# Difference in practical dialysis therapy between East Asia and US/EU

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# Impact of dialysis expense on…

1. Personal economics
2. Health insurance (national or private)
3. Social equality

## Budget for dialysis in Taiwan

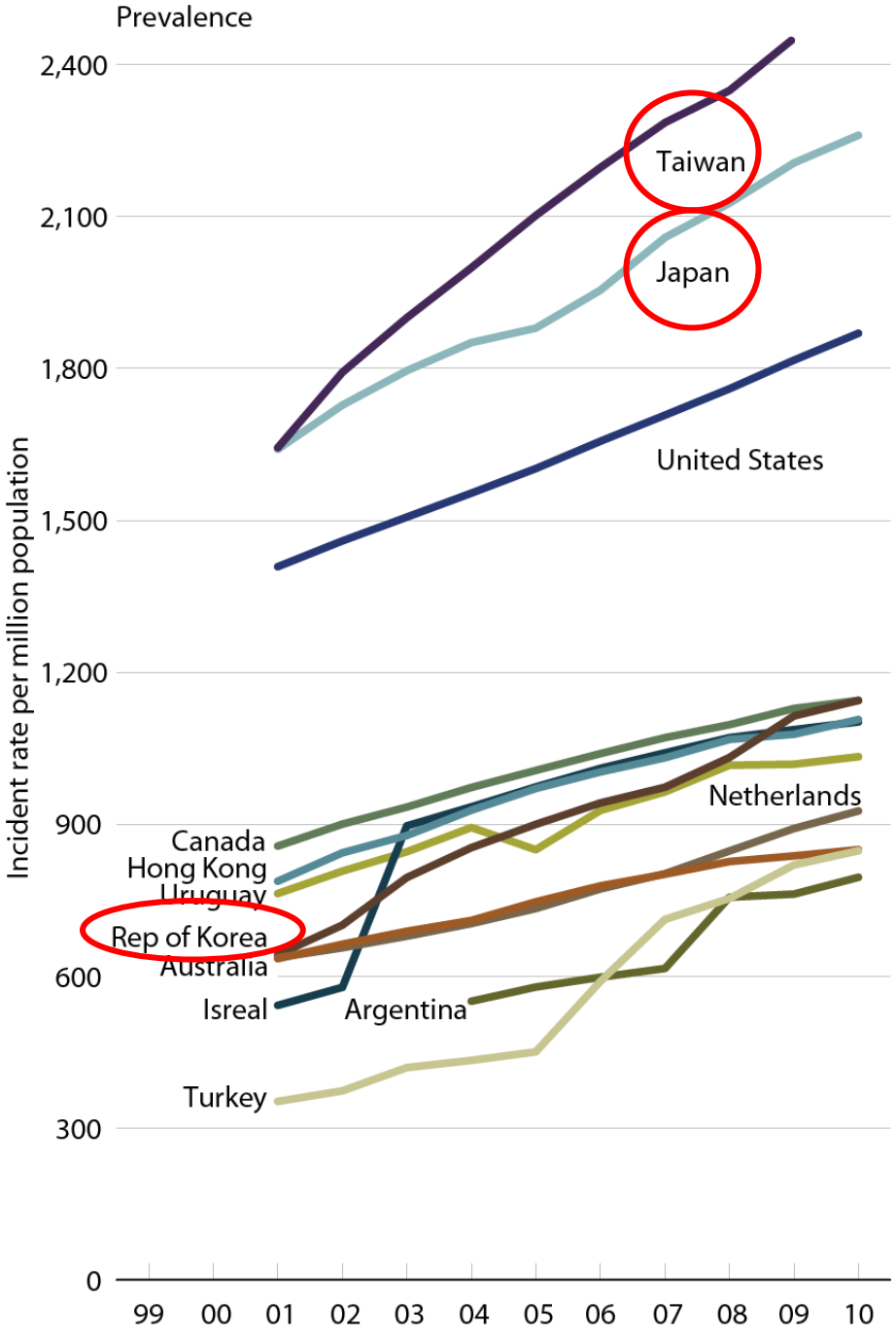
| **Fiscal year** | **2009** | **2010** | **2011** | **2012** | **2013** |
|---|---|---|---|---|---|
| Budget (USD, millions) | 1,007 | 1,028 | 1,028 | 1,038 | 1,063 |

- By the end of 2012, dialysis p'ts – 0.28% of population, but expenses – 6.3% !! (only fee for dialysis)

# 2012 USRDS

## Comparison of unadjusted ESRD prevalence worldwide

**Figure 12.1, continued (Volume 2)**

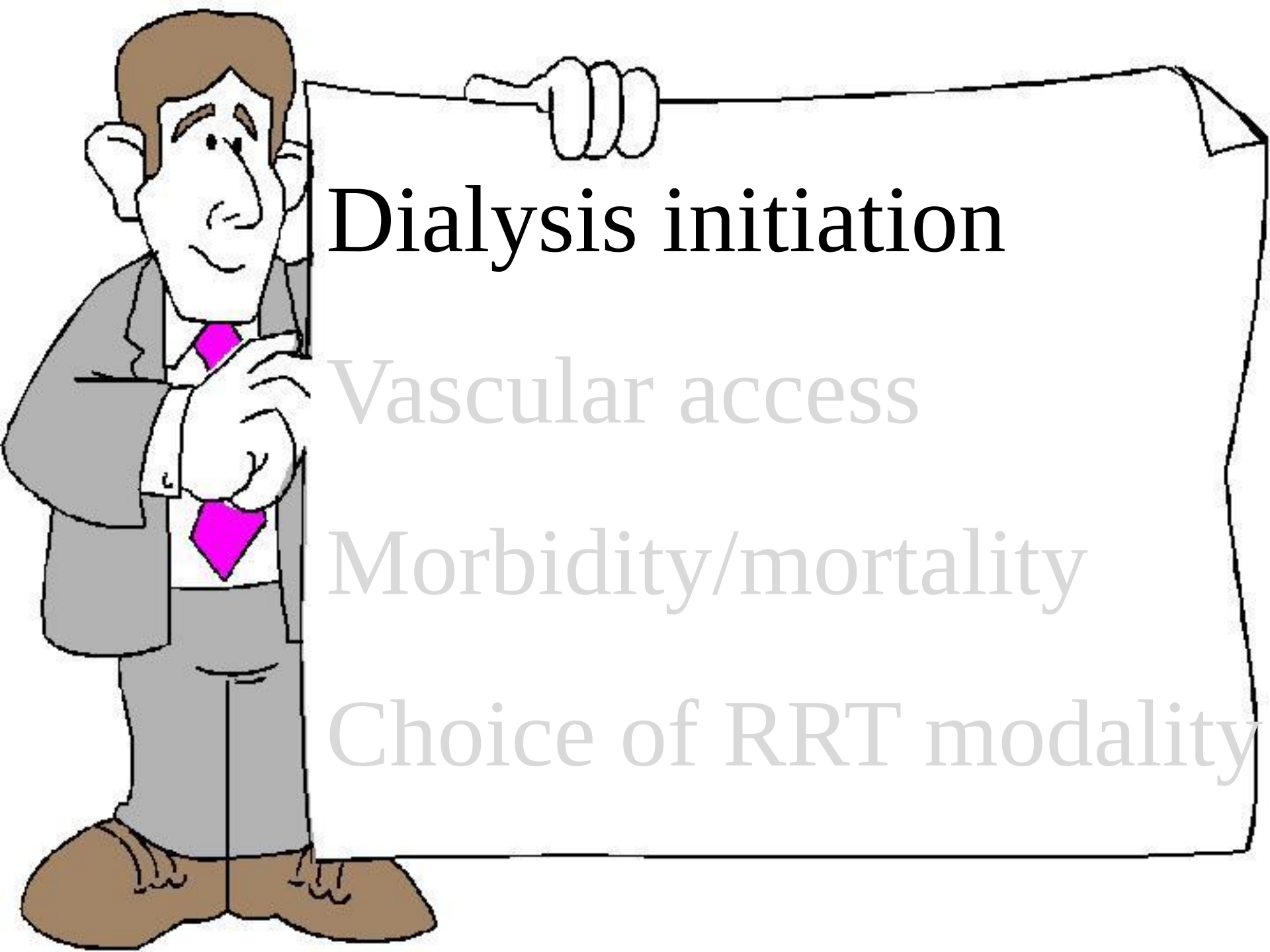



**All rates are unadjusted. Data from Argentina (2005–2007), Japan, & Taiwan are dialysis only.**

# What is more serious…

No quick end …
in the foreseeable future!

Regenerative medicine


Dialysis initiation
Vascular access
Morbidity/mortality
Choice of RRT modality

# A common reaction when patients are told to live on further with dialysis:


ちびまる子ちゃん

# All right, I'll take it。

But:

At what time should I start,

"Earlier" *vs* "Later"

# Proposed benefits of earlier initiation

- Minimize the clinical complications related to

**Will the late-initiation do worse?**

- Avoid uremic symptoms
- Lower the mortality

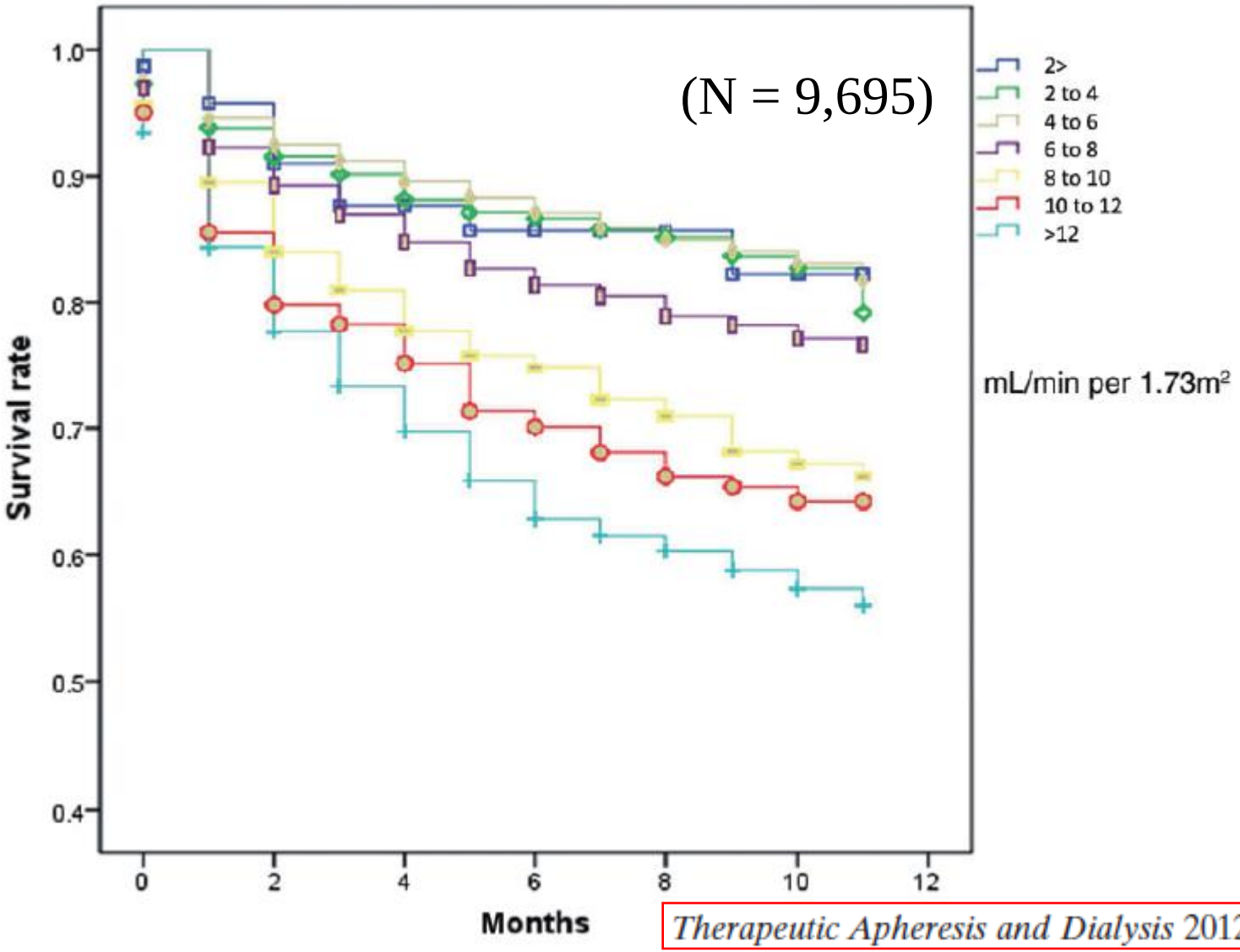
**How about the more recent data?**

- Improve the quality of life

Bonomini V et al, KI, 1985; Tattersall J et al, Am J Nephrol, 1995; Churchill DN et al, JASN, 1997; Hakim RM, Adv Nephrol Necker Hosp, 1994; Obrador GT et al, AJKD, 1998; ……

- Early? : > 10 ml/min/1.73 $m^2$BSA

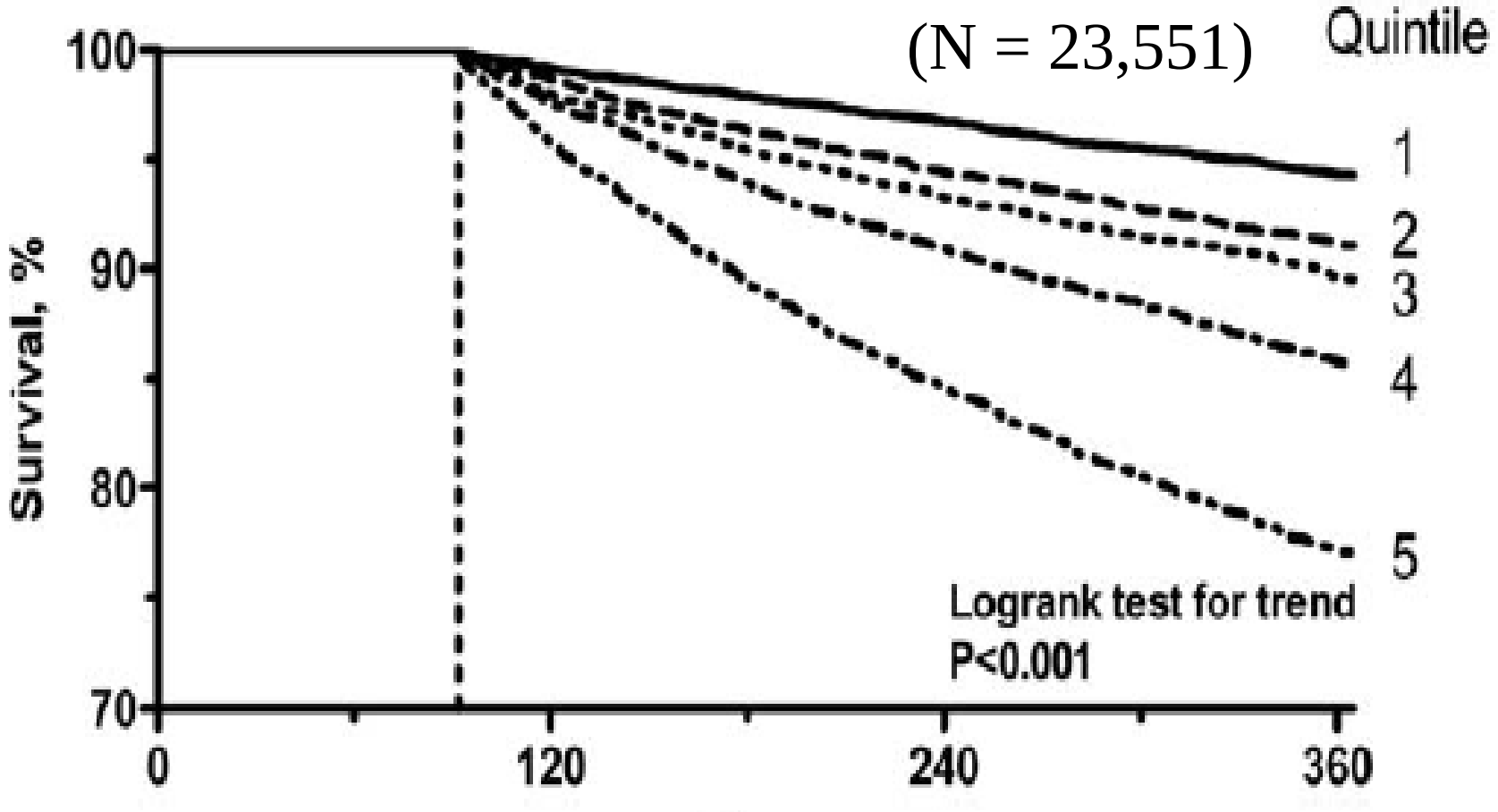
# Ideal Timing and Predialysis Nephrology Care Duration for Dialysis Initiation: From Analysis of Japanese Dialysis Initiation Survey




*Therapeutic Apheresis and Dialysis* 2012; 16(1):54–62

# Impact of the clinical conditions at dialysis initiation on mortality in incident haemodialysis patients: a national cohort study in Taiwan

- eGFR quintiles: <3.29, 3.29~4.27, 4.28~5.20, 5.21~6.51, >6.52




(Adjusted for age, gender, co-morbidities, Hct, primary etiologies, and dialysis modality)

Hwang SJ et al. *NDT*, 25:2616-24, 2010

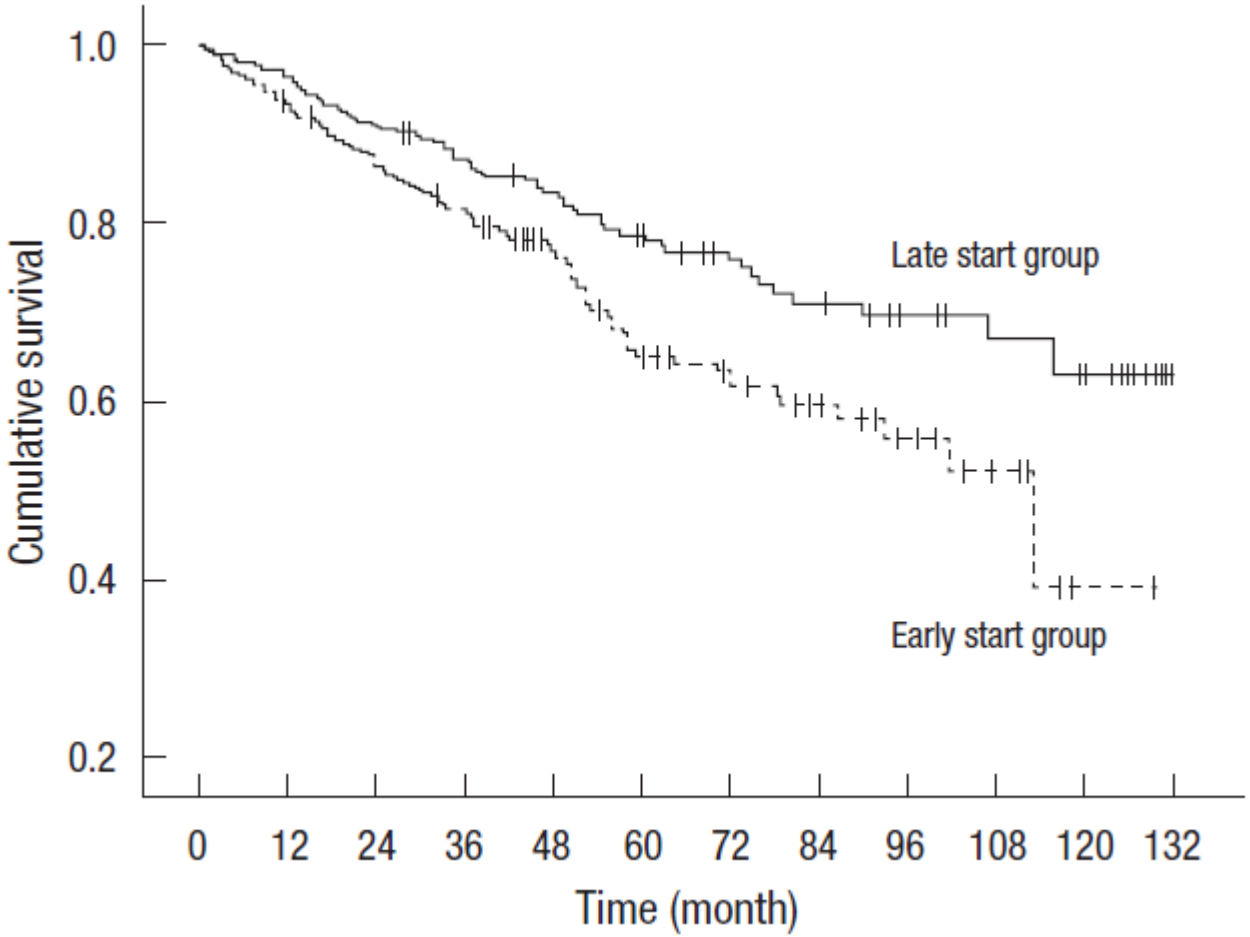
# Early Start of Dialysis Has No Survival Benefit in End-Stage Renal Disease Patients

J Korean Med Sci 2012; 27: 1177-1181

Early start: 11.1 ml/min/1.73 $m^2$

Late start: 6.2 ml/min/1.73 $m^2$

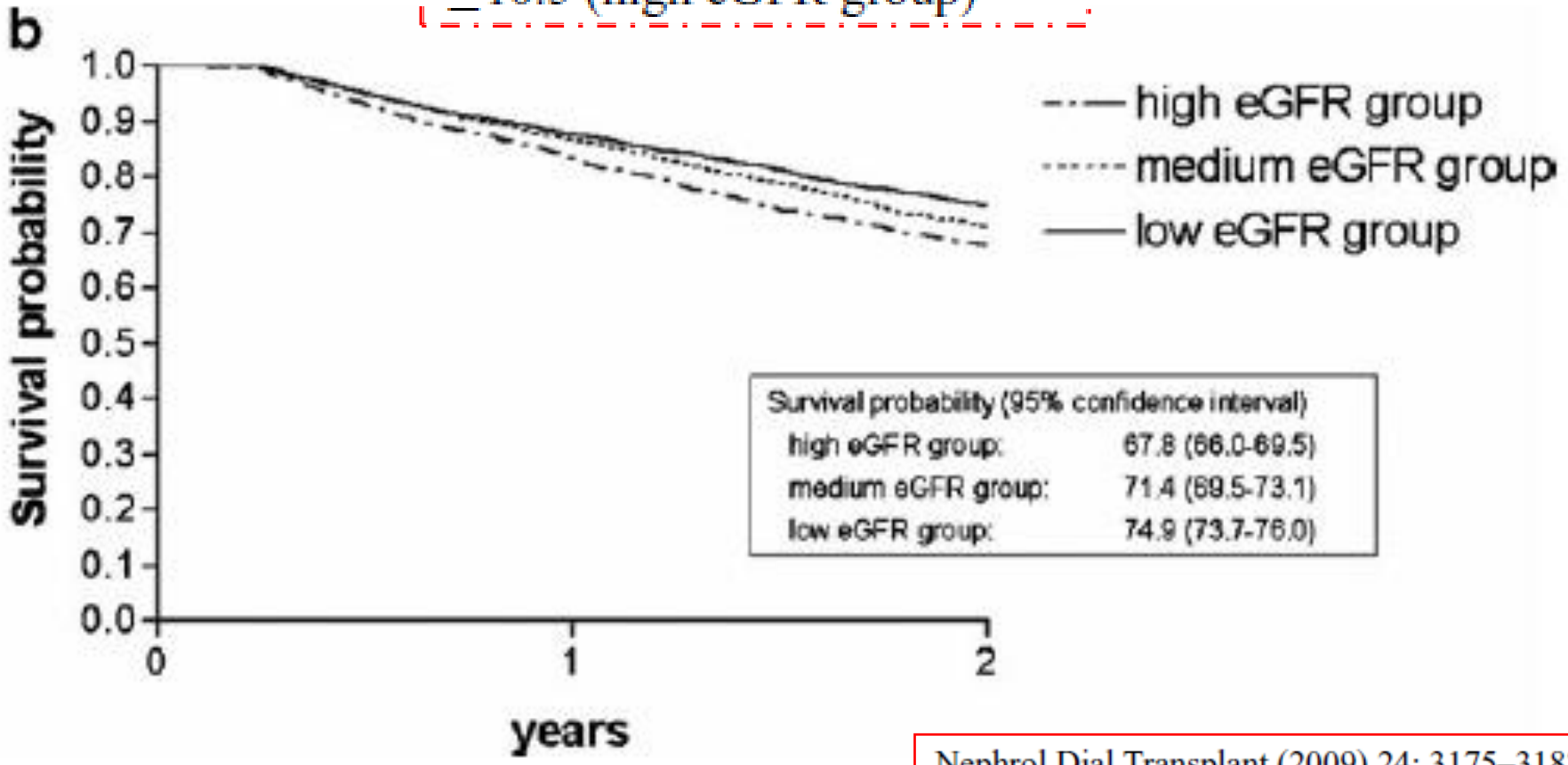
N = 836



# Residual renal function at the start of dialysis and clinical outcomes

- From 2003, ERA-EDTA registry, N = 11,472.

<8 (low eGFR group)
8–10.5 (medium eGFR group)
≥10.5 (high eGFR group)




Nephrol Dial Transplant (2009) 24: 3175–3182

# The only non-observational study

- IDEAL trial

  N Engl J Med 2010.

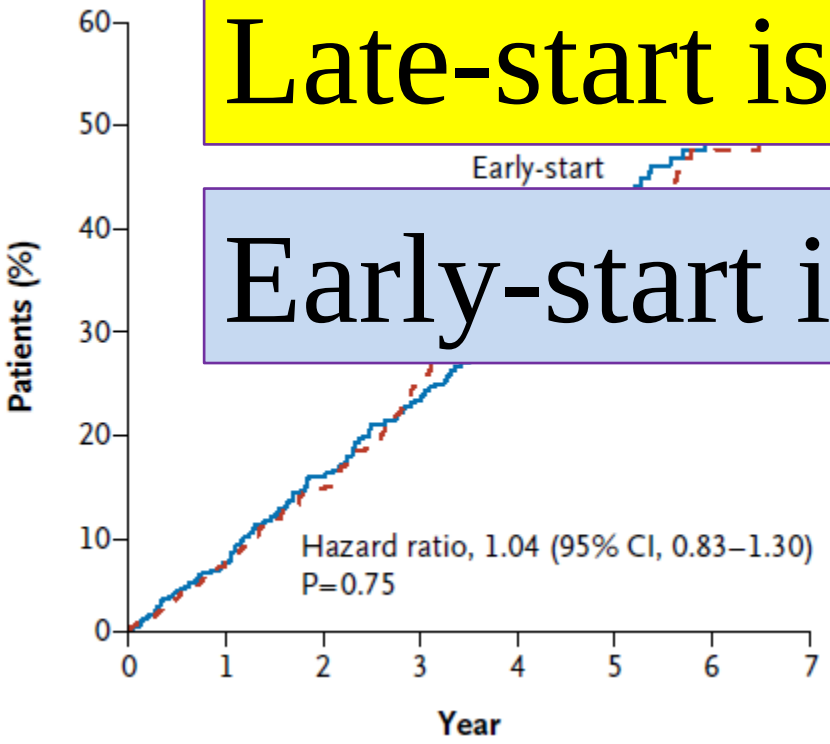
  828 CKD patients were randomized (Ccr) into:

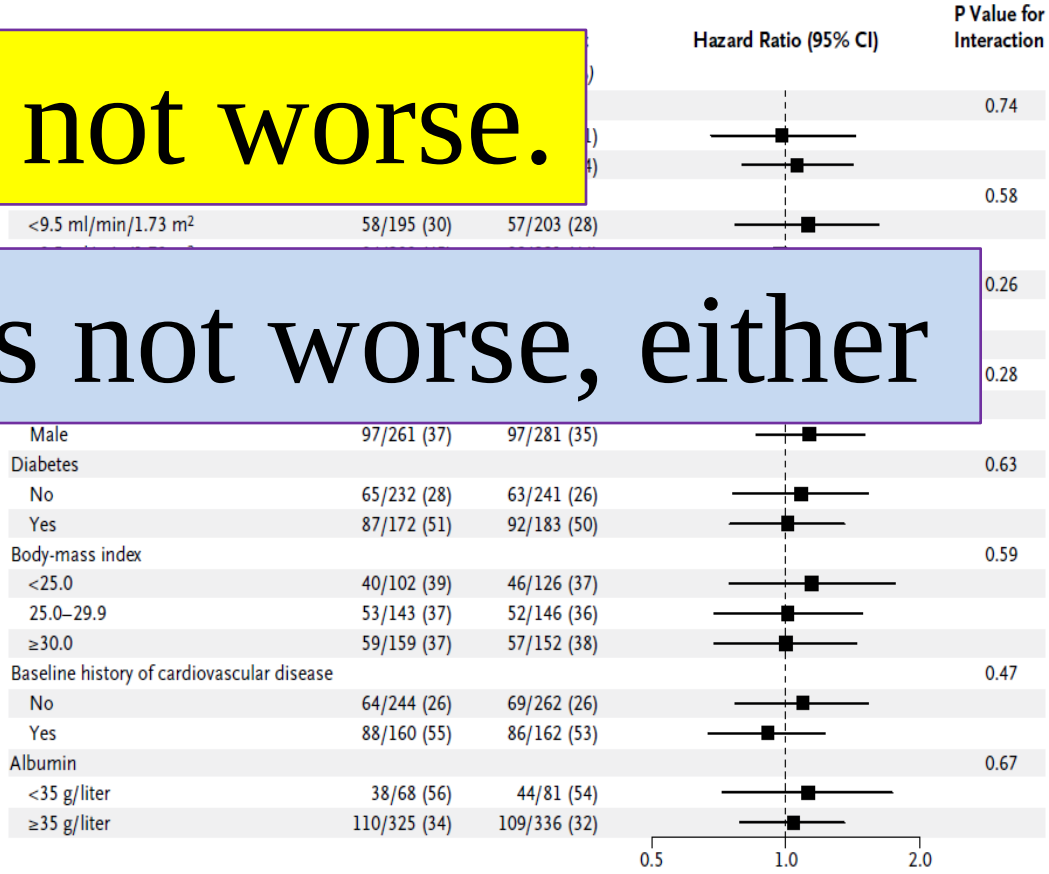
  -- Early-start – 10~14 ml/min

  -- Late-start – 5~7 ml/min

**Late-start is not worse.**

**Early-start is not worse, either**

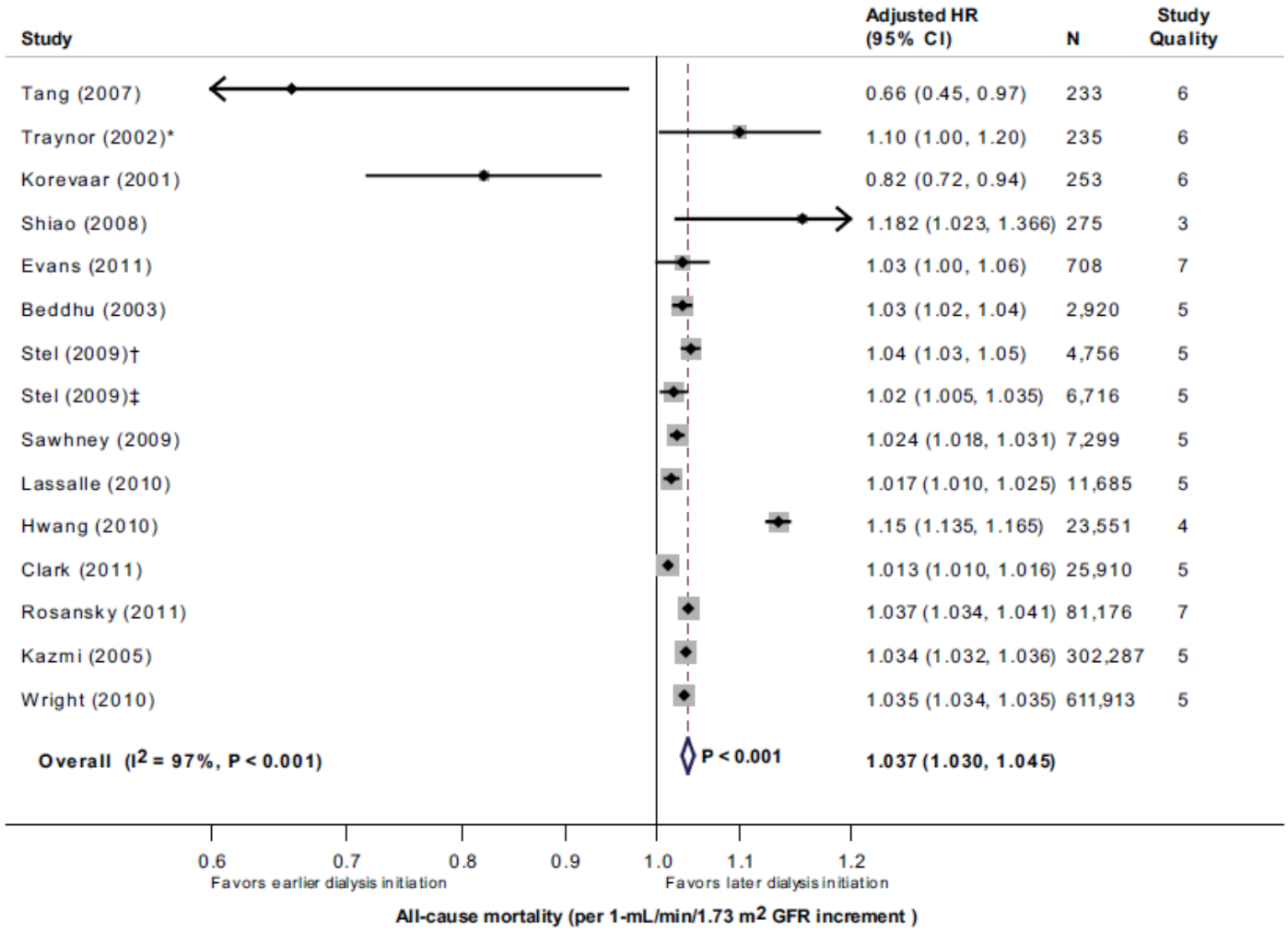


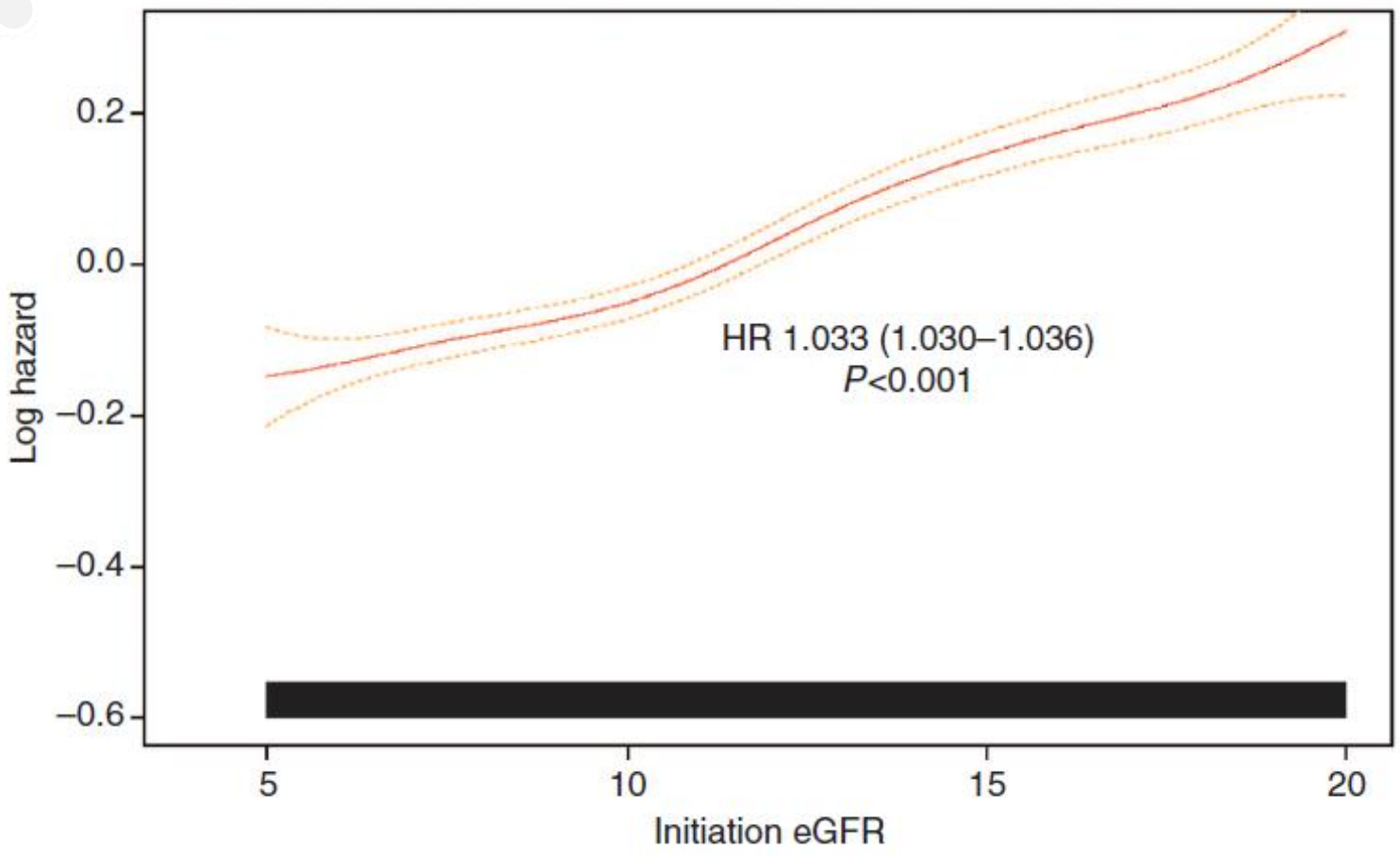
# GFR at Initiation of Dialysis and Mortality in CKD: A Meta-analysis

Am J Kidney Dis. 2012;59(6):829-840

- 16 cohort studies and one RCT – total 1,081,116 patients
- GFR: creatinine-based estimated or calculated GFR



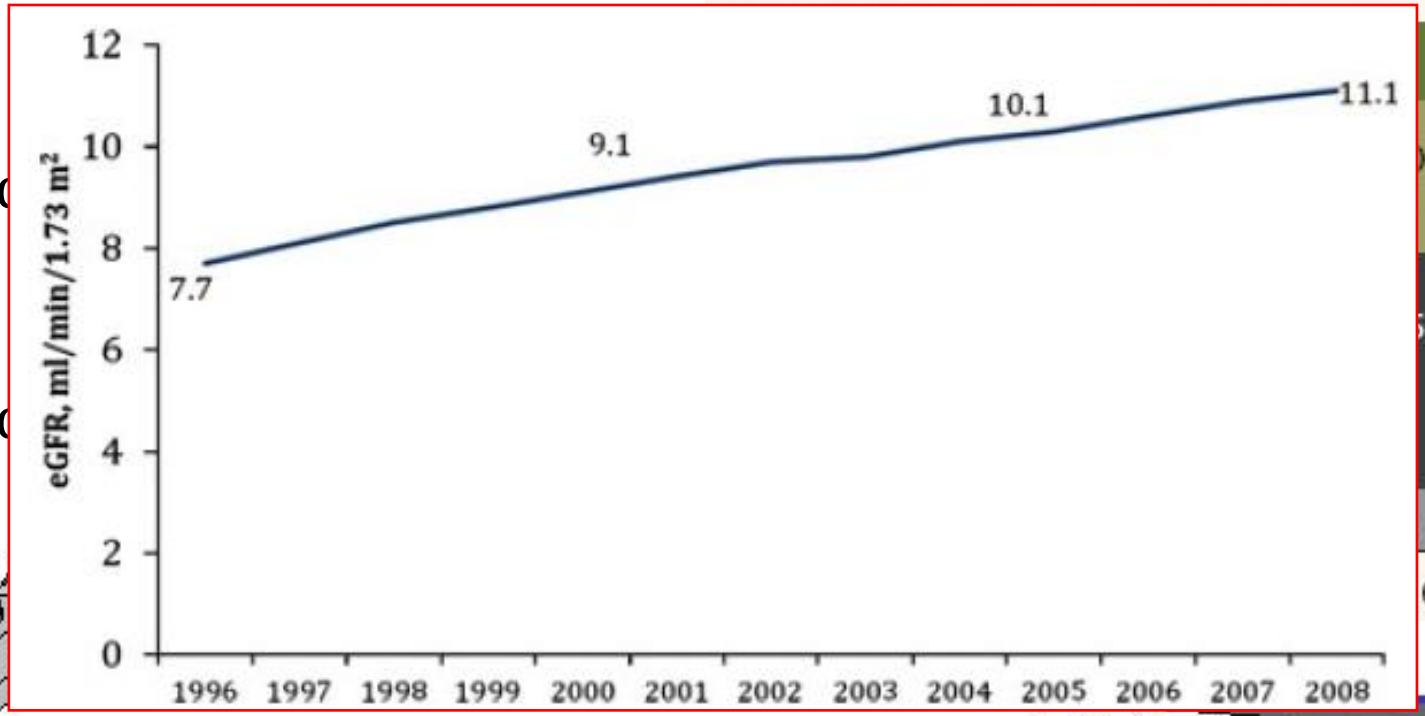
# An instrumental variable approach finds no associated harm or benefit with early dialysis initiation in the United States (N = 89,547)




Cox proportional hazard model

*Kidney International* advance online publication, 30 April 2014;

- The mean eGFR at initiation:
  - -- In Taiwan, **4.7 ml/min/1.73 m²** (~2005)
  - -- In Japan, **6.52 ml/min/1.73 m²** (~2007)
  - -- In Korea, **7~8 ml/min/1.73 m²** (~2009)
  - -- In EU, **10 ml/min/1.73 m²** (11 countries)
- How about in US?




vol 2
1.25

**Patient distribution at initiation, by eGFR (ml/min/1.73 m²)**

15+
)-<15
5-<10
<5
09 11

- In
  anc
- In
  anc

# Issues between Early *v.s.* Late dialysis

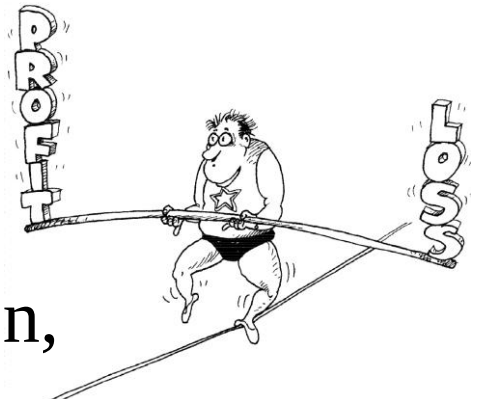
- Patients who were dialyzed earlier might have more co-morbid conditions, or might be older.
- Creatinine is a marker of renal function, and also of muscle mass. In sarcopenic CKD patients, CRTN-based eGFR might actually over-estimate the real GFR.

**The MDRD formula does not reflect GFR in ESRD patients**

Nephrol Dial Transplant (2011) 26: 1932–1937

- Using other method to assess renal function, no significant association was shown between higher GFR at dialysis initiation with death risk.

# Initiation of dialysis should be timely: neither early nor late



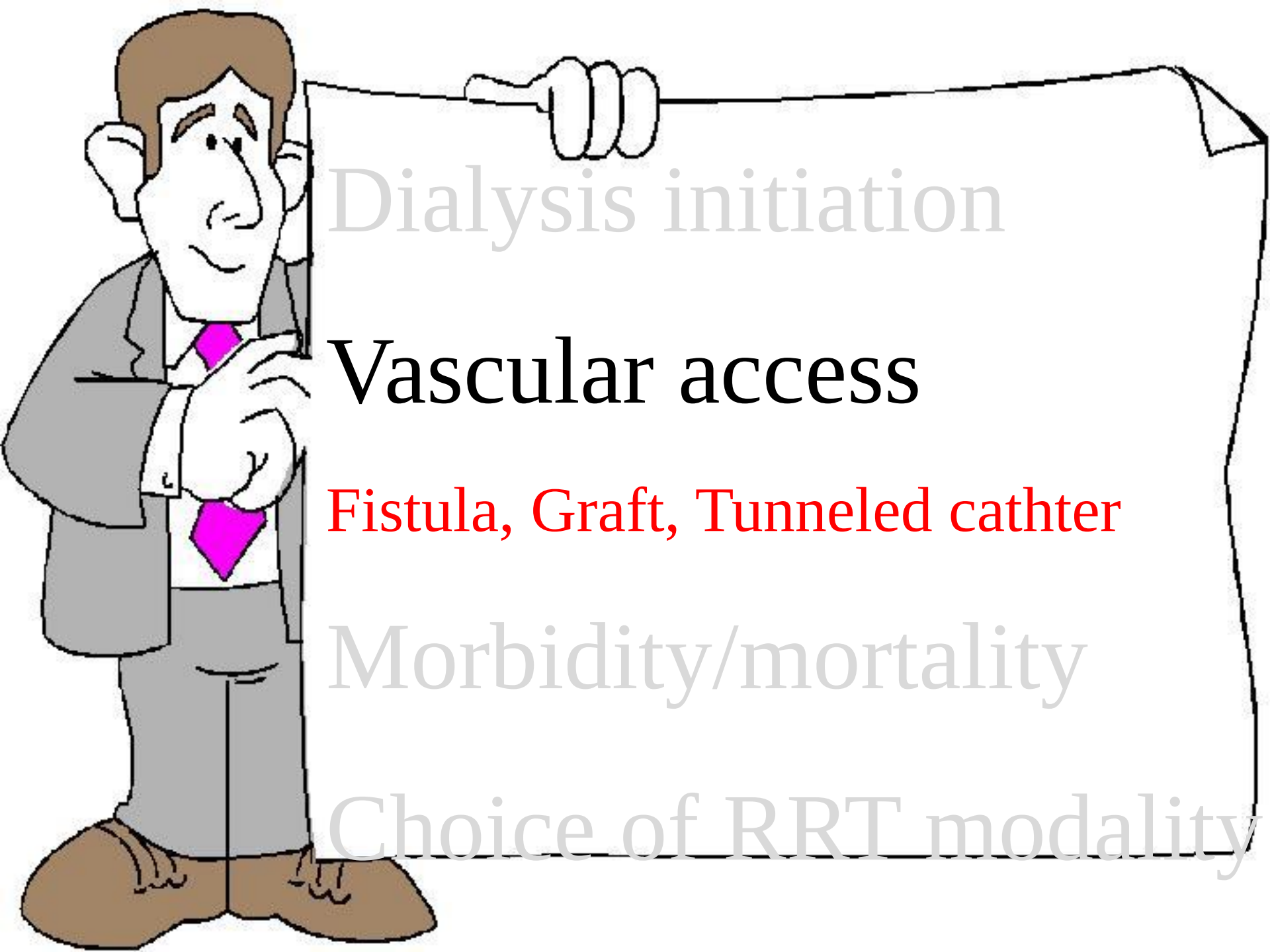

- Dialysis is not risk-free.
- In patients of advanced CKD

  but without obvious clinical manifestation,

  Dialysis Initiation: What's the Rush?

  *Seminars in Dialysis* 2013 pp. 650–657
- Dialysis should not be denied in CKD patients suffering from clinical complications, either related to renal or non-renal causes, even though the eGFR is 10 ml/min.
- Financial burden to the healthcare system.

*Seminars in Dialysis*—Vol 26, No 6
2013 pp. 644–649


Dialysis initiation
Vascular access
Fistula, Graft, Tunneled cathter
Morbidity/mortality
Choice of RRT modality

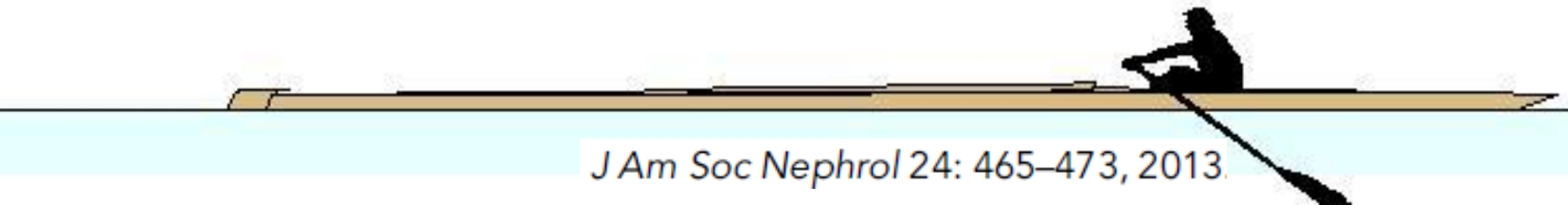
- ***Native vascular fistula***
  - ✓ Ability to heal (rather than clotting)
  - ✓ Easier to monitor the patency
  - ✓ Greatest expectancy of clinical usefulness
  - ✓ Needing longer time to be ready for cannulatation
- ***Synthetic graft***
  - ✓ Ready for use in shorter time
  - ✓ Less degree to heal naturally
  - ✓ Greater chance of thrombosis
- ***Tunneled center venous catheter***
  - ✓ Immediate use
  - ✓ Marked chance of central vascular stenosis
  - ✓ Shortest half-life
  - ✓ Risk of blood-stream infection

# Associations between Hemodialysis Access Type and Clinical Outcomes: A Systematic Review

- 67 studies, 586,337 patients
- ① All-cause mortality, ② CV events, ③ fatal infection
- 1985~2011 (26 years)

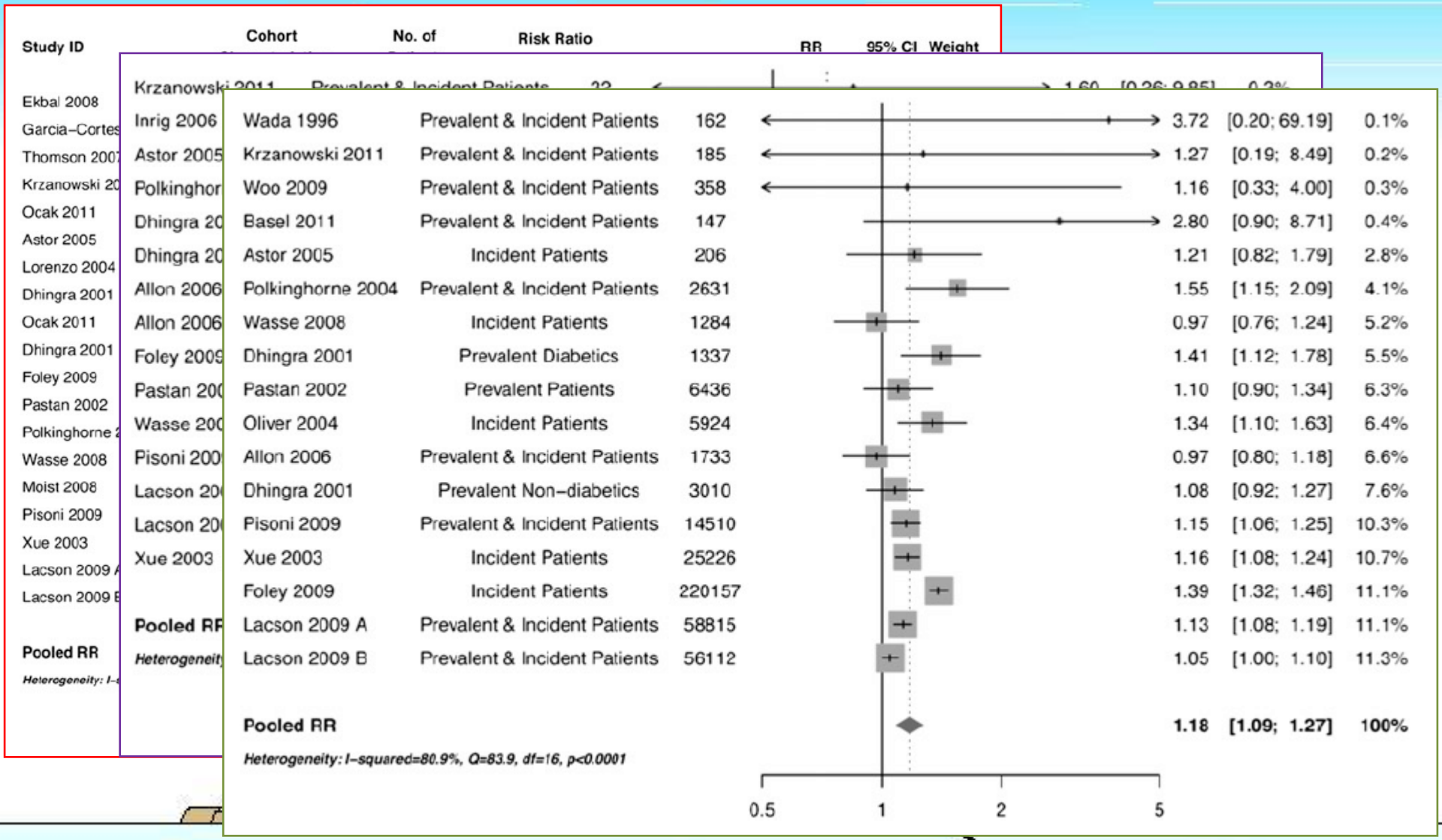
## Summary

- Fistula > Catheter in ①,②, and③
- Graft > Catheter in ①,②, and③
- Fistula > Graft in in ① and③, but not②



*J Am Soc Nephrol* 24: 465–473, 2013

# Associations between Hemodialysis Access Type and Clinical Outcomes: A Systematic Review




*J Am Soc Nephrol* 24: 465–473, 2013

# Type of vascular access

National Kidney Foundation Kidney Disease Outcomes Quality Initiative (US)

'Options for fistula placement should be considered first, followed by prosthetic grafts if fistula placement is not possible. Catheters should be avoided for HD and used only when other options listed are not available'

The Renal Association (UK)

'We recommend that any individual who commences haemodialysis should do so with an arteriovenous fistula as first choice, an arteriovenous graft as second choice, a tunnelled venous catheter as third choice and a nontunnelled catheter as an option of necessity'

Japanese Society for Dialysis Therapy

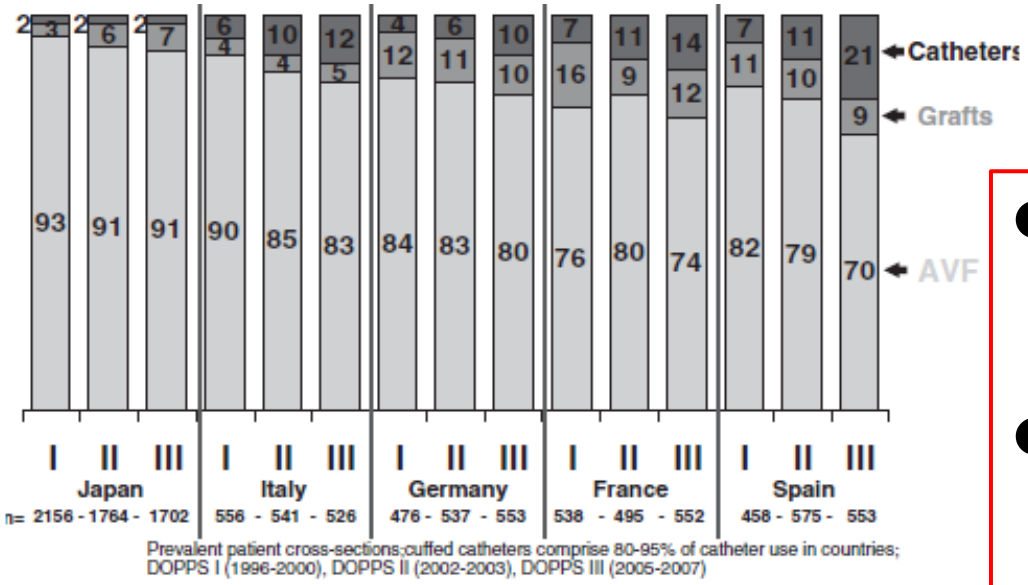
'The first (vascular access) choice is an AVF'

Taiwan Society of Nephrology

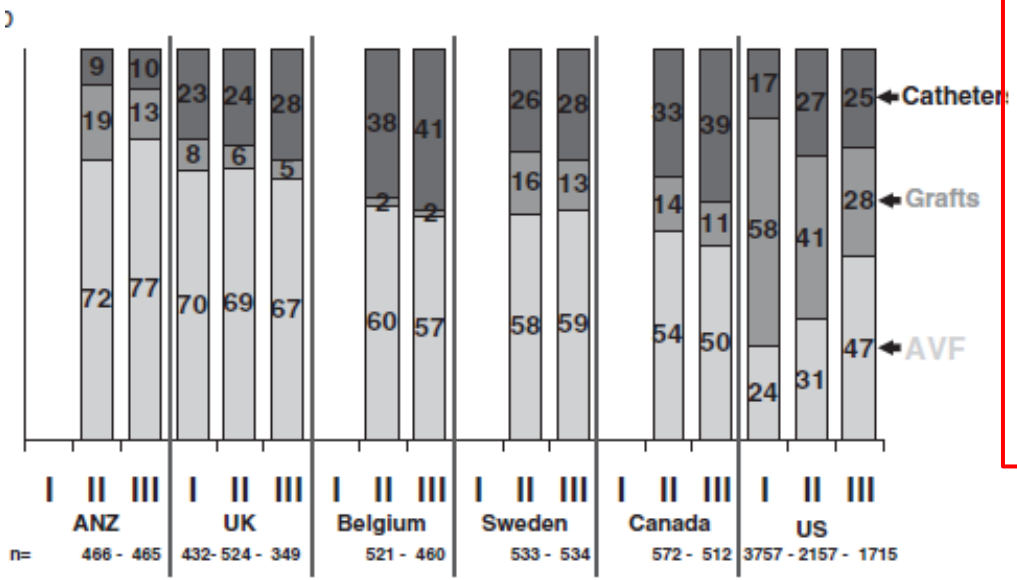
AVF recommended

# Easier said than done

# Vascular access use and outcomes: an international perspective from the dialysis outcomes and practice patterns study




Prevalent patient cross-sections;cuffed catheters comprise 80-95% of catheter use in countries; DOPPS I (1996-2000), DOPPS II (2002-2003), DOPPS III (2005-2007)




Prevalent patient cross-sections; cuffed catheters comprise 80-95% of catheter use in countries; DOPPS I (1996-2000), DOPPS II (2002-2003), DOPPS III (2005-2007)

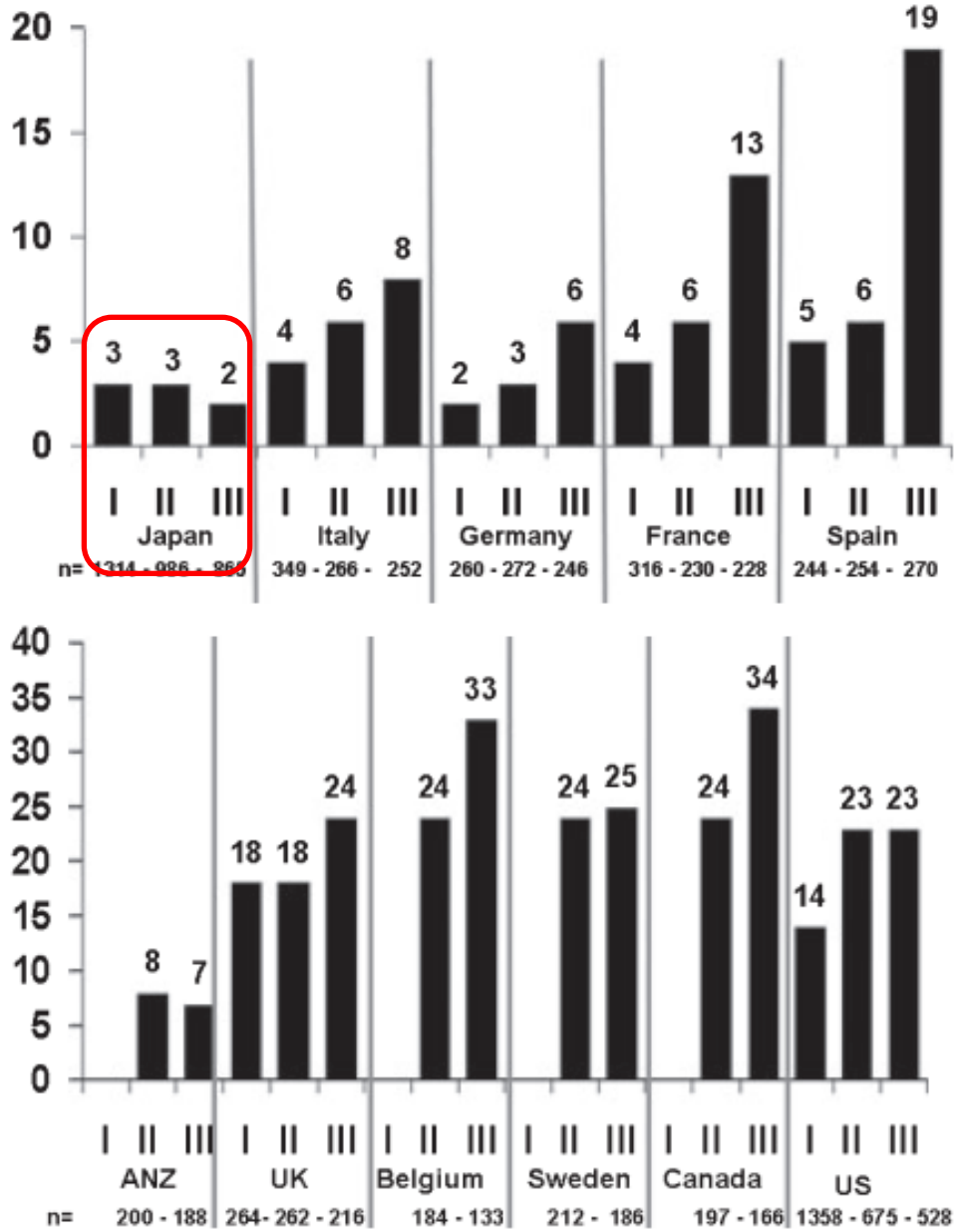
## DOPPS in past 20 yrs

- In US, AVF is increased and catheter, too.
- In EU, AVF in decreased and catheter is increased more than in US.
- In Japan, AVF > 90%
- In Taiwan, AVF ≒ 80~82%
  Graft ≒ 15%, catheter <5%

Nephrol Dial Transplant (2008) 23: 3219–3226

# The Increasing Use of Hemodialysis Catheters: Evidence from the DOPPS on Its Significance and Ways to Reverse It

*Seminars in Dialysis*—Vol 23, No 1
pp. 6–10




**In EU/US, the use of tunneled catheters is actually increased.**


Suggestion:
Fistula is the best.
Reality:
Catheters are increasing.

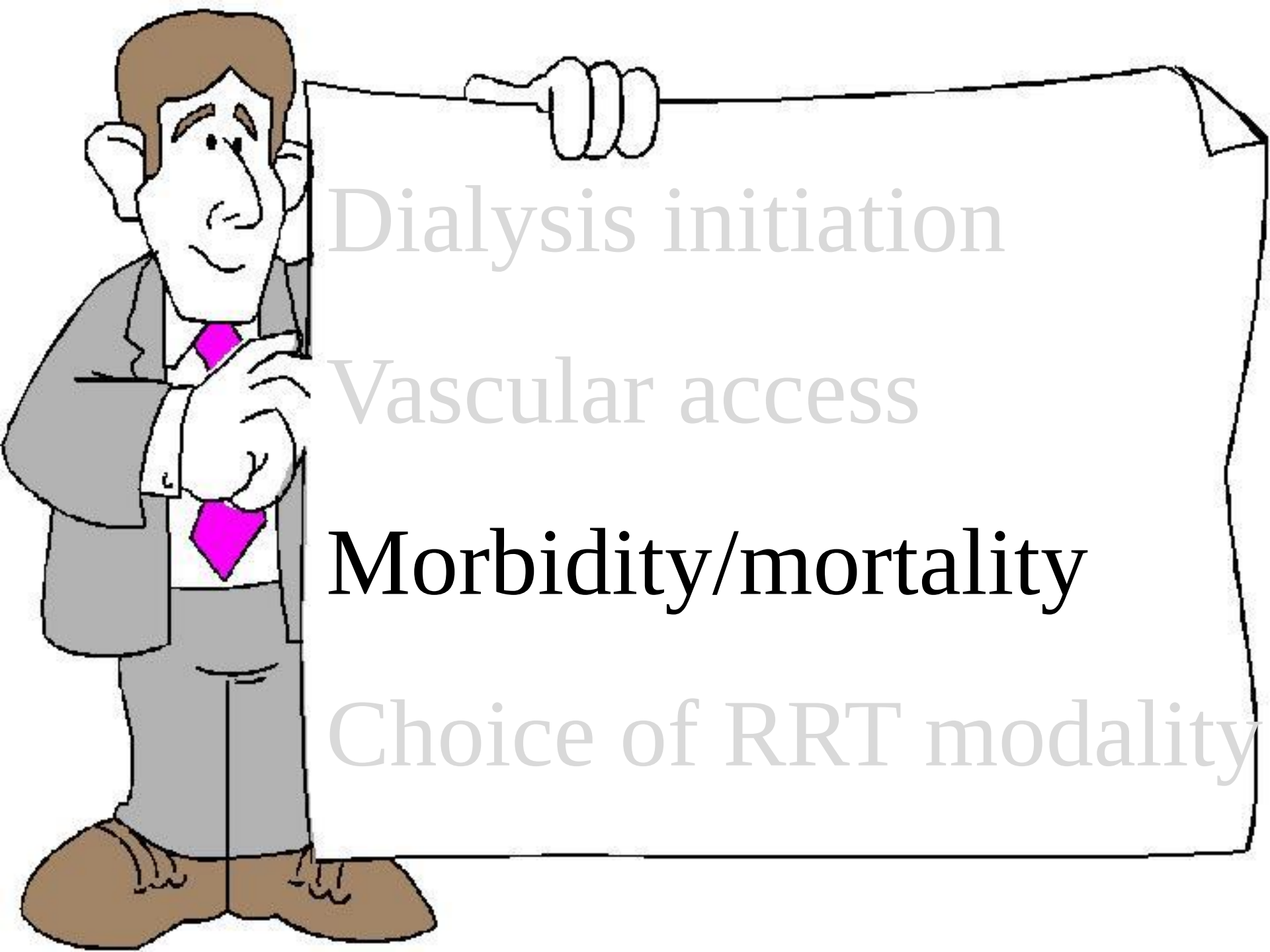
# Reasons of discrepancy

- ESRD patients are getting older.
- Diabetes prevails.
-

| Country | Timing of when patient first seen by nephrologist before ESRD onset | % Catheter use at ESRD start (United States) | % Catheter use at ESRD start (France, Germany, Italy) |
|---|---|---|---|
| Australia | | | |
| Belgium | Not seen or seen < 1 month prior to ESRD | 88 ($n$ = 52) | 62 ($n$ = 42) |
| Canada | | | |
| France | | | |
| German | 1–4 months prior to ESRD | 82 ($n$ = 28) | 50 ($n$ = 22) |
| Italy | 4 months–1 year prior to ESRD | 64 ($n$ = 28) | 23 ($n$ = 46) |
| Japan | | | |
| Spain | | | |
| Sweden | 1–2 years prior to ESRD | 72 ($n$ = 46) | 26 ($n$ = 62) |
| United K | > 2 years prior to ESRD | 63 ($n$ = 91) | 19 ($n$ = 157) |
| United S | | | |
| All coun | | | |

*Seminars in Dialysis*—Vol 23, No 1
pp. 6–10

- ✓ Cared by nephrologist as early as possible
- ✓ Fistula first – consider graft rather than catheter
- ✓ Experienced surgeons
- ✓ Interventional nephrology by nephrologist (healthcare system and training)


Dialysis initiation
Vascular access
Morbidity/mortality
Choice of RRT modality

# UpToDate®: Patient survival and maintenance dialysis

**CAUSES OF DEATH :**

- Cardiovascular disease accounts for approximately 50 percent of deaths. While a decline in cardiovascular deaths has occurred in the general population, a similar trend has not been observed in dialysis patients.
- Infections, which are the second most common cause of death, are usually due to common organisms (such as *Staphylococcus aureus*) and are frequently related to the hemodialysis vascular access.

**Questions**:

Is it also true in other part of the world?
if not, what's the difference?

# 4D

# Atorvastatin in Patients with Type 2 Diabetes Mellitus Undergoing Hemodialysis

- First RCT of HD patients on the effect of statin
- 1255 DM, HD patients, followed for 4 years

| End Point | Placebo Group (N=636) | Atorvastatin Group (N=619) | RR (95% CI) | P Value |
|---|---|---|---|---|
| | *no. (%)* | | | |
| **Primary** | 243 (38) | 226 (37) | 0.92 (0.77–1.10) | 0.37 |
| Death from cardiac causes | 149 (23) | 121 (20) | 0.81 (0.64–1.03) | 0.08 |
| Fatal stroke | 13 (2) | 27 (4) | 2.03 (1.05–3.93) | 0.04 |
| Death from all causes | 320 (50) | 297 (48) | 0.93 (0.79–1.08) | 0.33 |
| Death from causes other than cardiovascular or cerebrovascular disease | 158 (25) | 149 (24) | 0.95 (0.76–1.18) | 0.62 |
| Fatal infection | 68 (11) | 60 (10) | | |

Death from CV causes/All death = 40~46%

N Engl J Med 2005;353:238-48.

# AURORA

## Rosuvastatin and Cardiovascular Events in Patients Undergoing Hemodialysis

- RCT, 2776 patients, 50~80 y/o, followed for 3.8 yrs

| | | | | | | |
|---|---|---|---|---|---|---|
| **Primary end point** | | | | | | |
| Combined outcome (major cardiovascular event) | 396 | 9.2 | 408 | 9.5 | 0.96 (0.84–1.11) | 0.59 |
| Death from cardiovascular causes | 324 | 7.2 | 324 | 7.3 | 1.00 (0.85–1.16) | 0.97 |
| **Secondary end point** | | | | | | |
| Death | | | | | | |
| From any cause | 636 | 13.5 | 660 | 14.0 | 0.96 (0.86–1.07) | 0.51 |
| From coronary heart disease (definite) | 143 | 3.2 | 156 | 3.5 | | |
| From coronary heart disease (suspected) | 61 | 1.4 | 53 | 1.2 | | |
| From other cardiac cause | 36 | 0.8 | 30 | 0.7 | | |
| From other vascular cause | 44 | 1.0 | 48 | 1.1 | | |
| From other cardiovascular cause | 0 | 0.0 | 1 | 0.0 | | |
| From noncardiovascular cause | 248 | 5.5 | 268 | 6.0 | 0.92 (0.77–1.09) | 0.34 |

Death from CV causes/All death = 50.9%

N Engl J Med 2009;360:1395-407.

# Overview of Regular Dialysis Treatment in Japan (as of 31 December 2011)

*Ther Apher Dial, Vol. 17, No. 6, 2013*

**TABLE 12.** *Classification of causes of death of dialysis patients who died in 2011*

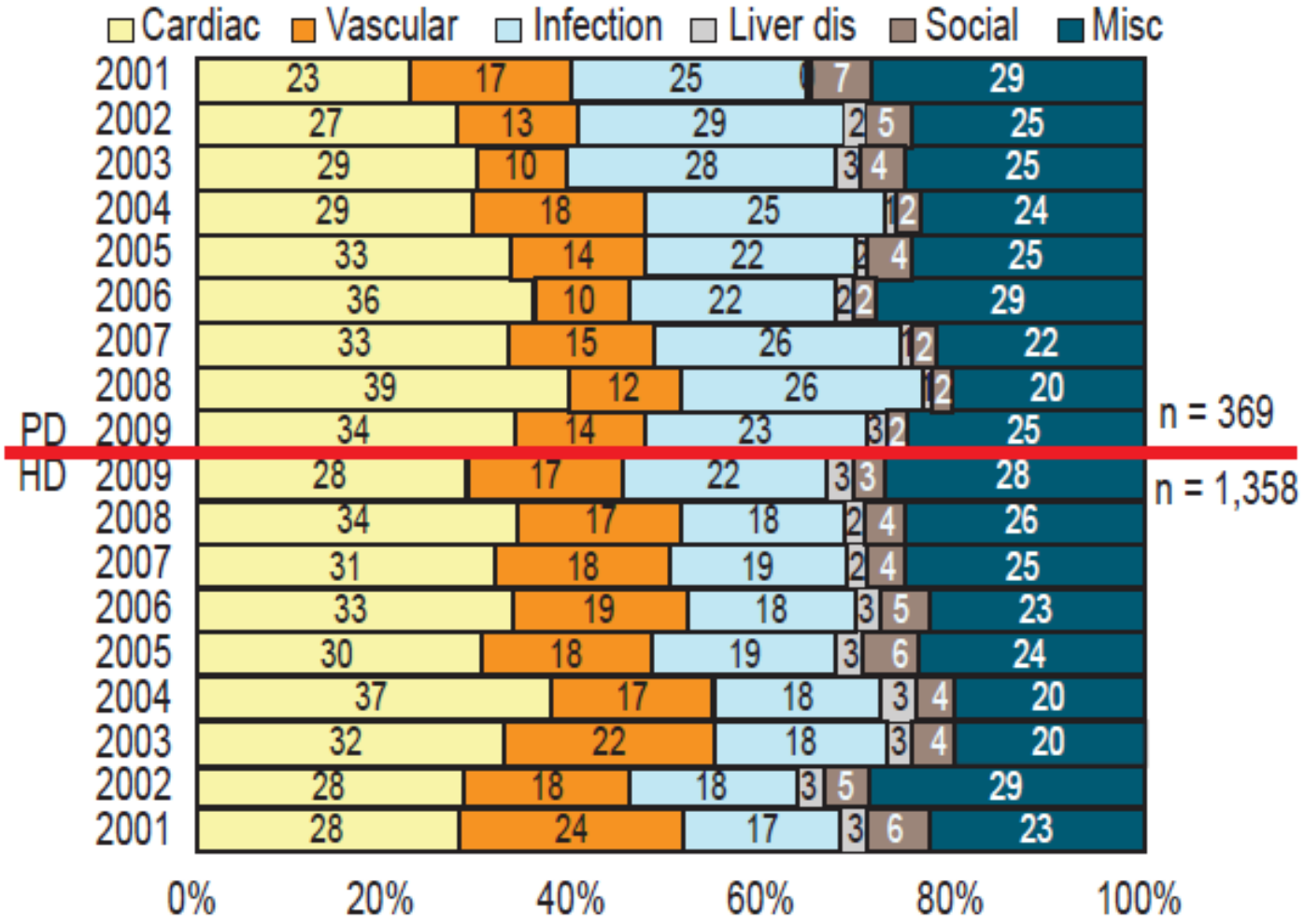
| Cause of death | Male | Female | Subtotal | Total |
|---|---|---|---|---|
| Cardiac failure | 4 678 | 2 991 | 7 669 | 7 669 |
| (%) | (25.3) | (28.8) | (26.6) | (26.6) |
| Cerebrovascular disorder | 1 367 | 841 | 2 208 | 2 208 |
| (%) | (7.4) | (8.1) | (7.7) | (7.7) |
| Infectious disease | 3 890 | 1 976 | 5 866 | 5 866 |
| (%) | (21.1) | (19.1) | (20.3) | (20.3) |
| Hemorrhage | 318 | 181 | 499 | 499 |
| (%) | (1.7) | (1.7) | (1.7) | (1.7) |
| Malignant tumor | 1 915 | 718 | 2 633 | 2 633 |
| (%) | (10.4) | (6.9) | (9.1) | (9.1) |
| Cachexia/Uremia | 596 | 532 | 1 128 | 1 128 |
| (%) | (3.2) | (5.1) | (3.9) | (3.9) |
| Cardiac infarction | 916 | 424 | 1 340 | 1 340 |
| (%) | (5.0) | (4.1) | (4.6) | (4.6) |

Cardiac infarction + Cardiac failure

26.6 + 4.6 = 31%

# Current Status of Dialysis Therapy in Korea

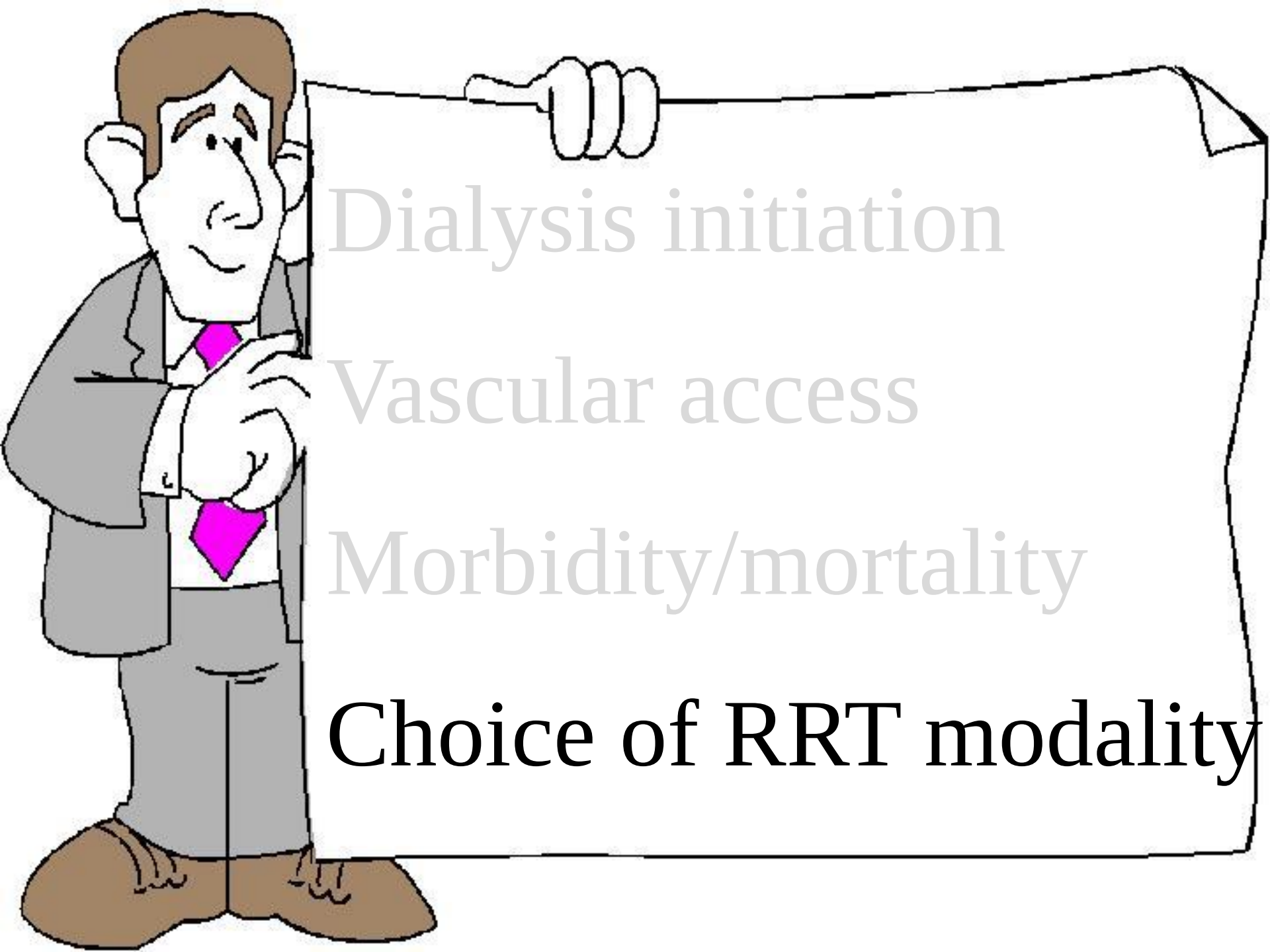
The Korean Journal of Internal Medicine Vol. 26, No. 2, June 2011



# Why the difference?

- Comparison between countries is difficult
- How do we issue the death certificate?

  (A patient might be admitted and passed away because of pneumoniae, but the certificate might list “cardiac arrest” as the direct cause of death.)
- There is a common trend that dialysis patients in East Asian are less likely to die from CV diseases, but infection may be more prevalent.


Dialysis initiation
Vascular access
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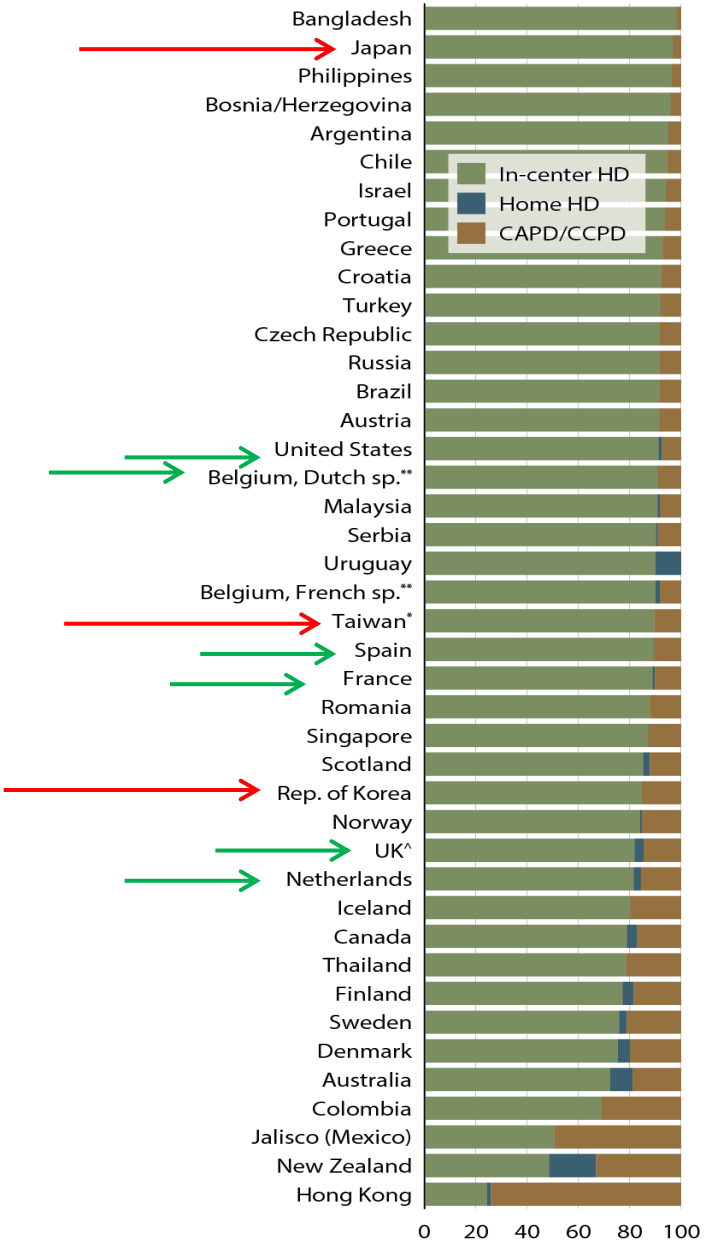
# Percent distribution of prevalent dialysis patients, by modality, 2011




| | Hemodialysis | | | | | Home hemodialysis | | | | | Peritoneal dialysis | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2007 | 2008 | 2009 | 2010 | 2011 | 2007 | 2008 | 2009 | 2010 | 2011 |
| Argentina | 96.1 | 96.0 | 96.0 | 95.8 | 95.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.9 | 4.0 | 4.0 | 4.2 | 4.9 |
| Australia | 68.3 | 68.6 | 69.6 | 71.4 | 72.3 | 9.8 | 9.4 | 9.3 | 9.1 | 8.8 | 22.0 | 22.1 | 21.1 | 19.5 | 18.8 |
| Austria | 91.2 | 91.0 | 91.0 | 91.0 | 91.5 | 0.1 | 0.1 | 0.0 | 0.0 | 0.1 | 8.7 | 8.9 | 8.9 | 8.9 | 8.4 |
| Bangladesh | 98.4 | 98.3 | 98.3 | 98.3 | 98.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 |
| Belgium, Dutch sp.** | 89.2 | 89.7 | 89.8 | 90.6 | 90.9 | 0.2 | 0.3 | 0.3 | 0.3 | 0.1 | 10.6 | 10.1 | 9.9 | 9.2 | 9.0 |
| Belgium, French sp.** | 90.5 | 90.7 | 90.2 | 89.9 | 90.0 | 1.2 | 1.3 | 1.2 | 1.4 | 1.6 | 8.3 | 8.0 | 8.6 | 8.7 | 8.3 |
| Bosnia/Herzegovina | 95.2 | 95.1 | 94.9 | 95.2 | 96.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 4.7 | 4.9 | 5.0 | 4.8 | 4.0 |
| Brazil | 89.4 | 89.6 | 92.3 | 90.6 | 91.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.6 | 10.4 | 7.7 | 9.4 | 8.4 |
| Canada | 78.6 | 78.3 | 78.4 | 78.5 | 79.0 | 3.0 | 3.3 | 3.5 | 3.7 | 3.9 | 18.4 | 18.4 | 18.1 | 17.8 | 17.1 |
| Chile | 95.2 | 95.3 | 95.3 | 95.1 | 94.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.8 | 4.7 | 4.7 | 4.9 | 5.4 |
| Colombia | 63.4 | 68.0 | 68.2 | 68.7 | 69.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 36.6 | 32.0 | 31.8 | 31.3 | 30.9 |
| Croatia | 92.8 | 91.8 | 91.0 | 91.5 | 92.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.2 | 8.2 | 9.0 | 8.5 | 7.9 |
| Czech Republic | 92.3 | 91.8 | 92.0 | 92.1 | 91.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.7 | 8.2 | 8.0 | 7.9 | 8.3 |
| Denmark | 71.8 | 72.9 | 73.7 | 74.0 | 75.3 | 3.7 | 4.2 | 4.5 | 4.7 | 4.7 | 24.5 | 22.9 | 21.8 | 21.2 | 20.0 |
| Finland | 75.8 | 74.3 | 75.0 | 77.1 | 77.3 | 3.8 | 3.9 | 3.7 | 3.9 | 4.2 | 20.4 | 21.7 | 21.3 | 18.9 | 18.6 |
| France | 87.4 | 87.8 | 88.5 | 88.5 | 88.9 | 1.6 | 1.3 | 1.2 | 1.0 | 0.9 | 11.1 | 10.8 | 10.3 | 10.5 | 10.2 |
| Greece | 91.7 | 91.7 | 92.0 | 92.3 | 92.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.3 | 8.3 | 7.9 | 7.7 | 7.2 |
| Hong Kong | 19.8 | 20.4 | 21.5 | 23.5 | 24.4 | 0.2 | 0.4 | 0.6 | 0.9 | 1.5 | 80.0 | 79.2 | 77.9 | 75.6 | 74.1 |
| Iceland | 72.1 | 76.6 | 87.1 | 83.3 | 80.2 | 1.6 | 1.6 | 0.0 | 0.0 | 0.0 | 26.2 | 21.9 | 12.9 | 16.7 | 19.8 |
| Israel | 92.9 | 93.6 | 93.3 | 93.8 | 94.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.1 | 6.4 | 6.7 | 6.2 | 5.9 |
| Jalisco (Mexico) | 34.2 | 40.4 | 41.5 | 48.7 | 50.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 65.8 | 59.6 | 58.5 | 51.3 | 49.4 |
| Japan | 96.7 | 96.8 | 96.7 | 96.7 | 96.8 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 3.3 | 3.1 | 3.2 | 3.2 | 3.1 |
| Rep. of Korea | 80.2 | 81.0 | 83.1 | 84.4 | 84.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 19.8 | 19.0 | 16.9 | 15.6 | 15.3 |
| Malaysia | 89.9 | 90.0 | 90.3 | 90.6 | 90.7 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 9.1 | 9.1 | 8.7 | 8.4 | 8.3 |
| Netherlands | 76.0 | 77.4 | 79.0 | 79.4 | 81.5 | 2.3 | 2.5 | 2.5 | 2.7 | 2.7 | 21.7 | 20.1 | 18.5 | 17.9 | 15.8 |
| New Zealand | 48.2 | 48.1 | 48.4 | 47.3 | 48.6 | 15.8 | 15.7 | 16.6 | 17.8 | 18.2 | 36.0 | 36.2 | 35.0 | 34.9 | 33.2 |
| Norway | 80.6 | 83.4 | 80.7 | 81.3 | 84.1 | 0.3 | 0.3 | 0.5 | 0.7 | 0.6 | 19.1 | 16.4 | 18.8 | 18.0 | 15.3 |
| Philippines | 87.3 | 93.3 | 95.6 | 95.9 | 96.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.7 | 6.7 | 4.4 | 4.1 | 3.6 |
| Portugal | . | 94.8 | 94.4 | 93.9 | 93.7 | . | 0.0 | 0.0 | 0.0 | 0.0 | . | 5.2 | 5.6 | 6.1 | 6.3 |
| Romania | 81.8 | 82.8 | 84.5 | 86.5 | 87.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 18.2 | 17.1 | 15.5 | 13.5 | 12.2 |
| Russia | . | 91.0 | 91.3 | 91.4 | 91.6 | . | 0.0 | 0.0 | 0.0 | 0.0 | . | 9.0 | 8.7 | 8.6 | 8.4 |
| Scotland | 80.7 | 82.6 | 83.8 | 84.6 | 85.2 | 1.9 | 2.2 | 2.5 | 2.4 | 2.6 | 17.5 | 15.1 | 13.7 | 13.0 | 12.2 |
| Serbia | . | . | . | . | 90.1 | . | . | . | . | 0.7 | . | . | . | . | 9.1 |
| Singapore | 82.5 | 85.6 | 86.3 | 87.4 | 87.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 17.4 | 14.4 | 13.6 | 12.5 | 12.8 |
| Spain | 89.4 | 90.6 | 90.6 | 89.8 | 89.3 | 0.1 | 0.3 | 0.2 | 0.2 | 0.2 | 10.5 | 9.2 | 9.2 | 10.0 | 10.6 |
| Sweden | 73.0 | 73.3 | 73.7 | 74.8 | 75.8 | 2.9 | 2.8 | 2.7 | 2.7 | 3.0 | 24.2 | 23.9 | 23.6 | 22.5 | 21.2 |
| Taiwan* | 91.5 | 90.8 | 89.7 | 89.6 | . | 0.0 | 0.0 | 0.0 | 0.0 | . | 8.5 | 9.2 | 10.3 | 10.4 | . |
| Thailand | 94.5 | 90.5 | 84.1 | 81.9 | 78.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 9.5 | 15.9 | 18.1 | 21.4 |
| Turkey | 88.1 | 87.4 | 89.6 | 90.4 | 91.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.9 | 12.5 | 10.4 | 9.6 | 8.2 |
| UK^ | 78.9 | 81.0 | 81.9 | 82.0 | 82.0 | 2.0 | 2.1 | 2.5 | 2.9 | 3.4 | 19.1 | 16.9 | 15.6 | 15.1 | 14.6 |
| United States | 92.2 | 92.2 | 92.1 | 91.8 | 91.3 | 0.7 | 0.9 | 1.0 | 1.2 | 1.3 | 7.1 | 6.9 | 6.9 | 7.0 | 7.4 |
| Uruguay | 90.6 | 91.1 | 90.8 | 90.1 | 90.1 | 0.0 | 0.0 | 0.0 | 0.0 | 9.9 | 9.4 | 8.9 | 9.2 | 9.9 | 0.0 |

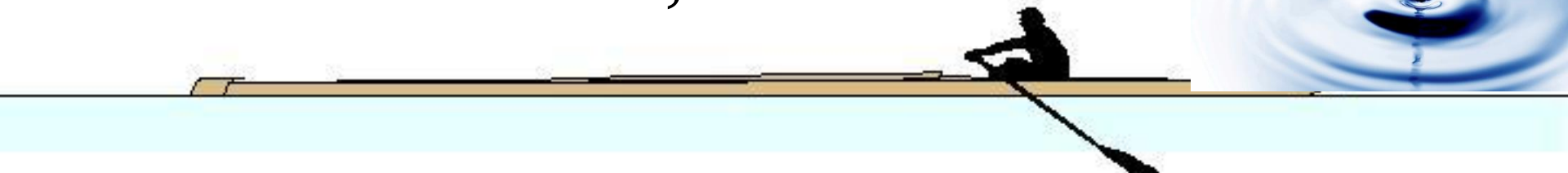
# PD utility rate (2012)

| | | |
|---|---|---|
| Global | 235,000 | ≒9% |
| US | | ≒7.4% |
| EU (variable) | | ≒8~20% |
| Japan | | ≒3.1% |
| Korea | | ≒15.3% |
| Taiwan | | ≈9.5% |

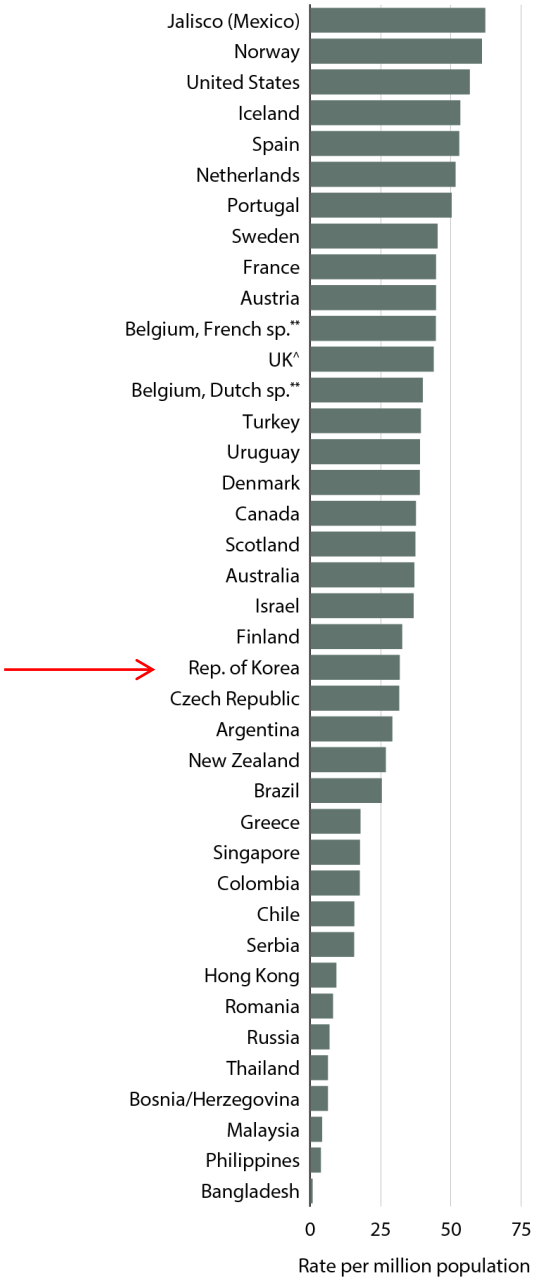
Generally, PD penetration rate is decreasing.

# Differences are from:

- ✓ Geographic: populated area or not
- ✓ Cultural: PD as a self-care treatment
- ✓ Practice: Ex. in Japan, JSN/JSDT
- ✓ Healthcare policy: PD-first policy
- ✓ Advances between HD and PD
- ✓ Patients: older, more diabetics

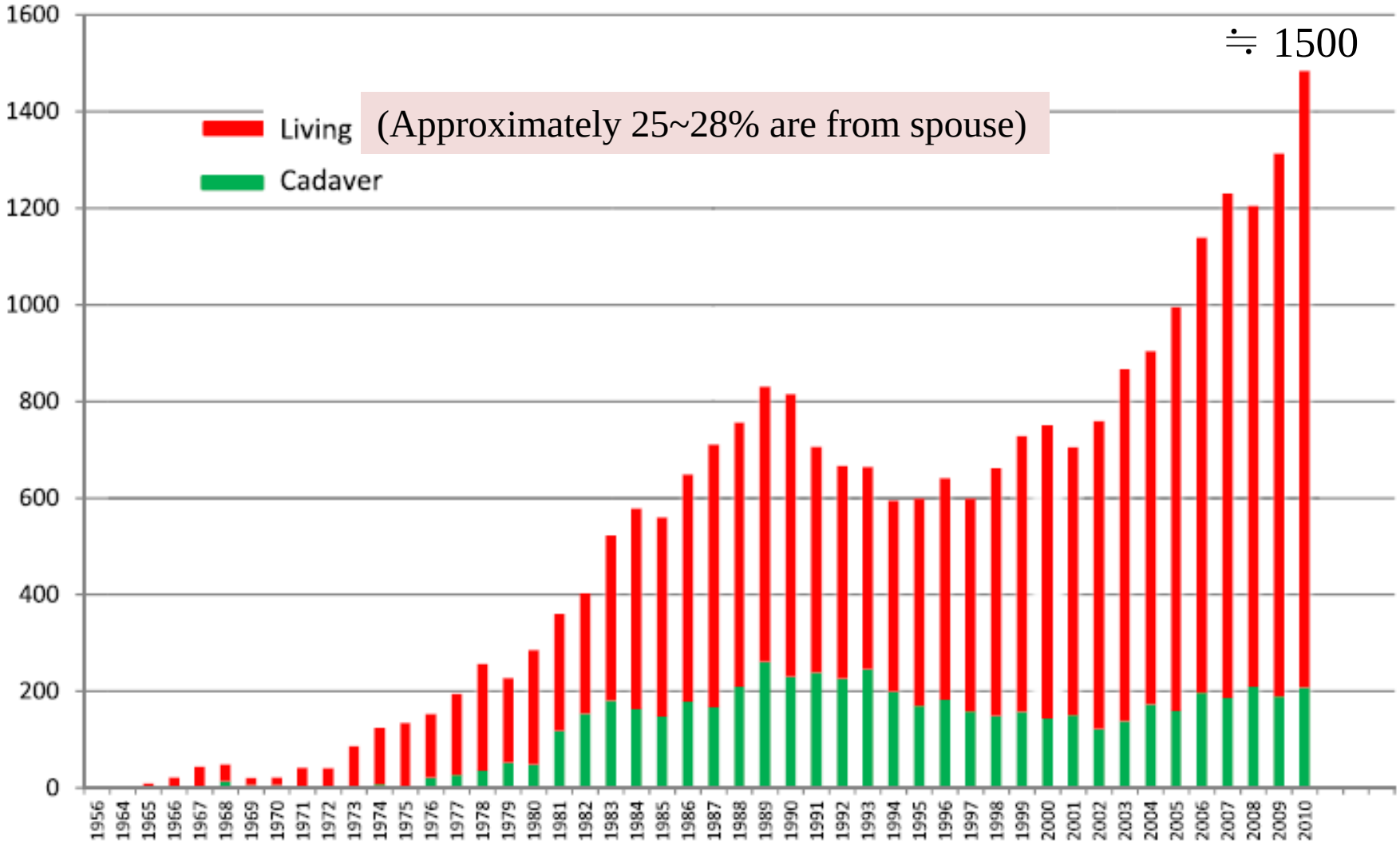


# Transplant rates, 2011




| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| Argentina | 21.7 | 23.0 | 25.1 | 26.4 | 28.4 | 29.1 |
| Australia | 31.0 | 29.3 | 38.0 | 35.5 | 38.3 | 37.0 |
| Austria | 47.9 | 43.7 | 39.5 | 47.4 | 44.6 | 44.6 |
| Bangladesh | 0.2 | 0.5 | 0.5 | 0.6 | 0.6 | 0.8 |
| Belgium, Dutch speaking** | 39.7 | 43.3 | 40.3 | 39.3 | 37.9 | 40.0 |
| Belgium, French speaking** | 39.3 | 40.8 | 37.4 | 37.7 | 38.8 | 44.6 |
| Bosnia & Herzegovina | 6.8 | 8.4 | 9.1 | 7.0 | 6.0 | 6.3 |
| Brazil | 17.8 | 18.5 | 20.2 | 22.2 | 24.3 | 25.4 |
| Canada | 38.4 | 39.5 | 38.3 | 37.7 | 37.9 | 37.6 |
| Chile | 18.5 | 17.1 | 16.8 | 15.1 | 13.5 | 15.6 |
| Colombia | 14.9 | 14.8 | 16.1 | 18.9 | 19.5 | 17.6 |
| Czech Republic | 41.6 | 38.0 | 31.9 | 34.0 | 27.2 | 31.6 |
| Denmark | 30.8 | 30.3 | 34.8 | 40.3 | 40.9 | 38.9 |
| Finland | 39.7 | 32.3 | 28.0 | 32.8 | 32.4 | 32.7 |
| France | 39.9 | 45.1 | 44.9 | 43.6 | 44.6 | 44.7 |
| Greece | 22.2 | 21.9 | 24.0 | 14.9 | 11.1 | 17.8 |
| Hong Kong | 9.6 | 9.5 | 11.0 | 13.4 | 11.3 | 9.3 |
| Iceland | 26.3 | 22.5 | 25.2 | 31.4 | 34.6 | 53.3 |
| Israel | 43.2 | 37.7 | 33.1 | 28.6 | 23.7 | 36.7 |
| Jalisco (Mexico) | 52.2 | 59.3 | 54.3 | 58.1 | 60.1 | 62.2 |
| Rep. of Korea | 18.8 | 18.5 | 22.7 | 24.5 | 25.1 | 31.7 |
| Malaysia | 11.1 | 8.2 | 4.7 | 5.1 | 4.5 | 4.3 |
| Netherlands | 41.0 | 51.0 | 47.0 | 49.9 | 52.1 | 51.6 |
| New Zealand | 21.5 | 29.1 | 28.6 | 28.0 | 25.2 | 26.8 |
| Norway | 45.5 | 55.2 | 58.3 | 60.5 | 53.8 | 61.0 |
| Philippines | 7.5 | 11.1 | 7.1 | 5.2 | 4.0 | 3.8 |
| Portugal | . | . | 49.4 | 55.7 | 54.3 | 50.2 |
| Romania | 5.3 | 2.8 | 7.3 | 6.3 | 6.1 | 8.1 |
| Russia | 2.9 | . | 5.5 | 5.9 | 7.3 | 6.8 |
| Scotland | 26.4 | 37.7 | 41.0 | 40.8 | 35.2 | 37.3 |
| Serbia | . | . | . | . | . | 15.6 |
| Singapore | 24.1 | 23.2 | 20.0 | 18.5 | 16.2 | 17.7 |
| Spain | 48.2 | 47.3 | 48.3 | 49.8 | 47.3 | 52.9 |
| Sweden | 40.5 | 42.3 | 45.6 | 42.3 | 39.3 | 45.2 |
| Thailand | 3.6 | 5.9 | 5.4 | 4.8 | 5.5 | 6.3 |
| Turkey | 11.6 | 18.6 | 18.1 | 26.3 | 34.5 | 39.3 |
| U.K., England, Wales & N Ireland | 34.1 | 38.3 | 40.5 | 42.5 | 44.5 | 43.9 |
| United States | 60.6 | 58.3 | 57.2 | 57.8 | 57.4 | 56.6 |
| Uruguay | 42.8 | 28.9 | 37.5 | 35.0 | 25.6 | 39.0 |

# Prevalence and incidence of chronic kidney disease stage G5 in Japan

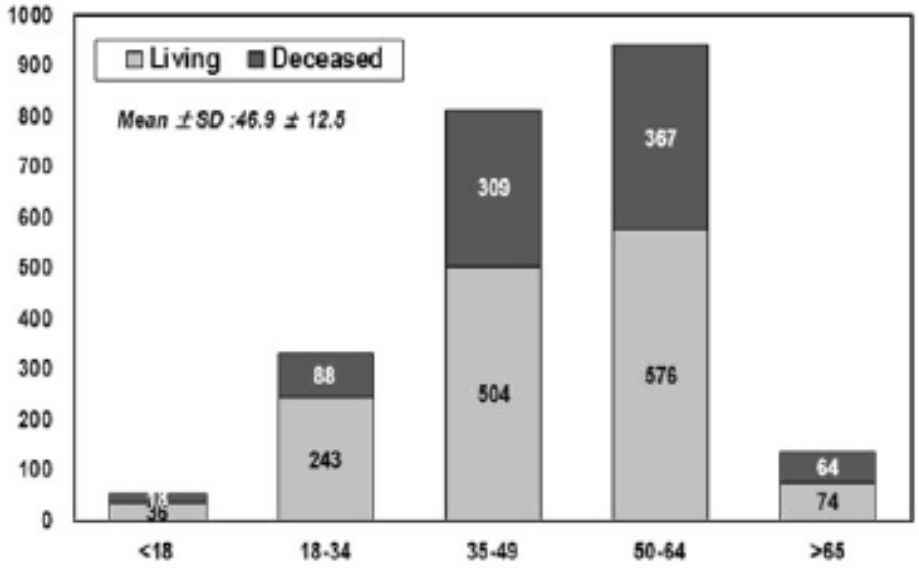


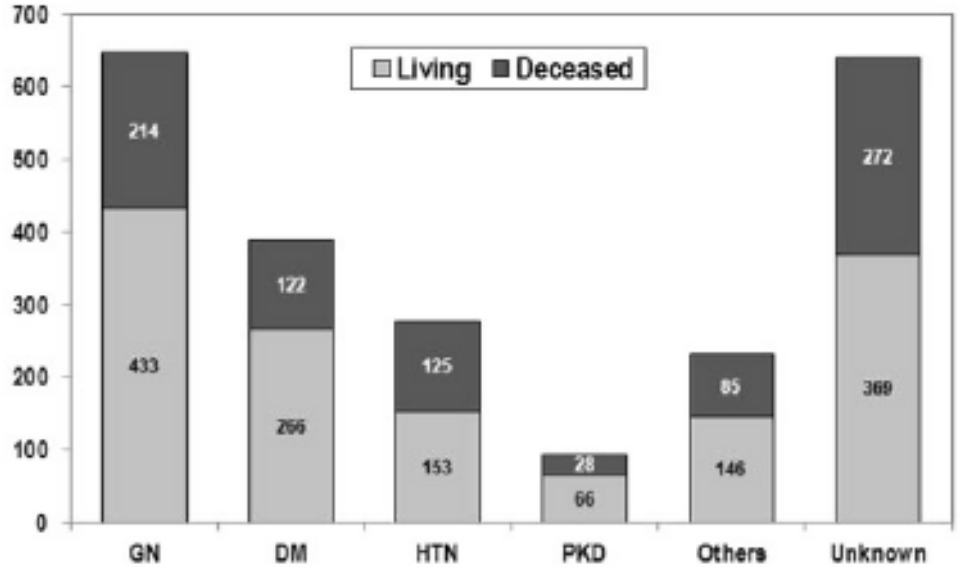

At least 14,000 are on the waiting list.

Clin Exp Nephrol
DOI 10.1007/s10157-014-0978-x

# Initial Report of the Korean Organ Transplant Registry: The First Report of National Kidney Transplantation Data

- There were 1125 KTs in 2009, 1154 KTs in 2010
- Living donors 62.9%, deceased donors 37.1%

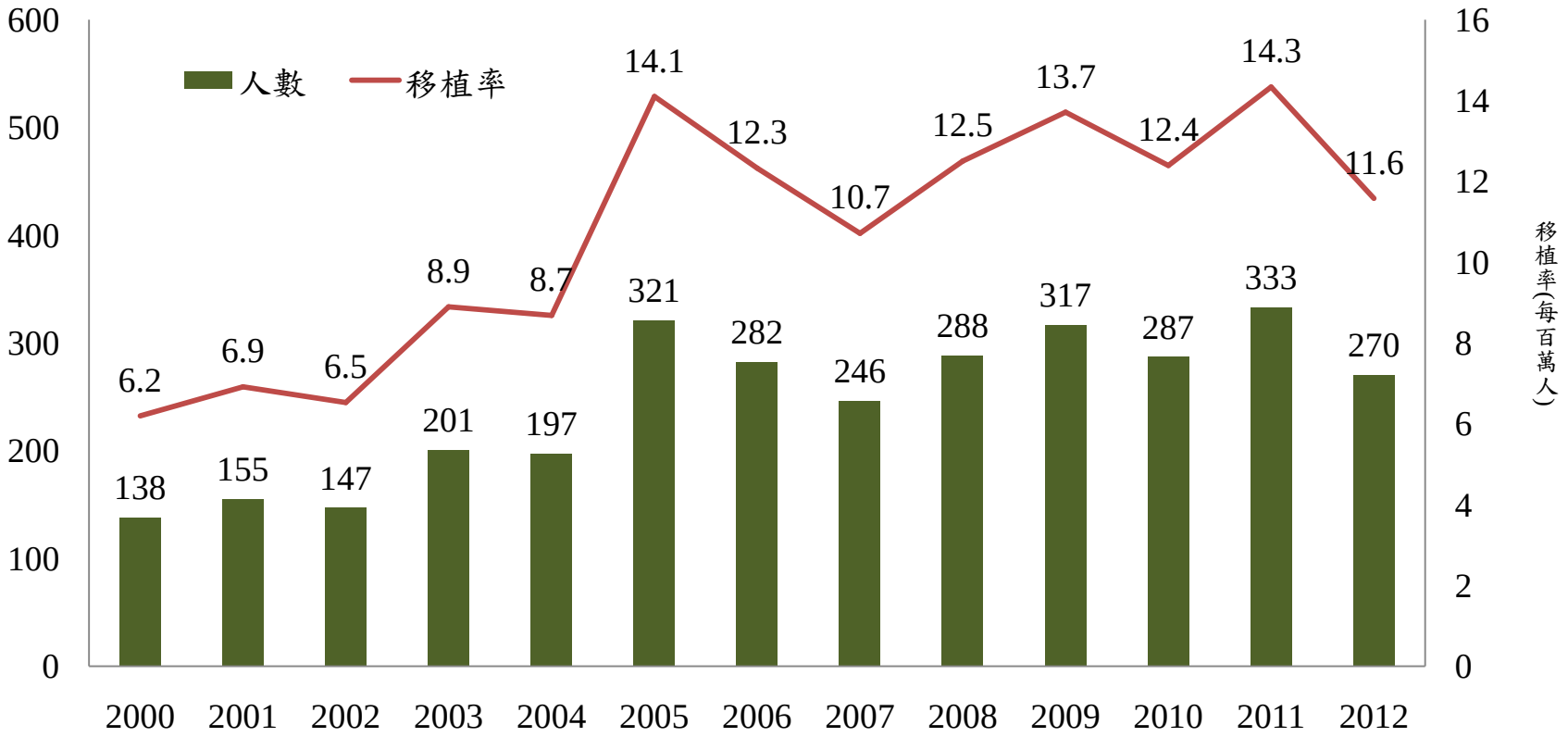



- ☐ Good – there were more living donors.
- ☐ Bad – deceased donors became less.

*Transplantation Proceedings*, 46, 425–430 (2014)

# 2000-2012 Kidney transplant in Taiwan




- KTs from abroad: approximately similar number in 2000-2010
- KTs from abroad: greatly reduced in recent year.
- Liver donors > Deceased donors in recent 2-3 years.
- > 6000 in waiting list for KT, but……
- Many agree to donate, but only few really do.

# OPTN/SRTR 2012 Annual Data Report

Waiting list

| | Level | 2002 N | 2002 % | 2012 N | 2012 % |
|---|---|---|---|---|---|
| Age | 18-34 | 7,147 | 14.0 | 8,811 | 9.5 |
| | 35-49 | 17,323 | 34.0 | 24,799 | 26.7 |
| | 50-64 | 20,340 | 39.9 | 40,523 | 43.6 |
| | 65-74 | 5,661 | 11.1 | 16,779 | 18.1 |
| | 75+ | 533 | 1.0 | 1,973 | 2.1 |
| Total | | 51,004 | 100 | 92,885 | 100 |

Transplant done

| Level | 2002 All N | 2002 All % | 2002 Deceased N | 2002 Deceased % | 2002 Living N | 2002 Living % | 2012 All N | 2012 All % | 2012 Deceased N | 2012 Deceased % | 2012 Living N | 2012 Living % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 14,916 | 100.0 | 9,118 | 100.0 | 5,798 | 100.0 | 16,526 | 100.0 | 11,195 | 100.0 | 5,331 | 100.0 |

92,885 *v.s.* 16,526

# Even more complicated to realize the difference

- People's views regarding life/death, ethics and religion have greatly influenced their attitude toward organ donation.
- Support from the relevant laws?
- More attention has to be focused on improving care of the prevalent dialysis patients, if the KT rate is low.
- KTs are not without risks:

  Surgical risk. Incident cancer. Infections.


Thanks for
your attention