



PARIS MASH MEETING

11th edition

Organized by
Arun Sanyal & Lawrence Serfaty

September 11 & 12, 2025
Institut Pasteur, Paris





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11th edition

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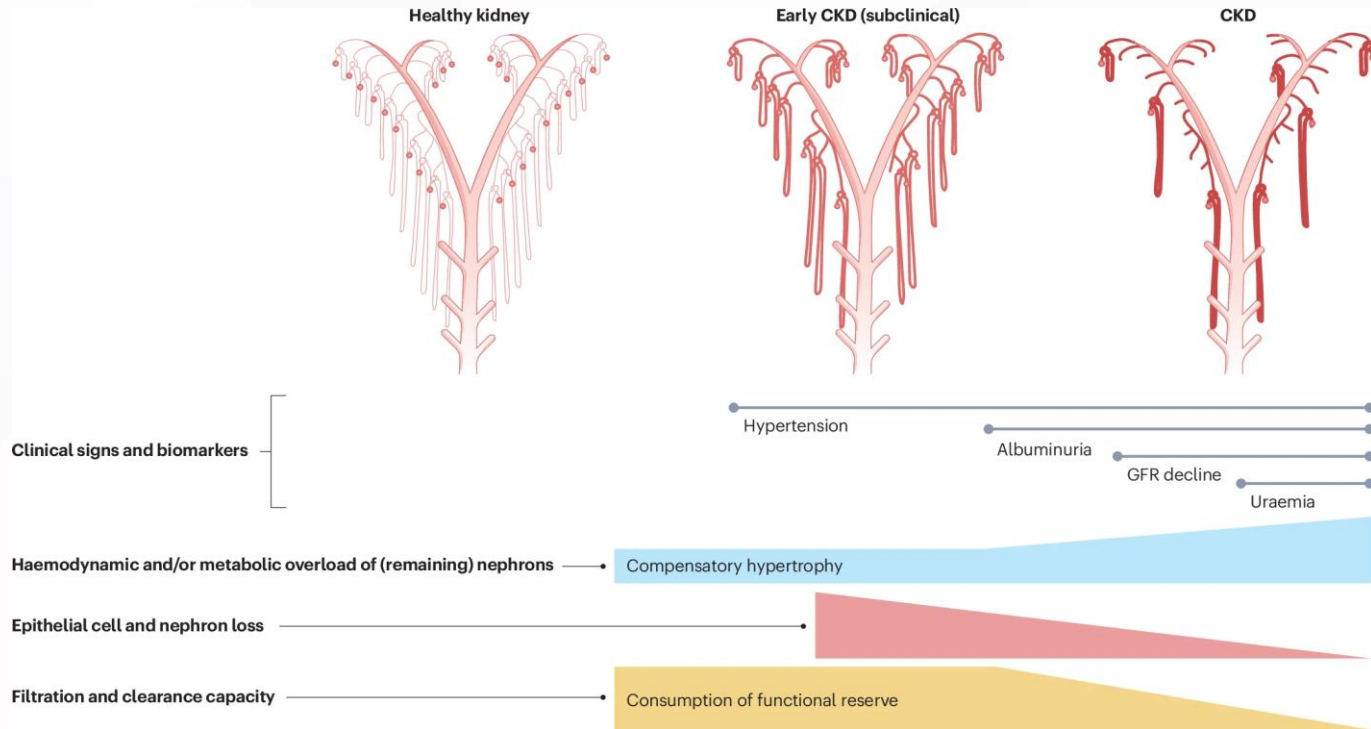


Metabolic Liver Disease in End-stage Kidney Disease (ESKD) and Kidney Transplantation



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Natural History of Chronic Kidney Disease (CKD)



Nature reviews disease primers, Romagnani, Jan 2025

KDIGO Staging of CKD

GFR categories (ml/min/1.73 m²) (description and range)

			Persistent albuminuria categories (description and range)		
			A1 Normal to mildly increased <30 mg/g <3 mg/mmol	A2 Moderately increased 30–300 mg/g 3–30 mg/mmol	A3 Severely increased >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			

■ Low risk
 ■ Moderately increased risk
 ■ High risk
 ■ Very high risk

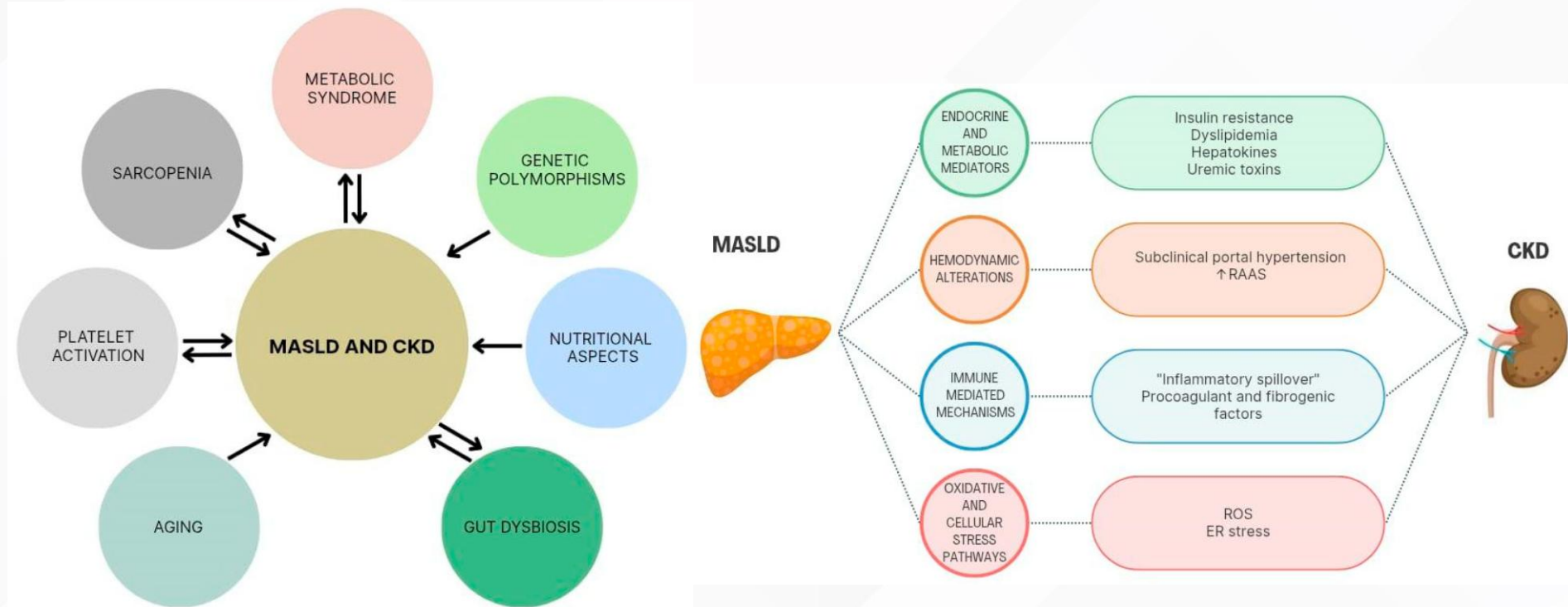
Nature reviews disease primers, Romagnani, Jan 2025

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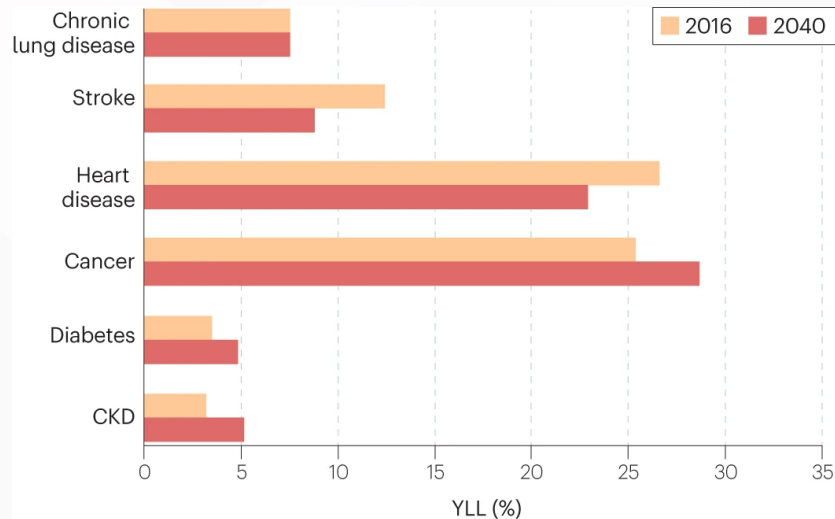
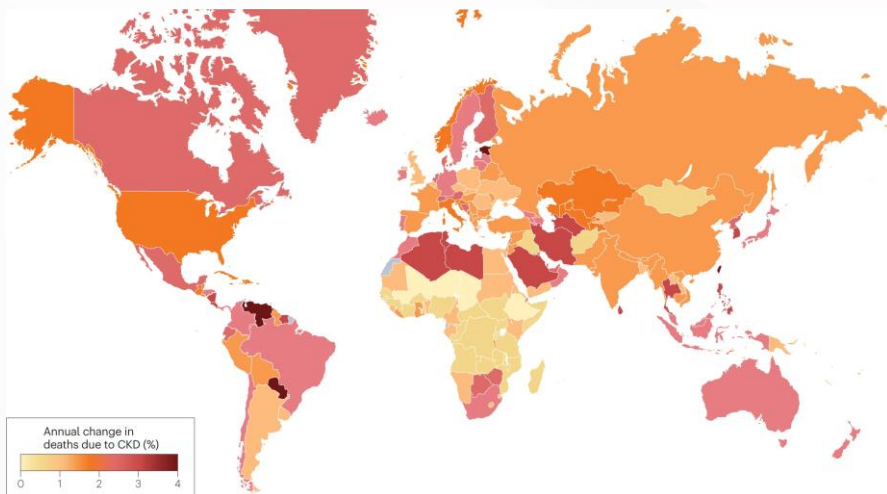
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Pathways That Link MASLD With CKD



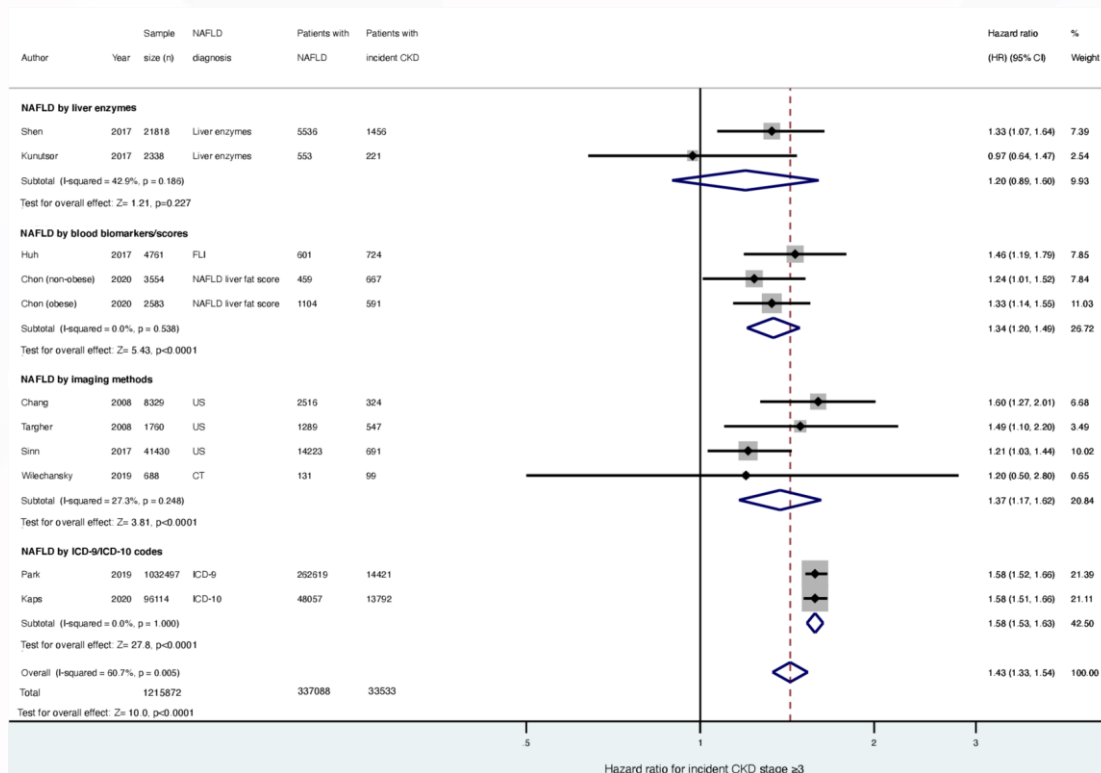
BioMedicines, Souto Maior, Aug 2025

Incidence and Prevalence of CKD



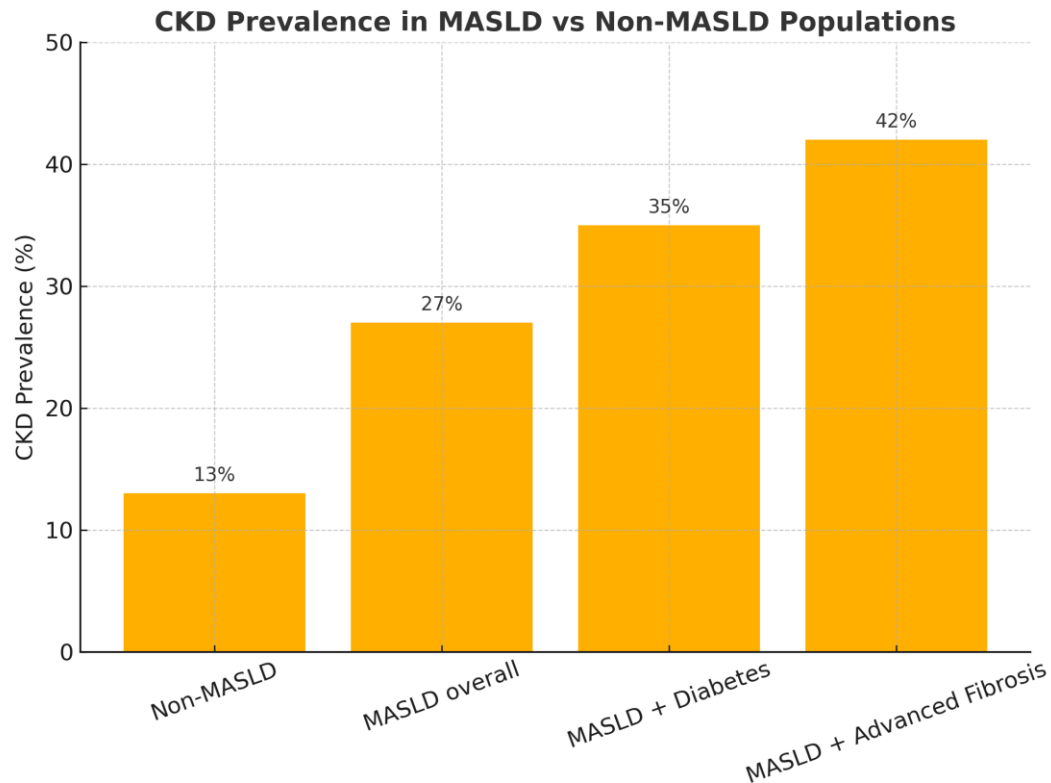
Nature reviews Nephrology, Francis, April 2024

MASLD And Risk Of Incident CKD: A Meta-Analysis



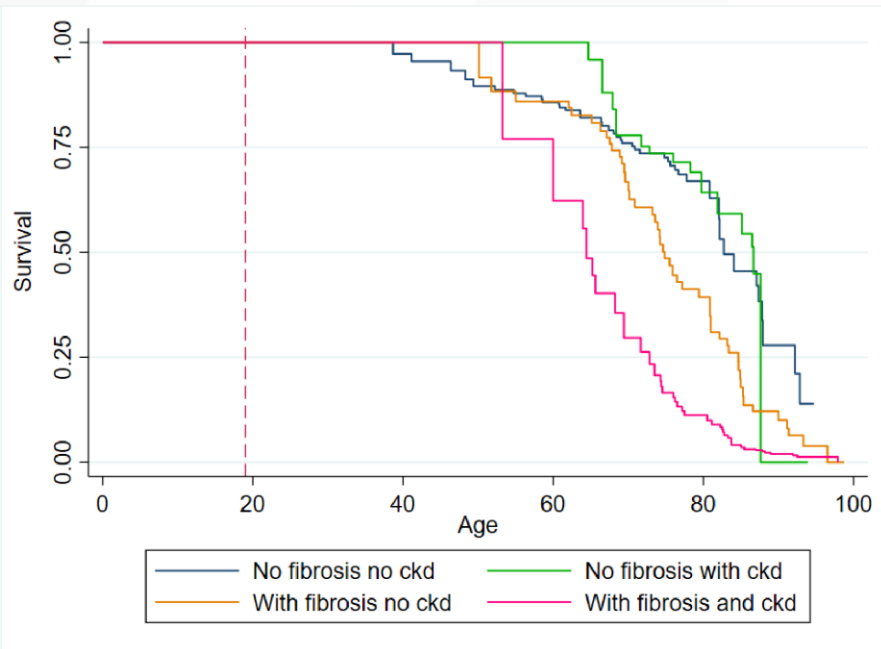
Gut, Mantovani, Jan 2022

MASLD And Prevalence of CKD



Liver International, Targher, 2025
J of Hepatol, Van Sloten, 2025
BMC Gastro, Feng, 2025
Aliment Pharmacol Ther, Younossi, 2025

Liver Fibrosis And CKD: Association with Mortality



Variable	n (%) [†]	HR (95% CI)	p
MASLD [no fibrosis, no CKD]	42 (3.3%)		
MASLD no fibrosis, with CKD	15 (10.4%)	1.94 (1.05–3.55)	0.033
MASLD with fibrosis, no CKD	46 (9.6%)	2.36 (1.54–3.63)	<0.001
MASLD with fibrosis and CKD	37 (33.0%)	5.19 (3.20–8.43)	<0.001

Variable	n (%) [†]	aHR (95% CI)	p
MASLD [no fibrosis, no CKD]	42 (3.3%)		
MASLD no fibrosis, with CKD	15 (10.4%)	1.88 (1.02–3.47)	0.044
MASLD with fibrosis, no CKD	46 (9.6%)	2.30 (1.49–3.56)	<0.001
MASLD with fibrosis and CKD	37 (33.0%)	5.07 (3.07–8.39)	<0.001

Sex [female]	53 (5.9%)		
Male	87 (7.7%)	1.37 (0.97–1.95)	0.074
Diabetes [no]	31 (5.3%)		
Yes	109 (7.6%)	1.09 (0.72–1.66)	0.680
CVD [no]	81 (5.3%)		
Yes	59 (12.2%)	1.04 (0.72–1.50)	0.846

Abbreviations: HR: hazard ratio; aHR: adjusted hazard ratio; MASLD, metabolic dysfunction associated steatotic liver disease; CVD, cardiovascular disease.

[†]Sum of cohort at each variable level who died.

Note: This analysis excluded individuals with CKD of structural, autoimmune, or malignant, aetiology; therefore, n = 7 deaths are excluded from the estimates.

Univariable model fit: χ^2 43.78, $p = <0.0001$. Harrell's C: 0.56 (95% CI 0.50 to 0.62), $p <0.0001$.

Adjusted model fit: χ^2 47.34, $p = <0.0001$. Harrell's C: 0.58 (95% CI 0.52 to 0.64), $p <0.0001$.

Survival information: n = 2,024; failures = 140, time at risk = 4,619.46 years; earliest entry age = 19.2; last observed exit age = 98.7.

<https://doi.org/10.1371/journal.pone.0299507.t004>

Prevalence of MASLD in ESKD Patients

Study or subgroup	Prevalence (%)	SE	NAFLD Total	No NAFLD Total	Weight (%)	Prevalence (%) IV, random (95% CI)	Year	Prevalence (%) IV, random (95% CI)
Mikolasevic	56.38	5.11	53	41	43.7	56.38 (46.36–66.40)	2015	
Stolic	51.39	5.89	37	35	32.9	51.39 (39.85–62.93)	2016	
Behairy	58	6.98	29	21	23.4	58.00 (44.32–71.68)	2021	
Total (95% CI)			119	97	100	55.12 (48.50–61.74)		

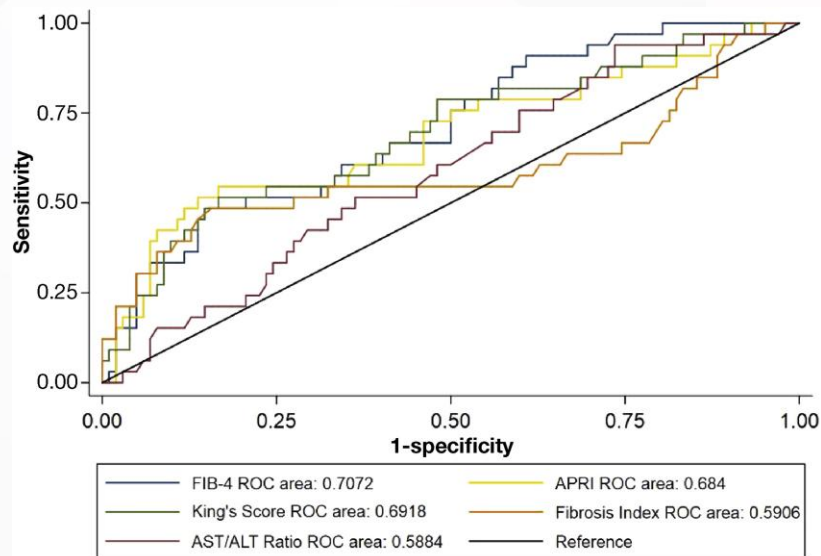
Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 0.63$; $df = 2$ ($P = 0.73$); $I^2 = 0\%$
 Test for overall effect: $Z = 16.32$ ($P < 0.00001$)

55%

It was not possible to perform sensitivity analyses for this subgroup, as all studies exhibited a high risk of bias.

Clin Kidney J, Swift, 2022

Non-Invasive Tests for MASLD/Liver Fibrosis Assessment in ESKD



Non-invasive tests for diagnosis of advanced liver fibrosis in ESKD Patients with Chronic HCV (Reference: Liver biopsy)

Schmoyer, Clinical Gastroentero 2020

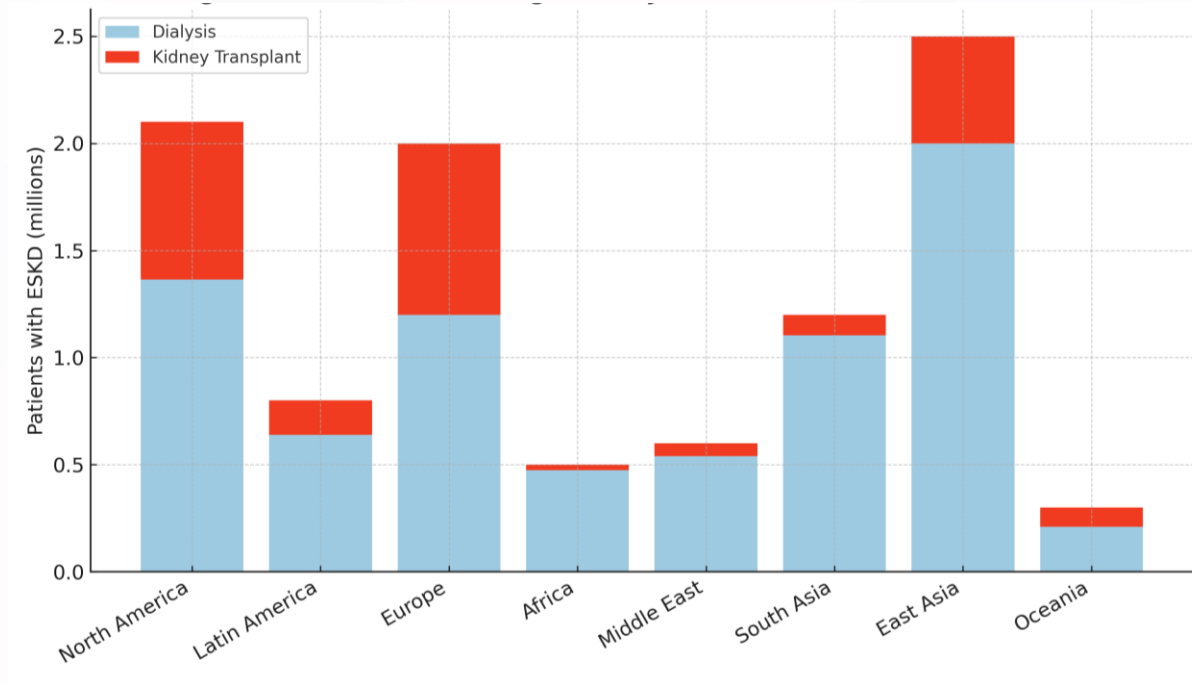
Syed, Gastroenterol Research 2021

Table 3. Comparison of Multiple Variables and Serum-Based Non-Invasive Models With Transient Elastography for Detection of Advanced Fibrosis (LS \geq 9 kPa)

Variables and models	LS < 9 kPa	LS \geq 9 kPa	P values
Patients (n)	135	36	
Male (%)	61	75	
Black (%)	59	64	
Age ^a	54 (12)	62 (10)	0.005
%BMI \geq 30	37	31	
%DM	44	56	
%CAP > 263 dB/m	25	25	
%DL	54	62	
XL probe (%)	38	35	
AST (IU/L) ^a	31.6 (32.7)	30.8 (14.9)	
ALT (IU/L) ^a	29.48 (50.4)	26.2 (19.9)	
Platelets ($\times 10^3$ /mL) ^a	218 (89)	203 (76)	
APRI ^a	0.35 (0.42)	0.34 (0.23)	
%APRI > 1.5	22	0	
FIB-4 ^a	1.89 (1.27)	2.28 (1.5)	
%FIB-4 > 2.67	20	23	
NFS ^a	-0.560 (1.61)	0.138 (1.52)	0.021
%NFS > 0.675	16	36	0.007

^aMean \pm SD. LS: liver stiffness (by transient elastography); BMI: body mass index; DM: diabetes mellitus; CAP: controlled attenuated parameter; DL: dyslipidemia; XL: large probe; AST: aspartate aminotransferase; ALT: alanine aminotransferase; APRI: AST to platelet ratio index; FIB-4: Fibrosis-4; NFS: non-alcoholic fatty liver disease fibrosis score; SD: standard deviation.

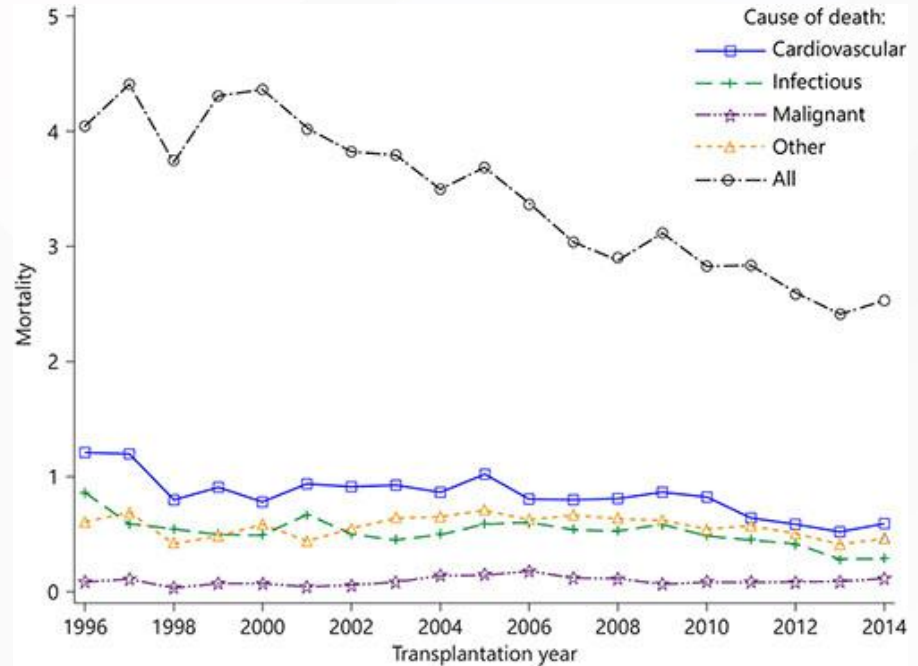
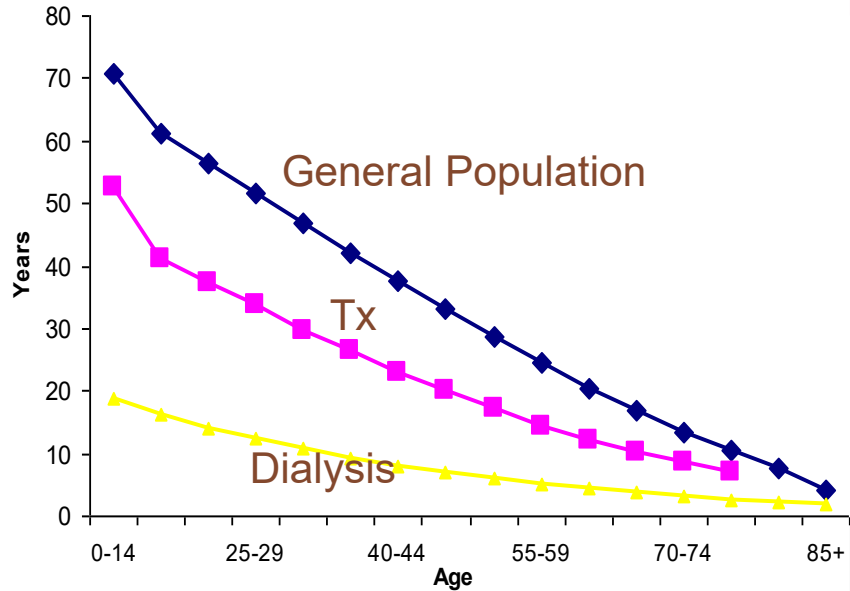
Kidney Replacement Therapy Distribution



<https://www.theisn.org/in-action/research/global-kidney-health-atlas/>

Adapted using Scholar GPT

Mortality in Kidney Transplantation



JGIM, Gupta, 2010
Am J Nephro, 2018

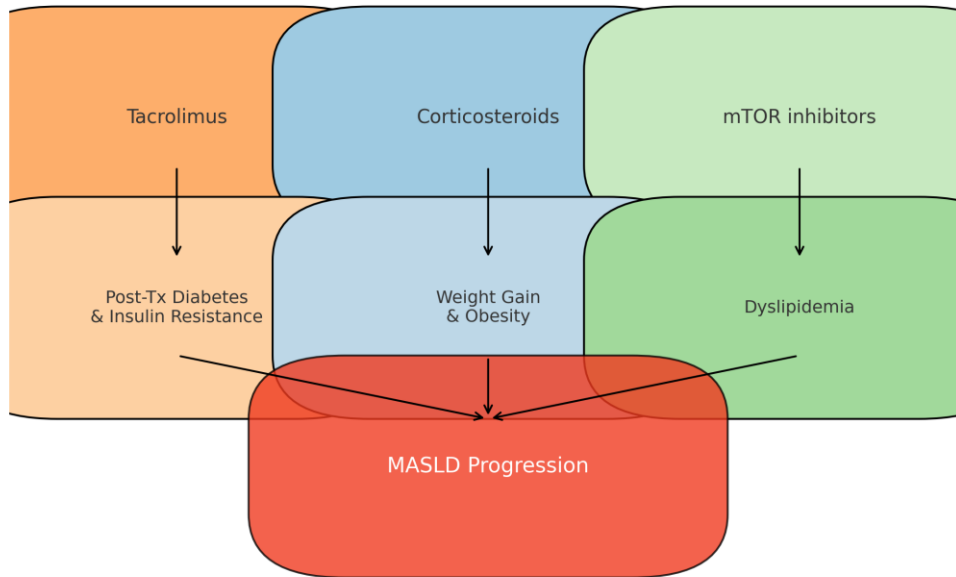
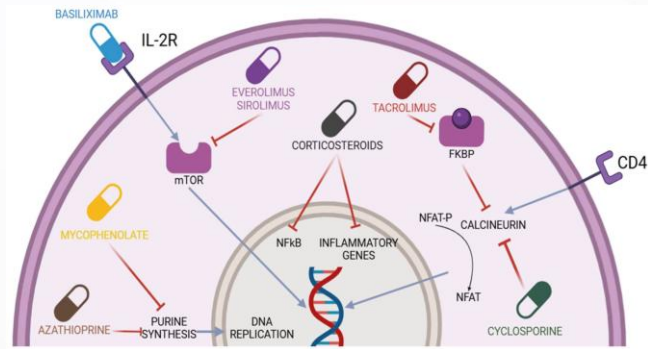
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What is Unique about Kidney Transplant Patients?

Immunosuppressant Effects on Metabolism and MASLD Progression



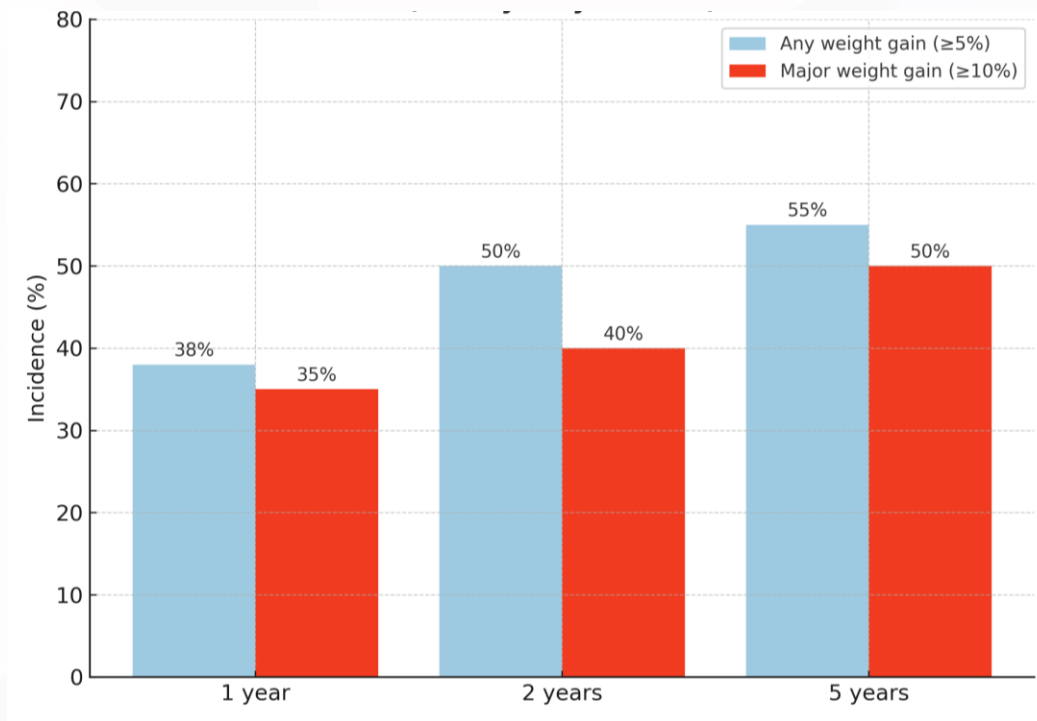
Pharmaceuticals, Gabrielli, April 2025

What is Unique about Kidney Transplant Patients?

	General adult population	Dialysis patients	Kidney Transplant Recipients
Obesity (BMI >30)	25–30%	14%	10–60%
Smoking	21%	25%	25%
Diabetes	11%	35%	45–55%
Hypertension	21–29%	80%	60–85%
Hyperlipidemia	25–29%	25%	60%
Chronic kidney disease	13%	100%	100%

JGIM, Gupta, 2010

Weight Gain After Kidney Transplantation



AJT Supplement, Khalil, 2025

Data Voids in Kidney Transplantation

- Incidence/Prevalence of MASLD
- Impact of Metabolic Syndrome and MASLD on Outcomes (mortality, graft dysfunction, CV risk)
- Dyslipidemia Management: Is there a LDL goal?
- Diabetes Management: What is the Ideal HbA1c Target?
- Do therapies for CKD Progression have the same effect? Are they safe?
 - ACEI/ARB/Mineralocorticoid Antagonists
 - SGLT2i
 - GLP1/Dual Agonists
 - Others

99% RCTs exclude kidney transplant patients

Prevalence of MetS and MASLD in Kidney Transplantation

Publication	N	Method of detection	Prevalence
Cai, Netherlands	429	Biochemical/Demographic	MetS=54%
De Vries, Netherlands	606	Biochemical/Demographic	MetS=63%
Yesil, Turkey	52	Fibroscan	MetS=35% MASLD=42%
Mikolasevic, Croatia	73	Fibroscan	MASLD=57%
Alfieri, Italy	531	Hepatic Steatosis Index	MASLD=27.5%
Syed, USA	171	Fibroscan (+/- Biopsy)	MASLD=25% Advanced Fibrosis=21%
Zeleeke, TriNetX*	~68763	Diagnosis code based	MASLD~3%

Cai, Nutrition, Metabol, CV Diseases, 2021; De Vries, AJT 2004
Hepatol Forum, Yesil, 2023; Mikolasevic, Transplant Proc 2013, Alfieri, ASN 2024
Syed, Gastroenterol Research 2021; *: unpublished

Metabolic associated steatotic liver disease in renal transplant recipients: a retrospective cohort study

METABOLIC ASSOCIATED STEATOTIC LIVER DISEASE IN RENAL TRANSPLANT RECIPIENTS: A RETROSPECTIVE COHORT STUDY

AIM

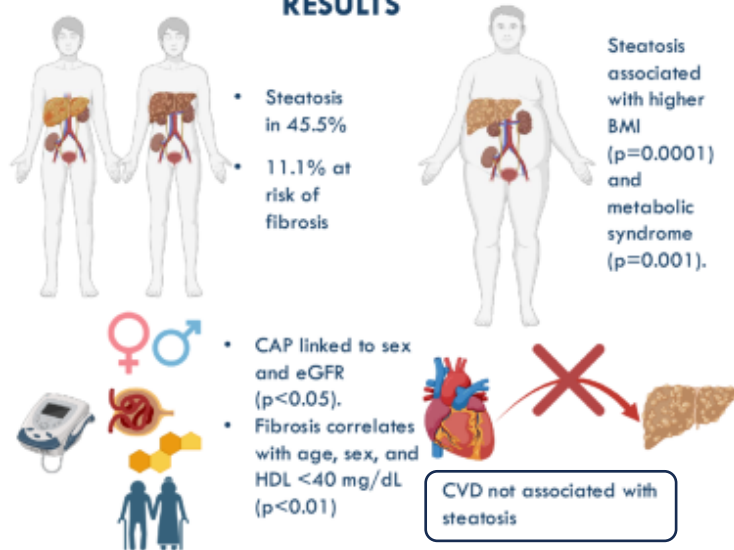
This study investigates the prevalence and factors associated with steatosis in kidney transplant patients and its relationship with CVD

METHODS



200 Kidney Transplant Recipients. Collection of demographics, clinical and laboratory findings, abdominal ultrasound, liver stiffness, and controlled attenuation parameter.

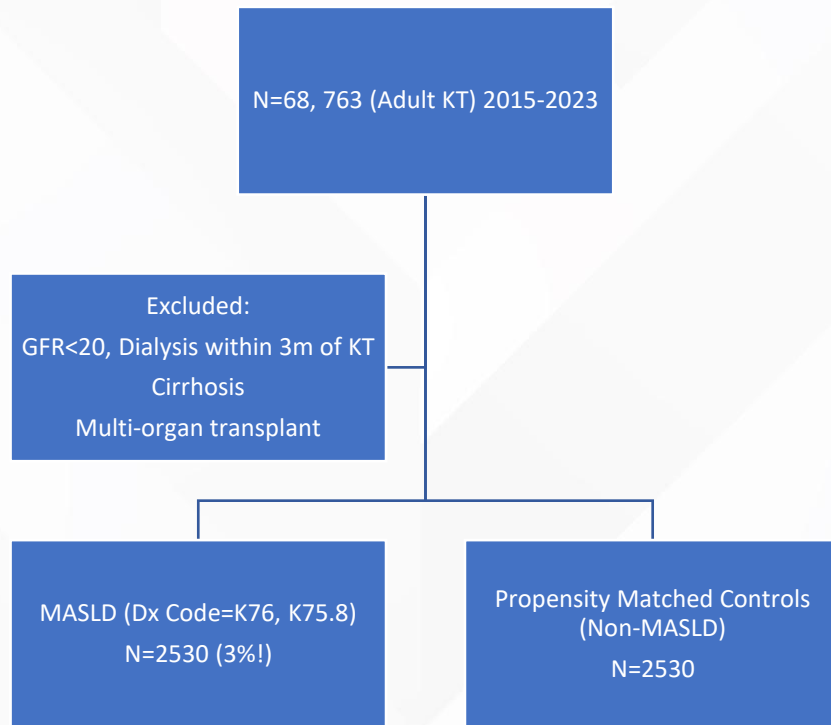
RESULTS



CONCLUSION: MASLD and metabolic syndrome were highly prevalent in kidney transplant recipients, though no significant link was found between steatosis and CVD history.

Created in <https://BioRender.com>

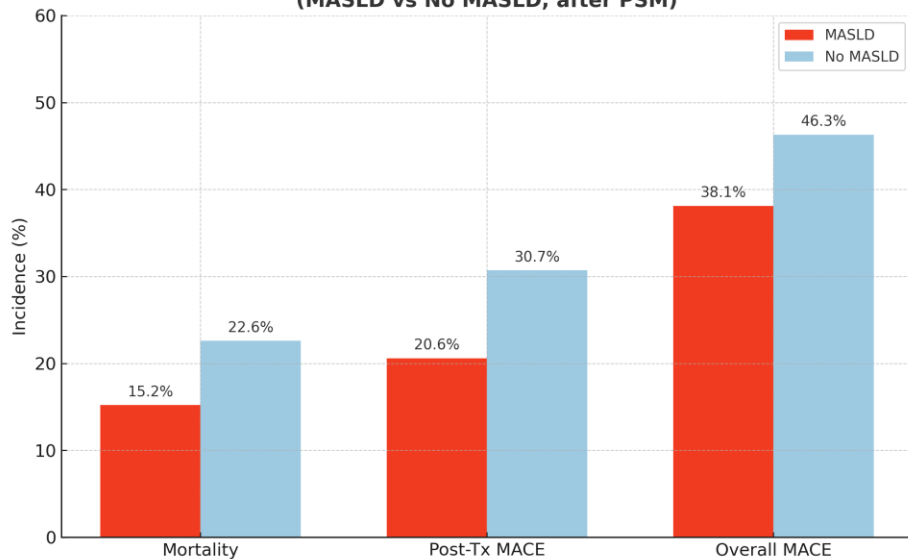
Metabolic associated steatotic liver disease in renal transplant recipients: Propensity Matched Analysis Using TriNetX



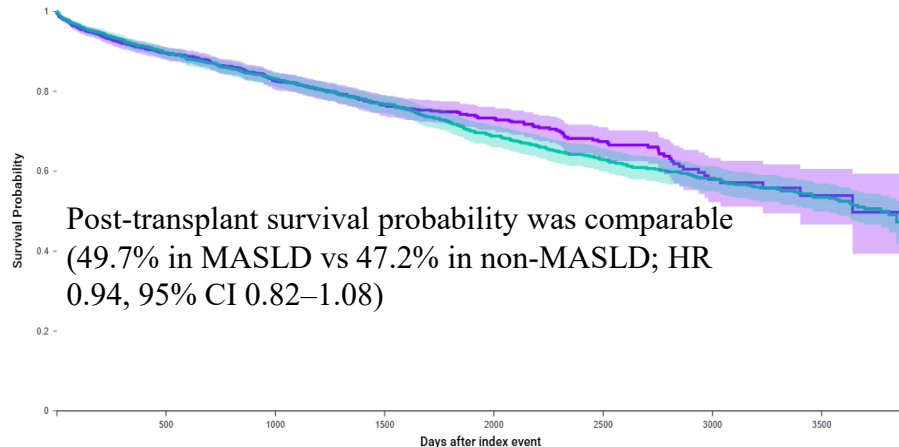
Zelege, Patel, Gupta, unpublished

Metabolic associated steatotic liver disease in renal transplant recipients: Propensity Matched Analysis Using TriNetX

Key Cardiovascular Outcomes in Kidney Transplant Recipients
(MASLD vs No MASLD, after PSM)



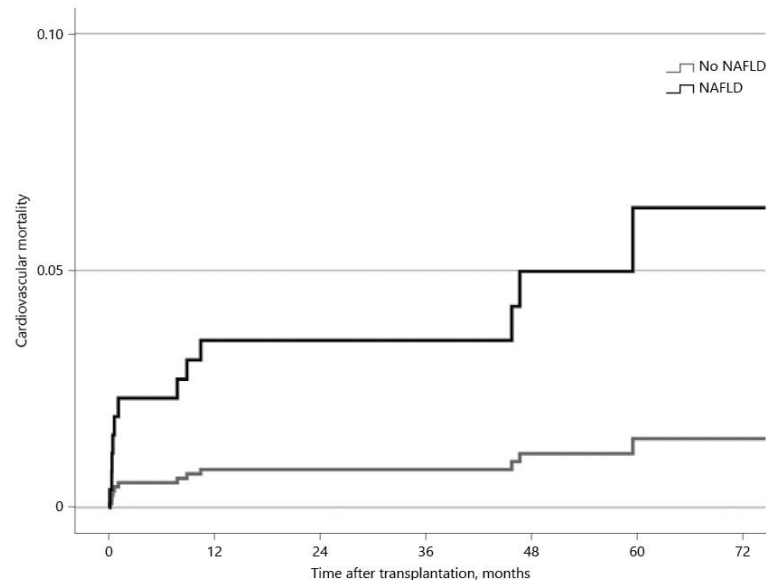
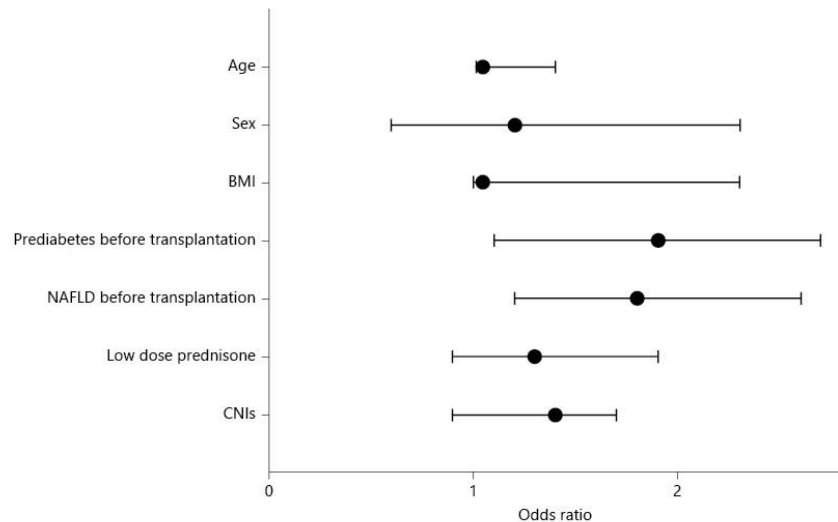
Kaplan-Meier Survival Curve



Limitations: Dx codes are likely inadequate
? Better care

Zelege, Patel, Gupta, unpublished

MASLD *before* Kidney Transplantation Correlates with New Onset Diabetes and CV Outcomes



Am j Nephrol, Grupper, 2022

Effect of MetS and MASLD on Kidney Transplant Function

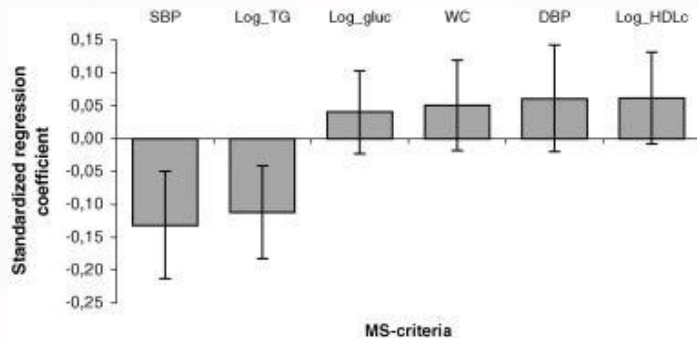
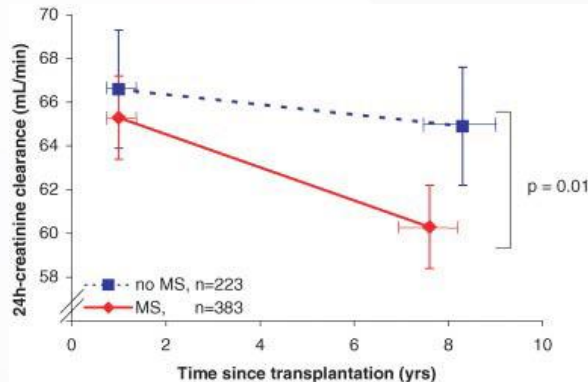
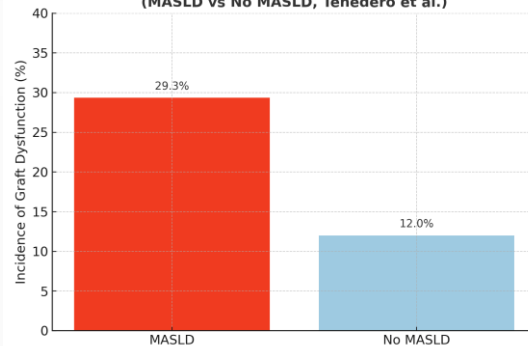


Table 2. Outcome of adult patients who are renal transplant recipients at the National and Kidney Transplant Institute (NKTi) from January 2013 to December 2023. (n=2593)

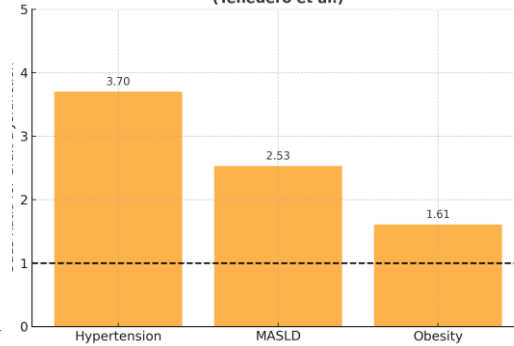
Outcome	Cumulative incidence	95% CI
Renal graft dysfunction [n=2030]	20.30%	18.57, 22.11
Metabolic dysfunction-associated steatotic liver disease [n=2566]	34.29%	32.46, 36.17
Renal graft dysfunction among patients with MASLD [n=784]	29.34%	26.17, 32.66

MASLD was found to be significantly associated with renal graft dysfunction. Patients with MASLD had a 2.53-fold increased risk of renal graft dysfunction compared to those without MASLD (OR: 2.53, 95% CI: 1.83 to 3.50). Other factors associated with increased risk of renal graft dysfunction were hypertension (OR: 3.70, 95% CI: 2.56 to 5.35) and obesity (OR: 1.61, 95% CI: 1.18 to 2.21).

Incidence of Renal Graft Dysfunction (MASLD vs No MASLD, Tenedero et al.)



Risk Factors for Graft Dysfunction (Tenedero et al.)



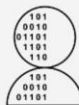
MASLD diagnosed by biochemical parameters only

Dyslipidemia in Kidney Transplantation

Statins in Kidney Transplant Recipients: Usage, All-Cause Mortality, and Interactions with Maintenance Immunosuppressive Agents

JASN
JOURNAL OF THE AMERICAN SOCIETY OF NEPHROLOGY

METHODS



58,264 kidney transplant recipients in 2006-2016 with Medicare A/B/D

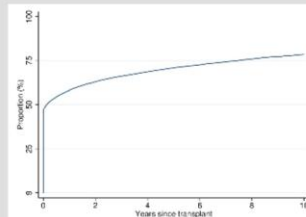
Statin use
Exposure
(time-varying)

Mortality
Outcome

Immunosuppression
Effect modifier

STATIN USE

At transplant: 46%
1 year post-transplant: 58%
3 year post-transplant: 66%
5 year post-transplant: 71%



MORTALITY

Overall: Lower hazard of death in statin users
(aHR=0.95 [95% CI; 0.90-0.99])

Stratified by immunosuppression:

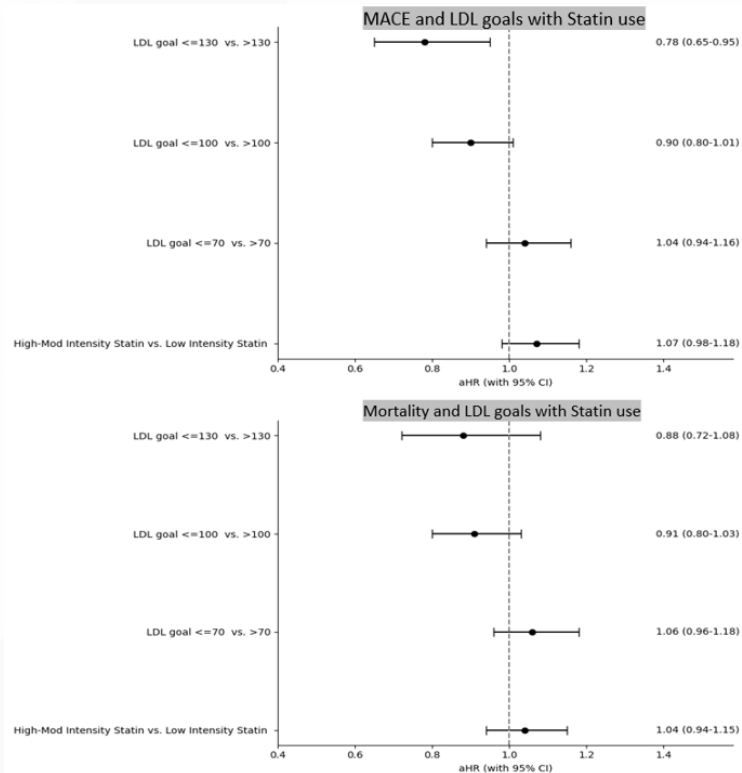
Population	aHR (95% CI)	Interaction P
Calcineurin Inhibitor		
Tacrolimus	0.97 (0.92-1.03)	Reference
Cyclosporin	0.81 (0.67-0.98)	0.1
None	0.72 (0.60-0.87)	0.002
Mycophenolates		
No	0.96 (0.91-1.02)	Reference
Yes	0.76 (0.64-0.89)	0.004
mTORi		
No	0.73 (0.57-0.92)	Reference
Yes	0.95 (0.91-1.00)	0.03
Early Steroid Withdrawal		
No	0.94 (0.89-1.00)	Reference
Yes	0.95 (0.87-1.03)	1.0

CONCLUSION: Statins may reduce all-cause mortality in kidney transplant recipients. Effectiveness may vary by immunosuppression agents.

DOI: 10.1681/ASN.000000000000112

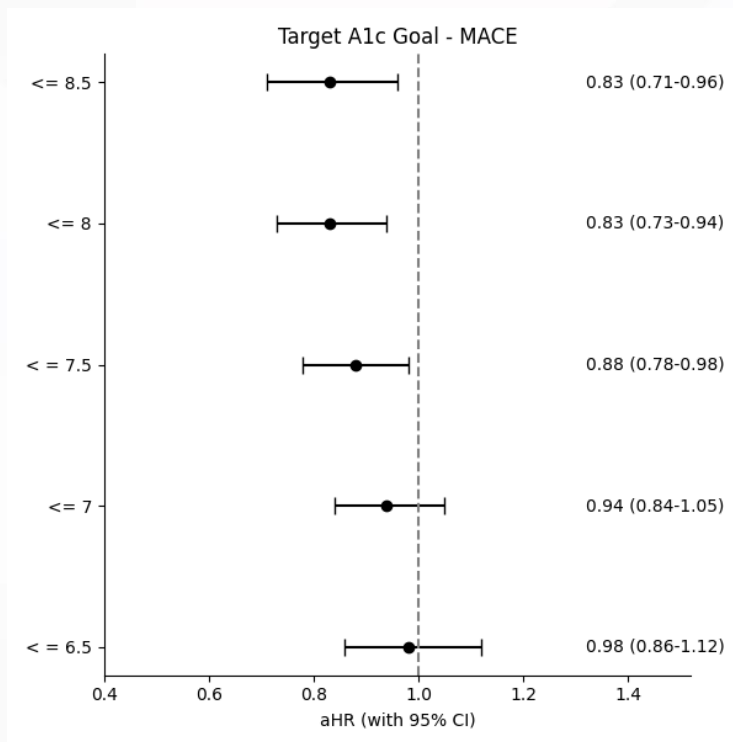
Despite statin use, only 5% reduction in mortality

Association of LDL Targets and Statin Dosing with Cardiovascular Events and Adverse Reactions After Kidney Transplantation: TriNetX Analysis



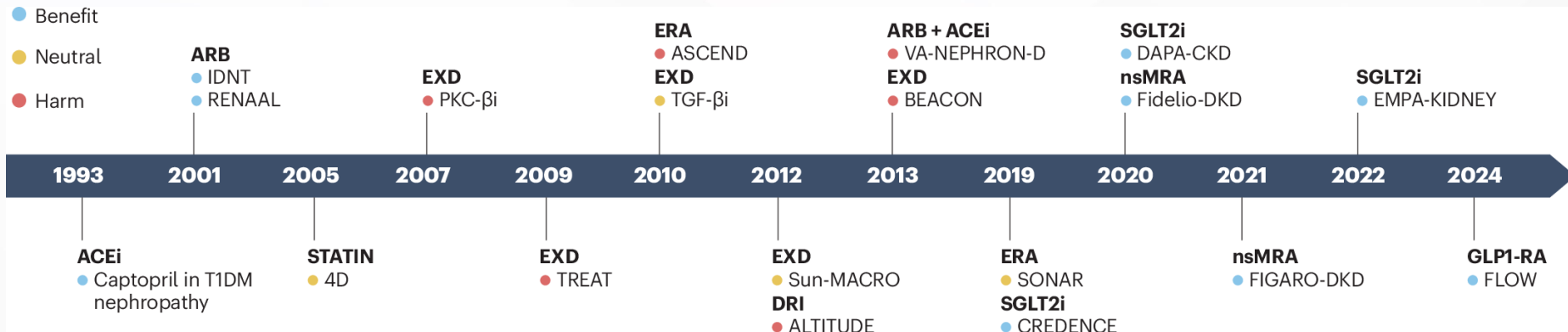
Zelege, ASN 2025

Impact of Different A1c Targets on Cardiovascular Outcomes in Diabetic Kidney Transplant Recipients: A TriNetX Analysis



Bobba, WTC 2025

Evolution of Therapies for CKD



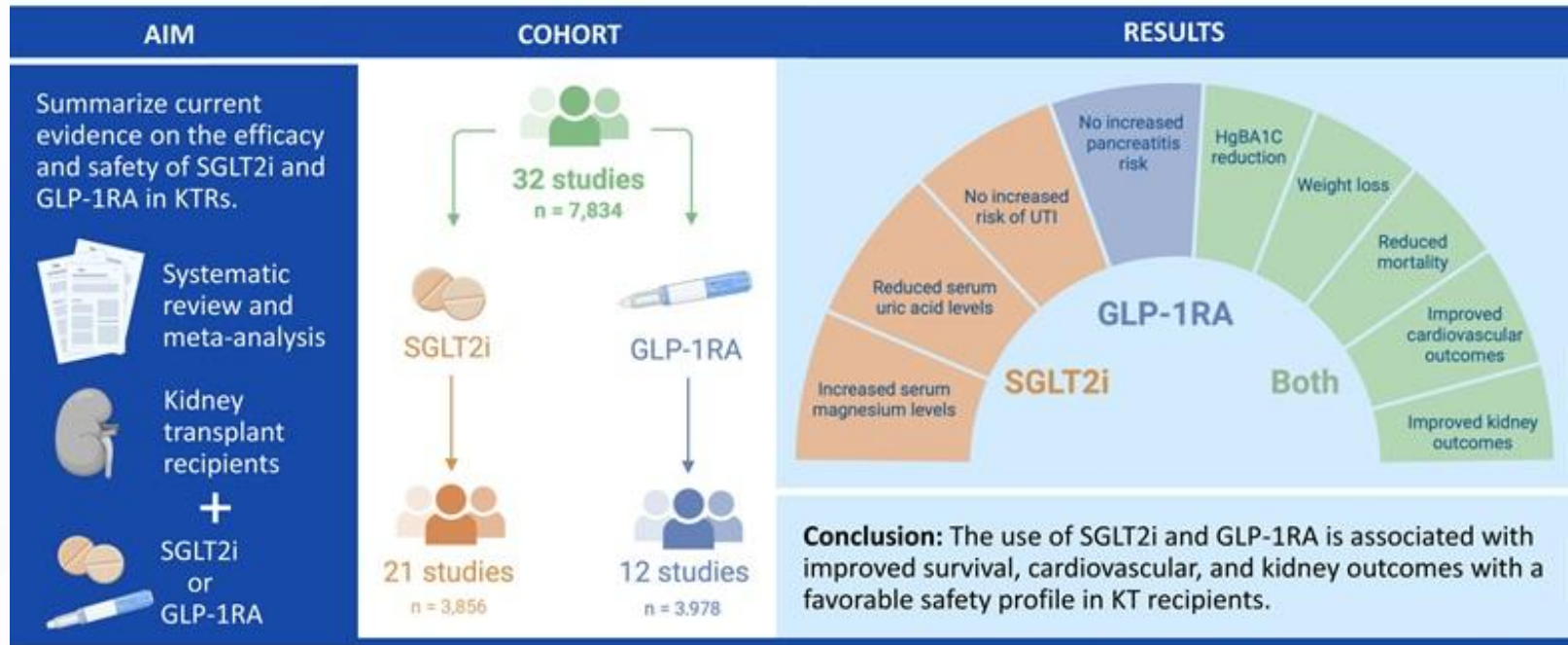
Nature reviews disease primers, Romagnani, Jan 2025

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SGLT2 Inhibitors and GLP-1 Receptor Agonists in Kidney Transplantation: A Systematic Review and Meta-Analysis



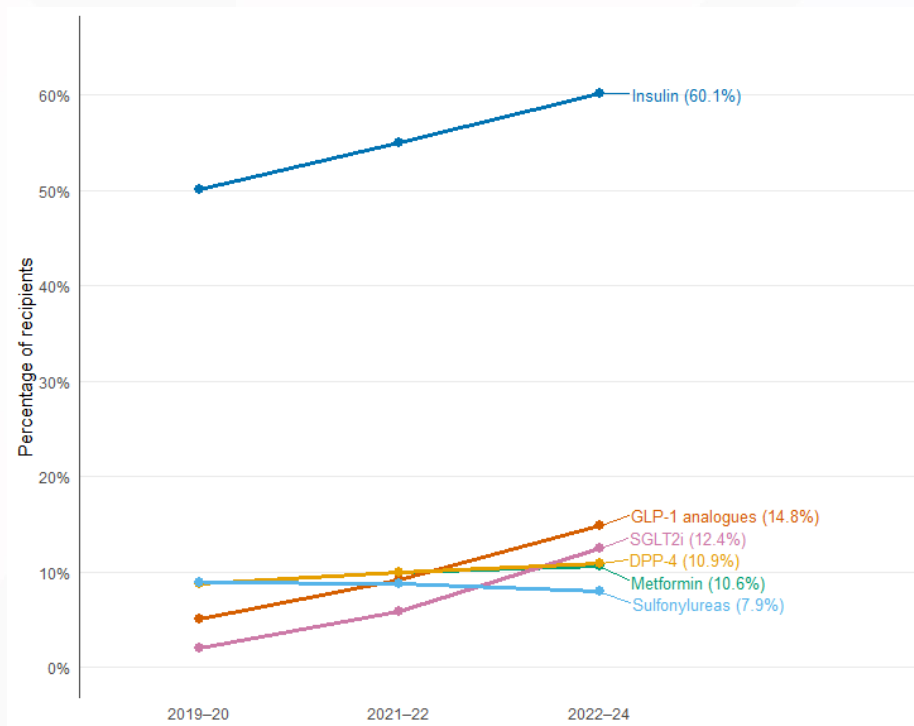
Lee et al. *Transplantation*. 2025

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Transplantation

Utilization of Key Drugs in Diabetic Kidney Transplant Patients



Bobba, WTC 2025

Other Implications: Drug Exposure and Elimination

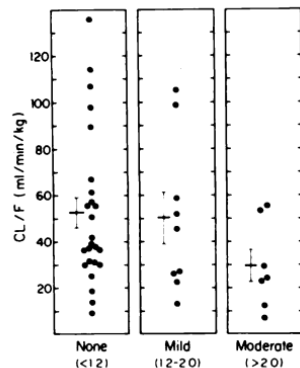
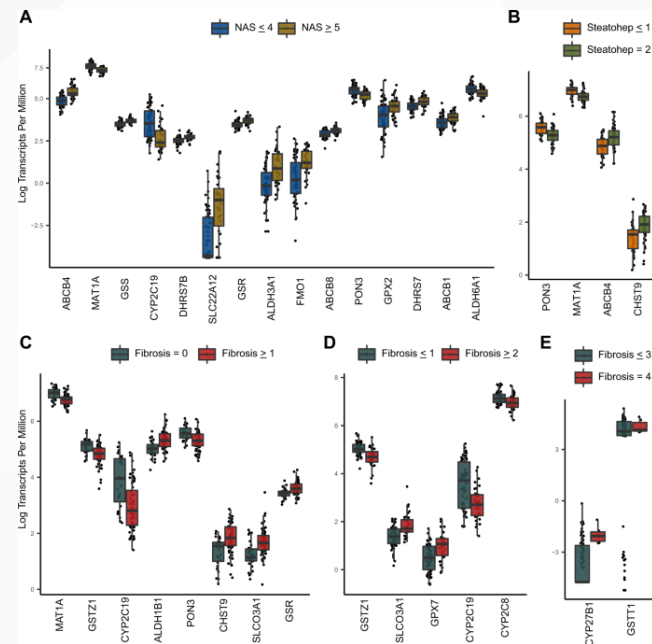
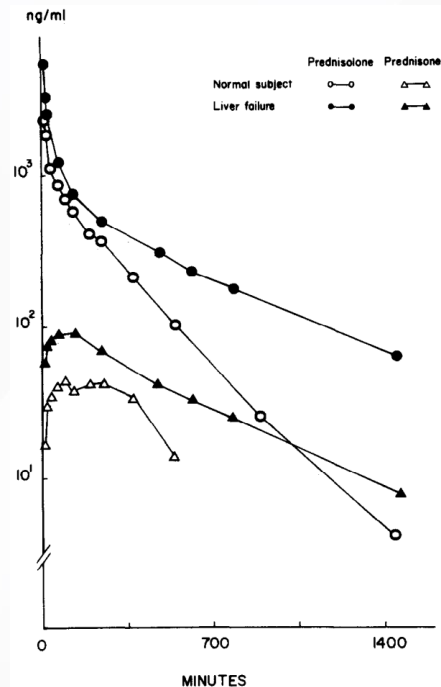


Fig 1. Cyclosporine *CL/F* in patients with no, mild, or moderate hepatic dysfunction. Bars indicate the mean ± SEM (serum bilirubin, mg/dL).



Nature Comm, Powell, 2023
Blood, Yee, 1984
Gastroenterology, Renner, 1986

Summary

- Immunosuppression and weight gain may result in a higher risk of MASLD in kidney transplant patients, but current data estimates are based upon small single-center cohort studies and are likely inaccurate.
- Limited data did not identify a conclusive association between MASLD and cardiovascular mortality in kidney transplant patients, although the association with key end points (like graft dysfunction) and cancer needs to be investigated further.
- Protocolized screening for MASLD prior to kidney transplant needs to be systematically assessed.
- HbA1c and LDL goals (beyond a certain point) are unlikely to improve mortality in kidney transplant patients. There's residual 'unattributed' risk for mortality in these patients and new therapeutic pathways and targets need to be implemented and studied.

Learn more about our research

Interested in the
MAP-KT MMDx
Consortium?

Interested in the
ABMR ReFrAMe
Consortium?



Scan QR Code and a member of our team will follow-up with you.

Faculty & Staff Research Collaborators



Gaurav Gupta,
MD
Chief



PhD
Assoc. Chief
Research



Dhiren Kumar,
MD
Living Donor
MD



Irfan Moinuddin,
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Neph Fellowship
PD



Nilang Patel, MD
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Ambreen Azhar,
MD



Meron Zeleke
MBBS, MPH



Johanna
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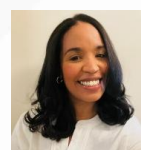
Will Hayes,
AGACNP



Randi Thompson,
AGACNP



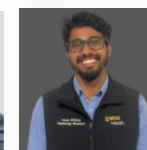
Danielle Kirkman,
PhD



Leana Yancey,
MSN, RN



Stephen
Seelam, MPH



Pawan Sinhar



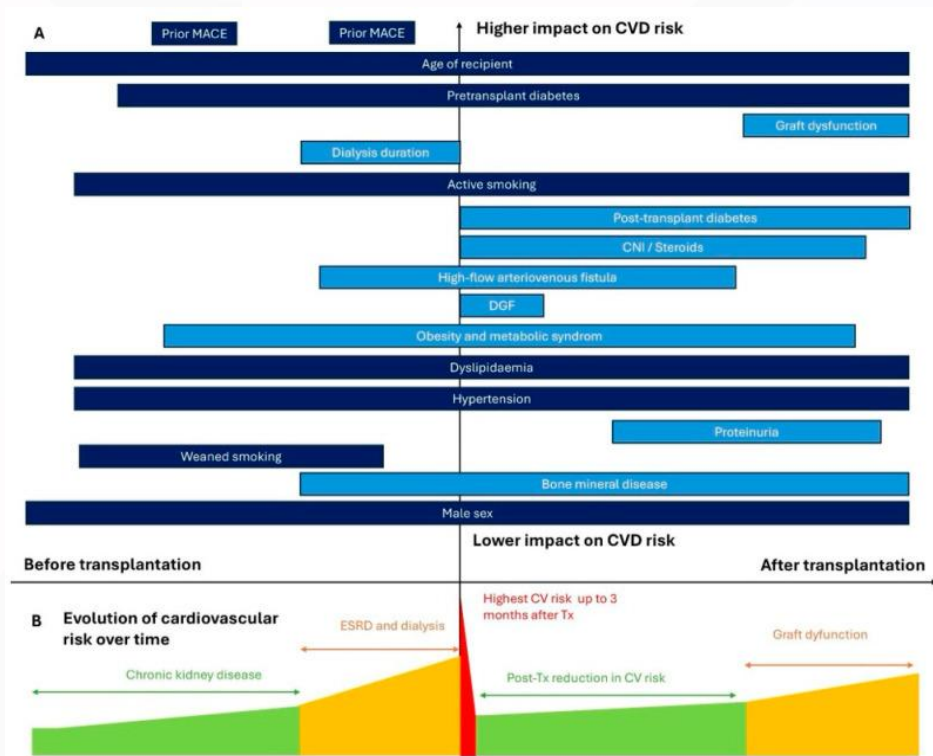
Dipankar
Bandyopadhyay,
PhD



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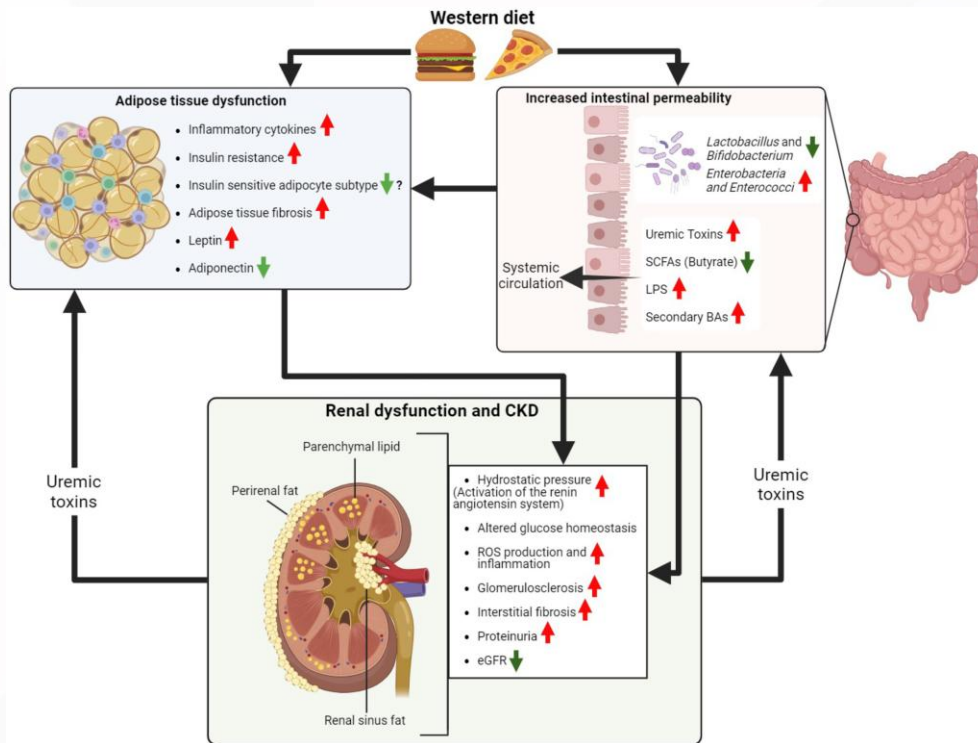
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Cardiovascular Risk Evolution in Kidney Transplantation



Diagnostics, Beaudreau, 2025

Pathways That Link MASLD With CKD



Diabetes and Metabolism, Bilson, Jan 2024