



CKD

Data

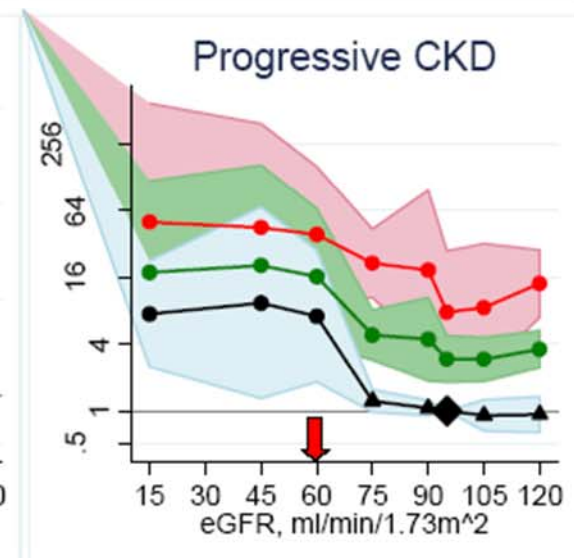
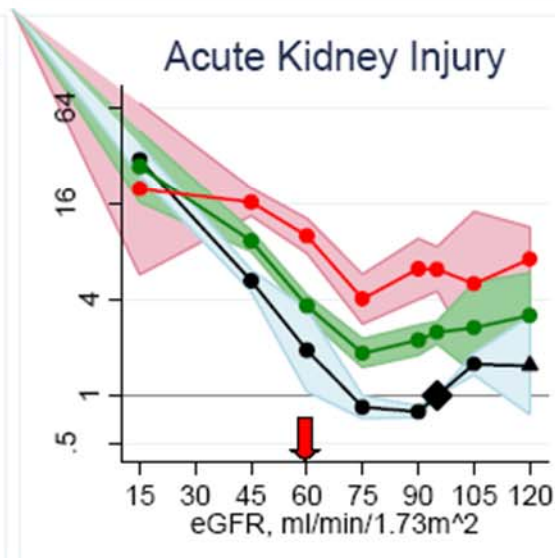
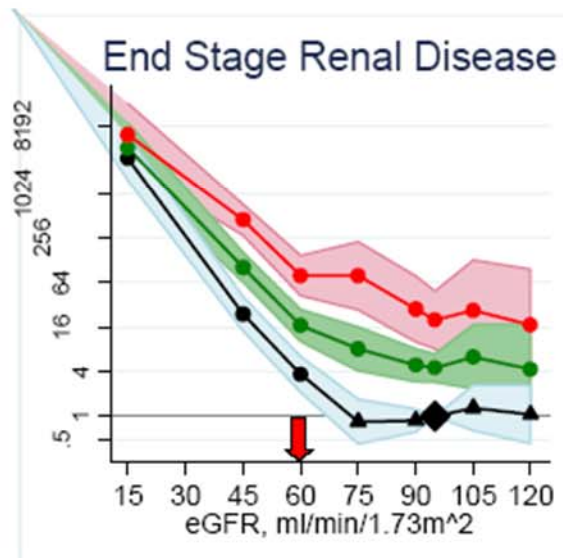
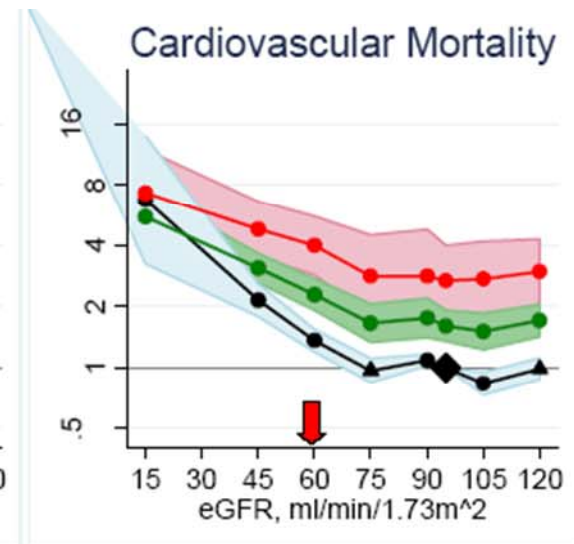
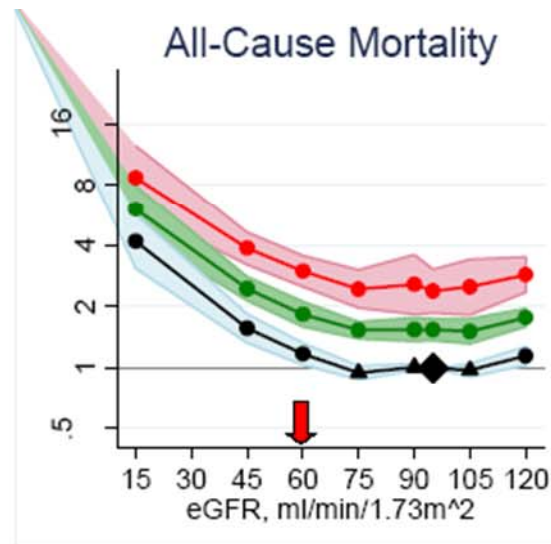
Information

Knowledge

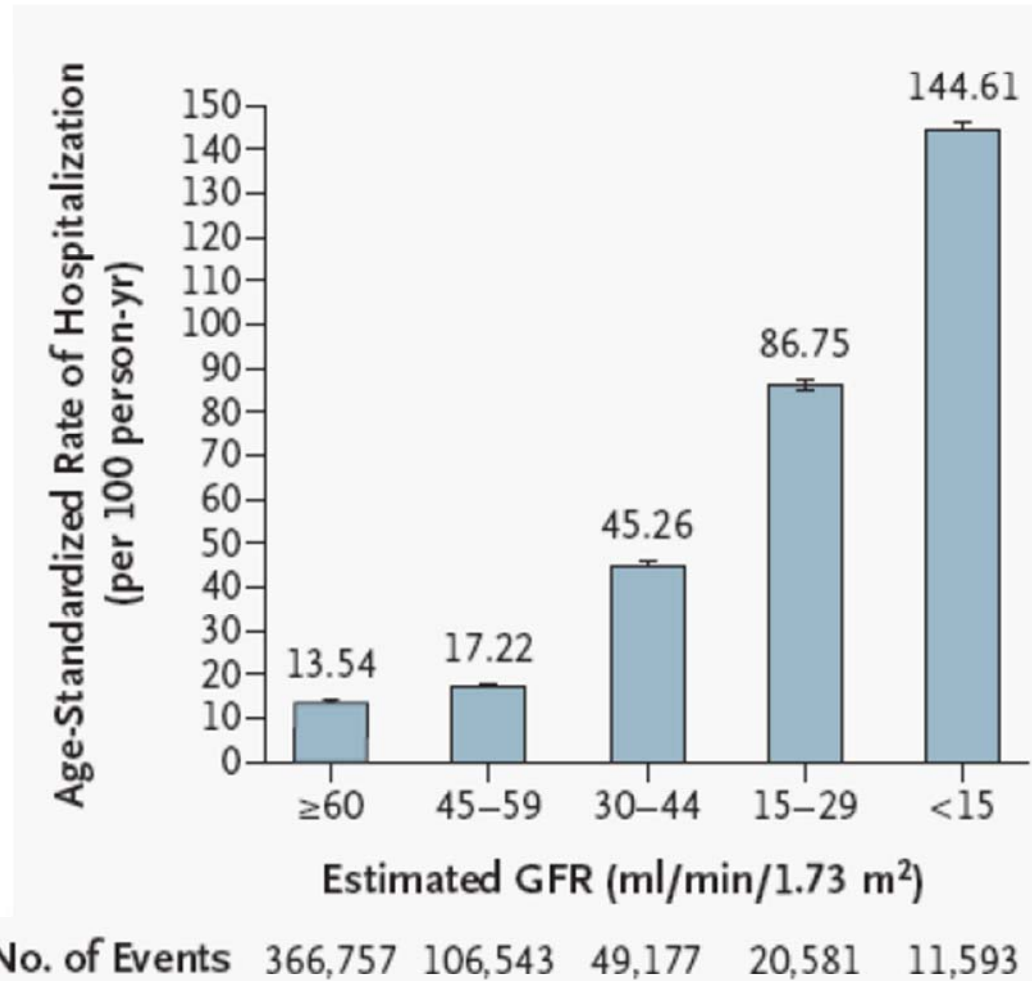
Implementation

CKD = Health Issue

Summary of
Relative Risks
from
Continuous
Meta-Analysis



Association of eGFR with all-cause hospitalization in general population

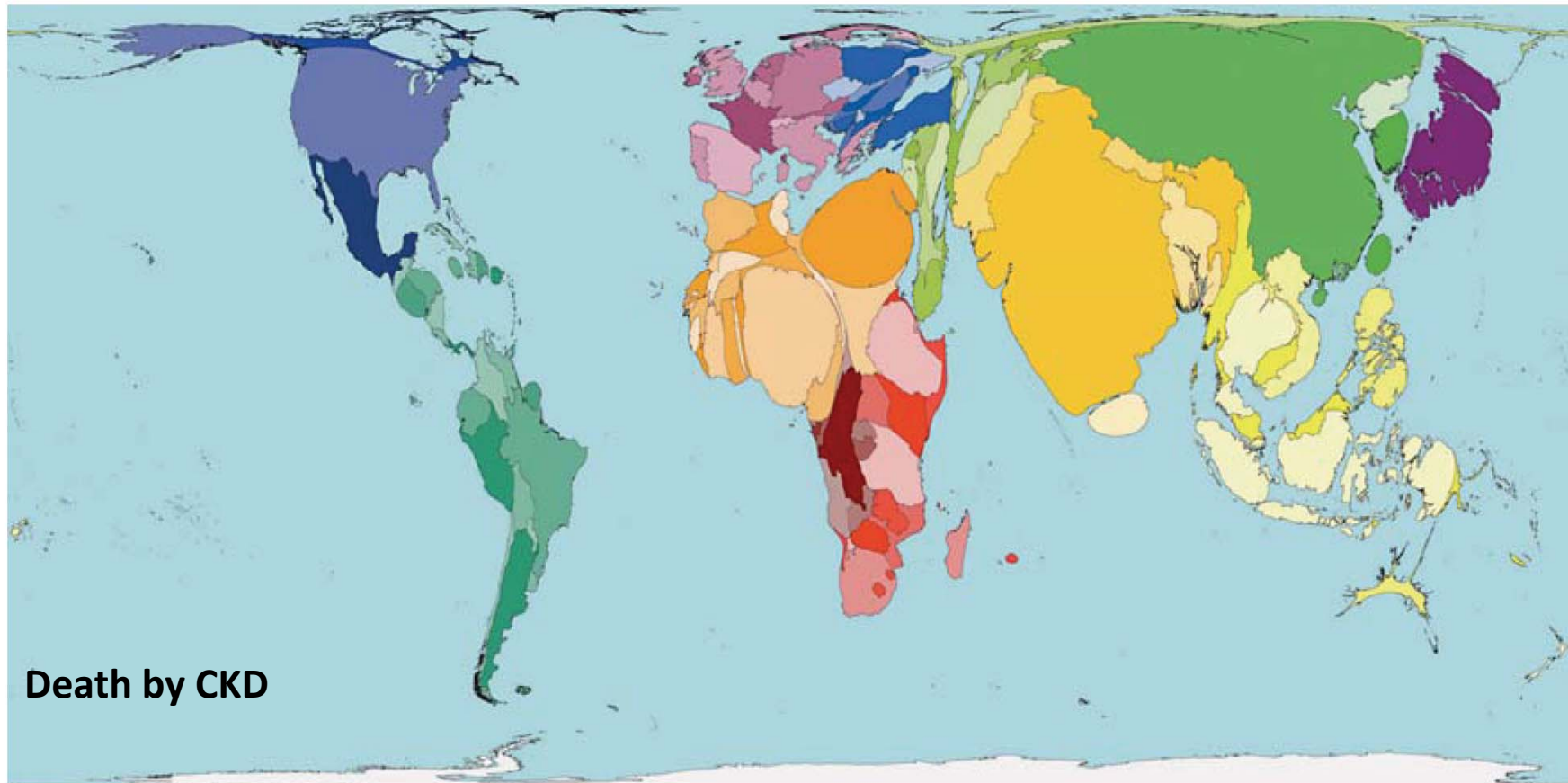


CKD = Health Issue

1,120,295 Ambulatory Adults

N Engl J Med 2004;351:1296-305

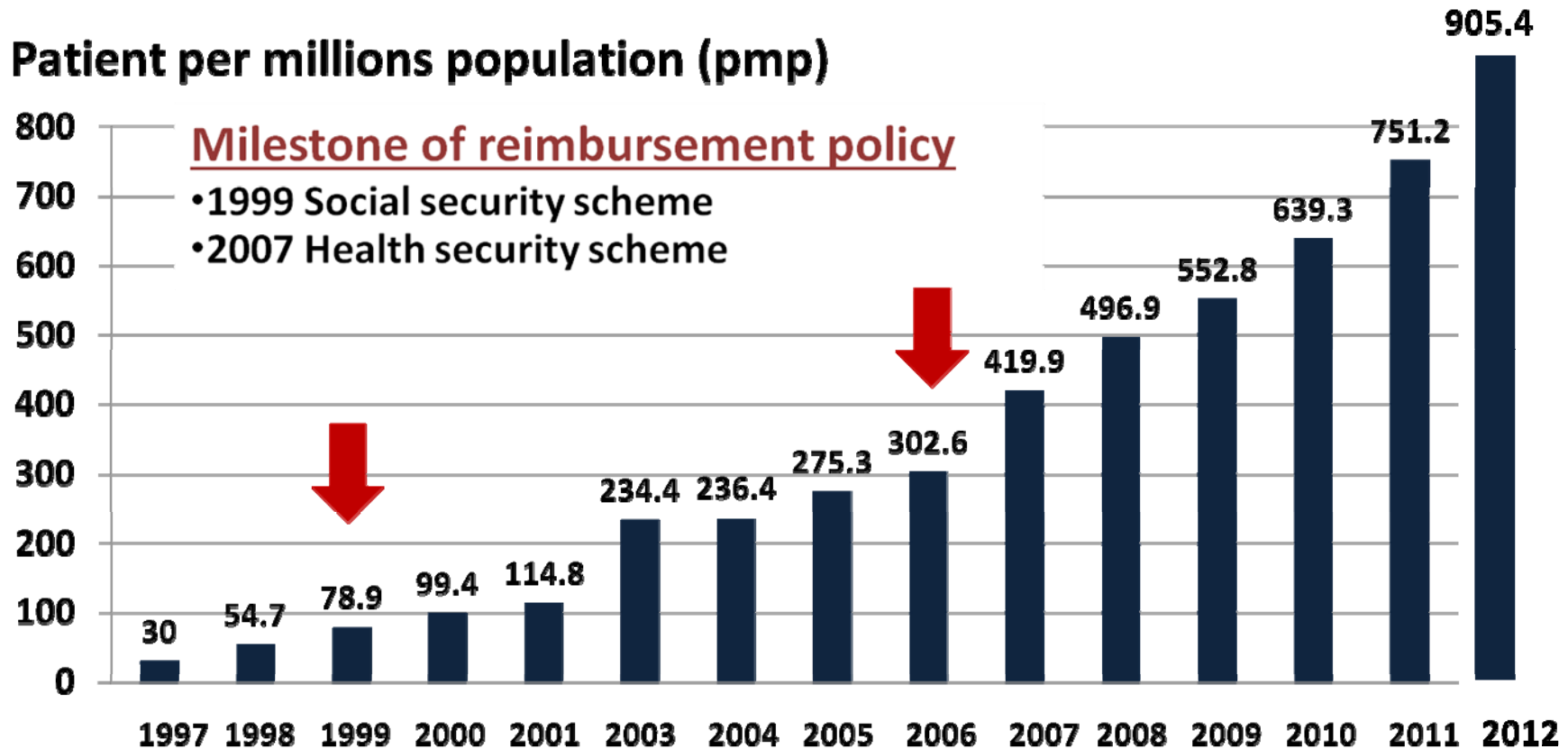
The Burden of Chronic Kidney Disease on Developing Nations: A 21st Century Challenge in Global Health



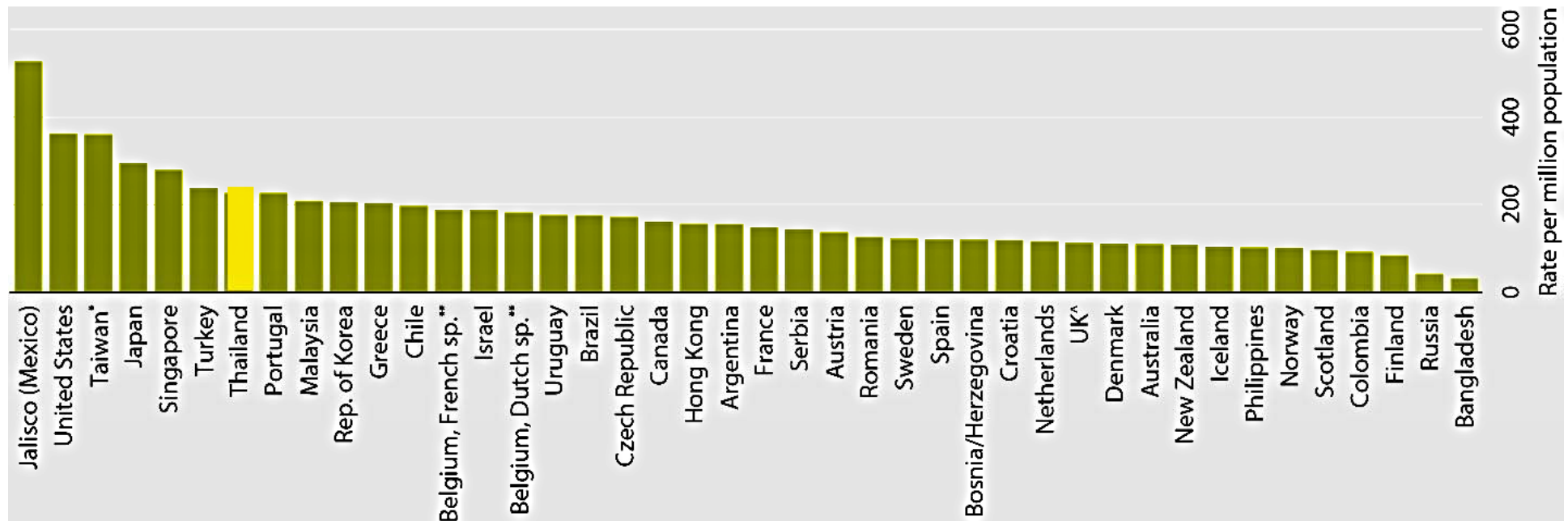
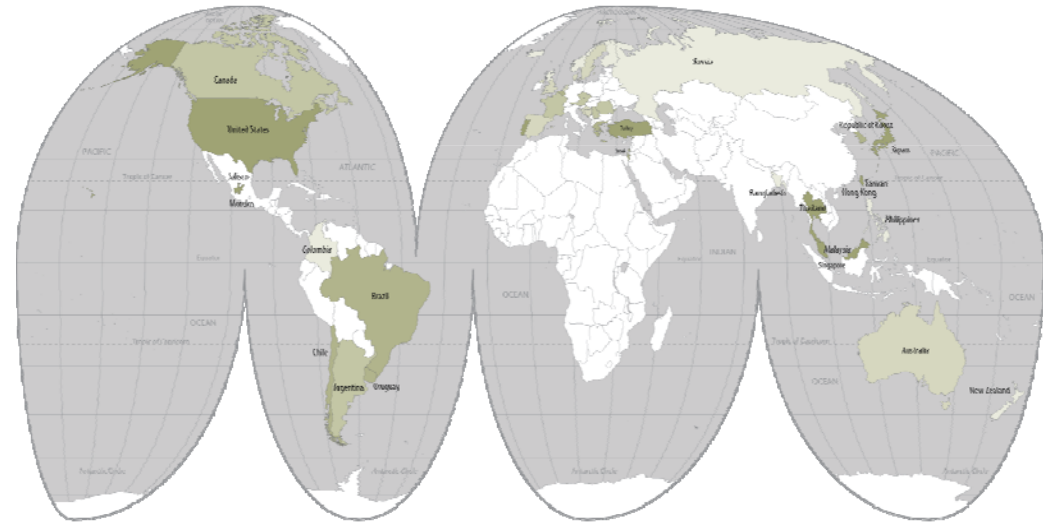
Yearly prevalence trend of renal replacement therapy patients, Thailand 1997- 2012



Patient per millions population (pmp)



Geographic variations in the incidence of ESRD (per million population), 2011



U.S. Renal Data System, USRDS 2013 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2013



CKD

- Dx of CKD
- Identification of patient at risk
- Outcome of RRT
- Unique Thai CKD

Data

Information

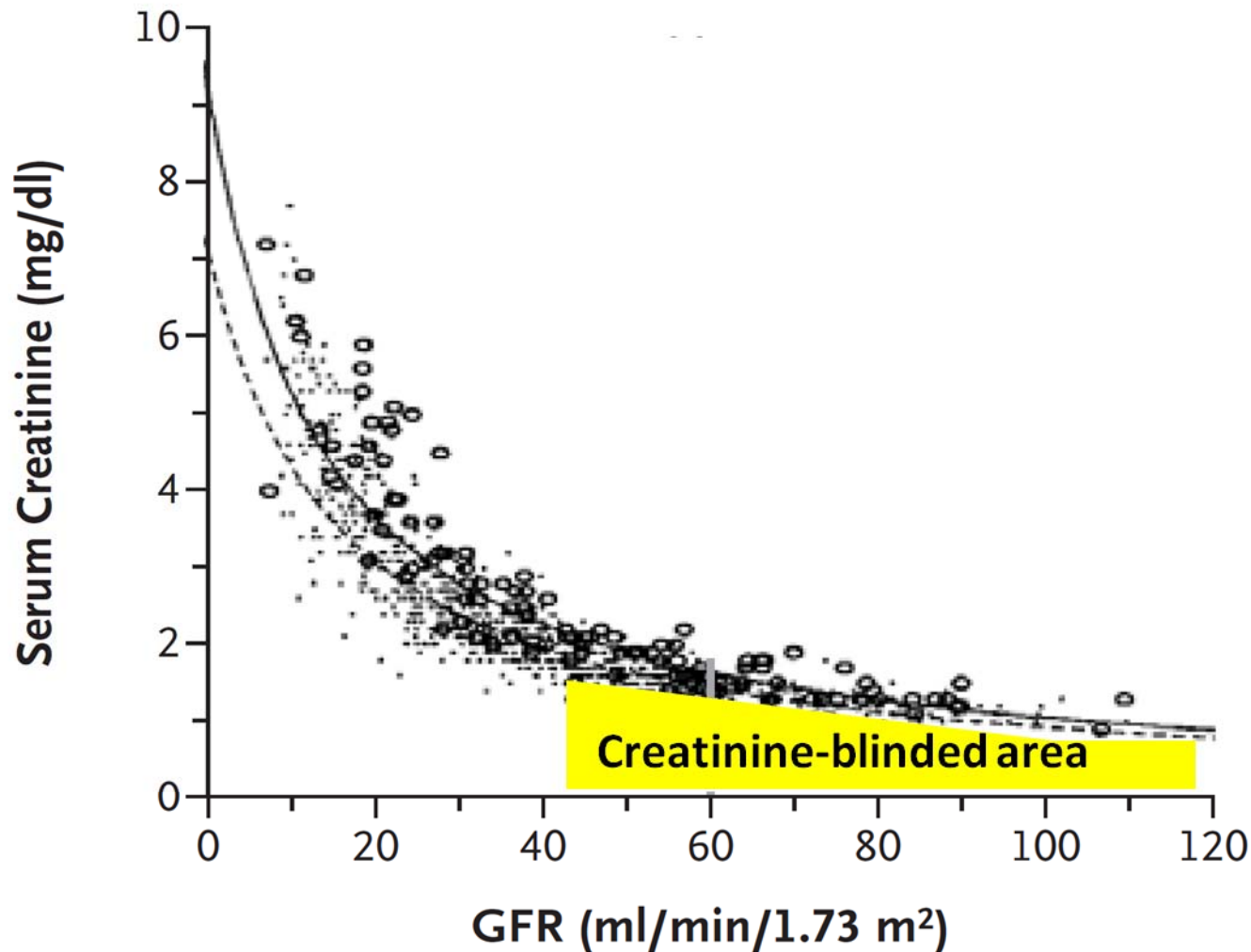
Knowledge

Implementation

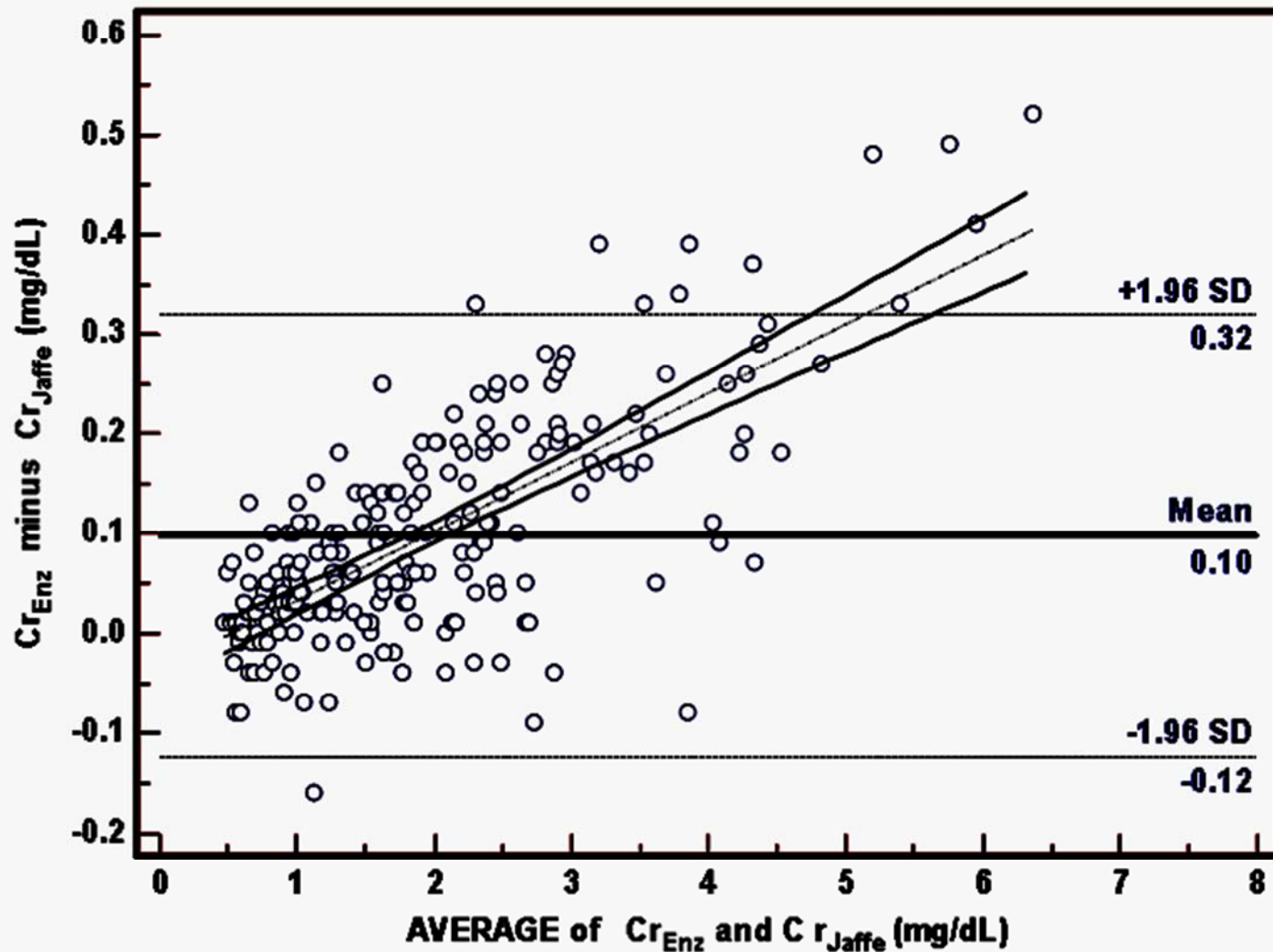
High prevalence of chronic kidney disease in Thailand (% Population)

Age subgroup (years)	Thailand	USA	Taiwan	P-value	
				USA	Taiwan
<i>Stage III CKD</i>					
Cockcroft-Gault					
40-59	8.1 (0.9)	0.8 (0.2)	NA	<0.001	
60-69	57.3 (3.1)	10.1 (1.1)	NA	<0.001	
>70	84.4 (2.7)	46.1 (1.2)	NA	<0.001	
All	25.5 (0.6)	12.3 (0.3)	NA	<0.001	
MDRD					
40-59	7.5 (0.8)	1.8 (0.3)	3.4 (2.0)	<0.001	0.17
60-69	31.7 (2.2)	7.6 (0.9)	21.7 (3.4)	<0.001	<0.012
>70	47.1 (3.2)	25.9 (1.1)	31 (3.7)	<0.001	<0.0014
Overall	16.3 (0.5)	8.1 (0.3)	NA	<0.001	

The need for eGFR equation validation in different Thai CKD population |



Disagreement between IDMS-traceable Cr_{Enz} and Jaffe's Cr



The need for robust validation for MDRD-based glomerular filtration rate estimation in various CKD populations

eGFR methods	Serum Cr	Equations
Reexpressed MDRD equation	Cr_{Enz}	$175 \times (Cr_{Enz})^{-1.154} \times (age)^{-0.203} (\times 0.742 \text{ if female})$
CKD-EPI equation [4]	$Cr_{Enz} \leq 0.7 \text{ mg/dL}$	$144 \times (Cr_{Enz}/0.7)^{-0.329} \times (0.993)^{Age}$
	$Cr_{Enz} > 0.7 \text{ mg/dL}$	$144 \times (Cr_{Enz}/0.7)^{-1.209} \times (0.993)^{Age}$
	$Cr_{Enz} \leq 0.9 \text{ mg/dL}$	$141 \times (Cr_{Enz}/0.9)^{-0.411} \times (0.993)^{Age}$
	$Cr_{Enz} > 0.9 \text{ mg/dL}$	$141 \times (Cr_{Enz}/0.9)^{-1.209} \times (0.993)^{Age}$
Chinese equation [5]	Cr_{Jaffe}	$175 \times (Cr_{Jaffe})^{-1.234} \times (age)^{-0.179} (\times 0.79 \text{ if female})$
Japanese equation [7]	Cr_{Enz}	$194 \times (Cr_{Enz})^{-1.094} \times (age)^{-0.287} (\times 0.739 \text{ if female})$

The need for robust validation for MDRD-based glomerular filtration rate estimation in various CKD populations

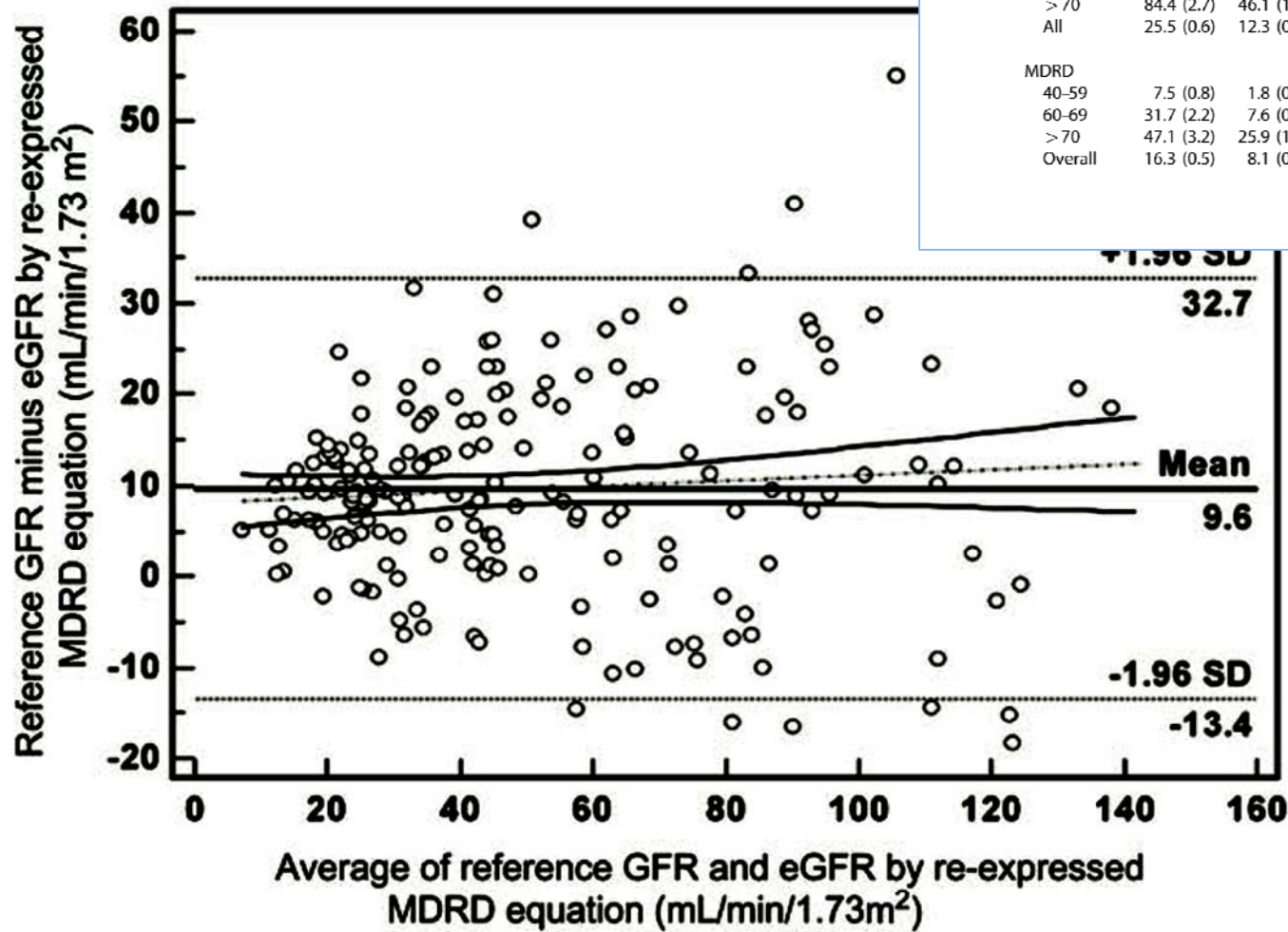
Characteristics	All (N = 350)
Age: years (mean \pm SD)	59.5 \pm 13.6
Weight: kg (mean \pm SD)	60.0 \pm 15.1
Height: cm (mean \pm SD)	1.61 \pm 0.08
Body mass index: kg/m ² (mean \pm SD)	25.3 \pm 4.8
Body surface area: m ² (mean \pm SD)	1.67 \pm 0.18
Proteinuria: g/day (mean \pm SD)	0.87 \pm 0.60
Hematuria > 3 cells/hpf; % case	24.8%
Serum creatinine (Cr _{ENZ}): mg/dL (mean \pm SD)	2.02 \pm 1.32
Serum BUN: mg/dL (mean \pm SD)	26.52 \pm 17.12
Albumin: g/dL (mean \pm SD)	4.1 \pm 0.3
Reference GFR: mL/min/1.73 m ² (mean \pm SD)	55.86 \pm 30.40
DM: (% case)	33.5%
Mean arterial pressure: mmHg (mean \pm SD)	99.0 \pm 14.0

Re-expressed MDRD

High prevalence of chronic kidney disease in Thailand (% Population)

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>70	47.1 (3.2)	25.9 (1.1)	31 (3.7)	<0.001	<0.0014
Overall	16.3 (0.5)	8.1 (0.3)	NA	<0.001	

Kidney International (2008) **73**, 473-479



eGFR Equation for Thai

$$\ddagger \text{GFR} = 375.5 \times \text{Cr}_{\text{enz}}^{(-0.848)} \times \text{Age}^{(-0.364)} \times 0.712 \text{ (if female)}$$

$$\text{eGFR} = 175 \times \text{Cr}_{\text{Enz}}^{(-1.154)} \times \text{Age}^{(-0.203)} \times 0.742 \text{ (if female)} \times 1.129 \text{ (if Thai)}.$$

We recommend that clinical laboratories should (*IB*):

- measure serum creatinine using an assay with calibration traceable to the international standard reference material.
- report eGFR_{creat} in addition to the serum creatinine concentration in adults and specify the equation used whenever reporting eGFR.
- report eGFR in adults using the 2009 CKD-EPI creatinine equation. An alternative creatinine-based GFR estimating equation is acceptable if it has been shown to improve accuracy of GFR estimates compared to the 2009 CKD-EPI creatinine equation.



ลำดับ รายการ	ผล	หน่วย	ค่าปกติ
BIOCHEMISTRY			
1 Glucose	102	mg%	70-110
2 BUN	12.85	mg%	5-25
3 Creatinine	1.54	mg%	0.5-1.5
4 Cholesterol	299	mg%	120-240
5 Triglyceride	261	mg%	10-190
6 eGFR	35.66	mL/min/1.73m²	

eGFR by CKD EPI & Thai (enz.)

CKD EPI (n)	Thai (enz.) (n)					Total (n)
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	
Stage 1	357	5	0	0	0	362
Stage 2	43	304	0	0	0	347
Stage 3	0	38	130	0	0	168
Stage 4	0	0	8	8	0	16
Stage 5	0	0	0	0	6	6
Total (n)	400	347	138	8	6	899



CKD

- Dx of CKD
- Identification of patient at risk
- Outcome of RRT
- Unique Thai CKD

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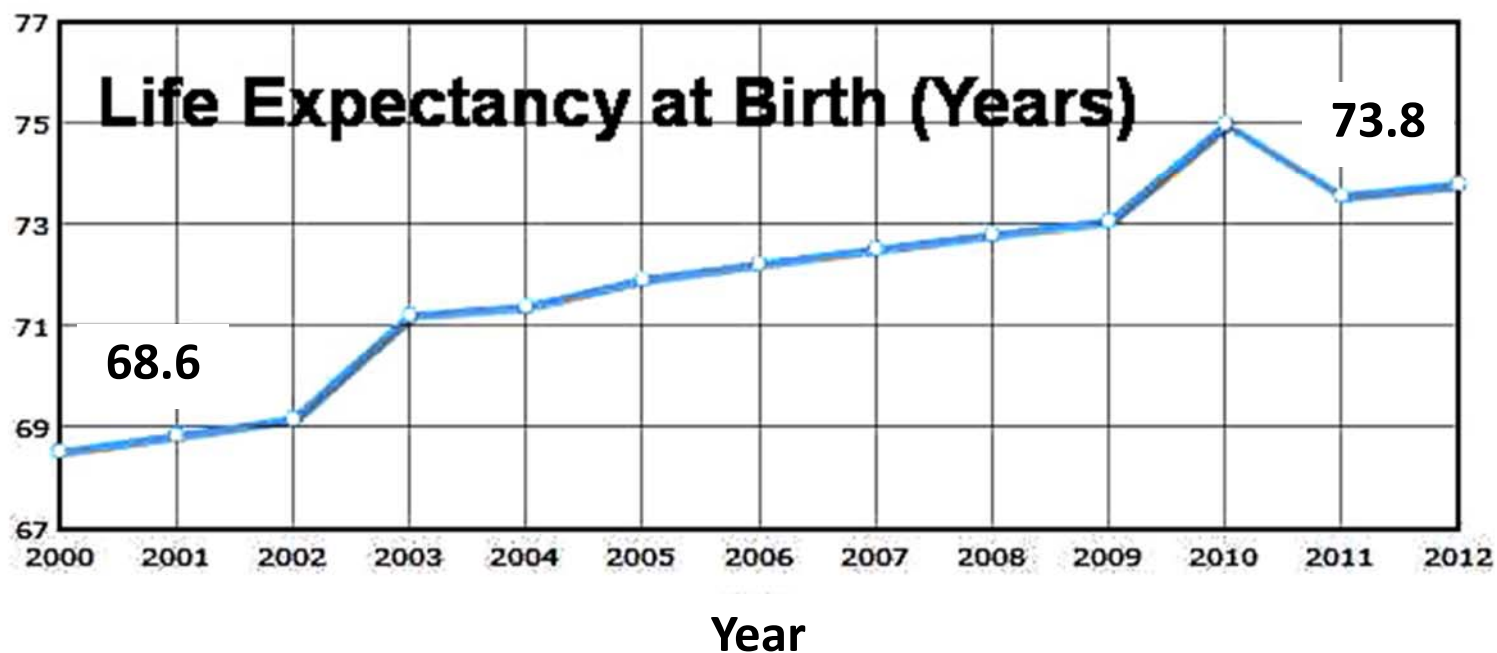
Prevalence of dialysis cases by age group in 2008-2012



Age groups (years)	2008: Cases (pmp)	2009: Cases (pmp)	2010: Cases (pmp)	2011: Cases (pmp)	2012: Cases (pmp)
0-19	159 (8.42)	194 (10.22)	288 (10.27)	464 (24.24)	576 (29.91)
20-44	4,784 (172.58)	5,733 (205.66)	6,364 (226.97)	8,030 (285.59)	8,712 (308.01)
45-64	9,687 (781.84)	12,125 (972.02)	15,048 (1,199.36)	18,968 (1,507.55)	20,75 (1640.09)
65-74	5,077 (1,726.87)	6,004 (2,022.55)	7,481 (2,505.50)	8,502 (2,839.45)	9,543 (3168.33)
>75	3,183 (2,630.57)	4,029 (3,299.67)	5,706 (4,646.04)	5,486 (4,460.16)	6,621 (5344.23)

Trend of Life Expectancy of Thais (2000 – 2012)

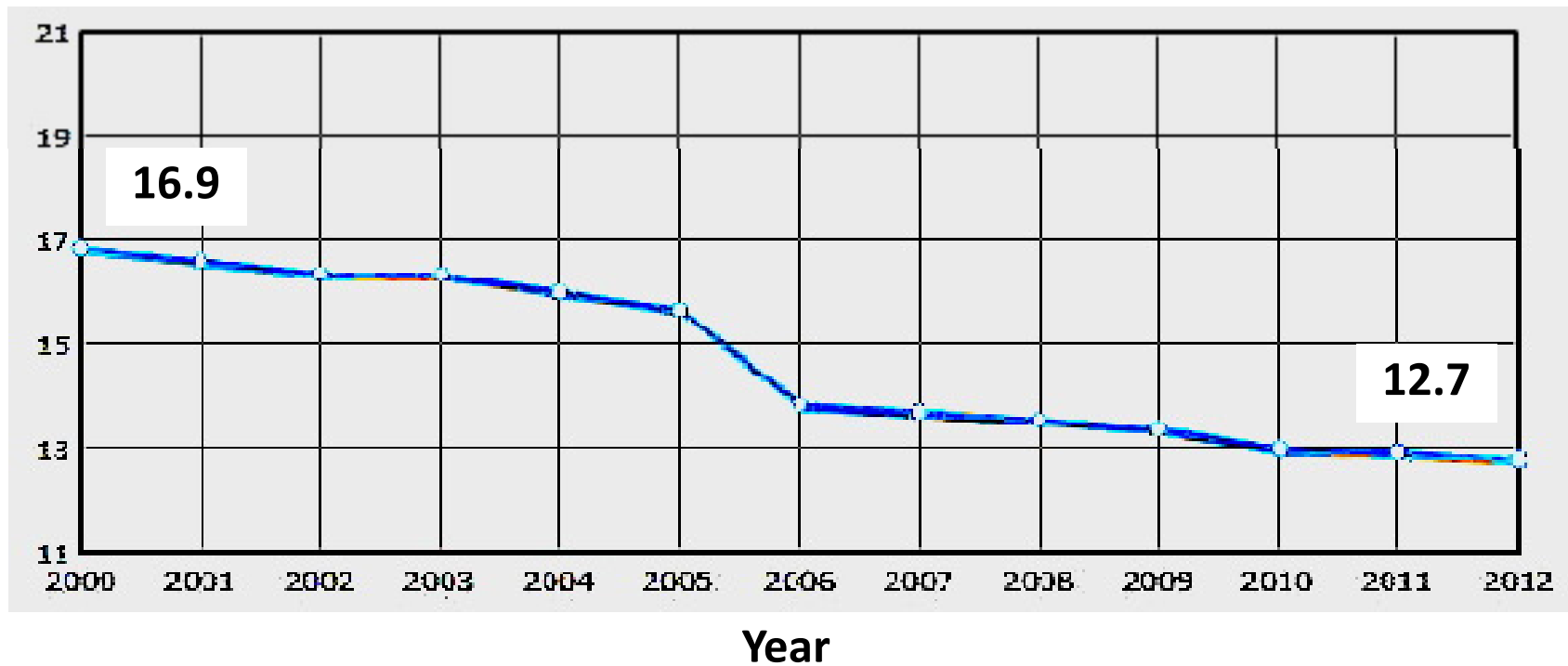
Age (Year)



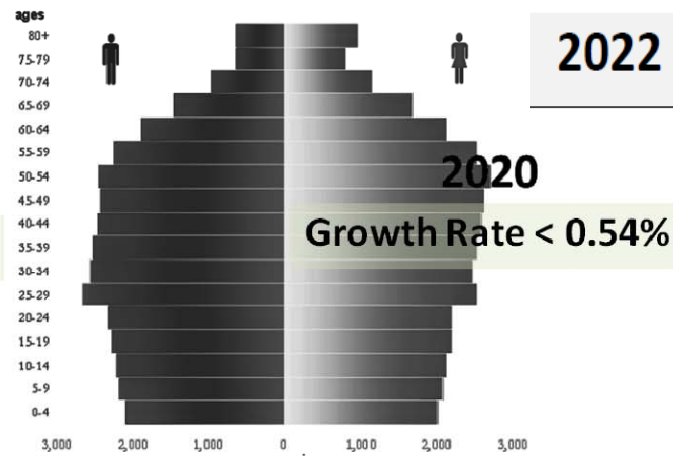
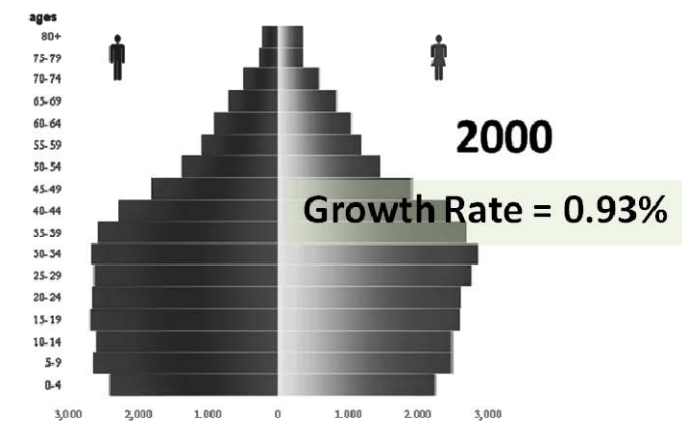
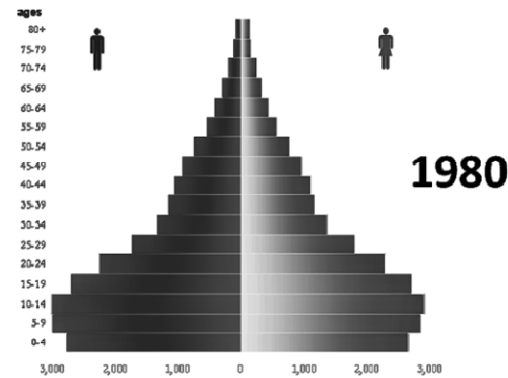
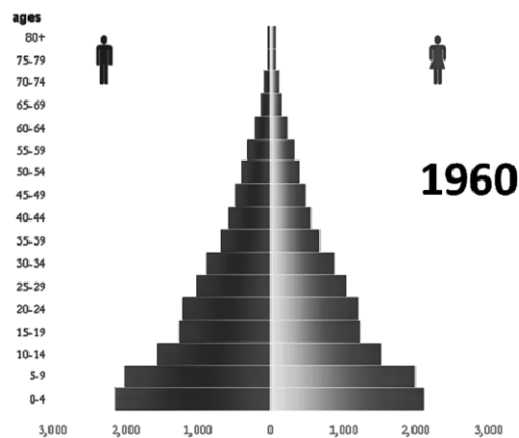
Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Thailand	68.55	68.86	69.18	71.24	71.41	71.95	72.25	72.55	72.83	73.1	75.02	73.6	73.83

Trend of Birth Rate of Thais (2000 – 2012)

Birth Rate (Birth/1000 Population)



Demographic Transition of Thais

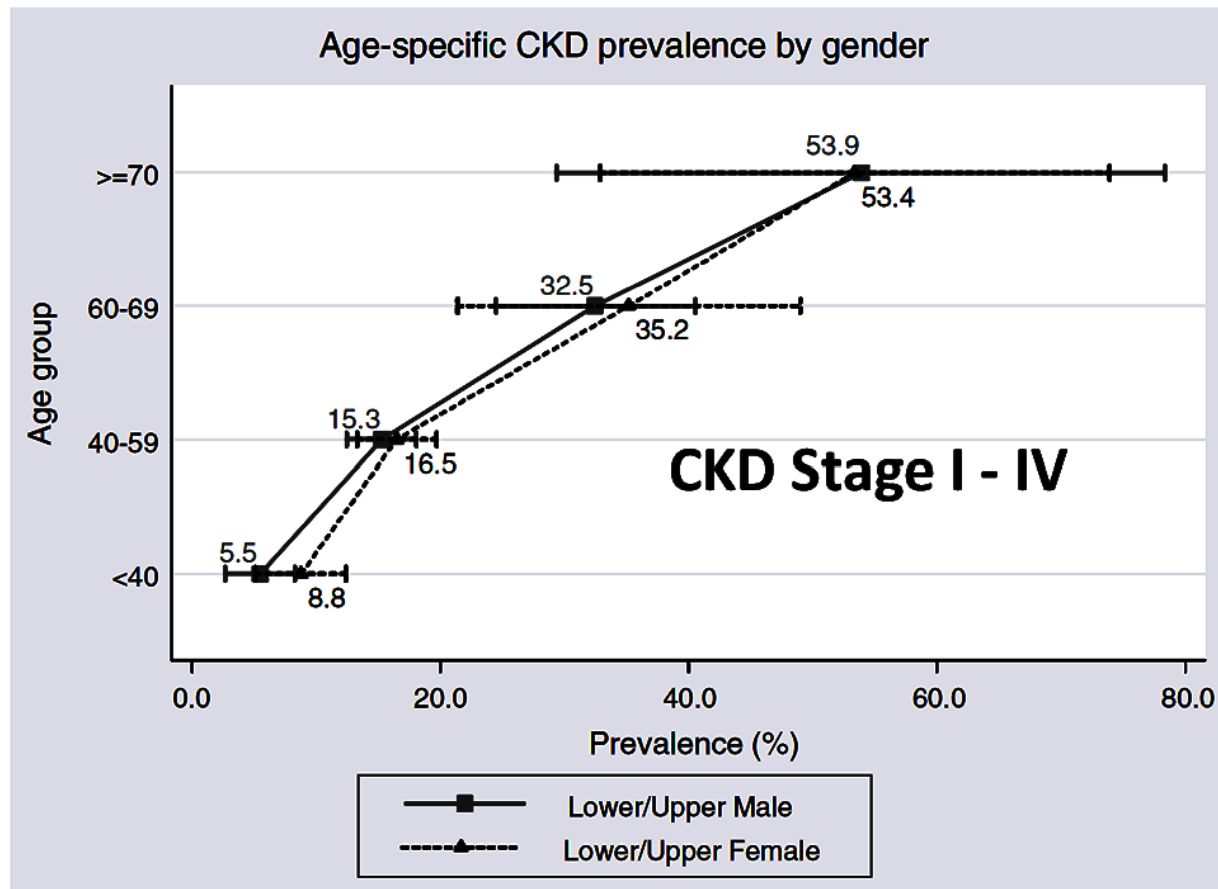


Year	Population Age > 60 Years
2007	16.0 %
2012	18.7 %
2017	22.8 %
2022	24.0 %

Source - Statistics Thailand 1960, 1980, 2000. National Statistics Organization.
Population Projection 2020. Institute for Population and Social Research, Mahidol University

Prevalence and risk factors of chronic kidney disease in the Thai adult population: Thai SEEK study

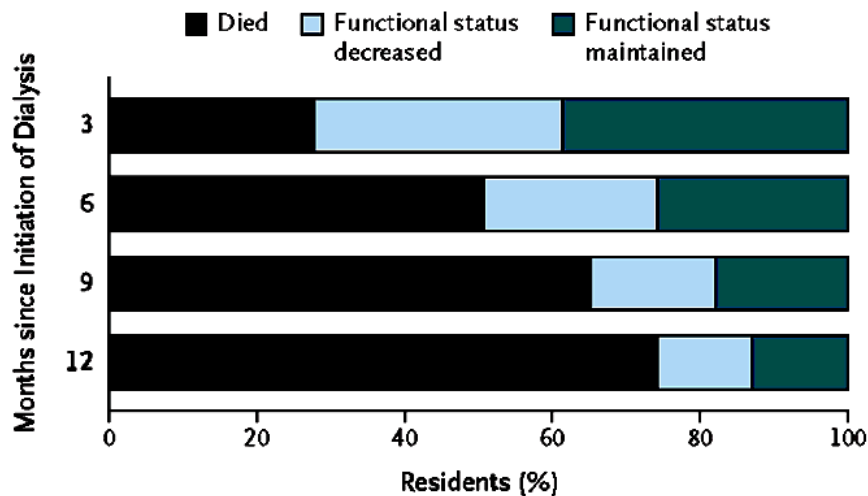
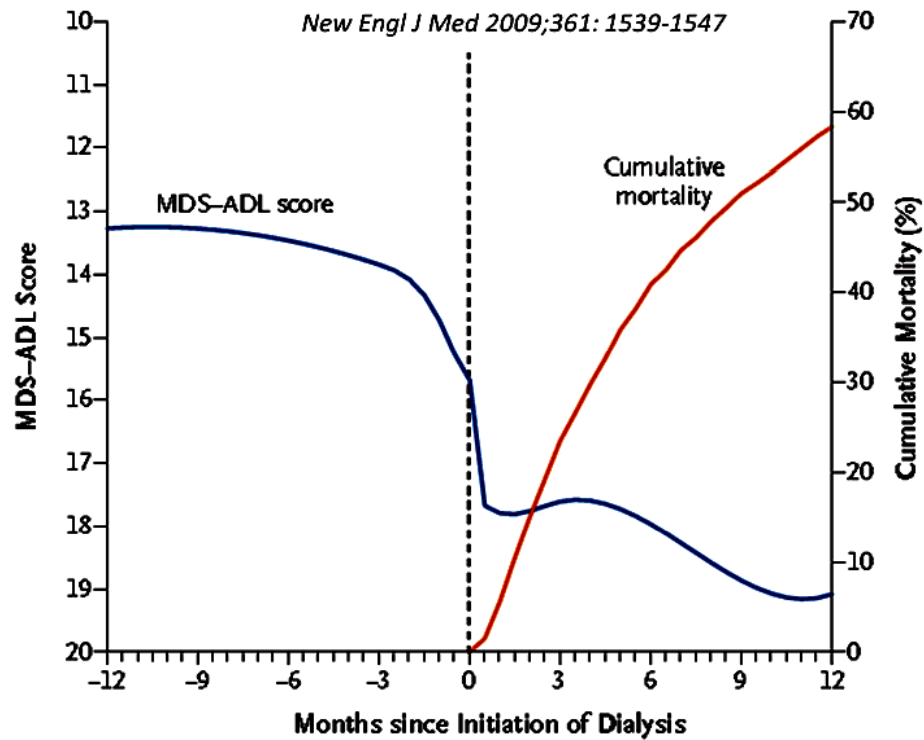
Atiporn Ingsathit¹, Ammarin Thakkinstian¹, Amnart Chaiprasert², Pornpen Sangthawan³, Pongsathorn Gojaseni⁴, Kriwiporn Kiattisunthorn⁵, Leena Ongaiyooth⁵, Somlak Vanavanan⁶, Dhavee Sirivongs⁷, Prapaipim Thirakhupt⁸, Bharati Mittal⁹, Ajay K. Singh⁹ and the Thai-SEEK Group



Prevalence of CKD in Thai Adults: A National Health Survey

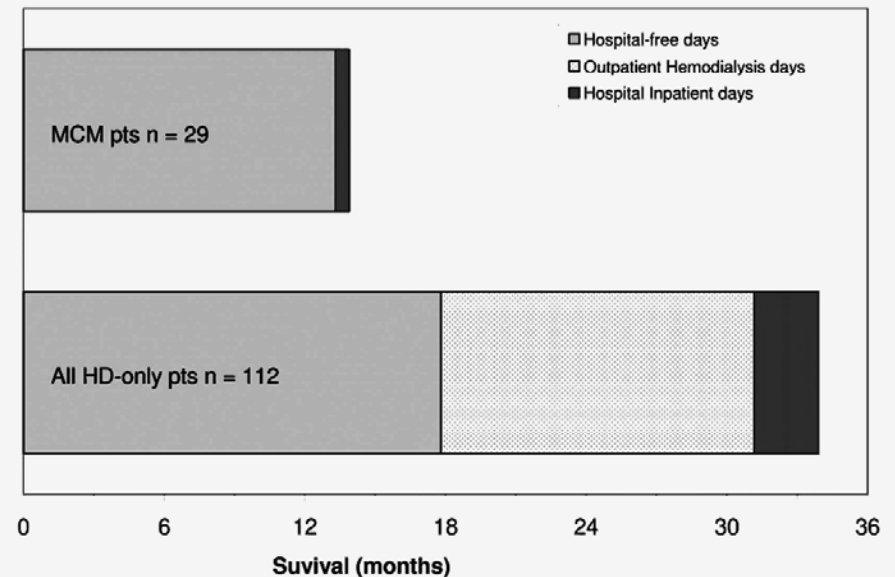
	Stage3	Stage4	Stage5	Total
Total	8.1 (7.3, 9.1)	0.2 (0.1, 0.5)	0.2 (0.1, 0.4)	8.9 (8.0, 9.9)
Sex				
Men	4.8 (3.8, 6.0)	0 (0, 0.4)	0.1 (0, 0.6)	5.5 (4.3, 6.8)
Women	11.4 (10.1, 12.9)	0.4 (0.2, 0.8)	0.2 (0.0, 0.6)	12.3 (10.8, 13.8)
Age group (yr)				
15-29	0.2 (0, 1.3)	0	0	0.4 (0.1, 1.2)
30-44	1.5 (0.7, 3.0)	0	0.2 (0, 1.1)	2.3 (1.3, 4.1)
45-59	12.4 (9.5, 16.0)	0.3 (0, 2.0)	0.2 (0, 1.7)	13.1 (10.1, 16.8)
≥ 60	37.7 (33.6, 42.0)	1.4 (0.5, 3.5)	0.5 (0.1, 2.2)	39.8 (35.6, 44.1)

Functional Status of Elderly Adults before And after Initiation of Dialysis N=3702, Age 73.2 ± 10.9 years



Maximum Conservative Management for Elderly ESRD, N = 202, Age > 70 years

Distribution of Days Survived:
Hospital-free Days, Outpatient Hemodialysis Days
and Hospital Inpatient Days



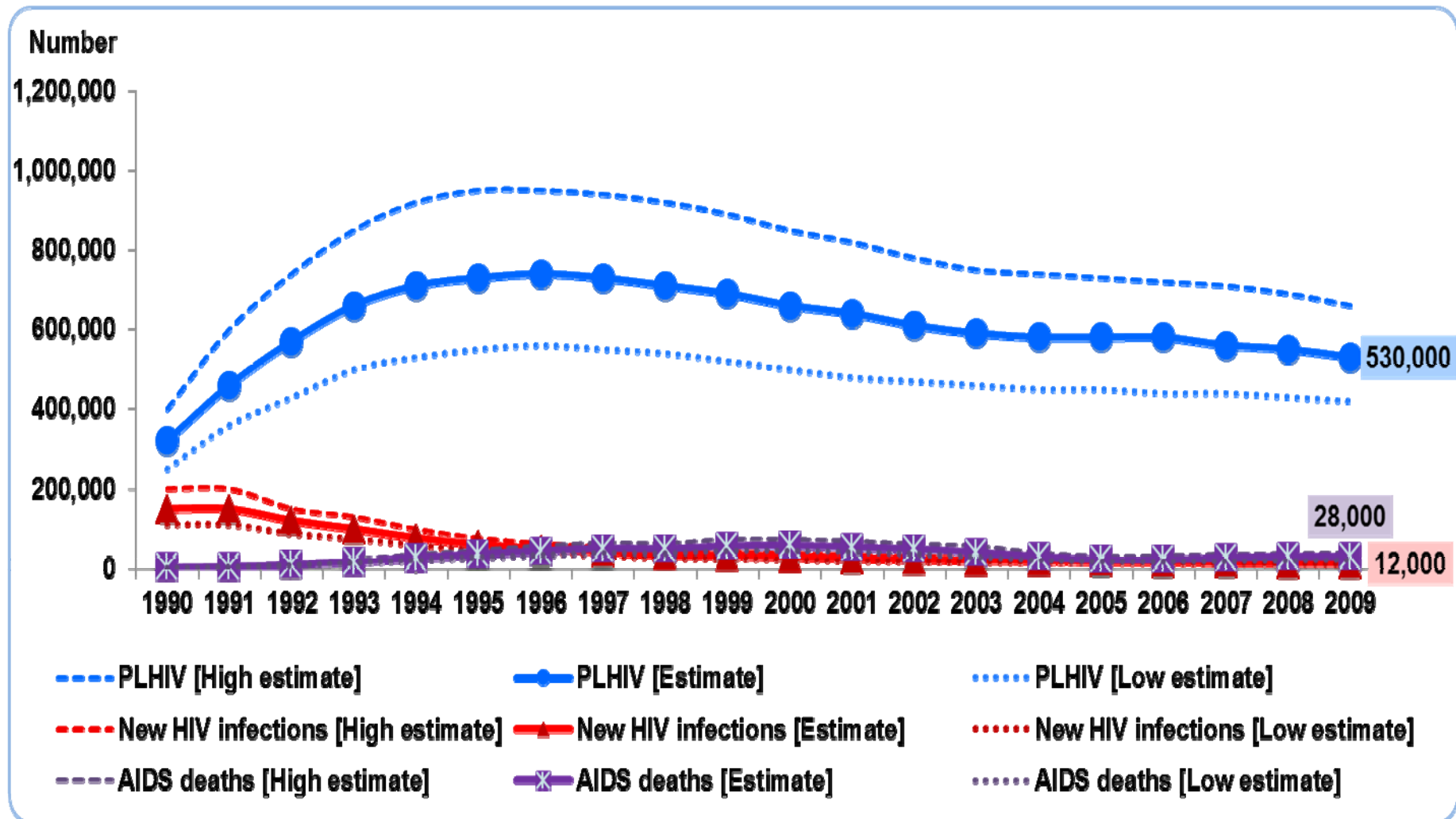
Carson RC et al. Clin J Am Soc Nephrol 2009;4:1611-1619

The National Health Commission of Thailand



ผู้ป่วยบางคนต้องให้อาหารทางสายยางผ่าน
ช่องจมูกหรือช่องท้อง ญาติควรเตรียมอาหารตาม
สูตรและปริมาณที่ได้รับคำแนะนำจากแพทย์ ควร
ให้อาหารตามเวลา รวมทั้งดูแลความสะอาด
บริเวณที่สอดสายยาง สายยาง
กระบอกให้อาหาร ด้วยการ
ล้างด้วยน้ำสะอาด ผึ่งให้
แห้งและเก็บไว้ในภาชนะ
ที่มิดชิด

Estimated number of adults and children living with HIV, new infections and AIDS deaths, 1990-2009



Source: Prepared by www.aidsdatahub.org based on [UNAIDS. \(2010\). Global Report: UNAIDS Report on the Global AIDS Epidemic.](#)

Renal Pathology and HIV Infection

Kearkiat Praditpornsilpa, MD, Sophon Napathorn, MD, Saowanee Yenrudi, MD, Pongsak Wankrairo, MD, Kriang Tungsaga, MD, and Visith Sitprijia, MD, PhD

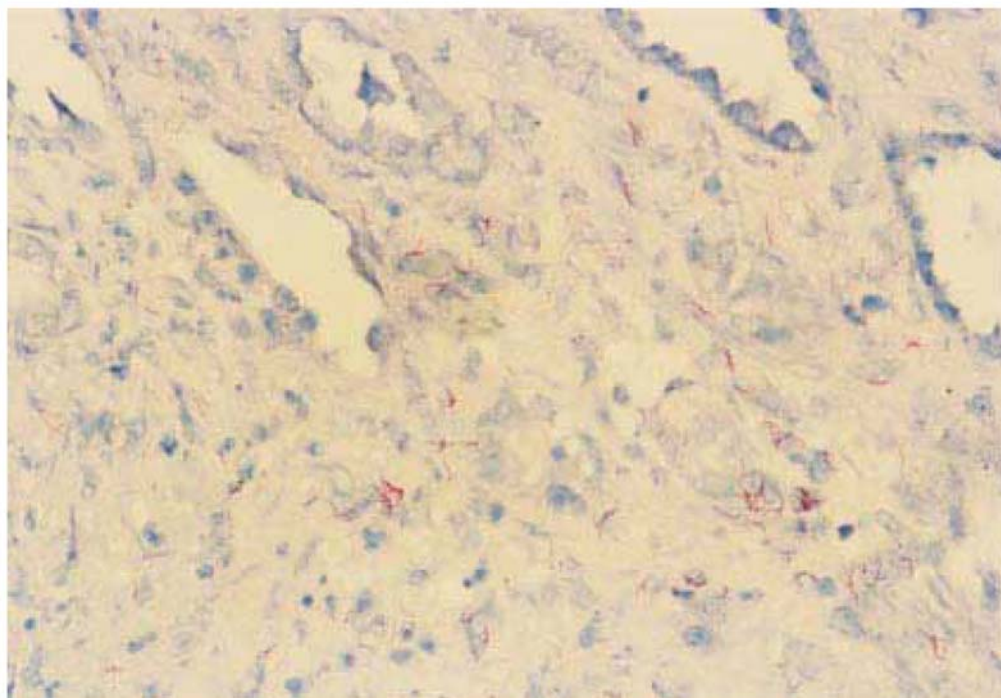


Fig 1. Numerous acid-fast bacilli (AFB)-positive staining bacilli are present in the interstitial tissues of noncaseating granuloma. (Original magnification $\times 1,000$.)

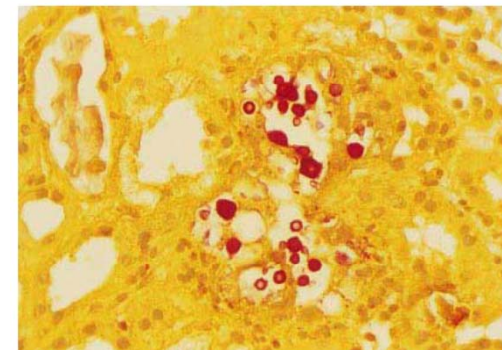


Fig 3. Positive mucin-staining small round organisms are present in the interstitial tissues. (Original magnification $\times 1,000$.)

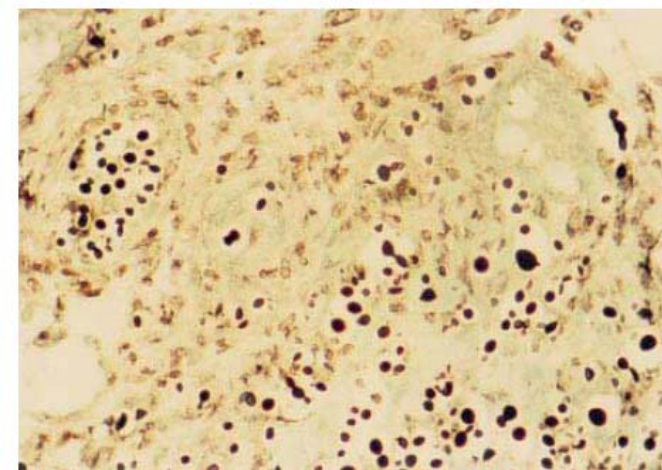


Fig 2. Positive Gomori's methanamine silver (GMS)-staining small round organisms are present in the interstitial tissues. (Original magnification $\times 1,000$.)

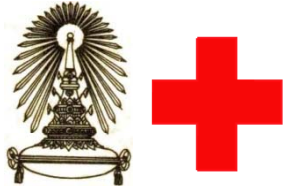
CKD in HIV-infected Thais

- Assessment of CKD in 1317 HIV+ Thais
 - Prevalence 22%
 - Associated with:
 - Age >50 (HR 2.1; 95% CI 1.5-3.0)
 - IDV exposure (HR 3.1; 95% CI 2.5-3.8)
 - DM (HR 1.8; 95% CI 1.3-2.4)
 - TDF exposure (HR 1.6; 95% CI 1.2-2.3)

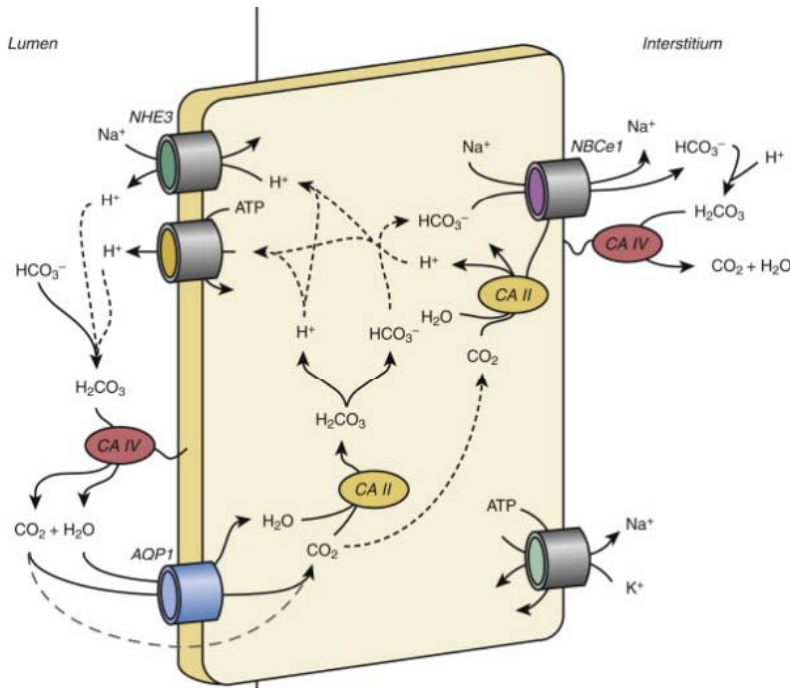
“Close monitoring of renal function is warranted among Asian patients with these risk factors”

Avihingsanon A, Praditpornsilpa K et al., CROI 2011. Boston.

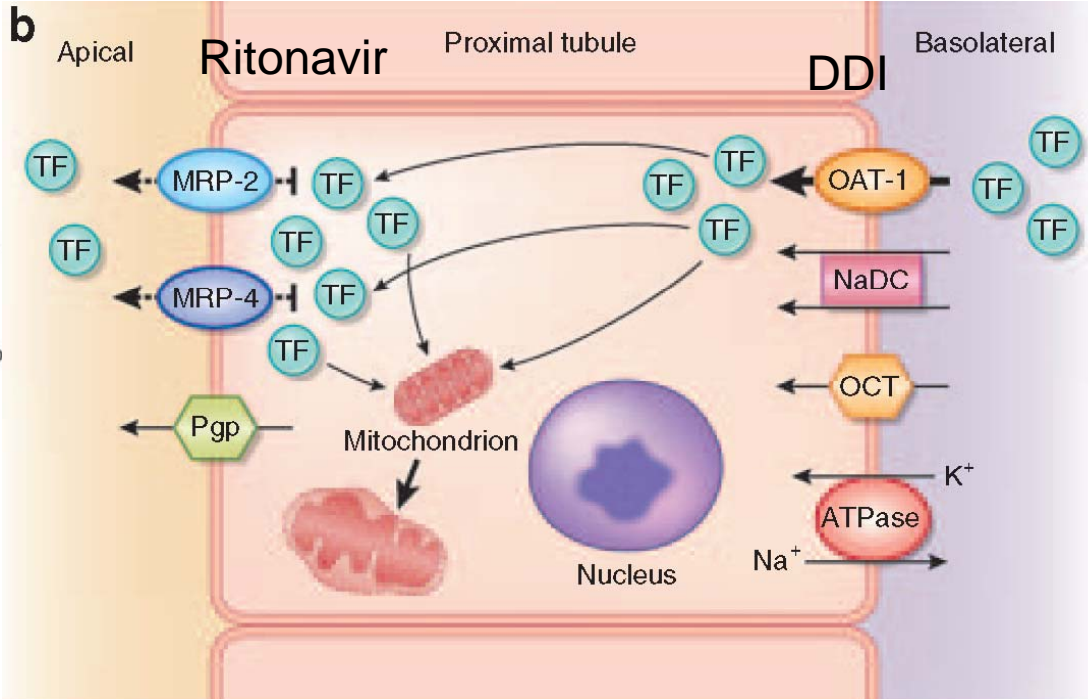
Tenofovir Nephrotoxicity



Phosphate
Glucose
Uric acid
Amino acid

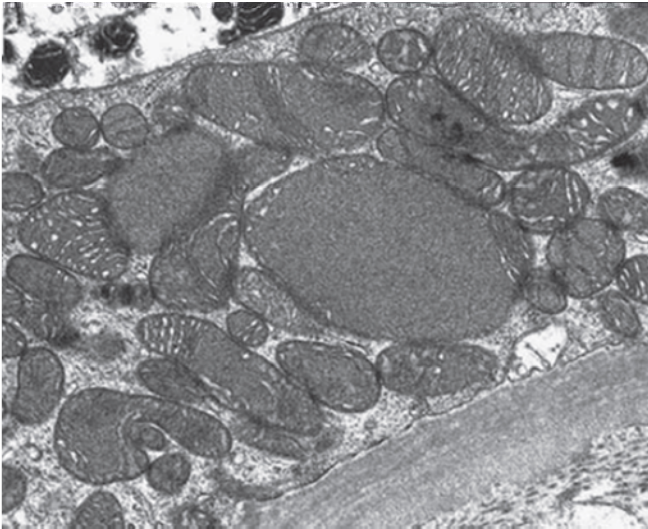
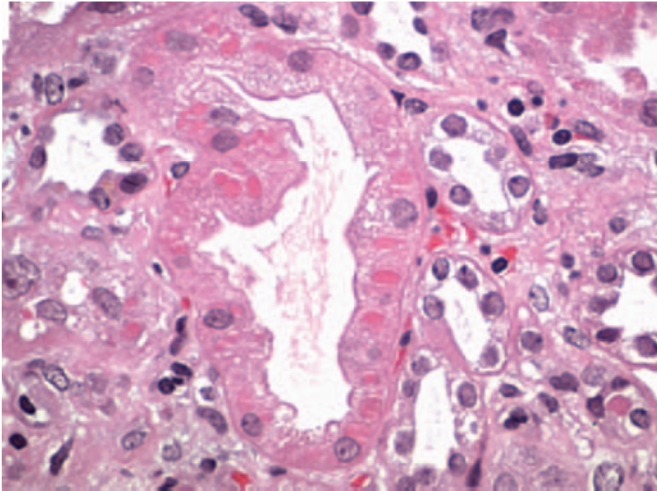


Urine RBP/Cr ratio
Urine B2M, NGAL



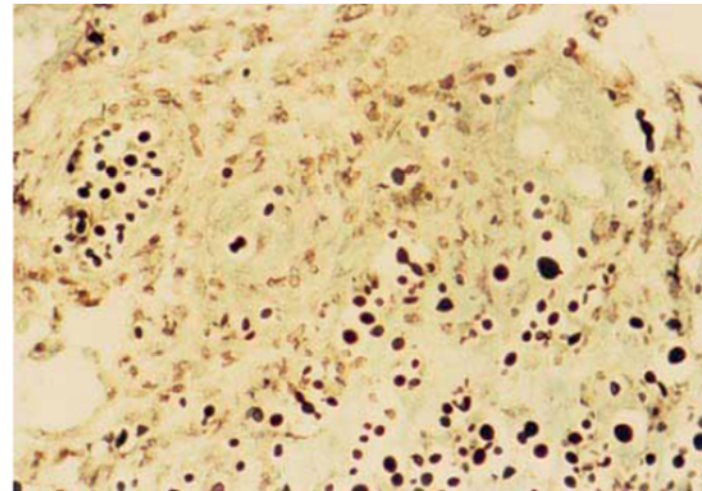
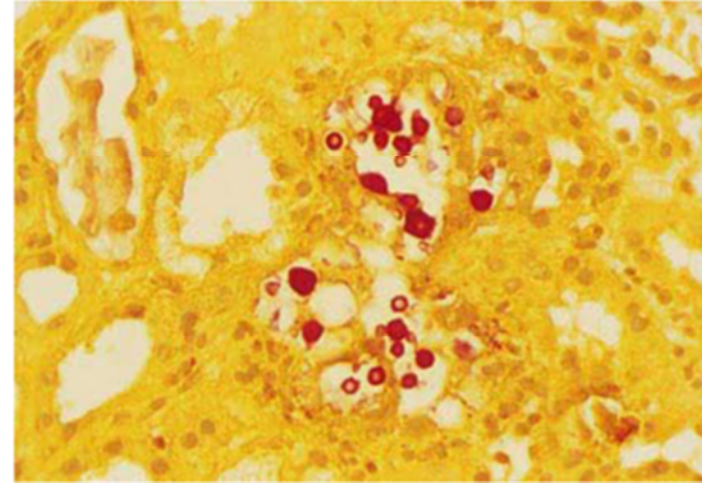
Brenner & Rector The Kidney 9th Edition
Perazella MA. Kidney Int 2010;78:1060-1063

Tenofovir nephrotoxicity



Zimmerman AE. *Clin Infect Dis* 2006;42 283-290
Herlitz LC. *Kidney Int* 2010;78:1171-1177

HIV renal disease in pre-HAART era



Praditpornsilpa K et al. *Am J Kidney Dis* 1999;33:282-286



Increased risk of Subclinical Kidney Tubular abnormalities in HIV-infected individuals on long term Antiretroviral Therapy: Asian cohort perspective

Anchalee Avihingsanon^{1,2}, Kearkiat Praditpornsilpa³, Reshmie Ramautarsing¹, Jiratchaya Wongsabut¹, Amanda Clark¹, Wirach Maek-a-nantawat¹, Sasiwimol Ubolyam², Yingyos Avihingsanon³, Narin Hiransuthikul⁴, Kiat Ruxrungham^{1,2}

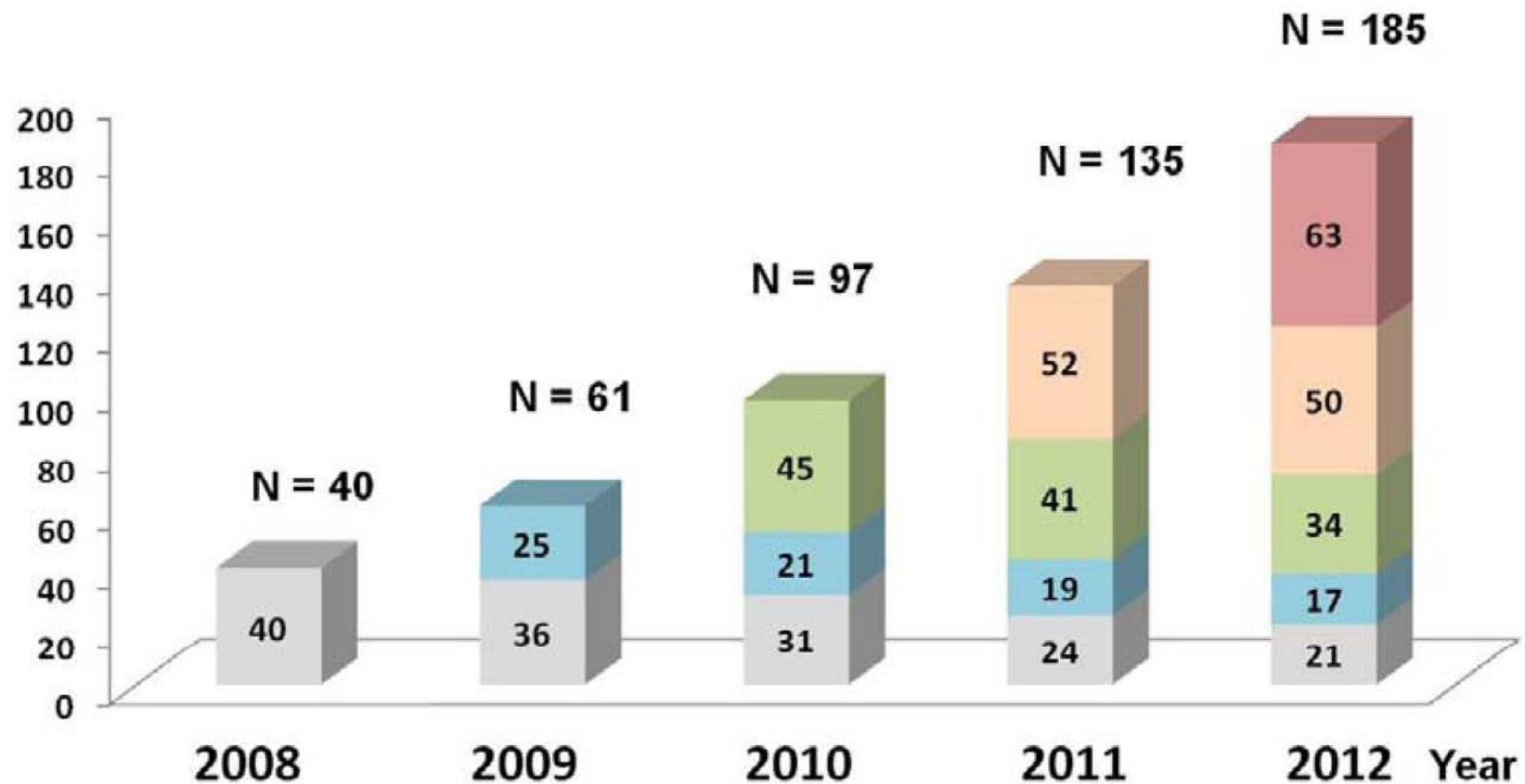
671 ARV exposure (88 boosted atazanavir) with PRTD; hyperphosphaturia (TmP/GFR < 2.5 mg/dL)

	PRTD	HR	95% CI	<i>p</i>
• Male		2.67	1.51 – 4.72	0.001
• Indinavir		2.23	1.06 – 4.70	0.035
• TDF Plasma concentration > 0.16 mg/L		2.04	1.18 – 3.51	0.01

Yearly prevalence trend of HIV positive Patients in 2008-2012



HIV positive cases



Comparisons between validated estimated glomerular filtration rate (GFR) equations and isotopic GFR in HIV patients

N = 196

	Mean \pm SD	Median
Age (years)	43.6 \pm 7.8	43.2
Body weight (kg)	59.0 \pm 10.9	56.6
Height (meter)	1.63 \pm 0.82	1.62
ARV vintage (years)	8.6 \pm 3.5	8.7
HIV Viral load (copies/ml)	2,647.9 \pm 18,590.2	50.0
CD4 count (cells/uL)	610.3 \pm 241.5	585.5
CD4 (%)	28.0 \pm 7.8	24.0
BMI (kg/m ²)	22.3 \pm 3.2	21.9
BSA (m ²)	1.63 \pm 0.18	1.60
Skeletal muscle mass (kg)	24.6 \pm 5.6	23.9
Body fat mass (kg)	13.7 \pm 6.5	13.1
Fat free mass (kg)	45.0 \pm 9.2	44.2
Soft lean mass (kg)	42.5 \pm 8.7	41.5
MAP (mmHg)	91.0 \pm 11.5	90
BUN (mg/dL)	12.41 \pm 4.96	12.00
Serum creatinine (mg/dL)	0.91 \pm 0.29	0.90
Urine protein (mg/day)	439.6 \pm 1095.7	220.0
Total cholesterol (mg/dL)	204.1 \pm 45.9	196
Serum triglyceride (mg/dL)	152.0 \pm 96	119
HDL (mg/dL)	50.9 \pm 16.6	49
Plasma glucose (mg/dL)	92.1 \pm 25.1	87.0
Serum phosphate (mg/dL)	3.52 \pm 0.53	3.50

Comparisons between validated estimated glomerular filtration rate (GFR) equations and isotopic GFR in HIV patients

	Mean GFR \pm SD (mL/min/1.73m ²)	Mean bias \pm SD (mL/min/1.73m ²)
Reference GFR	117.7 \pm 29.2	NA
eGFR by reexpressed MDRD	98.7 \pm 26.1	18.9 \pm 27.3
eGFR by CKD-EPI equation	106.6 \pm 11.9	11.1 \pm 25.5
eGFR by Thai racial factor	111.5 \pm 29.5	6.2 \pm 28.8
eGFR by Thai equation	104.1 \pm 23.4	15.4 \pm 27.0
Cockcroft & Gault	86.4 \pm 29.2	30.4 \pm 28.0
eGFR by Cystatin C	114.0 \pm 36.1	3.2 \pm 36.1
CrCl by 24 hr urine	112.3 \pm 31.4	5.0 \pm 12.1

Average Body Mass Index

1980

2008

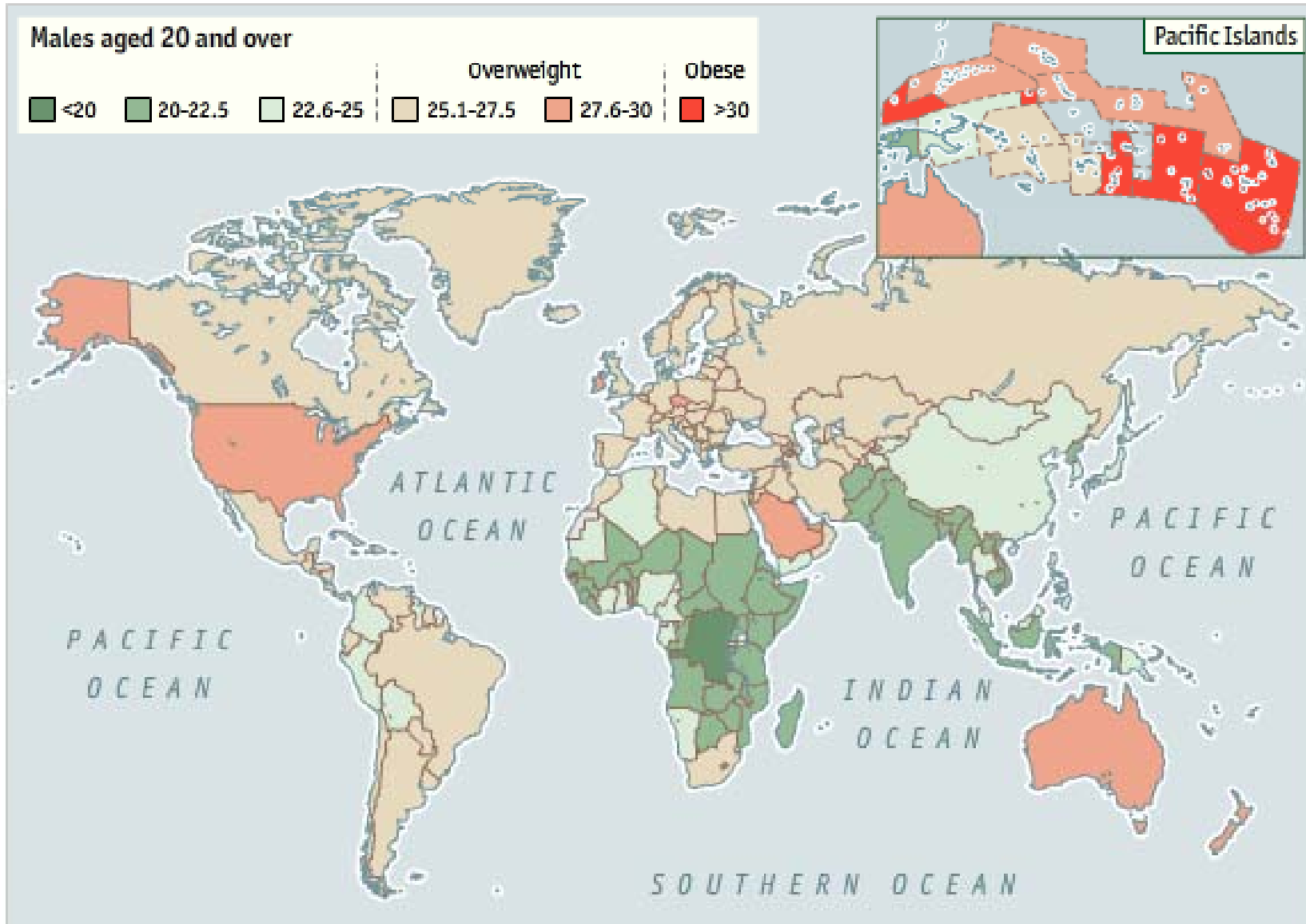
% change

Average Body Mass Index

1980

2008

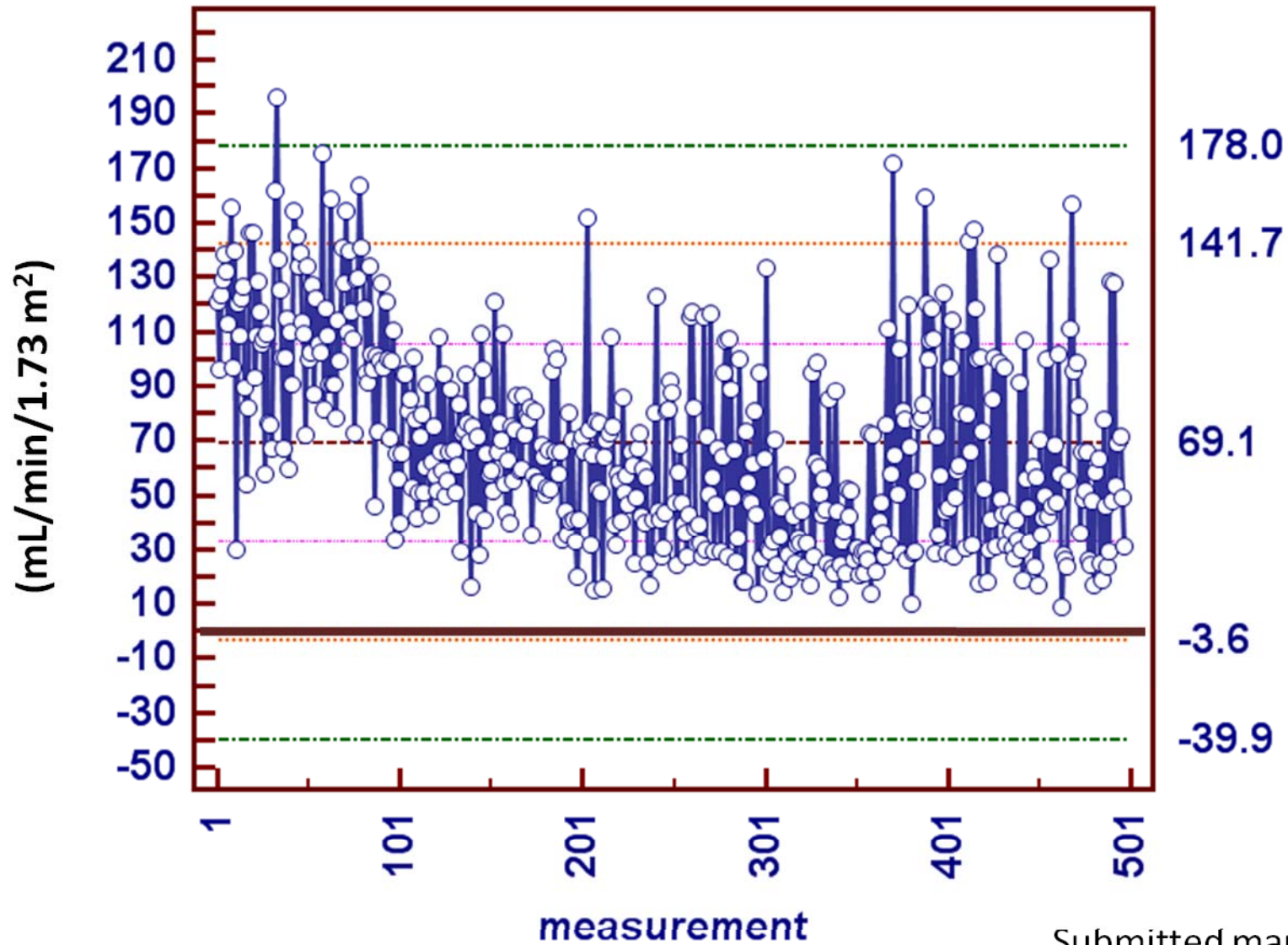
% change



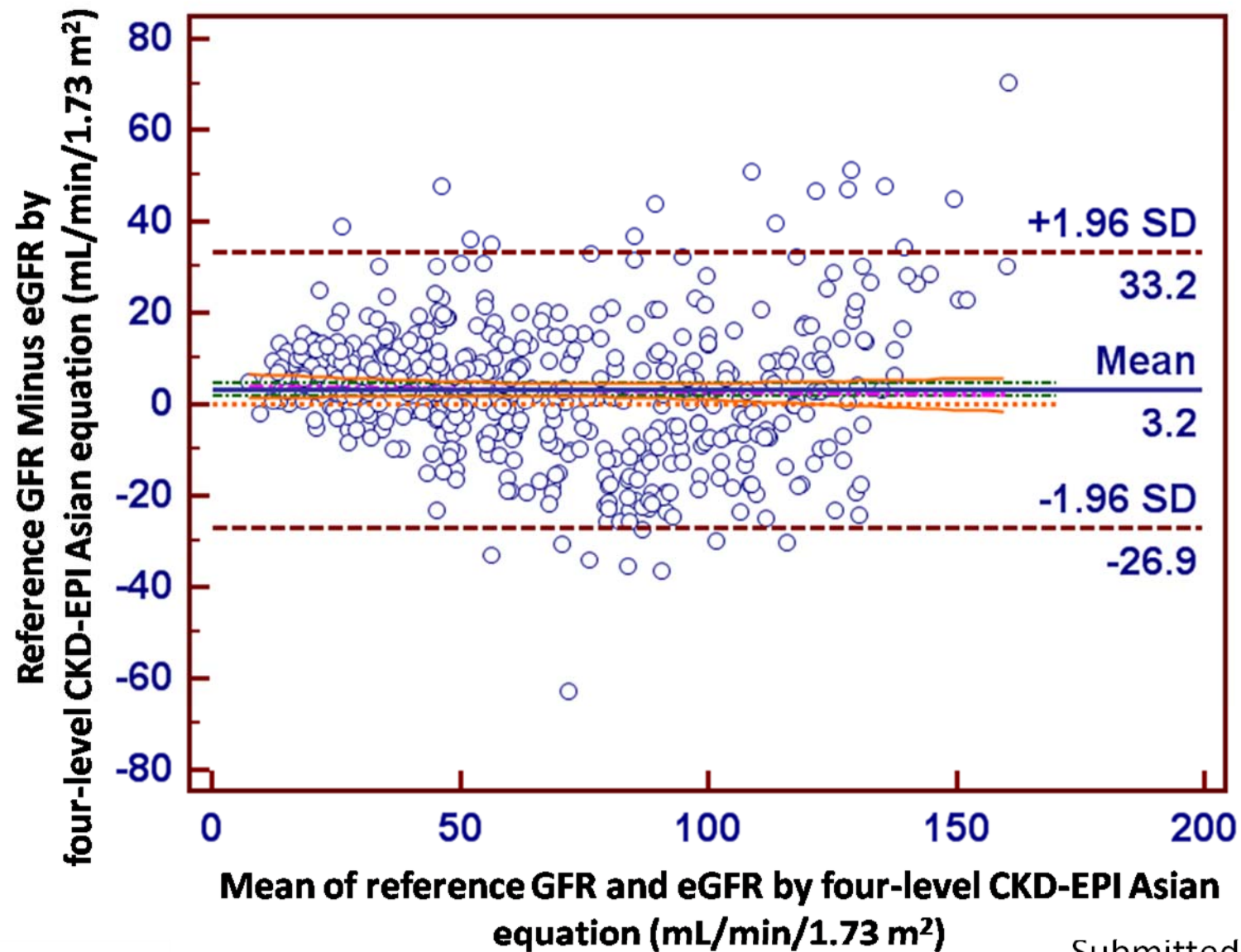
Compilation of Data

	All	Obesity	Non-obesity
• Number	526	125	401
• Age (years)	56.1±16.2	47.2±14.8	59.9±15.3
• Body weight (kg)	71.3±18.8	89.2±18.5	63.8 ± 13.1
• Height (meter)	1.61±0.08	1.59 ±0.08	1.61±0.08
• Body mass index (kg/m ²)	27.5±6.6	35.4±5.7	24.1±3.3
• Body surface area (m ²)	1.74±0.22	1.92±0.21	1.66±0.18
• BUN (mg/dL)	23.9±16.9	18.0 ±15.2	26.5 ± 16.9
• Serum creatinine (mg/dL)	1.68±1.34	1.10 ±1.04	1.93±1.38
• Serum albumin (g/dL)	4.2 ±0.3	4.1 ±0.3	4.2 ± 0.4
• Reference GFR (mL/min per 1.73 m ²)	69.0±38.7	96.8±39.8	57.9±32.2

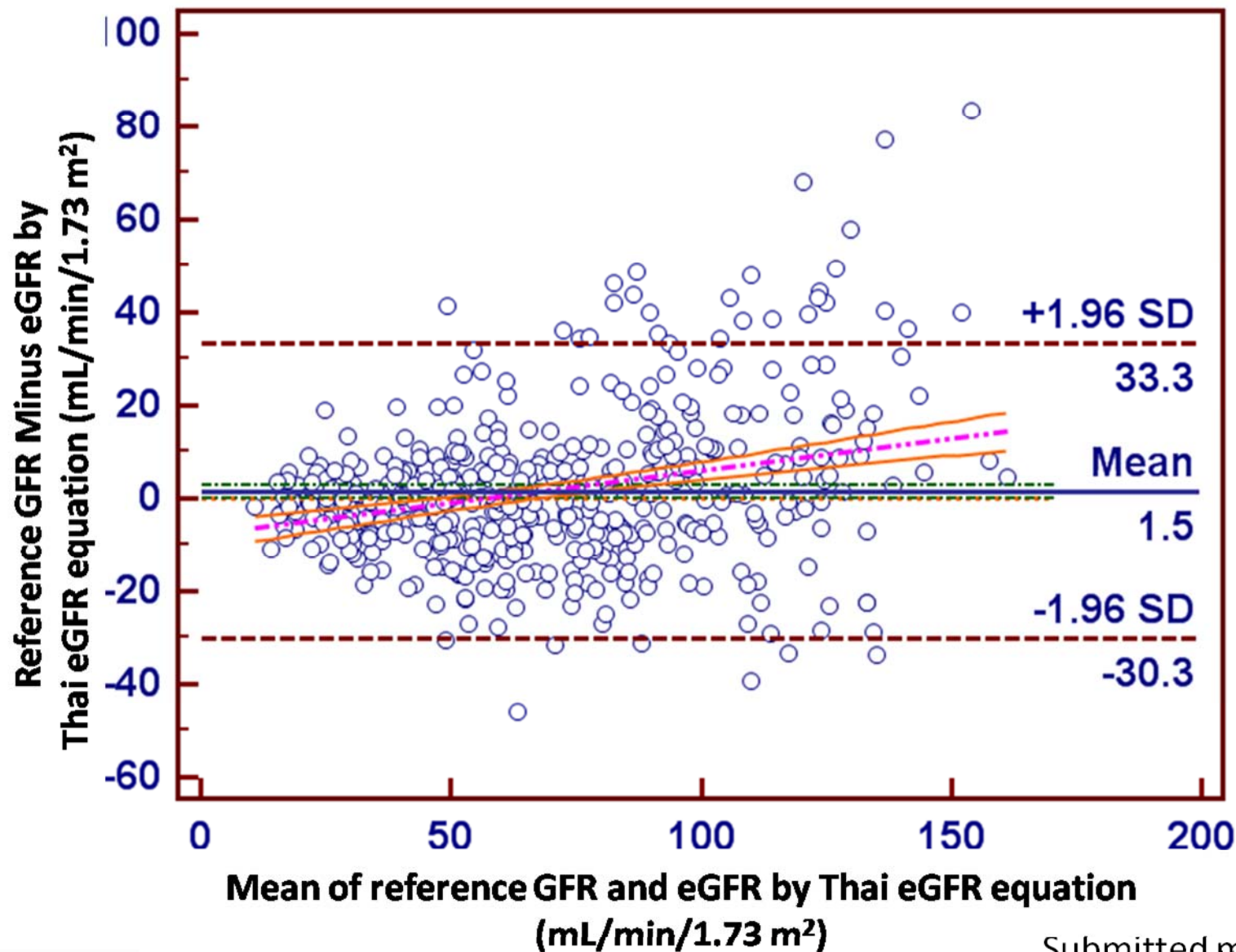
Reference GFR in all cases (mL/min/1.73 m²), N = 526



Mean bias between reference GFR and eGFR by four-level race
CKD-EPI Asian equation (mL/min/1.73 m²), N = 526



Mean bias between reference GFR and eGFR by Thai equation (mL/min/1.73 m²), N = 526





CKD

- Dx of CKD
- Identification of patient at risk
- Outcome of RRT
- Unique Thai CKD

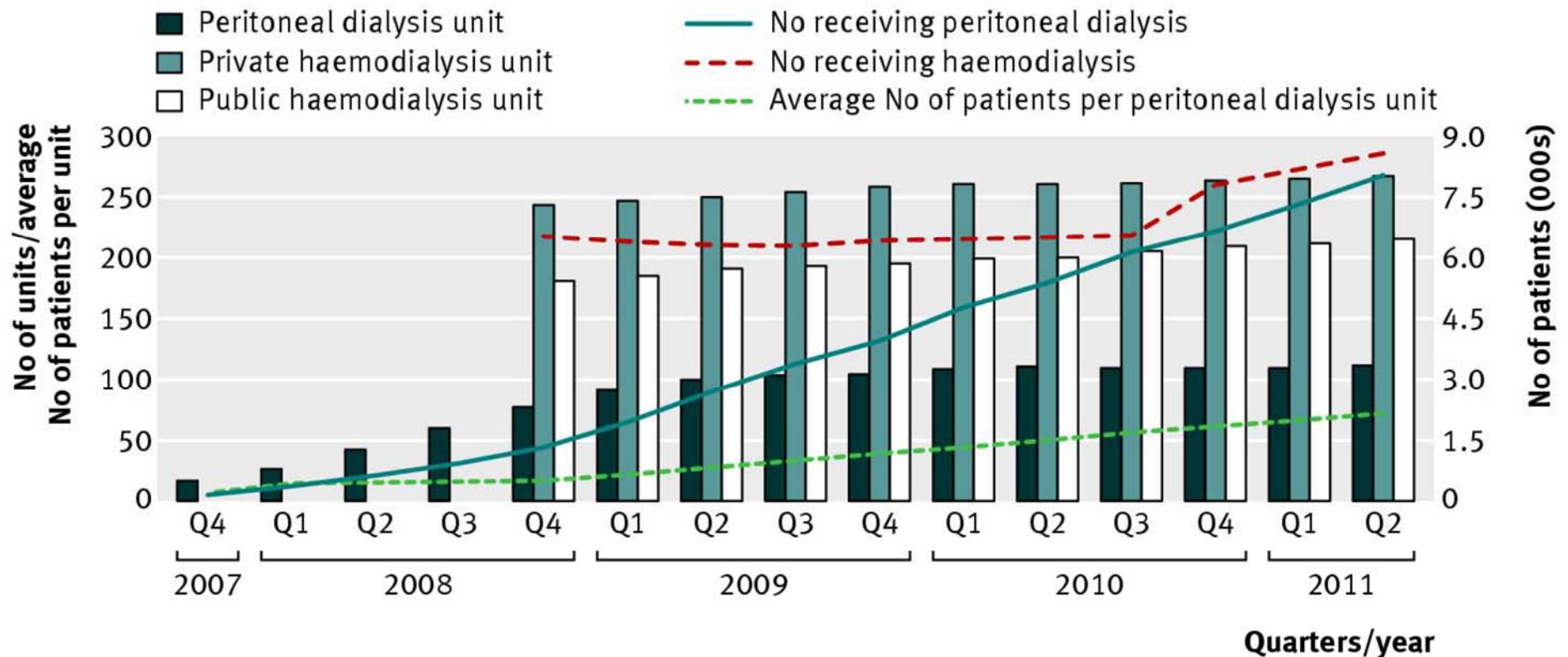
Data

Information

Knowledge

Implementation

Universal coverage of renal dialysis in Thailand: promise, progress, and prospects



Universal coverage of renal dialysis in Thailand: promise, progress, and prospects

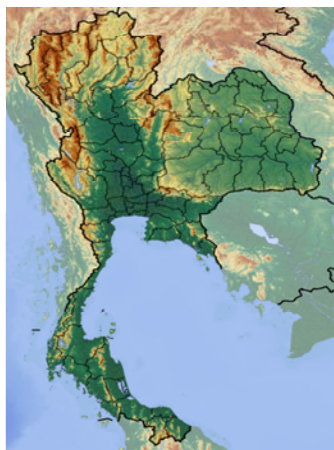
Budget allocation to renal replacement therapy compared with total budget (million baht), 2008-12

Fiscal year	Million (baht)	Million (baht)
	Total budget	Renal replacement therapy (%)
2008	76 800	160 (0.2)
2009	80 600	1400 (1.7)
2010	89 400	2700 (3.0)
2011	101 100	3200 (3.2)
2012	114 500	3900 (3.4)

2L bag PD = 106 baht

2L Ultrabag= 306 baht

5L APD = 872 baht



Survival analysis of renal replacement in Thailand by registry data

	HD First	PD First
•Age (years)	52.5	57.5
•Gender (M/F) (%)	53/47	46/54
•Region (%)		
Bangkok and vicinity	20.3	8.4
Central	27.7	19.8
Northern	10.8	13.4
Northeastern	22.0	35.6
Eastern	8.1	6.6
Western	3.7	4.6
Southern	7.4	11.6
•Mode switching (%)	1.5	10.8
• Charlson score	2.3	2.7

Initiation of chronic dialysis in 2013

	BUN	Cr	eGFR	Symptoms
Social security fund	----	----	<6mL/min/1.73m ²	6-15 mL/min/1.73m ²
States enterprise reimbursement	NA	NA	NA	NA
Government reimbursement	NA	NA	<6mL/min/1.73m ²	6-15 mL/min/1.73m ²
National health security office fund	----	----	<6mL/min/1.73m ²	6-15 mL/min/1.73m ²

Impact of dialysis modality, renal function at dialysis initiation, and iron therapy towards efficacy and economical burden

Multicenter prospective cohort study

- **What is the incidence rate of mortality in patients who were initiated chronic hemodialysis and chronic peritoneal dialysis?**
- **How do we explain the effect of**
 - **Demographic, body composition**
 - **Co-morbidity, geographic**
 - **Dialysis related factor**
 - **CKD-MBD**
 - **Nutritional factor**
 - **Biomarkers**
 - **Renal Function at Initiation**
 - **Renal anemia Rx, IV iron on the mortality?**
- **Is the renal function at chronic dialysis initiation associated with mortality?**

•How do we explain the effect IV iron use, recombinant erythropoietin use, towards renal anemia management ?

Registered ESA in 2013

Brand name	Registered Year	Brand name	Registered Year
• Eprex	1990	• EPOO 4000 IU	2007
• Hemax	1997	• Aranesp	2007
• Recormom	1998	• Epotin	2008
• Eporon	2002	• Mircera	2008
• Epokline	2003	• Eritromax	2009
• Espogen	2004	• Epoetin GPO	2009
• Hemapo	2005	• Erypo	2009
• Bioyetin	2005	• GPOetin	2009
• Renogen	2006	• Erypo FS	2010
• Hypercrit	2007	• Eposis	2010
• Epiao	2007	• Eritine	2010
• Eritrogen	2007	• Recombinant Human Erythropoietin ALFA Injection PFS	2010
• Recombinant Human Erythropoietin Injection	2007	• Epo X	2011
• Recombinant Human for Erythropoietin Injection	2007	• Hema Plus	2012
• Innopoetin	2007		

How Bio-questionable are the Different Recombinant Human Erythropoietin Copy Products in Thailand?

Liem Andhyk Halim • Vera Brinks • Wim Jiskoot • Stefan Romeijn • Kearkiat Praditpornsilpa • Anunchai Assawamakin • Huub Schellekens

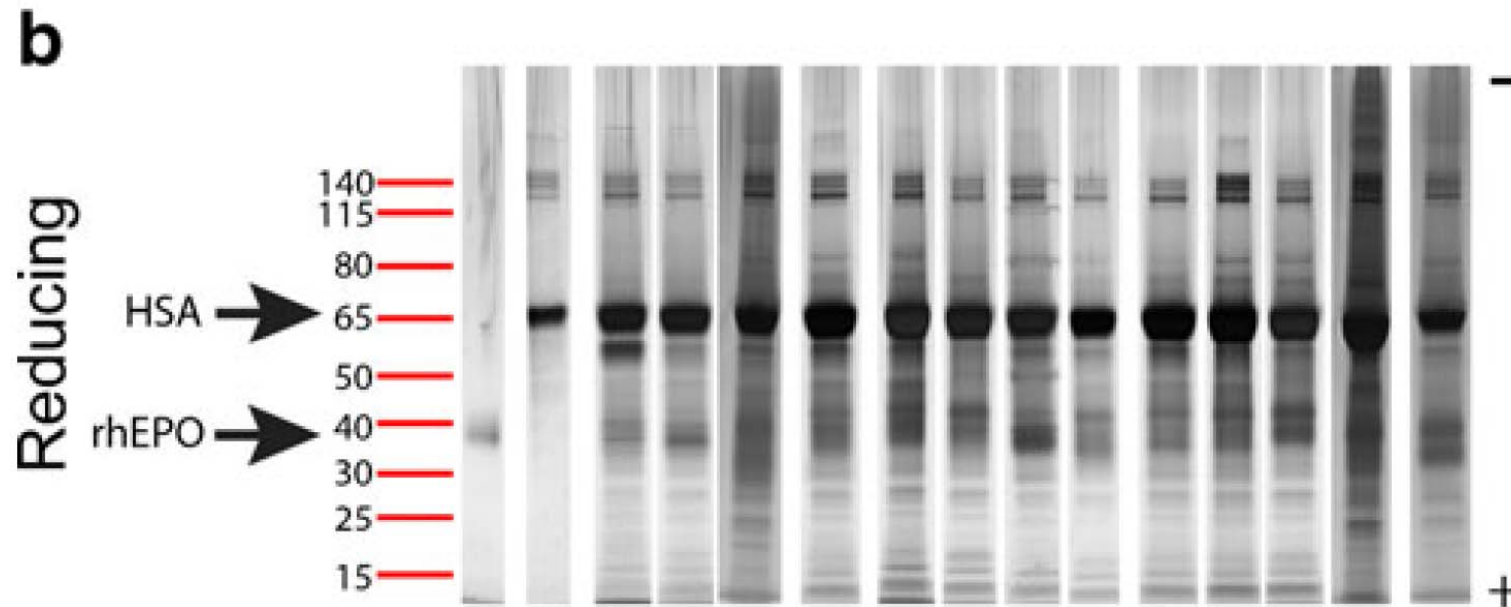


Fig. 1 SDS-PAGE gel of different rhEPO copy products (2 IU/lane) stained with SilverQuest™ Silver Staining under (a) non-reducing conditions and (b) reducing conditions. Arrows indicate the expected molecular weights of rhEPO or HSA.

Biosimilar recombinant human erythropoietin induces the production of neutralizing antibodies

	Anti-r-HuEpo positive	Anti-r-HuEpo negative
Numbers of patients (cases)	23	7
Gender, male/female (case/case)	13/10	3/4
Age, years \pm s.d.	61.1 \pm 21.4	52.8 \pm 4.8
<i>CKD status, cases (%)</i>		
Predialysis	8 (34.8)	2 (28.6)
Hemodialysis	14 (60.9)	4 (57.1)
Peritoneal dialysis	1 (4.3)	1 (14.3)
<i>Etiology of CKD, cases (%)</i>		
Diabetic nephropathy	5 (26.1)	3 (42.9)
Chronic glomerulonephritis	3 (13.0)	0
Unknown	14 (60.9)	4 (57.1)
r-HuEpo exposure duration, months \pm s.d. (range in months)	12.1 \pm 7.8 (3–36)	22.3 \pm 19.8 (6–60)
r-HuEpo dose, U/kg/week \pm s.d.	149 \pm 82	171 \pm 91
Hb before LOE, g/dl \pm s.d.	10.8 \pm 1.6	11.4 \pm 0.7
Hemoglobin by the time of LOE, g/dl \pm s.d.	5.6 \pm 0.9	7.3 \pm 0.7
Reticulocytes, cell/mm ³ \pm s.d.	5978 \pm 1217	13,128 \pm 3,456
Serum ferritin, ng/ml \pm s.d.	368.6 \pm 83.1	370.3 \pm 93.7
Transferring saturation, % \pm s.d.	28.3 \pm 6.6	28.8 \pm 5.2
Serum folate, pg/ml \pm s.d.	12.8 \pm 4.5	12.5 \pm 4.3
Serum B ₁₂ , pg/ml \pm s.d.	258.2 \pm 189.2	177.1 \pm 84.4
CRP, mg/l \pm s.d.	4.22 \pm 2.98	3.62 \pm 3.56
iPTH, pg/ml \pm s.d.	241.4 \pm 127.1	284.0 \pm 151.6

Original Article

The association of anti-r-HuEpo-associated pure red cell aplasia with HLA-DRB1*09-DQB1*0309

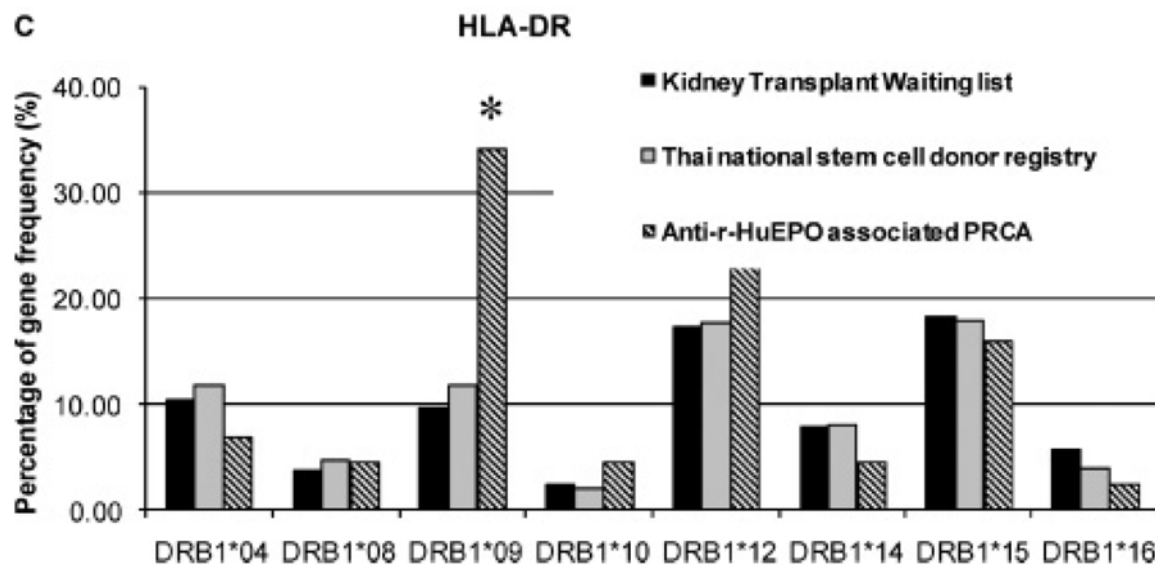


Table 4. Odds ratio for HLA alleles identified as potential associated HLA gene with anti-r-HuEpo-associated PRCA

	Anti-r-HuEpo-associated PRCA cases	Thai national stem cell donor	Odds ratio (95% CI)	<i>P</i>
HLA-DRB1*09	15 (34.1%)	354 (11.8%)	2.89 (1.88–4.46)	<0.001



CKD

- Dx of CKD
- Identification of patient at risk
- Outcome of RRT
- Unique Thai CKD

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Implementation



- Renal stone disease,
- RTA.
- Hypokalemia

- Cadmium
- Lead

Tropical Nephrology

- Leptospirosis
- DHF
- Malaria

- Alternative medicine

- Urbanization

- Betle nut

Prevalence of herbal and dietary supplement usage in Thai outpatients with chronic kidney disease: a cross-sectional survey

Mayuree Tangkiatkumjai^{1*}, Helen Boardman², Karkiat Praditpornsilpa³ and Dawn M Walker¹

Table 1 Comparison of characteristics between HDS users and non-users (n=421)

Characteristics	HDS user (n=189)	Non user (n=232)	χ^2 p-value
Medication adherence**			0.015*
Low	61 (32.3%)	47 (20.2%)	
Medium	79 (41.8%)	122 (52.6%)	
High	49 (25.9%)	63 (27.2%)	

Table 3 Reasons for HDS use and information sources (n=189)

	Frequency	Percentage
Reasons (n=317)*		
Family/friend's recommendation	111	35.0
HDS will work	71	22.4
Willing to try anything that helps	61	19.2
Prefer to use HDS	34	10.7
Health care provider's recommendation	21	6.6
Safer than conventional medicines	9	2.8
Easy access	5	1.6
Recommended by traditional practitioners or HDS sellers	2	0.7
Experienced adverse effects from conventional medicines	2	0.7
Recommended by other patients with CKD	1	0.3



CKD

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