台灣慢性腎臟病防治現況

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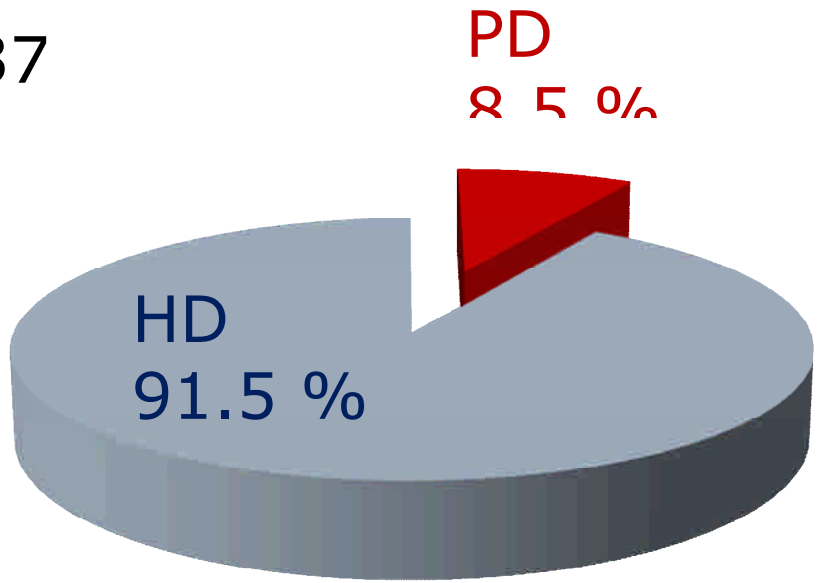
Treatment Modalities of Dialysis ESRD Patients in Taiwan

Total cases	52,537
Hemodialysis	48,
CAPD	4,4



Prevalence rate

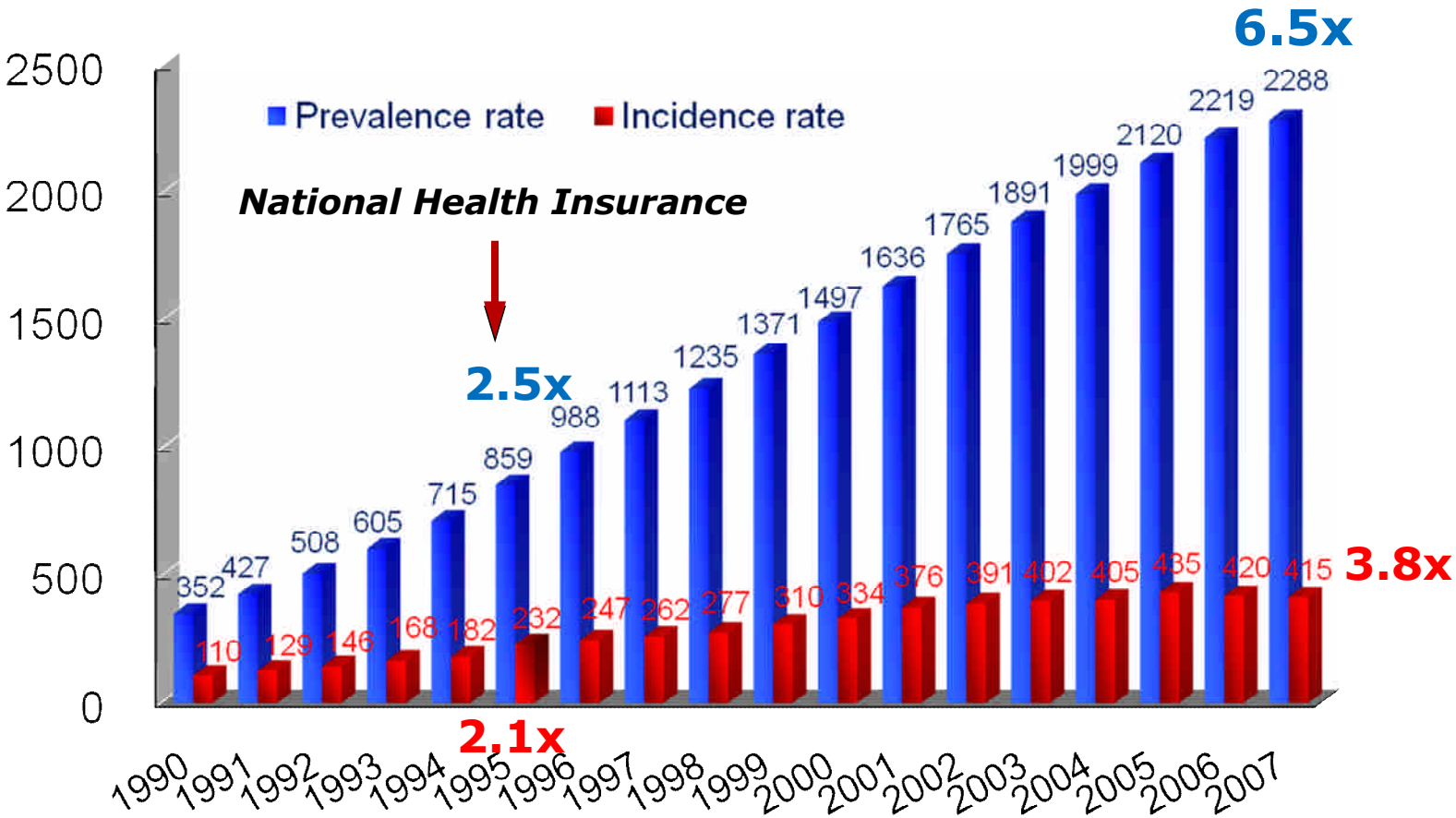
2,288 per million population

Incidence rate

416 per million population

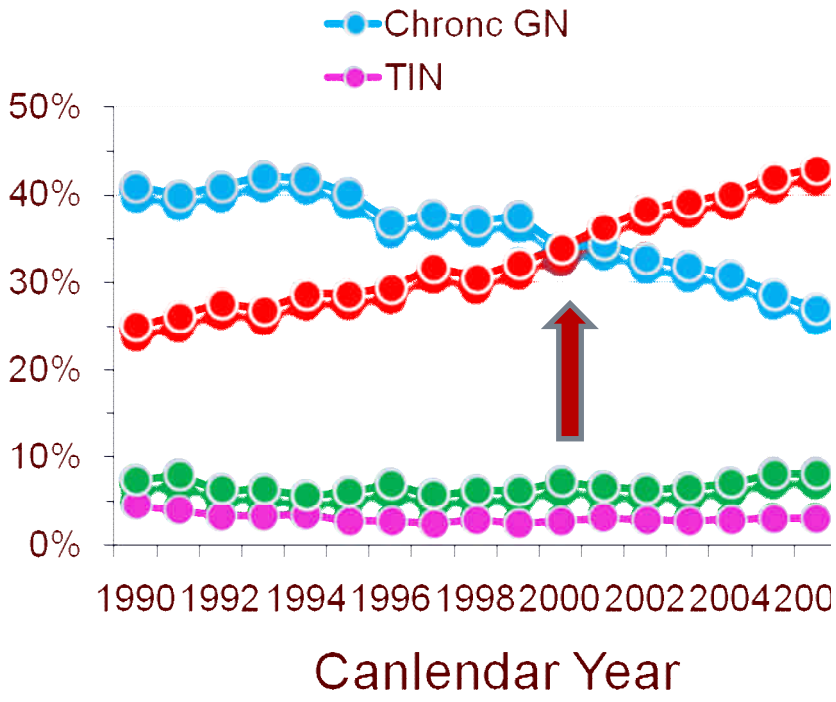
TSN Renal Registry
1990 ~ 2007

Trend of Prevalence and Incidence of Dialysis ESRD Patients

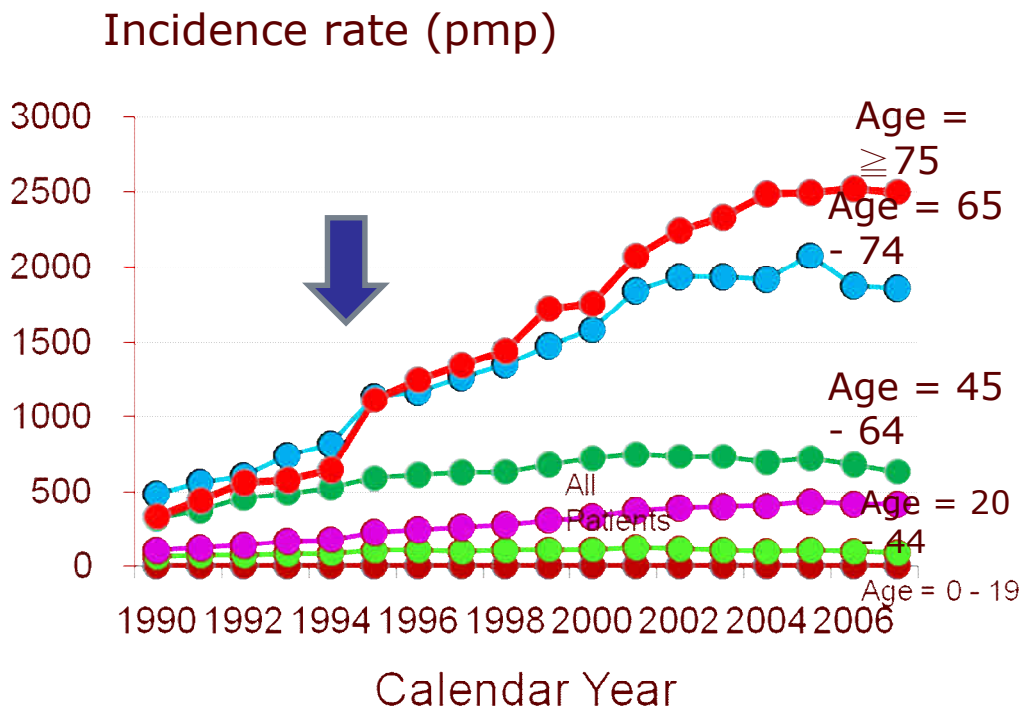


TSN Renal Registry
1990 ~ 2007

Diabetes became the top cause of ESRD



Increase of incidence of aged group after launching of NHI

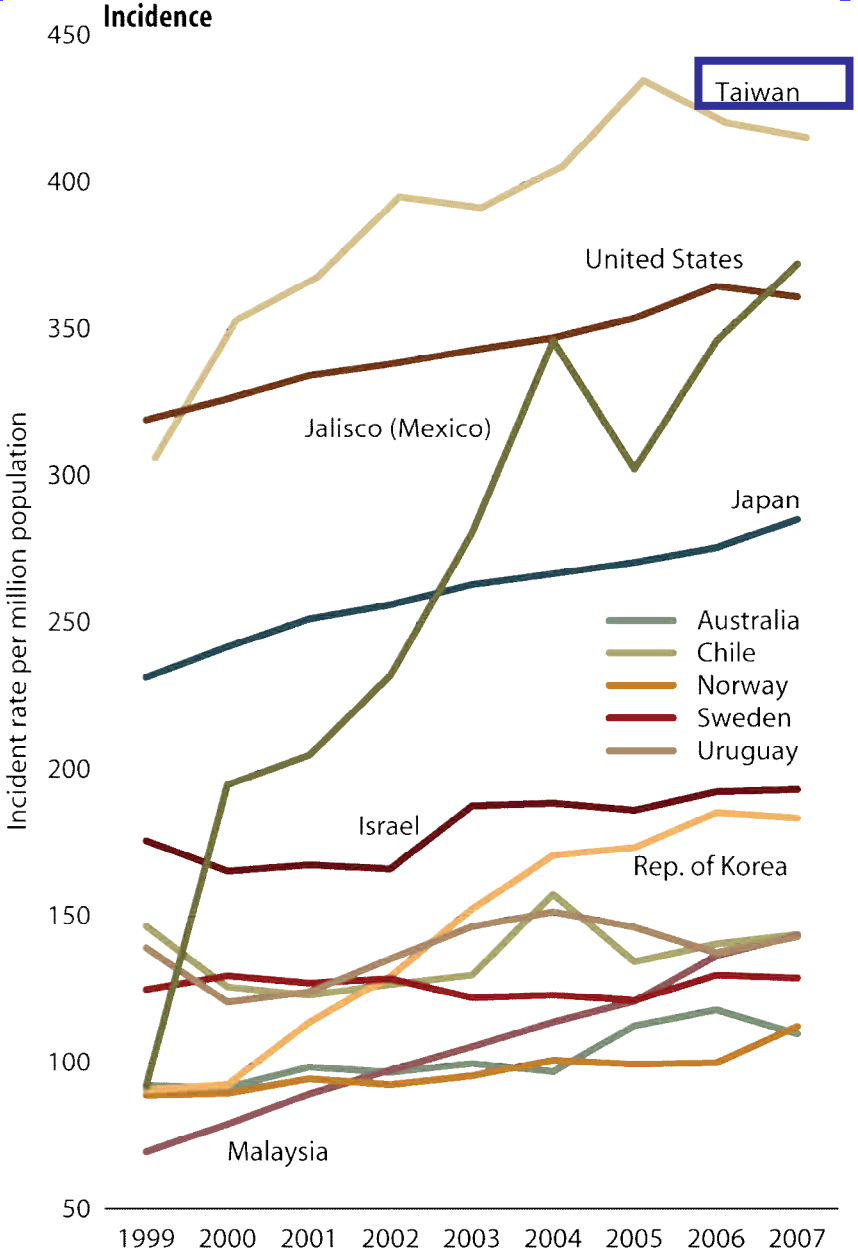


Diabetes, aged, and health insurance are majors for increase of ESRD.

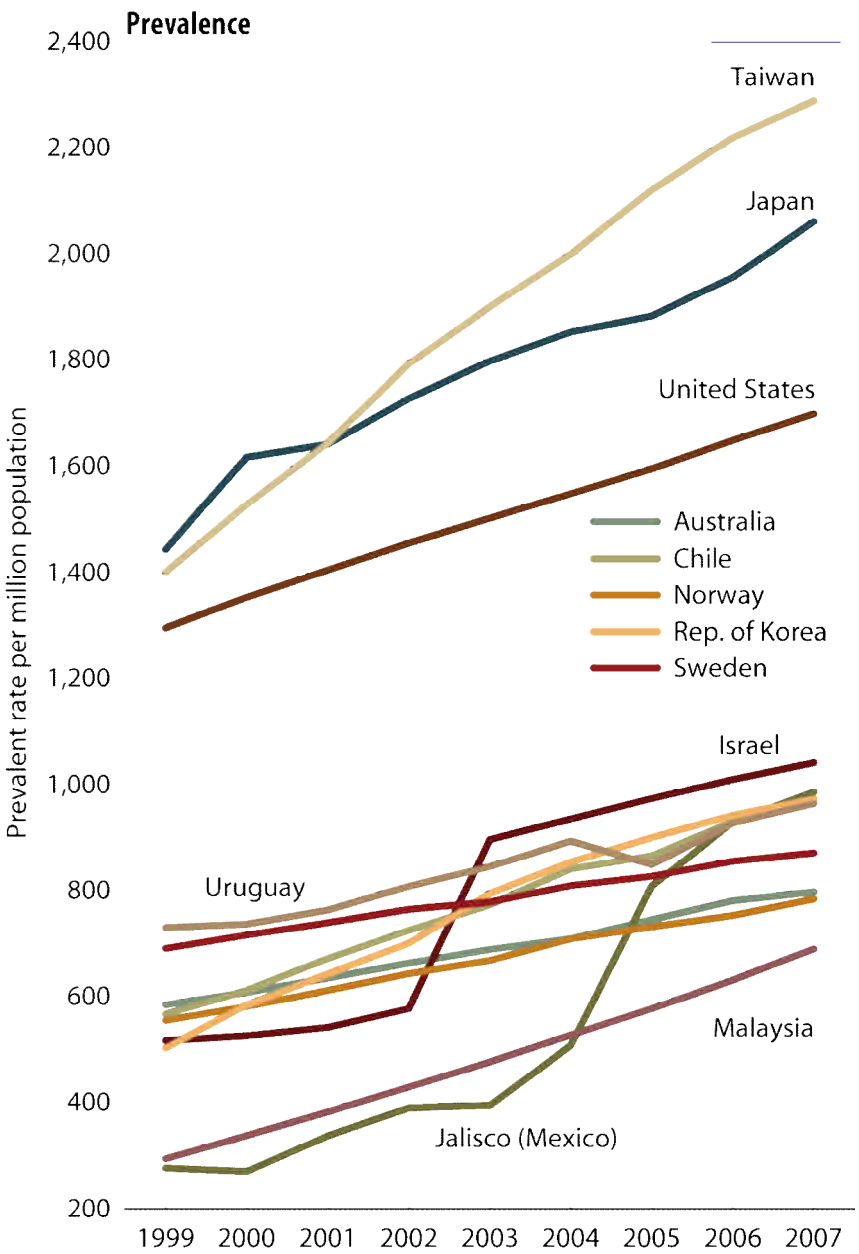
TSN Renal Registry 1990~2001

Yang & Hwang, NDT, 2008

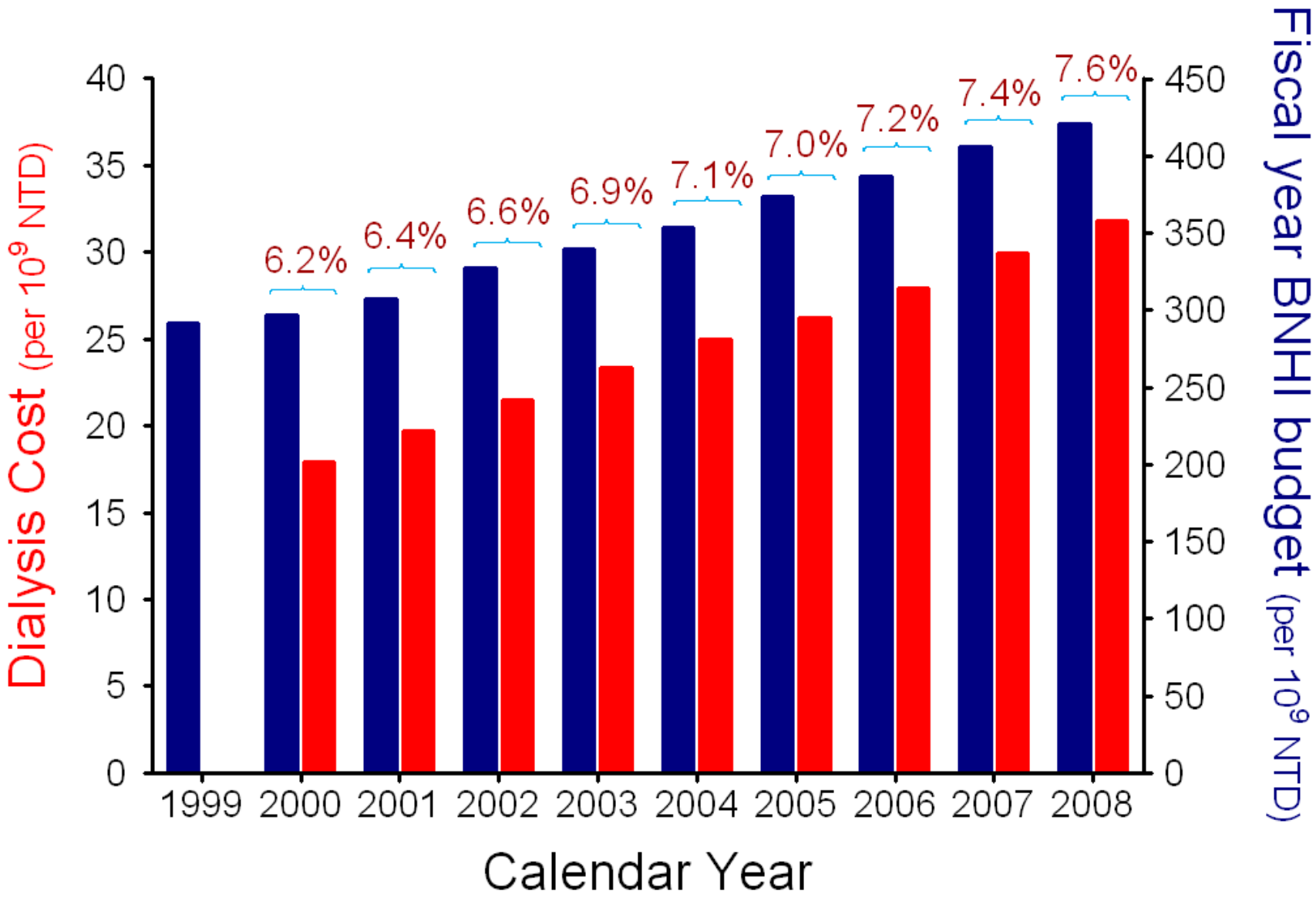
Incidence of ESRD,(pmp)
USRDS 2009 發生率



Prevalence of ESRD,(pmp)
USRDS 2009 盛行率



The great impact of the dialysis costs on health care system



Summary of the Dialysis Therapy in Taiwan

Causes of high prevalence and high incidence

- Increase of longevity and aged population
- Improvement in care of chronic diseases, but also increase of the chance of renal injury

⇨Diabetes and Aged are two major disease and group of dialysis patients

- National Health Insurance decreases the barrier for entering dialysis therapy

⇨Increasing dialysis patients after launching NHI

⇨ ⇨Increasing medical expenses and burdens

台灣的透析醫療的爭議問題

洗腎發生、盛行率 台灣蟬聯雙冠王

自由時報 2009/10/22 04:09

- 最新國際洗腎率排名出爐（USRDS），台灣再度蟬聯洗腎發生率與盛行率的雙冠王，連續八年發生率第一
- 健保加持-台灣洗腎率高，我國在1995年全民健保開辦後，提供國民完善醫療照顧，尿毒症病患人人可洗腎，是洗腎率飆高主因，許多貧窮國家的洗腎率低，是因人民沒錢洗腎

YAHOO! 奇摩

首度超越牙病 健保前5大門診 洗腎躍居榜首

2009/04/25 03:07

- 中央健保局公布前20大門診疾病排行榜，洗腎、牙科、感冒、高血壓、糖尿病為前五大，一年花費逾1,300億元，占健保總支出近三分之一。其中洗腎首度超越牙病，僅門診就花掉338億居榜首。
- 健保局指出，國內洗腎技術好，病患存活長，加上人口老化，洗腎人口持續成長，費用也跟著上升

排名世界第一的衝擊

- 困擾
  - 健康與公衛問題（名聲與面子問題）
  - 醫療經費負擔問題（財務與裡子問題）
- 事實
  - 為什麼會這麼多透析病患?
    - 進入端（發生率:疾病、醫療、 時機）
    - 政策面（盛行率:醫療保險制度）
    - 退出端（死亡率:照護品質 ）

為什麼會有這麼多透析病人?

Inflow增加

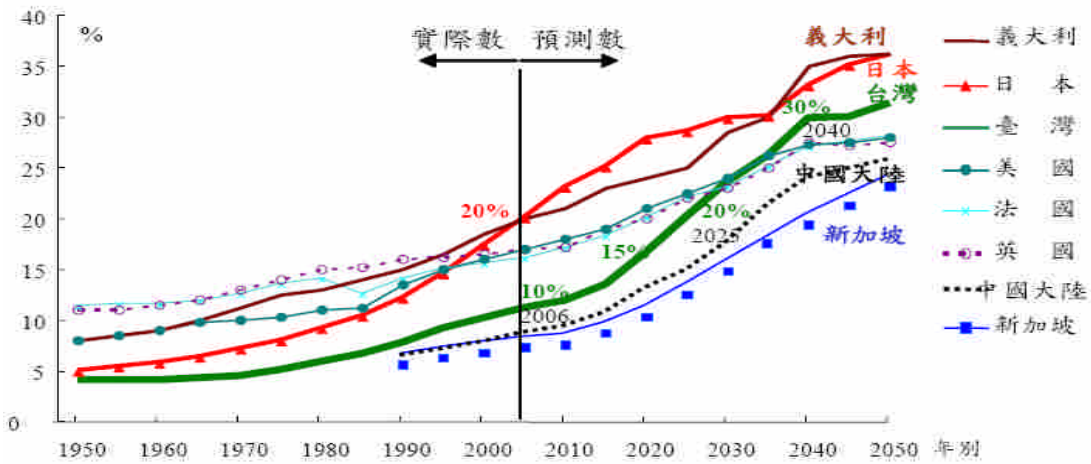
- 人口老化
- 慢性病崛起
  - 直接傷害－糖尿病腎病變
- 藥物－中、西藥物
- 健保制度
  - 全額給付免部分負擔
  - 不必基層醫師轉診
- 未知因子

※ 2008年20歲以上人口總計：17,525,876人。

國民健康局2009

行政院經濟建設委員會，95年6月

1993: 7% 2007: 10% 2018: 14% 2027: 21%

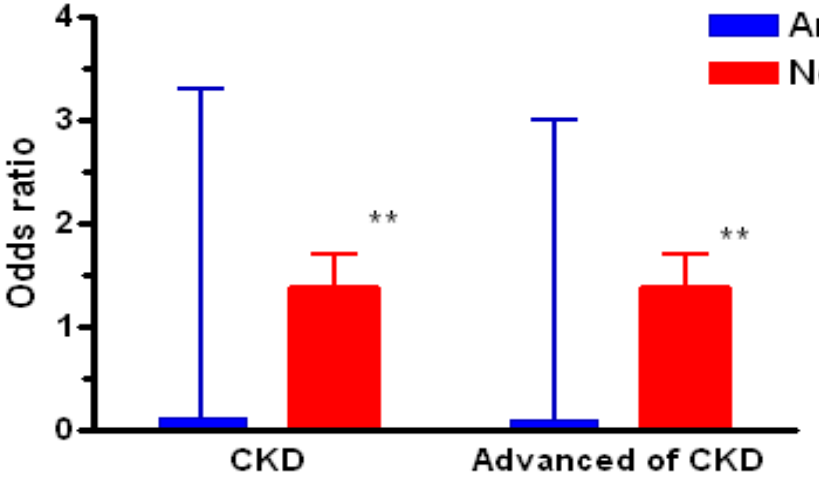


	高血壓	高血糖	高血脂			
			高膽固醇	高TG	低HDL	高LDL
年齡校正盛行率	24%	7.9%	10.1%	14.2%	10.2%	7.3%
預估人口數	約421萬人	約138萬人	約177萬人	約249萬人	約179萬人	約128萬人

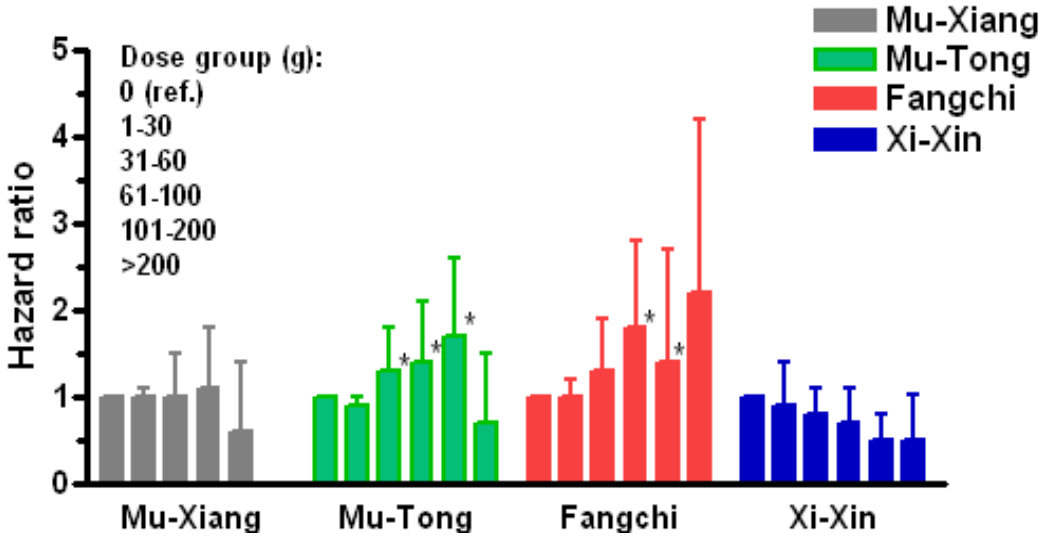
Herb therapy is associated with the risk of CKD in adults not using analgesics

Aristolochic acid (馬兜鈴酸) relative Chinese herb products increased risks of CKD

－1% Dataset of NHI and Dataset of Chinese Medicine, NHI



Adjusted for age, sex, obesity, smokin alcohol drink, DM, hypertension, cardiovascular disease, cholesterol



Adjusted for age, sex, DM, hypertension, NSAID, acetaminophen

Guh JY et al. AJKD (49) 5: 626-633,2007

Lai MN et al. Nephrology 2008

為什麼會有這麼多透析病人?

Inflow增加

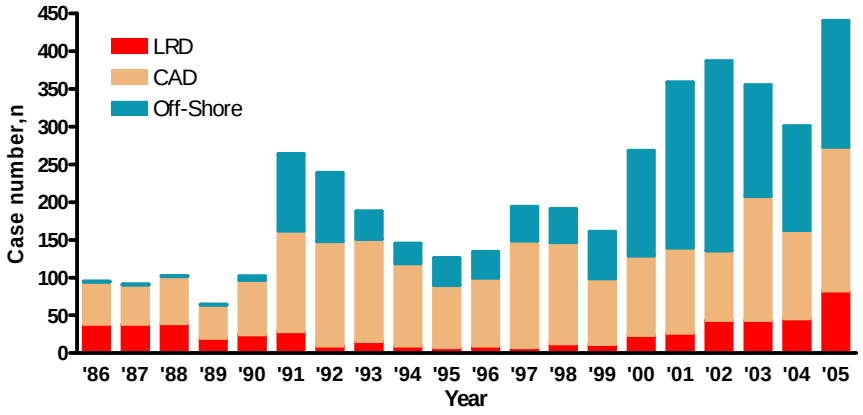
- 人口老化
- 慢性病崛起
  - 直接傷害－糖尿病腎病變
  - 間接增加－慢性病照顧佳，死亡與腎衰竭的危險比低
- 藥物－中、西藥物
- 健保制度
  - 全額給付免部分負擔
  - 不必基層醫師轉診
- 未知因子

為什麼會有這麼多透析病人?

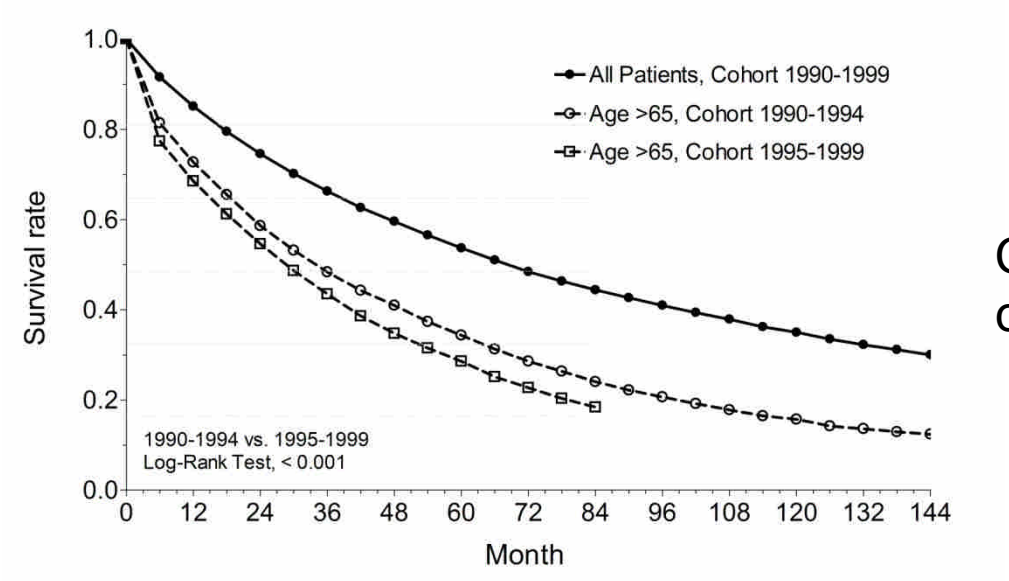
Outflow減少

- 腎臟移植率偏低
- 透析醫療品質佳
  透析死亡率低

Case Numbers of Renal Transplant



Data from Organ Donation Association



Cumulative survival rate of dialysis patients

Yang & Hwang, NDT, 2008

為什麼會有這麼多透析病人?

重大的CKD負擔

- CKD人口多
  - 糖尿病 高血壓 老人
  - 但是並未較外國高

- ☐ 吸菸
- ☐ 糖尿病
- ☐ 高血壓
- ☐ 貧血
- ☐ 高血脂
- ☐ 肥胖
- ☐ 中草藥

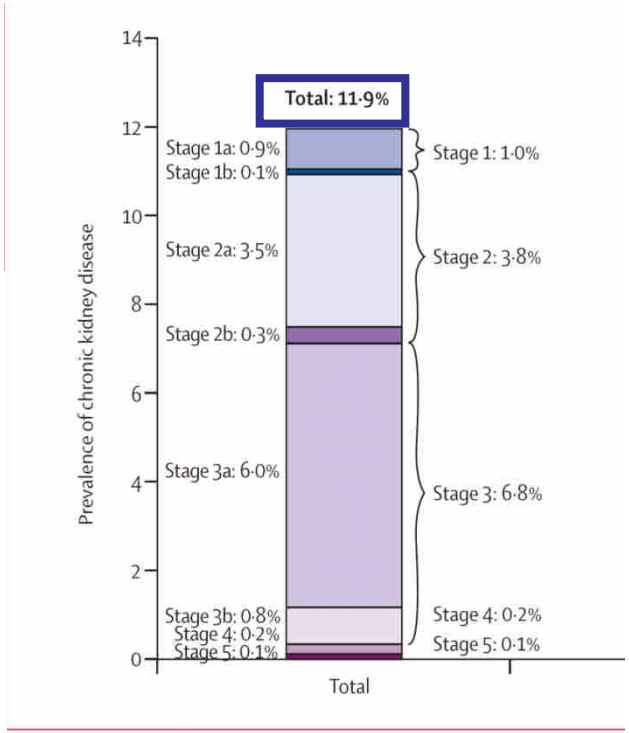
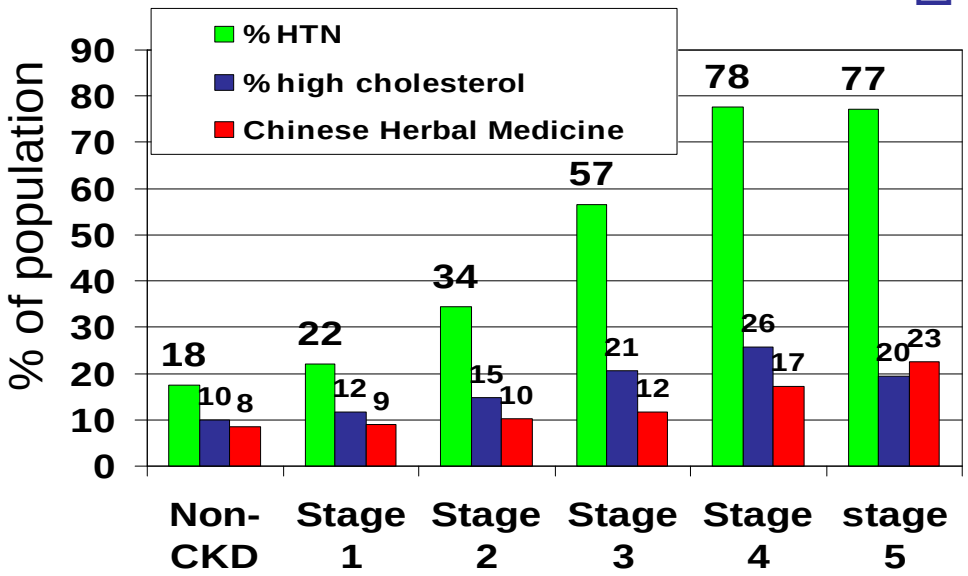


Figure 2: National prevalence of chronic kidney disease in adults in Tai



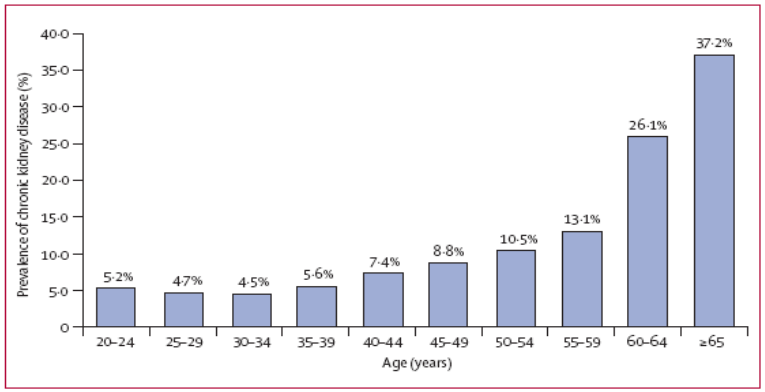
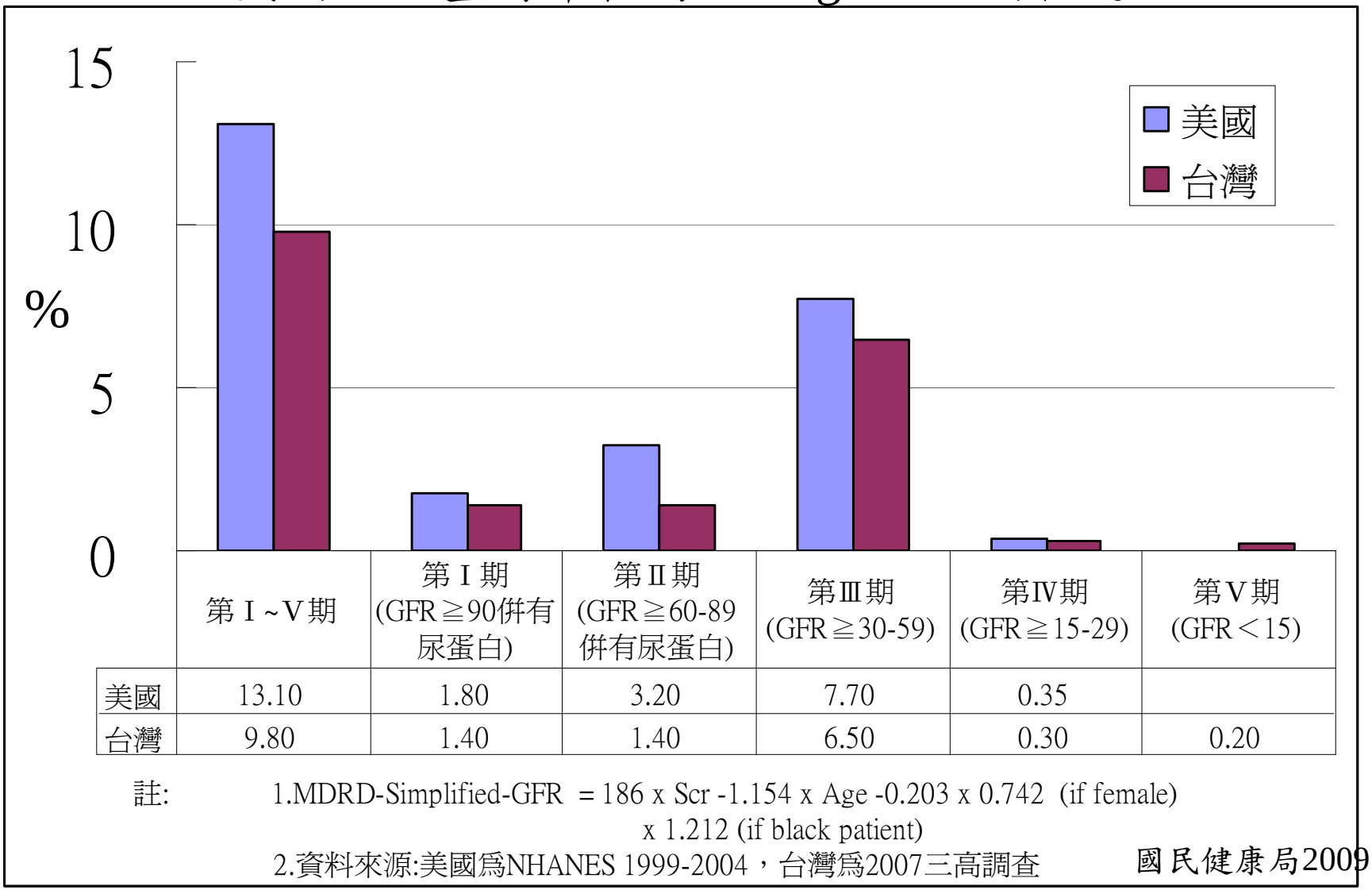


Figure 3: National prevalence of chronic kidney disease by 5-year age groups in adults in Taiwan

Wen CP et al. Lancet 371: 2173–82, 2008

慢性腎臟病盛行率之台灣、美國比較

美國CKD盛行率較高 但stage4/5兩國相近



	第Ⅰ~Ⅴ期	第Ⅰ期 (GFR≧90併有尿蛋白)	第Ⅱ期 (GFR≧60-89 併有尿蛋白)	第Ⅲ期 (GFR≧30-59)	第Ⅳ期 (GFR≧15-29)	第Ⅴ期 (GFR＜15)
美國	13.10	1.80	3.20	7.70	0.35	
台灣	9.80	1.40	1.40	6.50	0.30	0.20

註: 1.MDRD-Simplified-GFR = 186 x Scr -1.154 x Age -0.203 x 0.742 (if female)
x 1.212 (if black patient)
2.資料來源:美國爲NHANES 1999-2004，台灣爲2007三高調查

國民健康局2009

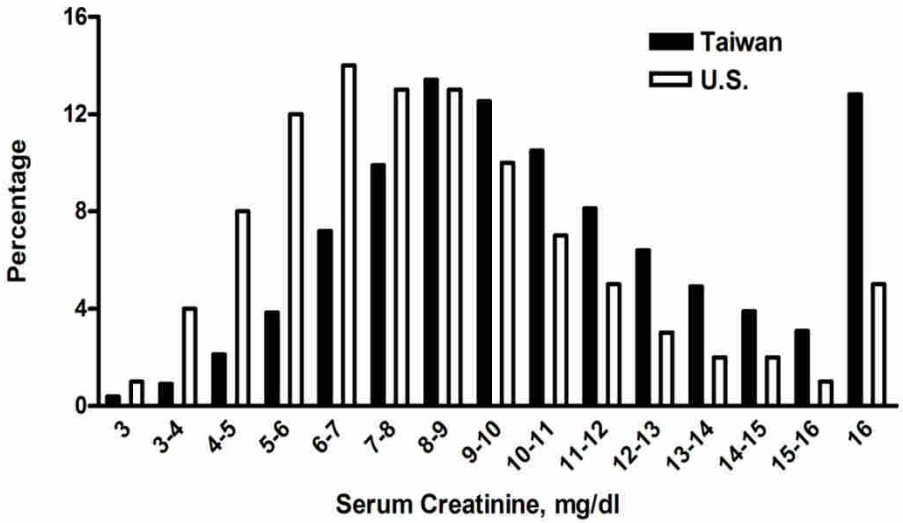
為什麼會有這麼多透析病人?

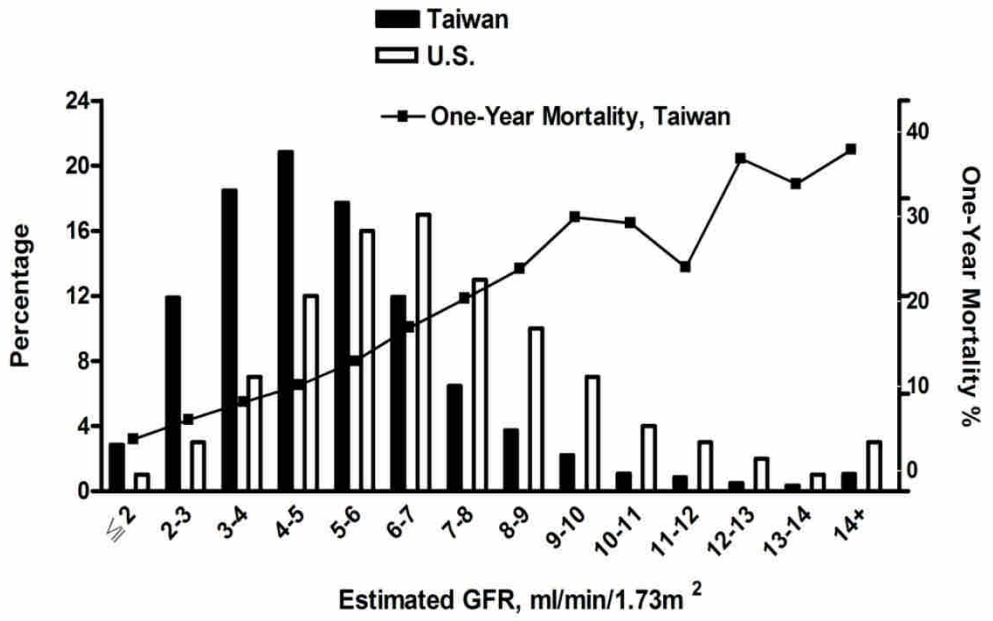
重大的CKD負擔

- CKD醫療品質
  - CKD死亡率低?
  - GFR下降速度快?
  - 透析時機早晚?

台灣CKD病患是否太早進入透析？

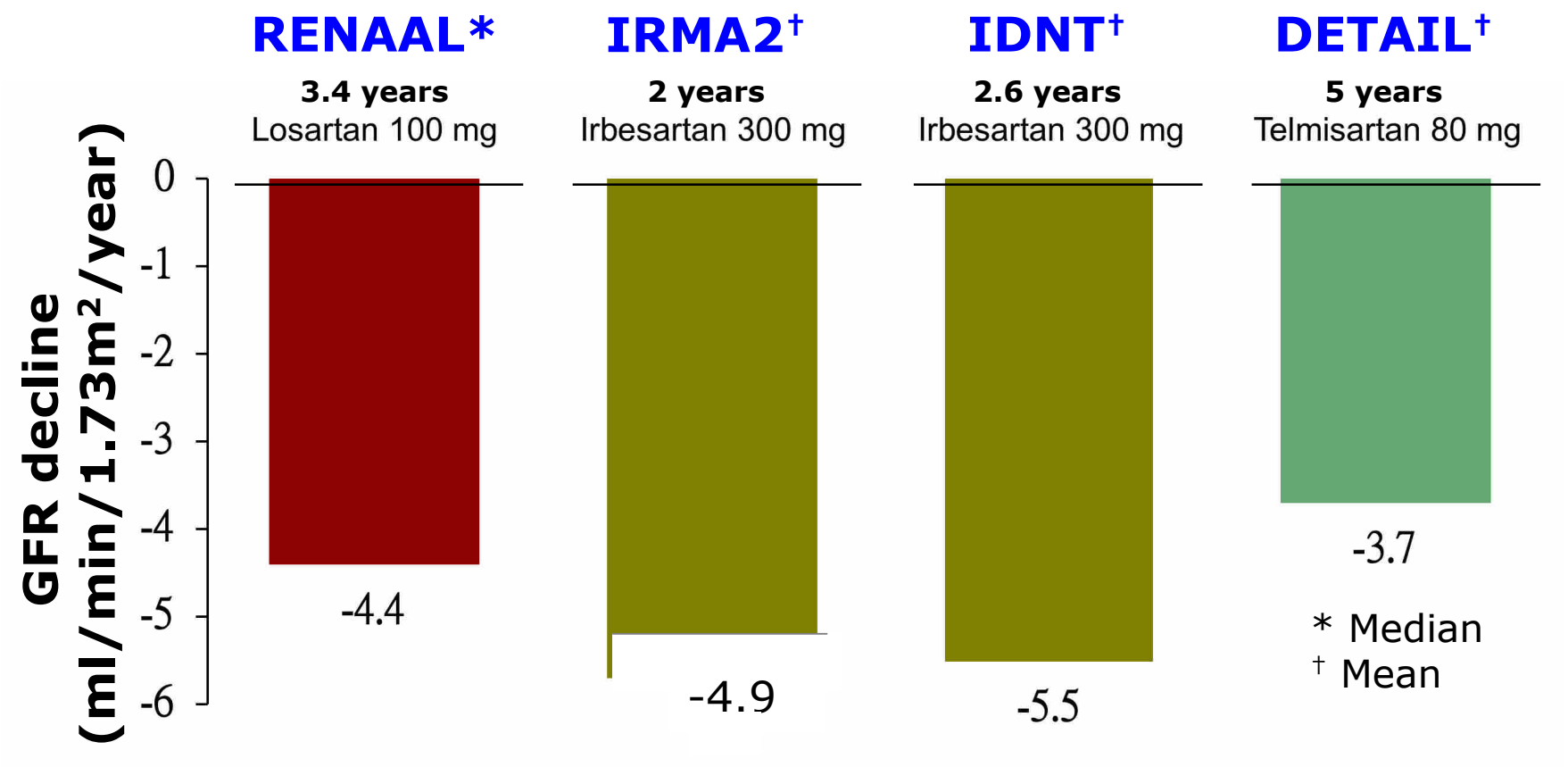
否





Hwang SJ, NDT, in revision

Renoprotective effects of ARBs: GFR decline in DETAIL, IRMA 2, IDNT and RENAAL



*Currently attainable rates of decrease in glomerular filtration rate remain at **2 to 8 mL/min/y** depending on the underlying disease.*

***Acta Diabetol* 42:S42–S49, 2004**

Renal progression and patient outcome of chronic kidney disease in NTUH

- 434 patients classified as stage 3 (n=184), stage 4 (n=142) and stage 5 not on dialysis (n=108) participated this study. 267 patients were male (61.5%) and 144 (33.2%) were diabetic.
- The mean annual GFR decline rates were **1.96**, **3.89** and **4.32** ml/min/1.73m^2 for stage 3, 4, and 5, respectively.

Outcomes of Stage 3–5 Chronic Kidney Disease before End-Stage Renal Disease at a Single Center in Taiwan

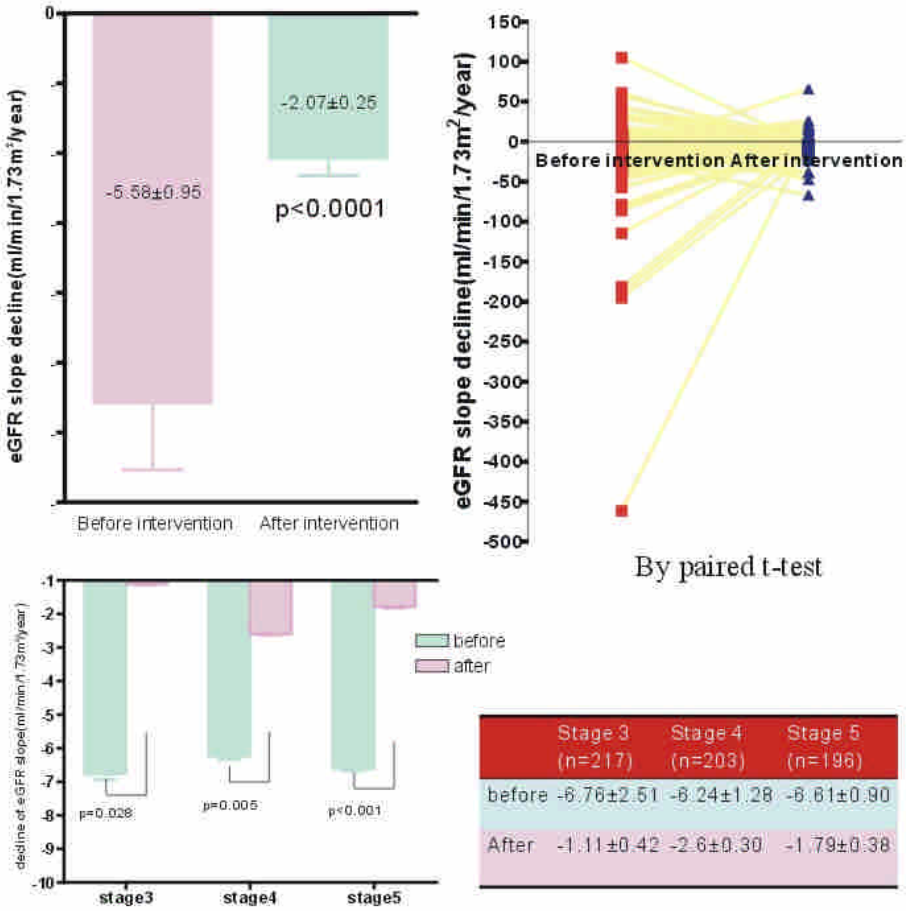
Yen-Ling Chiu[a] Kuo-Liong Chien[b] Shuei-Liong Lin[b] Yung-Ming Chen[b] Tun-Jun Tsai[b] Kwan-Dun Wu[b]

Nephron Clin Pract 2008;109:c109–c118

The intervention of CKD program slows the deterioration of renal function in CKD patients

Mei-Chuan Kuo, Chi-Chih Hung, Shang-Jyh Hwang, Yi-Wen Chiu, Su-Li Wang, Shih-Min Siao, Pei-Ni Hsiao, Lan-Fang Kung, Hung-Chun Chen
Division of Nephrology, Department of Internal Medicine, Kaohsiung Medical University Hospital

Fig 4. eGFR slope decline before and after intervention



	Stage 3 (n=217)	Stage 4 (n=203)	Stage 5 (n=196)
before	-6.76±2.51	-6.24±1.28	-6.61±0.90
After	-1.11±0.42	-2.6±0.30	-1.79±0.38

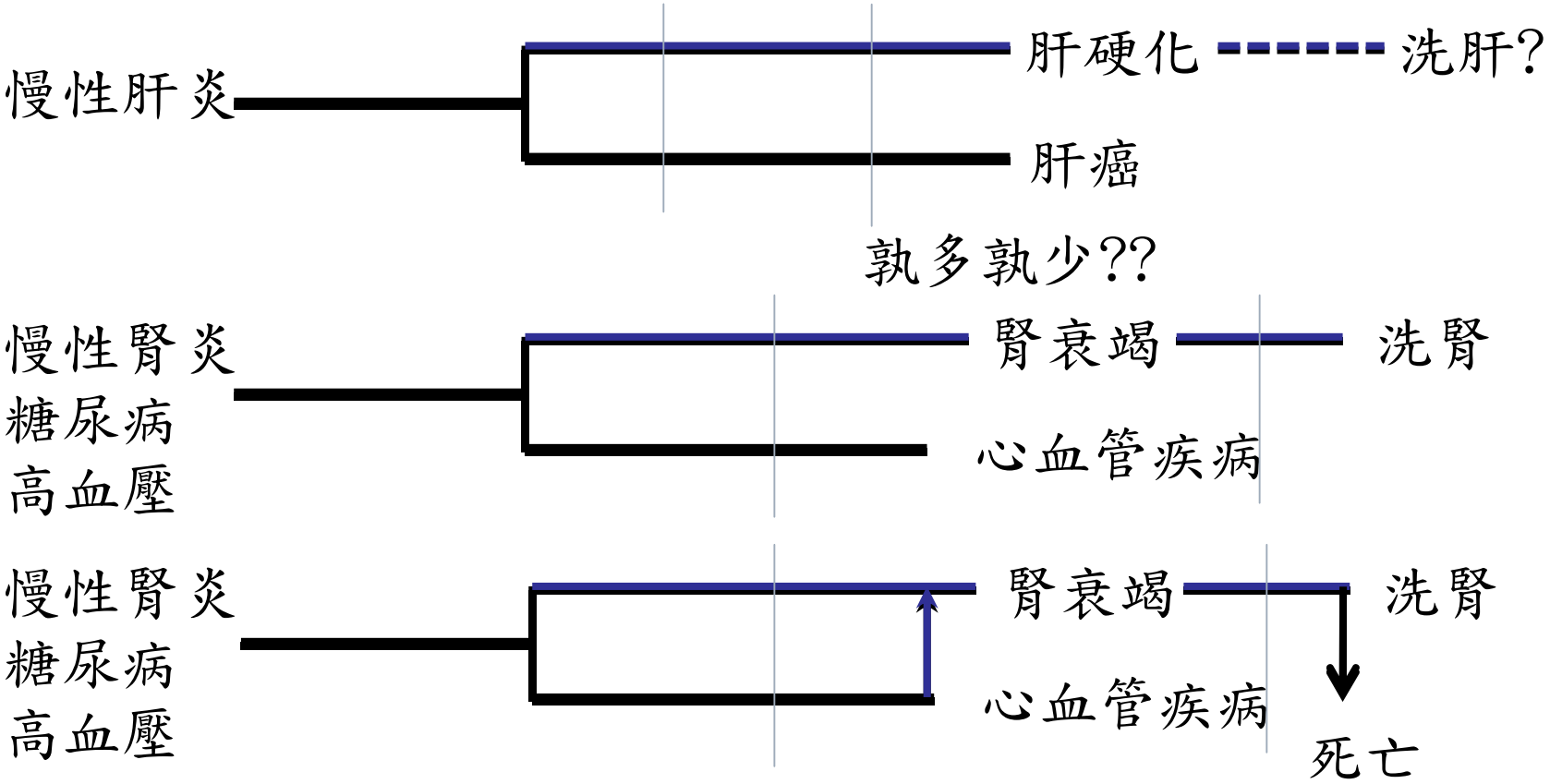
Table 2. Slope change in DM and Hypertensive patients

	Before (ml/min/1.73m²/year)	After (ml/min/1.73m²/year)	p
Male (n=389)	-6.05±1.59	-1.97±0.39	0.013
Female (n=286)	-4.93±0.64	-2.2±0.27	<0.001
DM (n=224)	-7.62±1.18	-3.19±0.63	0.001
nonDM(n=451)	-4.57±1.30	-1.51±0.21	0.022
Not using Anti-HT (n=47)	-4.66±1.39	-1.52±0.44	0.029
Using Anti-HT (n=628)	-5.65±1.02	-2.11±0.27	0.001

慢性病死亡與腎衰竭的危險比競爭死亡

The concept of competing risk (龜兔round1-3.exe)

慢性疾病的自然過程



1947 vs. 2006 台灣十大死亡原因

	1947	2007
平均餘命(歲)	男：41.08 女：45.79	男：75.5 女：82.0
第一位	肺炎	惡性腫瘤
第二位	痲疹	心臟疾病
第三位	老邁	腦血管疾病
第四位	腹瀉腸炎及腸潰瘍	肺炎
第五位	呼吸性結核	糖尿病
第六位	腎炎	意外事故
第七位	癆疾	慢性下呼吸道疾病
第八位	支氣管炎	慢性肝病及肝硬化
第九位	氣喘	自殺
第十位	腦出血	腎炎、腎病症候群及腎病變

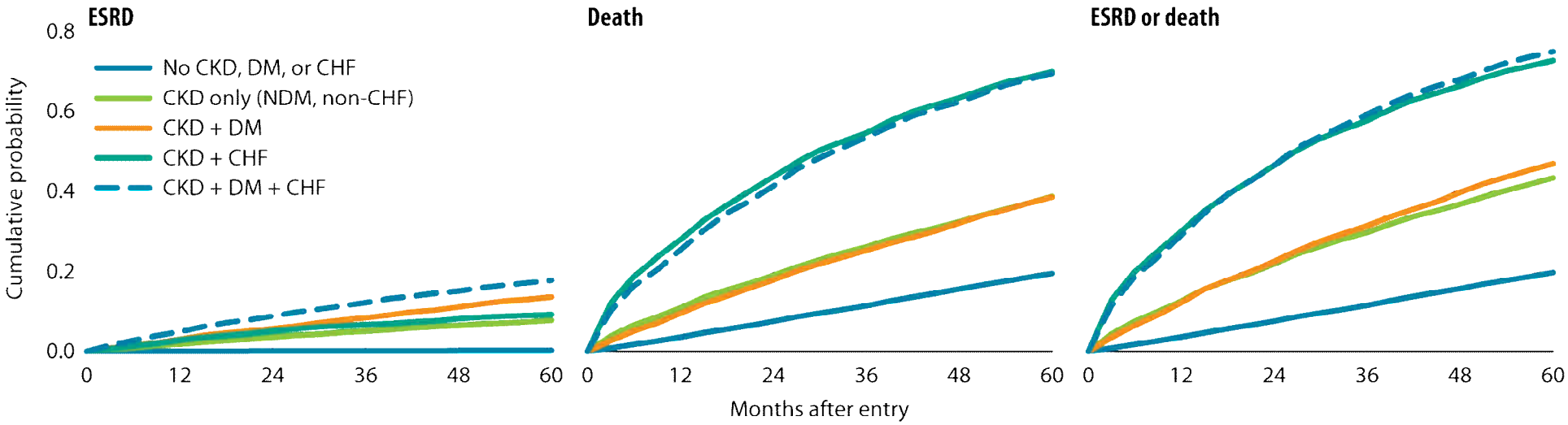
死亡平均年齡

	1947	2007
肺炎	16.6	79.0
腦血管疾病	63.6	73.7
心臟疾病	-	73.2
腎炎	43.5	75.2

資料來源：衛生署統計室

具各種合併症病患發生ESRD、死亡、或兩者之機率

Figure 4.2 (Volume 1)



point prevalent general Medicare patients entering Medicare before January 1, 2001, alive & age 66 or older on December 31. Patients enrolled in an HMO, with Medicare as secondary payor, or diagnosed with ESRD during the year are excluded. Excludes those enrolled in Medicaid in 2001. CKD, diabetes, & CHF defined during 2001. Follow-up period is five years & comorbidity groups are mutually exclusive.

ADR USRDS, 2008

Five-year follow-up and outcomes in a population with CKD in a large managed care organization

(Kaiser Permanente Northwest Division, KPNW)

End points	Stage 2		Stage 3 (n=11,278)	Stage 4 (n=777)
	No proteinuria (n=14,202)	Proteinuria (n=1,741)		
Disenrolled from plan	14.9	16.2	10.3	6.6
Died (prior to RRT)	10.2	19.5	24.3	45.7
Received a transplant	0.01	0.2	0.2	2.3
Initiated dialysis	0.06	0.9	1.1	17.6
None of the above	74.8	63.3	64.2	27.8

Stage 2, protein (+): risk factor 2X for death

risk factor 10X for RRT

Keith et al., *Arch Intern Med* (2004)164:659

Relationships of Race and Ethnicity to Progression of Kidney Dysfunction and Clinical Outcomes in Patients with Chronic Renal Failure

Table 1. Incidence Rate of End-Stage Renal per 10 Million Population Stratified by Gender Adjusted for Age and Gender, 1997-2000 Combined

	Incidence Rate per 10 Million				*Rate Ratio*			
Primary Diagnosis	*Whites*	*Blacks*	*N. Am*	*Asian*	*Whites*	*Blacks*	*N. Am*	*Asian*
Male (adjusted for age)								
Diabetes	1,166	4,030	4,792	2,010	ref = 1	3.46	4.11	1.72
Hypertension	780	3,901	915	1,310	ref = 1	5.00	1.17	1.68
Glomerulonepritis	320	839	585	614	ref = 1	2.62	1.83	1.92
Female (adjusted for age)								
Diabetes	909	4,336	5,586	1,693	ref = 1	4.77	6.15	1.86
Hypertension	396	2,766	657	834	ref = 1	6.98	1.66	2.11
Glomerulonepritis	161	515	414	428	ref = 1	3.20	2.57	2.66
Overall (adjusted for gender and age)								
Diabetes	1,024	4,208	5,233	1,836	ref = 1	4.11	5.11	1.79
Hypertension	554	3,302	778	1,036	ref = 1	5.96	1.40	1.87
Glomerulonepritis	232	670	496	510	ref = 1	2.89	2.14	2.20

NOTE. The underlined numbers represent the highest rate ratio for each comparison with the referent race. Source: USRDS 2002 Annual Data Report[1].
Abbreviations: N. Am, Native American; ref, referent race (ie, white).

Antonio Alberto Lopes Adv Renal Repl Thr, 2004

International comparison of the relaioship of CKD prevalence and ESRD risk

- US, NHANES, 1988-1994 (15,488), 1999-2000 (4,101)
- Norway, HUNT II,1995-1997 (65,181, 70.4%)
- Comparable CKD prevalence, Nor 10.2% vs. US 11.0-11.7%
- CKD prevalence in Norway was similar to US, suggesting low progression to ESRD rather than a samller pool of individuals at risk accounts for the lower incidence of ESRD in Norway

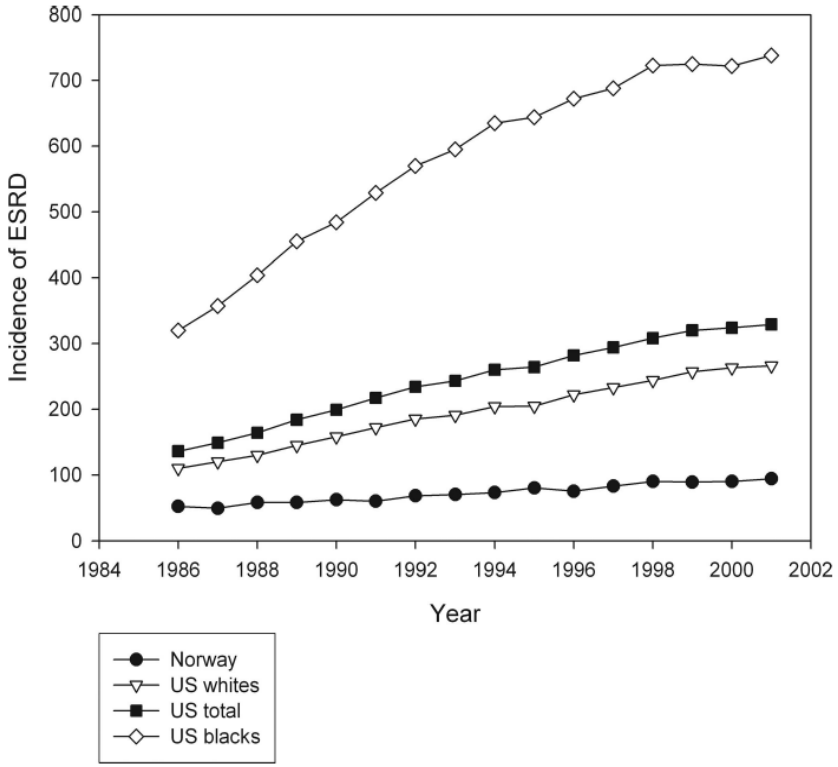


Figure 1. Annual incidence of ESRD (per million inhabitants) in Norway and the United States.

Hallan et al. JASN, 2006,17:2275-2284.

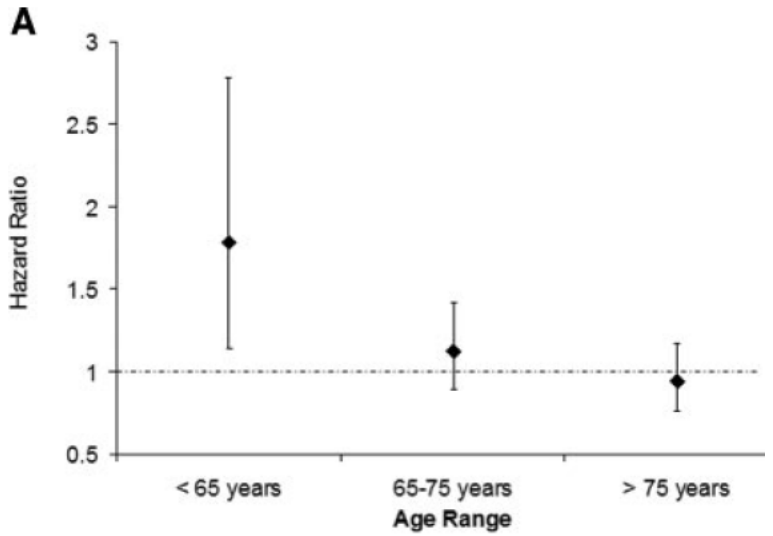
Racial Differences in Mortality Among Those with CKD

J Am Soc Nephrol 19: 1403–1410,

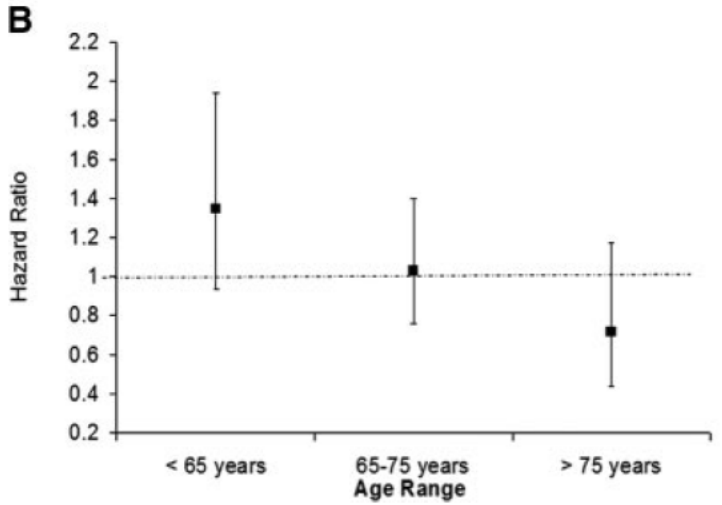
Rajnish Mehrotra,*† Dulcie Kermah,‡ Linda Fried,§ Sharon Adler,*† and Keith Norris†‡

- 3rd NHANES, 14,611
- 2892 has CKD (< 60)

Blacks vs Whites



Mexican Americans
Vs Whites



Competing Risk Factor Analysis of ESRD and Mortality in CKD

Agarwal R. Am J Nephrol, 2008,28:569-575.

- Prospectively recruited 220 consecutive p's at a VAM
- eGFR < 60, Upcr > 0.22 g/g
- Age, Race, Proteinuria, eGFR, sBP, CAD as predicto
- Competing Cox regression

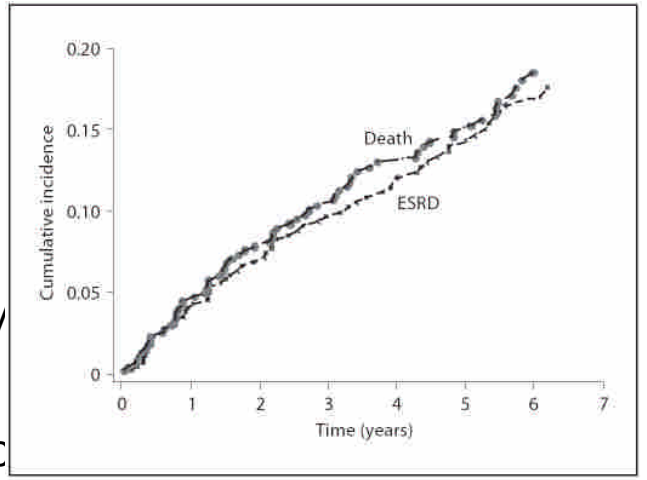


Fig. 1. Cumulative incidence rates for the competing end-points [illegible] death in patients with CKD.

Table 2. Hazard ratios for individual end-points of ESRD or mortality in patients with CKD

Clinical factor	ESRD			All-cause mortality		
	hazard ratio	95% CI	p value	hazard ratio	95% CI	p value
Age, years	0.98	0.96–1.01	0.2	1.07	1.04–1.11	<0.001
Black race	3.35	1.71–6.55	<0.001	1.15	0.61–2.17	0.7
log eGFR, ml/min/1.73 m^2	0.005	0.001–0.025	<0.001	0.43	0.21–0.85	0.02
log protein/creatinine ratio, g/g	1.71	1.36–2.14	<0.001	1.26	1.03–1.54	0.03
Systolic blood pressure, mm Hg	1.01	0.999–1.023	0.06	0.99	0.98–1.00	0.2
Coronary artery disease	1.17	0.65–2.10	0.6	2.58	1.07–6.20	0.04
Time-varying covariate log eGFR ml/min/1.73 m^2	1.002	1.001–1.003	<0.001			

Table 3. Hazard ratios for competing end-points of ESRD or mortality in patients with CKD

Clinical factor	ESRD			All-cause mortality			
	hazard ratio	95% CI	p value	hazard ratio	95% CI	p value	p value for equality of hazard ratios
Age, years	0.91	0.88–0.95	<0.001	1.07	1.04–1.11	<0.001	<0.001
Black race	2.75	1.09–6.92	0.03	1.15	0.60–2.17	0.7	0.2
log eGFR, ml/min/1.73 m^2	0.014	0.003–0.077	<0.001	0.43	0.21–0.85	0.016	<0.001
log protein/creatinine ratio, g/g	1.37	1.01–1.85	0.04	1.26	1.03–1.54	0.03	0.7
Systolic blood pressure, mm Hg	1.02	1.003–1.04	0.02	0.99	0.98–1.00	0.2	0.04
Coronary artery disease	0.78	0.36–1.73	0.5	2.52	1.20–5.28	0.01	0.08
Time-varying covariate log eGFR, ml/min/1.73 m^2	1.002	1.001–1.003	0.001				
Coronary artery disease				0.999	0.998–0.999	0.04	

ESRD	Mortality
Black	Age
eGFR	eGFR
Upcr	Upcr
	CAD
ESRD vs Mortality	
Age	
eGFR	
CAD	

Death among insured African Americans with CKD

- Prepaid, integrated health system, Retrospective cohort study
- P’ts with Scr tests >= 1 time over 9 years
- 182,959, 8% blacks, CKD stage 3 or 4
- Competing-risk method
- Age and gender adjusted HR for ESRD and death prior to ESRD in black, 1.83 and1.15 compared to non-blacks
- Blacks with CKD were twice as likely to enter into ESRD as to die prior to ESRD

Table 3 | Ratio of the cumulative incidence of death before ESRD to the cumulative incidence of ESRD by entry eGFR strata, race group, and year: adjusted data (bold) and raw data (italics)

	Years from entry eGFR				
	1	2	3	4	5
45 to <60 ml/min per 1.73 m²					
Black	**9.78**	**5.95**	**3.61**	**2.58**	**2.52**
	35.67	*21.83*	*13.46*	*10.18*	*9.41*
Non-Black	**19.57**	**13.55**	**9.93**	**7.41**	**6.39**
	74.60	*55.59*	*38.45*	*32.17*	*29.05*
30 to <45 ml/min per 1.73 m²					
Black	**1.51**	**1.02**	**0.815**	**0.625**	**0.564**
	10.82	*5.30*	*3.80*	*3.16*	*2.86*
Non-Black	**4.35**	**2.10**	**1.77**	**1.52**	**1.28**
	23.10	*13.39*	*11.20*	*9.62*	*8.83*
15 to <29 ml/min per 1.73 m²					
Black	**0.432**	**0.309**	**0.256**	**0.242**	**0.239**
	1.19	*0.80*	*0.71*	*0.67*	*0.65*
Non-Black	**0.625**	**0.423**	**0.363**	**0.354**	**0.356**
	2.32	*1.67*	*1.51*	*1.45*	*1.46*

eGFR, estimated glomerular filtration rate; ESRD, end-stage renal disease.
The adjusted data (bold) are directly standardized to the year 2000 US population to adjust for age and sex differences between the populations represented in each table cell.

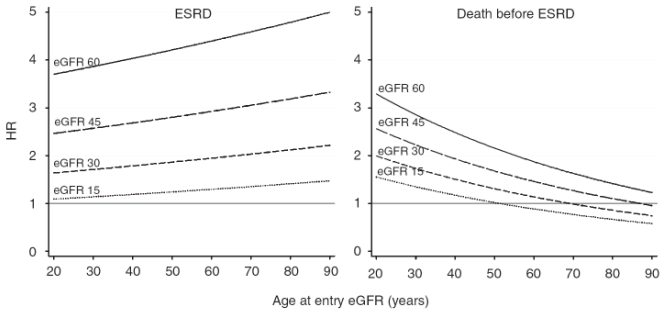
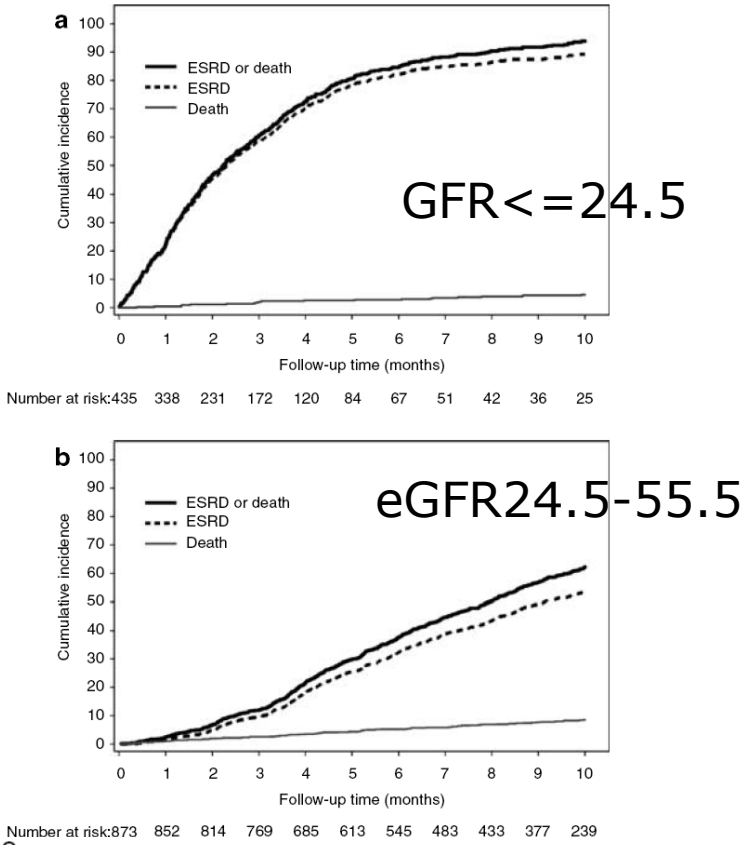


Figure 3 | Risk of ESRD (left) and risk of death before ESRD (right) in Blacks vs non-Blacks by study entry age and eGFR (ml/min per 1.73 m²). On the basis of the competing-risk regression models with interaction terms, as shown in Table 4. Solid lines: entry eGFR 60 ml/min per 1.73 m². Long dashed lines: entry eGFR 45 ml/min per 1.73 m². Dashed lines: entry eGFR 30 ml/min per 1.73 m². Dotted lines: entry eGFR 15 ml/min per 1.73 m². eGFR, estimated glomerular filtration rate; ESRD, end-stage renal disease.

Derose SF, et al, KI 2009, 76, 629-637.

Long-term outcomes in nondiabetic CKD

- Retrospective study of nondiabetic CKD stage 2-4 from randomized and non-randomized cohorts of MDRD.
- 1,666 p’ts, KF 4X > Death
- eGFR, Proteinuria, kidney disease, gender and race.
- > 65 y ESRD=Death
- Conclusion. Young, non-DM ESRD risk >> Death
- Delaying Progression



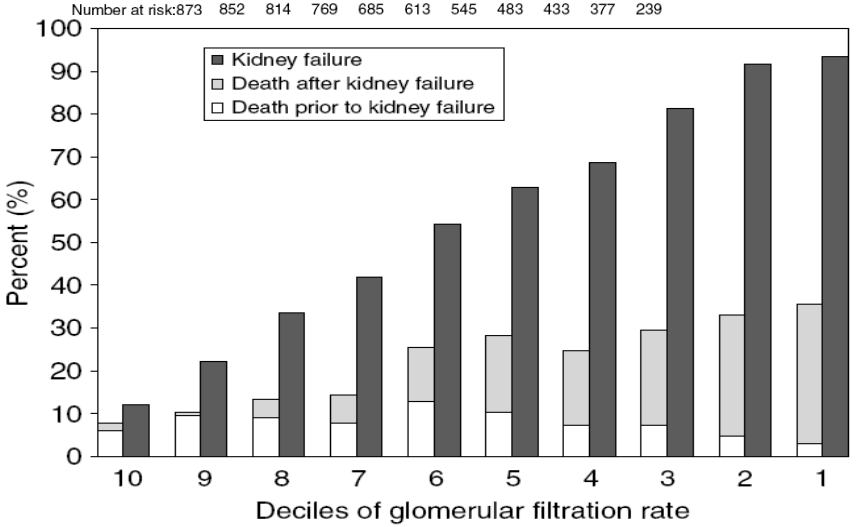


Figure 3 | Kidney failure outcomes (%) and mortality (%) (deaths before and after kidney failure) by deciles of baseline GFR. There

Menon V, KI,2008, 73,1310-1315

Long-term outcomes of patients with chronic kidney disease

Nisha Bansal and Chi-yuan Hsu*

SUMMARY

This Practice Point commentary discusses a recent paper by Menon *et al*. that described the natural history of a cohort of nondiabetic patients with stage 2–4 chronic kidney disease (CKD) who had been recruited from nephrology practices and screened for entry into the Modification of Diet in Renal Disease (MDRD) trial. Kidney failure was the most common outcome during long-term follow-up among these patients and there was a low competing risk of death, findings in contrast to observations in other cohorts of patients with CKD. Patients with lower glomerular filtration rate and greater proteinuria at baseline were at increased risk for both kidney failure and death, but kidney failure remained more likely than death in all glomerular filtration rate subgroups. These results emphasize the heterogeneity of the CKD population. Nephrologists should not rely on CKD staging alone to direct management of or risk-stratify patients with CKD, but should also consider the etiology and rate of progression of kidney disease, patient age and cardiovascular disease risk factors.

KEYWORDS chronic kidney disease, epidemiology, KDOQI, outcomes

Nature Clin Pract Nephrol, Oct 2008

The crude hazard rates for mortality and ESRD

Table 3 | Crude mortality rates and rates of ESRD, stratified by cardiac diagnosis, age and renal function

	Death/100 patient years	ESRD/100 patient years	Death/ESRD
Full cohort	9.34 (8.85, 9.82)	0.29 (0.20, 0.38)	31.99
Cardiac diagnosis			
ACS	4.69 (4.39, 4.99)	0.14 (0.091, 0.20)	32.48
CHF	21.80 (21.00, 22.60)	0.64 (0.48, 0.79)	34.27
CHF and ACS	17.31 (15.76, 18.85)	0.77 (0.41, 1.13)	22.45
Age (years)			
<60	2.11 (1.78, 2.43)	0.27 (0.15, 0.39)	7.80
60–69	5.88 (5.32, 6.44)	0.32 (0.18, 0.45)	18.51
70–79	11.91 (11.25, 12.56)	0.34 (0.22, 0.46)	34.80
⩾80	23.10 (22.16, 24.04)	0.21 (0.11, 0.32)	108.72
GFR (ml/min/1.73 m^2)			
>60	5.37 (5.04, 5.71)	0.08 (0.037, 0.12)	67.38
30–<60	13.10 (12.50, 13.71)	0.17 (0.093, 0.24)	78.62
<30	33.45 (31.70, 35.19)	4.27 (3.52, 5.02)	7.83

ACS, acute coronary syndrome; CHF, congestive heart failure; ESRD, end-stage renal disease; GFR, glomerular filtration rate.

Kidney International (2008) 74, 356–363;

eGFR與死亡危險之關係

eGFR遇低死亡機會愈大，但有蛋白尿則是在高eGFR時仍有較高之死亡危險