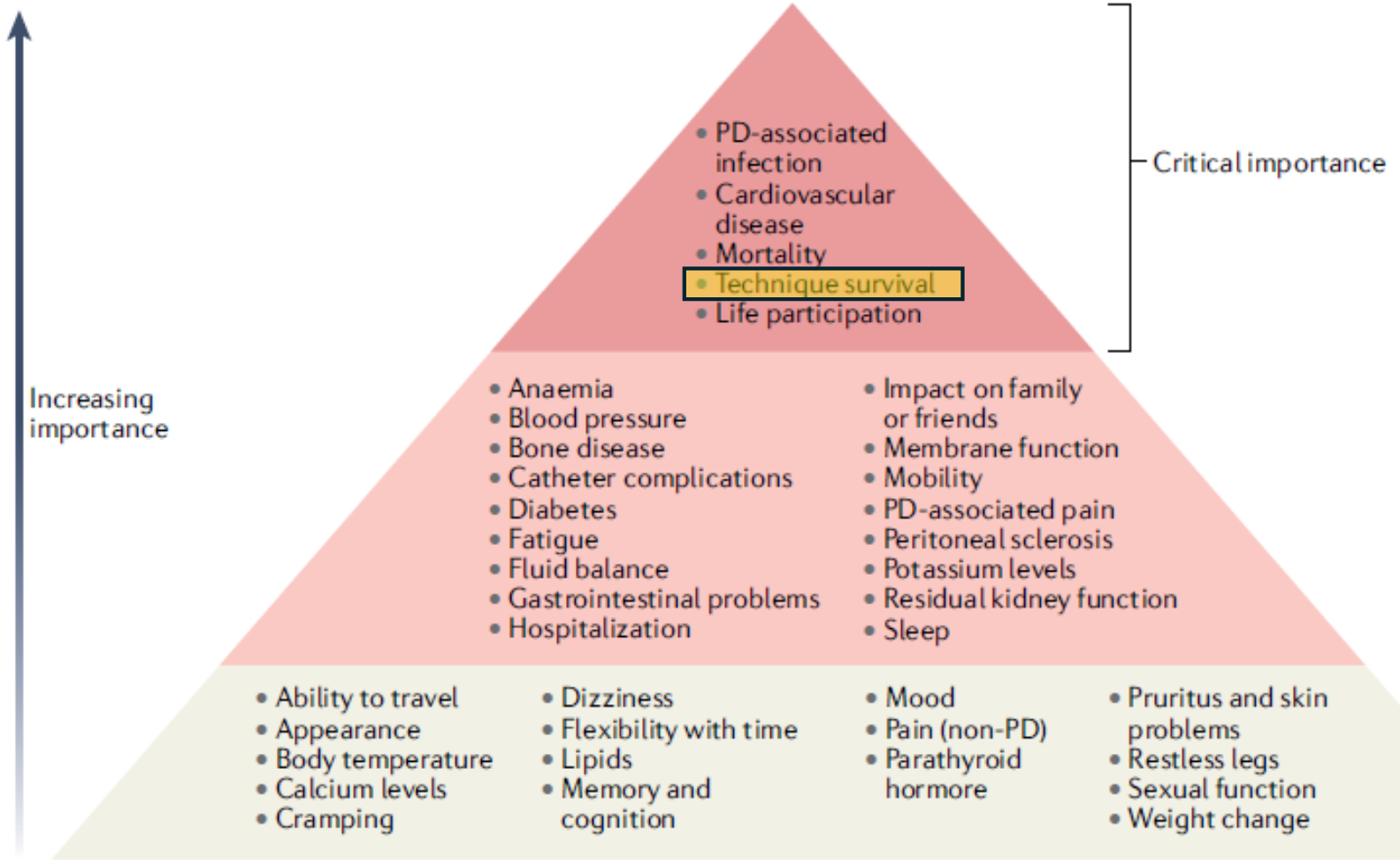
ΠΚ: Μια μέθοδος με ημερομηνία λήξης;

Όλγα Μπαλάφα
Διευθύντρια ΕΣΥ
Νεφρολογική Κλινική
Πανεπιστημιακού Γενικού Νοσοκομείου Ιωαννίνων

PD outcomes

SONG –PD initiative



Bello A et al. Nat Rev Nephrol, 2022
Manera, K. E. et al. Am. J. Kidney Dis. 2020

Technical Failure/Survival (αποτυχία τεχνικής)

3ετής επιβίωση τεχνικής 29-90%

Διαφορές ορισμού
- έναρξη ΠΚ – τοποθέτηση καθετήρα, έναρξη εκπαίδευσης, τέλος εκπαίδευσης
- τέλος ΠΚ (1,2 ,3 μήνες μεταφοράς σε ΑΚ)

death, transplantation censoring

Σύνθετο καταληκτικό σημείο μεταφοράς σε αιμοκάθαρση >30 ημέρες ή θάνατος

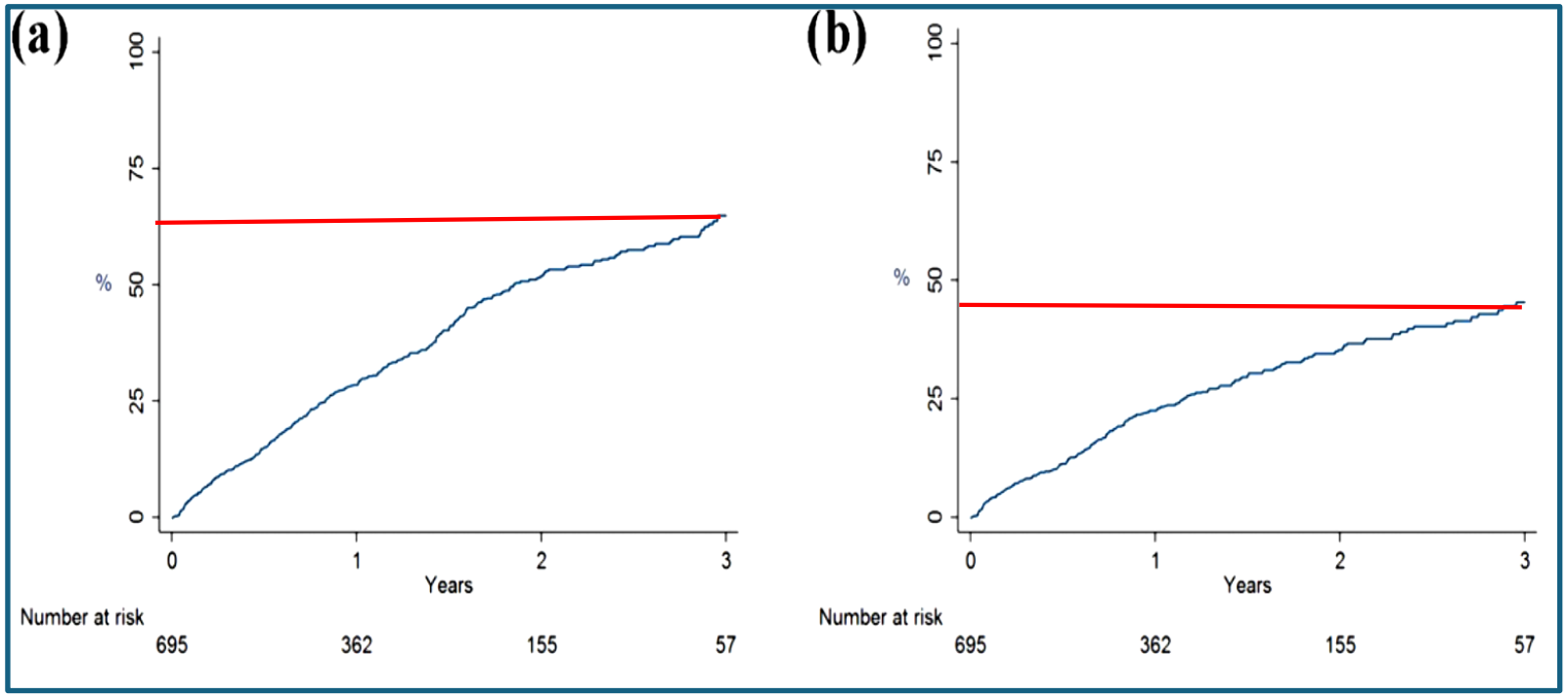
Selection bias with residual confounding
- ✓Δημογραφικοί λόγοι
- ✓Γεωγραφικοί
- ✓Συν-νοσηρότητες
- ✓Πρωτοπαθείς νεφρικές νόσοι
- ✓Νεφρολογικά κέντρα

Bello A et al. Nat Rev Nephrol, 2022

Technique failure

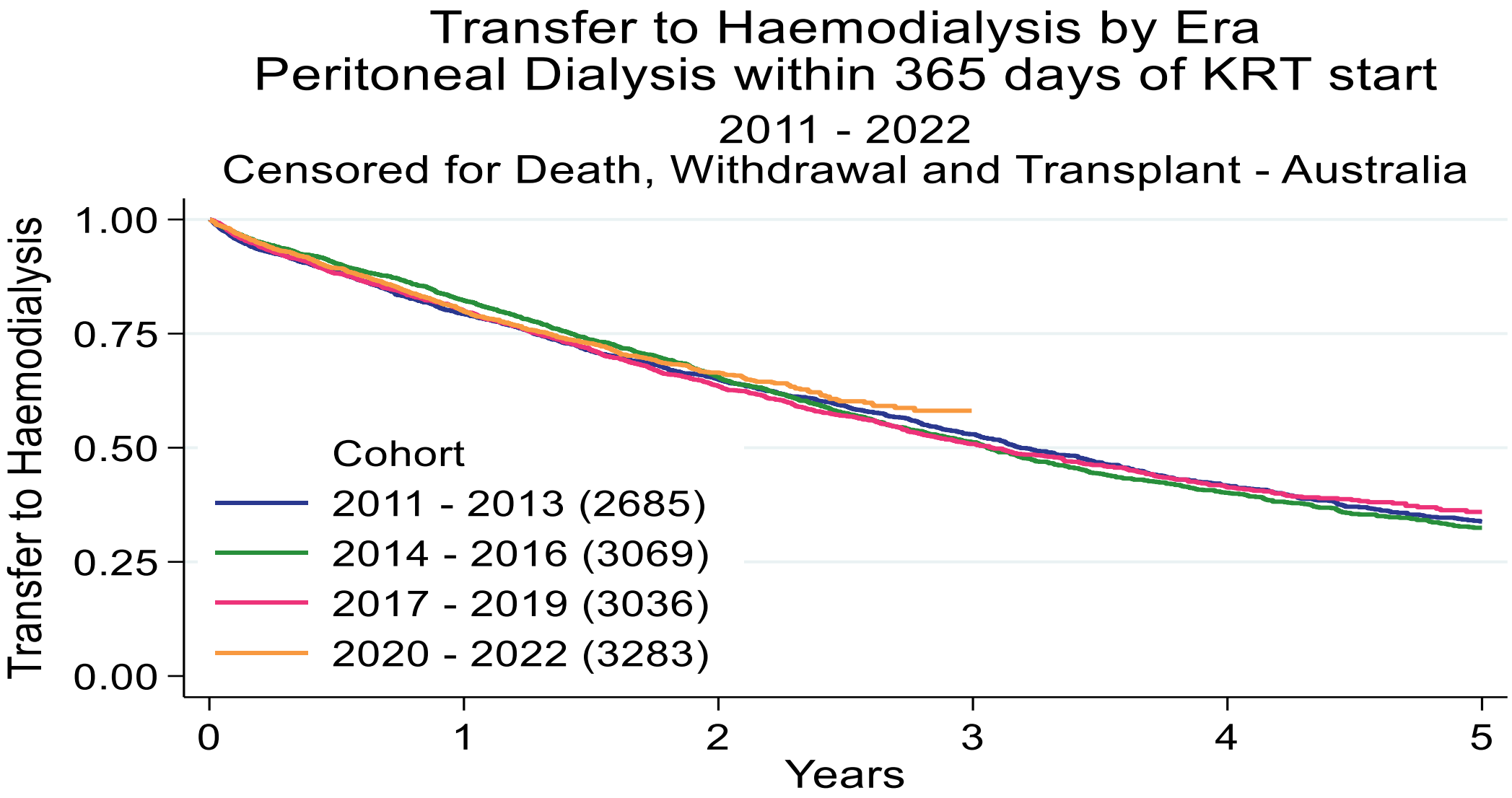
transfer to CHD or death

death-censored technique failure



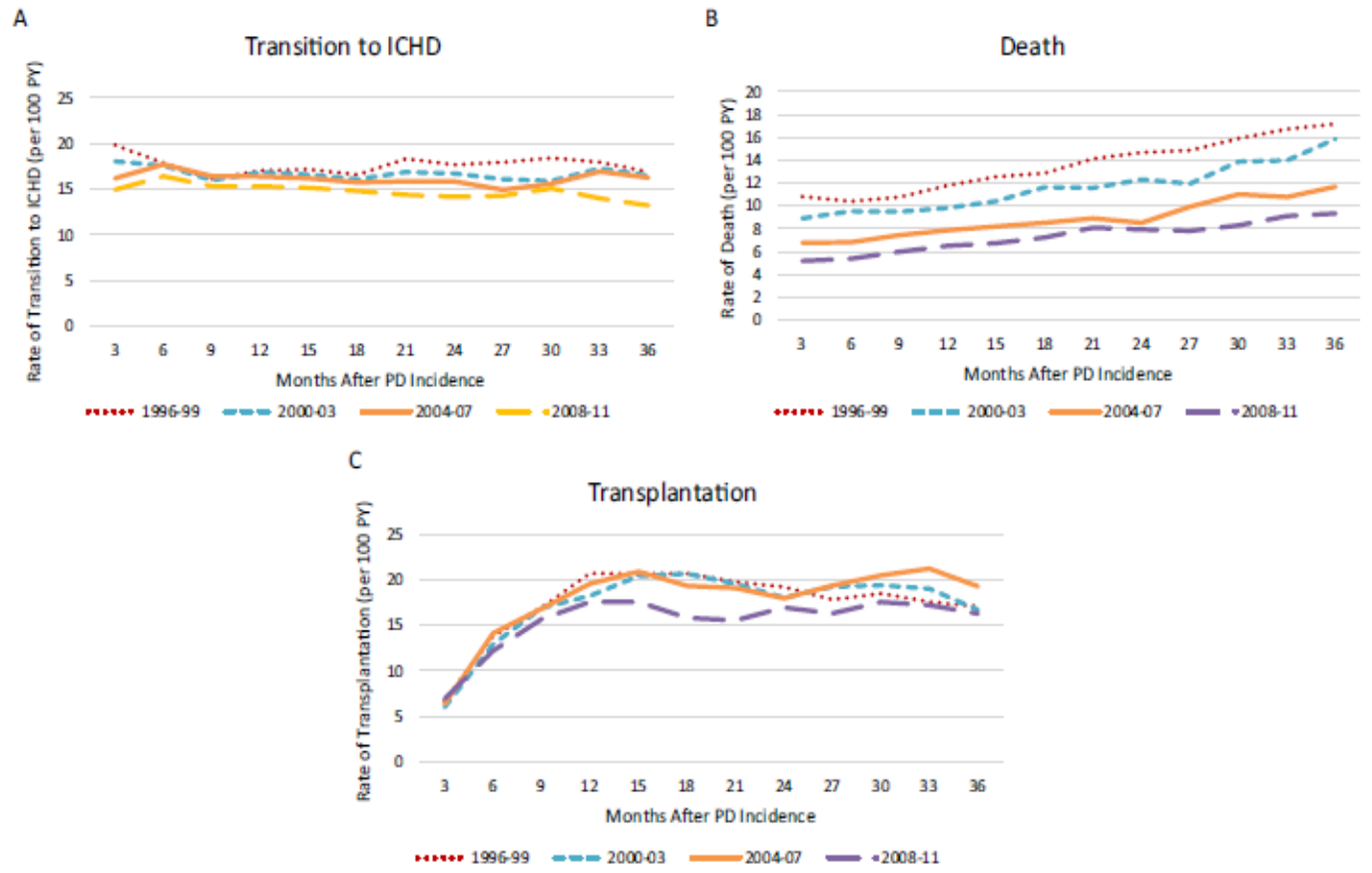
2012-2017
695 ασθενείς

Bonenkamp A et al. Perit Dial Int, 2023



2023 ANZDATA Annual Report, Figure 5.18.1

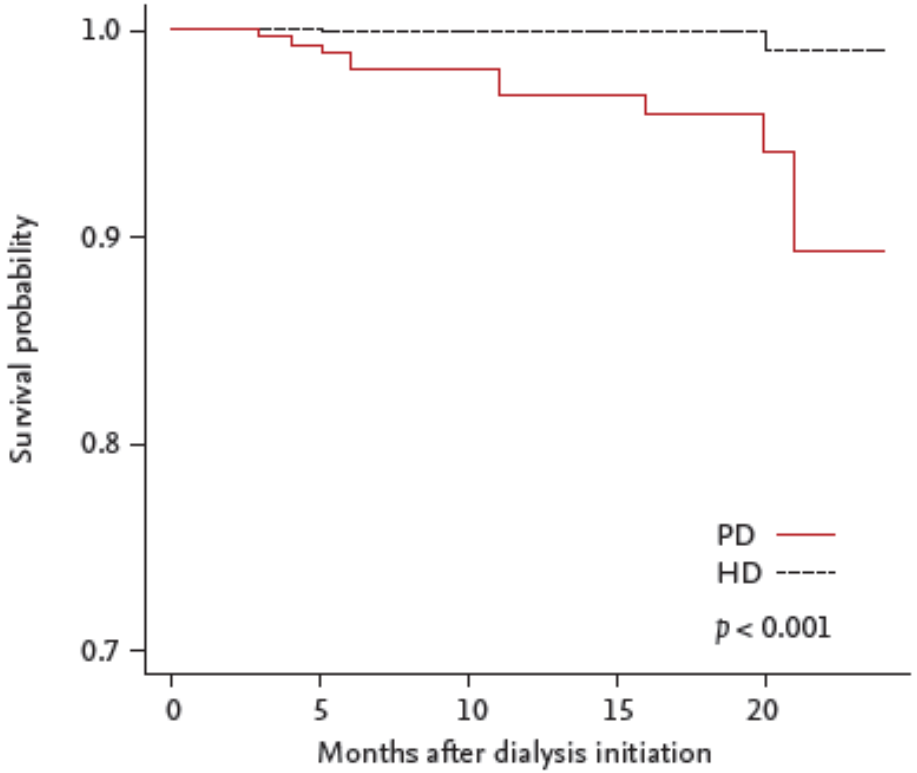
Adjusted rates by months on peritoneal dialysis for grouped incident PD patient cohorts (1996-2011)



USA Renal Data System

Sukul M et al. Kidney Med, 2020

Technical failure
ΠΚ vs ΑΚ



Number of patients at risk

PD	311	251	176	103	54	18
HD	731	582	433	269	10	32

81 κλινικές στις ΗΠΑ-7 έτη
- ✓ 25% ΠΚ μεταφορά σε ΑΚ
- ✓ 5% ΑΚ μεταφορά σε ΠΚ

Jong-Hak Lee et al. Korean J Intern Med 2016
Jaar B et al. *Ann Intern Med.* 2005

Λόγοι μεταφοράς σε ΑΚ

Α. Ασθενής

- Ηλικία
- Φύλο
- Φυλή
- BMI

Δημογραφικοί λόγοι

- ΣΔ
- Κήλες
- Προηγούμενο ΑΕΕ
- Μειωμένη όραση

Ιατρικό ιστορικό

- Μορφωτικό και κοινωνικο-οικονομικό επίπεδο
- Κατάθλιψη

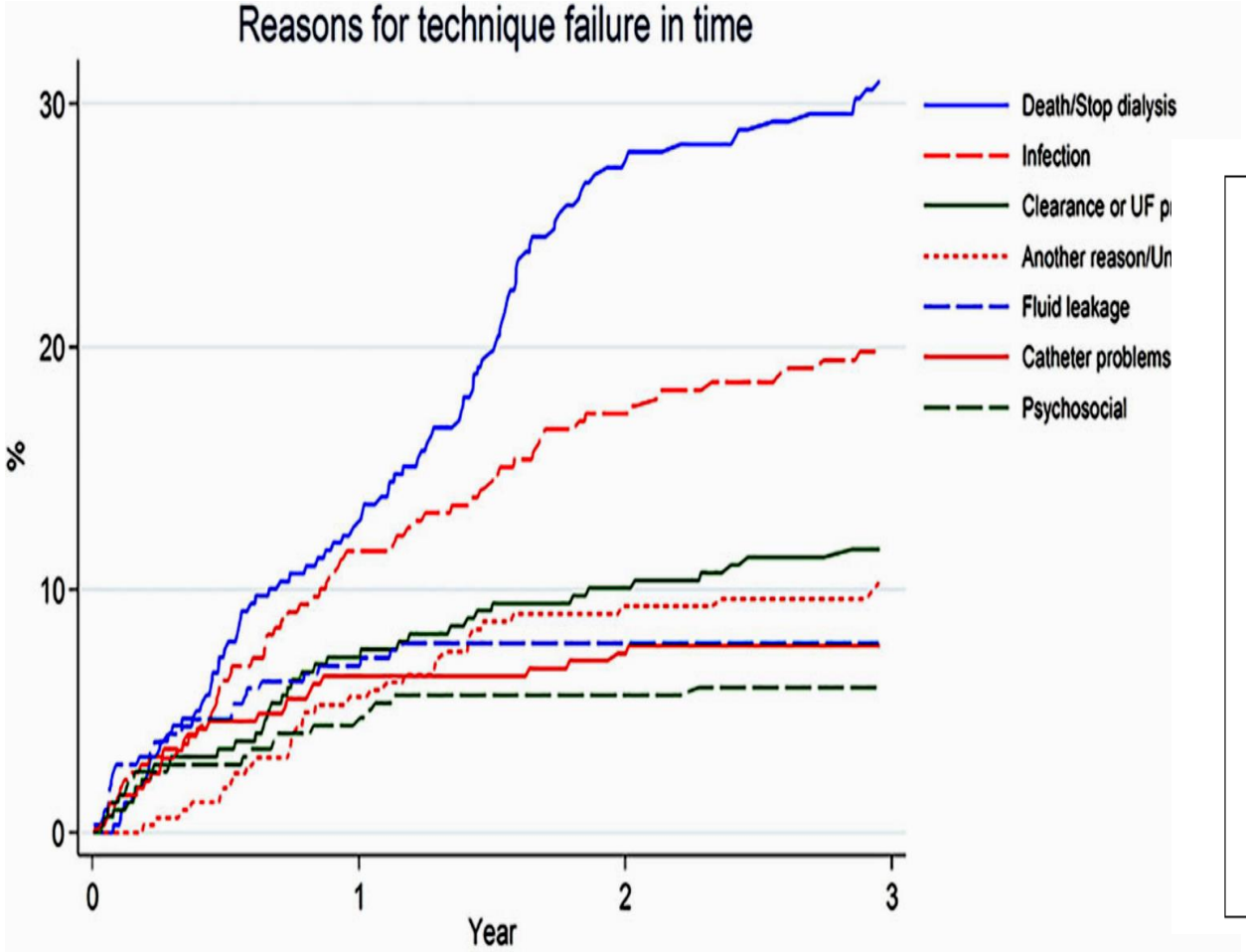
Β. Μέθοδος

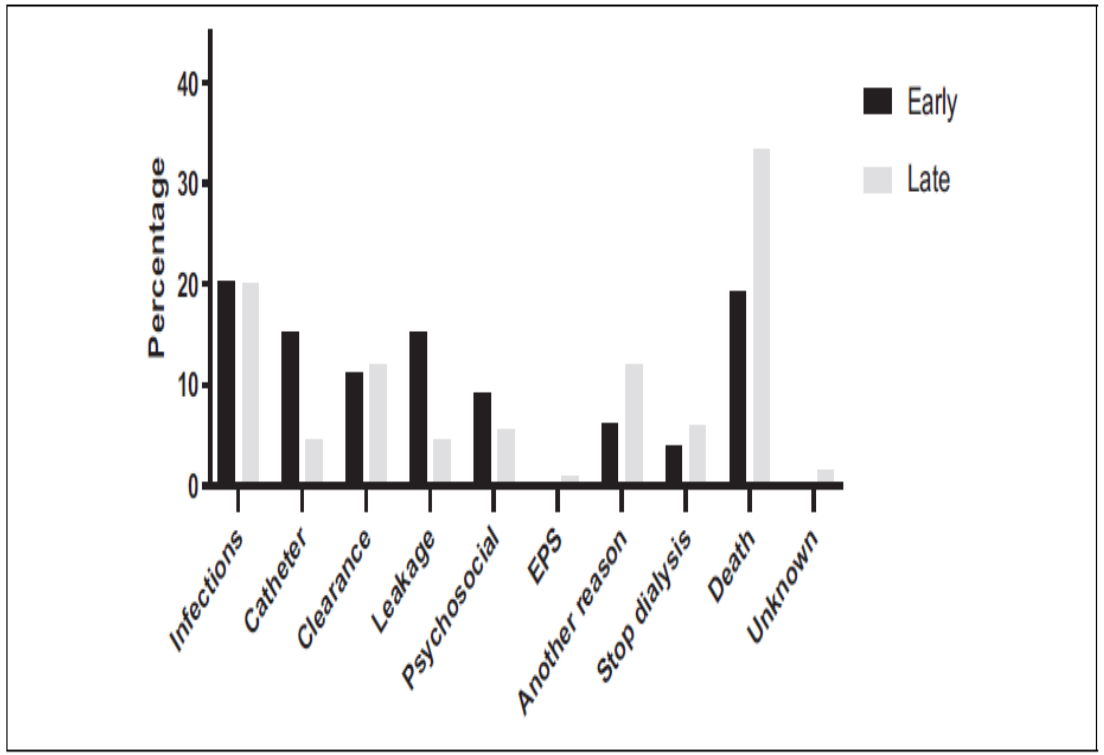
- Διαφυγή
- Μηχανικά προβλήματα καθετήρα
- Προηγούμενη μεταμόσχευση ή αιμοκάθαρση
- ΑΠΚ vs CAPD
- Υπολειπόμενη νεφρική λειτουργία
- Λοιμώξεις (60%)
- Ανεπάρκεια κάθαρσης και υπερδιηθήματος

Γ. Μονάδα ΠΚ

- Μέγεθος και εμπειρία μονάδας
- Τοποθεσία
- Έγκαιρη εκτίμηση/ένταξη

Da Luz et al. Blood Purif, 2019



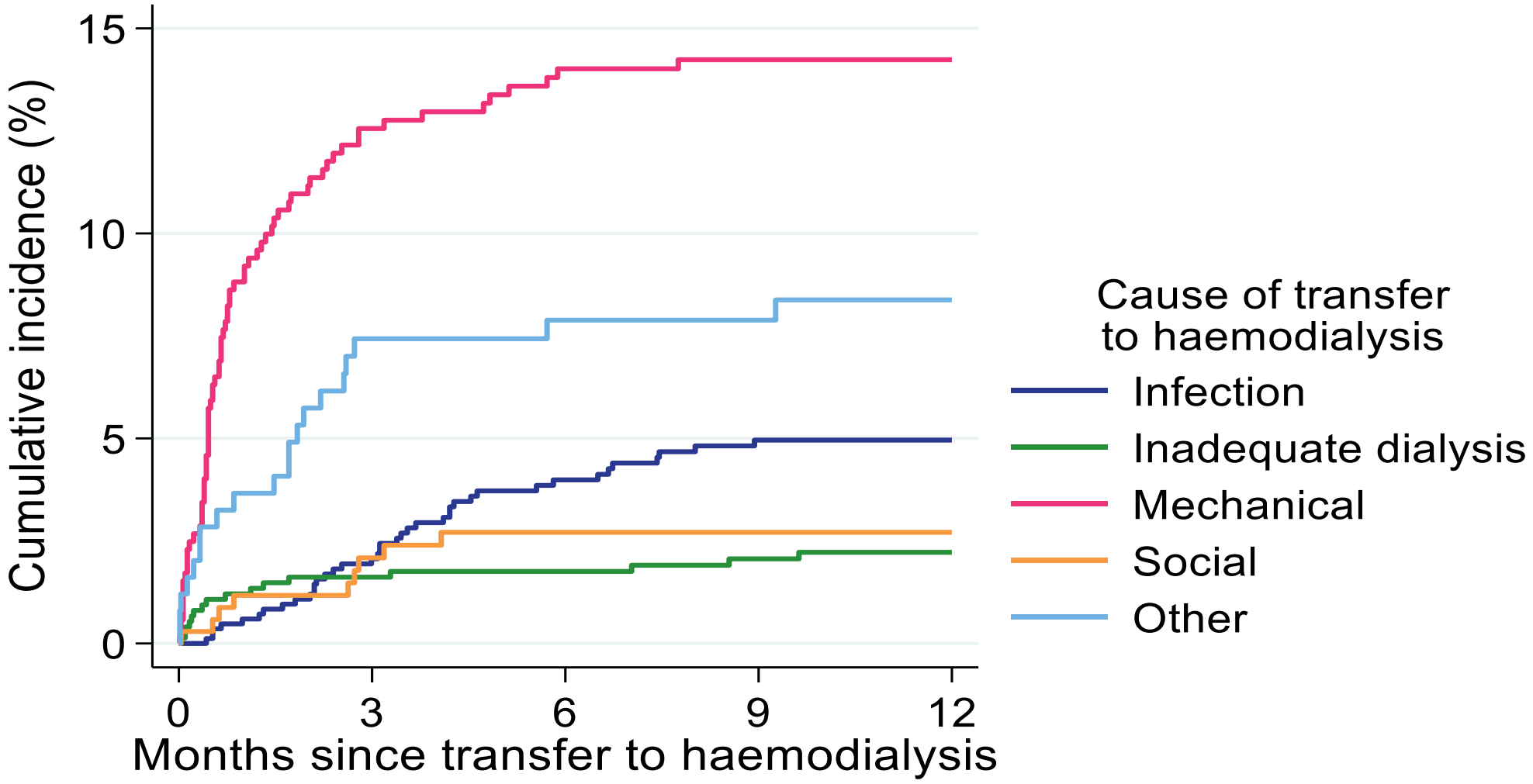


Πρώιμη (πρώτους έξι μήνες)-όψιμη
Προσωρινή ή μόνιμη

Bonenkamp A et al. Perit Dial Int, 2023

Time to Restarting PD after Transfer to Haemodialysis

Australia 2018-2022



2023 ANZDATA Annual Report, Figure 5.21.1

Trends in Peritoneal Dialysis Technique Survival, Death, and Transfer to Hemodialysis: A Decade of Data from the RDPLF

AJN American Journal of Nephrology

Retrospective, multicenter study

French Language Peritoneal Dialysis Registry (RDPLF)

(2005-2016)

14,673 Patients initiated Peritoneal Dialysis (PD)

PD cessation

69 %

Death

37 %

Transfer Hemodialysis (HD)

32 %

Transfer HD Causes

Inadequate dialysis	39 %
Infection	16 %
Catheter issues	10 %
Other	27 %

The rate of PD cessation due to death or transfer to HD decreased over time
(PR 0.96, 95% CI 0.95-0.97)

Conclusion: Rates of the composite end point of either death or transfer to HD, death, and transfer to HD have decreased in recent decades. The decline in transfers to HD rates, observed since 2011, is mainly the result of a significant decline in infection-related transfers .

Boyer A, Lanot A, Lambie M, Verger C, Guillouet S, Lobbedez T, Béchade C: Trends in Peritoneal Dialysis Technique Survival, Death, and Transfer to Hemodialysis: A Decade of Data from the RDPLF. Am J Nephrol DOI: 10.1159/000515472

Visual Abstract by Aldo Rodrigo Jimenez Vega@aldorodrigo

median time on PD was 19 months (interquartile range, 8–35 months)

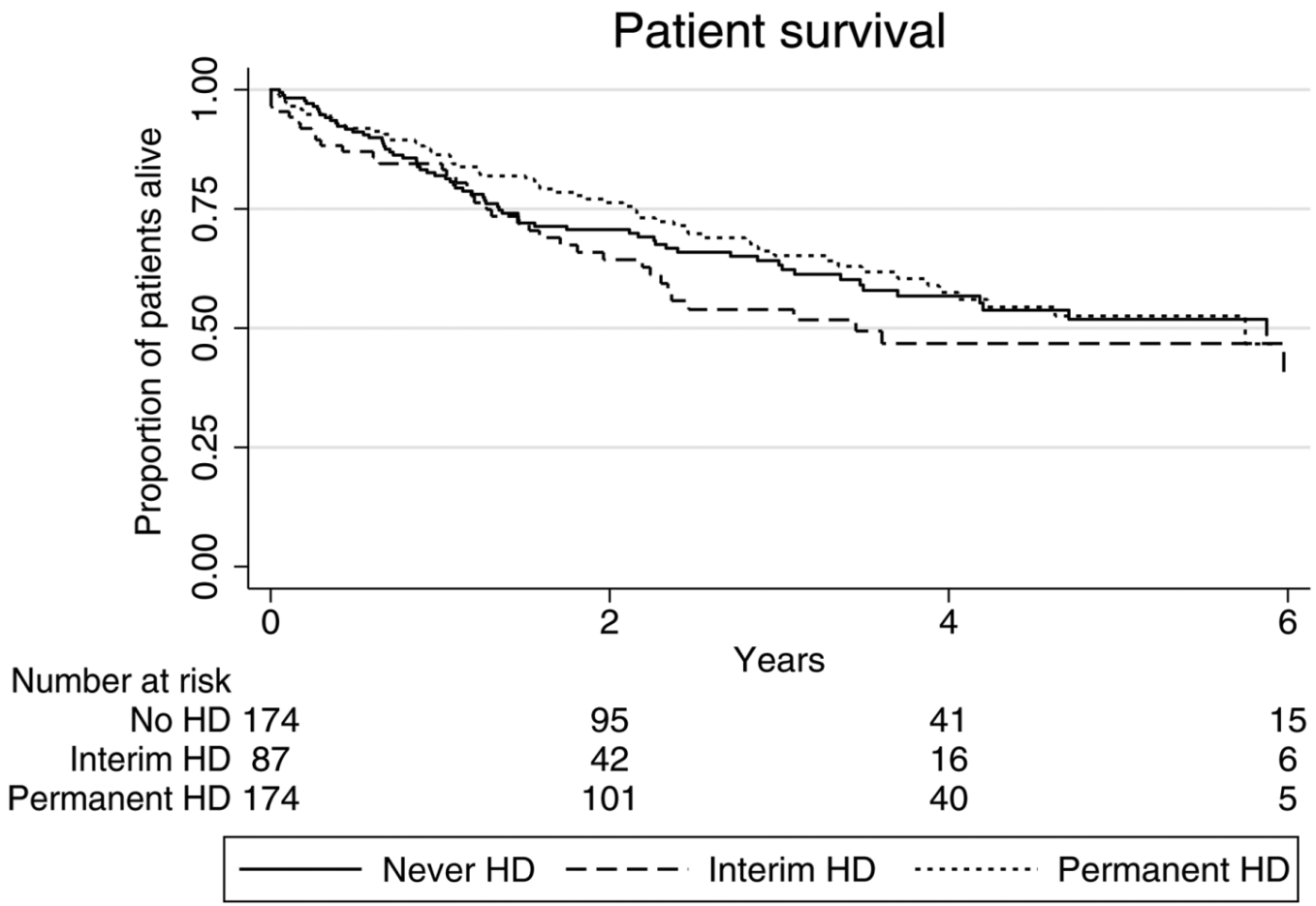
Θνησιμότητα μετά τη μεταφορά στην ΑΚ

	Infection (n=2415)	Inadequate Dialysis (n=883)	Mechanical (n=836)	Social (n=529)	Total (n=4663)	p-value
All-cause mortality (per 100 patients, 95% CI)						
0–2 years (n=4663)	29 (27–31)	21 (18–23)	20 (17–22)	35 (31–40)	26 (25–28)	<0.001
>2–5 years (n=2379)	38 (36–41)	33 (29–38)	36 (32–41)	35 (29–42)	37 (35–39)	0.30
>5 years (n=880)	64 (60–68)	62 (54–69)	58 (50–65)	59 (48–69)	62 (59–65)	0.48
Cardiac mortality (per 100 patients, 95% CI)						
0–2 years	10.3 (9.1–11.5)	7.9 (6.3–9.9)	6.8 (5.3–8.7)	10.8 (8.4–13.7)	9.3 (8.5–10.1)	0.007
>2–5 years	14.7 (12.8–16.7)	12.9 (10.1–16.3)	11.4 (8.7–14.8)	11.6 (8.0–16.4)	13.5 (12.1–14.9)	0.27
>5 years	23.3 (19.8–27.3)	26.1 (19.9–33.4)	23.8 (17.7–31.2)	19.3 (12.2–29.0)	23.5 (20.8–26.4)	0.70

5243 patients PD technique failure, 3248 (62%) died

Chen A et al. Scientific Rep, 2018

Patients returning to PD following temporary HD transfer for peritonitis ...



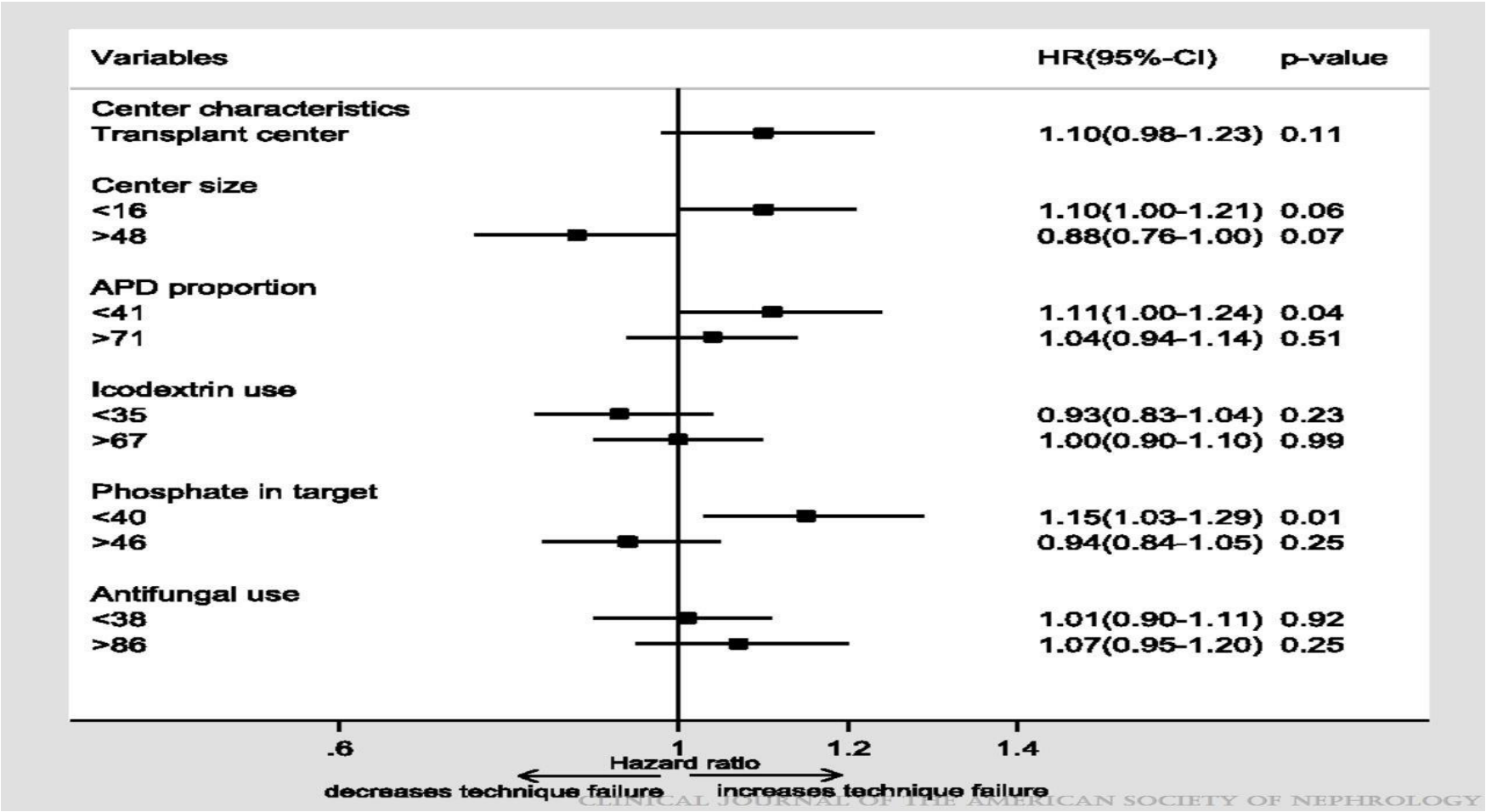
3305 patients peritonitis

553 episodes (16.7%) resulted in transfer to HD

101 patients subsequently returned to PD

Nephrology Dialysis Transplantation, Volume 29, Issue 10, October 2014, Pages 1940–1947, https://doi.org/10.1093/ndt/gfu050

Αποτυχία τεχνικής και εμπειρία του κέντρου



technique failure rate was 0.35 (95% CI, 0.34 to 0.36) episodes per patient-year

Wolters Kluwer

Htay; Cho et al. Clinical Journal of the American Society of Nephrology 2017.

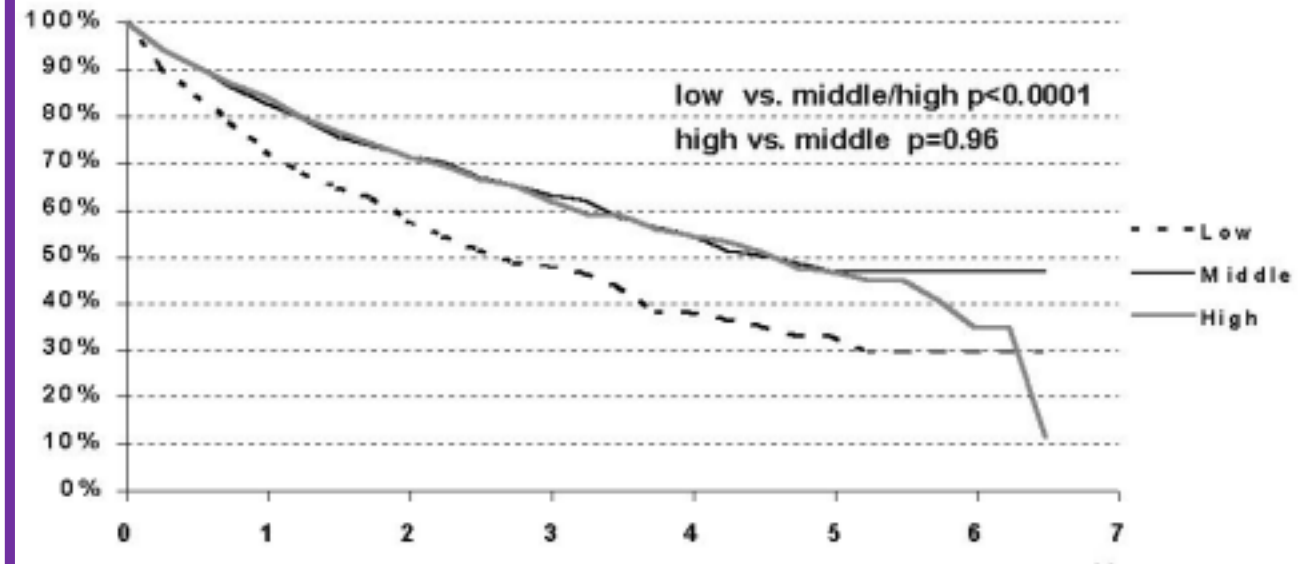
Nephrol Dial Transplant (2002) 17: 1655–1660

Nephrology
Dialysis
Transplantation

Original Article

Patient-related and centre-related factors influencing technique survival of peritoneal dialysis in The Netherlands

Roel M. Huisman[1], Martin G. M. Nieuwenhuizen[2] and Frank Th. de Charro[2]

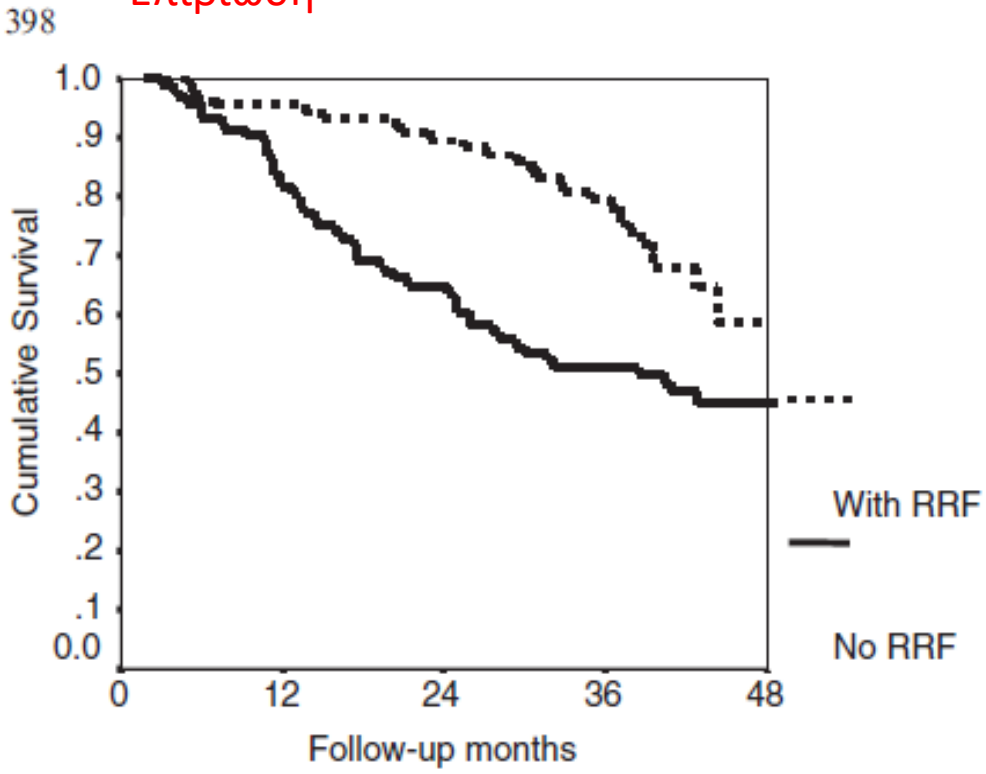


N=1012	504	227	98	30	*< 20*
1209	735	378	157	56	*20-32*
1828	1142	568	262	102	*>32*

Αναλογία ασθενών ΠΚ/ΑΚ

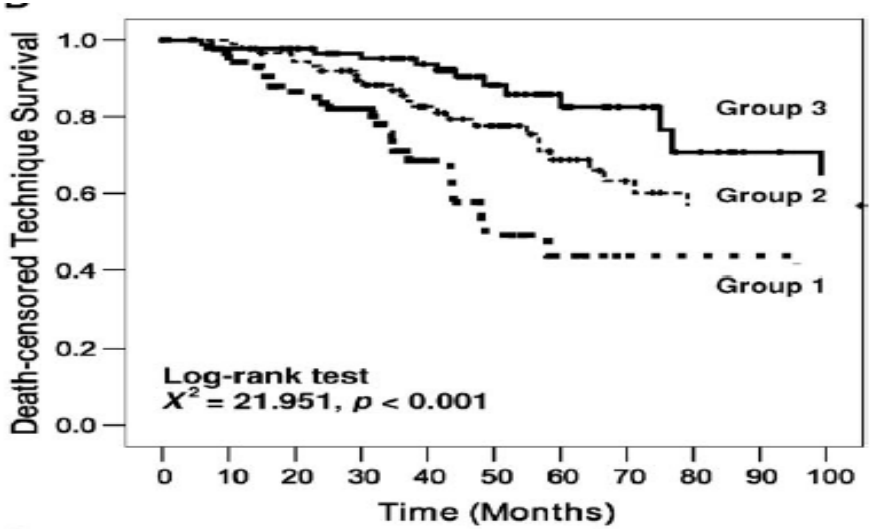
Υπολειπόμενη νεφρική λειτουργία

Επιβίωση



1ml/min of residual GFR associated with 15 – 25% reduction in annual mortality

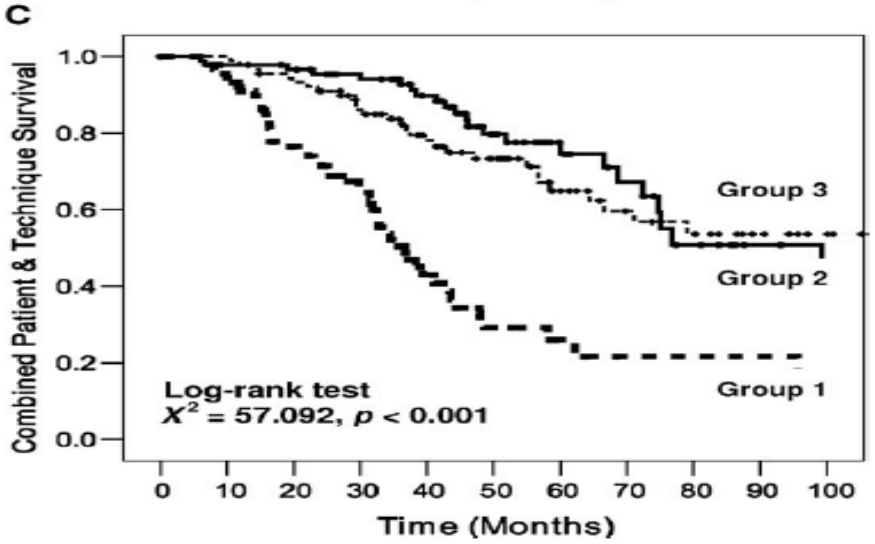
Επιβίωση τεχνικής



3,7ml/min'

2,61ml/min

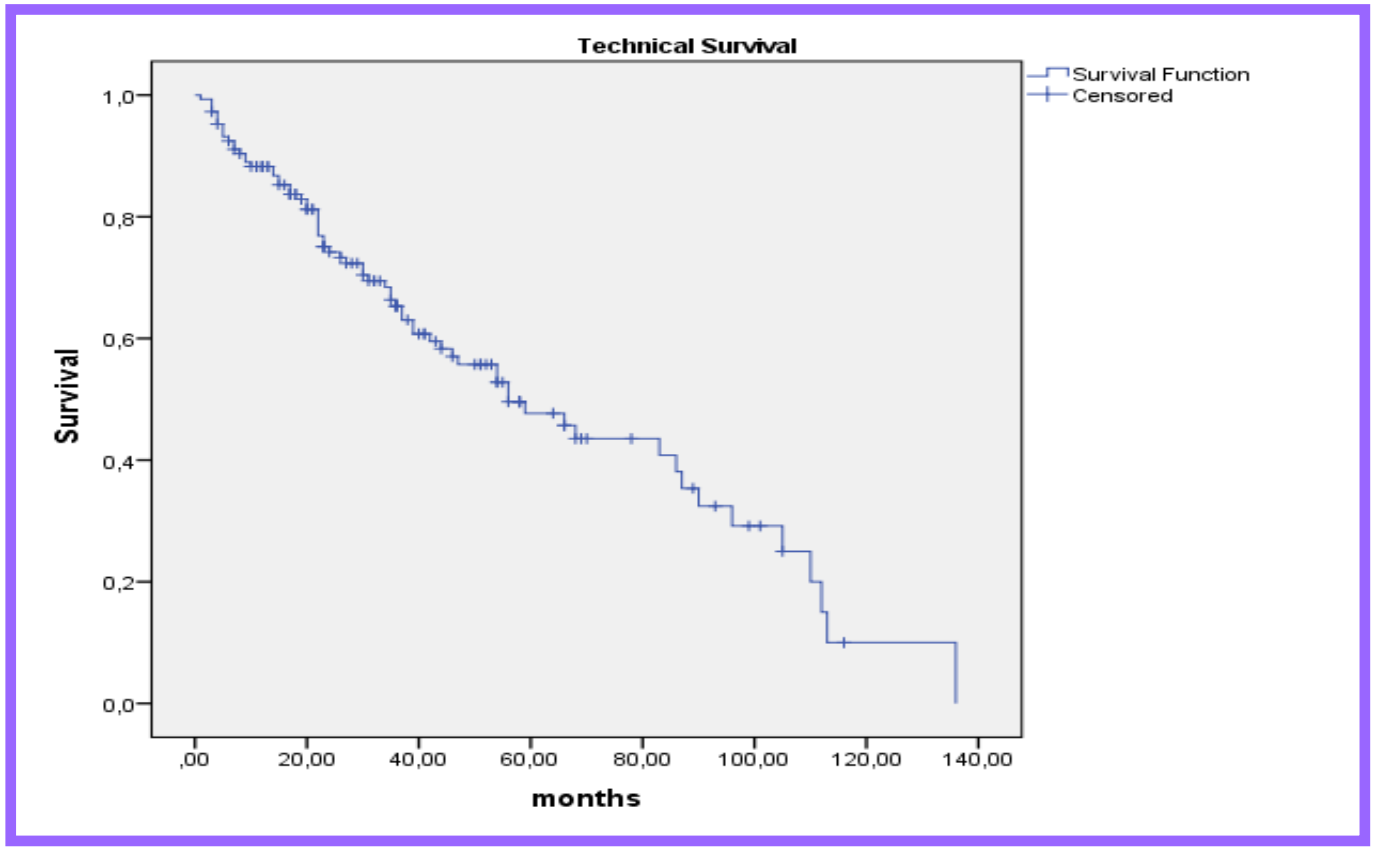
1,93 ml/min



Chia-Te Liao et al. Nephrol Dial Transplant, 2009

Wang A et al, Nephrol Dial Transplant, 2005

Μακροχρόνια ΠΚ στη μονάδα ΠΓΝΙ



The median technique survival time was 54 months (95% CI 37.6-70.4)

- ✓ 170 patients -68 (38%) patients were switched to hemodialysis permanently.
- ✓ 41 patients were long PD patients (more than 54 months on PD).
- ✓ baseline albumin level , comorbidity index and diabetes prevalence
- ✓ The main reason for dropping out PD in long term patients was ultrafiltration failure.

Age 61.15 years old
Diabetes 23.5%
Residual GFR (mL/min/1.73 m_2) 10.2

Abstract ISPD 2014

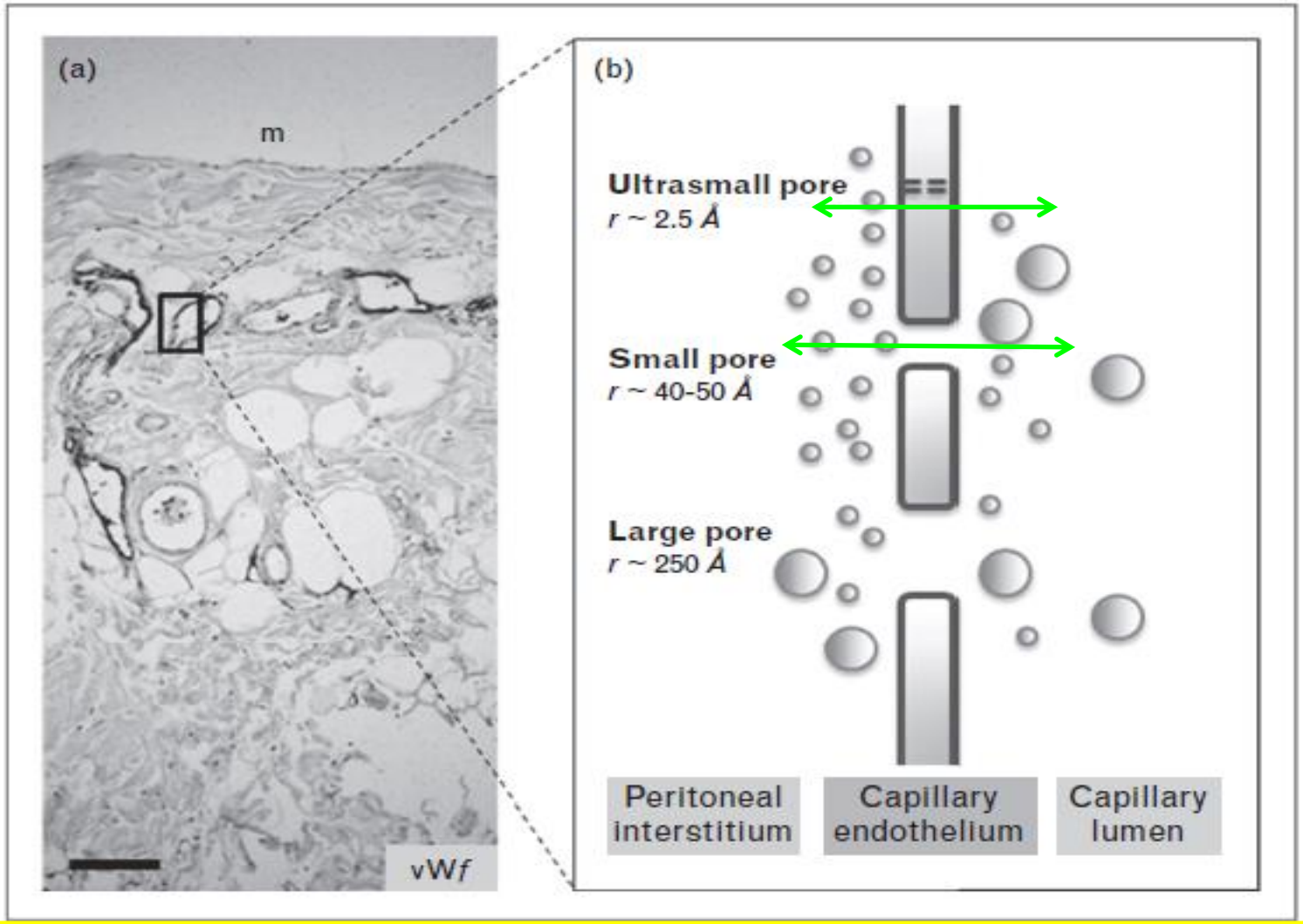
Aging of the Peritoneal Dialysis Membrane

Raymond T. Krediet*

“Anything used intensively will decay in the long-term and the peritoneum of patients treated with peritoneal dialysis is no exception”

Front. Physiol. 2022

Περιτοναϊκή μεμβράνη στην αρχή της μεθόδου



aquaporines 1-2% επιφάνειας

Free water transport (FWT)

97% επιφάνειας

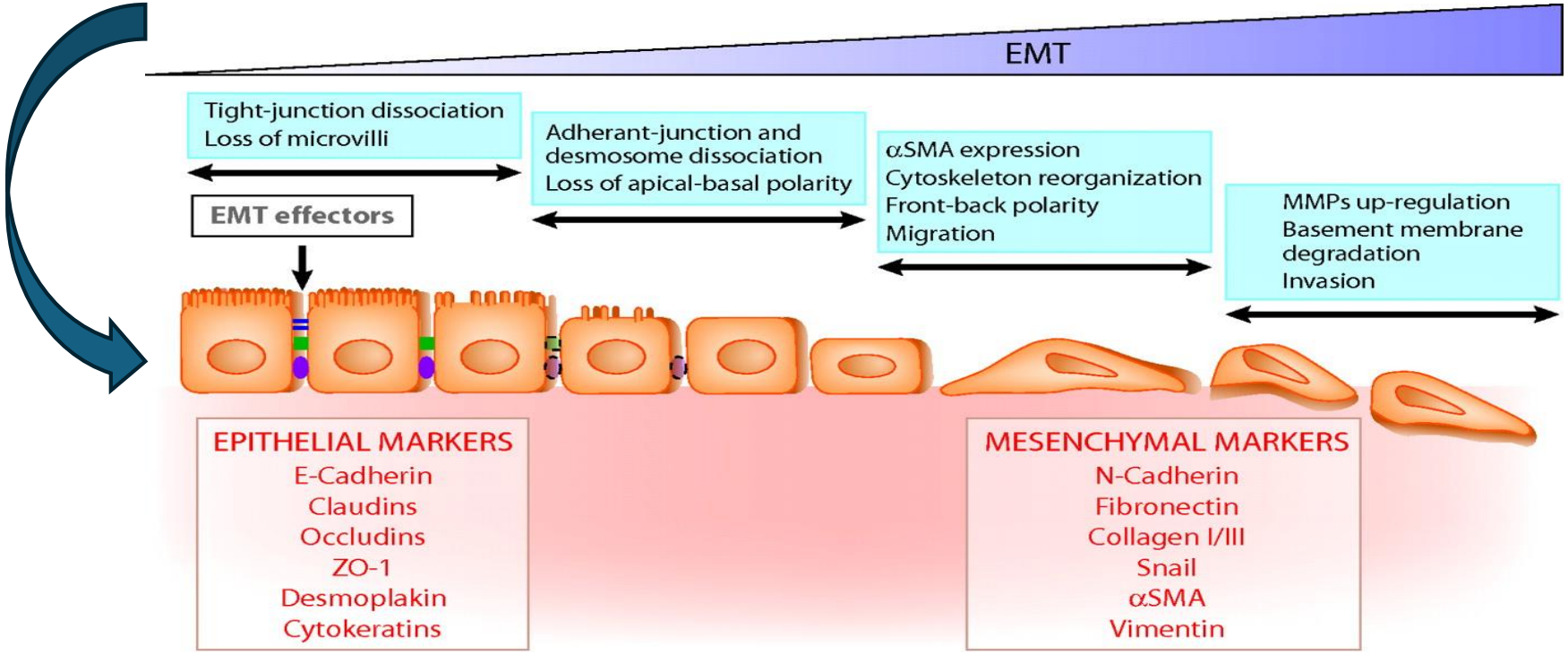
Small pore water transport

0.1% επιφάνειας

Rippe B, 1998

ΠΜ τα δυο πρώτα έτη

advanced glycosylation end-products (AGEs)

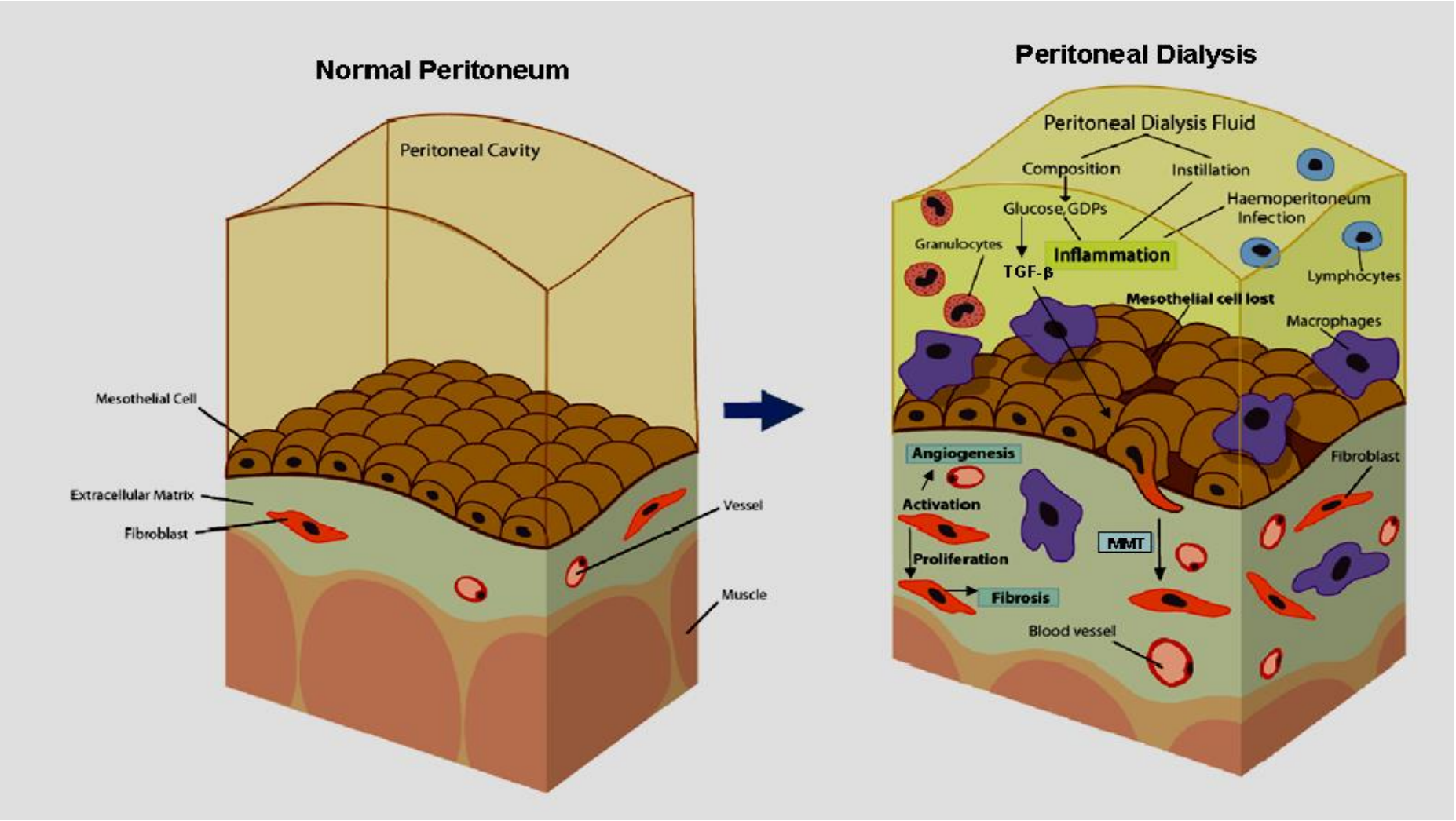


3 μήνες

Epithelial-mesenchymal transition

Mesothelial-mesenchymal transition

Αλλαγές στην ΠΜ μακροπρόθεσμα

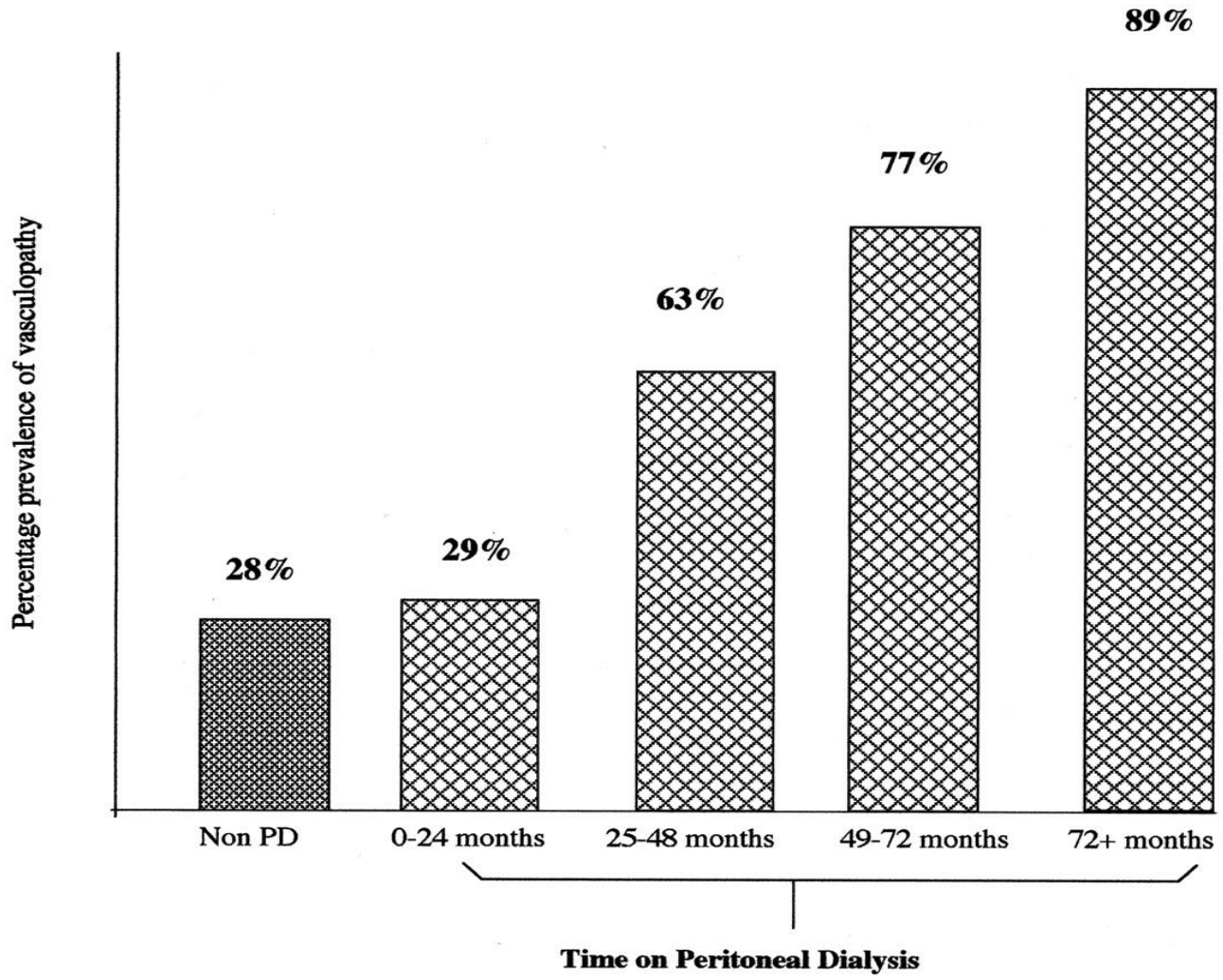


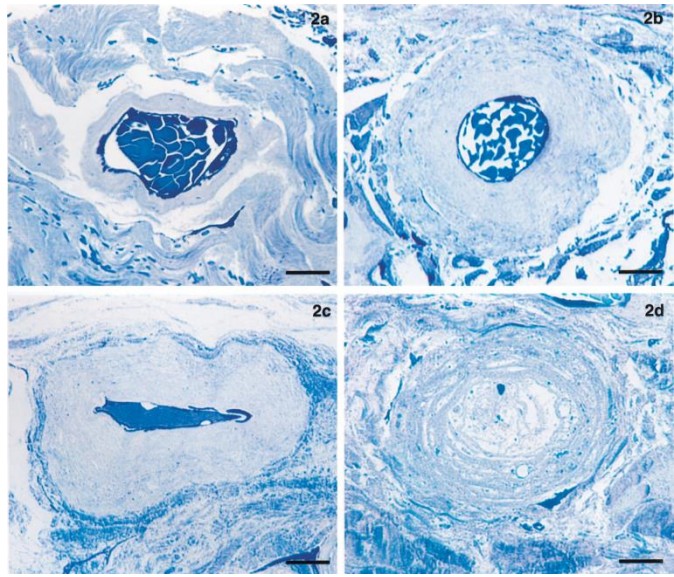
- ✓ Απώλεια μεσοθηλιακών
- ✓ Αγγειοπάθεια
- ✓ ίνωση

Yanez-Mo et al. N Engl J Med, 2003
Luiz S. Aroeira et al. JASN 2007

vasculopathy

- Subendothelial hyalinosis
- Narrowing of vascular lamina

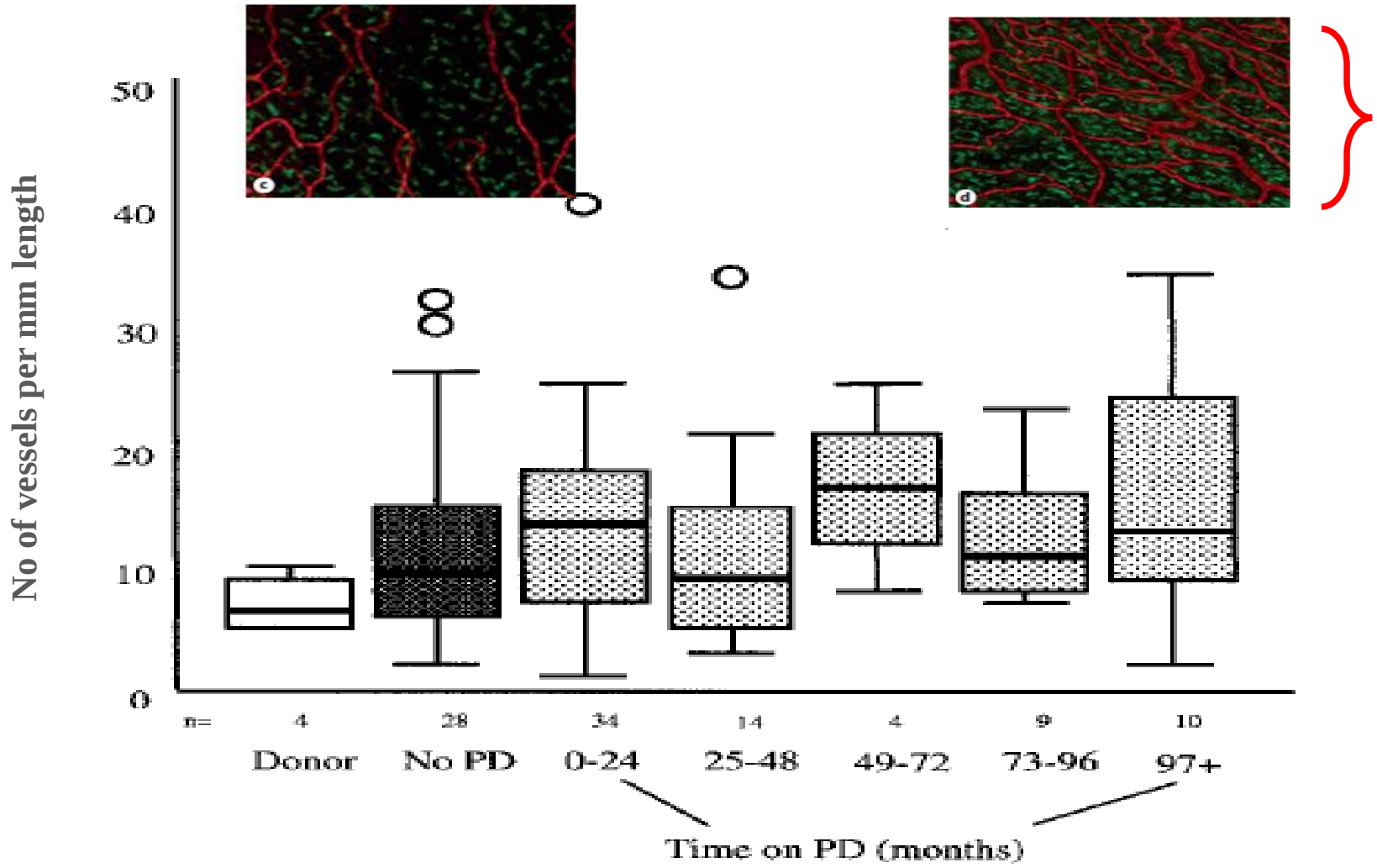




John D. Williams et al. JASN 2002;13:470-479

JASN
JOURNAL OF THE AMERICAN SOCIETY OF NEPHROLOGY

Blood vessel density

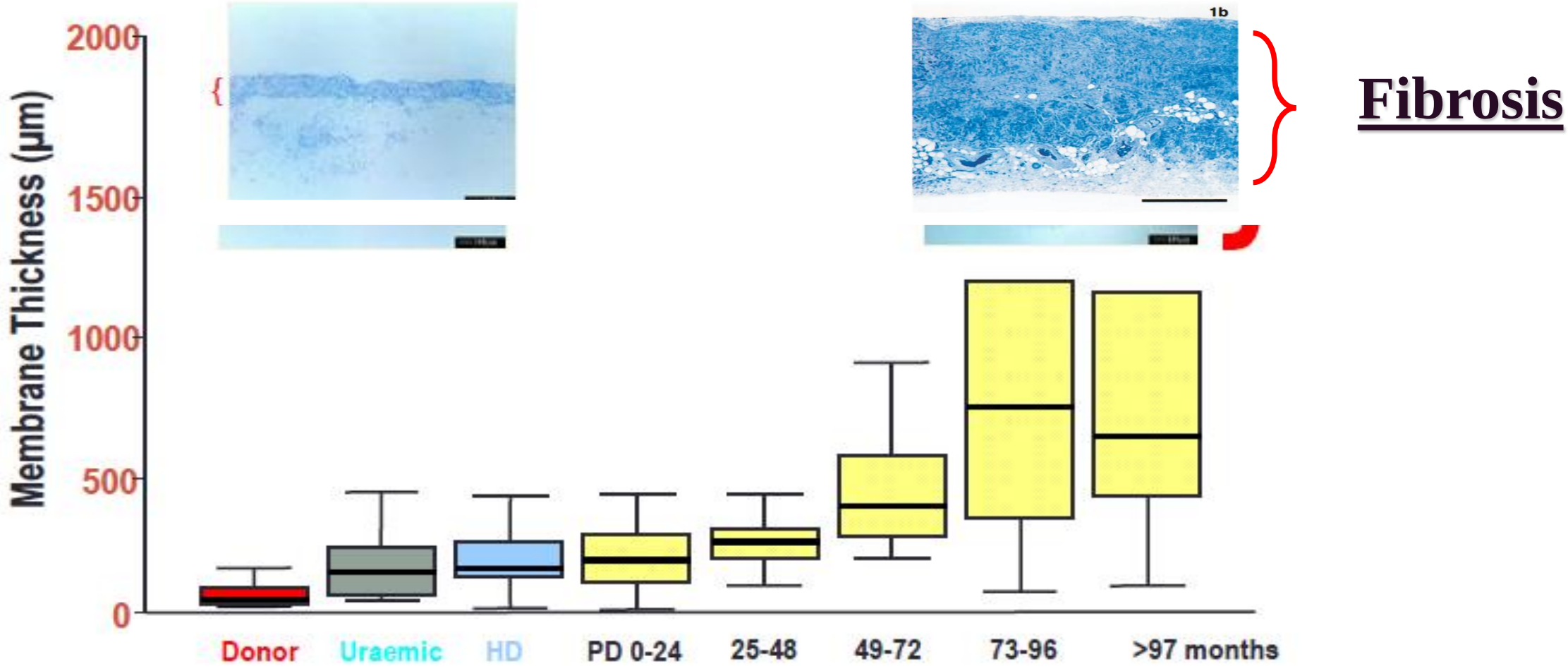


angiogenesis

Williams et al, J Am Soc Nephrol , 2002

Schilte MN, et al.: Perit Dial Int 2009

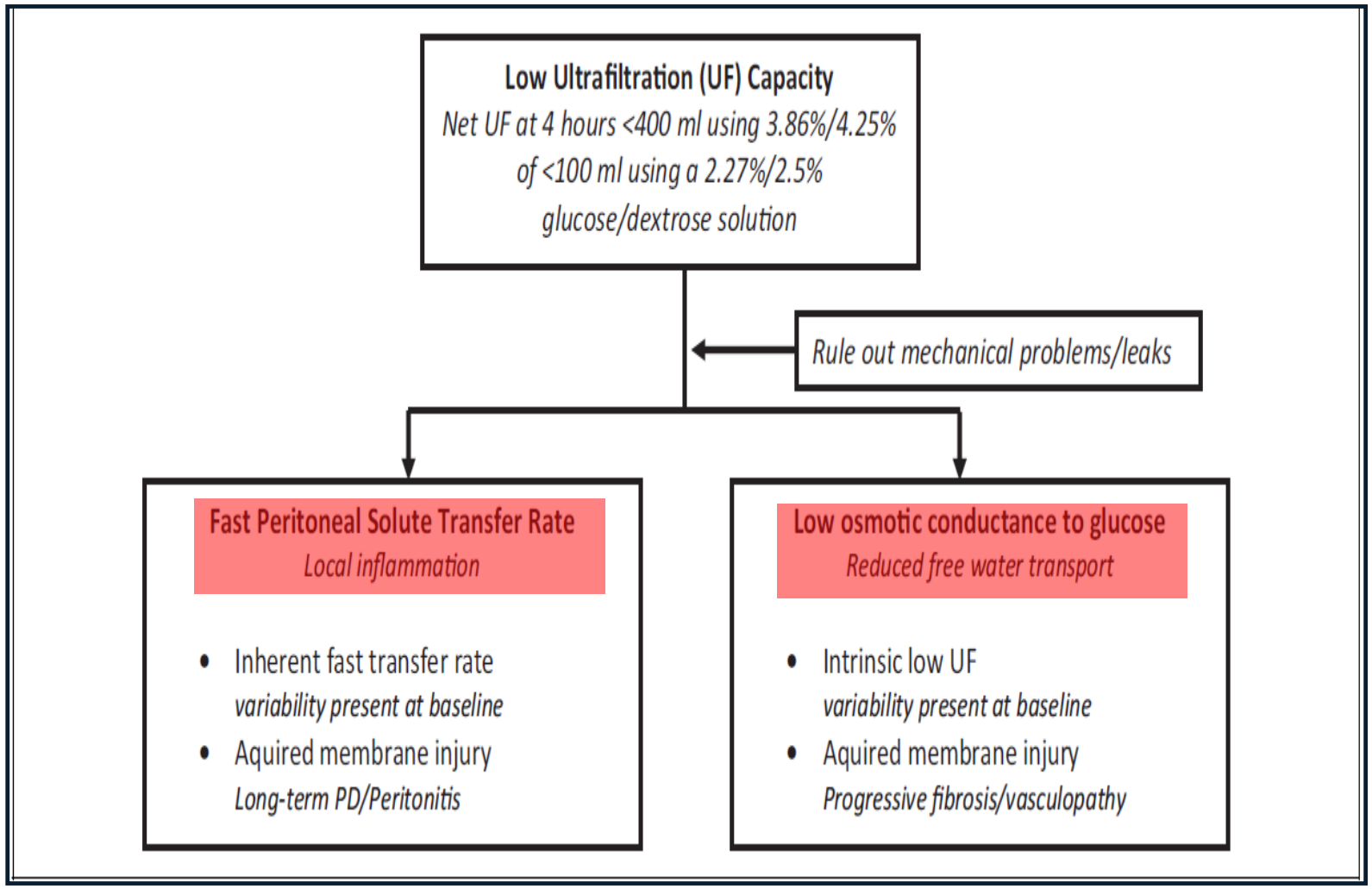
Changes in the submesothelial compact zone



Fibrosis

Williams et al, J Am Soc Nephrol , 2002

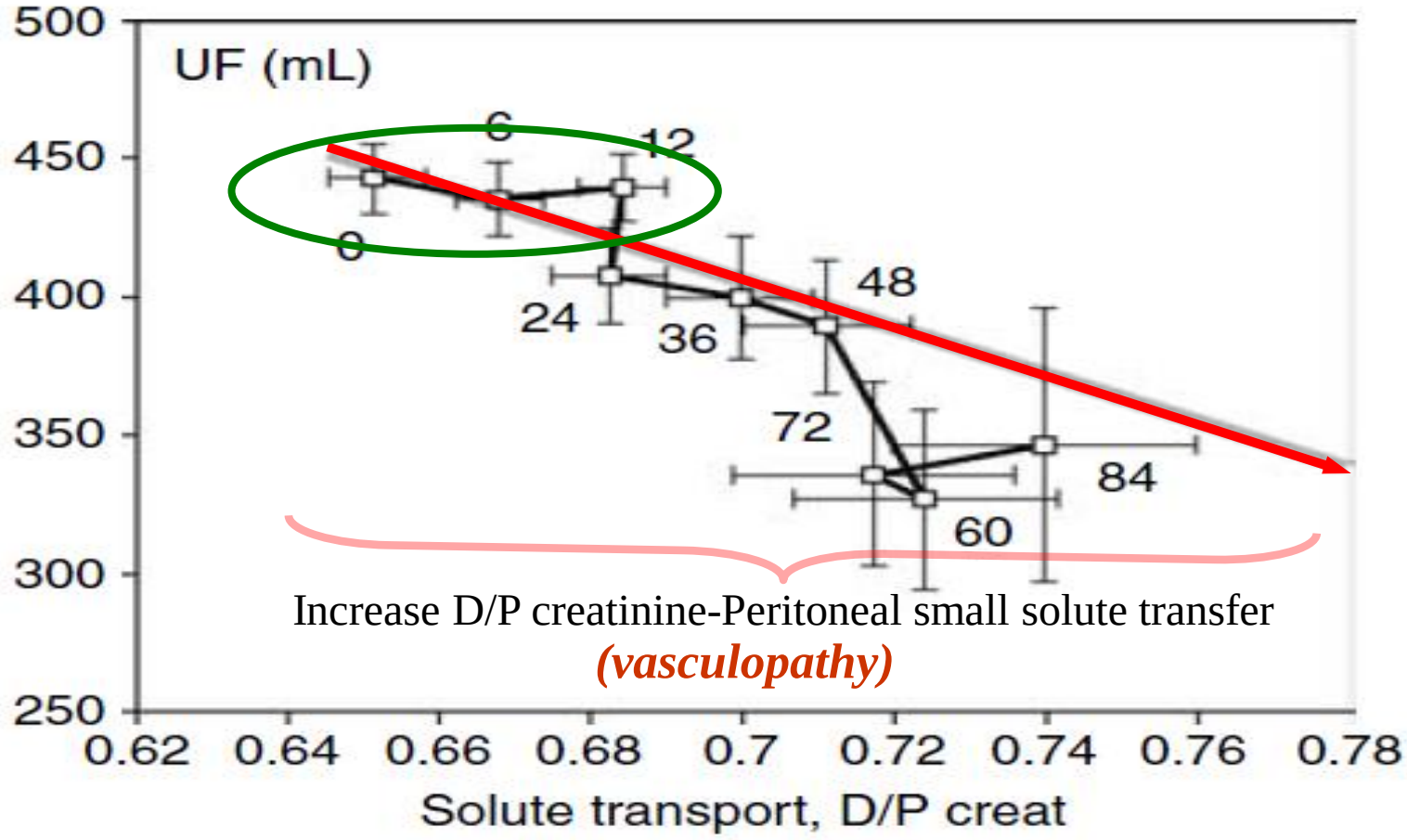
Ανεπάρκεια υπερδιηθήματος



38% after 3 years PD

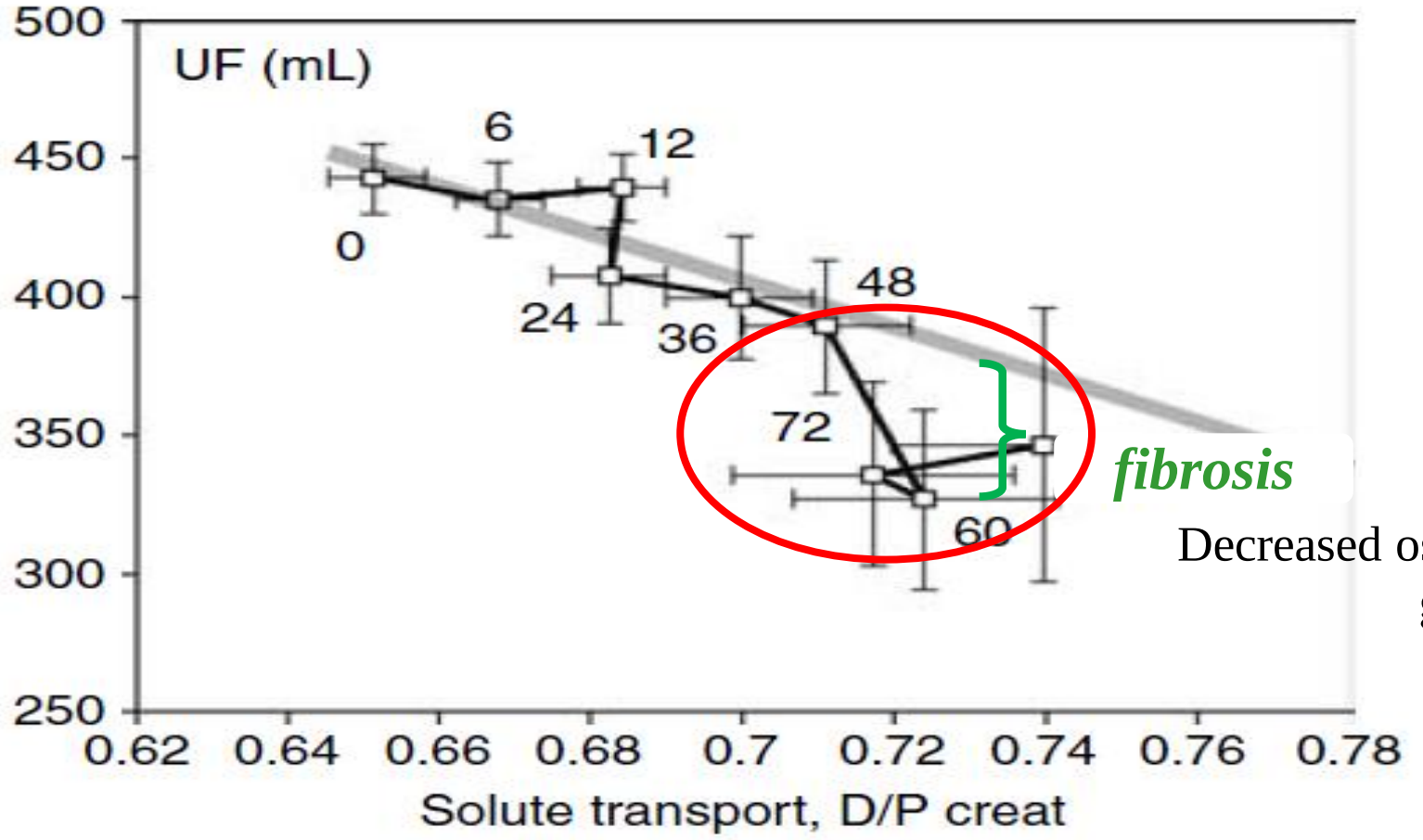
ISPD, 2021

Λειτουργικές διαταραχές της ΠΜ



Davies S.et al: Kidney Int 2004

Λειτουργικές διαταραχές της ΠΜ



fibrosis

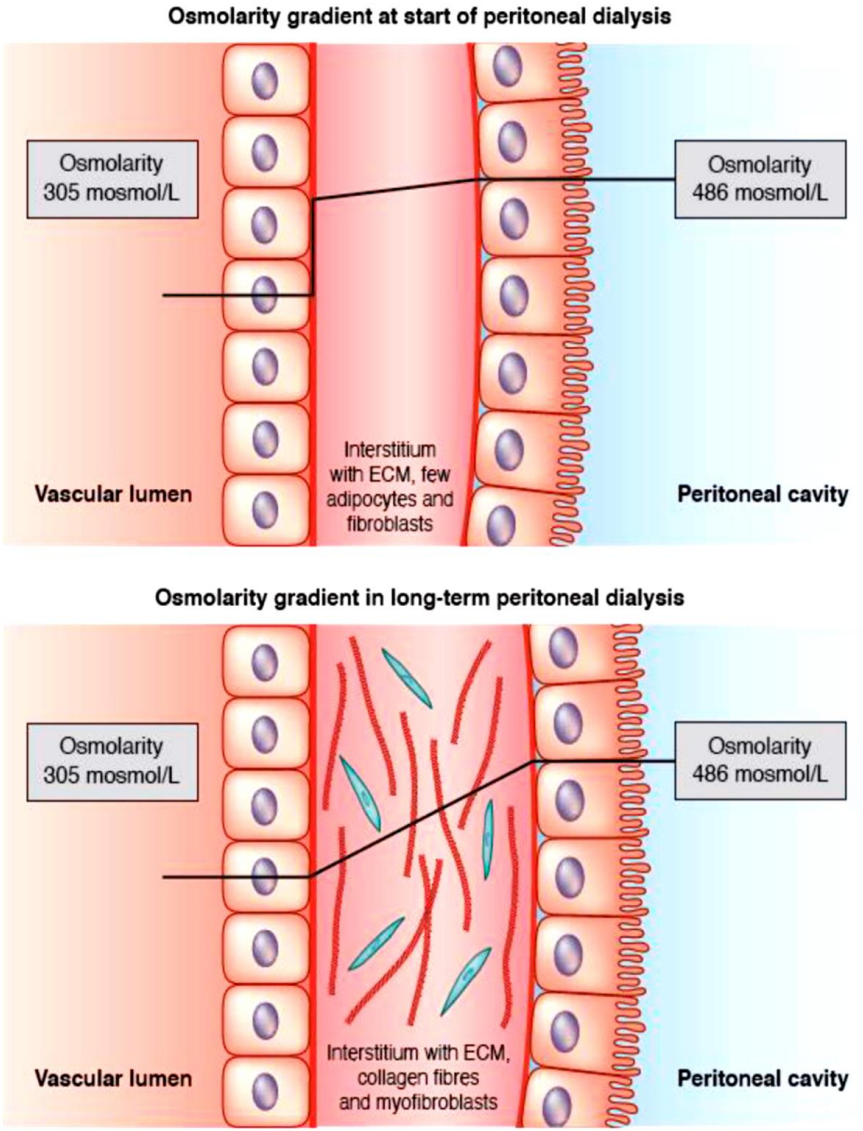
Decreased osmotic conductance glucose

Davies S.et al: Kidney Int 2004

DipNa and UFF

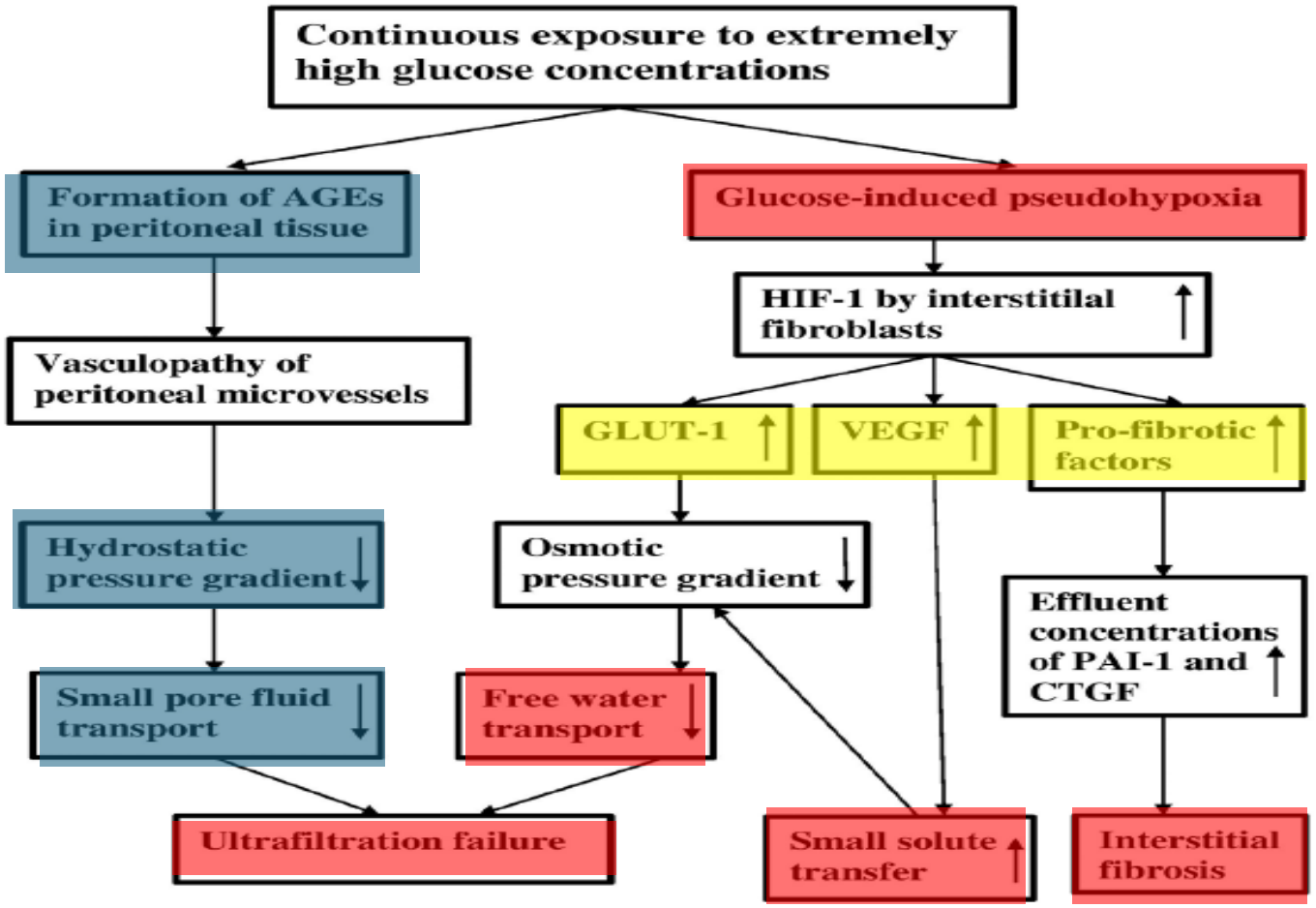
Table 4 | Cox univariate regression model for the ment of UF failure during the follow-up in 95 pati therapy

	Risk ratio	Lower CI	U
Sex (female)	0.754	0.438	1
Age at start of PD (increase of 1 year)	1.010	0.970	1
Urine volume (increase of 1 ml)	0.999	0.999	1
GFR (increase of 1 ml/min)	0.906	0.696	1
Plasma Albumin (increase of 1 g/dl)	0.464	0.114	1
UF (increase of 1 ml)	0.998	0.997	1
D/D_0 (increase of 0.001)	0.987	0.973	0
D/P_{Creat} (increase of 0.001)	1.005	0.998	1
ΔD_{Na} (increase of 1 mmol/l)	0.768	0.624	0



LaMilia V et al . Kidney Int 2005

Παθογενετικοί μηχανισμοί



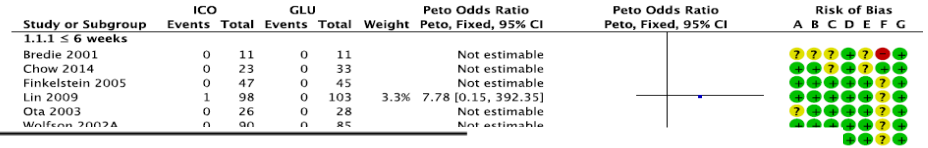
Krediet R. Perit Dial Int, 2024

Πώς να επιμηκύνω το χρόνο ζωής της ΠΚ

✓Διόρθωση μηχανικών επιπλοκών-διαφυγής
✓Διατήρηση υπολειπόμενης νεφρικής λειτουργίας
✓Μείωση περιτονιτίδων
✓ΣΥΝΤΑΓΟΓΡΑΦΗΣΗ-ΕΚΠΑΙΔΕΥΣΗ-ΠΡΩΤΟΚΟΛΛΑ

✓Επιλογή ασθενών
✓Δίαιτα
✓Εκπαίδευση και επανεκπαιδευση
✓Υποστήριξη

Πώς να επιμηκύνω τη ζωή της μεμβράνης



Study or Subgroup	ICO Events	ICO Total	GLU Events	GLU Total	Weight	Peto Odds Ratio Peto, Fixed, 95% CI
1.1.1 ≤ 6 weeks						
Bredie 2001	0	11	0	11		Not estimable
Chow 2014	0	23	0	33		Not estimable
Finkelstein 2005	0	47	0	45		Not estimable
Lin 2009	1	98	0	103	3.3%	7.78 [0.15, 392.35]
Ota 2003	0	26	0	28		Not estimable
Wolfson 2002A	0	90	0	85		Not estimable

Peto Odds Ratio
Peto, Fixed, 95% CI

Risk of Bias
A B C D E F G

Α. Μειωμ

✓Ορθολο

✓Αλλαγή

Ικοντεξ

Γλυκερ

✓Διαλύμ

✓ Συνδυ

(γλυκερόλ

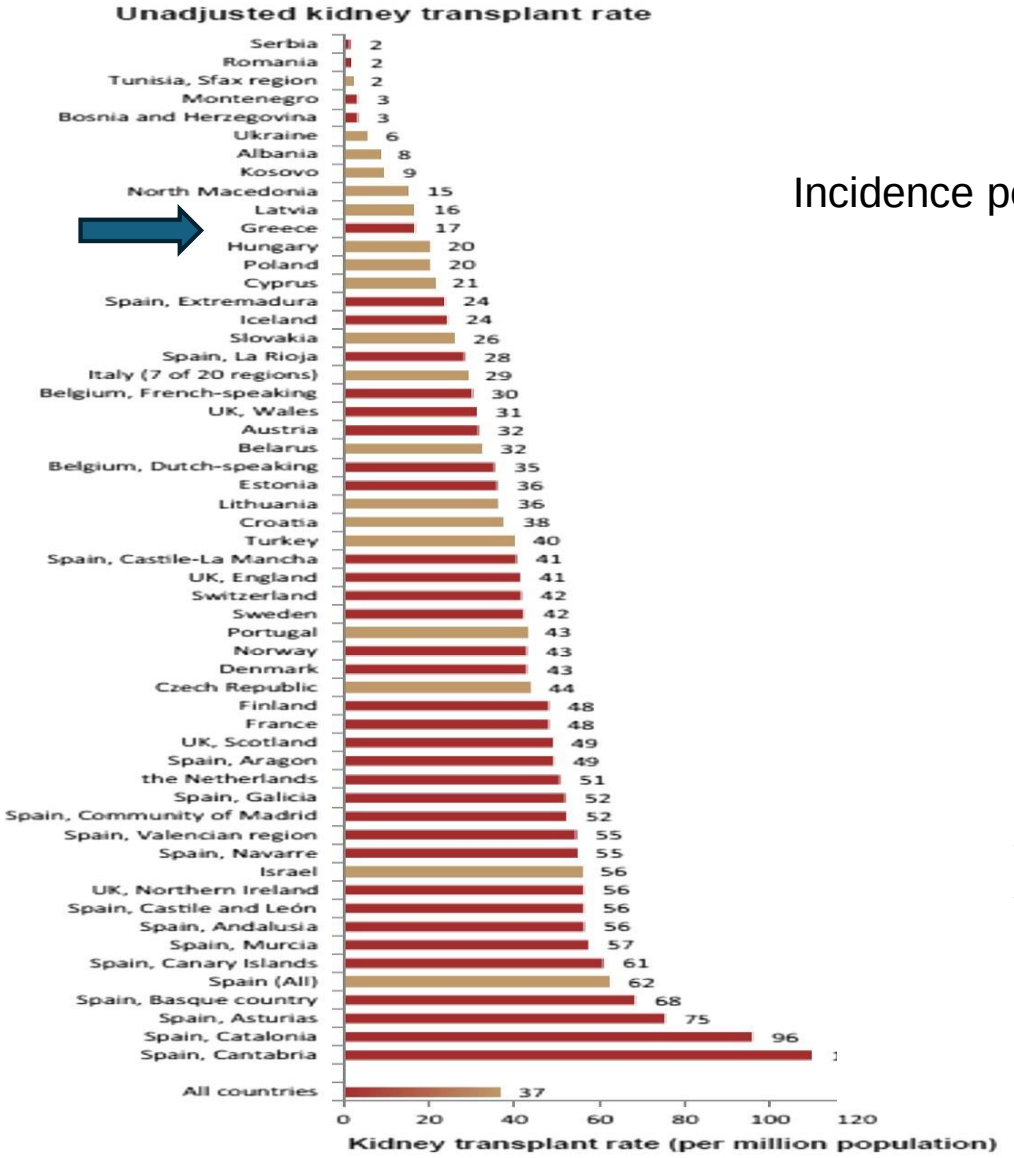
Β . Φάρμα

Drug	Mechanism	Use in PD patients
Zopolrestat	Aldose reductase inhibition, affecting the polyol pathway	Not registered for human use due to side effects
Nicotinamide mononucleotide	Interference with the NADH/NAD+ ratio	Nutritional supplement, few human data, no data in PD patients
SGLT-2 inhibitors	Inhibition of sodium-coupled cellular glucose uptake	Currently no data on peritoneal UF in PD patients
Phloretin	Higher UF rates by inhibition of cellular glucose uptake by GLUTs	Not registered as a drug; only experimental data in an acute PD model
Tamoxifen	Anti-fibrotic properties	Favourable results in EPSNo data on prophylactic use
Rapamycin/ sirolimus	mTOR inhibitor that decreases TGFβ production	Case reports on favourable results in EPSNo data on prophylactic use
ACE inhibitors/ ARBs	Effects on diabetes-like vasculopathy	Prevent the long-term increase in small solute transport rateNo marked effect on fluid transport

2

DP]

Krediet R et al. JASN 2021
Bonomini M et al, Int J Mol, 2021



Incidence per million population of transplantation in 2021

Ο μέσος χρόνος αναμονής για μόσχευμα στην Ελλάδα είναι 6,5 χρόνια

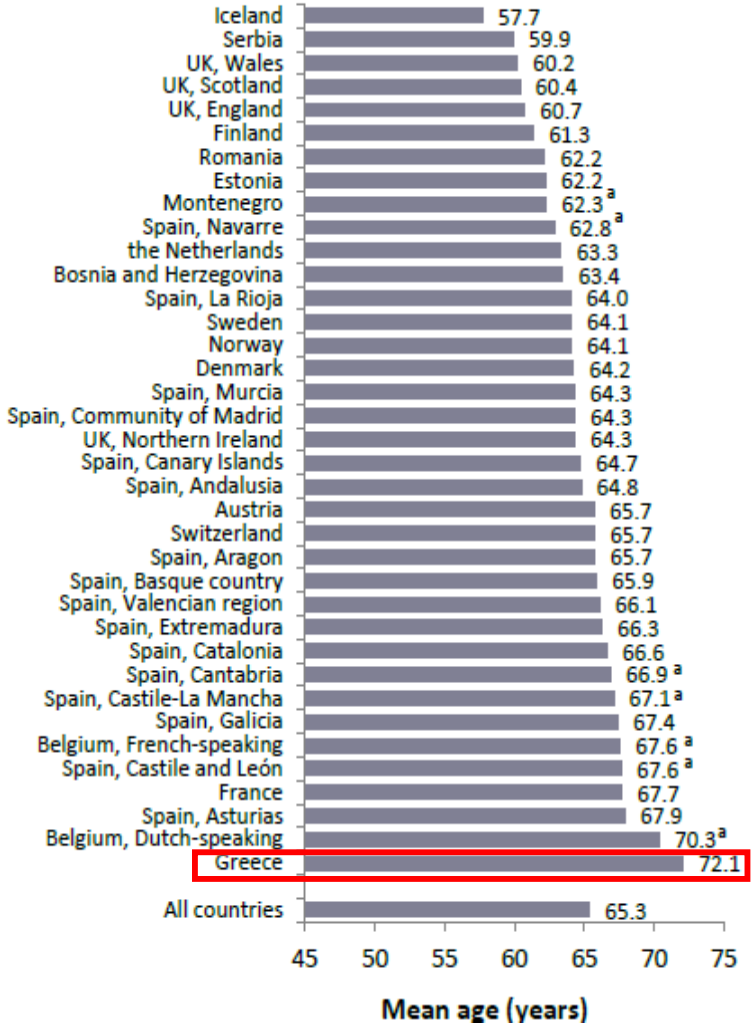
- ✓ ο μέσος χρόνος «ζωής» μιας φίστουλα 49-75 μήνες
- ✓ ο μέσος χρόνος ζωής ενός μόνιμου κεντρικού καθετήρα 14 μήνες

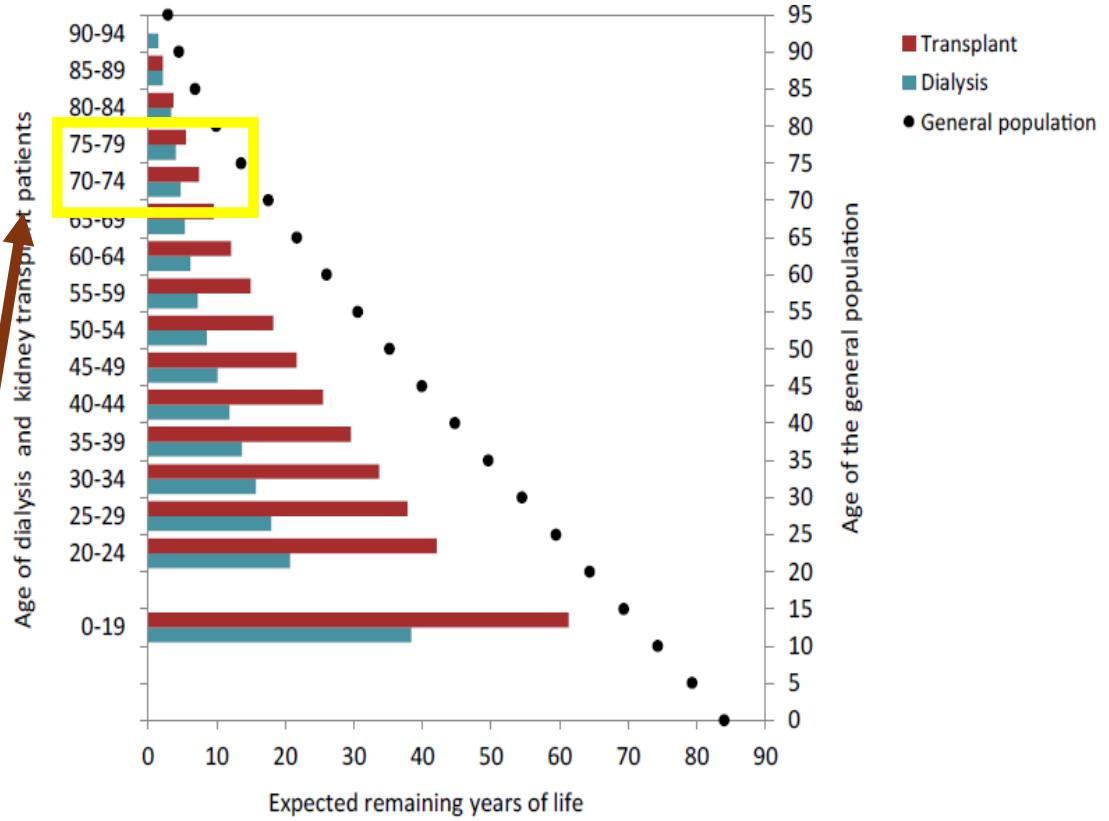
Clin Kidney J, 2024

Liu, P., et al. Ren Fail, 2023

Mean age at start of KRT

Renal registries providing individual patient data





ΠΚ: Μια μέθοδος με ημερομηνία λήξης;

- Είναι η ημερομηνία λήξης ίδια για όλους?

  Όχι
- Μπορώ να επιμηκύνω τη διάρκεια ζωής της ΠΚ και πώς?

  Ναι
- Έχει σημασία η λήξη ή η ζωή με ΠΚ μέχρι τη λήξη?

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Peritoneal dialysis in the modern era

Ayman Karkar[1] and Martin Wilkie[2]

Table 2. Comparison between conventional PD and modern PD management styles.

Management component	Conventional PD	Modern PD
Patient selection	– Suitable patients selected (younger age, avoiding those with significantl comorbidities or frailty)	– Patient choice based on patient education and shared decision-making – Broad inclusion criteria
PD treatment	– Not evidence-based – Similar prescription for all	– Evidence-based – Patients focused – individualised prescription
PD adequacy	– Focused on Kt/V	– Focused on patient well-being – Holistic considerations include nutritional status and treatment burden
PD treatment monitoring	– Clinic visits	– Clinic visits – Remote monitoring and management