

Table S1. Definitions of CKM Syndrome Stages for Adults

CKM Syndrome Stages ^a	Definition
Stage 0: No CKM health risk factors	Participants exhibit a normal BMI (< 25 kg/m ²) and waist circumference (< 88 cm for women, < 102 cm for men), normoglycemia (fasting blood glucose < 100 mg/dL and glycated hemoglobin < 5.7%), normotension (systolic BP < 130 mmHg and diastolic BP < 80 mmHg), a normal lipid profile (triglycerides < 135 mg/dL), and no signs of CKD or subclinical or clinical CVD.
Stage 1: Excess and/or dysfunctional adiposity	Participants have an elevated BMI (≥ 25 kg/m ²), waist circumference (≥ 88 cm for women, ≥ 102 cm for men), or prediabetes (HbA1c ≥ 5.7%–6.5%, or fasting blood glucose between 100 mg/dL and 126 mg/dL), without additional metabolic risk factors or CKD.
Stage 2: Metabolic risk factors and CKD	Participants meet criteria for metabolic risk factors or moderate-to-high-risk CKD as per KDIGO guidelines [1], as recommended by the AHA [2]. Metabolic risk factors include elevated fasting triglycerides (≥ 135 mg/dL), hypertension ^b , diabetes ^c , or metabolic syndrome ^d . Estimated GFR is calculated using the race-free CKD-EPI 2021 creatinine equation. CKD stages were identified based on GFR and urinary albumin-to-creatinine ratio [1].
Stage 3: Subclinical CVD in CKM	Participants are identified by very-high-risk KDIGO CKD stages (stage G4 or G5 CKD or very high risk per KDIGO classification) [1] or a predicted 10-year CVD risk of ≥ 20%, estimated using the AHA Predicting Risk of CVD EVENTS (PREVENT) equations ^e [3].
Stage 4: Clinical CVD in CKM	Participants are defined by self-reported established cardiovascular conditions including heart attack, heart failure, and stroke. Atrial fibrillation and peripheral artery disease data were not included due to unavailability.

Abbreviations: CKM, cardiovascular-kidney-metabolic; BMI, body mass index; BP, blood pressure; CKD, chronic kidney disease; CVD, cardiovascular disease; HbA1c, hemoglobin A1c; KDIGO, Kidney Disease Improving Global Outcomes; AHA, American Heart Association; GFR, glomerular filtration rate; NHANES, National Health and Nutrition Examination Survey; HDL-C, high density lipoprotein cholesterol.

^a CKM syndrome stages were identified among NHANES III (1988–1994) and NHANES 1999–2018 participants in accordance with the 2023 AHA Presidential Advisory on CKM Health [2]. In this analysis, CKM stage definitions were adapted to data available in the NHANES.

^b Hypertension Diagnosis: Average blood pressure is calculated by excluding zero diastolic readings. If all diastolic readings are zero, the average is zero. For one reading, that value is used as the average. In cases of multiple readings, the first is excluded from the calculated average. Hypertension is defined as a systolic BP ≥ 130 mmHg, diastolic BP ≥ 80 mmHg, or the self-reported use of antihypertensive medications [4].

^c Diabetes Diagnosis: Includes HbA1c ≥ 6.5%, fasting glucose ≥ 7.0 mmol/L, random glucose ≥ 11.1 mmol/L, two-hour oral glucose tolerance test (OGTT) blood glucose ≥ 11.1 mmol/L, or current use of diabetes medications or insulin [5].

^d Metabolic Syndrome: Defined by the presence of at least three of the following: elevated waist circumference, low HDL-C level (<40 mg/dL for men, <50 mg/dL for women), fasting triglycerides ≥ 150 mg/dL, elevated blood pressure (systolic BP ≥ 130 mmHg, diastolic BP ≥ 80 mmHg, and/or use of blood pressure-lowering medications), or prediabetes.

^e 10-Year CVD Risk Estimation: This estimation employs the AHA Predicting Risk of CVD EVENTS (PREVENT) equations, designating a high-risk classification as a ≥ 20% probability of experiencing a cardiovascular event within 10 years (based on recommended thresholds and Online Calculator [<https://professional.heart.org/en/guidelines-and-statements/prevent-calculator>]) [3]. These equations have been validated for adults aged 30 to 79 years, with individuals aged 80 and older assigned an age of 79 to ensure conservative risk estimates. Additionally, the PREVENT model was developed based on specific variable ranges: total cholesterol (130-320 mg/dL), HDL-C (20-100 mg/dL), systolic BP (90-200 mmHg), and GFR (15-140 mL/min/1.73 m²). To align with the PREVENT risk strata, values that exceed these thresholds are adjusted to the respective upper or lower limits. It is important to note that data on cardiac biomarkers and imaging for subclinical cardiovascular disease were not available in the NHANES 1988–1994 and 1999–2018.

References

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Table SII. Baseline Characteristics of Adults in NHANES 2003–2006 and 2009–2014, Stratified by Advanced CKM Syndrome.

Characteristics	Total (n=9598)	Advanced CKM syndrome (Stages 3 or 4)		P value
		No (n=8298)	Yes (n=1300)	
Age, years				<0.01
20-39	3571 (40.01)	3528 (44.02)	43 (4.79)	
40-59	3680 (42.27)	3387 (43.66)	293 (30.04)	
≥ 60	2347 (17.72)	1383 (12.32)	964 (65.17)	
Sex, %				<0.01
Female	4883 (50.89)	4320 (51.52)	563 (45.38)	
Male	4715 (49.11)	3978 (48.48)	737 (54.62)	
Race/ethnicity, %				<0.01
Non-Hispanic white	4301 (67.71)	3584 (67.01)	717 (73.78)	
Non-Hispanic black	1935 (11.57)	1665 (11.53)	270 (11.94)	
Other	3362 (20.73)	3049 (21.46)	313 (14.28)	
Education level, %				<0.01
Below high school	2344 (16.93)	1900 (15.90)	444 (25.97)	
High school	2141 (22.35)	1819 (21.73)	322 (27.73)	
Above high school	5113 (60.73)	4579 (62.37)	534 (46.30)	
Family PIR, %				<0.01
≤1.0	2118 (15.10)	1812 (14.83)	306 (17.54)	
1.1–3.0	3859 (35.47)	3247 (34.29)	612 (45.88)	
>3.0	3621 (49.42)	3239 (50.88)	382 (36.58)	
Smoking status, %				<0.01
Never smoker	5359 (54.91)	4810 (56.58)	549 (40.24)	
Former smoker	2146 (22.71)	1674 (21.21)	472 (35.92)	
Current smoker	2093 (22.37)	1814 (22.20)	279 (23.85)	
Drinking status, %				<0.01
Nondrinker	1881 (16.02)	1532 (15.12)	349 (23.91)	
Low-to-moderate drinker	6894 (73.89)	6027 (74.57)	867 (67.92)	
Heavy drinker	823 (10.09)	739 (10.31)	84 (8.17)	
Physical activity, %				<0.01
Inactive	2347 (20.97)	1801 (19.04)	546 (37.94)	
Insufficiently active	3595 (41.13)	3212 (42.21)	383 (31.58)	
Active	3656 (37.90)	3285 (38.74)	371 (30.47)	
Psoriasis, %				<0.01

No	9316 (96.90)	8089 (97.25)	1227 (93.84)	
Yes	282 (3.10)	209 (2.75)	73 (6.16)	
All-cause mortality, %				<0.01
No	8738 (92.96)	7917 (95.92)	821 (66.96)	
Yes	860 (7.04)	381 (4.08)	479 (33.04)	
Follow-up time, years	9.25 (6.92, 13.75)	9.58 (7.17, 14.08)	7.42 (5.67, 9.42)	<0.01

Continuous variables without a normal distribution are presented as medians [interquartile ranges]. Categorical variables are presented as numbers (percentages). N reflect the study sample while percentages reflect the survey-weighted data. Abbreviation: NHANES, National Health and Nutrition Examination Survey; CKM, Cardiovascular-Kidney-Metabolic; PIR, poverty income ratio.

Table SIII. HRs (95% CIs) for CCD Mortality According to CKM Syndrome Stages or Psoriasis: NHANES 2003–2006 and 2009–2014.

	Crude		Model 1		Model 2	
	HR (95% CI)	<i>P</i> value	HR (95% CI)	<i>P</i> value	HR (95% CI)	<i>P</i> value
CKM syndrome stages						
Stage 0	1 [Reference]		1 [Reference]		1 [Reference]	
Stage 1	1.79 (0.31-10.25)	0.51	1.36 (0.24-7.74)	0.73	1.34 (0.23-7.71)	0.74
Stage 2	5.93 (1.20-29.18)	0.03	3.17 (0.63-15.88)	0.16	2.86 (0.56-14.50)	0.2
Stage 3	122.94 (26.17-577.41)	<0.01	24.67 (4.91-123.95)	<0.01	18.35 (3.59-93.71)	<0.01
Stage 4	87.33 (19.03-400.70)	<0.01	25.64 (5.27-124.72)	<0.01	21.06 (4.28-103.75)	<0.01
Advanced CKM syndrome (Stages 3 or 4)						
No	1 [Reference]		1 [Reference]		1 [Reference]	
Yes	22.43 (15.93-31.59)	<0.01	9.39 (6.25-14.10)	<0.01	8.16 (5.42-12.28)	<0.01
Psoriasis						
No	1 [Reference]		1 [Reference]		1 [Reference]	
Yes	2.86 (1.64-4.98)	<0.01	2.65 (1.43-4.93)	<0.01	2.69 (1.42-5.08)	<0.01

Model 1 was adjusted for age (20-39, 40-59, or ≥ 60), sex (male or female), and race/ethnicity (Non-Hispanic White, Non-Hispanic Black or Other); Model 2 was adjusted as model 1 plus education level (below high school, high school, or above high school), family PIR (≤ 1.0 , 1.1–3.0, or > 3.0), smoking status (never smoker, former smoker, or current smoker), drinking status (nondrinker, low-to-moderate drinker, or heavy drinker), and physical activity (inactive, insufficiently active, or active). Abbreviations: HR, hazard ratio; CI, confidence interval; NHANES, National Health and Nutrition Examination Survey; CKM, cardiovascular-kidney-metabolic; CCD, cardio-cerebrovascular disease; PIR, poverty income ratio.

Table SIV. HRs (95% CIs) for CCD Mortality According to the Joint Association of CKM Syndrome Stages and Psoriasis: NHANES 2003–2006 and 2009–2014.

	Crude		Model 1		Model 2	
	HR (95% CI)	<i>P</i> value	HR (95% CI)	<i>P</i> value	HR (95% CI)	<i>P</i> value
CCD Mortality						
No advanced CKM and psoriasis	1 [Reference]		1 [Reference]		1 [Reference]	
Psoriasis alone	1.61 (0.34-7.56)	0.55	1.61 (0.34-7.65)	0.55	1.71 (0.35-8.29)	0.51
Advanced CKM alone	21.78 (16.02-29.60)	<0.01	8.94 (6.24-12.80)	<0.01	7.68 (5.35-11.04)	<0.01
Advanced CKM and psoriasis	38.14 (19.30-75.38)	<0.01	18.62 (8.18-42.43)	<0.01	16.47 (7.26-37.33)	<0.01
<i>P</i> for interaction		0.92		0.77		0.80

Model 1 was adjusted for age (20-39, 40-59, or ≥ 60), sex (male or female), and race/ethnicity (Non-Hispanic White, Non-Hispanic Black or Other); Model 2 was adjusted as model 1 plus education level (below high school, high school, or above high school), family PIR (≤ 1.0 , 1.1–3.0, or > 3.0), smoking status (never smoker, former smoker, or current smoker), drinking status (nondrinker, low-to-moderate drinker, or heavy drinker), and physical activity (inactive, insufficiently active, or active). Abbreviations: HR, hazard ratio; CI, confidence interval; NHANES, National Health and Nutrition Examination Survey; CKM, cardiovascular-kidney-metabolic; CCD, cardio-cerebrovascular disease; PIR, poverty income ratio.

Table SV. Stratified Analyses of the Associations Between the Joint Effects of CKM Syndrome Stages and Psoriasis and All-Cause Mortality Among Adults: NHANES 2003–2006 and 2009–2014.

Subgroups	N	No advanced CKM and no psoriasis	Psoriasis alone	Advanced CKM alone	Advanced CKM and psoriasis	<i>P</i> _{interaction}
		HR	HR (95% CI)	HR (95% CI)	HR (95% CI)	
Age, years						0.07
20-39	3571	1 [Reference]	2.83 (0.53-15.25)	1.16 (0.14-9.54)	19.03 (4.83-75.03)	
40-59	3680	1 [Reference]	0.39 (0.12-1.25)	3.73 (2.56-5.44)	9.75 (5.96-15.96)	
≥ 60	2347	1 [Reference]	2.34 (1.04-5.27)	3.52 (2.81-4.40)	5.87 (3.53-9.74)	
Sex, %						0.47
Female	4883	1 [Reference]	1.94 (0.81-4.65)	3.40 (2.43-4.76)	6.61 (3.87-11.27)	
Male	4715	1 [Reference]	0.82 (0.37-1.83)	3.75 (2.79-5.03)	8.34 (5.06-13.72)	
Race/ethnicity, %						0.20
Non-Hispanic white	4301	1 [Reference]	1.06 (0.55-2.03)	3.23 (2.54-4.09)	6.85 (4.52-10.39)	
Non-Hispanic black	1935	1 [Reference]	4.34 (0.70-26.78)	6.23 (4.13-9.41)	25.51 (12.84-50.70)	
Other	3362	1 [Reference]	1.24 (0.31-4.95)	3.25 (2.14-4.94)	3.97 (1.43-11.04)	
Education level, %						0.62
Below high school	2344	1 [Reference]	0.48 (0.08-2.74)	2.99 (2.15-4.14)	6.99 (4.11-11.89)	
High school	2141	1 [Reference]	2.56 (0.59-11.07)	3.87 (2.57-5.83)	6.80 (3.01-15.35)	
Above high school	5113	1 [Reference]	1.32 (0.64-2.69)	3.62 (2.64-4.97)	7.25 (4.04-12.99)	
Family PIR, %						0.38
≤1.0	2118	1 [Reference]	0.89 (0.14-5.53)	2.93 (1.88-4.56)	6.55 (3.93-10.92)	
1.1–3.0	3859	1 [Reference]	1.95 (0.74-5.11)	4.17 (3.04-5.71)	9.55 (5.33-17.09)	
>3.0	3621	1 [Reference]	0.99 (0.38-2.55)	2.93 (2.10-4.09)	5.52 (2.28-13.39)	
Smoking status, %						0.01
Never smoker	5359	1 [Reference]	1.41 (0.39-5.13)	4.43 (3.39-5.80)	5.16 (1.84-14.46)	
Former smoker	2146	1 [Reference]	1.23 (0.50-2.99)	3.15 (2.28-4.35)	8.11 (4.62-14.24)	
Current smoker	2093	1 [Reference]	1.38 (0.47-4.07)	2.89 (1.71-4.88)	7.30 (4.65-11.46)	
Drinking status, %						0.03
Nondrinker	1881	1 [Reference]	0.84 (0.10-6.75)	5.87 (3.60-9.57)	5.92 (2.62-13.38)	
Low-to-moderate drinker	6894	1 [Reference]	1.09 (0.45-2.61)	2.94 (2.19-3.95)	8.38 (5.48-12.81)	
Heavy drinker	823	1 [Reference]	2.96 (1.29-6.80)	3.60 (1.68-7.72)	8.73 (2.56-29.74)	
Physical activity, %						<0.01
Inactive	2347	1 [Reference]	1.86 (0.61-5.72)	4.10 (3.26-5.16)	6.64 (4.12-10.70)	
Insufficiently active	3595	1 [Reference]	1.27 (0.44-3.64)	4.74 (3.22-6.96)	12.81 (8.30-19.79)	
Active	3656	1 [Reference]	0.89 (0.29-2.71)	1.74 (1.11-2.74)	5.98 (2.50-14.29)	

Analyses were adjusted for covariates age (20-39, 40-59, or ≥60), sex (male or female), race/ethnicity (Non-Hispanic

White, Non-Hispanic Black or Other), education level (below high school, high school, or above high school), family PIR (≤ 1.0 , 1.1–3.0, or >3.0), smoking status (never smoker, former smoker, or current smoker), drinking status (nondrinker, low-to-moderate drinker, or heavy drinker), and physical activity (inactive, insufficiently active, or active) when they were not the strata variables. Abbreviations: HR, hazard ratio; CI, confidence interval; NHANES, National Health and Nutrition Examination Survey; CKM, cardiovascular-kidney-metabolic; CCD, cardio-cerebrovascular disease; PIR, poverty income ratio.

Table SVI. Adjusted HRs (95% CIs) for All-Cause and Cause-Specific Mortality Among Cancer Survivors According to CKM Syndrome Stages, After Excluding Participants With Missing Data: NHANES 2003–2006 and 2009–2014 (n = 8,191).

	Crude		Model 1		Model 2	
	HR (95% CI)	<i>P</i> value	HR (95% CI)	<i>P</i> value	HR (95% CI)	<i>P</i> value
All-Cause Mortality						
No advanced CKM and psoriasis	1 [Reference]		1 [Reference]		1 [Reference]	
Psoriasis alone	1.37 (0.74-2.54)	0.31	1.32 (0.70-2.51)	0.39	1.28 (0.66-2.48)	0.46
Advanced CKM alone	10.63 (8.55-13.22)	<0.01	4.39 (3.47-5.57)	<0.01	3.52 (2.79-4.44)	<0.01
Advanced CKM and psoriasis	18.68 (13.00-26.85)	<0.01	9.16 (5.98-14.01)	<0.01	6.91 (4.77-10.02)	<0.01
CCD Mortality						
No advanced CKM and psoriasis	1 [Reference]		1 [Reference]		1 [Reference]	
Psoriasis alone	1.65 (0.35-7.73)	0.53	1.65 (0.35-7.81)	0.53	1.76 (0.37-8.49)	0.48
Advanced CKM alone	21.22 (15.33-29.38)	<0.01	9.06 (6.20-13.23)	<0.01	7.78 (5.28-11.46)	<0.01
Advanced CKM and psoriasis	34.58 (16.68-71.66)	<0.01	17.77 (7.44-42.44)	<0.01	15.54 (6.55-36.88)	<0.01

Model 1 was adjusted for age (20-39, 40-59, or ≥ 60), sex (male or female), and race/ethnicity (Non-Hispanic White, Non-Hispanic Black or Other); Model 2 was adjusted as model 1 plus education level (below high school, high school, or above high school), family PIR (≤ 1.0 , 1.1–3.0, or > 3.0), smoking status (never smoker, former smoker, or current smoker), drinking status (nondrinker, low-to-moderate drinker, or heavy drinker), and physical activity (inactive, insufficiently active, or active). Abbreviations: HR, hazard ratio; CI, confidence interval; NHANES, National Health and Nutrition Examination Survey; CKM, cardiovascular-kidney-metabolic; CCD, cardio-cerebrovascular disease; PIR, poverty income ratio.

Table SVII. Adjusted HRs (95% CIs) for All-Cause and Cause-Specific Mortality Among Cancer Survivors According to CKM Syndrome Stages, After Excluding Participants Who Died Within the First Year of Follow-Up: NHANES 2003–2006 and 2009–2014 (n = 9,546).

	Crude		Model 1		Model 2	
	HR (95% CI)	<i>P</i> value	HR (95% CI)	<i>P</i> value	HR (95% CI)	<i>P</i> value
All-Cause Mortality						
No advanced CKM and psoriasis	1 [Reference]		1 [Reference]		1 [Reference]	
Psoriasis alone	1.42 (0.78-2.59)	0.25	1.36 (0.73-2.53)	0.33	1.35 (0.71-2.54)	0.36
Advanced CKM alone	10.81 (8.80-13.27)	<0.01	4.37 (3.51-5.44)	<0.01	3.50 (2.83-4.33)	<0.01
Advanced CKM and psoriasis	19.22 (13.20-27.99)	<0.01	8.98 (5.82-13.86)	<0.01	6.99 (4.68-10.45)	<0.01
CCD Mortality						
No advanced CKM and psoriasis	1 [Reference]		1 [Reference]		1 [Reference]	
Psoriasis alone	1.73 (0.35-8.63)	0.5	1.75 (0.35-8.82)	0.5	1.86 (0.36-9.67)	0.46
Advanced CKM alone	22.54 (16.42-30.96)	<0.01	9.11 (6.15-13.50)	<0.01	7.93 (5.36-11.74)	<0.01
Advanced CKM and psoriasis	38.62 (18.83-79.20)	<0.01	18.74 (7.86-44.67)	<0.01	16.98 (7.27-39.62)	<0.01

Model 1 was adjusted for age (20-39, 40-59, or ≥ 60), sex (male or female), and race/ethnicity (Non-Hispanic White, Non-Hispanic Black or Other); Model 2 was adjusted as model 1 plus education level (below high school, high school, or above high school), family PIR (≤ 1.0 , 1.1–3.0, or > 3.0), smoking status (never smoker, former smoker, or current smoker), drinking status (nondrinker, low-to-moderate drinker, or heavy drinker), and physical activity (inactive, insufficiently active, or active). Abbreviations: HR, hazard ratio; CI, confidence interval; NHANES, National Health and Nutrition Examination Survey; CKM, cardiovascular-kidney-metabolic; CCD, cardio-cerebrovascular disease; PIR, poverty income ratio.