



# 心腎共病的臨床照護實務經驗分享

## 以慢性腎臟病合併高血壓為例

高醫附設醫院 心臟內科

高雄市立大同醫院 心臟內科

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2024.08.14



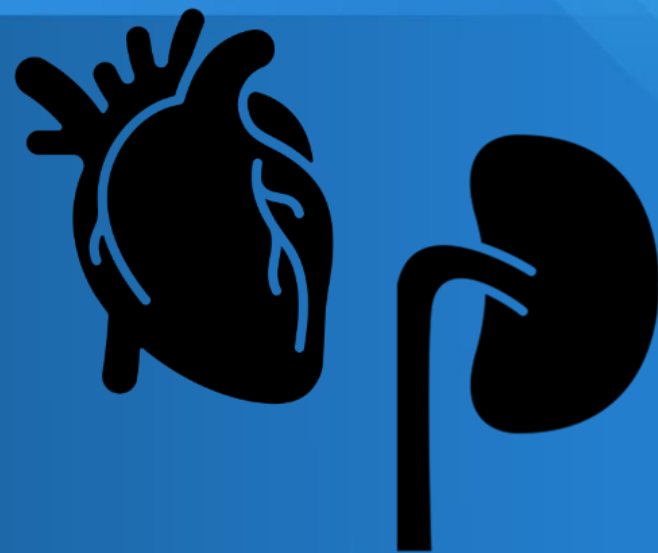
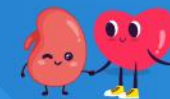




# 演講大綱

- 慢性腎臟病對心血管疾病的挑戰
- 個案分享：慢性腎臟病合併高血壓之治療經驗
- 實證：從臨床試驗到治療指引
- 總結



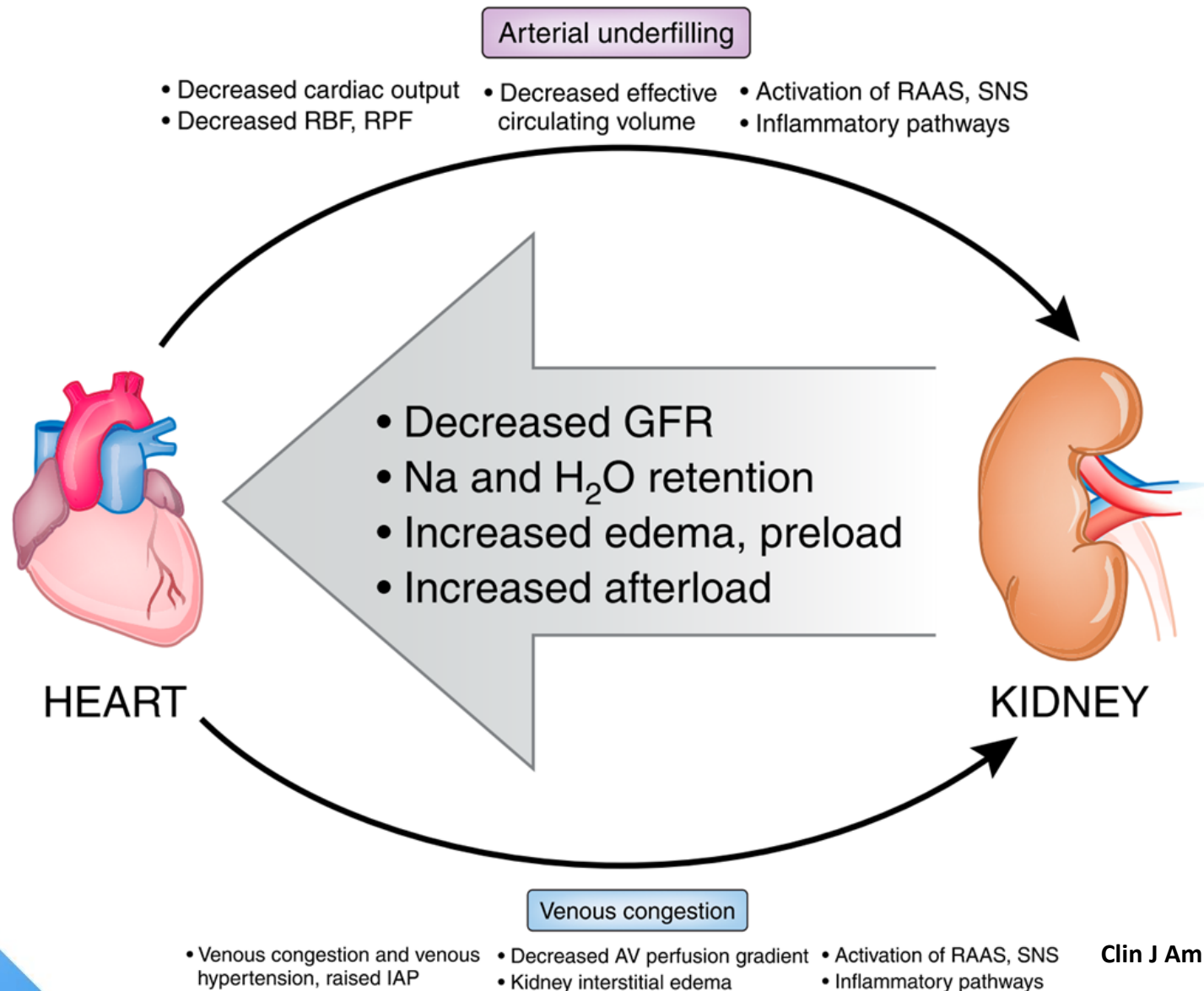


# 慢性腎臟病對心血管疾病的挑戰



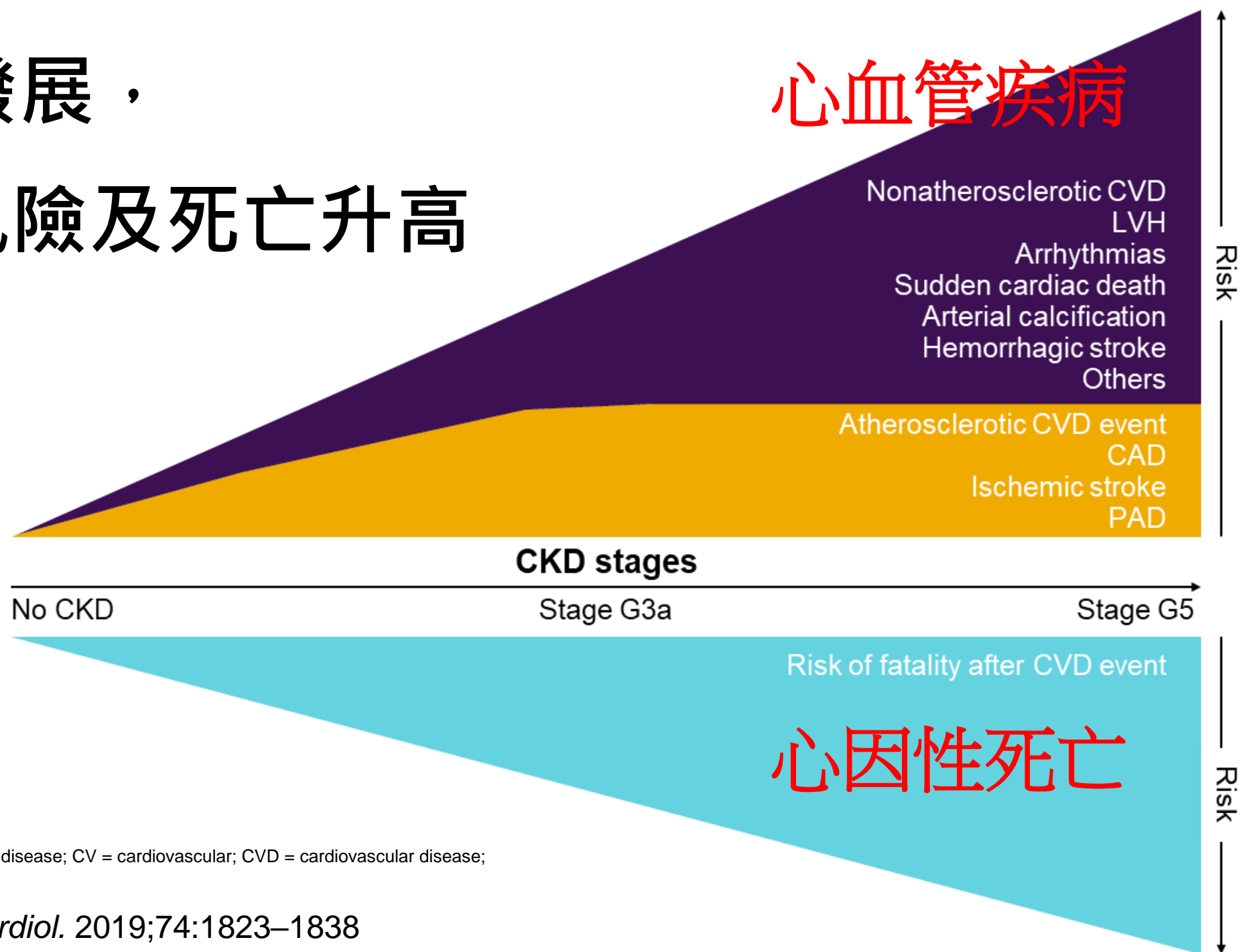


# 腎臟不好會影響心臟





# 隨CKD病程發展， 心血管疾病風險及死亡升高



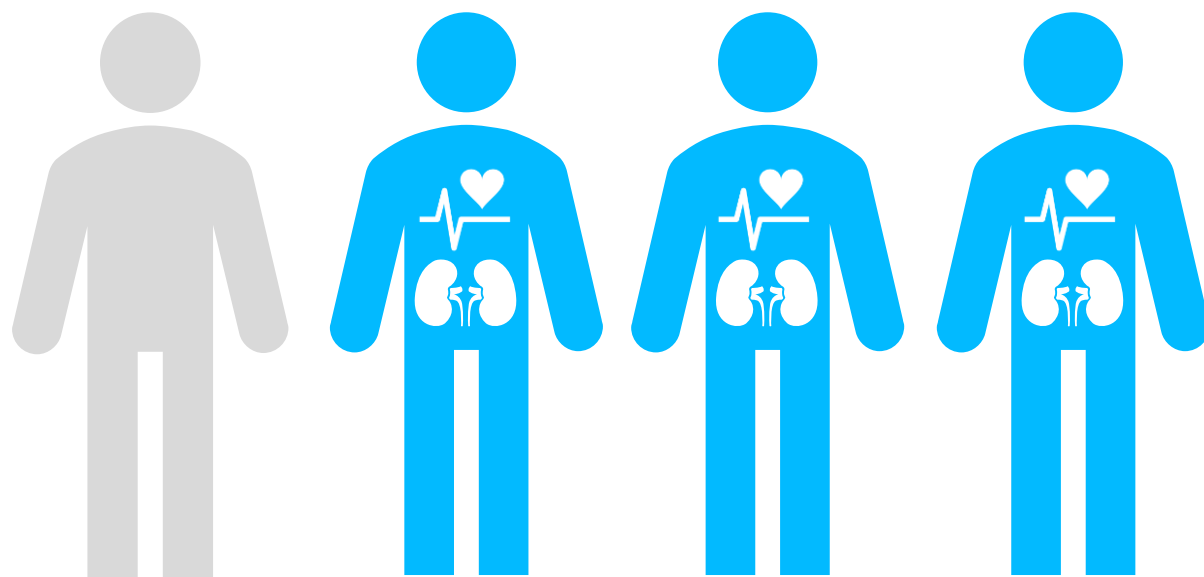
CAD = coronary artery disease; CKD = chronic kidney disease; CV = cardiovascular; CVD = cardiovascular disease;  
LVH = left ventricular hypertrophy;  
PAD = peripheral artery disease.

Sarnak MJ et al. *J Am Coll Cardiol.* 2019;74:1823–1838





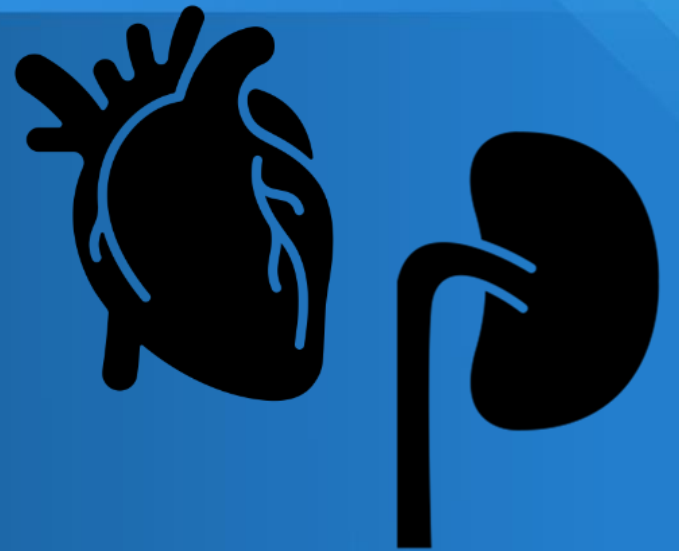
# 心臟衰竭病患每4位就有3位有慢性腎病變



 **76%**

心衰竭患者者同時合併  
高血壓與腎病變





個案分享：

慢性腎臟病合併高血壓之治療經驗





# Case 1: 46 y/o male

- HTN, Hyperlipidemia, CKD stage 4  
(長期於腎臟科門診追蹤, > 5 years)
- Smoking (-)
- Alcohol (-)

從腎臟科門診  
轉介過來

**胸悶、很容易喘**





# 基本身體檢查、用藥史

- BW: 70kg, BMI:27.3
- BP: 112/70 mmHg, PR: 73 bpm
- HS: RHB
- BS: clear
- L/L: 雙下肢 pitting edema 1+

## Current Medication

- Concor 5mg QD
- Twynsta 80/5mg QD
- Doxaben 2mg QD
- Crestrol 10/10mg QD
- Fenofibrate 160mg QD
- Feburic 40mg QD



# 半年前的抽血報告

<b>Hgb</b> (g/dl)	<b>11.6</b>
<b>Hct</b> (%)	<b>37.4</b>
<b>SGPT</b> (IU/L)	<b>48</b>
<b>Creatinine</b> (mg/dl)	<b>2.93</b>
<b>eGFR</b> (ml/min/1.73m <sup>2</sup> )	<b>31</b>
<b>Na</b> (m mol/L)	<b>136</b>
<b>K</b> (m mol/L)	<b>4.4</b>

<b>AC sugar</b> (mg/dL)	<b>106</b>
<b>HbA1c</b> (%)	<b>6.0</b>
<b>LDL</b> (mg/dL)	<b>86</b>
<b>TG</b> (mg/dL)	<b>185</b>
<b>Uric acid</b> (mg/dL)	<b>3.6</b>
<b>NT-proBNP</b> (pg/ml)	<b>23.8</b>
<b>UPCR</b> (mg/gm)	<b>2043</b>



# 這次的抽血報告

<b>Hgb</b> (g/dl)	<b>10.6</b>
<b>Hct</b> (%)	<b>34.6</b>
<b>SGPT</b> (IU/L)	<b>26</b>
<b>Creatinine</b> (mg/dl)	<b>3.41</b>
<b>eGFR</b> (ml/min/1.73m <sup>2</sup> )	<b>26</b>
<b>Na</b> (m mol/L)	<b>143</b>
<b>K</b> (m mol/L)	<b>4.2</b>

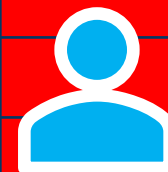
<b>AC Sugar</b> (mg/dL)	<b>109</b>
<b>HbA1c</b> (%)	<b>6.1</b>
<b>LDL</b> (mg/dL)	<b>102</b>
<b>TG</b> (mg/dL)	<b>233</b>
<b>Uric acid</b> (mg/dL)	<b>5.3</b>
<b>NT-proBNP</b> (pg/ml)	<b>231.2</b>
<b>UPCR</b> (mg/gm)	<b>2111</b>



# CKD風險分期情況



			Persistent albuminuria categories		
			Description and range		
			A1	A2	A3
			<30 mg/g <3 mg/mmol	30-300 mg/g 3-30 mg/mmol	>300 mg/g >30 mg/mmol
GFR categories (ml/min per 1.73m <sup>2</sup> ) Description and range	G1	≥90			
	G2	60-90			
	G3a	45-59		CKD	
	G3b	30-44			
	G4	15-29			
	G5	<15			



Green, low risk (if no other markers of kidney disease, no CKD); yellow, moderately increased risk; orange, high risk; red, very high risk.









# 心臟超音波報告

- Minimal amount of pericardial effusion
- LA dilatation
- LV hypertrophy
- Normal LV systolic function (LVEF:64.7%)
- LV diastolic dysfunction
- Mild TR with pulmonary HTN (PPG:36mmHg)





# 臨床診斷

- Heart Failure with preserved EF, NYHA II-III
- HTN
- CKD stage 4 with proteinuria
- Hyperlipidemia





# 治療策略

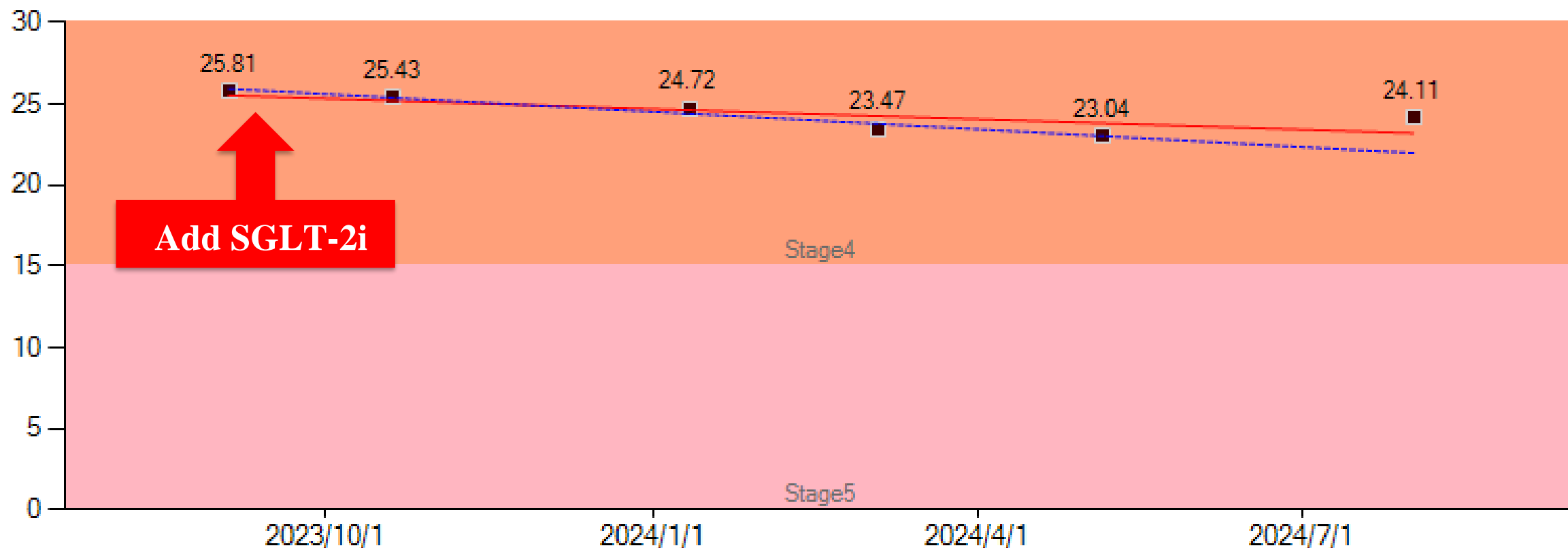
- 飲食衛教 (限水、限鹽)
- 加上furosemide 40mg QD x 3 days
- 加上SGLT-2i (Forxiga 1# QD)

## Current Medication

- Concor 5mg QD
- Twynsta 80/5mg QD
- Doxaben 2mg QD
- Crestrol 10/10mg QD
- Fenofibrate 160mg QD
- Feburic 40mg QD



— 迴歸線    - - 迴歸線(不含最後一個數值)



GFR(Schwartz) 檢驗 [REDACTED] (46歲) 2022/08/13 ~ 2024/08/13

☒ 是否呈現圖表數值

☐ GFR(MDRD)   ☒ GFR(Schwartz)   ☐ ACR   ☐ PCR

截止日期 2024/08/13 [calendar icon] ☐ 1   ☒ 2   ☐ 3   ☐ 4   ☐ 自訂 2023/08/13 [calendar icon] ~ 2024/08/13 [calendar icon]

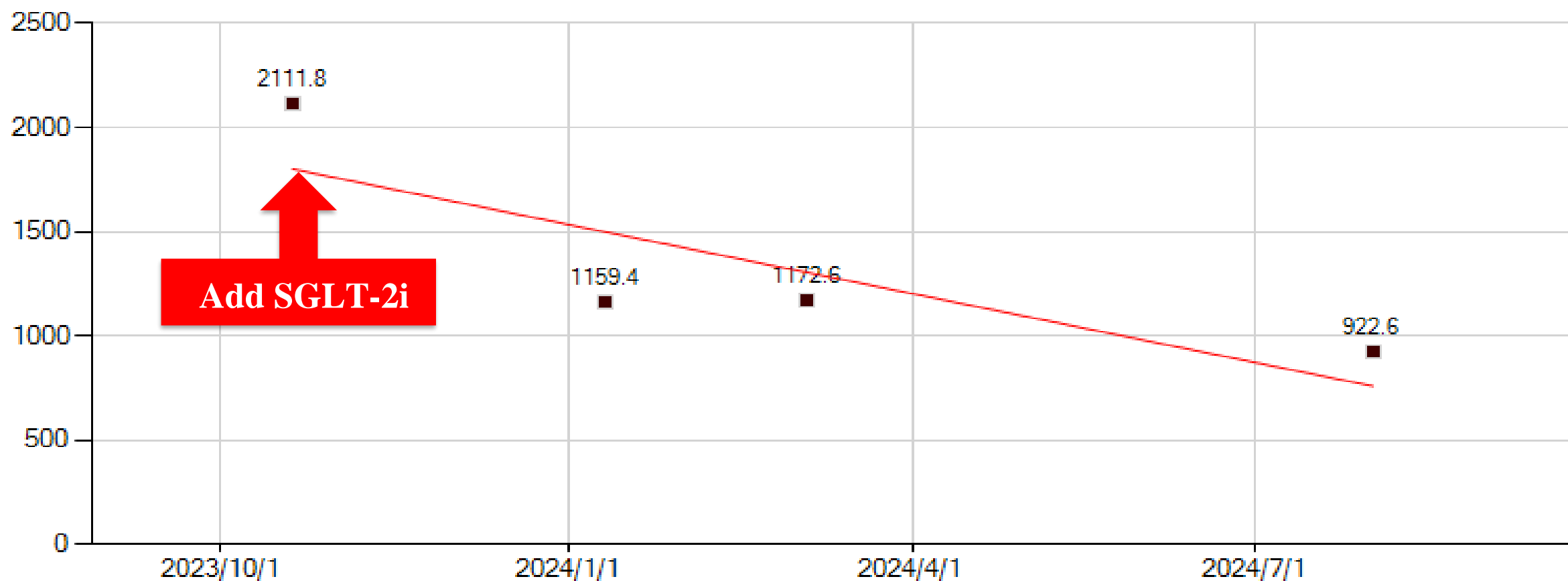
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mg/gm

## 【PCR 變化率】

公式



PCR 檢驗 ██████████ (46歲) 2023/08/09 ~ 2024/08/09

☒ 是否呈現圖表數值☐ GFR(MDRD) ☐ GFR(Schwartz) ☐ ACR ☒ PCR

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<input checked="" type="checkbox"/>	2024/03/04	1172.60
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	2024/08/01 08:56	2024/08/01 08:32	2024/05/06 08:13	2024/03/04 08:33	2024/03/04 08:28	2024/01/11 08:04	2024/01/11 07:52	2023/10/20 08:38	2023/09/04 09:08
► Protein@U	71.3			93.3		110.5		164.4	
U-CRE@Ur	77.28			79.57		95.31		77.85	
MicroALB@	49.7					75.7		107.5	
GLU(AC)		128	100		94		101		109
GPT(ALT)		34	18		18		25		26
Uric acid		5.1	5.2		4.5		4.4		5.2
Urea N		37.5	40.8		47.8		38.3		24.1
Creatinine		3.65	3.82		3.75		3.56		3.41
Na		142	141		140		141		143
K		4.5	5.3		5.8		5.2		4.2
CHOL (T)		133	130		124		123		169
TG		174	174		143		142		233
HDL-C		38	40		40		42		40
LDL-C		74	63		65		62		102
GOT(AST)									87

Add SGLT-2i





# 接受SGLT-2i治療後

- 心衰竭症狀完全改善
- 不再水腫
- 生活品質大幅提升
- **eGFR**穩定
- 蛋白尿大幅減少





# Case 2: 71 y/o male

- old MI, s/p PCI, HTN, DM, Hyperlipidemia  
(自從5年前發生AMI後, 長期於心臟科門診追蹤)
- CKD stage 3
- HF with reduced EF

已用SGLT-2i治療超過五年了!!



# SGLT-2i治療前抽血報告

<b>Hgb</b> (g/dl)	<b>14.3</b>
<b>Hct</b> (%)	<b>46.0</b>
<b>SGPT</b> (IU/L)	<b>15</b>
<b>Creatinine</b> (mg/dl)	<b>2.08</b>
<b>eGFR</b> (ml/min/1.73m <sup>2</sup> )	<b>32</b>
<b>Na</b> (m mol/L)	<b>142</b>
<b>K</b> (m mol/L)	<b>4.9</b>

<b>AC sugar</b> (mg/dL)	<b>121</b>
<b>HbA1c</b> (%)	<b>6.0</b>
<b>LDL</b> (mg/dL)	<b>50</b>
<b>TG</b> (mg/dL)	<b>61</b>
<b>Uric acid</b> (mg/dL)	<b>5.2</b>
<b>NT-proBNP</b> (pg/ml)	<b>2537.3</b>
<b>ACR</b> (mg/gm)	<b>15.1</b>



# CKD風險分期情況

			Persistent albuminuria categories		
			Description and range		
			A1	A2	A3
			<30 mg/g <3 mg/mmol	30-300 mg/g 3-30 mg/mmol	>300 mg/g >30 mg/mmol
GFR categories (ml/min per 1.73m <sup>2</sup> ) Description and range	G1	≥90			
	G2	60-90	CKD		
	G3a	45-59			
	G3b	30-44			
	G4	15-29			
	G5	<15			

Green, low risk (if no other markers of kidney disease, no CKD); yellow, moderately increased risk; orange, high risk; red, very high risk.





# Current Medication

- ✓ 心臟: Entresto, Concor, Coralan, Aldactin
- ✓ 心血管: Bokey, Brilinta
- ✓ 血脂: Lipitor
- ✓ 血糖: Insulin Toujeo, Forxiga, Amaryl





一般報告	細菌報告	傳染病通報	完整報告	正常值查詢
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[illegible]



2022-2024



	2024/07/22 09:38	2024/05/07 08:05	2024/02/06 09:20	2024/02/06 08:34	2023/11/09 10:19	2023/11/09 09:18	2023/07/24 09:53	2023/07/24 09:30	2023/05/17 20:13	2023/04/12 09:22	2023/01/19 08:30	2023/01/19 08:18	2022/10/19 07:41	2022/05/10 08:06
GLU(AC)	106	106		112		107		109		127		125	149	147
GPT(ALT)	14	16		16		16		26		13		12	12	11
Uric acid	5.4	5.4		5.8		6.0		5.8		6.0		6.1	5.7	6.0
Urea N	45.8	46.9		36.5		43.0		45.4		38.7		37.6	42.9	48.7
Creatinine	2.11	2.13		2.03		2.18		2.15		2.14		2.20	2.41	2.36
Na	140	142		138		140		140		138		140	139.2	138.6
K	4.2	4.0		4.4		4.3		4.2		4.4		3.9	4.2	4.4
CHOL (T)	121	111		117		112		123		114		118	117	111
TG	111	77		100		86		108		86		105	100	71
HDL-C	32	35		32		37		39		37		42	38.5	40.6
LDL-C	68	58		66		62		69		64		62	58.7	58.6
MicroALB@			1.6		0.5						1.9			
U-CRE@Ur							116.96				119.69			

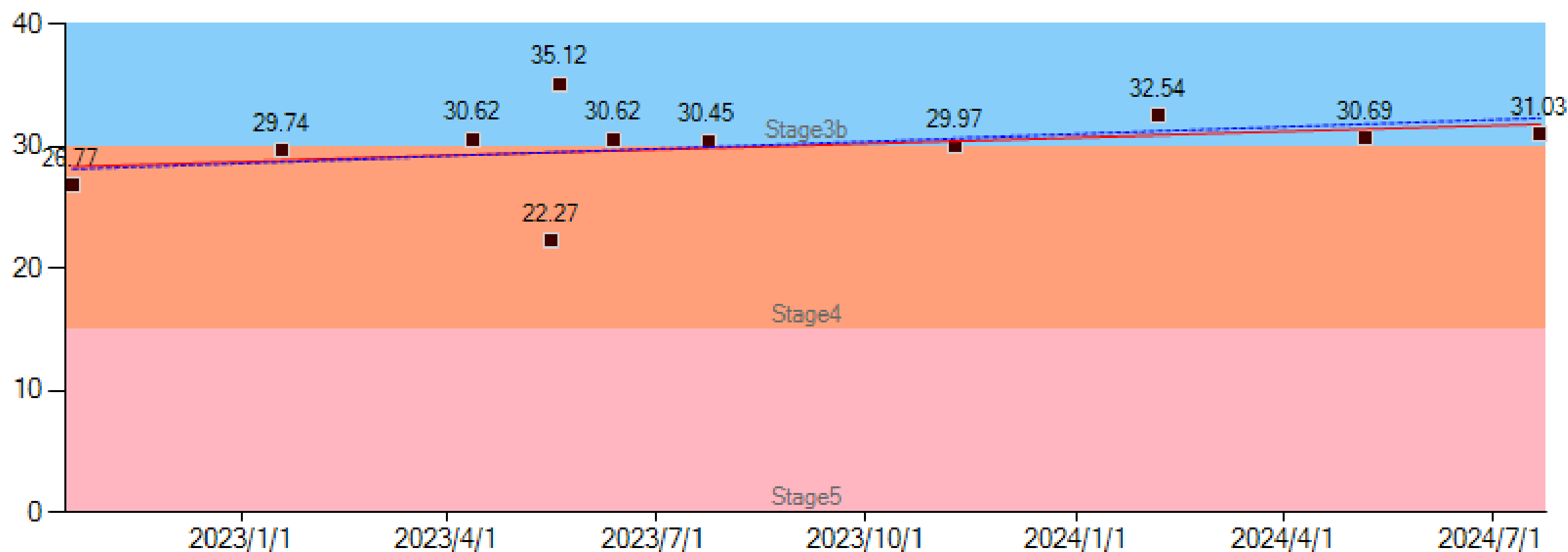


ml/min

【GFR(MDRD) 變化率】 【年:1.9643】 【月:0.1637】 ml/min 1.73m<sup>2</sup>

公式

— 迴歸線 --- 迴歸線(不含最後一個數值)



GFR(MDRD) 檢驗 (71歲) 2022/08/09 ~ 2024/08/09

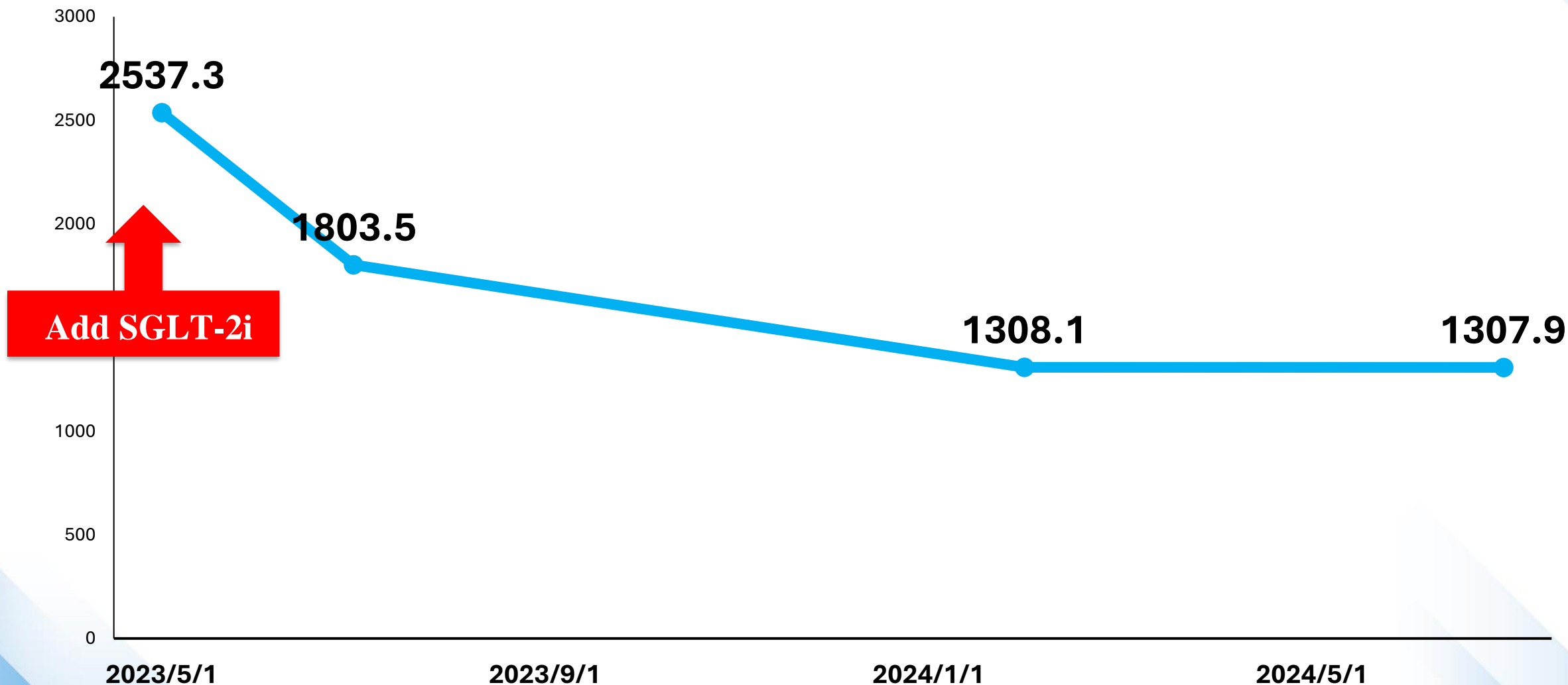
☒ 是否呈現圖表數值☒ GFR(MDRD) ☐ GFR(Schwartz) ☐ ACR ☐ PCR

	日期	數值	↑
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<input checked="" type="checkbox"/>	2023/04/12	30.62	
<input checked="" type="checkbox"/>	2023/05/17	22.27	





# NT-proBNP (pg/ml)







# 接受SGLT-2i治療後

- eGFR穩定
- 心衰竭症狀穩定
- 心臟功能改善、NT-proBNP下降約50%





# Case 3: 91 y/o **f**emale

- HTN poor control

(自從5年前因血壓控制不佳, 轉介至心臟科門診後, 長期追蹤)

- CKD stage 3

兩年前, 心臟病 開始用 SGLT-2i

冠心病 (CAD)  
併心衰竭 (HFpEF)



# SGLT-2i治療前抽血報告

<b>Hgb</b> (g/dl)	<b>10.3</b>
<b>Hct</b> (%)	<b>31.8</b>
<b>SGPT</b> (IU/L)	<b>28</b>
<b>Creatinine</b> (mg/dl)	<b>1.38</b>
<b>eGFR</b> (ml/min/1.73m <sup>2</sup> )	<b>26.6</b>
<b>Na</b> (m mol/L)	<b>125</b>
<b>K</b> (m mol/L)	<b>3.4</b>

<b>AC sugar</b> (mg/dL)	<b>111</b>
<b>HbA1c</b> (%)	<b>6.1</b>
<b>LDL</b> (mg/dL)	<b>63</b>
<b>TG</b> (mg/dL)	<b>39</b>
<b>Uric acid</b> (mg/dL)	<b>3.9</b>
<b>NT-proBNP</b> (pg/ml)	<b>903.2</b>
<b>ACR</b> (mg/gm)	<b>1.9</b>



# CKD風險分期情況

			Persistent albuminuria categories		
			Description and range		
			A1	A2	A3
			<30 mg/g <3 mg/mmol	30-300 mg/g 3-30 mg/mmol	>300 mg/g >30 mg/mmol
GFR categories (ml/min per 1.73m <sup>2</sup> ) Description and range	G1	≥90			
	G2	60-90	CKD		
	G3a	45-59			
	G3b	30-44			
	G4	15-29			
	G5	<15			

Green, low risk (if no other markers of kidney disease, no CKD); yellow, moderately increased risk; orange, high risk; red, very high risk.





# Current Medication

- ✓ 血壓: Exforge-HCT, Concor
- ✓ 心血管: Bokey
- ✓ 血脂: Crestor
- ✓ 心衰竭: Forxiga



# 2022-2024

	2024/07/18 07:37	2024/01/25 07:47	2023/08/07 07:44	2023/04/06 07:44	2023/01/09 07:55	2022/08/06 07:30
▶ GLU(AC)	96	111	109	101	116	111
GPT(ALT)	17	18	12	45	15	28
Uric acid	5.2	6.8	6.0	5.5	9.1	3.9
Urea N	32.4	33.7	36.7	36.6	52.4	25.0
Creatinine	1.48	1.35	1.61	1.43	1.79	1.38
Na	140	144	143	140	140	125.0
K	4.1	3.5	3.0	4.0	3.5	3.4
CHOL (T)	137	149	129	169	129	142
TG	77	73	83	87	68	39
HDL-C	62	68	51	71	50	65.7
LDL-C	55	60	58	79	67	63.2
Albumin				4.4	4.3	

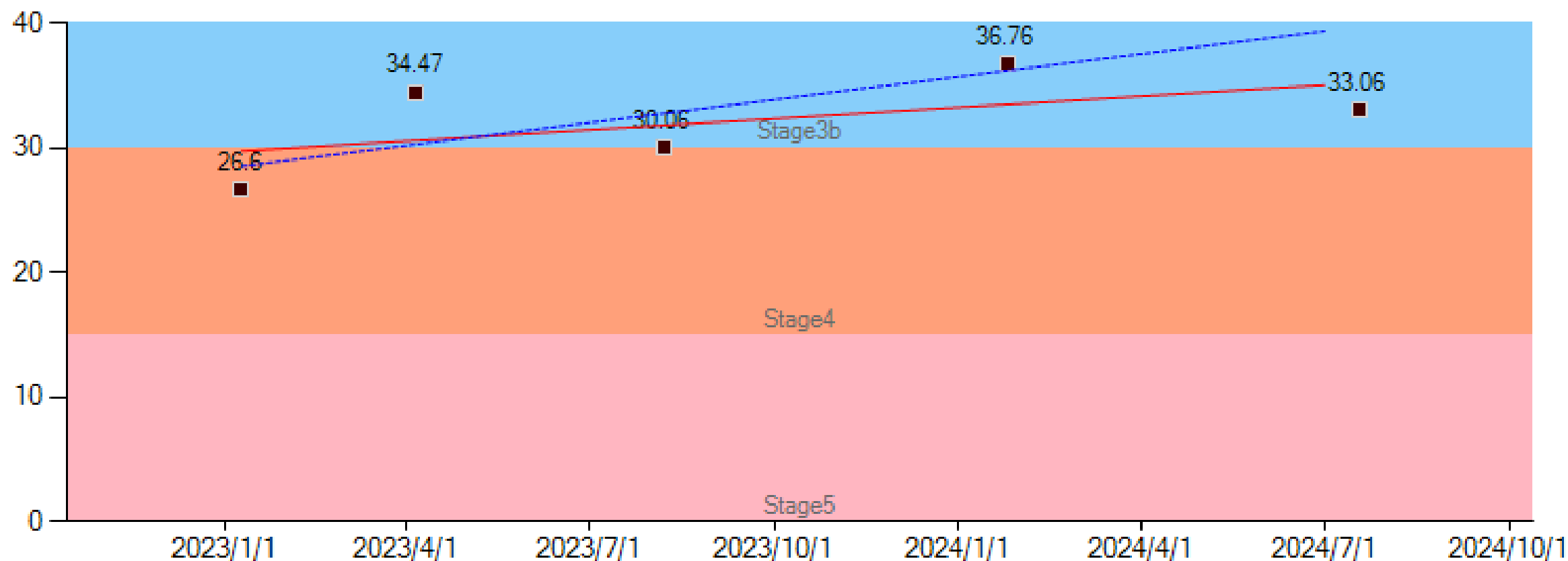


ml/min

【GFR(MDRD) 變化率】 【年:3.5870】 【月:0.2989】 ml/min 1.73m<sup>2</sup>

公式

— 迴歸線 — 迴歸線(不含最後一個數值)



GFR(MDRD) 檢驗 (91歲) 2022/08/09 ~ 2024/08/09

☒ 是否呈現圖表數值☒ GFR(MDRD) ☐ GFR(Schwartz) ☐ ACR ☐ PCR

	日期	數值
<input checked="" type="checkbox"/>	2023/01/09	26.60
<input checked="" type="checkbox"/>	2023/04/06	34.47
<input checked="" type="checkbox"/>	2023/08/07	30.06





# 接受SGLT-2i治療後

- 心衰竭症狀相當穩定、沒有再次住院過
- 沒有發生過UTI
- 生活品質大幅提升
- eGFR穩定



# 簡短回顧



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**Case 1: Advanced CKD  
w/ HTN**

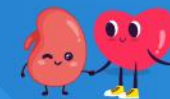
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**Case 2: CKD w/  
HTN/HF/DM, Old**

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**Case 3: CKD w/ HTN/HF,  
very Old female**





# 實證：

## 從臨床試驗到治療指引



# Dapagliflozin And Prevention of Adverse-outcomes in CKD (DAPA-CKD)

*Analysis of patients with and without cardiovascular disease at baseline*

**John McMurray**

**BHF Cardiovascular Research Centre, University of Glasgow &  
Queen Elizabeth University Hospital, Glasgow, Scotland, UK.**

My employer, Glasgow University, has been paid by a number of pharmaceutical companies for my participation in clinical trial committees and other activities related to these trials/products

Relevant to this presentation: AstraZeneca



# DAPA-CKD: Trial design

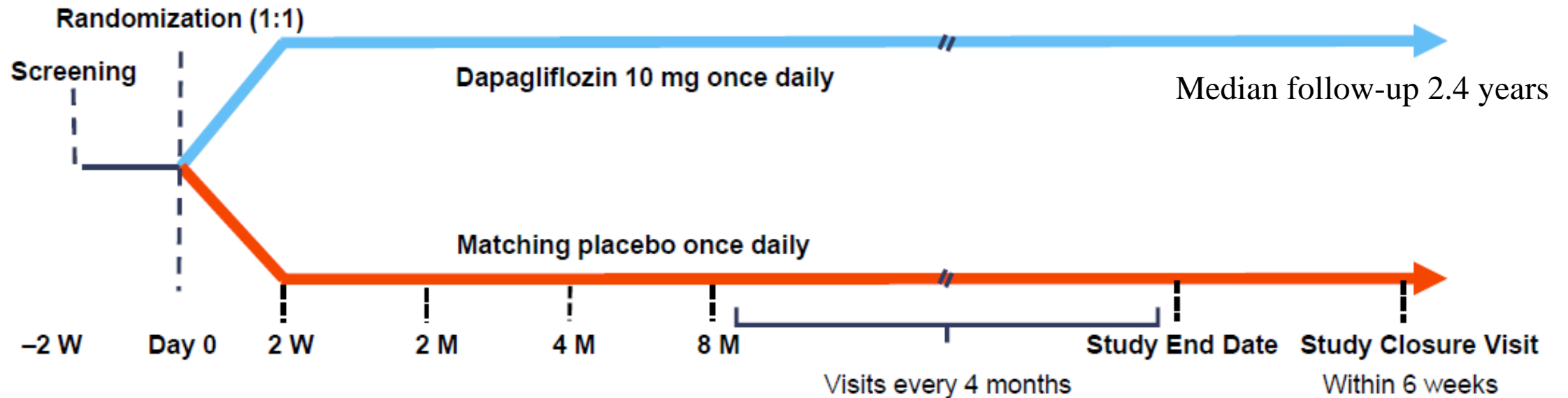
**Primary outcome: eGFR decline  $\geq 50\%$ , ESKD, or kidney/CV death**

## Key inclusion criteria:

- $\geq 18$  years of age
- eGFR 25 to 75 mL/min/1.73m<sup>2</sup>
- UACR 200 to 5000 mg/g (22.6 to 565 mg/mmol)
- Stable maximum tolerated labelled dose of ACEi or ARB for  $\geq 4$  weeks (if not contraindicated)

## Key exclusion criteria:

- Type 1 diabetes
- Polycystic kidney disease, lupus nephritis, ANCA-associated vasculitis
- Immunosuppressive therapy within 6 months prior to enrollment



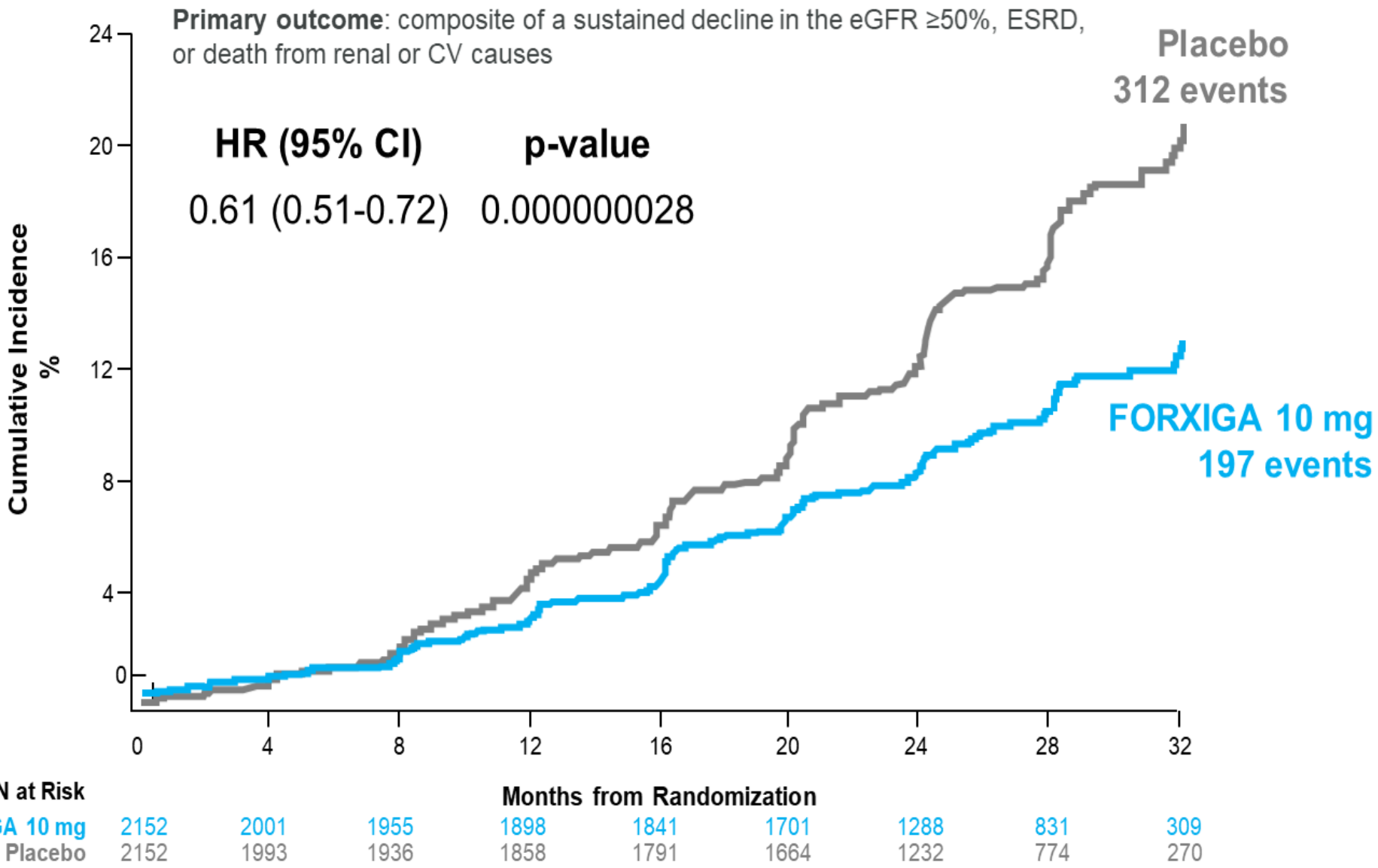
Outcome analyses based on Cox proportional hazard model stratified by type 2 diabetes and UACR and adjusted for eGFR



# DAPA-CKD: Baseline characteristics

	Dapagliflozin (N=2152)	Placebo (N=2152)
Age, years, mean	62	62
Sex, female, %	33	33
Type 2 diabetes, %	68	67
Hypertension, %	96	96
<b>Any cardiovascular disease, %</b>	<b>38</b>	<b>37</b>
Myocardial infarction, %	8.6	9.6
Stroke, %	6.7	7.2
Atrial fibrillation/flutter, %	5.3	5.2
Heart failure, %	11	11
Systolic blood pressure, mmHg, mean	137	137
eGFR, mL/min/1.73m <sup>2</sup> , mean	43	43
ACEi or ARB, %	97	97



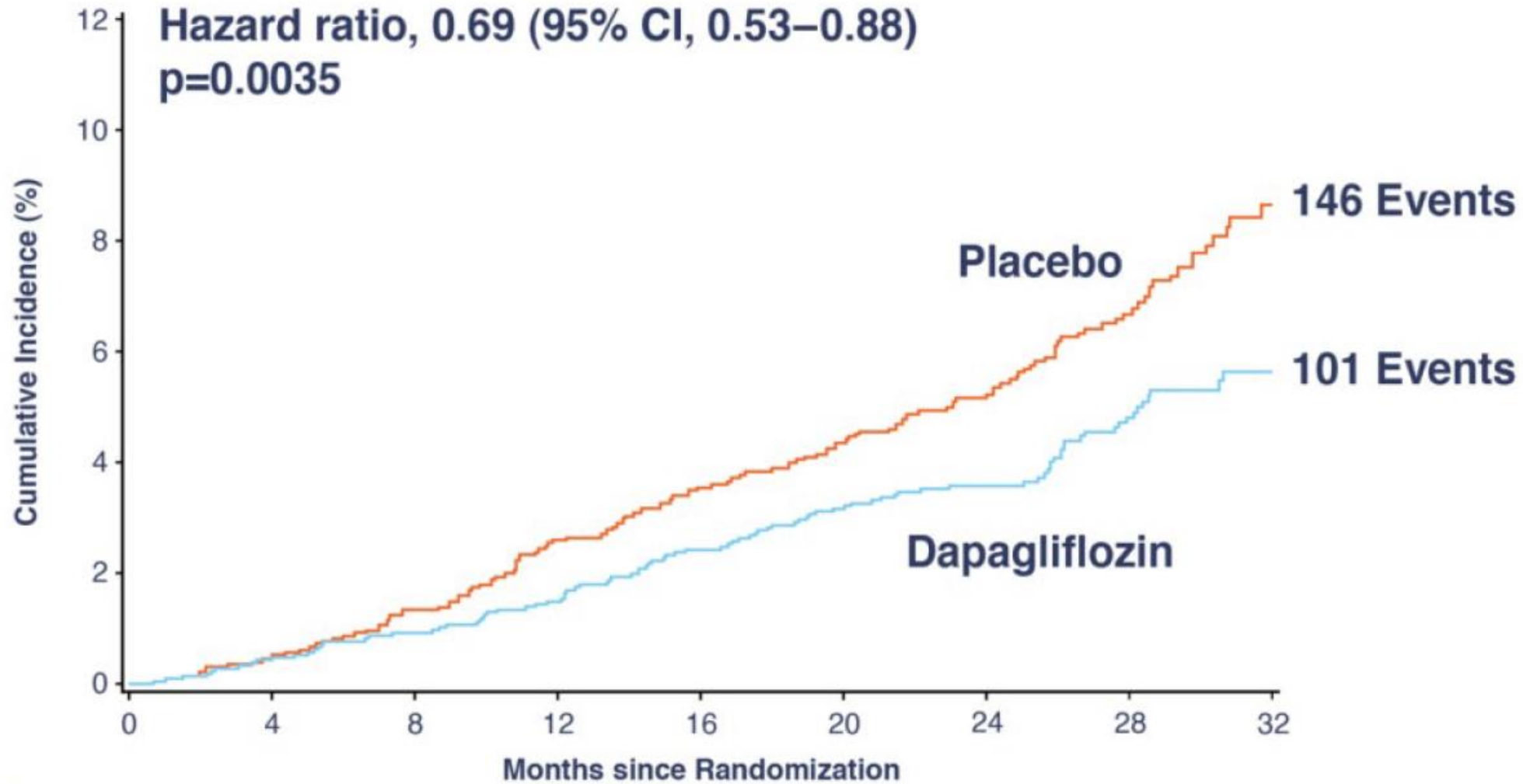


**39%  
RRR**

**ESRD ↓ 36%**  
HR 0.64 (0.50-0.82),  
p=0.0004



# Secondary outcome: All-cause mortality

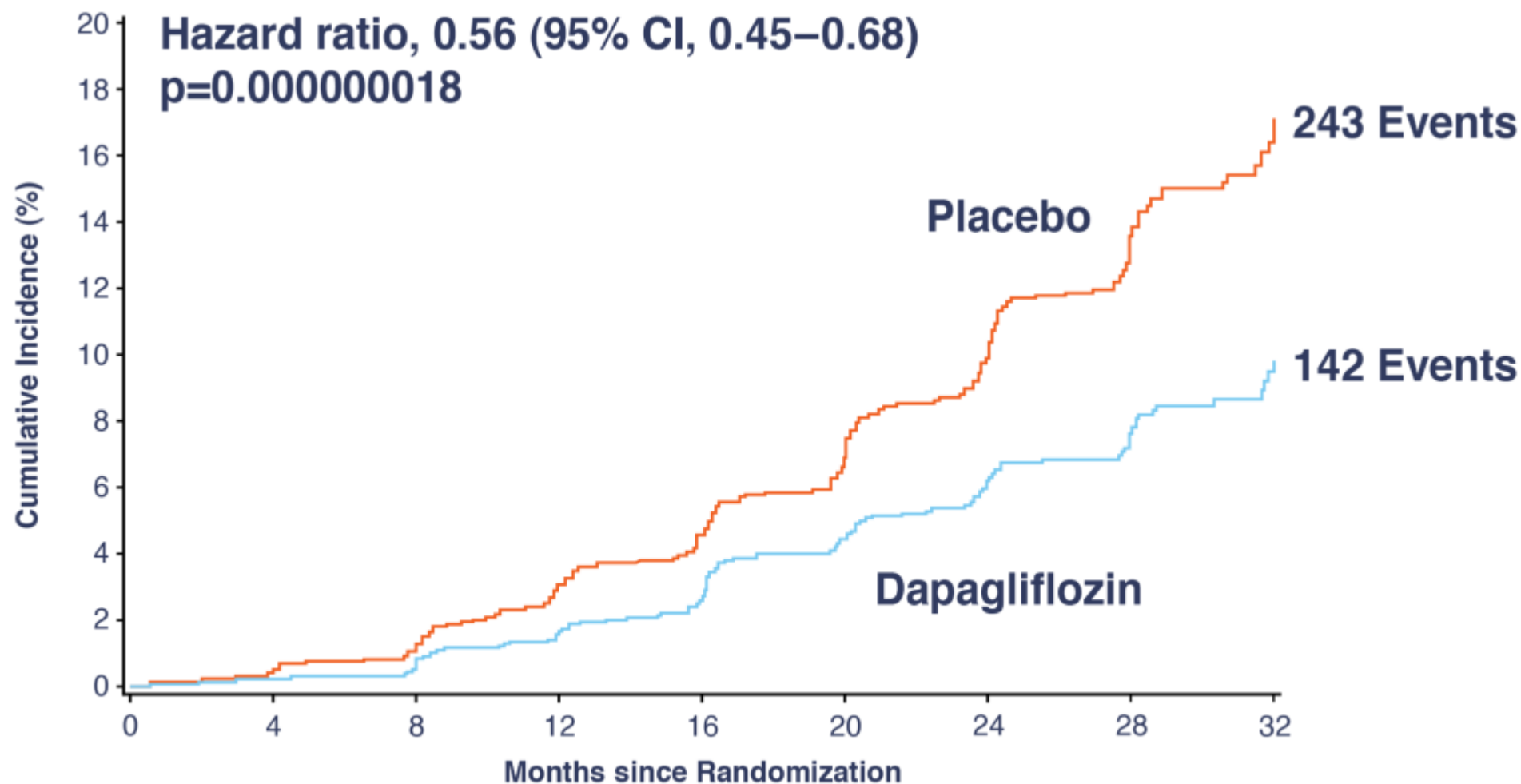


**31%  
RRR**

No. at Risk									
Dapagliflozin	2152	2039	2029	2017	1998	1925	1531	1028	398
Placebo	2152	2035	2018	1993	1972	1902	1502	1009	379



# Secondary outcome: eGFR decline $\geq 50\%$ , ESKD, or kidney death

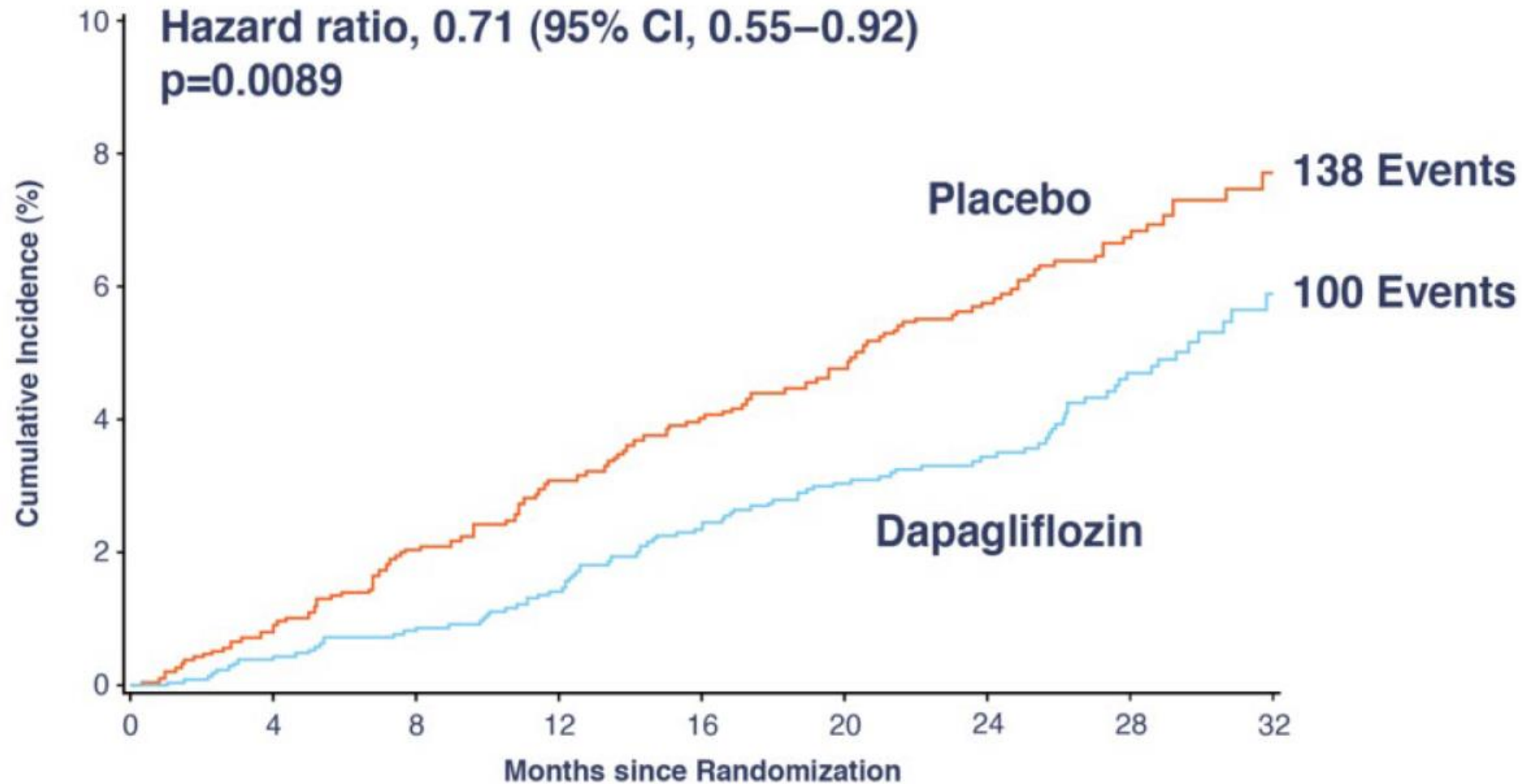


## No. at Risk

Dapagliflozin	2152	2001	1955	1898	1841	1701	1288	831	309
Placebo	2152	1993	1936	1858	1791	1664	1232	774	270



# Secondary outcome: CV death or HF hospitalization



**29%  
RRR**

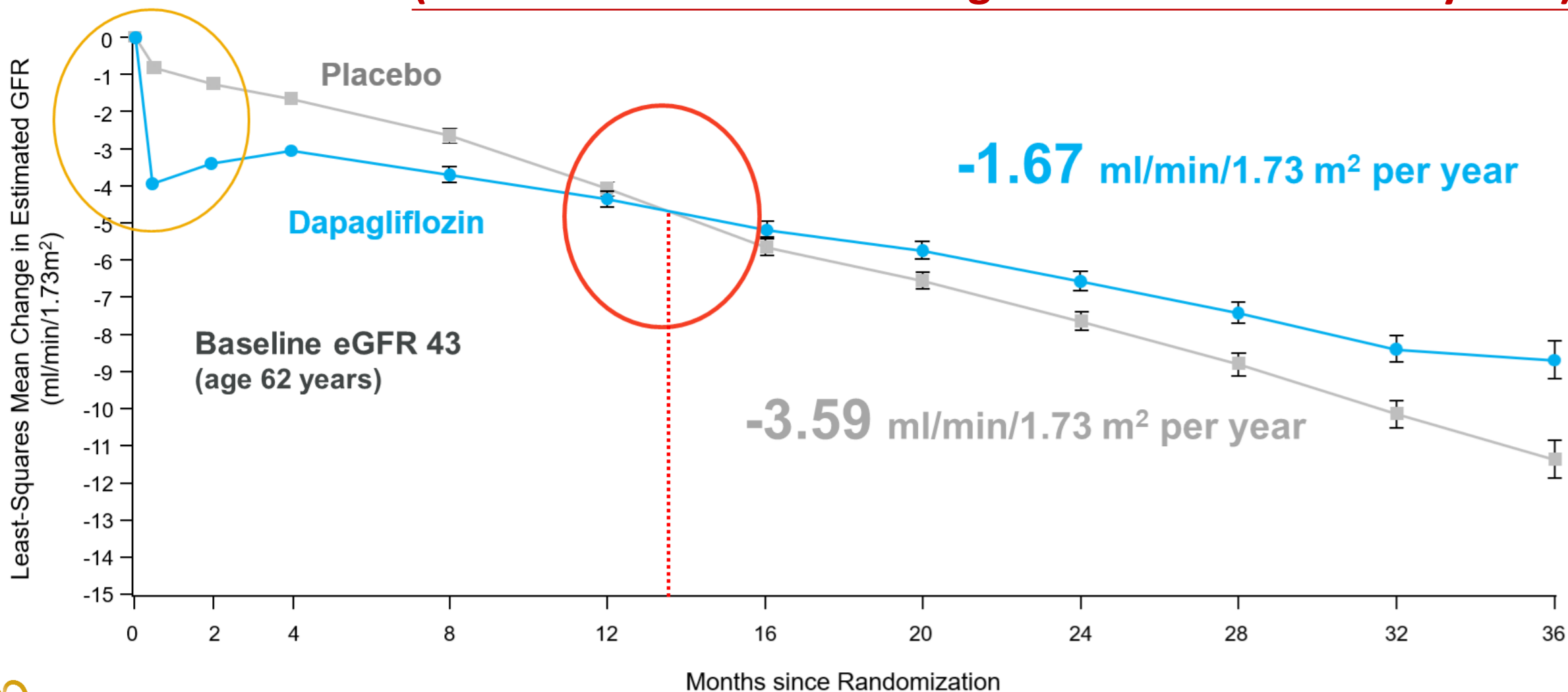
## No. at Risk

Dapagliflozin	2152	2035	2021	2003	1975	1895	1502	1003	384
Placebo	2152	2023	1989	1957	1927	1853	1451	976	360



# The difference of eGFR decline in DAPA-CKD

( Estimated time to CKD stage 5: **7.8 vs 16.7 years** )





# DAPA-CKD: Summary and conclusions

- In patients with CKD, with and without type 2 diabetes (T2D), dapagliflozin compared to placebo:
  - Reduced the risk of kidney failure
  - Reduced the risk of death from CV causes or hospitalization for HF
  - Prolonged survival



# 2023 ESC/ESH 高血壓指引

## HTN合併CKD，建議使用SGLT2i減少心腎風險 (Class 1A)

SGLT2is inhibitors are recommended for patients with diabetic and non-diabetic nephropathies CKD if eGFR is at least 20 ml/min/1.73 <sup>2</sup> . <sup>a</sup>	I	A
The non-steroidal MRA finerenone is recommended in patients with CKD and albuminuria associated with type 2 diabetes mellitus if eGFR is at least 25 ml/min/1.73 <sup>2</sup> and serum potassium <5.0 mmol/L.	I	A
In CKD patients with hyperkalemia a potassium binder can be used to maintain normal or near normal serum potassium levels (<5.5 mmol/L) in order to allow optimal treatment with a RAS-blocker or a MRA to continue.	II	B

<sup>a</sup>Additional eGFR and albuminuria criteria apply for initiation of treatment with different SGLT2is according to their respective approval.



# 2024 KDIGO CKD治療指引更新

## SGLT2i納入一線治療

2024 KDIGO治療指引  
建議等級/證據等級<sup>1</sup>

證據等級

治療建議

CKD患者



建議3.7.1:  
CKD合併T2D且  
eGFR $\geq$ 20ml/min/1.73m<sup>2</sup>的成人患者\*

1A

建議3.7.2:  
CKD合併心衰(無論蛋白尿狀態)  
或  
eGFR $\geq$ 20ml/min/1.73m<sup>2</sup>+UACR  $\geq$   
200 mg/g 的成人患者\*\*

1A

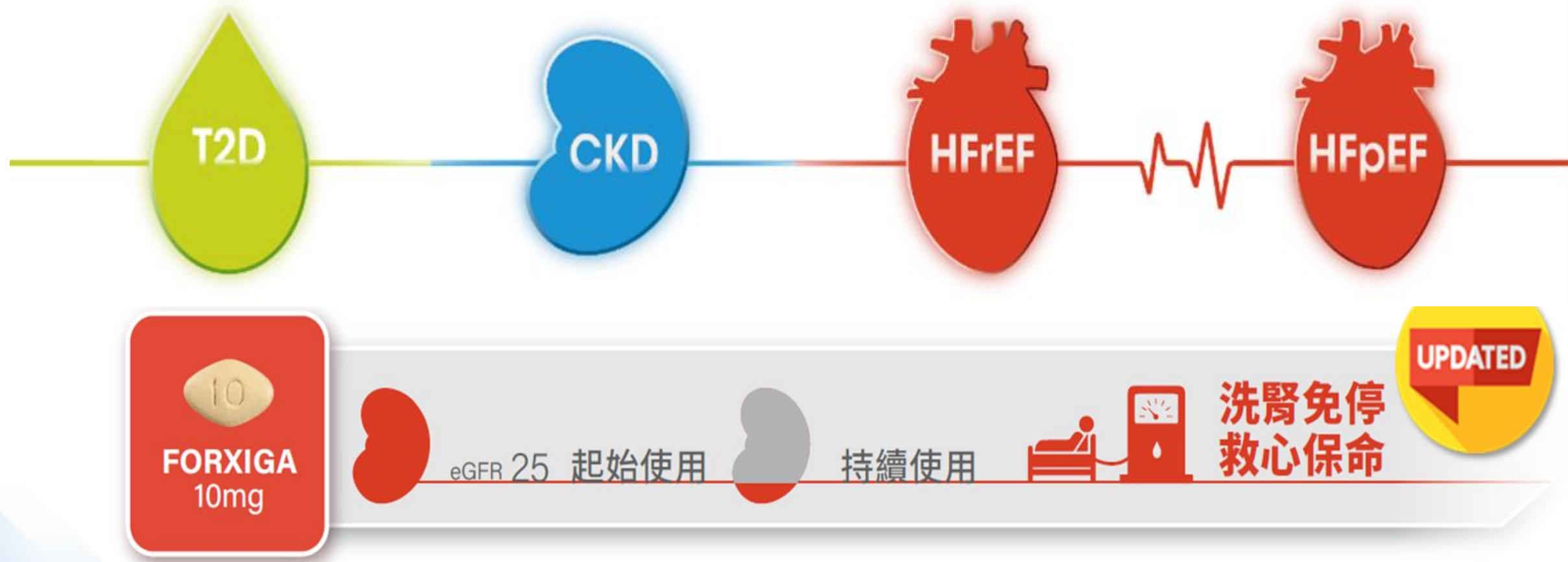
建議3.7.3:  
成人eGFR $\geq$ 20- 45ml /min  
/1.73m<sup>2</sup>+UACR < 200 mg/g

2B

推薦使用  
SGLT2i



# SGLT2-i 的適應症







# 福適佳 膜衣錠 5 毫克、10 毫克

## Forxiga Film-coated Tablets 5 mg, 10 mg

本藥須由醫師處方使用  
5 毫克 衛部藥輸字第 026475 號  
10 毫克 衛部藥輸字第 026476 號

## 2. 適應症

### 2.1 第二型糖尿病

- 血糖控制：配合飲食和運動，以改善第二型糖尿病成人病人的血糖控制。
- 預防心血管事件：用於具第二型糖尿病且已有心血管疾病 (CVD) 或多重心血管風險因子的成人病人時，可降低心衰竭住院的風險。
- 預防腎臟病：降低慢性腎臟病 (CKD) 新發生或惡化的風險。

### 2.2 慢性腎臟病

用於治療有惡化風險之慢性腎臟病的成人病人時，可降低持續性腎絲球過濾率 (eGFR) 下降、末期腎病 (ESKD)、心衰竭住院和心血管死亡的風險。

### 2.3 心衰竭

用於心衰竭的成人病人時，可降低心血管死亡、心衰竭住院和心衰竭緊急就醫的風險。

**2023/8/15 放寬心衰竭核准族群**

UPDATED



Thanks for listening !

