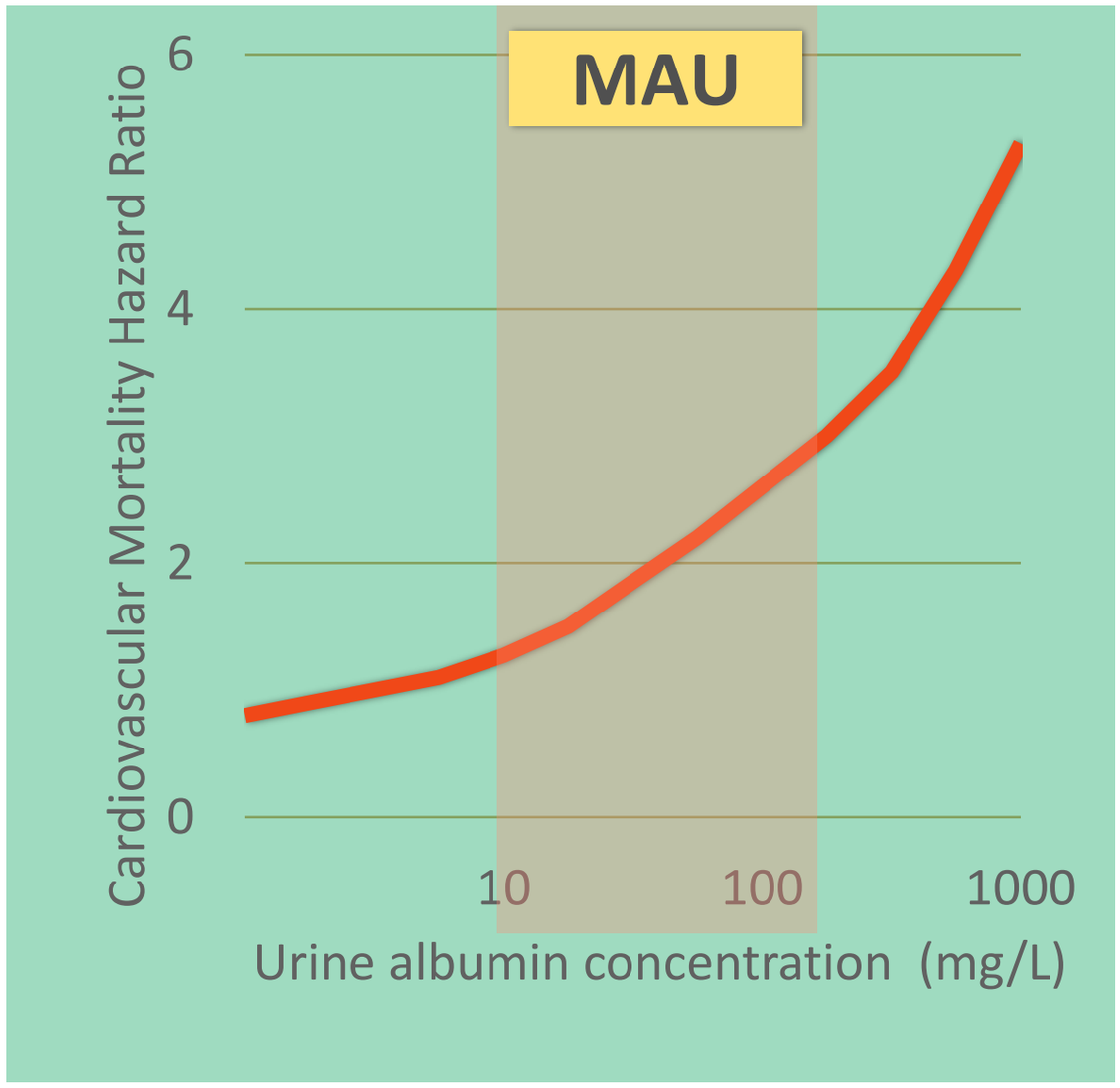
Outcomes



"Abnormal" albuminuria begins at 20 µg/min (≅30 mg/d)
= ACR < 3.0
ACR 2.0 = 14 µg/min = far side of X axis

Ruggenenti P, et al, JASN 2012;23(10):1717-1724

Proteinuria and Risk of CV Mortality



- CV risk rises in people with microalbuminuria even in the absence of diabetes or hypertension
- PREVEND
  - Population cross-section survey of a single city in the Netherlands
  - n=40,856 (n=5,241 for nonDM, nonhypertensive study)

Hillege HL, et al, Circulation 2002;106(14):1777-1782

eGFR +

uACR

CVD mortality risk by GFR and albuminuria categories

GFR categories: Description and range (mL/min/1.73 m²)			Albuminuria categories			
			A1		A2	A3
			<1.13 mg/mmol	1.13-3.3 mg/mmol	3.39 to 33.8 mg/mmol	≥33.9 mg/mmol
	G1	≥105				
		90-104				
	G2	75-89				
		60-74				
	G3a	45-59				
	G3b	30-44				
	G4	15-29				
	G5	<10				

Low risk*

Moderately increased risk

High risk

Very high risk

Matushita K, et al. Nat Review Nephrol 2022;18:696-707

CKD is classified based on: • Cause (C) • GFR (G) • Albuminuria (A)				Albuminuria categories Description and range		
				A1	**A2**	**A3**
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30–299 mg/g 3–29 mg/mmol	≥300 mg/g ≥30 mg/mmol
GFR categories (mL/min/1.73 m²) Description and range	**G1**	Normal or high	≥90	Screen 1	Treat 1	Treat and refer 3
	G2	Mildly decreased	60–89	Screen 1	Treat 1	Treat and refer 3
	G3a	Mildly to moderately decreased	45–59	Treat 1	Treat 2	Treat and refer 3
	G3b	Moderately to severely decreased	30–44	Treat 2	Treat and refer 3	Treat and refer 3
	G4	Severely decreased	15–29	Treat and refer* 3	Treat and refer* 3	Treat and refer 4+
	G5	Kidney failure	<15	Treat and refer 4+	Treat and refer 4+	Treat and refer 4+

Low risk (if no other markers of kidney disease, no CKD)

Moderately increased risk

High risk

Very high risk

Takeaways

- Order both creatinine and urine ACR routinely
- Gives you current renal status and vector
- Gives you another estimate of CV risk

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Prediction Equation

KFRE
(Kidney Failure Risk Equation)

Question 3:

Have you ordered or calculated the KFRE?

Prediction Equation

KFRE

2- and 5-year risk of ESRD

ESRD Risk Prediction

- Calculated at the lab and printed on lab result form automatically
- **Needs both eGFR and uACR!**
- 5 year ESRD risks 3-5% - refer to nephrology
- 2 year ESRD risk > 10% - multidisciplinary kidney clinic
- 2 year ESRD risk > 40% - set plan for dialysis/transplant/conservative care

Do you need to order KFRE = No

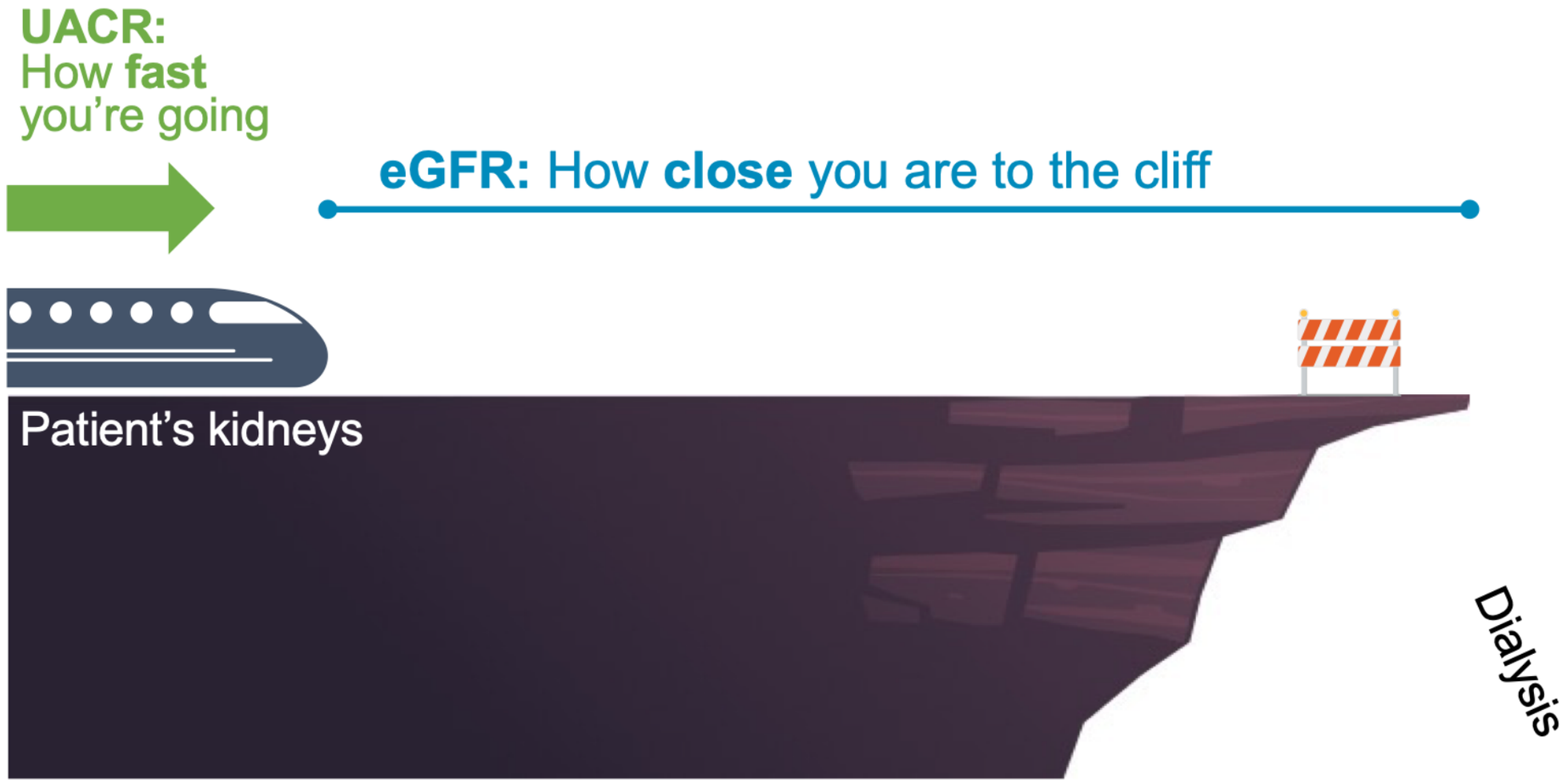
But you will get KFRE reports

If 5 yr risk > 5% ensure nephrology referral

So …
Need both eGFR and uACR

- Identify and stage CKD
- Cardiorenal risk assessment
- Risk of dialysis (KFRE)

UACR is an independent risk factor for progression of CKD and is just as important as eGFR. Both are needed to see the full picture of a patient's kidney health

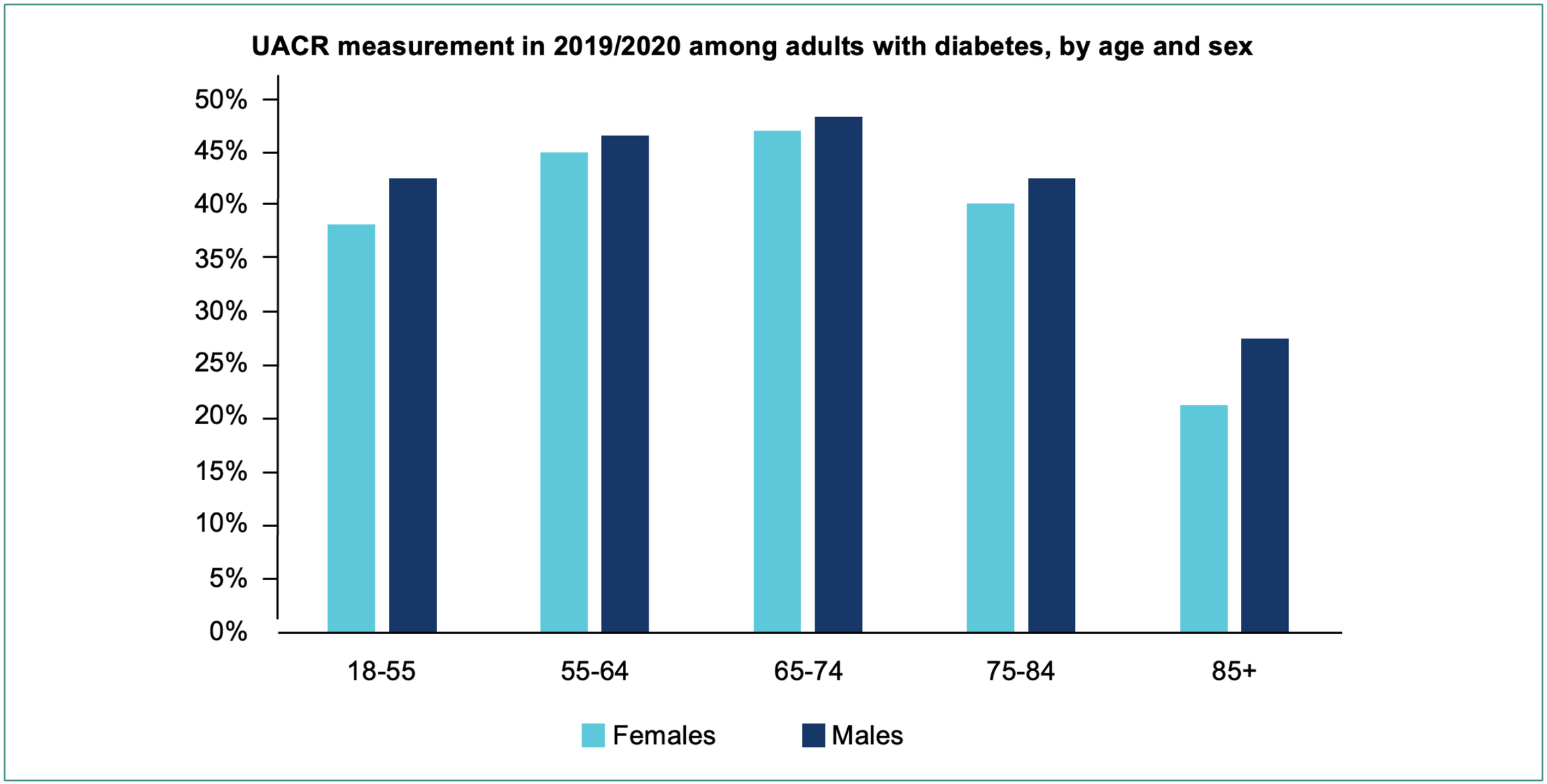


CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; NIDDM, non-insulin-dependent diabetes mellitus; UACR, urinary albumin to creatinine ratio.

Mattock MB, Keen H, Barnes DJ, et al. Microalbuminuria: a risk factor for coronary heart disease in non-insulin dependent diabetic men. In:. Cardiovascular Disease Prevention IILTeddington, UK: Hampton Medical Conferences, 1997: 30 (abstr). As cited in: Eastman RC, Keen H. *Lancet* 1997;350(suppl I):29-32.

But ....

Rate of uACR Testing in Diabetes in Alberta



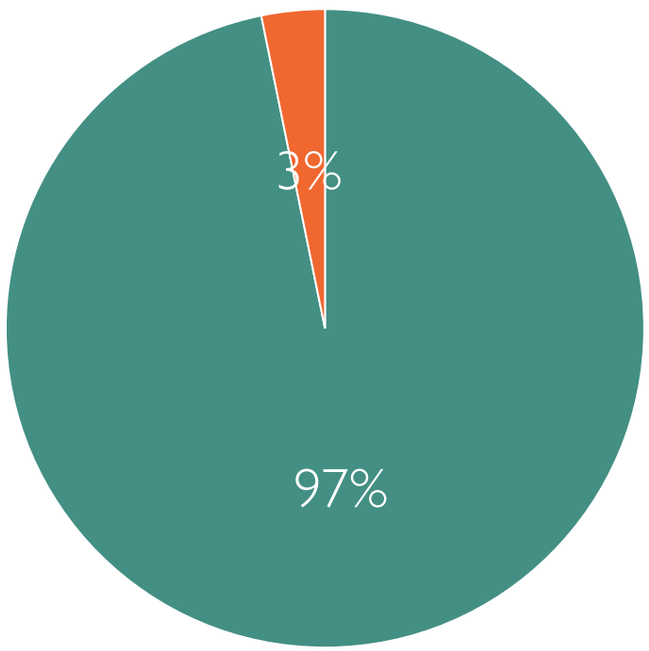
Alberta Health Services. Report: Kidney Care in Alberta. Prevalence and Quality of Care in Chronic Kidney Disease. 2023

Question 4:

Honestly – do you routinely order uACRs?

How are physicians doing screening for UACR?

AWARE-CKD[1]:
Physicians in Canada (GPs, endos & nephs) self-reported UACR screening



96.8% of physicians routinely test UACR to screen for CKD

1.Chu L, Bhogal SK, Lin P, et al. AWARE-CKD in T2D. Can J of Diabetes 2022;46:464-472., 2.Bello AK, Ronksley PE, Tangri N, et al. JAMA Netw Open. 2019 Sep 4;2(9):e1910704.,3.Shin, JI et al. Hypertension 2021;78:142-1052.

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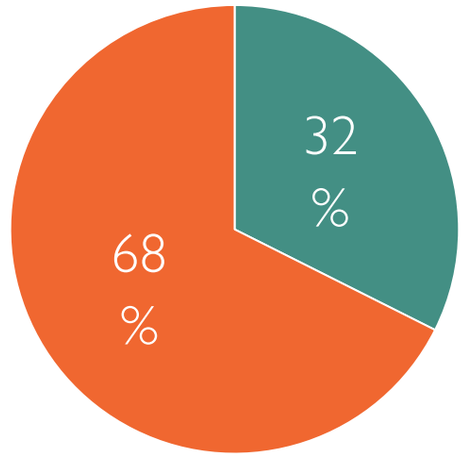
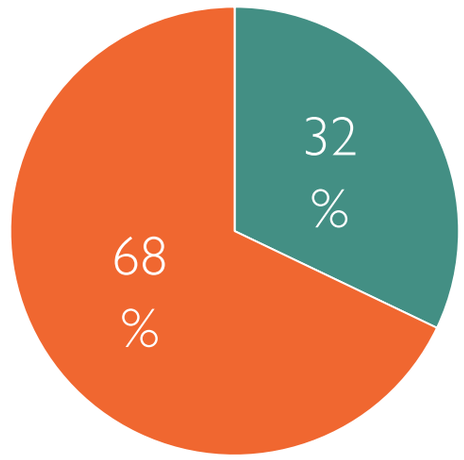
CANADIAN PRIMARY CARE[2]
32.4% of patients with diabetes receive a UACR test within 6 mo of an initial eGFR <60



CKD Prognosis Global Consortium[3]
32.1% of patients with diabetes received a screening UACR test



1.Chu L, Bhogal SK, Lin P, et al. AWARE-CKD in T2D. Can J of Diabetes 2022;46:464-472., 2.Bello AK, Ronksley PE, Tangri N, et al. JAMA Netw Open. 2019 Sep 4;2(9):e1910704.,3.Shin, JI et al. Hypertension 2021;78:142-1052.

I’m convinced!

How often?

Screen annually in people with diabetes and no history of kidney disease.

- For type 1 diabetes, begin 5 years after onset or if at an early age, start after puberty.
- For type 2 diabetes, start at diagnosis and annually thereafter.
- Screen with random urine ACR and serum creatinine to calculate eGFR and KFRE.

If urine ACR is positive but < 20 mg/mmol, repeat for 2 of 3 positive over at least 3 months.
If urine ACR ≥ 20 mg/mmol, diagnose diabetic nephropathy

CKD = eGFR ≤60 ml/min/m^2 ±ACR ≥2.0 mg/mmol
Diabetic nephropathy = ACR ≥2.0 mg/mmol ± eGFR ≤60 ml/min/m^2

ACR Testing Intervals for Screening Purposes

Condition	Interval for ACR screening
DM	Annually
Hypertension	No interval specified but should by annually
No compelling indication	No interval specified but should be any time routine labs are drawn for screening for CV risk factors/DM/etc

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Saving The Heart and Kidneys

Ex. Diabetes

Glucose Control
A1c<7.0%. A1c<6.5%?

BP Control
<130/80. <120?

ACEi or ARB

2003

Glucose Control
A1c<7.0%. A1c<6.5%?

BP Control
<130/80. <120?

ACEi or ARB

2003

SGLT2i — 2018

nsMRA — 2021

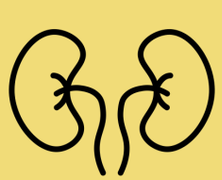
GLP1ra — 2024

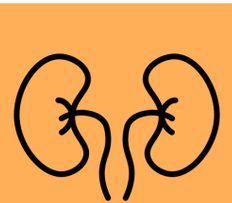
Glucose Control
A1c<7.0%. A1c<6.5%?

BP Control
<130/80. <120?

ACEi or ARB

2003

♡ X **SGLT2i**   2018

♡ X **nsMRA**   2021

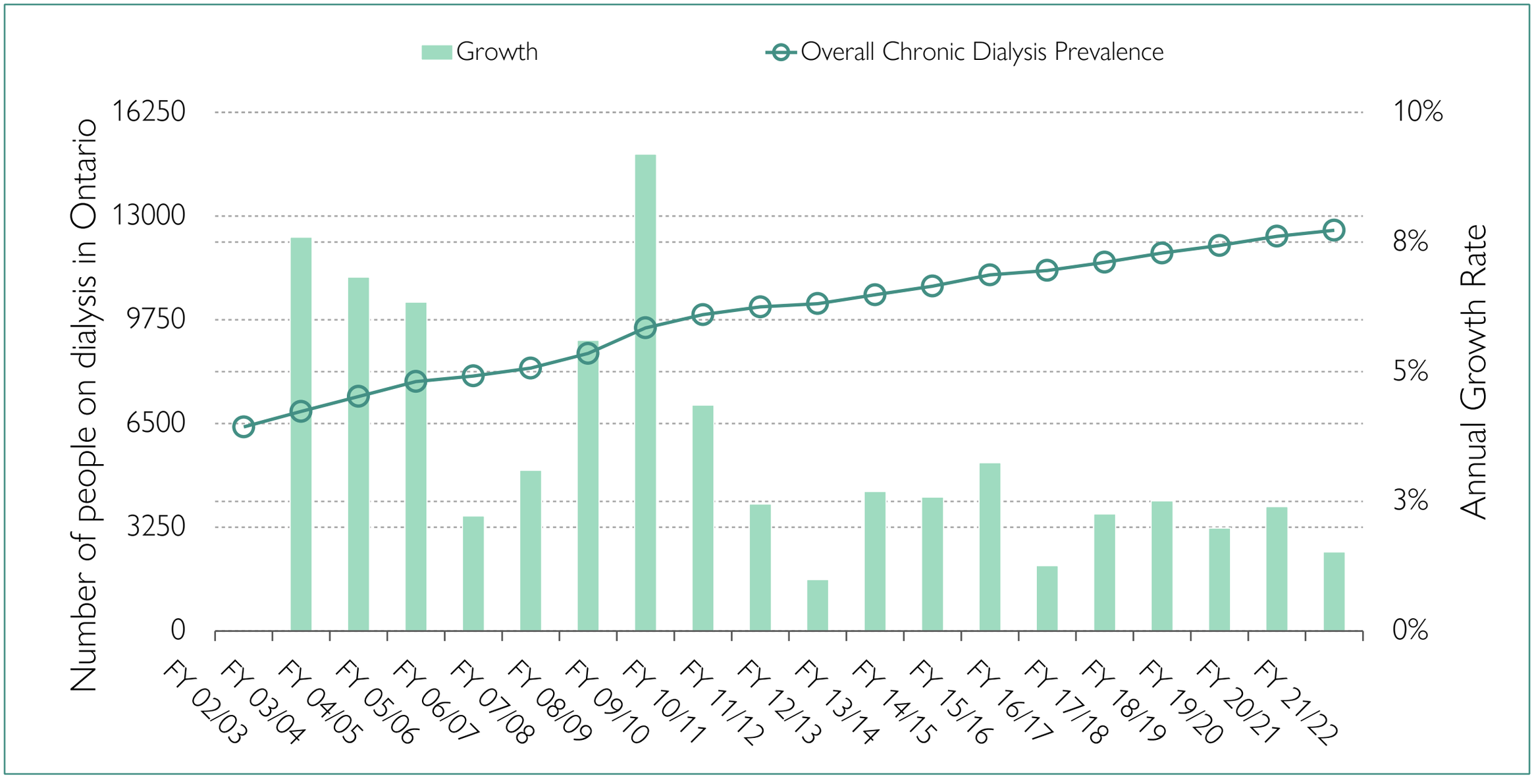
♡ X **GLP1ra**  2024

Real World?

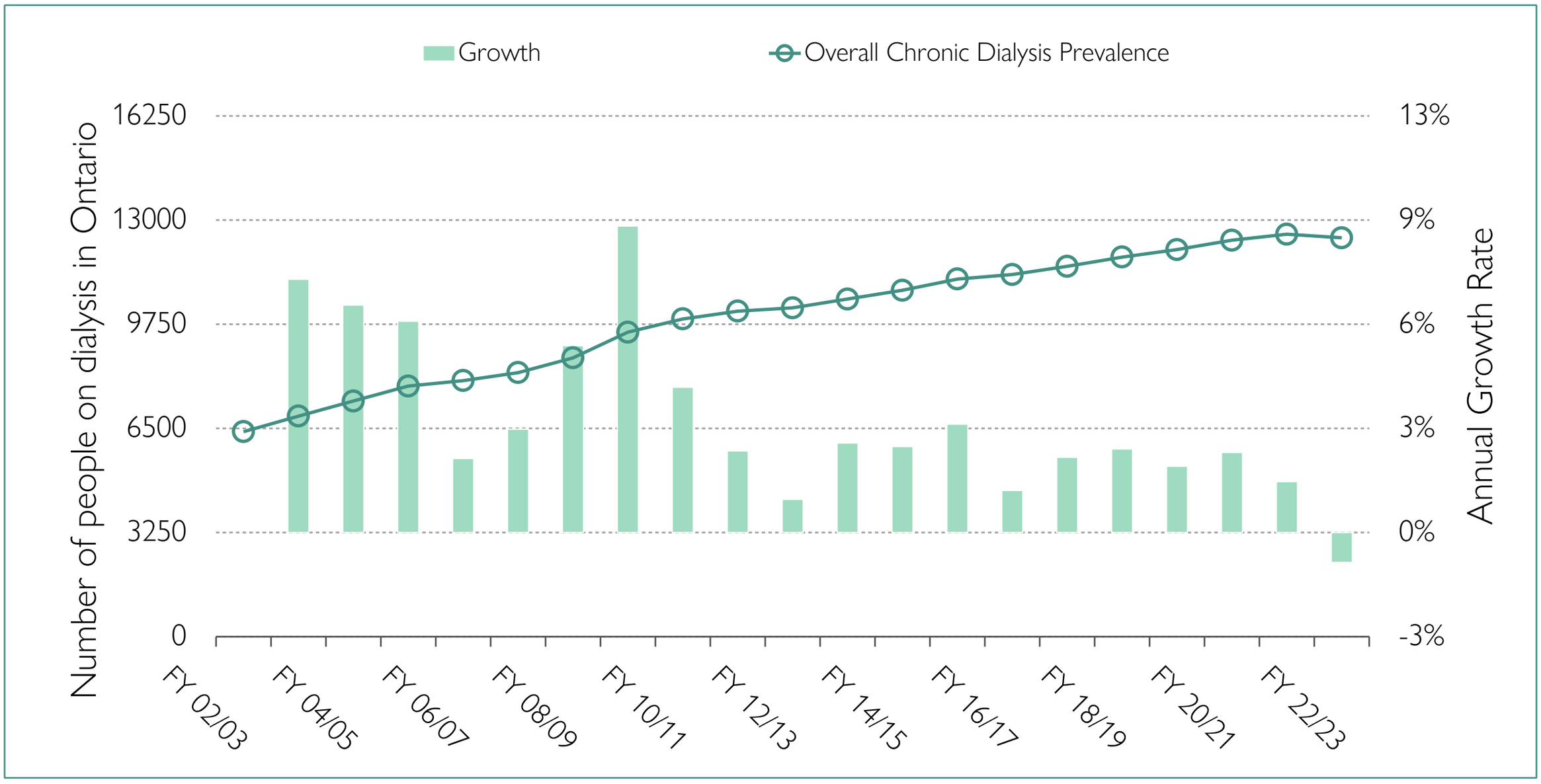
Dialysis growth in GTA 1996

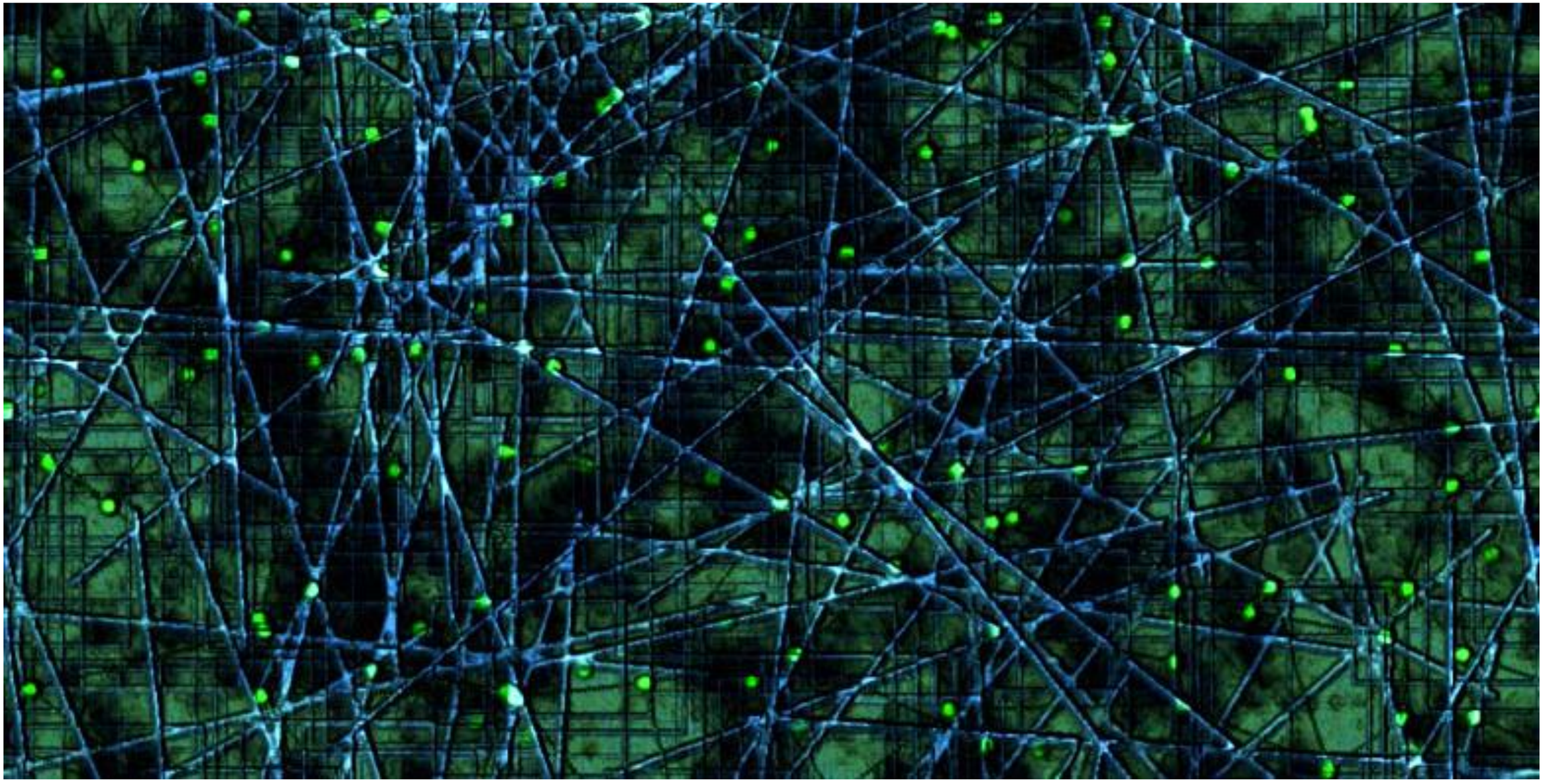
About 15%/yr

Prevalence and Growth of Dialysis in Ontario



Prevalence and Growth of Dialysis in Ontario





Summary

Summary

- eGFR and uACR are old tests but remain very valuable in detecting CKD and determining cardiorenal risk
  - uACR not done enough
- We now have risk equations that can predict end-stage renal disease and ensure people are receiving the appropriate care at the appropriate time
- We now have many strategies that can reduce the risk of dialysis, CV events and death in people with CKD
  - **Need to know that they have CKD though!**

Discussion

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