APCN x TSN 2025
23rd Asian Pacific Congress of Nephrology
Gene, Immunology, Vast, MEtabolism at its Finest!
2025
Dec. 5 Fri. ▶ 7 Sun.
TaiNEX 2, Taipei, Taiwan

Plenary lecture

Revolution of nephrology: new therapies and digitalization

Masaomi Nangaku
Immediate Past President of the ISN
Past President of the APSN
President of the JSN
Dean, The University of Tokyo Graduate School of Medicine

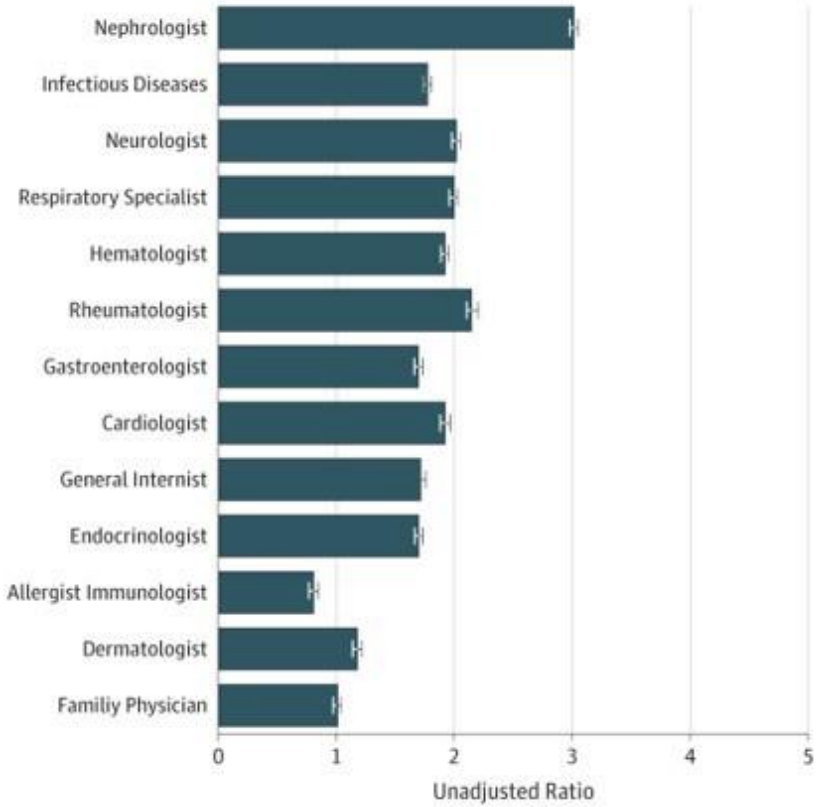
COI disclosure: financial presenter: Masaomi Nangaku

I have the following relationships to disclose.

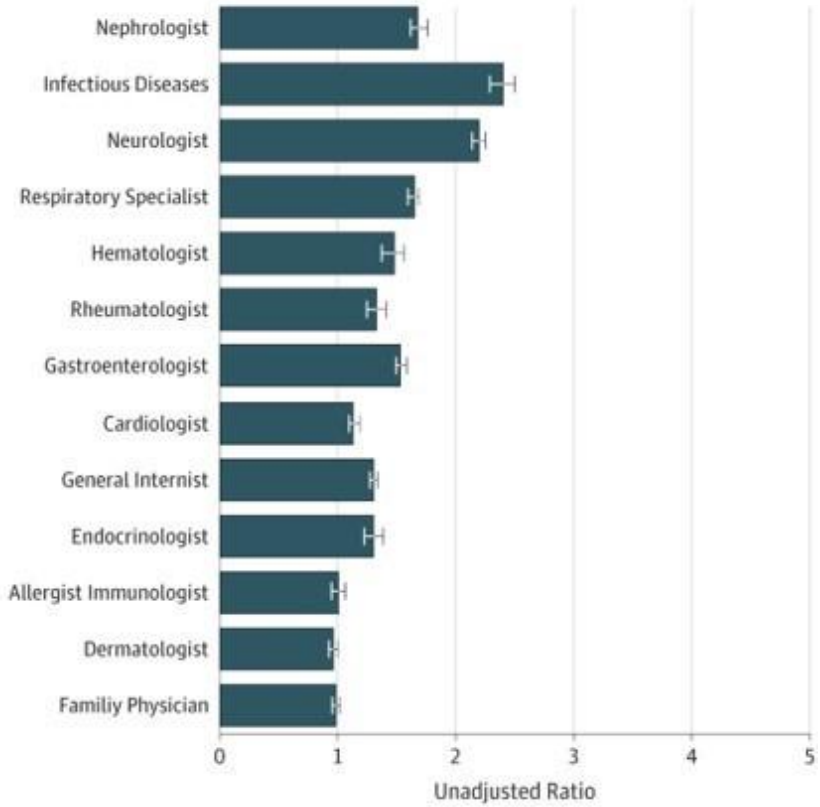
- Employment: No
- Stock ownership or options: No
- Patent royalties/licensing fees: No
- Honoraria and advisory fees: Kyowa-Kirin, Mitsubishi-Tanabe, Bayer
- Research funding: Kyowa-Kirin, BI, JT, Chugai, Mitsubishi-Tanabe, Torii

Comparison of the complexity of patients seen by different medical subspecialists in a universal health care system

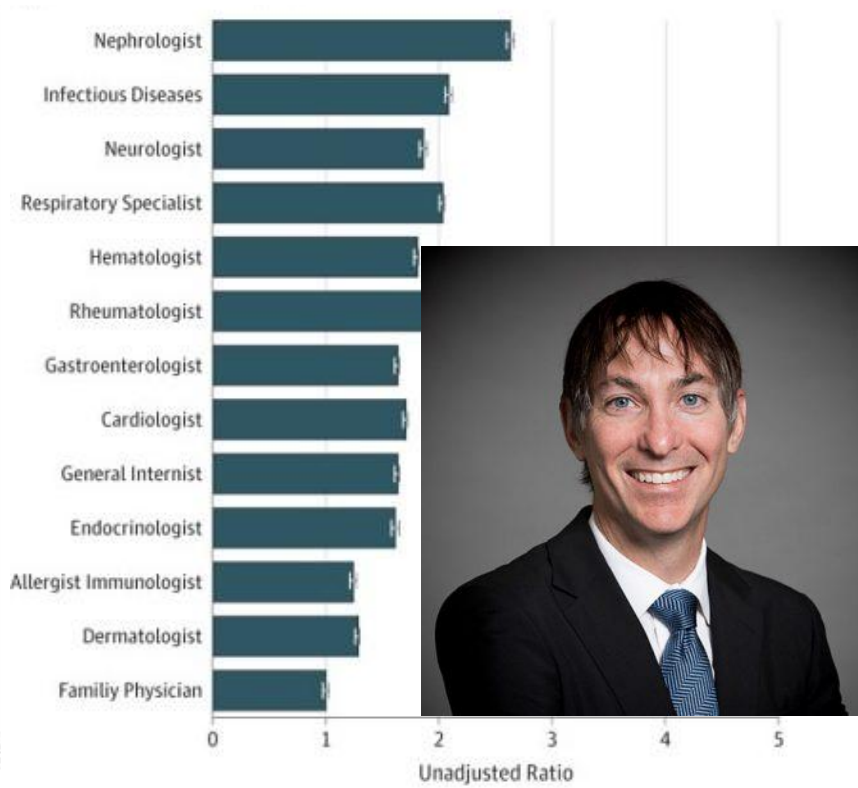
Comorbidities



Risk of mental health condition



Prescribed medications



Tonelli et al.
JAMA Network Open 2018

When types of physician were ranked according to patient complexity across all 9 markers, the most complex was nephrologist

Tonelli et al.
JAMA Network Open 2018

Historic win for kidney health as WHO adopts global resolution

Geneva — May 23, 2025

This historic step marks the first time kidney health has been formally prioritized within the WHO noncommunicable diseases (NCD) agenda

台灣腎臟醫學會
Taiwan Society of Nephrology

慢性腎臟病

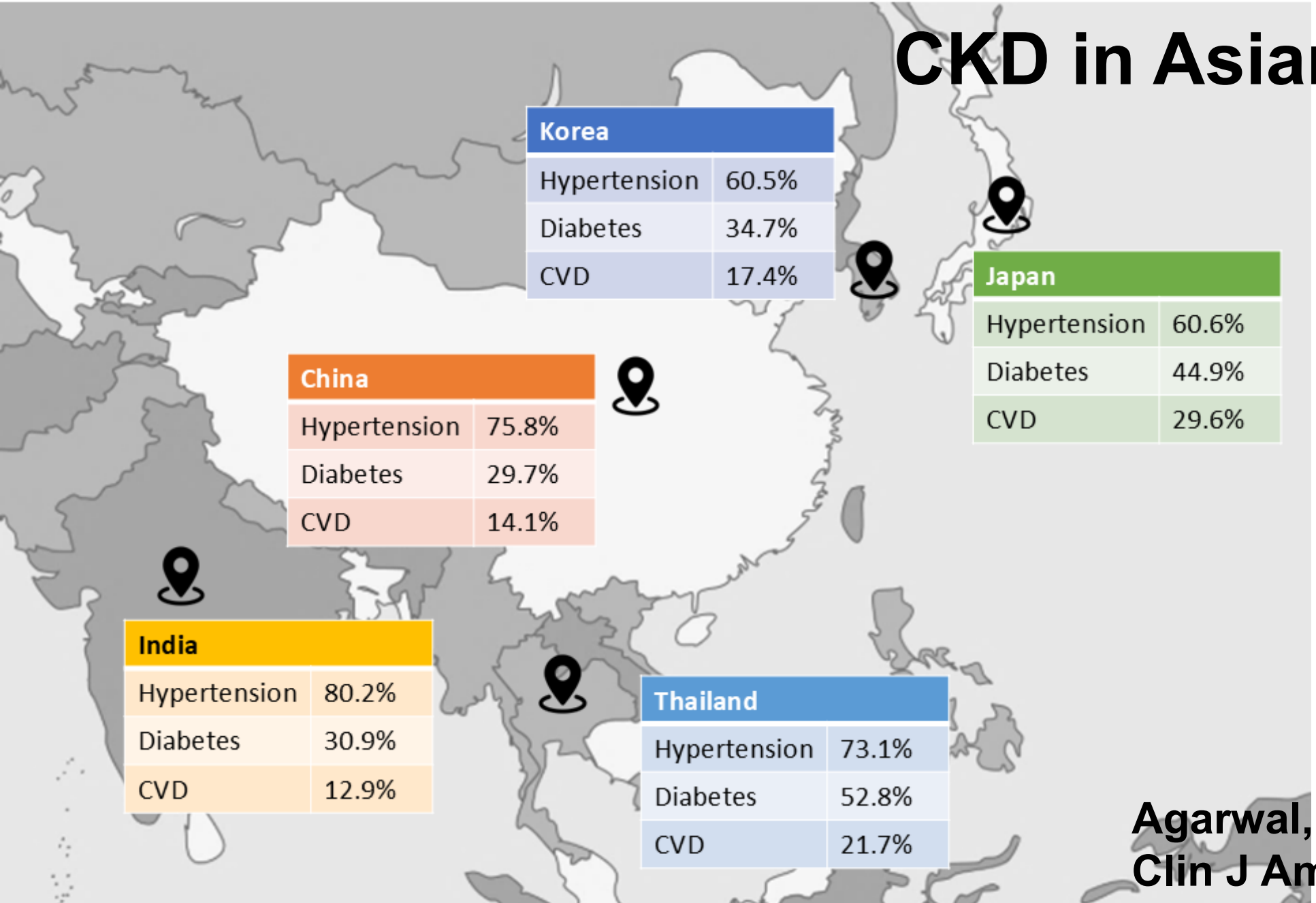
衛教記者會

Implementation of established global guidelines in the management of CKD in patients with type 2 diabetes in Asia

Agarwal R, Nangaku M, Chen L, Moon Wang AY, Yanagita M, Bavanandan S, Satirapoj B, Prasad N, Lim SK, Sriwijitkamol A, Roasa EA, Teo BW, Huang CN, Huang CY, Pollock C, Choi SH, Shah DS, Hao C, Kim SG, Jadhav U, Wu MS, Tang SC.

Clin J Am Soc Nephrol e-Pub

Prevalence of comorbidities in individuals with CKD in Asian countries



Korea	
Hypertension	60.5%
Diabetes	34.7%
CVD	17.4%

China	
Hypertension	75.8%
Diabetes	29.7%
CVD	14.1%

India	
Hypertension	80.2%
Diabetes	30.9%
CVD	12.9%

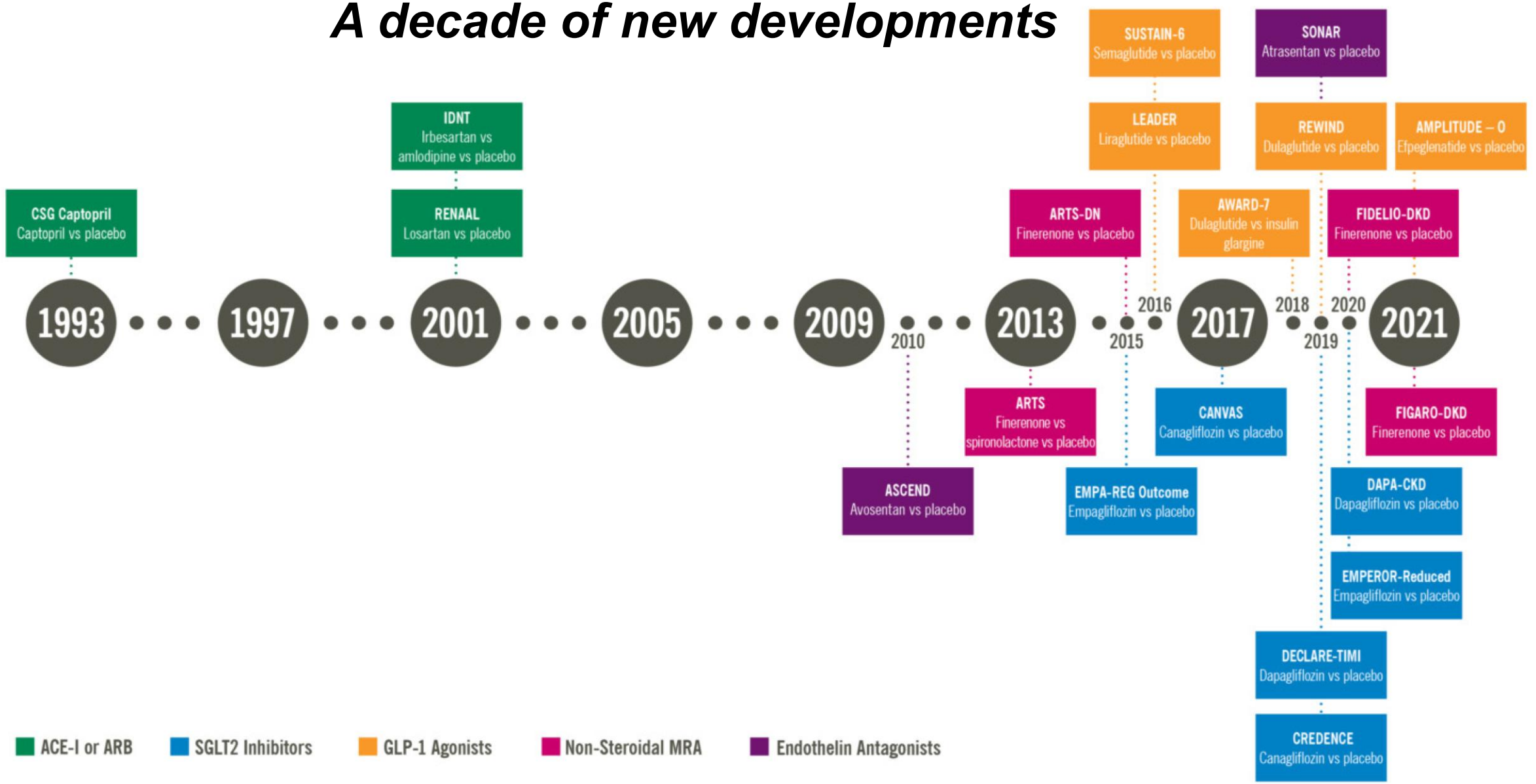
Thailand	
Hypertension	73.1%
Diabetes	52.8%
CVD	21.7%

Japan	
Hypertension	60.6%
Diabetes	44.9%
CVD	29.6%

Agarwal, Nangaku et al.
Clin J Am Soc Nephrol e-Pub

Exciting time in Nephrology

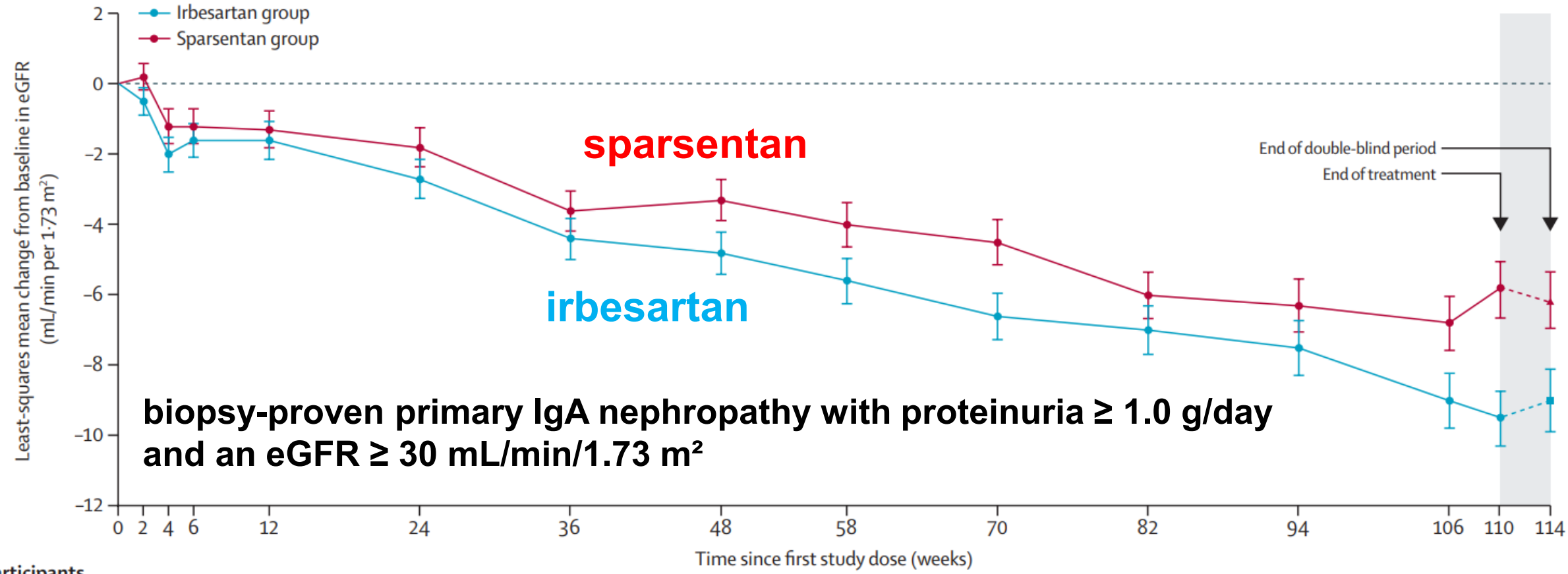
A decade of new developments



Sawaf H. J Clin Med 2022

IgA nephropathy

sparsentan versus irbesartan in patients with IgA nephropathy (PROTECT study)



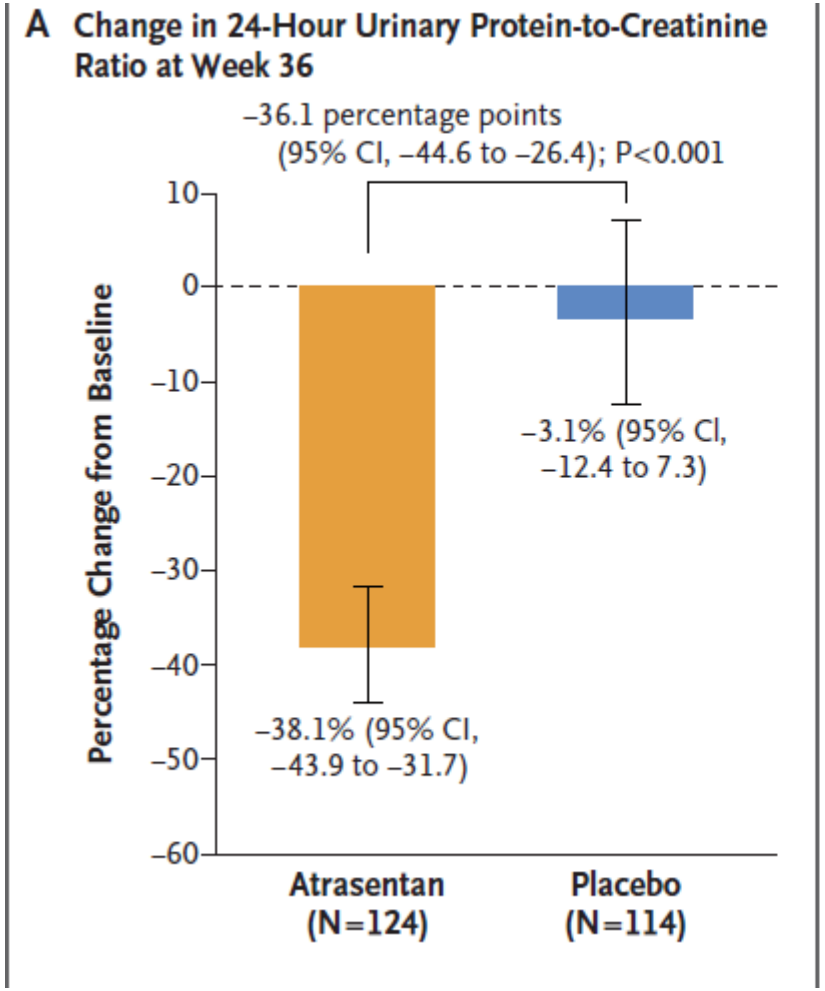
Number of participants

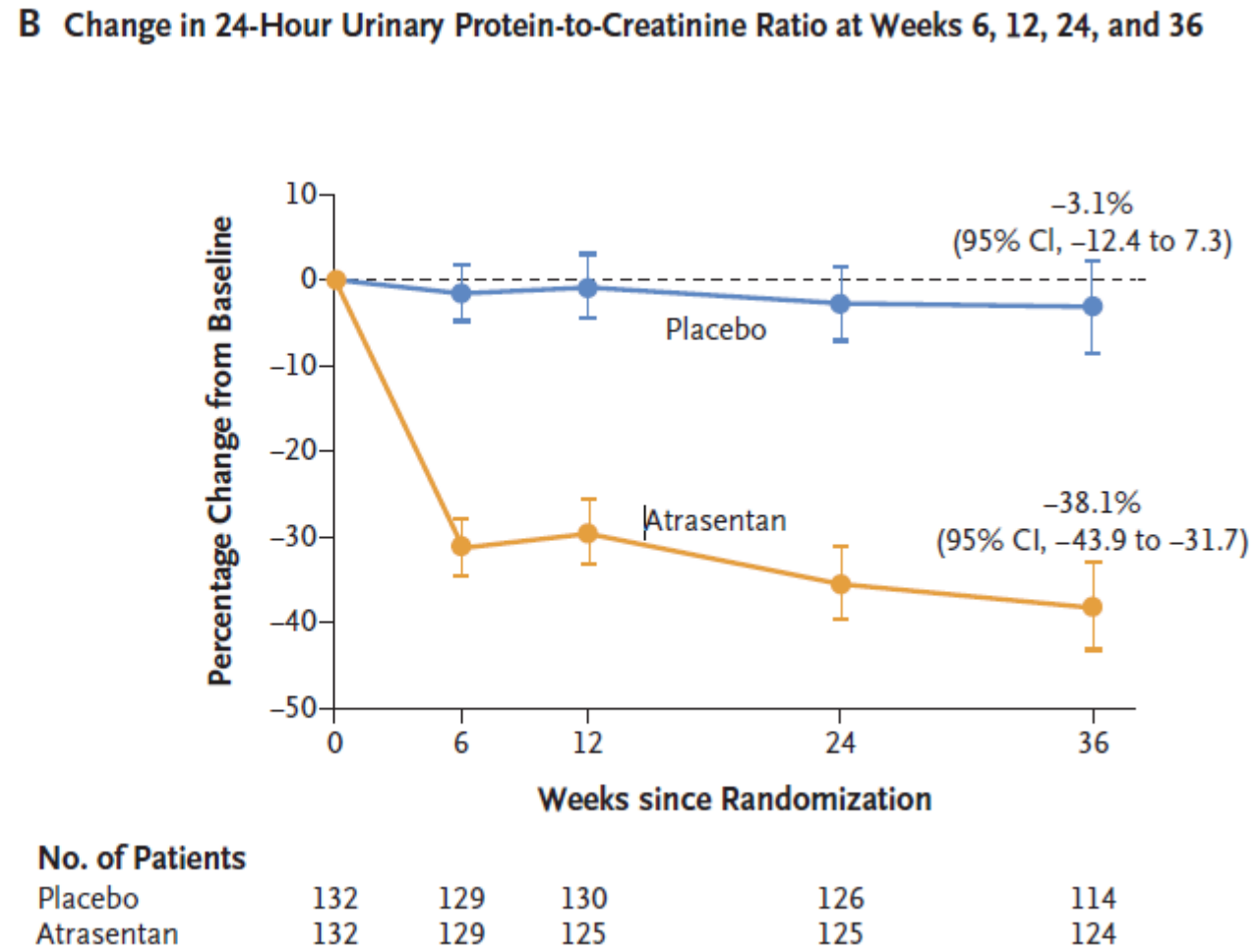
Irbesartan group	202	196	191	193	188	176	179	173	162	160	159	154	144	138	148
Sparsentan group	202	197	197	193	196	191	189	184	180	182	176	173	170	159	170

Rovin, Tang et al. Lancet 2023

atrasentan resulted in a reduction in proteinuria in patients with IgA nephropathy

prespecified interim analysis of ALIGN Trial





Heerspink, Zhang, Tang et al. N Engl J Med 2025

SGLT2 inhibitors

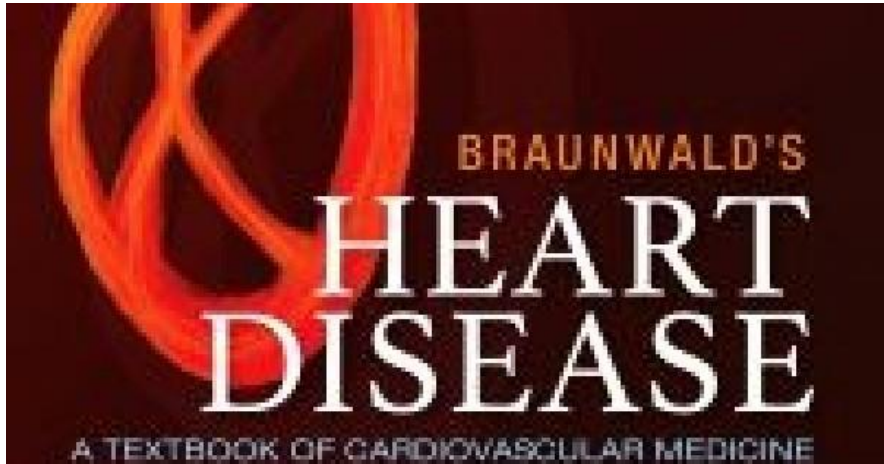
Eur Heart J 2022

SGLT2 inhibitors: the statins of the 21st century

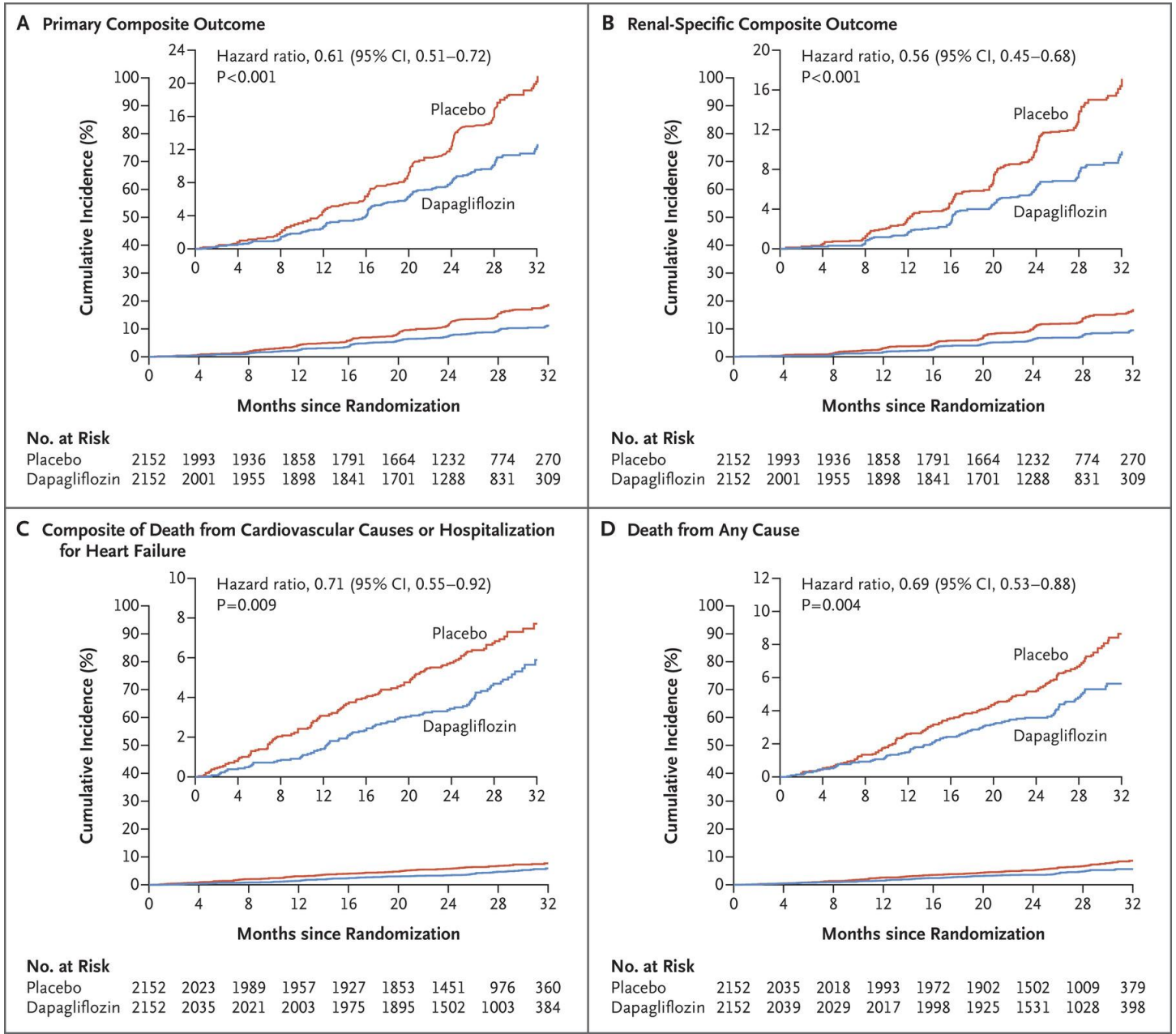
Eugene Braunwald [1,2]*

[1]TIMI Study Group, Division of Cardiovascular Medicine, Brigham and Women's Hospital, Hale Building for Transformative Medicine, Suite 7022, 60 Fenwood Road, Boston, MA 02115, USA; and [2]Department of Medicine, Harvard Medical School, Boston, MA, USA

A relatively small number of drugs have been responsible for major advances in medical practice. The discovery, development, and elucidation of the mechanisms of action of aspirin, penicillin, and statins are remarkable success stories, each with some surprises and each crowned by a Nobel Prize. The sodium glucose co-transporter inhibitors have been proven effective in the treatment of type 2 diabetes mellitus, various forms of heart failure, and kidney failure and represent *the, or one of the*, major pharmacological advances in cardiovascular medicine in the 21st century.



DAPA-CKD



Heerspink et al.
N Engl J Med 2020

The NEW ENGLAND JOURNAL of MEDICINE

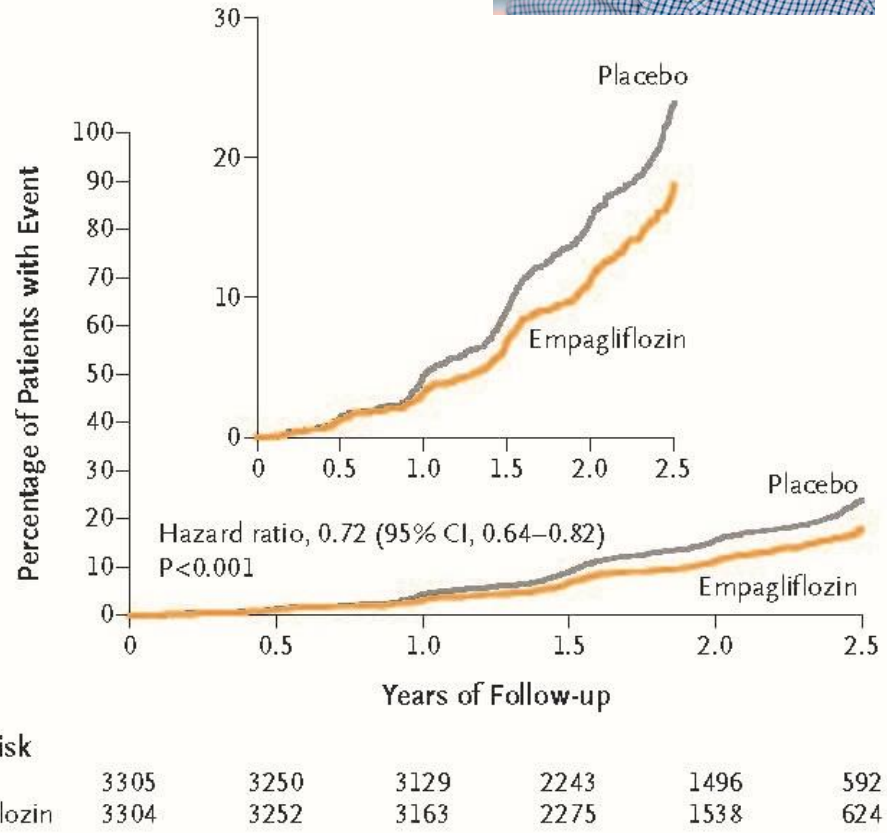
2023

Empagliflozin in Patients with Chronic Kidney Disease

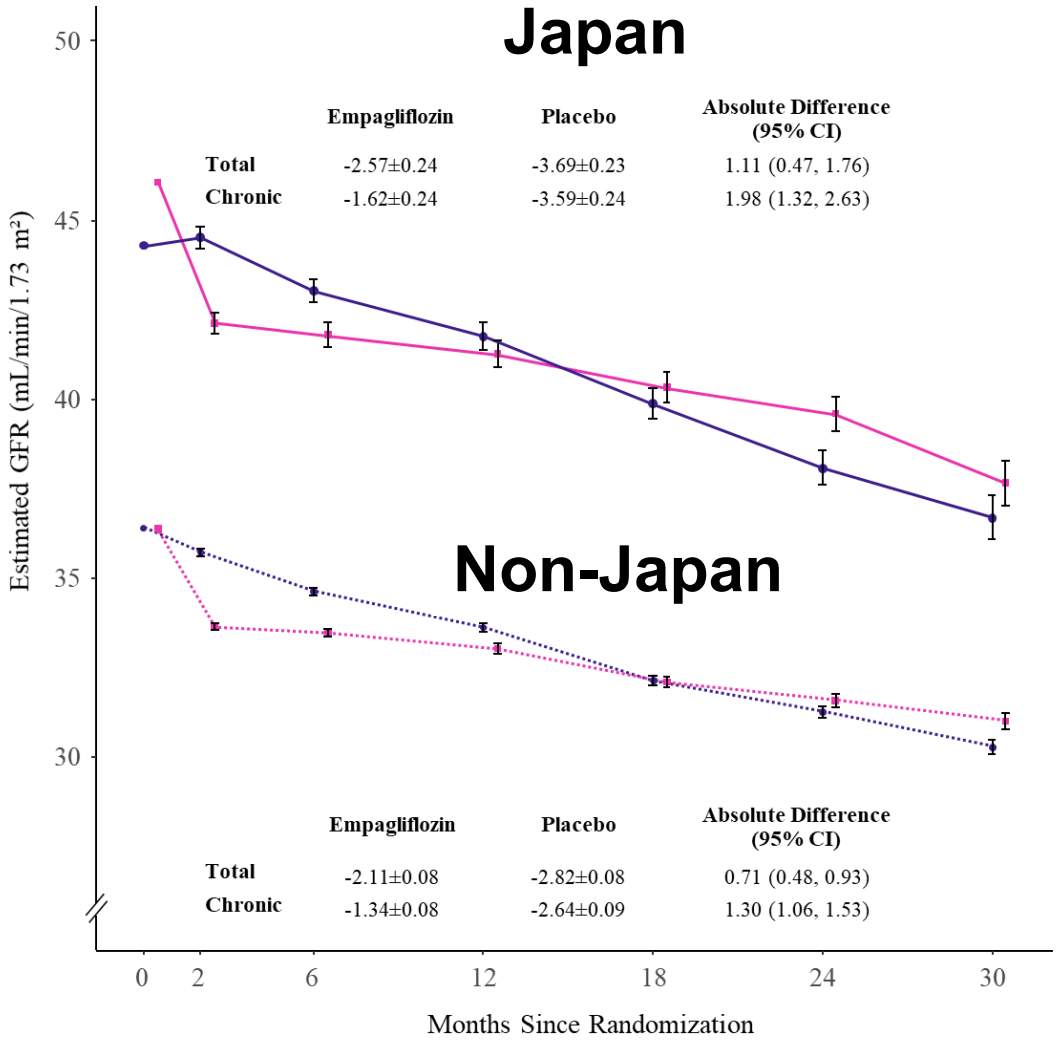
Herrington, Nangaku et al.
EMPA-KIDNEY Collaborative Group

Table 1. (Continued.)

Characteristic	Empagliflozin (N=3304)	Placebo (N=3305)
Cause of kidney disease — no. (%)		
Diabetic kidney disease	1032 (31.2)	1025 (31.0)
Hypertensive or renovascular disease	706 (21.4)	739 (22.4)
Glomerular disease	853 (25.8)	816 (24.7)
Other	387 (11.7)	421 (12.7)
Unknown	326 (9.9)	304 (9.2)



Change from baseline in the eGFR slope by Japan vs non-Japan regions (post-hoc exploratory analyses of EMPA-KIDNEY)

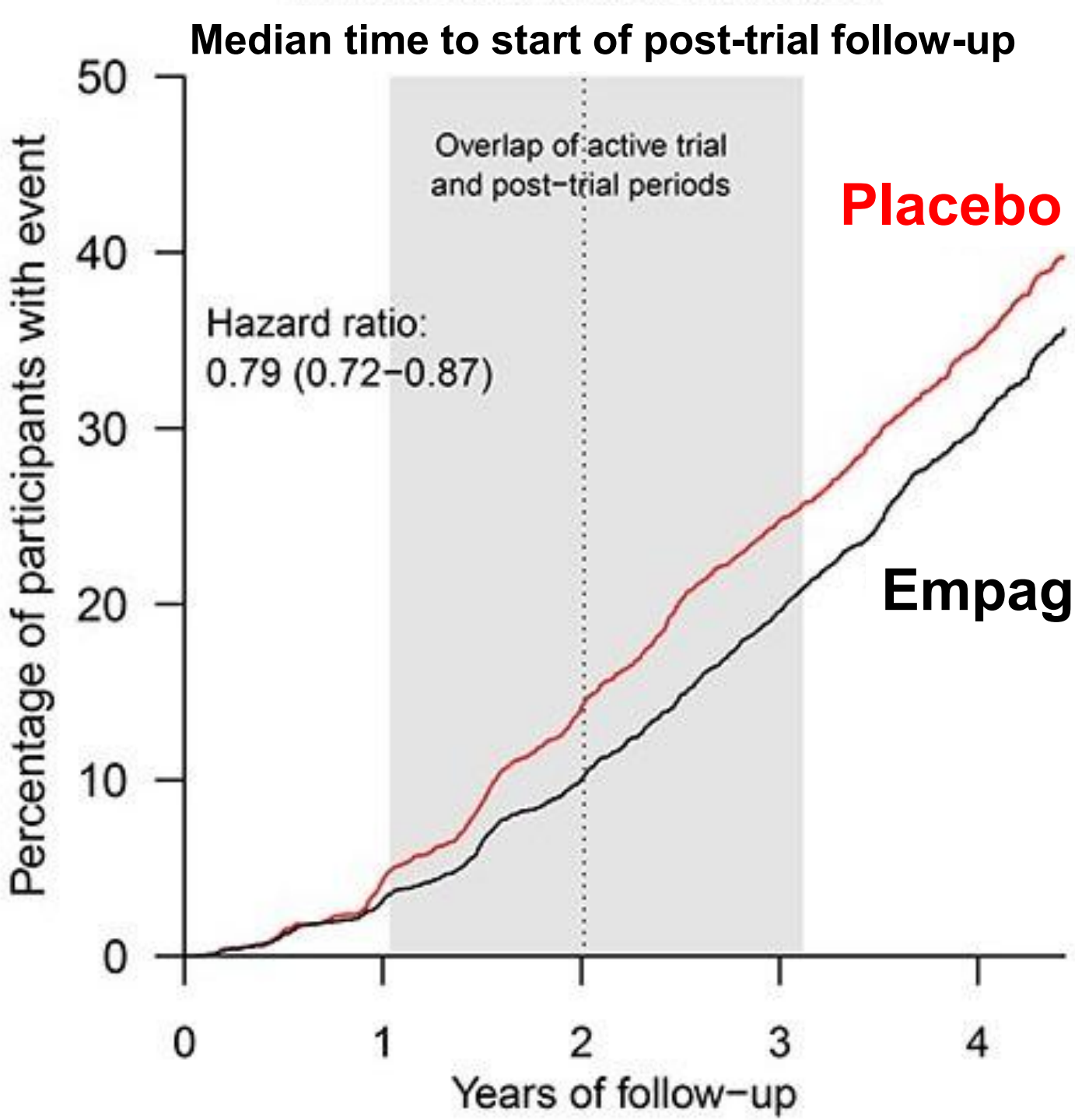


Empagliflozin
Placebo

Empagliflozin
Placebo

Nangaku, Herrington et al.
Clin Exp Nephrol 2024

Long-term effects of empagliflozin in patients with CKD

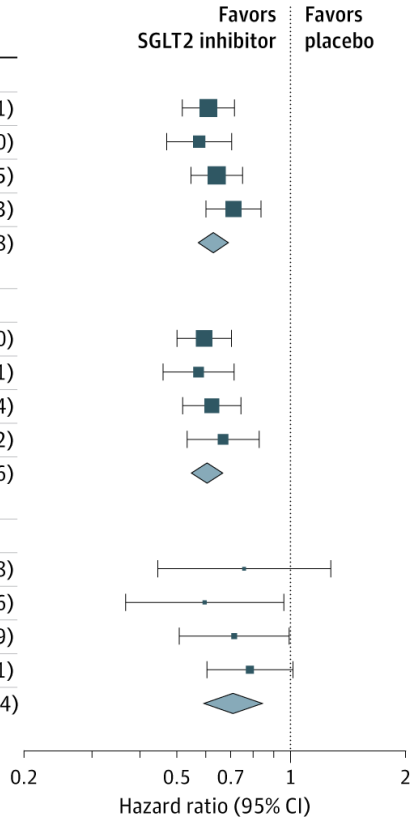


Herrington, Nangaku et al.
N Engl J Med 2025

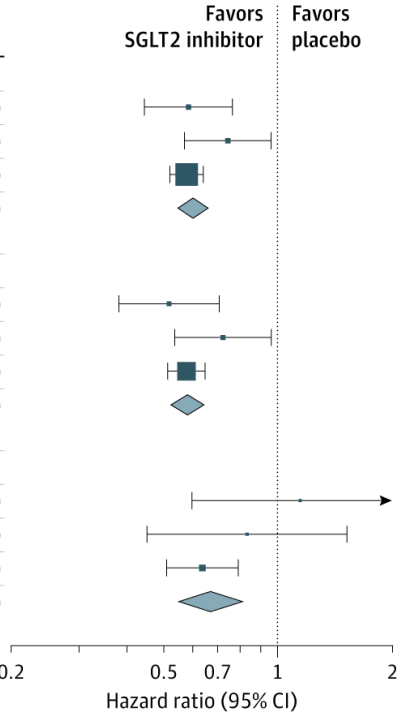
SGLT2 inhibitors reduced risk of CKD progression regardless of baseline eGFR categories and UACR:

SGLT2 Inhibitor Meta-Analysis Cardio-Renal Trialists' Consortium (SMART-C)

Baseline estimated GFR, mL/min/1.73 m^2	No. of participants/total No. (%) SGLT2 inhibitor	Placebo	Hazard ratio (95% CI)
All participants			
≥60	271/23 164 (1.2)	369/19 951 (1.8)	0.61 (0.52-0.71)
45 to <60	164/6255 (2.6)	273/5902 (4.6)	0.57 (0.47-0.70)
30 to <45	274/5561 (4.9)	389/5323 (7.3)	0.64 (0.54-0.75)
<30	241/1928 (12.5)	333/1966 (16.9)	0.71 (0.60-0.83)
Overall	950/36 911 (2.6)	1364/33 146 (4.1)	0.62 (0.57-0.68)
Trend by baseline estimated GFR: *P* = .16			
Participants with diabetes			
≥60	246/19 861 (1.2)	335/16 665 (2.0)	0.59 (0.50-0.70)
45 to <60	137/4355 (3.1)	226/4004 (5.6)	0.57 (0.46-0.71)
30 to <45	213/3586 (5.9)	306/3368 (9.1)	0.62 (0.52-0.74)
<30	139/1122 (12.4)	199/1105 (18.0)	0.66 (0.53-0.82)
Overall	735/28 940 (2.5)	1066/25 165 (4.2)	0.60 (0.55-0.66)
Trend by baseline estimated GFR: *P* = .39			
Participants without diabetes			
≥60	25/3303 (0.8)	34/3286 (1.0)	0.75 (0.45-1.28)
45 to <60	27/1900 (1.4)	47/1898 (2.5)	0.59 (0.37-0.96)
30 to <45	61/1975 (3.1)	83/1955 (4.2)	0.71 (0.51-0.99)
<30	102/788 (12.9)	134/837 (16.0)	0.78 (0.60-1.01)
Overall	215/7971 (2.7)	298/7981 (3.7)	0. 70 (0.59-0.84)
Trend by baseline estimated GFR: *P* = .57			



Baseline UACR, mg/g	No. of participants/total No. (%) SGLT2 inhibitor	Placebo	Hazard ratio (95% CI)
All participants			
<30	94/15 973 (0.6)	125/13 595 (0.9)	0.58 (0.44-0.76)
30 to 300	109/7583 (1.4)	128/6519 (2.0)	0.74 (0.57-0.96)
>300	637/7575 (8.4)	999/7275 (13.7)	0.57 (0.52-0.64)
Overall	843/31 407 (2.7)	1252/27 644 (4.5)	0.60 (0.55-0.65)
Trend by baseline UACR: *P* = .49			
Participants with diabetes			
<30	73/13 984 (0.5)	108/11 645 (0.9)	0.52 (0.38-0.70)
30 to 300	89/6365 (1.4)	103/5309 (1.9)	0.72 (0.53-0.96)
>300	503/5849 (8.6)	786/5497 (14.3)	0.57 (0.51-0.64)
Overall	668/26 464 (2.5)	997/22 696 (4.4)	0.58 (0.52-0.64)
Trend by baseline UACR: *P* = .96			
Participants without diabetes			
<30	21/1988 (1.1)	17/1950 (0.9)	1.15 (0.59-2.22)
30 to 300	20/1218 (1.6)	25/1210 (2.1)	0.83 (0.45-1.53)
>300	134/1726 (7.8)	213/1778 (12.0)	0.63 (0.51-0.79)
Overall	175/4943 (3.5)	255/4948 (5.2)	0.66 (0.55-0.81)
Trend by baseline UACR: *P* = .07			



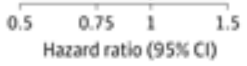
CKD progression, defined as kidney failure, at least 50% reduction in eGFR, or death due to kidney failure

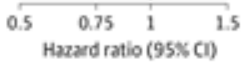
Neuen et al. JAMA 2025

Absolute benefits of SGLT2 inhibitors on kidney, hospitalization, and mortality outcomes irrespective of diabetes status and level of UACR

SMART-C

	Diabetes							No diabetes						
	No. of events/participants		Rate/1000 patient-years[a]				*P* for heterogeneity by albuminuria status[b]	No. of events/participants		Rate/1000 patient-years[a]				*P* for heterogeneity by albuminuria status[b]
	SGLT2 inhibitor	Placebo	SGLT2 inhibitor	Placebo	Hazard ratio (95% CI)	SGLT2 inhibitor better	Placebo better	SGLT2 inhibitor	Placebo	SGLT2 inhibitor	Placebo	Hazard ratio (95% CI)	SGLT2 inhibitor better	Placebo better
Kidney disease progression[c] *P* = .15 for heterogeneity by diabetes status														
Urine albumin to creatinine ratio, mg/g														
<200	368/19421	441/16166	15	22	0.65 (0.56-0.75)			69/2962	76/2913	11	13	0.88 (0.64-1.23)		
≥200	885/6778	1211/6285	52	77	0.65 (0.59-0.71)		.95	238/1970	325/2025	46	72	0.71 (0.60-0.84)		.24
Overall[d]	1262/26413	1655/22644	33	48	0.65 (0.60-0.70)			307/4943	401/4948	32	46	0.74 (0.63-0.85)		
Acute kidney injury[e] *P* = .61 for heterogeneity by diabetes status														
Urine albumin to creatinine ratio, mg/g														
<200	242/17018	284/13748	11	11	0.73 (0.61-0.87)			71/2962	94/2913	10	15	0.74 (0.54-1.01)		
≥200	273/6480	312/5969	22	26	0.81 (0.69-0.95)		.39	38/1970	57/2025	12	15	0.70 (0.46-1.07)		.83
Overall[d]	521/23705	604/19901	14	18	0.77 (0.69-0.87)			109/4943	152/4948	13	18	0.72 (0.56-0.92)		
Any hospitalization *P* = .75 for heterogeneity by diabetes status														
Urine albumin to creatinine ratio, mg/g														
<200	6987/19569	6115/16284	186	199	0.91 (0.88-0.94)			1021/2962	1095/2913	212	285	0.89 (0.82-0.98)		
≥200	2603/6800	2614/6293	251	294	0.87 (0.82-0.92)		.19	447/1970	517/2025	267	348	0.87 (0.77-0.99)		.72
Overall[d]	9677/26584	8809/22770	202	231	0.90 (0.87-0.92)			1471/4943	1616/4948	203	237	0.89 (0.83-0.95)		
Any death *P* = .49 for heterogeneity by diabetes status														
Urine albumin to creatinine ratio, mg/g														
<200	1270/19535	1146/16277	36	36	0.90 (0.83-0.98)			289/2962	300/2913	48	43	0.93 (0.79-1.10)		
≥200	652/6796	713/6292	61	68	0.78 (0.70-0.87)		.03	68/1970	95/2025	74	62	0.79 (0.57-1.09)		.35
Overall[d]	1930/26545	1877/22762	42	47	0.86 (0.80-0.91)			359/4943	395/4948	42	48	0.91 (0.78-1.05)		





Staplin et al.
JAMA 2025

Mineralocorticoid receptor antagonist (MRA) and aldosterone synthase inhibitor (ASi)

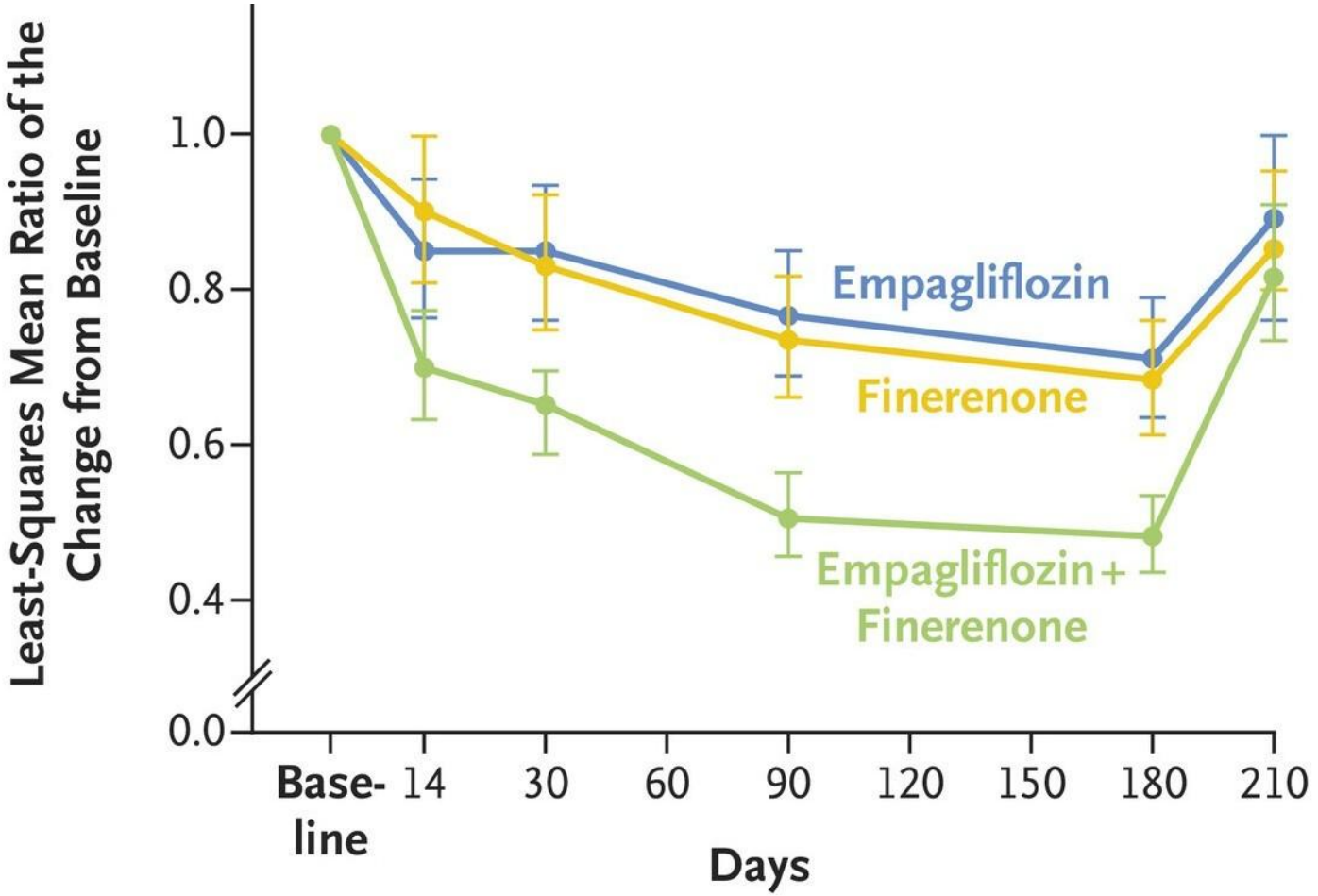
The NEW ENGLAND JOURNAL of MEDICINE

Finerenone with Empagliflozin in Chronic Kidney Disease and Type 2 Diabetes

Authors: Rajiv Agarwal, M.D., Jennifer B. Green, M.D., Hiddo J.L. Heerspink, Ph.D., Johannes F.E. Mann, M.D., Janet B. McGill, M.D., Amy K. Mottl, M.D., Julio Rosenstock, M.D., Peter Rossing, M.D., Muthiah Vaduganathan, M.D., M.P.H., Meike Brinker, M.D., Robert Edfors, M.D., Ph.D., Na Li, M.D., Ph.D., Markus F. Scheerer, Ph.D., Charlie Scott, M.Sc., and Masaomi Nangaku, M.D., Ph.D., for the CONFIDENCE Investigators*

N Engl J Med 2025;393:533-543

Change in Urinary Albumin-to-Creatinine Ratio



No. of Patients						
Finerenone	258	247	248	237	236	227
Empagliflozin	261	254	252	246	238	232
Empagliflozin+ finerenone	265	248	253	248	240	238

Agarwal, Nangaku et al. N Engl J Med 2025

Characteristic	Finerenone plus Empagliflozin (N=269)	Finerenone (N=264)	Empagliflozin (N=267)	Total (N=800)
Age — yr	67.7±10.0	65.5±10.7	66.2±10.1	66.5±10.3
Female sex — no. (%)	67 (24.9)	61 (23.1)	70 (26.2)	198 (24.8)
Race or ethnic group — no. (%) †				
White	130 (48.3)	105 (39.8)	116 (43.4)	351 (43.9)
Asian	114 (42.4)	132 (50.0)	125 (46.8)	371 (46.4)
Asian Indian	34 (12.6)	54 (20.5)	45 (16.9)	133 (16.6)
Black	22 (8.2)	21 (8.0)	24 (9.0)	67 (8.4)
Other	2 (0.7)	2 (0.8)	1 (0.4)	5 (0.6)
Geographic region — no. (%)				
Europe	81 (30.1)	62 (23.5)	72 (27.0)	215 (26.9)
North America	75 (27.9)	79 (29.9)	71 (26.6)	225 (28.1)
Asia	113 (42.0)	123 (46.6)	124 (46.4)	360 (45.0)

Agarwal, Nangaku et al. N Engl J Med 2025

CONFIDENCE: Finerenone and Empagliflozin in Patients from Asia with Chronic Kidney Disease and Type 2 Diabetes

CJASN
Clinical Journal of the American Society of Nephrology
Clinical Research

Chronic Kidney Disease (CKD)

Type 2 Diabetes

Urine albumin to creatinine ratio (UACR) 100-5000 mg/g

n=360 participants from Asia

PRIMARY EFFICACY OUTCOME

Change from baseline in UACR at 180 days

1:1:1 Randomization

- Finerenone + Empagliflozin
- Finerenone 10 or 20 mg/day (with Empagliflozin matching placebo)
- Empagliflozin 10 mg/day (with Finerenone matching placebo)

Clinical differences between Asia (and Europe/North America)

Asia		Europe/N. America
64 years	Age	69 years
26.2 kg/m²	BMI	31.8 kg/m²
663 mg/g	UACR	504 mg/g
21%	ASCVD	34%
21%	DIURETICS	49%
27%	Insulin use	50%

Adverse events in Patients from Asia (and Europe/North America)

Asia		Europe /N. America
41%	Adverse Event	61%
3%	Serious Adverse Event	9%
1%	Discontinuation of drug for Adverse Event	6%
10%	Hyperkalemia	7%

Reduction in UACR
Combination vs Finerenone alone 30% greater (95% CI 12-45%, P=0.003)
Combi. vs Empagliflozin alone 34% greater (95% CI 16-47%, P<0.001)

Simultaneous initiation of finerenone and empagliflozin was effective and well-tolerated among CONFIDENCE study participants from Asia, consistent with the overall population.

Agarwal, Nangaku et al. CJASN 2025

CONFIDENCE trial

relative efficacy and safety of combination therapy are consistent across a wide spectrum of predicted kidney disease risk

Vaduganathan, Nangaku et al. NDT 2025

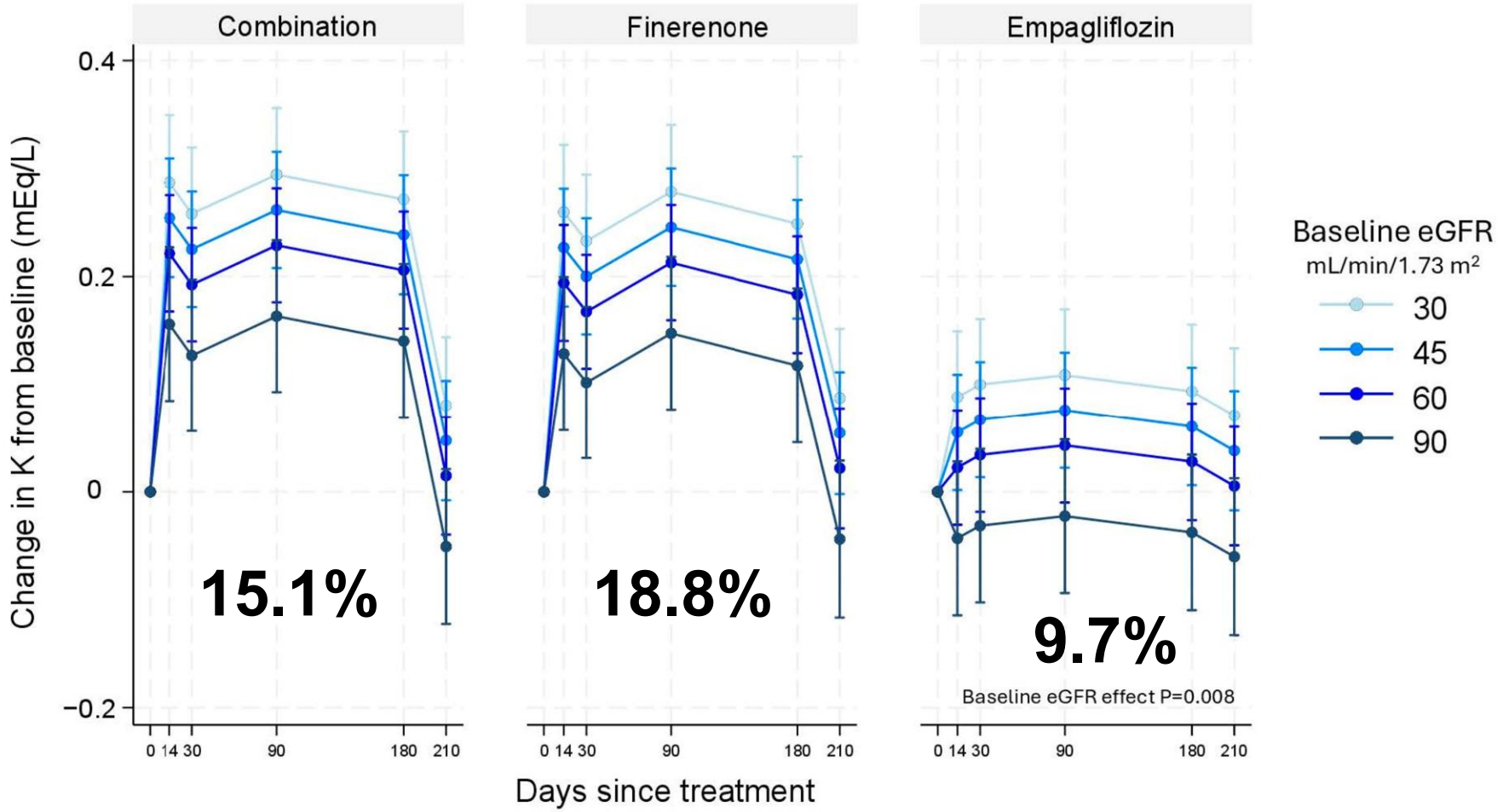
combination therapy was effective and well tolerated, irrespective of background use of a GLP-1 RA

Agarwal, Nangaku et al. Diabetes Care 2025

greater albuminuria lowering was seen with a higher baseline eGFR or UACR, older age, in female patients, and those with atherosclerotic cardiovascular disease, irrespective of the treatment

Mottl, Nangaku et al. JASN 2025

Risk of hyperkalemia: secondary analysis of CONFIDENCE trial

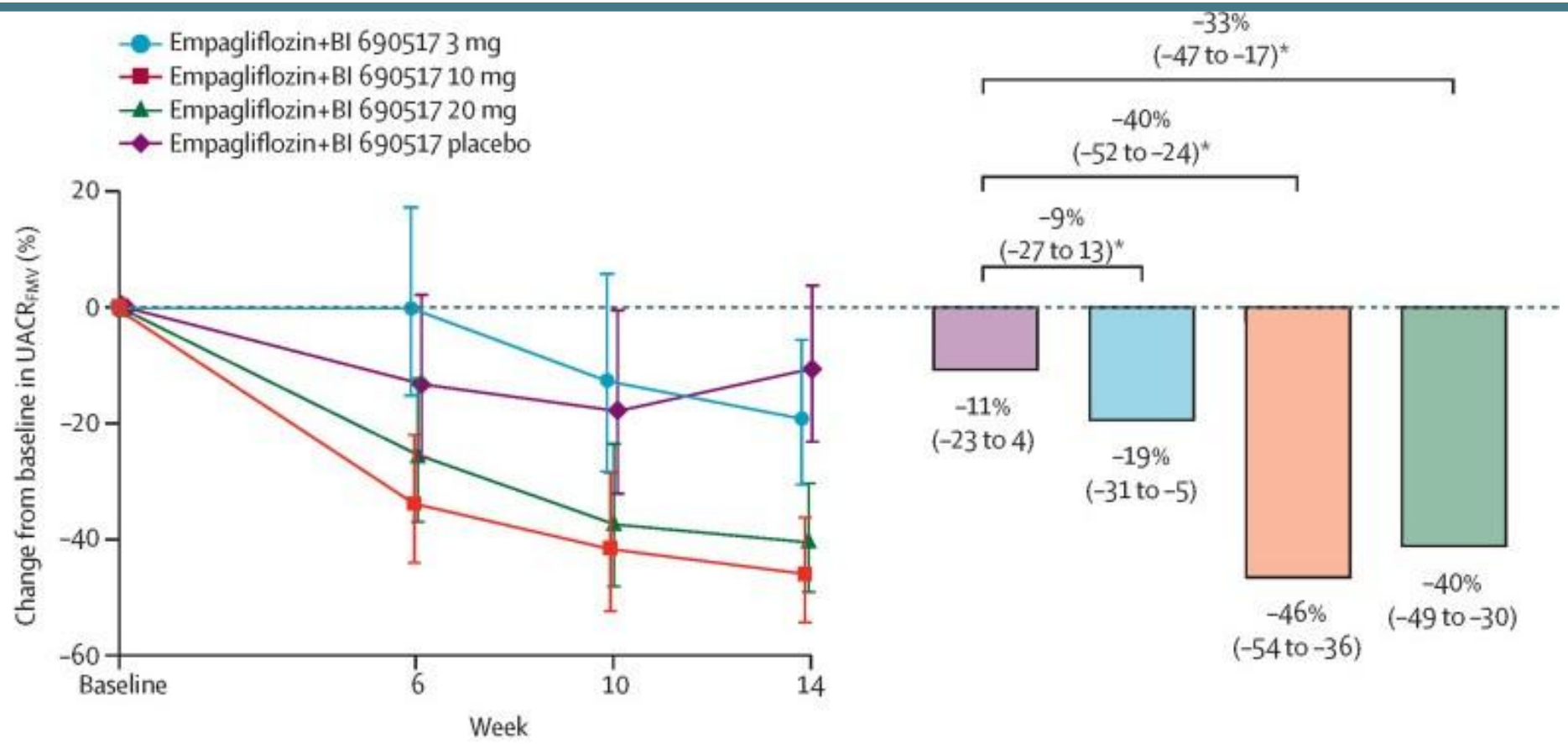


Patients developing hyperkalemia had lower eGFR at baseline.

There were few treatment discontinuations.

Agarwal, Nangaku et al. JACC 2025

Vicadrostat, aldosterone synthase inhibitor, with empagliflozin for CKD: a phase 2 trial



Empagliflozin+BI 690517 3 mg	63	60	56	56
Empagliflozin+BI 690517 10 mg	60	57	49	45
Empagliflozin+BI 690517 20 mg	62	57	56	52
Empagliflozin+BI 690517 placebo	64	62	58	58

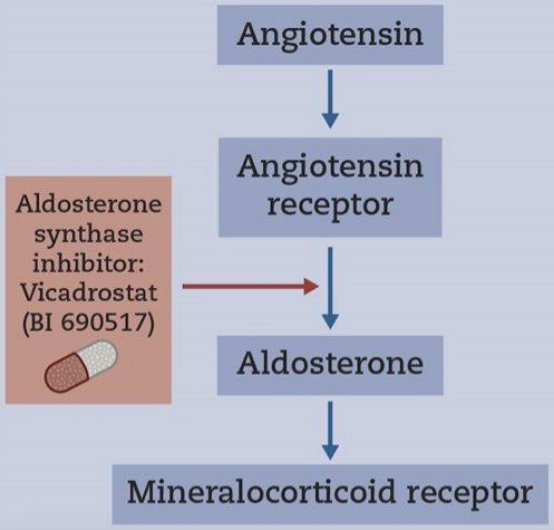
Tuttle, Nangaku et al. Lancet 2024

The potential for improving cardio-renal outcomes in chronic kidney disease with the aldosterone synthase inhibitor vicadrostat (BI 690517): a rationale for the EASi-KIDNEY trial

EASi-KIDNEY
Aldosterone Synthase inhibition & Empagliflozin in CKD

Trial aim was to assess safety and cardiorenal efficacy of aldosterone synthase inhibition in a broad range of patients with chronic kidney disease (CKD), with and without type 2 diabetes.

Targeting aldosterone overactivity



Trial design

n = 11,000

Key inclusion:
eGFR ≥ 20 and < 45 or
≥ 45 and < 90 + uACR ≥ 200 mg/g

Key exclusion:
K^+ > 5.2 mmol/L

Background therapy

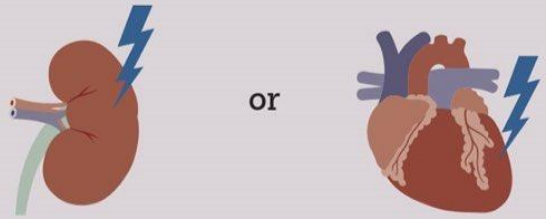
EMPAGLIFLOZIN and clinically appropriate RAS inhibitor*

*where indicated/tolerated

1:1 randomization

- Vicadrostat 10mg
- Placebo

Composite primary outcome



Kidney disease progression**

or

CV death or heart failure hospitalization

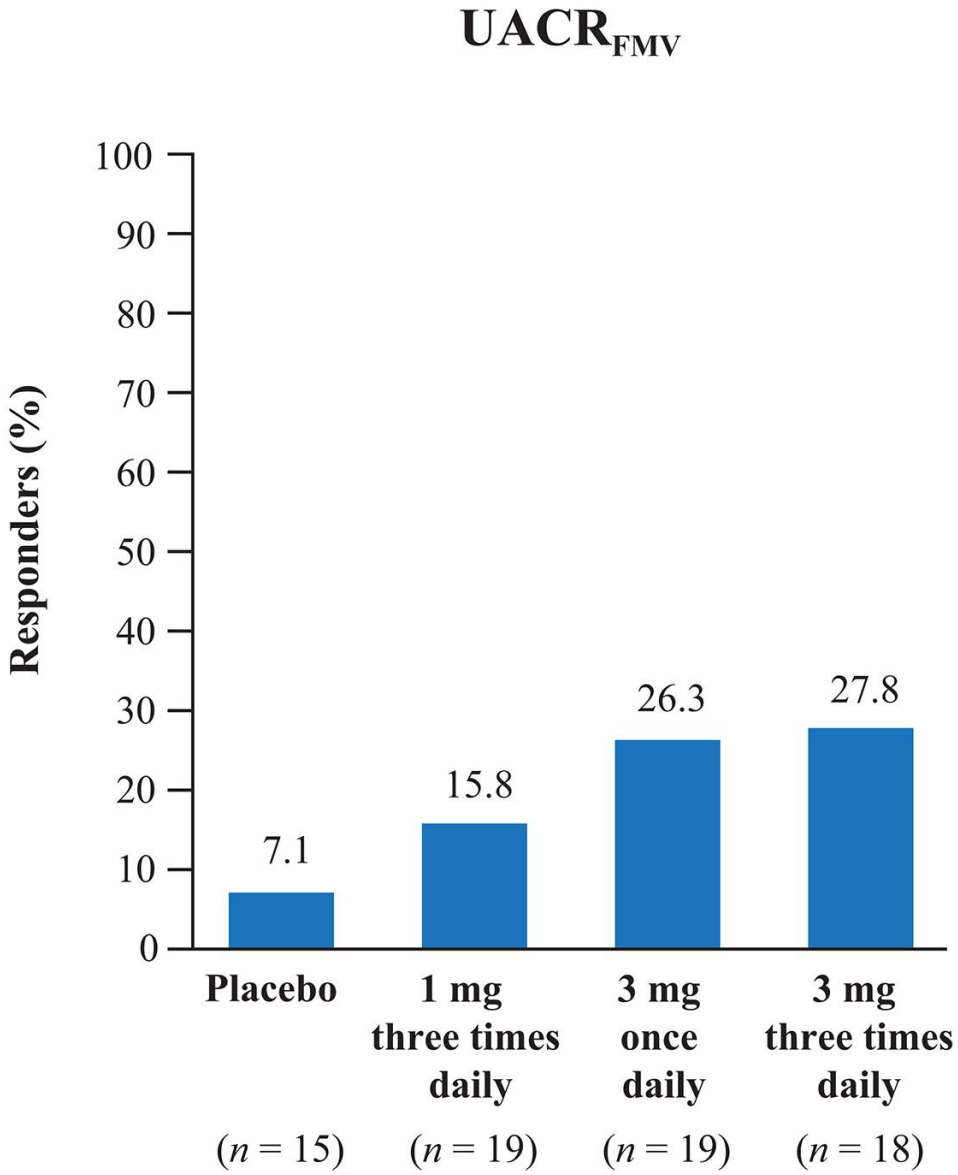
**Maintenance dialysis or kidney transplant, death from kidney failure, sustained eGFR < 10 or ≥ 40% eGFR decline

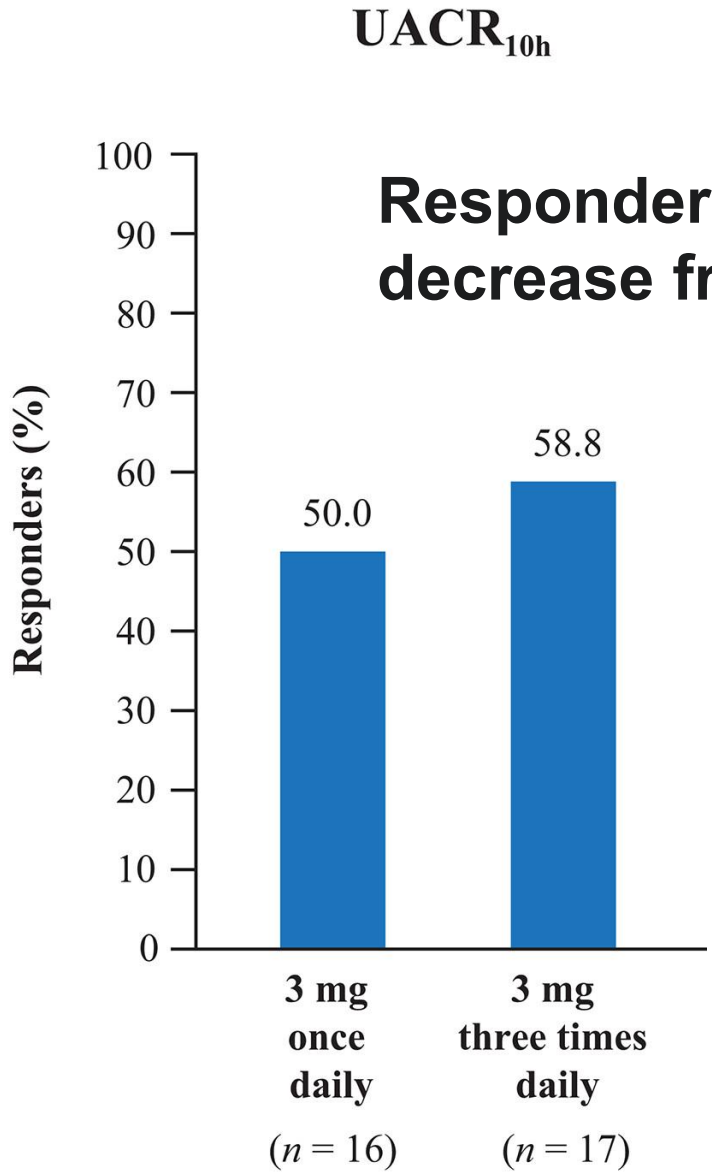
The EASi-KIDNEY Collaborative Group
NDT (2024)
@NDTSocial

The EASi-KIDNEY trial will assess the cardiorenal efficacy and safety of combining SGLT2 and aldosterone synthase inhibition in a large population with CKD at risk of progression (powered to assess effects in those with and without diabetes separately).

Soluble Guanylyl Cyclase Activators

Phase Ib trial of avenciguat (BI-685509)





Responder: defined as a ≥20% decrease from baseline

Cherney, Nangaku et al. Diabetes Obes Metab 2023

Efficacy, Safety, and Dosing of Avenciguat in Diabetic and Nondiabetic Chronic Kidney Disease

JASN®
Journal of the American Society of Nephrology

PRESPECIFIED POOLED ANALYSIS

2 Randomized Controlled Trials

Double Blind
(Placebo-controlled)

INCLUSION CRITERIA

eGFR ≥20 and eGFR <90
mL/min/1.73 m²

UACR ≥200 and UACR <3500
mg/g

On ACEi or ARB

BASELINE CHARACTERISTICS

62 years
Mean age

eGFR 44
mL/min/1.73 m²
Mean

UACR 719
mg/g
Median 10-hr

n=500

RANDOMIZATION

20 weeks

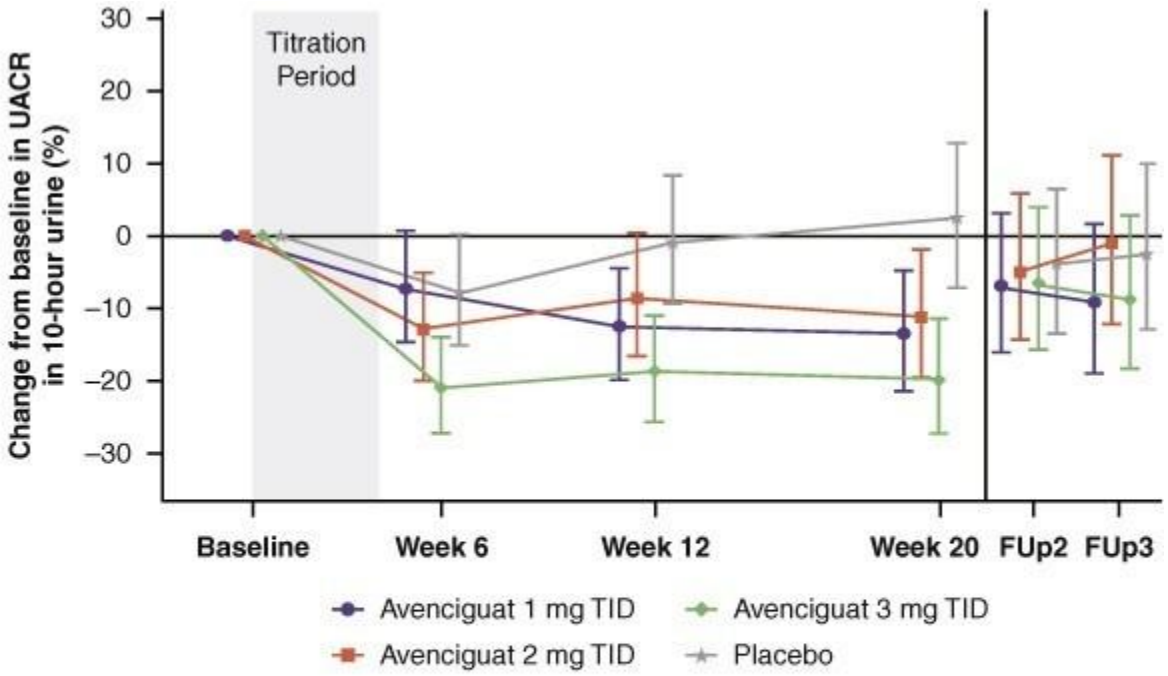
	UACR change (95% CI) (from baseline in in 10-hr urine) PRIMARY END POINT	UACR change (from baseline in 1st morning voided urine) SECONDARY END POINT
Avenciguat 1 mg TID n=125	-15.5% (-26.4, -3.0)	-19.4% (-30.0,-7.3)
Avenciguat 2 mg TID n=126	-13.2% (-24.6, -0.1)	-15.5% (-26.9,-2.5)
Avenciguat 3 mg TID n=127	-21.5% (-31.7,-9.8)	-23.4% (-33.5, -11.8)

Avenciguat was well tolerated; overall frequency events was low and clinically comparable to plac

Conclusions: Avenciguat (a novel, potent soluble guanylyl cyclase activator) was effective in lowering albuminuria and was well tolerated in patients with CKD.

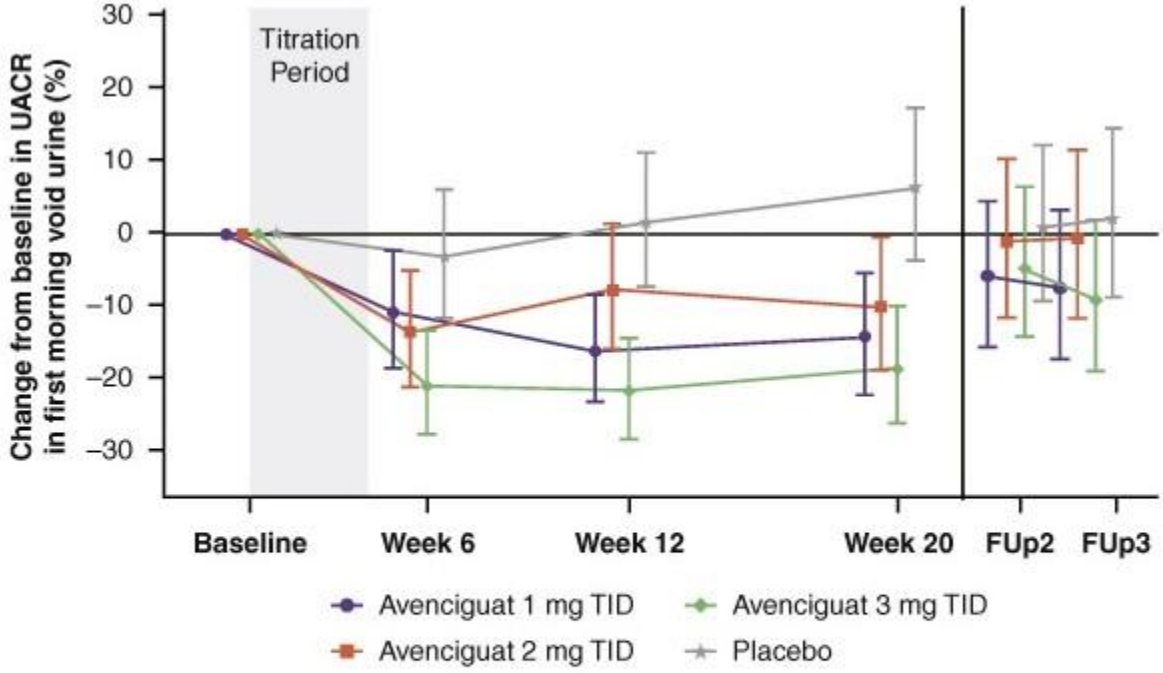
Heerspink, Nangaku et al.
J Am Soc Nephrol 2024

change from baseline in 10-hour UACR



No. of patients:						
Avenciguat 1 mg TID	121	120	117	112	108	108
Avenciguat 2 mg TID	114	112	105	105	99	102
Avenciguat 3 mg TID	118	116	112	107	102	104
Placebo	118	117	112	110	103	106

change from baseline in first morning void UACR

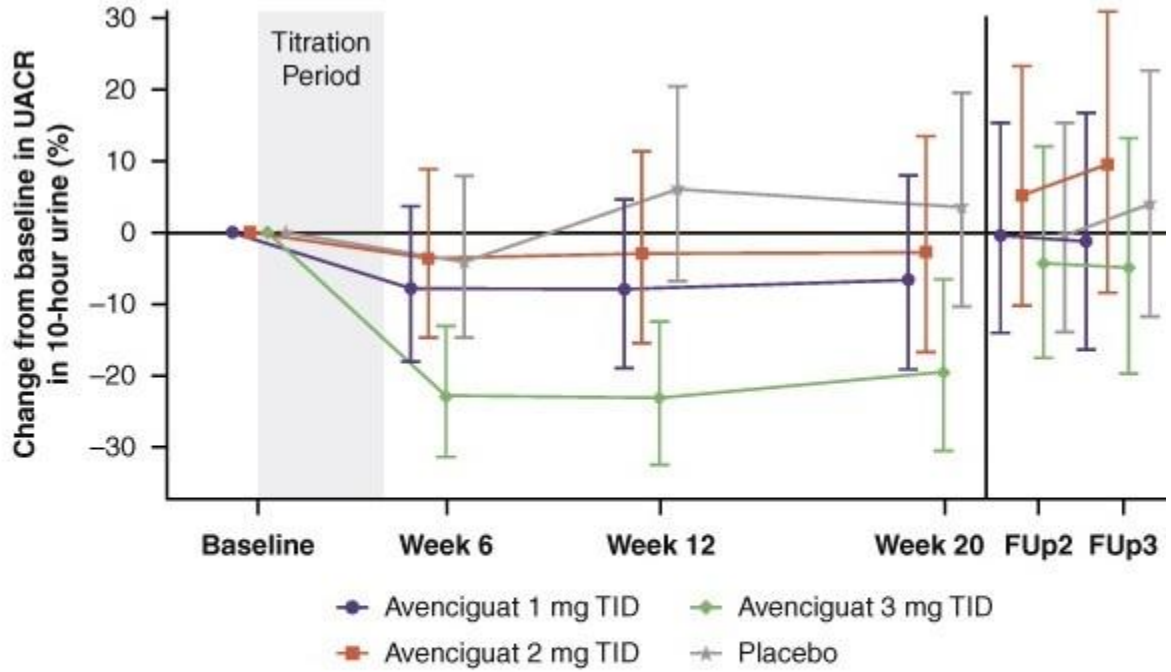


No. of patients:						
Avenciguat 1 mg TID	121	120	119	118	108	108
Avenciguat 2 mg TID	114	113	105	108	99	102
Avenciguat 3 mg TID	118	116	113	105	103	104
Placebo	118	117	112	117	103	106

The primary end point was change from baseline in UACR in 10-hour urine at week 20, analyzed per protocol.

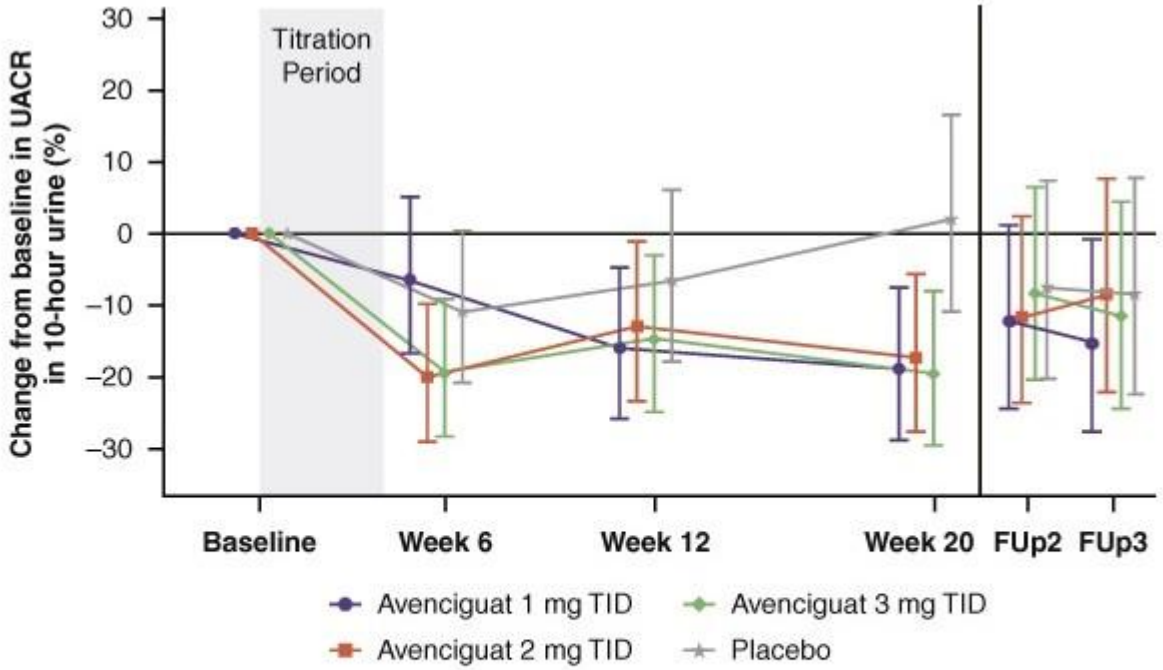
Heerspink, Nangaku et al. J Am Soc Nephrol 2024

The DKD trial



No. of patients:						
Avenciguat 1 mg TID	57	56	55	52	52	51
Avenciguat 2 mg TID	53	52	46	46	43	44
Avenciguat 3 mg TID	56	55	53	48	45	46
Placebo	56	56	54	53	51	53

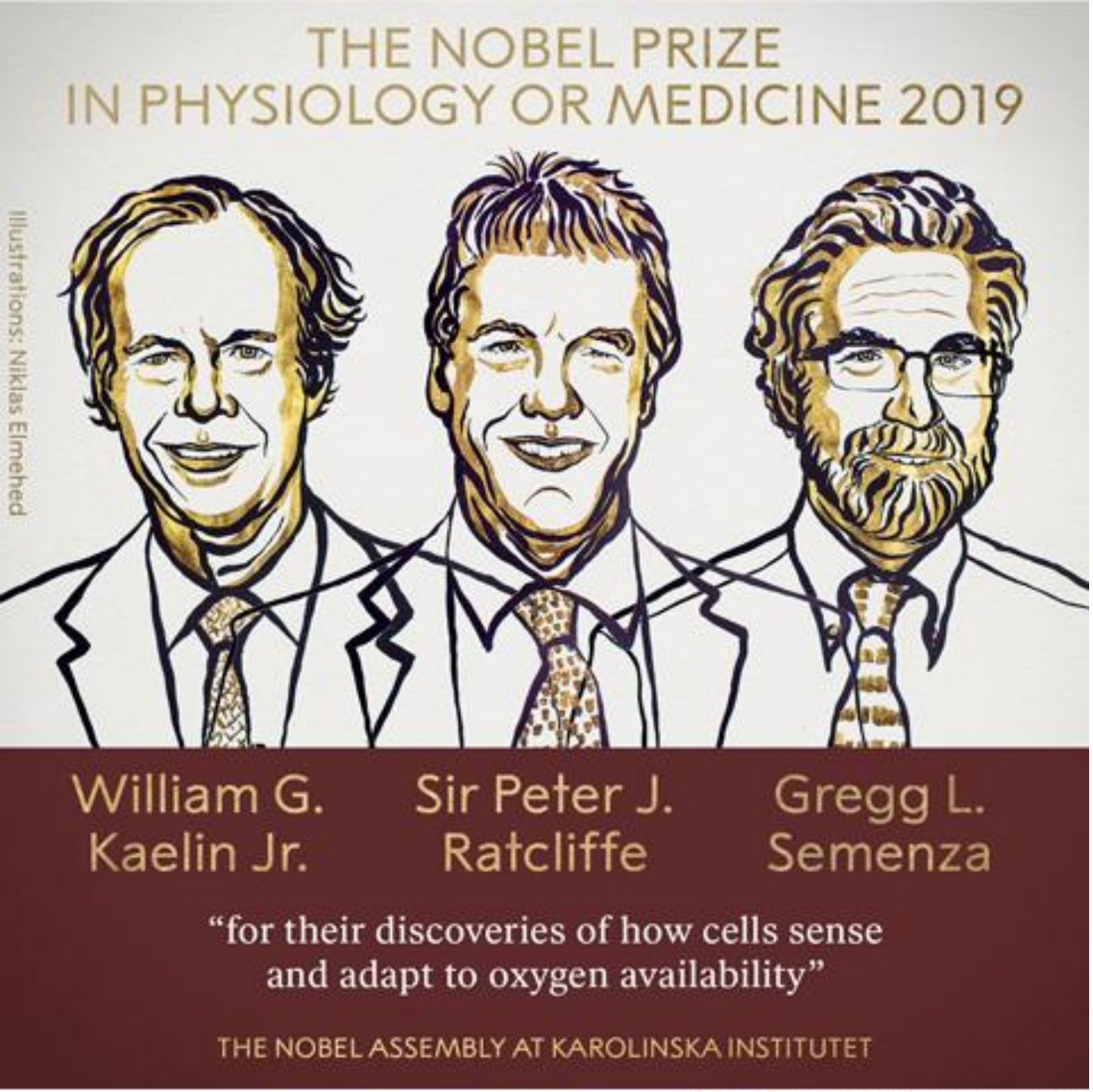
The non-DKD trial



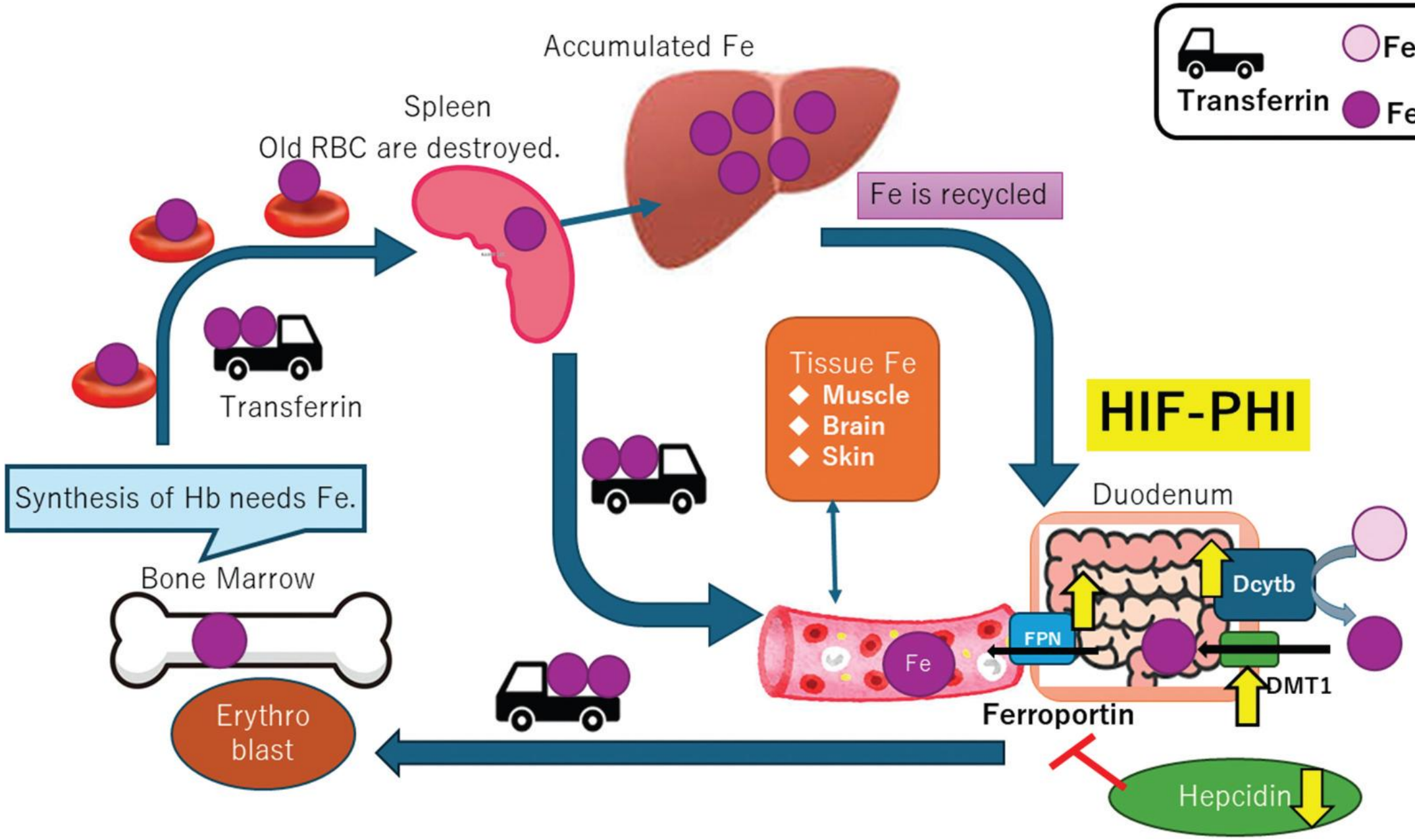
No. of patients:						
Avenciguat 1 mg TID	64	64	62	60	56	57
Avenciguat 2 mg TID	61	60	59	59	56	58
Avenciguat 3 mg TID	62	61	59	59	57	58
Placebo	62	61	58	57	52	53

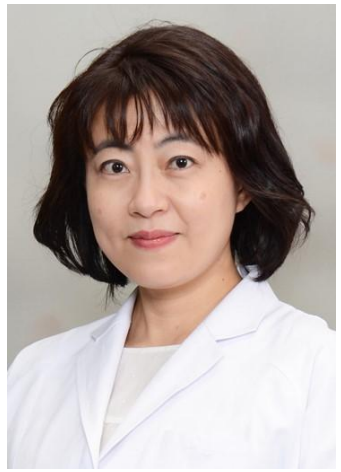
Heerspink, Nangaku et al. J Am Soc Nephrol 2024

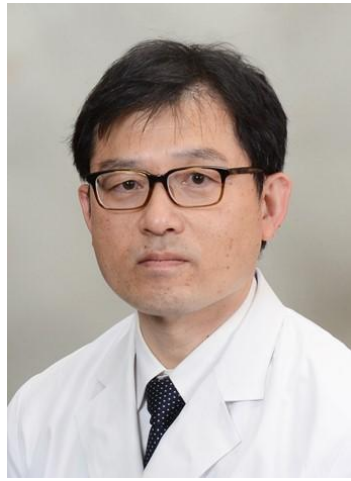
HIF-PH inhibitors



Hypoxia Inducible Factor (HIF) And oxygen-sensing mechanism







Mimura, Tanaka, Nangaku. Expert Opin Pharmacother 2024

HIF-PH inhibitors

phase 3 of daprodustat in Japanese patients

non-dialysis dependent CKD: Nangaku et al. Am J Nephrol 2021

HD: Akizawa, Nangaku et al. CJASN 2020

PD: Kanai, Nangaku et al. Ther Apher Dial 2021

phase 3 of vadadustat in Japanese patients

non-dialysis dependent CKD: Nangaku et al. JASN 2021

HD: Akizawa, Nangaku et al.; Nangaku et al. NDT 2021

phase 3 of enarodustat in Japanese patients

SYMPHONY-ND: Akizawa, Nangaku et al. KI Rep 2021

SYMPHONY-ND Long: Akizawa, Nangaku et al. Ther Apher Dial 2021

SYMPHONY-HD: Akizawa, Nangaku et al. Kidney Dis 2021

SYMPHONY-HD Long: Akizawa, Nangaku et al. Ther Apher Dial 2021

recommendation committee of proper use of HIF-PH inhibitor

Chair	Masaomi Nangaku
ANZSN	Lawrence McMahon
CSN	Nan HU
CSN	Chuan-ming HAO
HKSN	Desmond Yat-Hin YAP
JSN	Hirokazu Okada
JSN	Yusuke Suzuki
KSN	Sung Gyun Kim
MSN	Soo Kun Lim
NST	Kriengsak Vareesangthip
TSN	Chi-Chih HUNG

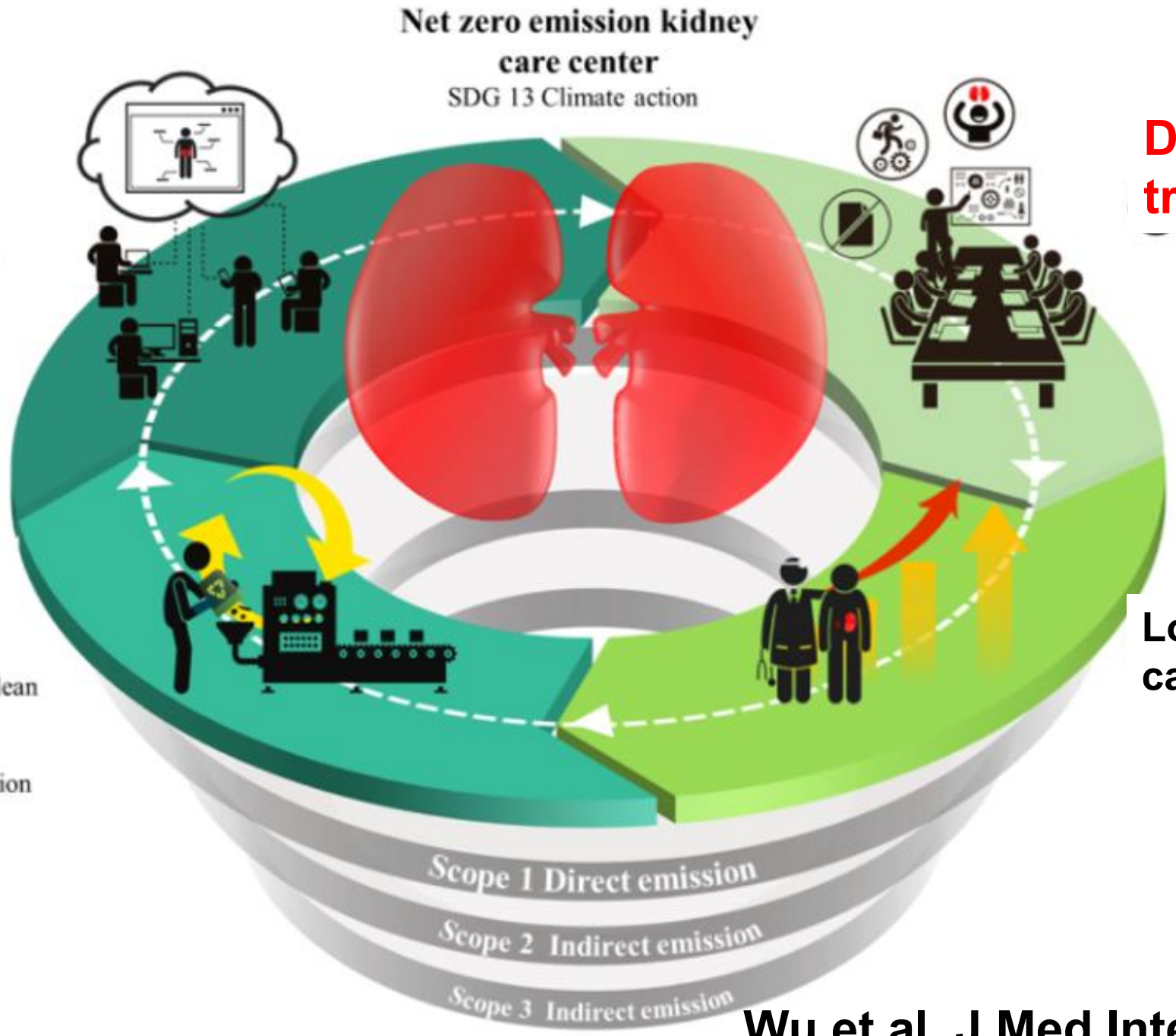
Nephrology 2021

Viewpoint

Establishing a Net-Zero Emissions Kidney Care Center: A Model Proposal for Taiwan

Mei-Yi Wu[1,2,3*], MD, PhD; Wei-Cheng Lo[3,4,5*], PhD; Min-Kuang Tsai[1,3], PhD; Yuan-Leng Lin[1,3,5], BS; Yih-Giun Cherng[6,7], MD; Ming-Che Lee[8,9], MD; Mai-Szu Wu[1,2,3], MD

Wu et al. J Med Internet Res 2025



Disease prevention

SDG 4 Quality education
SDG 10 Reduced inequalities
SDG 17 Partnerships for the goals

Digital transformation

SDG 3 Good health and well-being
SDG 4 Quality education

③ Circular economy

SDG 7 Affordable and clean energy
SDG 12 Responsible consumption and production

Low-carbon health care strategies

SDG 3 Good health and well-being

Wu et al. J Med Internet Res 2025

Digital transformation

Telemedicine

- Personalized
- Predictive
- Preventive
- Participatory

Telemedicine

- Personalized
- Predictive
- Preventive
- Participatory

Free yourself from spatial constraints and time constraints

Video/phone consultation

Remote patient vital signs monitoring

Online prescription service

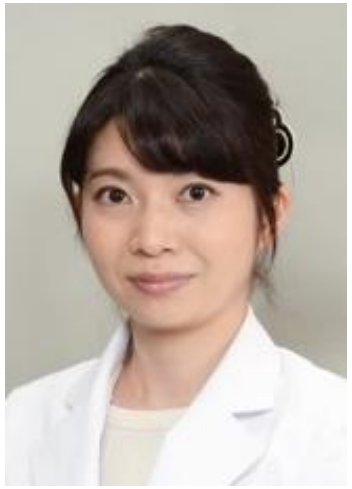
Telemedicine

Self-management digital applications

Patient education

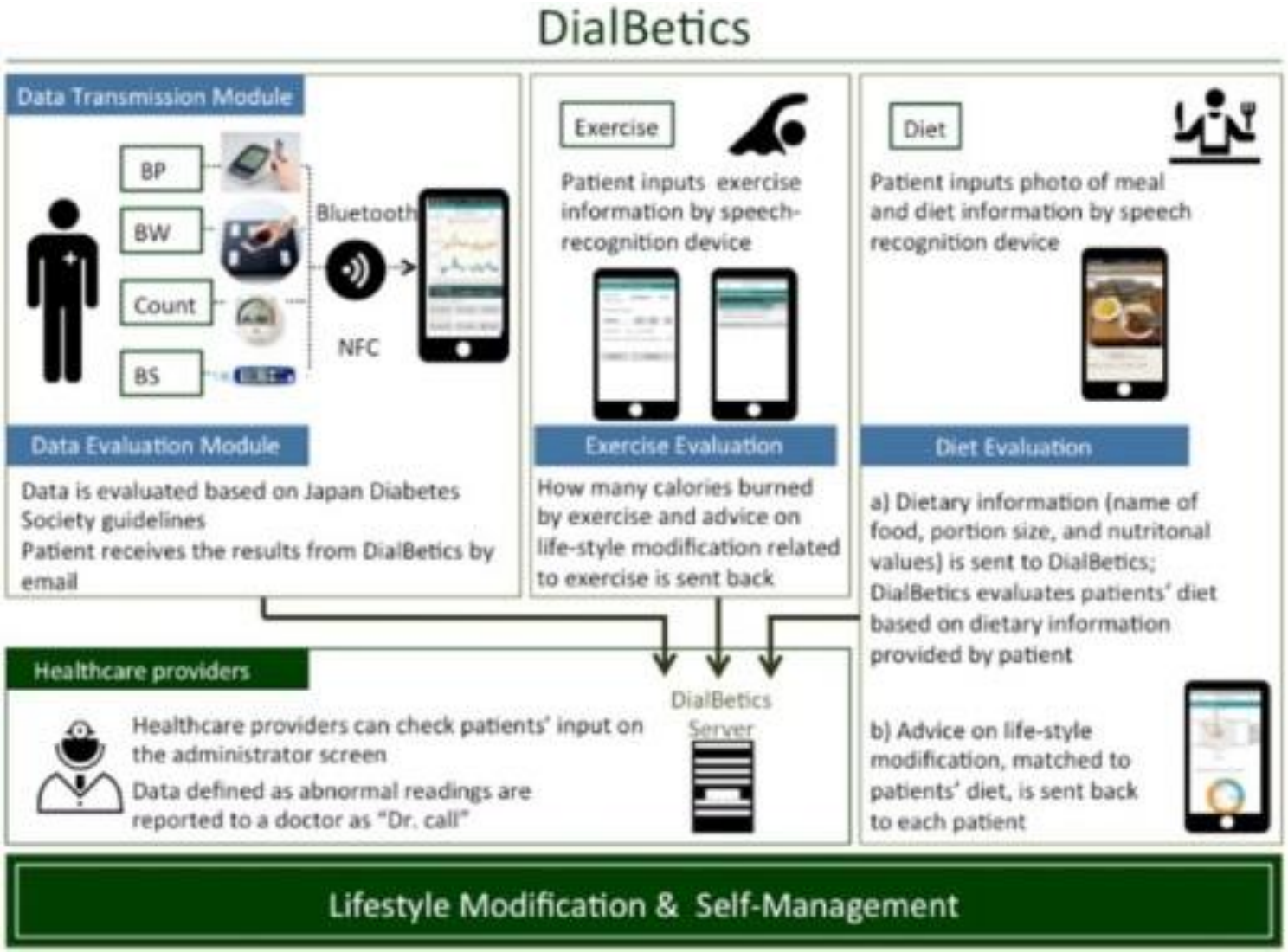
Training for healthcare professionals

Telehealth



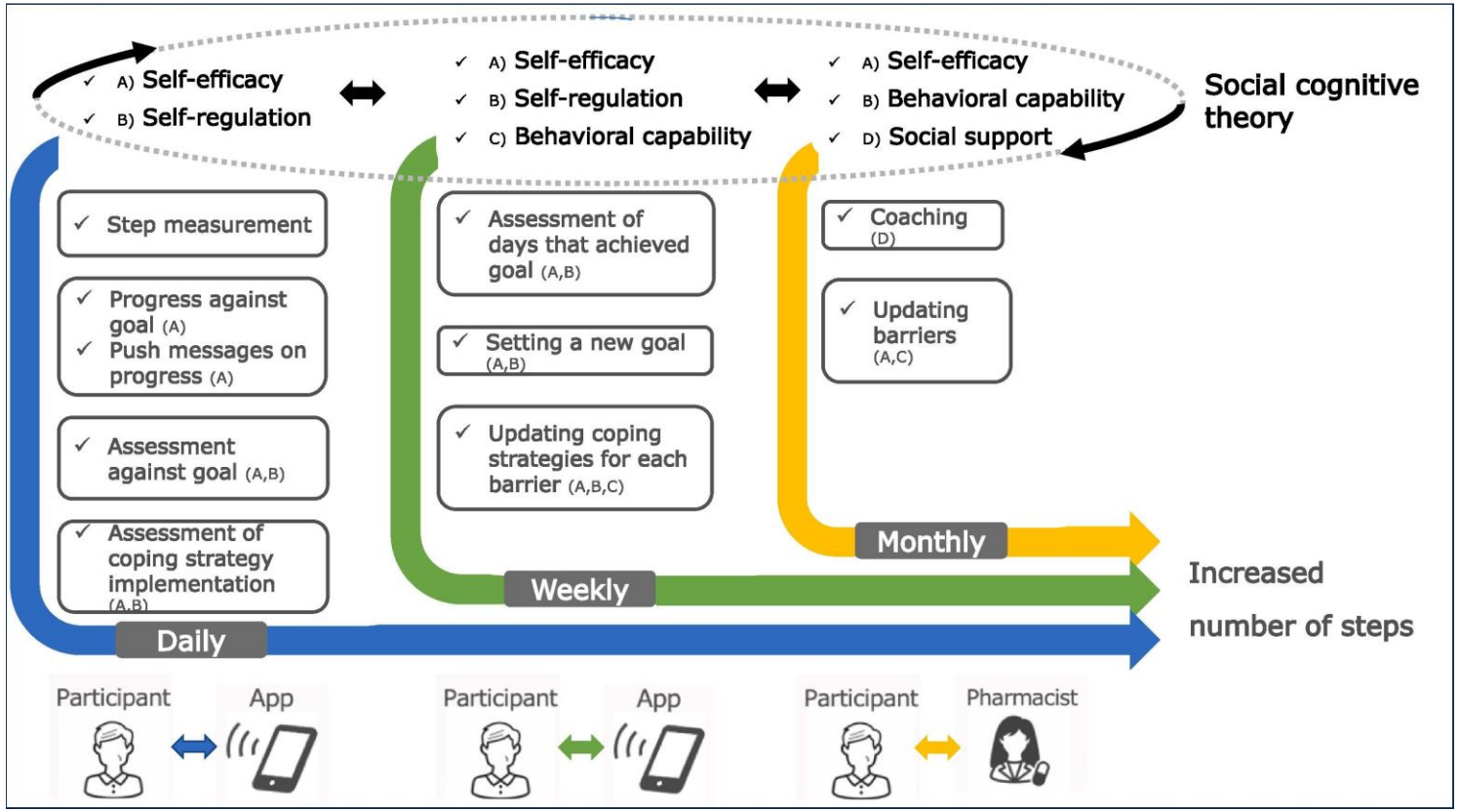
Sugawara et al. Clin Kidney J 2024

Smartphone-Based Self-Management for Diabetic Patients : DialBetics and DialBetes Plus



Waki, Nangaku et al.
J Diabetes Sci Technol 2016
Yamaguchi, Waki, Nangaku et al.
J Diabetes Investig 2017
Hayashi, Waki, Nangaku et al.
JMIR Res Protoc 2017
Yamaguchi, Waki, Nangaku et al.
JMIR Mhealth Uhealth 2019
Kawaki, Waki, Nangaku et al.
JMIR Res Protoc 2021
Sankoda, Waki, Nangaku et al.
J Diabetes Sci Technol 2021
Hirano, Waki, Nangaku et al.
J Med Internet Res 2021
Kawaki, Waki, Nangaku et al.
JMIR Diabetes 2022
Kondo, Waki, Nangaku et al.
JMIR Form Res 2022

StepAdd: A personalized mHealth intervention based on social cognitive theory to increase physical activity



Shibuta, Waki, Nangaku et al.
JMIR Cardio 2023

Sze, Waki, Nangaku et al.
J Biomed Inform 2023

Saito, Waki, Nangaku et al.
Stud Health Technol Inform 2023

Waki, Nangaku et al.
JMIR Res Protoc 2024

一般社団法人
日本医学会連合
The Japanese Medical Science Federation

composed of 144 medical societies in Japan

Recommendations about the first visit via “online medicine”

Chair: Masaomi Nangaku

June 1 2021

Recommendations about diseases which can be continuously managed by “online medicine”

April 2 2022

Chair: Masaomi Nangaku

2024

Original Paper

Issues in the Adoption of Online Medical Care: Cross-Sectional Questionnaire Survey

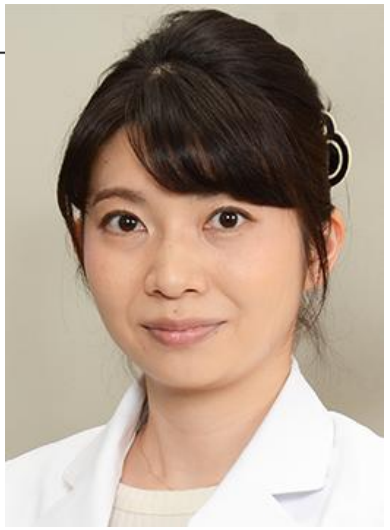
Yuka Sugawara[1], MD, PhD; Yosuke Hirakawa[1], MD, PhD; Masao Iwagami[2], MSc, MD, PhD; Haruo Kuroki[3], MD, PhD; Shuhei Mitani[1], MD; Ataru Inagaki[4], MD, PhD; Hiroki Ohashi[5], MD; Mitsuru Kubota[6], MD, PhD; Soichi Koike[7], MD, PhD; Rie Wakimizu[8], PhD; Masaomi Nangaku[1], MD, PhD

[1]

Two nationwide questionnaire surveys

(1) survey targeting both patients and healthy individuals (n= 40,000)

(2) survey targeting medical professionals (n= 6,000)



Original Paper

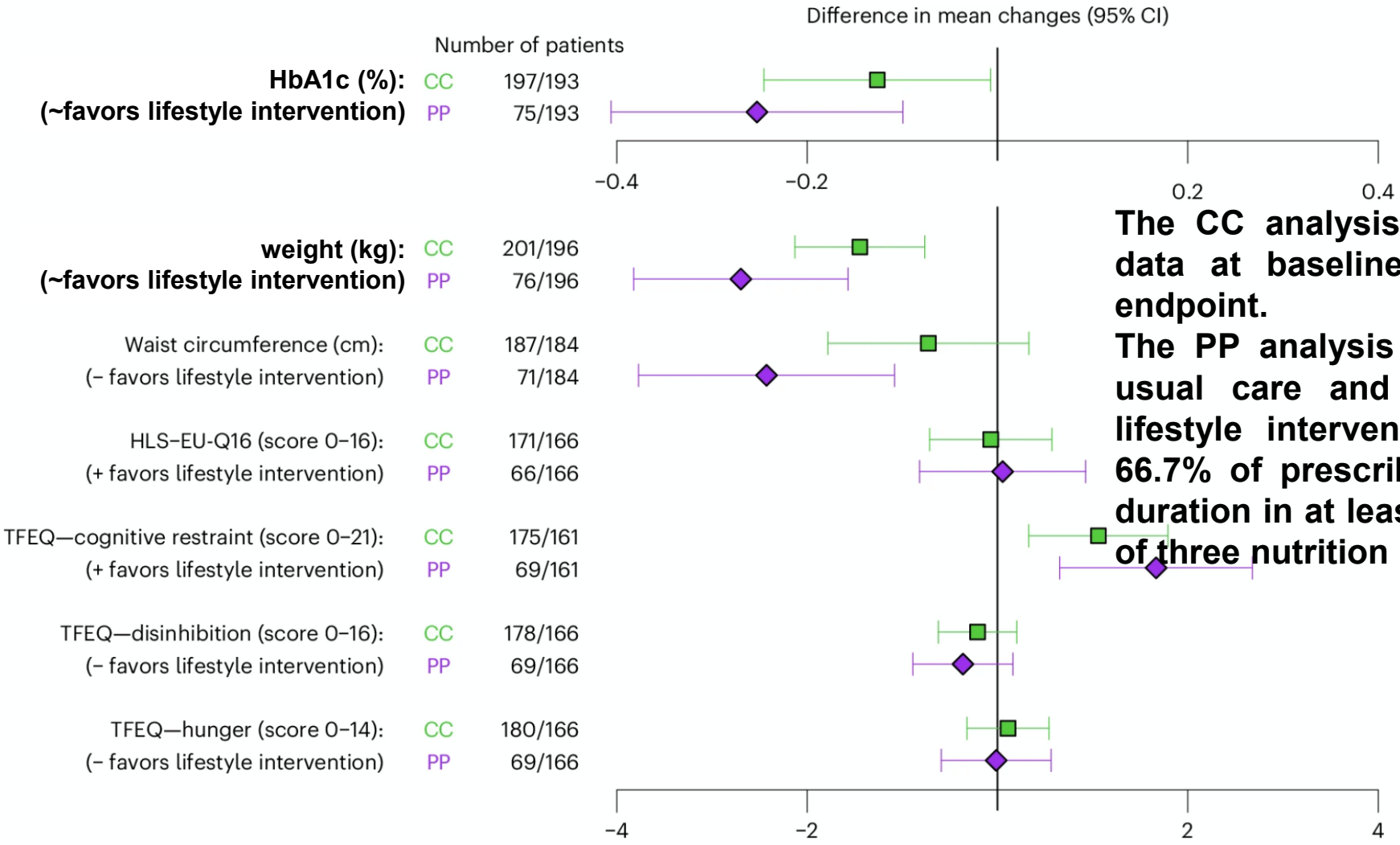
Issues in the Adoption of Online Medical Care: Cross-Sectional Questionnaire Survey

Online medical care is most frequently used in internal medicine and dermatology.

When there were more hospitals nearby and they felt it was more work to see a physician in person, they were more likely to use online medical care.

Telemedicine-supported lifestyle intervention in patients with coronary heart disease and T2DM

multicenter, RCT in Germany



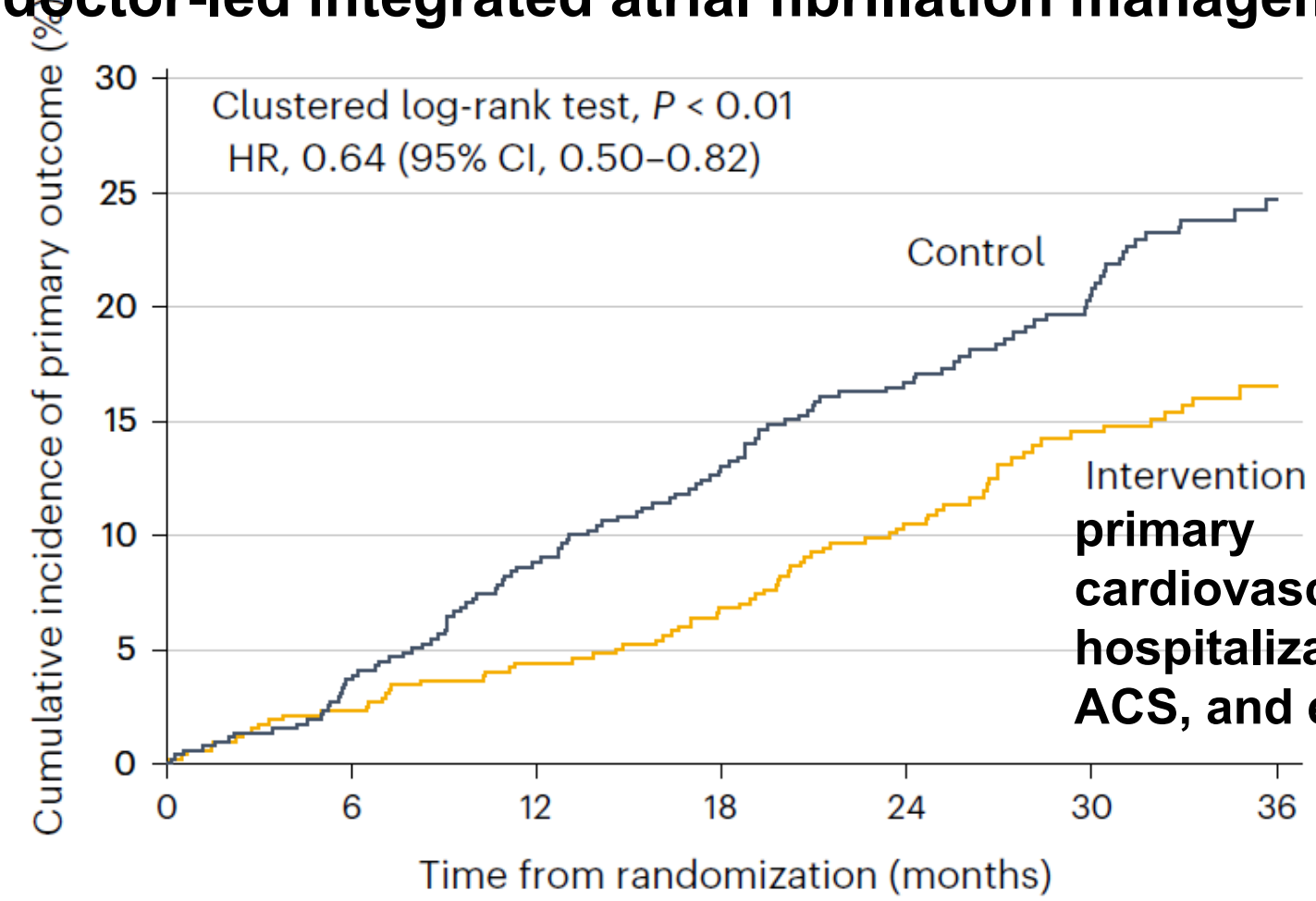
The CC analysis included all patients with available data at baseline and 6 months for the respective endpoint.

The PP analysis included all patients randomized to usual care and those patients randomized to the lifestyle intervention group who performed at least 66.7% of prescribed training duration, reached target duration in at least 50% of weeks and filled at least two of three nutrition diaries.

Mueller et al. Nat Med 2025

MIRACLE-AF trial

cluster randomized clinical trial to assess its efficacy of a telemedicine-based, village doctor-led integrated atrial fibrillation management in China



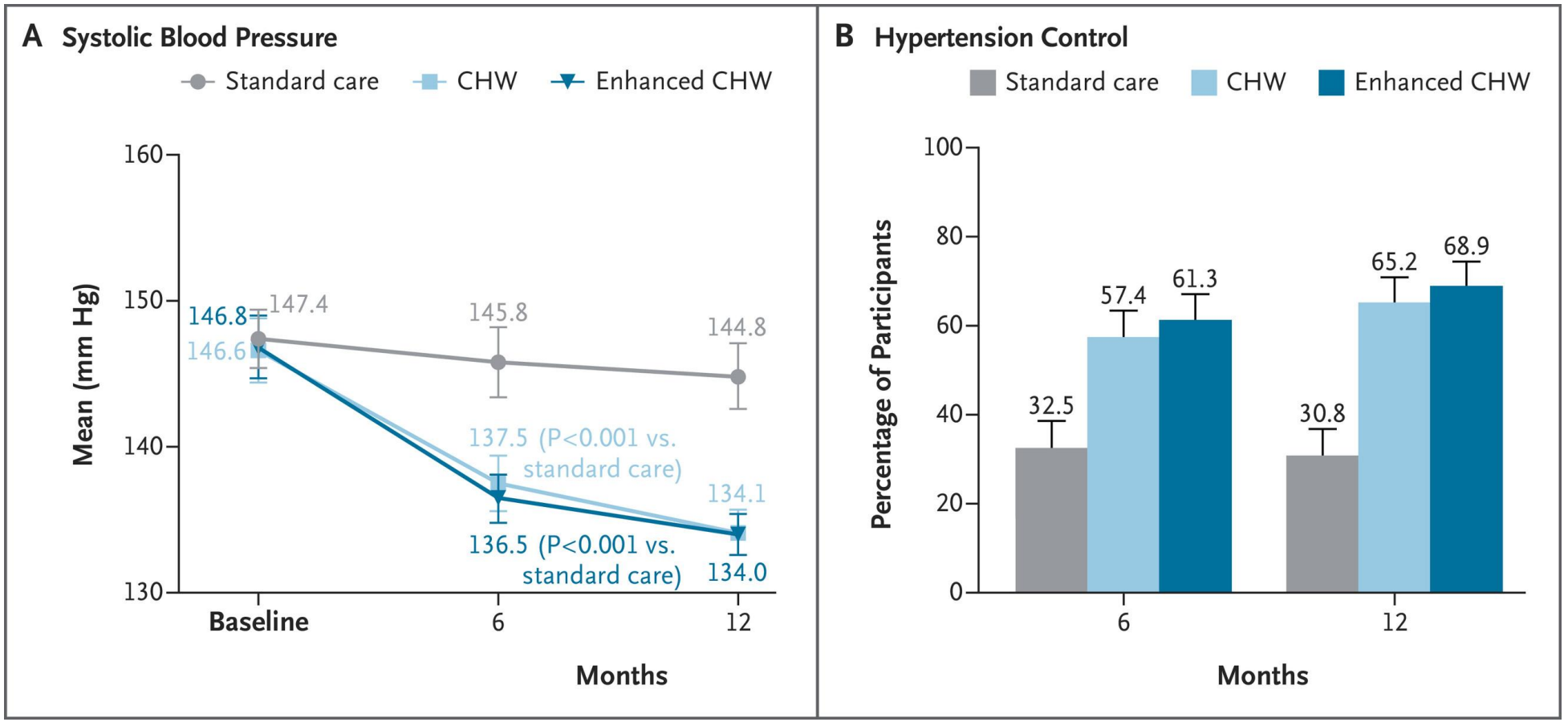
primary outcome: a composite of cardiovascular death, all strokes, hospitalization due to worsening of HF or ACS, and emergency visits due to AF

Chu et al.
Nat Med 2025

Home-based care for hypertension in rural South Africa

CHW group: patient monitoring of blood pressure, home visits from a community health worker (CHW) for data collection and medication delivery, and remote nurse-led decision making supported by a mobile application

enhanced CHW group: the same intervention but with blood-pressure machines transmitting readings automatically



Siedner et al.
N Engl J Med 2025

Conducting Clinical Trials With Decentralized Elements

Guidance for Industry, Investigators, and Other Interested Parties

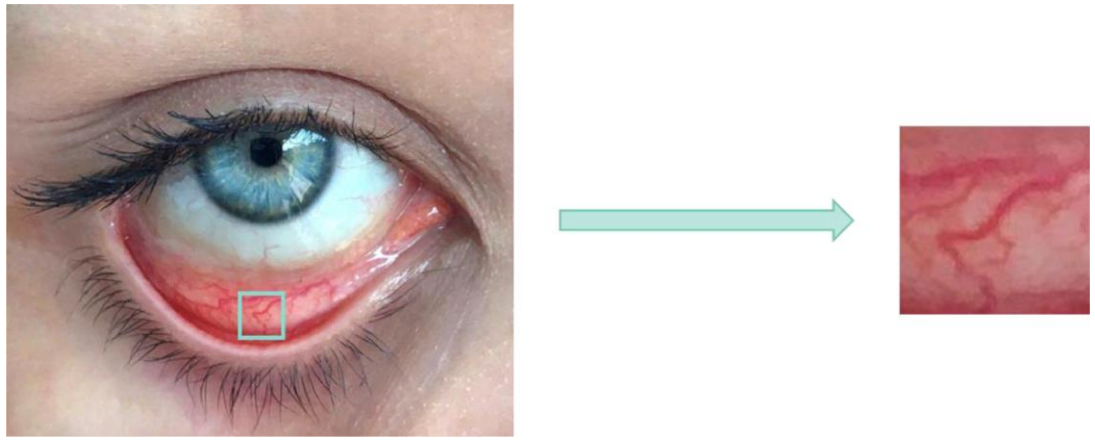
U.S. Department of Health and Human Services
Food and Drug Administration
Center for Drug Evaluation and Research (CDER)
Center for Biologics Evaluation and Research (CBER)
Center for Devices and Radiological Health (CDRH)
Oncology Center of Excellence (OCE)

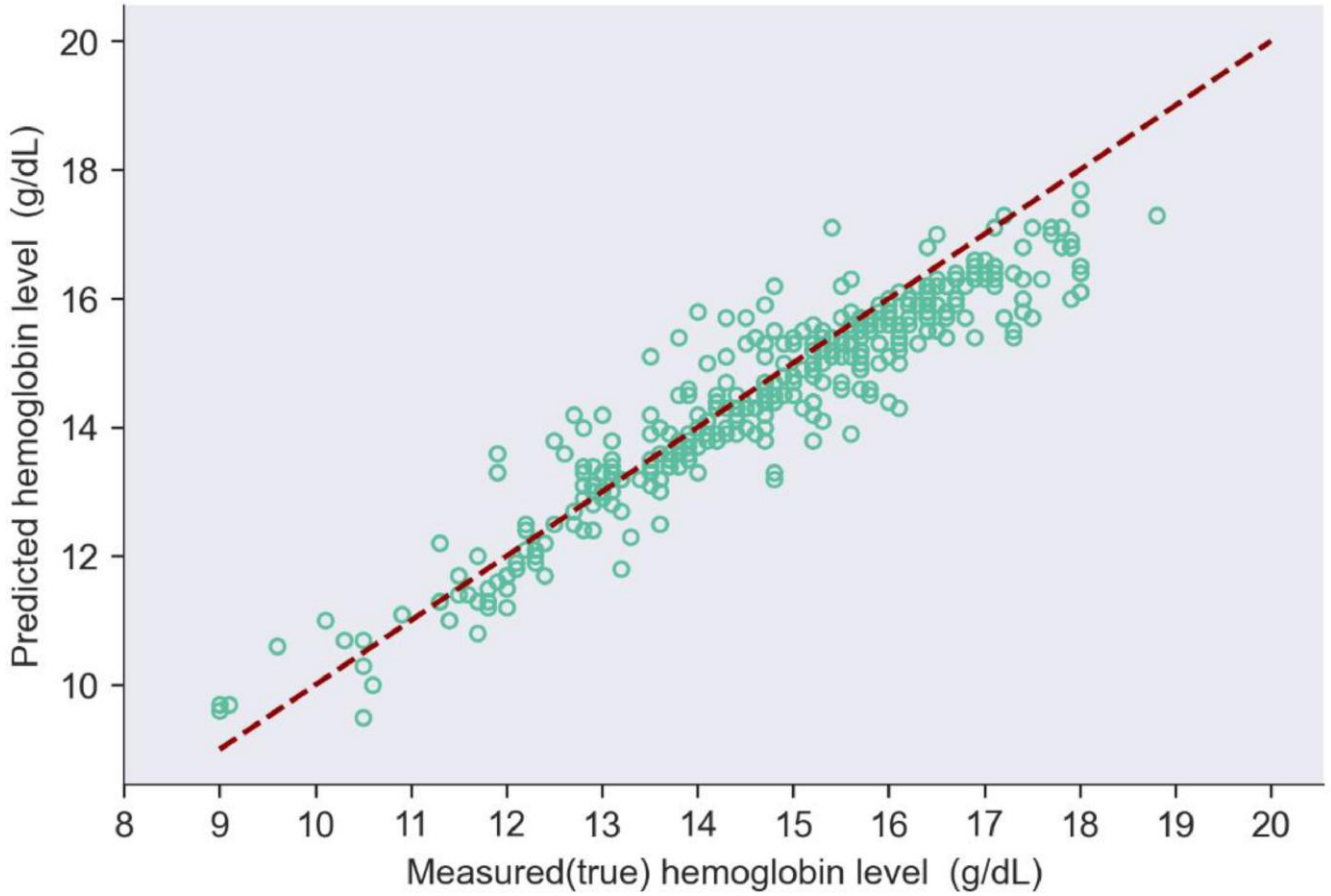
September 2024
Clinical/Medical

Barriers to telemedicine

Patient-related	Physician-related	Related to law, governance and infrastructure
Technological difficulty especially for the elderly.	Resistance to change.	Regulations about telemedicine are preliminary and imperfect.
Problems about internet connection.	Limited availability about biological data (only information of sounds and images).	Technology may fail either spontaneously or during denial-of-service attack.
Care may be perceived as impersonal when compared with face-to-face.	Additional workload due to technological issues.	Cost and reimbursement.
Anxiety when remote advice not immediately available.	Perceived loss of control when compared with face-to-face.	
Feeling unnecessary because of easy accessibility to family doctors and hospitals	Data overload and user fatigue.	

Non-invasive hemoglobin estimation from conjunctival images using deep learning





Çuvadar and Yılmaz. Med Eng Phys 2023

three-dimensional telemedicine

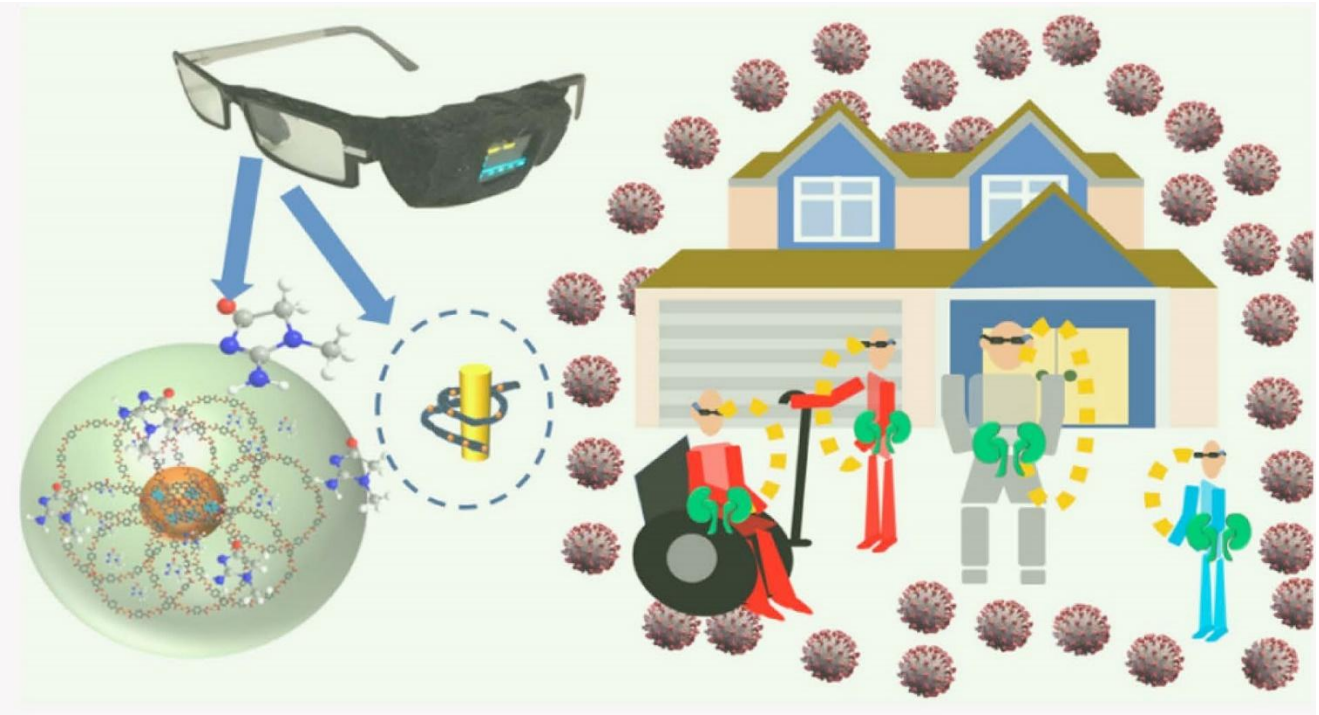
Patient Site

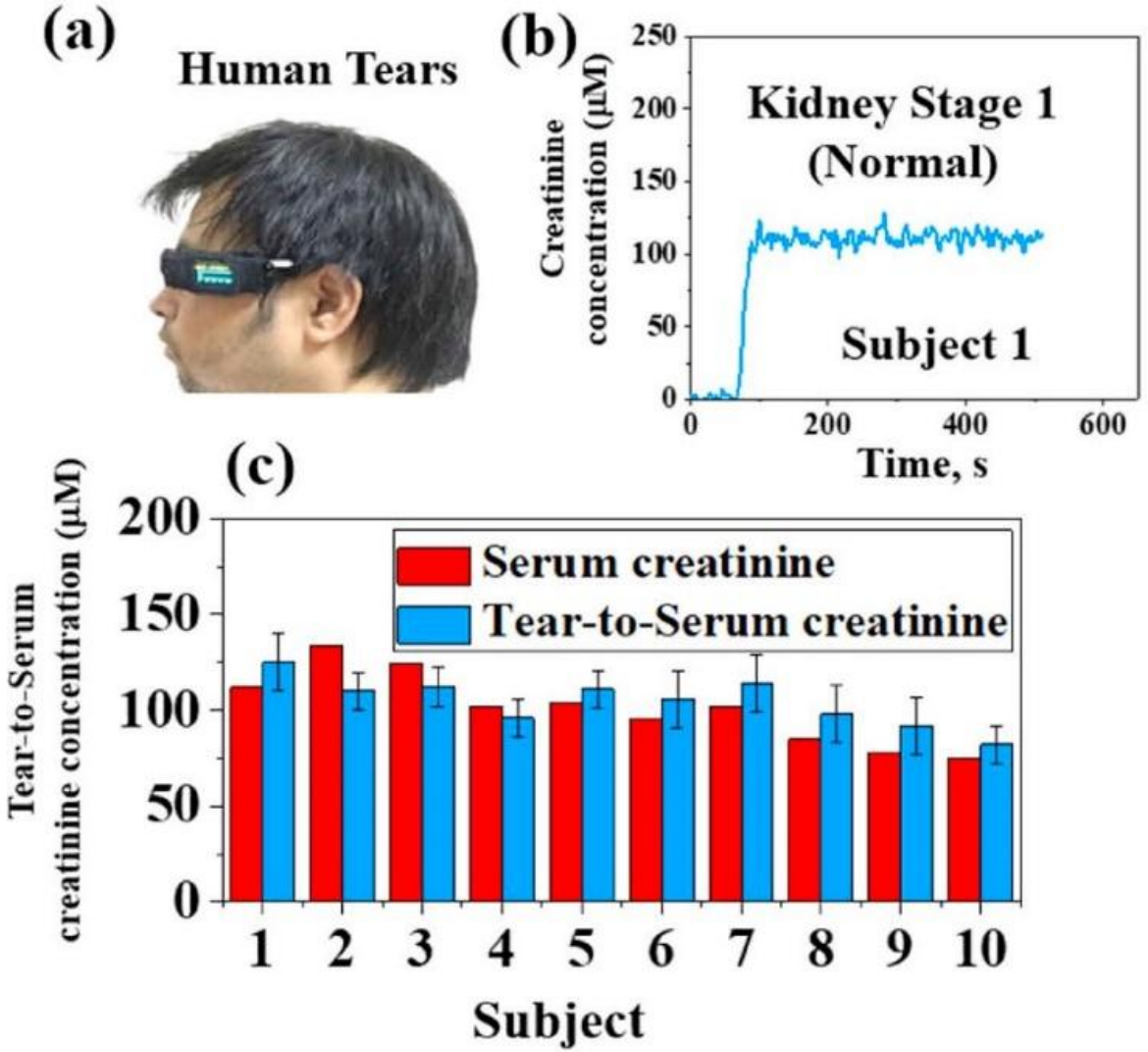
Doctor Site

Motion capture using infrared light and an augmented/mixed reality head mount display with a hologram monitor

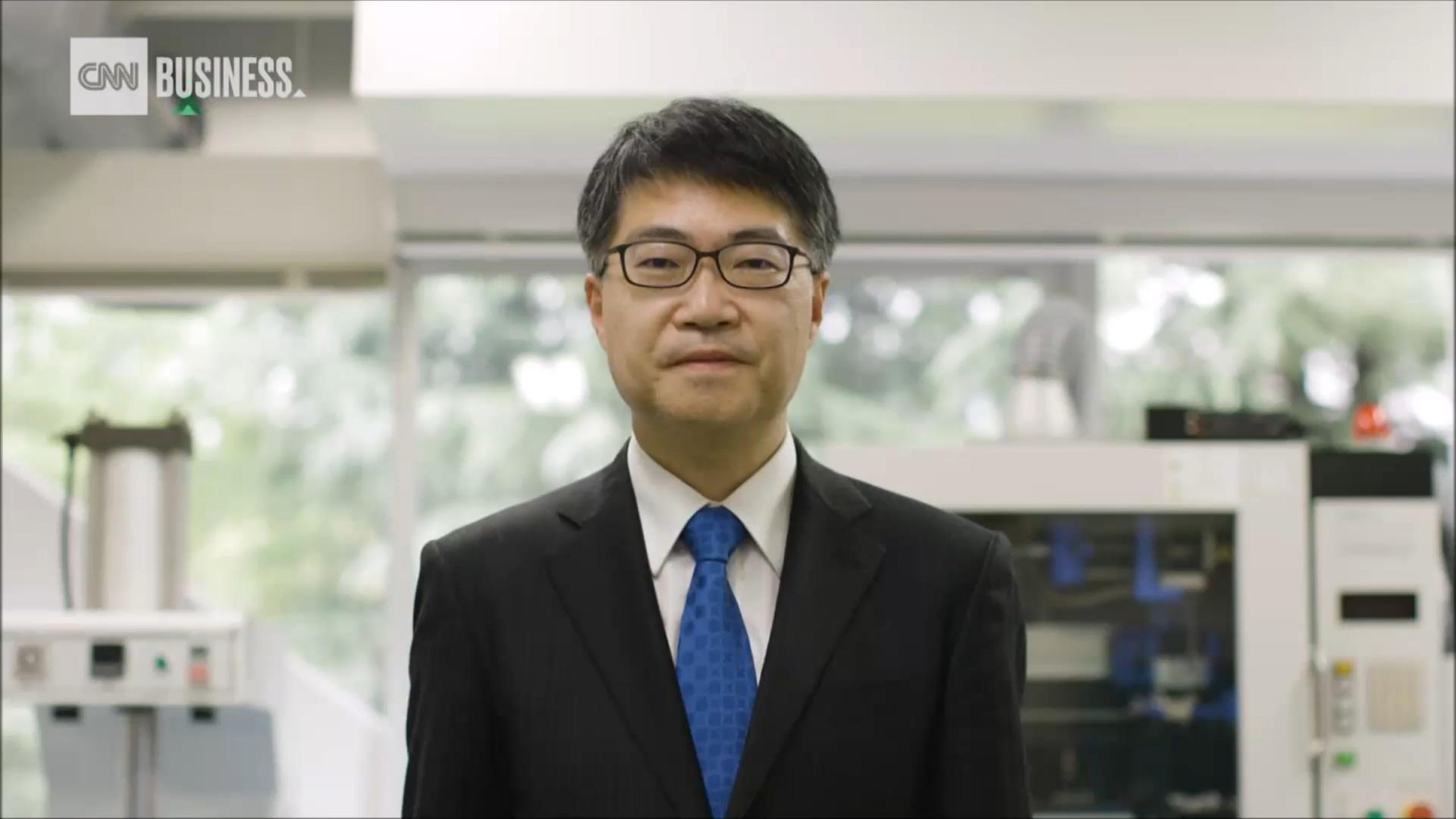
Sekimoto et al. Mov Disord 2020

Lab-on-eyeglasses to monitor kidneys: Machine learning in predicting serum creatinine using tear creatinine

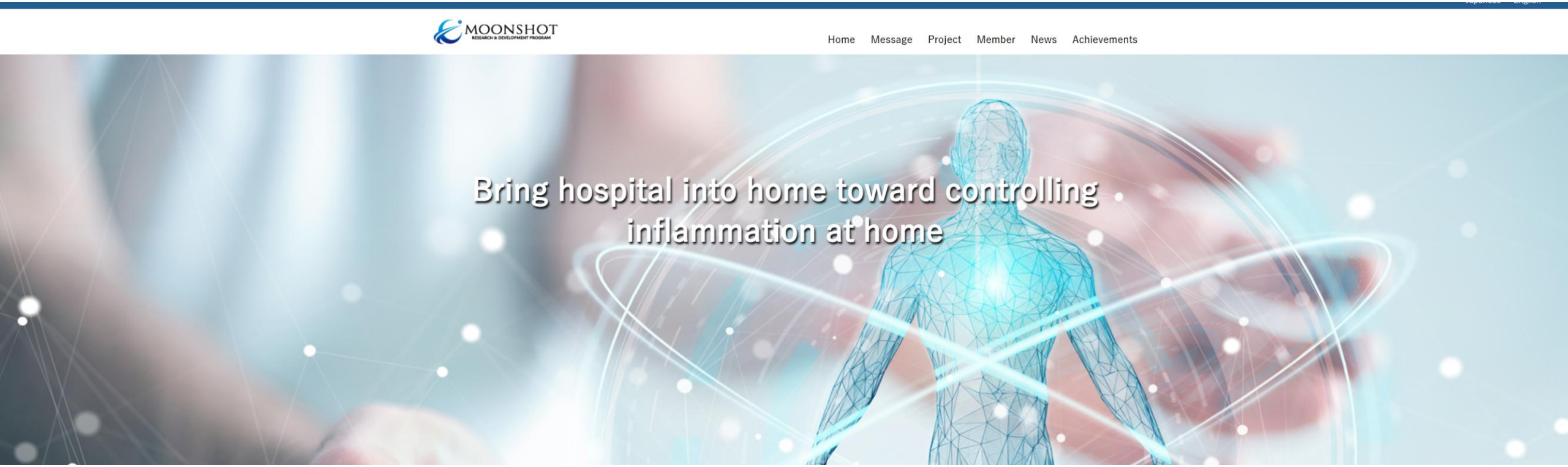




Kalasin et al. Anal Chem 2021


CNN BUSINESS

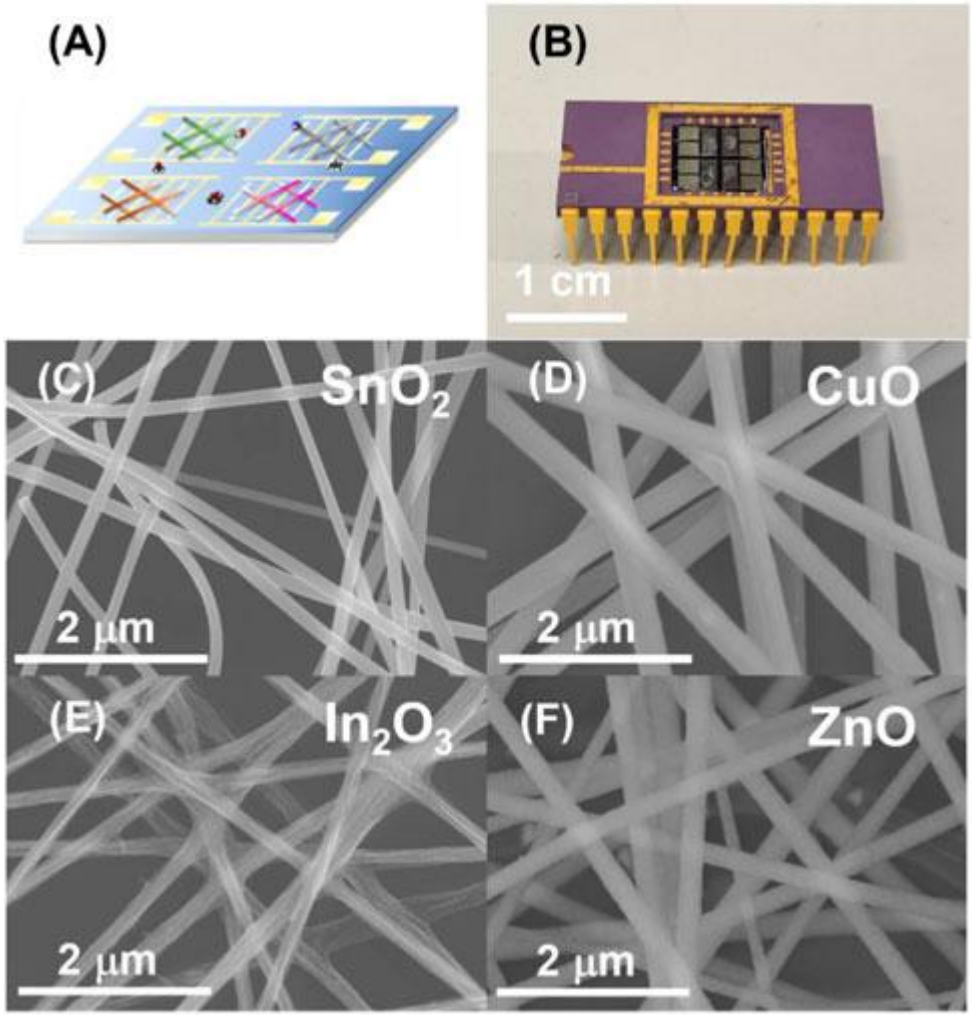
Moonshot Research and Development Program [Goal 7]

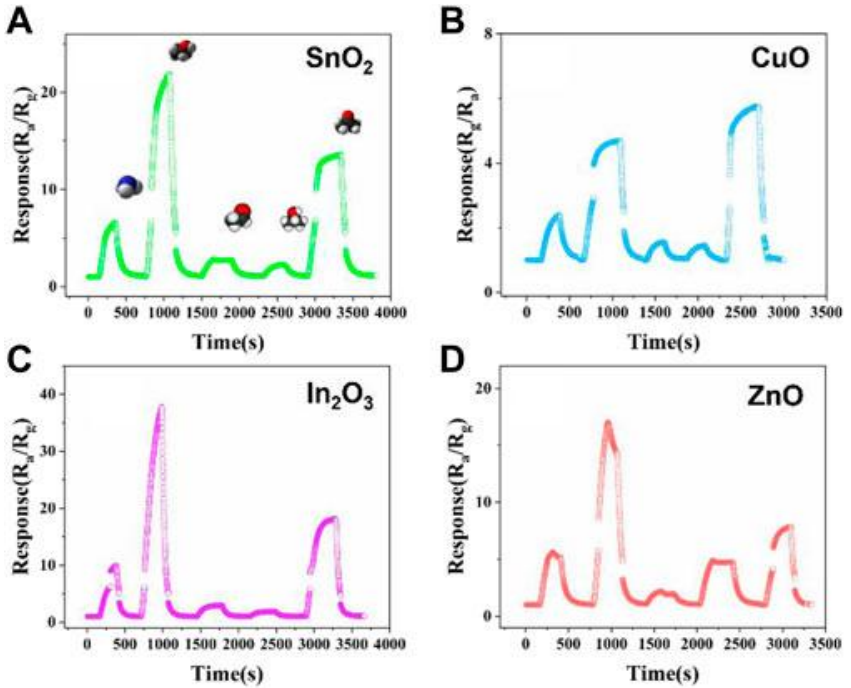


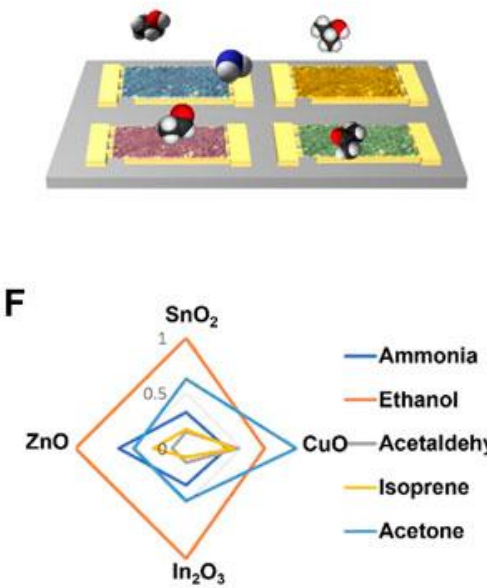
Realization of sustainable care systems to overcome major diseases by 2040, for enjoying one's life with relief and release from health concerns until 100 years old.

Principal Investigator: Masaomi Nangaku

Electronic nose based on multiple electrospinning nanofibers sensor array



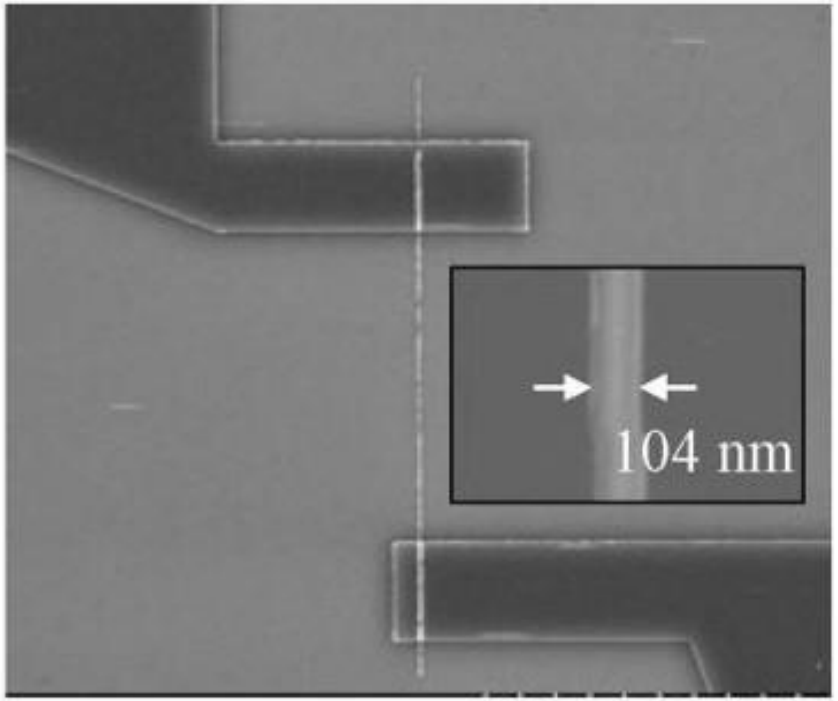




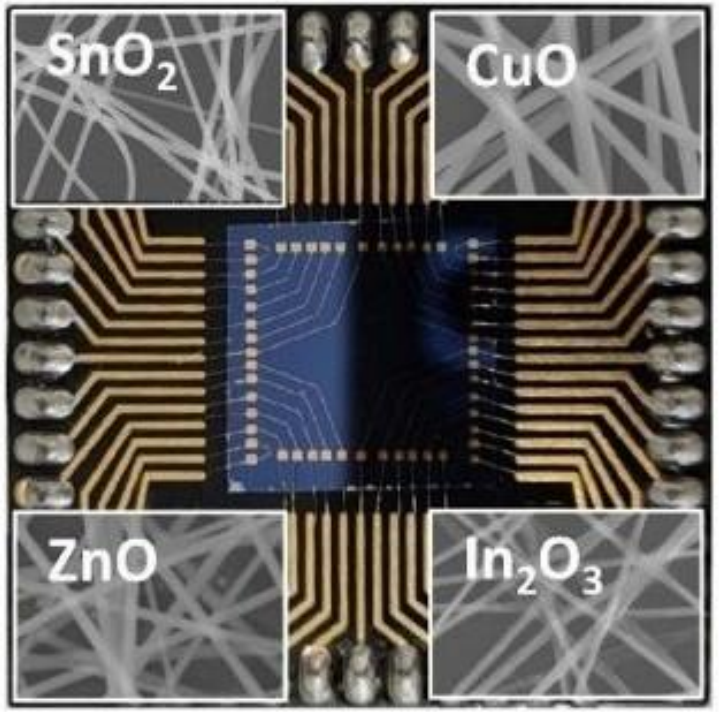
Zang, Tabata et al.
Front Sensors 2023

Ultra-sensitive gas detection

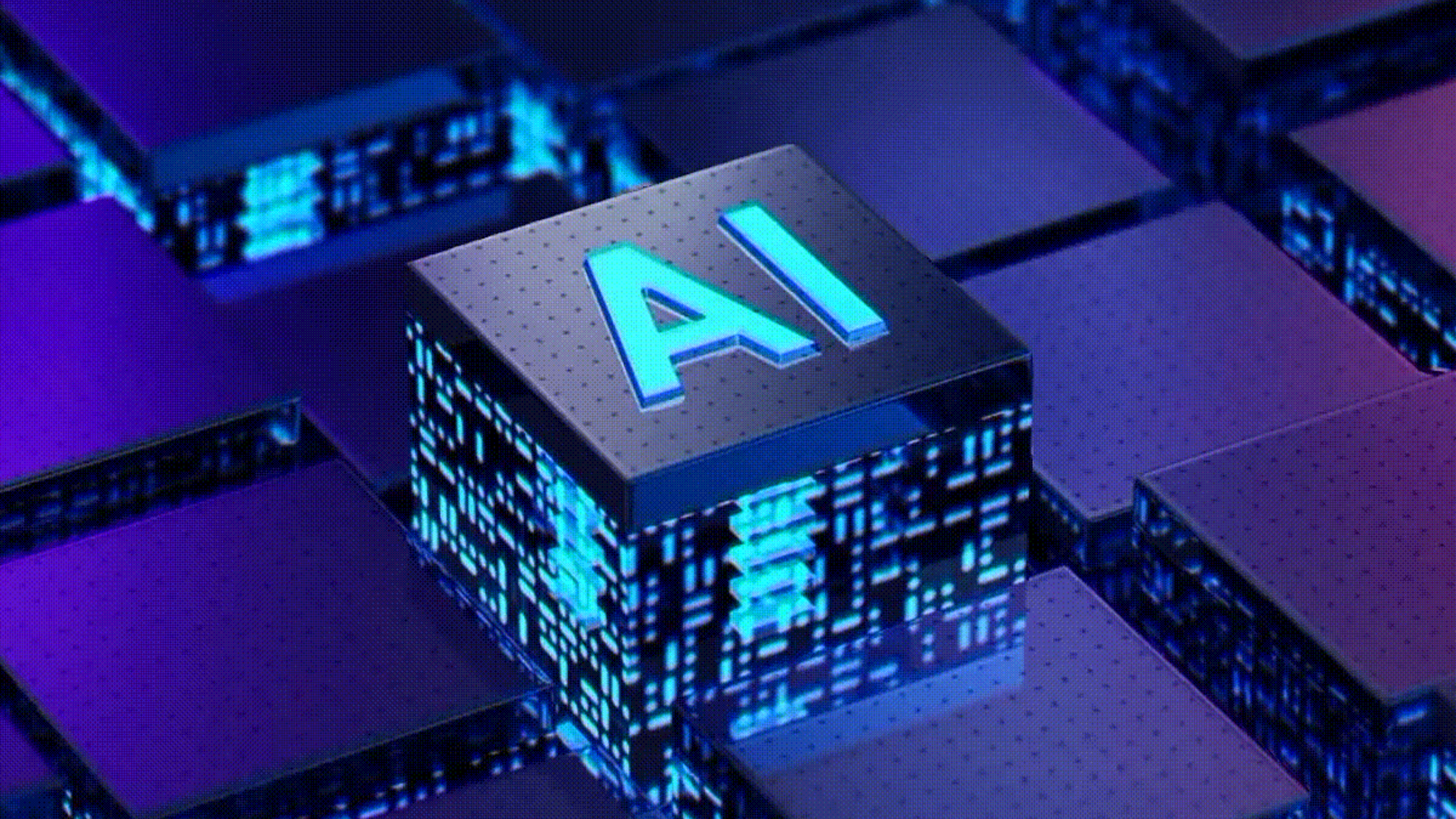
Nano-fabrication



Nano-sensor array

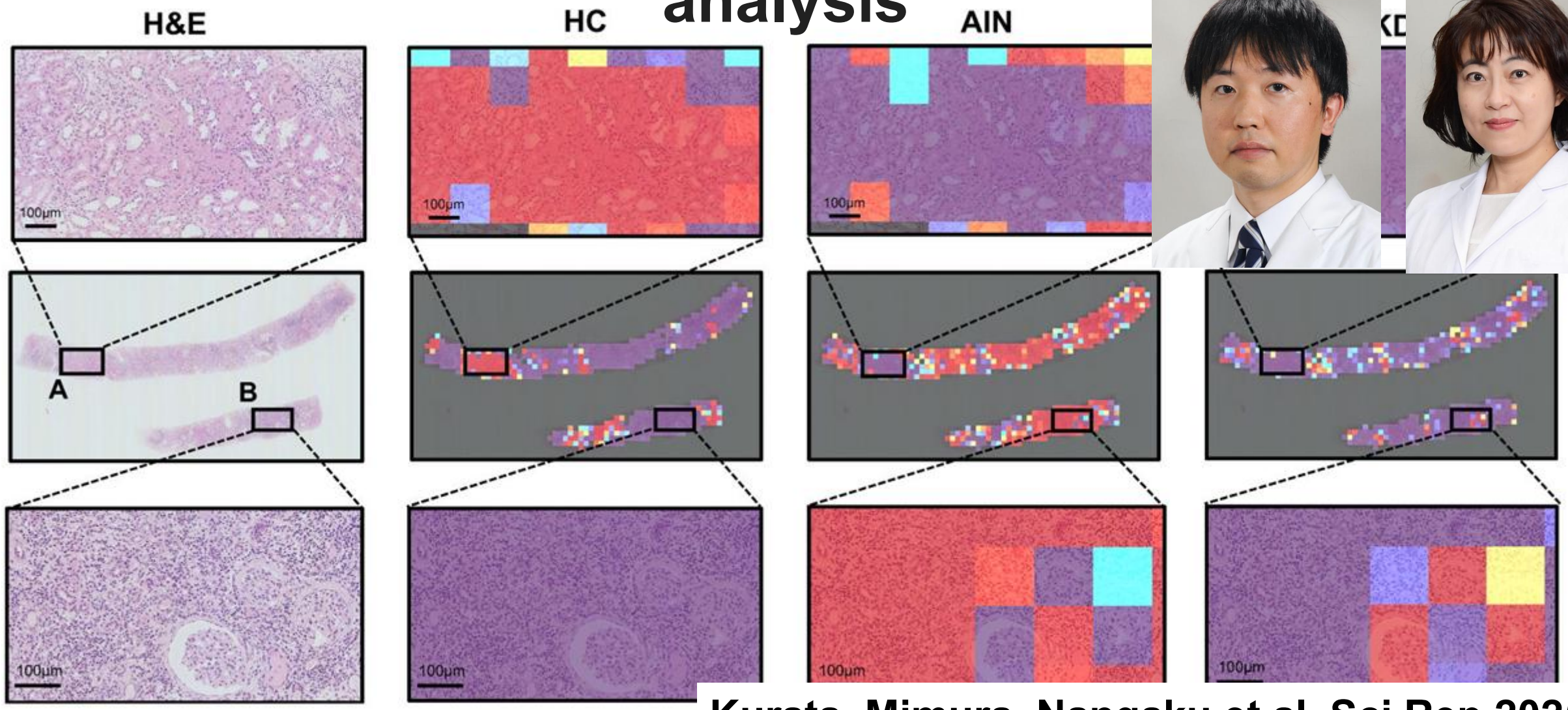


Each sensor exhibits a different resistance change for each gas species based on the relative acidity of the oxide semiconductor and the dissociation constant of the measured gas


AI

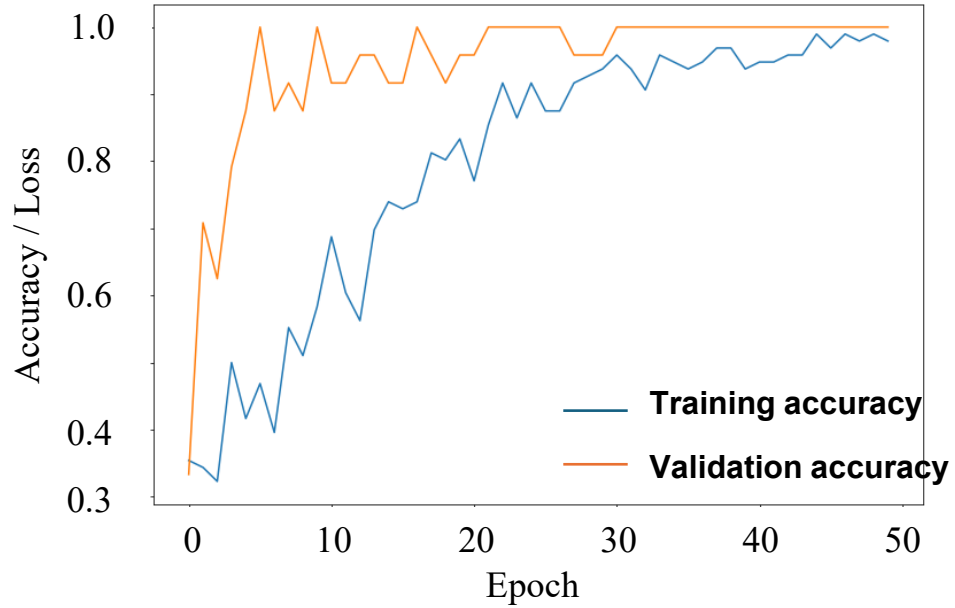

Session A-9
Global Bio
& Investment 環球生技
Smart HealthCare
-organizer /
ponsor /
臺北醫學大學
Mai-Szu Wu

the utility of pathology foundation models combined with multiple instance learning for kidney pathology analysis



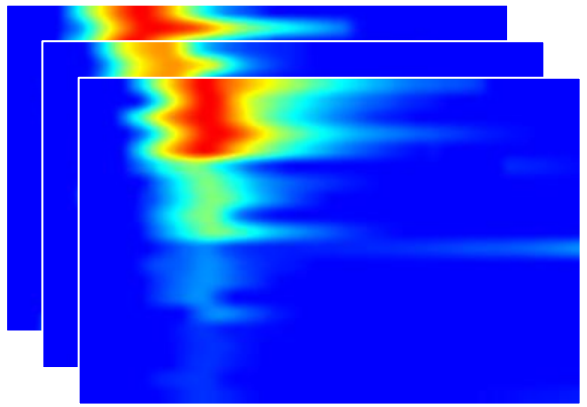
Kurata, Mimura, Nangaku et al. Sci Rep 2025

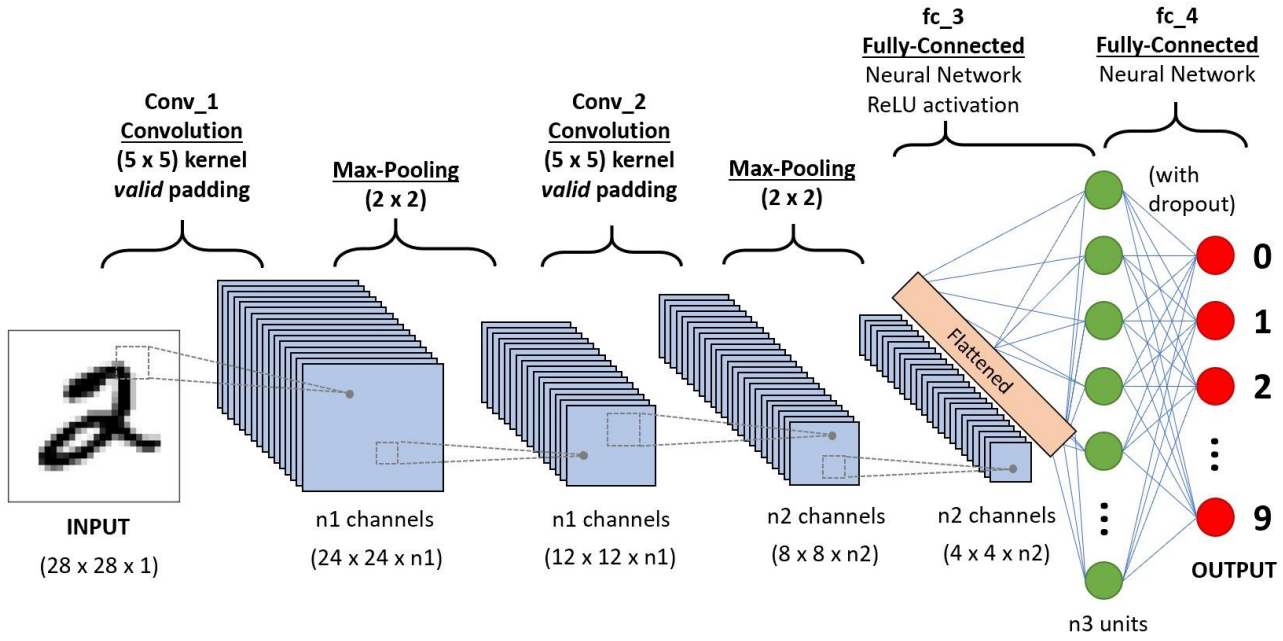
Analysis of body gas utilizing convolutional neural network



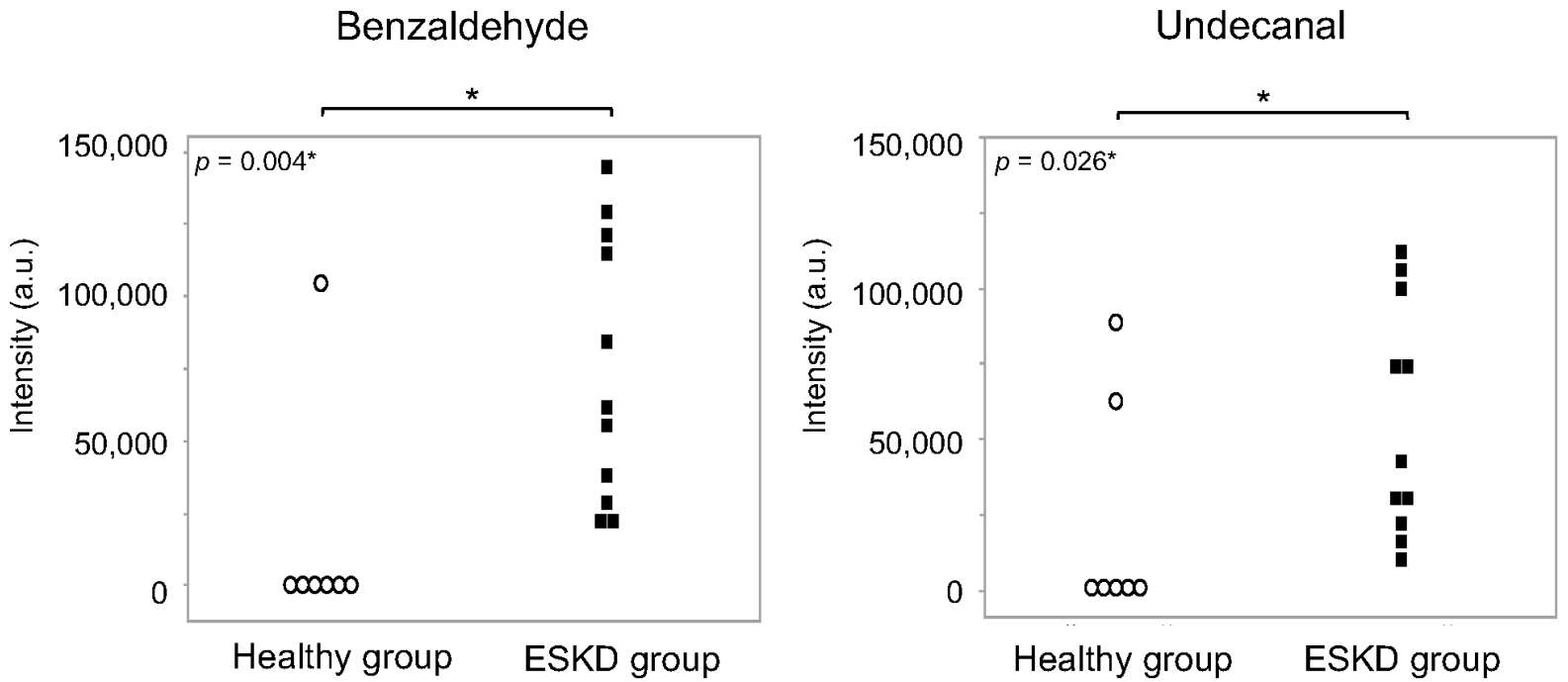
Visualization of gas responses from sensor array in heat map

60 dataset: 3 gases × 20 measurements





Skin gas analysis of patients with kidney disease



In the HD group, we focused on changes in skin gases before and after the first HD session and detected 35 substances before, but not after, HD.

Five of these substances became undetectable in more than half of the patients in the HD group.

Hashiba, Hirakawa et al. Nephrology 2025

Building a network between the next-generation health system and data collection system from sensing devices in the daily life space

Cloud cyber- space

connected service by API

Continuous discovery of new medical knowledge

AI cloud

health consultation support

standardized medical information

HL7 FHIR

Health information cloud

Ubiquitous hospital cloud

Integration of health and medical information

health and medical information

utilization of Medical application

Ubiquitous medical care

personalized health advice

Electronic Medical Record System

Progress record
・problem, findings, diagnostic process, treatment strategy
NLP description
structured data entry

Medical documents
・test result report, surgery record, medical certificate, consent form

Nursing support
・Nursing records
・Nursing Diagnosis
・Nursing instructions
・Pressure ulcer management
・Vital signs

Order-entry System
- Disease name order
- Medication order
- Test order (blood, physiology, pathology)
- Clinical path, Others (surgery, meals, admission and discharge) , DPC

部門システム

- Pharmacy department
- Radiology department
- Laboratory test
- Bacteriology
- physiological test
- Pathology department
- Blood Transfusion
- Endoscopy department
- surgery department
- cancer registry

Hospital Information

Hospital

Various biological signals

smart avatar

Movile devices

smart wearable

Biologging from the daily living area

interface for information sharing

Monitoring and visualization of health status+Real-time health support with smart devices

real time support

smart Environmental monitor

CO2、PM2.5、Formaldehyde

smart toilet

microRNA, microbiome

Connection and cooperation by standard IF (manufacturers, devices, and communication protocols independent)

Home

adopting the Transformer model, which is the foundational technology of generative AI

Barriers to telemedicine

Patient-related	Physician-related	Related to law, governance and infrastructure
Technological difficulty especially for the elderly.	Resistance to change.	Regulations about telemedicine are preliminary and imperfect.
Problems about internet connection.	Limited availability about biological data (only information of sounds and images).	Technology may fail either spontaneously or during denial-of-service attack.
Care may be perceived as impersonal when compared with face-to-face.	Additional workload due to technological issues.	Cost and reimbursement.
Anxiety when remote advice not immediately available.	Perceived loss of control when compared with face-to-face.	
Feeling unnecessary because of easy accessibility to family doctors and hospitals	Data overload and user fatigue.	

AR and VR

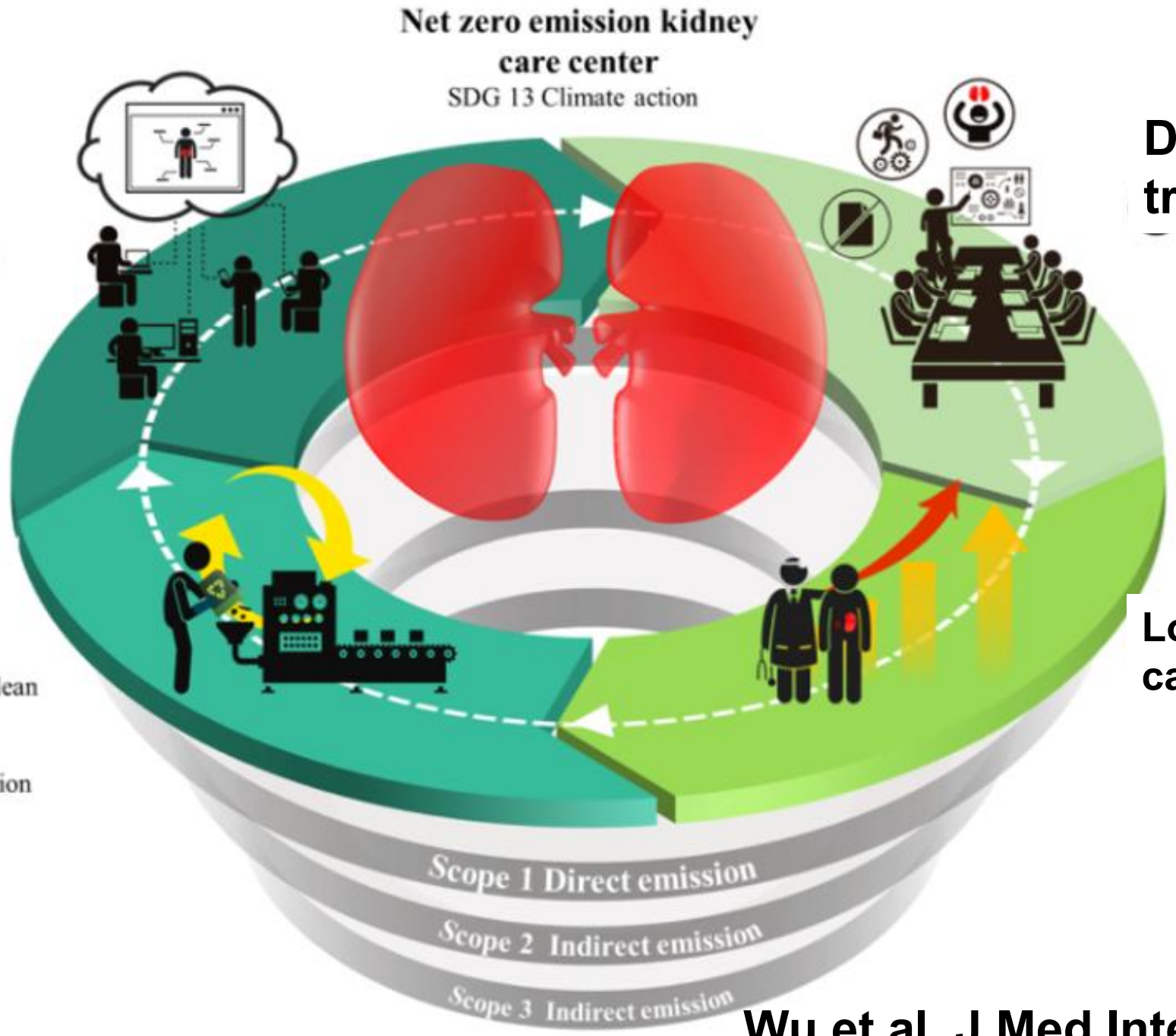

Provided by Kengo Miyo

Navigating the Global Economic Landscape of Dialysis: A Summary of Expert Opinions from The 4th International Congress of Chinese Nephrologists

Philip Kam-Tao Li[a] Jack Kit-Chung Ng[a, b] Guang-yan Cai[c] Wei Chen[d]
Kai Ming Chow[a] Stanley Fan[e] John Cijiang He[f] Lai Seong Hooi[g]
York Pei[h] Boon Wee Teo[i] Muh Geot Wong[j] I-Wen Wu[k] Jianhui Zhou[c]
Na Tian[l] Zhiming Ye[m] Xueqing Yu[m]

<Key Messages> Implementation of preventive measures and cost-effective treatment strategies are the cornerstone to combat the global CKD epidemic.

Kidney Dis 2024



Disease prevention

SDG 4 Quality education
SDG 10 Reduced inequalities
SDG 17 Partnerships for the goals

Digital transformation

SDG 3 Good health and well-being
SDG 4 Quality education

③ Circular economy

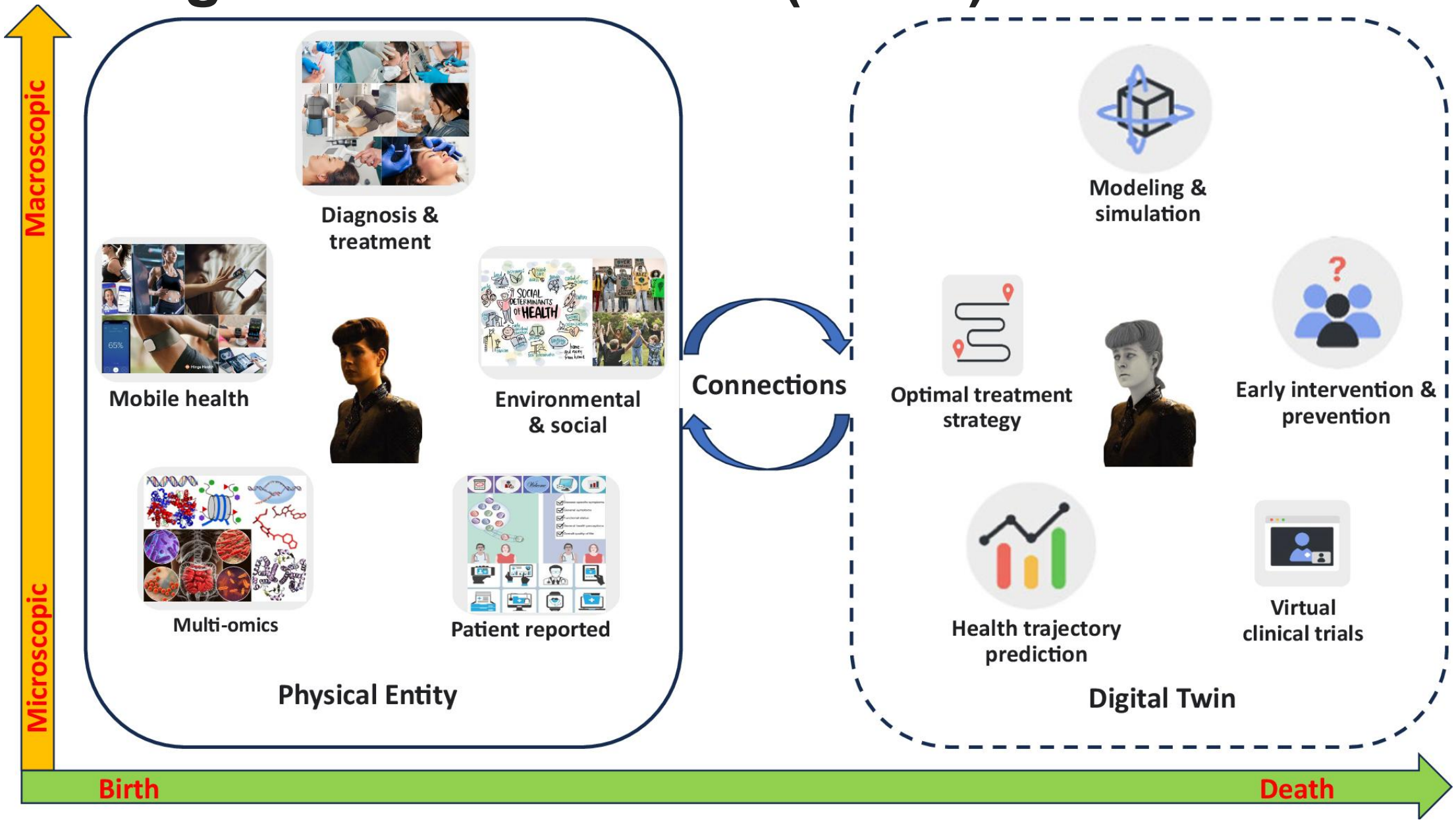
SDG 7 Affordable and clean energy
SDG 12 Responsible consumption and production

Low-carbon health care strategies

SDG 3 Good health and well-being

Wu et al. J Med Internet Res 2025

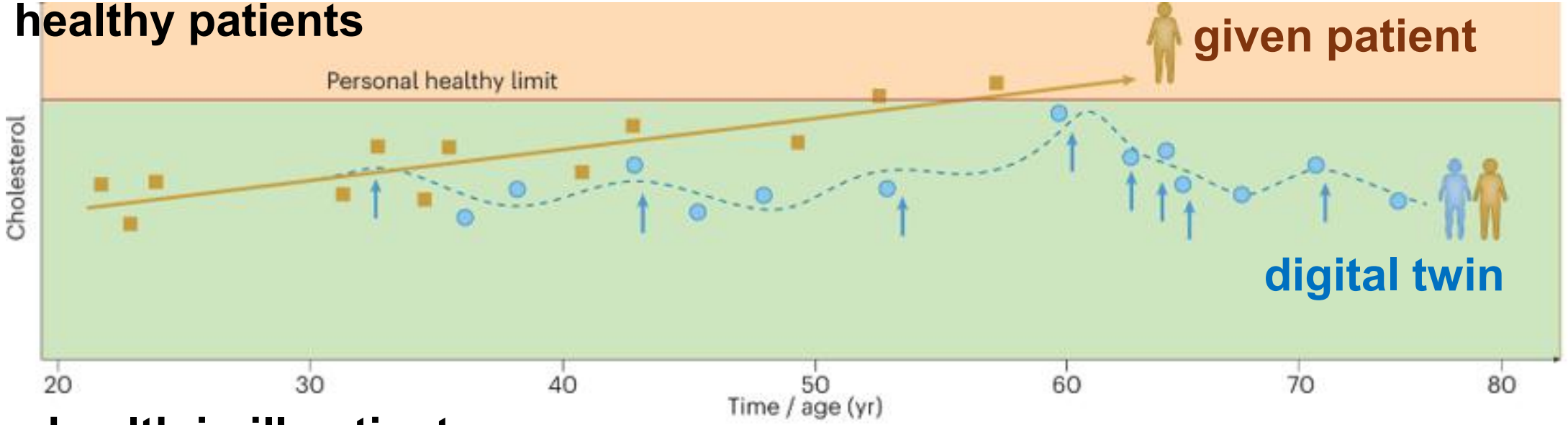
Digital twin for health (DT4H) envisioned



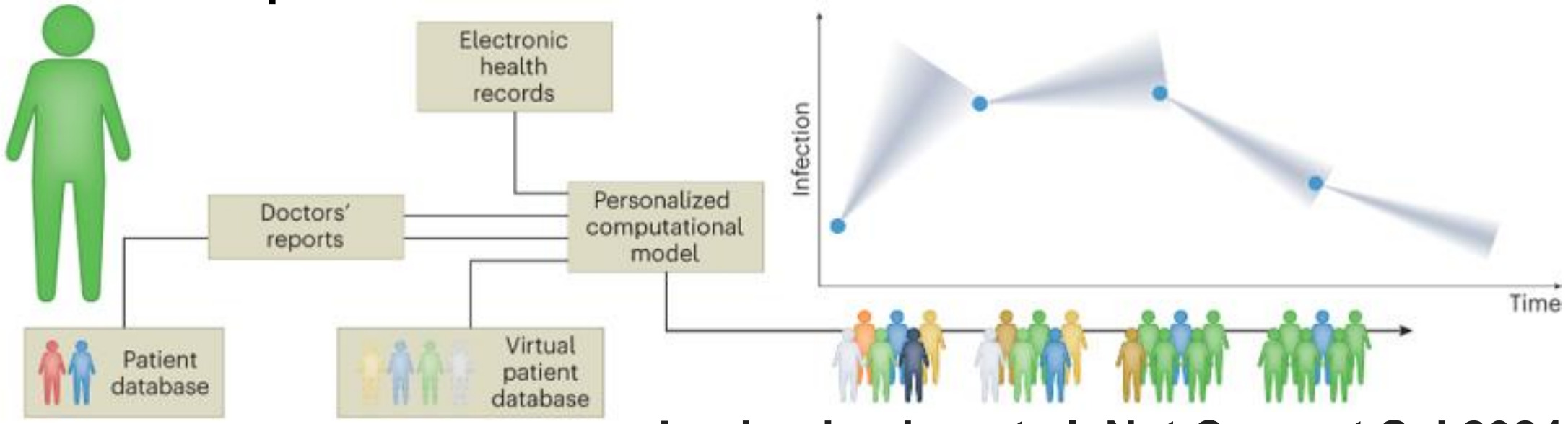
Katsoulakis et al. NPJ Digit Med 2024

Medical digital twins

Keeping healthy patients healthy

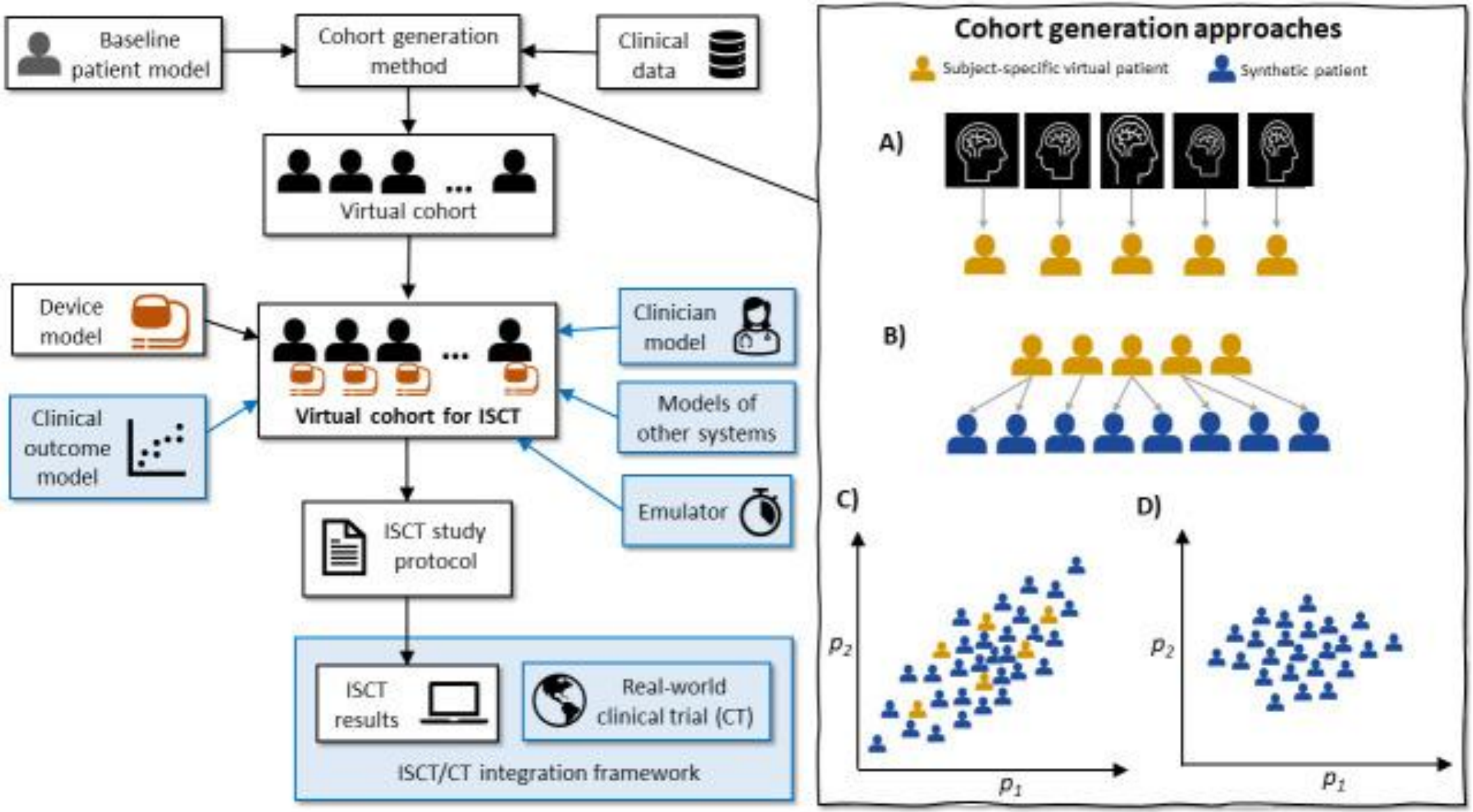


Restoring health in ill patients



Laubenbacher et al. Nat Comput Sci 2024

In silico clinical trials



Pathmanathan et al. PLoS Comput Biol 2024

Telemedicine improves the sustainability of medical care by addressing its environmental and social dimensions

1. Environmental Sustainability

- Reduction in patient and provider travel with lower energy consumption
- Improvement of patient adherence to treatment plans by making healthcare more accessible and convenient, reducing the need for costly hospitalizations and emergency room visits

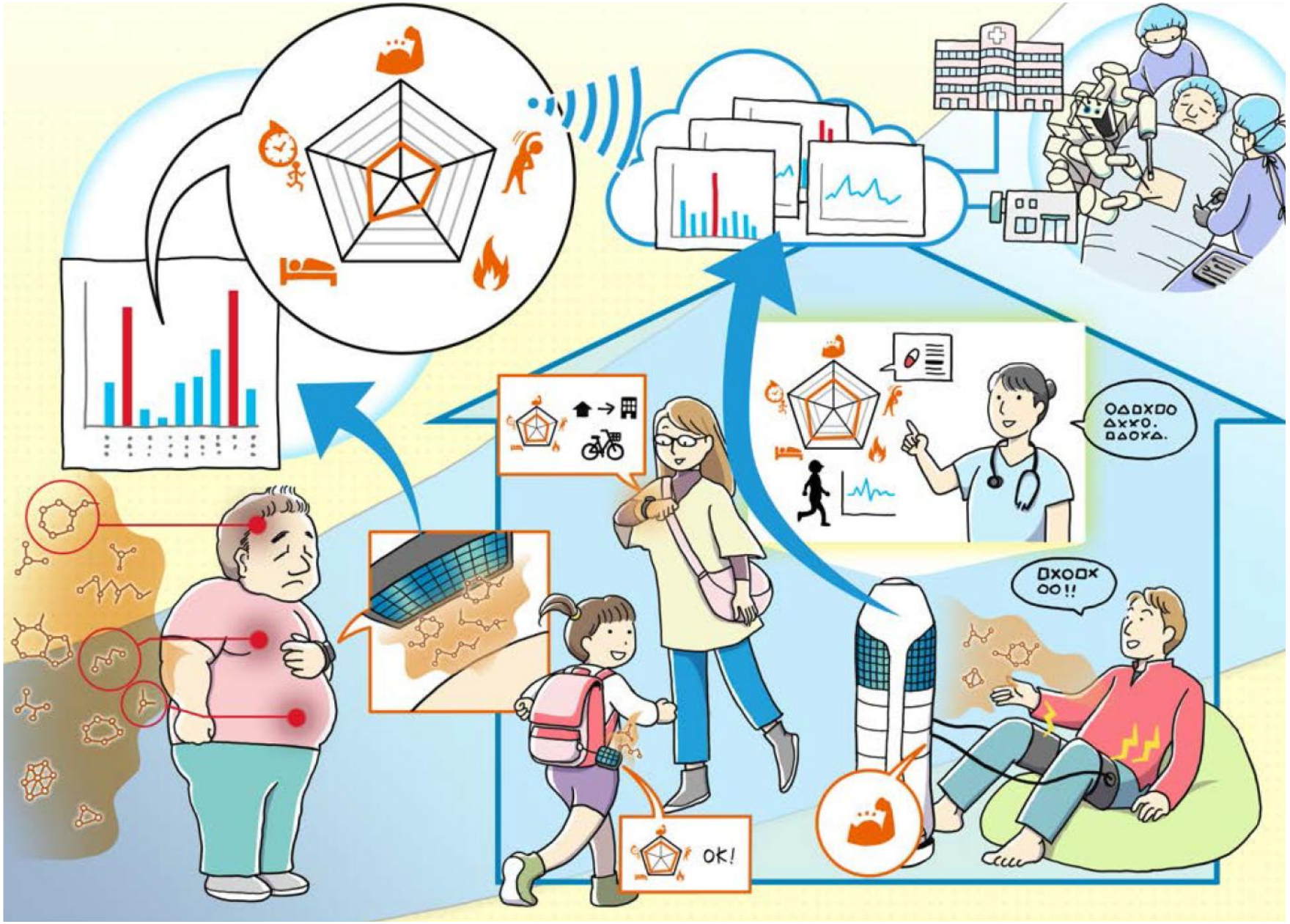
Telemedicine improves the sustainability of medical care by addressing its environmental and social dimensions

2. Enhanced Accessibility and Equity

- Access to specialized care for patients in rural or underserved areas
- Access for individuals with mobility issues, the elderly, and those who have difficulty taking time off work
- “Democratization of healthcare" to reduce inequalities in health access

MOONSHOT
RESEARCH & DEVELOPMENT PROGRAM

[Goal 7]



Realization of sustainable care systems to overcome major diseases by 2040, for enjoying one's life with relief and release from health concerns until 100 years old.


UTokyo


Motoko Yanagita
Rathika Krishnasamy
Hyeong Cheon Park
Sunny WONG Dr, UCH COS(M&G)
Jung Pyo Lee
APSN


台灣腎臟醫學會
T.S.N.
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