

Web Table 1. Description of cancer and cardiovascular disease prevention metrics adapted from American Cancer Society and American Heart Association recommendations

	ACS recommendations	AHA recommendations
Alcohol consumption		
Poor (0)	>2/day for men or >1/day for women	N/A
Intermediate (1)	Moderate drinkers (<2/day men/<1/day women)	
Ideal (2)	Current non-drinkers	
Leisure-time Physical activity^a		
Poor (0)	0 MET-hr/wk	0 MET-hr/wk
Intermediate (1)	≥ 0 - <8.75 MET-hr/wk	≥ 0 - <8.75 MET-hr/wk
Ideal (2)	≥8.75 MET-hr/wk	≥8.75 MET-hr/wk
Healthy diet score		
Poor (0)	ACS diet score < 3 ^b	Meeting 0-1 AHA diet components ^c
Intermediate (1)	ACS diet score 3-5	Meeting 2-3 AHA diet components
Ideal (2)	ACS diet score ≥ 6	Meeting 4-5 AHA diet components
Body weight		
Poor (0)	BMI ≥ 30kg/m ² either baseline, age 50, or both	BMI ≥ 30kg/m ²
Intermediate (1)	Other combinations of weight status	25 ≤ BMI < 30kg/m ²
Ideal (2)	BMI < 25kg/m ² at baseline and age 50	BMI < 25kg/m ²
Smoking^d		
Poor (0)	Current smoker	Current smoker
Intermediate (1)	Quit ≤ 1 year ago	Quit ≤ 1 year ago
Ideal (2)	Never smoker or quit >1 year ago	Never smoker or quit >1 year ago
Blood pressure		
Poor (0)	N/A	SBP ≥ 140 or DBP ≥ 90
Intermediate (1)		SBP 120-139 or DBP 80-89 or treated to ideal ^e
Ideal (2)		SBP < 120 and DBP < 80
Total cholesterol		
Poor (0)	N/A	≥ 240mg/dL
Intermediate (1)		200-239mg/dL or treated to ideal level ^e
Ideal (2)		< 200mg/dL
Fasting plasma glucose		
Poor (0)	N/A	≥ 126mg/dL
Intermediate (1)		100-125 mg/dL or treated to ideal level ^e
Ideal (2)		< 100mg/dL

ACS, American Cancer Society; AHA, American Heart Association; BMI, body mass index; CHS, Cardiovascular Health Study; DBP, diastolic blood pressure; MET-hr, metabolic equivalent hour (kcal expended per kg body weight); SBP, systolic blood pressure.

^a Under the AHA (1) and ACS (2), minimum recommended physical activity considered as ideal health is ≥ 150 minutes/week moderate-intensity physical activity (3.5 METs), which translates to 8.75 MET-hr/week.

^b We created an ACS diet sub-score ranging from 0-9. First, one point was given for consuming 2.5 or more cups of fruits and vegetables/day, excluding juice and potatoes. We then created a fruit and vegetable variety score by summing the number of unique fruits and vegetables consumed at least once per month. Two points and one point were assigned to those in the highest and middle tertiles of variety, respectively. For red and processed meats, quartiles of servings per day were assigned values from 0 (highest quartile) to 3 (lowest quartile). Proportion of whole grains was calculated by dividing servings/day of whole grains (dark bread, high fiber cereals, cooked cereals) by servings per day of refined grains (all other grain products on the questionnaire). Scores of 0-3 were assigned over quartiles of whole grain fraction.

^c AHA diet components include limiting intake of sodium (< 1500mg/day) and sugar-sweetened beverages (< 36oz/week), while maintaining a diet rich in fruits and vegetables (≥ 4.5 cups/day), fish (≥ 2 – 3.5oz servings/week), and whole grains (≥ 3 – 1oz servings/day). Concordance with 4 out of these 5 criteria are recommended for ideal cardiovascular health.

^d While ACS guidelines do not set targets for smoking behavior, we incorporated smoking status into the definition of concordance with ACS recommendations since this organization unequivocally supports smoking cessation.

^e Individuals treated with drugs for dyslipidemia, hypertension and diabetes were not considered to have ideal risk factor status regardless of their achieved level of FPG, BP or TC. These individuals were assigned to either intermediate or poor risk factor status categories depending on whether or not treatment targets were achieved.

Web Table 2. Concordance with ACS/AHA prevention guidelines and subsequent incidence of cancer and cardiovascular disease (n=3,491)

Prevention guideline concordance	Cancer Incidence			CVD Incidence		
	Cases	Adjusted HR (95% CI) ^a	P-trend ^a	Cases	Adjusted HR (95% CI) ^a	P-trend ^a
ACS metrics						
ACS Body weight = Poor (0)	152	1.00 (Referent)	0.4137	430	1.00 (Referent)	<0.0001
Intermediate (1)	370	0.90 (0.75, 1.10)		973	0.89 (0.79, 1.00)	
Ideal (2)	237	0.91 (0.73, 1.12)		575	0.73 (0.64, 0.83)	
Drinking = Poor (0)	97	1.00 (Referent)	0.0099	207	1.00 (Referent)	0.0640
Intermediate (1)	346	1.02 (0.81, 1.29)		766	1.02 (0.87, 1.19)	
Ideal (2)	316	0.80 (0.63, 1.02)		1005	1.12 (0.96, 1.31)	
ACS Diet score = Poor (0)	120	1.00 (Referent)	0.7997	292	1.00 (Referent)	0.2070
Intermediate (1)	483	1.01 (0.82, 1.23)		1250	0.94 (0.82, 1.07)	
Ideal (2)	156	0.97 (0.76, 1.25)		436	0.90 (0.77, 1.05)	
Shared metrics^b						
Smoking = Poor (0)	125	1.00 (Referent)	<.0001	235	1.00 (Referent)	0.0206
Intermediate (1)	20	1.40 (0.87, 2.25)		27	0.75 (0.50, 1.12)	
Ideal (2)	614	0.64 (0.52, 0.78)		1716	0.84 (0.73, 0.97)	
PA = Poor (0)	55	1.00 (Referent)	0.0627	164	1.00 (Referent)	0.0002
Intermediate (1)	191	0.95 (0.70, 1.28)		497	0.88 (0.73, 1.05)	
Ideal (2)	513	0.83 (0.62, 1.10)		1317	0.76 (0.65, 0.90)	
AHA metrics						
AHA Diet score = Poor (0)	229	1.00 (Referent)	0.0592	495	1.00 (Referent)	0.5141
Intermediate (1)	477	0.86 (0.73, 1.01)		1340	1.13 (1.01, 1.25)	
Ideal (2)	53	0.82 (0.60, 1.11)		143	0.94 (0.78, 1.14)	
AHA Body weight = Poor (0)	149	1.00 (Referent)	0.3070	399	1.00 (Referent)	0.0009
Intermediate (1)	326	0.85 (0.70, 1.03)		870	0.93 (0.83, 1.05)	
Ideal (2)	284	0.87 (0.71, 1.07)		709	0.82 (0.72, 0.93)	
FPG = Poor (0)	87	1.00 (Referent)	0.6150	301	1.00 (Referent)	<0.0001
Intermediate (1)	342	1.08 (0.85, 1.38)		831	0.62 (0.55, 0.71)	
Ideal (2)	330	1.00 (0.78, 1.27)		846	0.55 (0.48, 0.64)	
BP = Poor (0)	294	1.00 (Referent)	0.6825	912	1.00 (Referent)	<0.0001
Intermediate (1)	335	0.99 (0.85, 1.16)		806	0.72 (0.65, 0.79)	
Ideal (2)	130	0.95 (0.77, 1.18)		260	0.54 (0.47, 0.62)	
TC = Poor (0)	145	1.00 (Referent)	0.4291	439	1.00 (Referent)	0.4713
Intermediate (1)	306	1.11 (0.91, 1.35)		778	0.93 (0.83, 1.05)	
Ideal (2)	308	1.10 (0.90, 1.35)		761	0.95 (0.84, 1.07)	

ACS, American Cancer Society; AHA, American Heart Association; BP, blood pressure; CI, confidence interval; CVD, cardiovascular disease; FPG, fasting plasma glucose; HR, hazard ratio; PA, physical activity; TC, serum total cholesterol

^a Adjusted for age (continuous), self-rated health (continuous), detailed smoking history (except models of smoking main effect), race/ethnicity, income, education, gender, and marital status; models of CVD incidence were additionally adjusted for non-steroidal anti-inflammatory drug use and limitations in instrumental activities of daily living

^b Scores for smoking and physical activity were computed using identical criteria for both AHA and ACS guidelines

Web Table 3. Concordance with ACS/AHA individual prevention metrics and subsequent cause-specific and overall mortality (n=3,491)

Prevention guideline concordance	Cancer Mortality			CV-Specific Mortality			All-Cause Mortality		
	Cases	Adjusted HR (95% CI) ^a	P-trend ^a	Cases	Adjusted HR (95% CI) ^a	P-trend ^a	Cases	Adjusted HR (95% CI) ^a	P-trend ^a
ACS metrics									
Body weight = Poor (0)	115	1.00 (Referent)	0.1662	219	1.00 (Referent)	0.0009	543	1.00 (Referent)	0.0856
Intermediate (1)	291	0.94 (0.76, 1.18)		440	0.77 (0.65, 0.91)		1278	0.89 (0.80, 0.99)	
Ideal (2)	174	0.85 (0.67, 1.08)		275	0.72 (0.60, 0.87)		869	0.89 (0.80, 1.00)	
Drinking = Poor (0)	72	1.00 (Referent)	0.3421	84	1.00 (Referent)	0.0107	286	1.00 (Referent)	0.1073
Intermediate (1)	254	1.03 (0.79, 1.34)		350	1.09 (0.86, 1.39)		1056	1.00 (0.88, 1.14)	
Ideal (2)	254	0.92 (0.70, 1.21)		500	1.28 (1.01, 1.63)		1348	1.08 (0.94, 1.23)	
Diet score = Poor (0)	106	1.00 (Referent)	0.0254	142	1.00 (Referent)	0.1048	431	1.00 (Referent)	<0.0001
Intermediate (1)	362	0.81 (0.65, 1.02)		603	0.96 (0.80, 1.15)		1716	0.87 (0.78, 0.97)	
Ideal (2)	112	0.72 (0.54, 0.96)		189	0.84 (0.67, 1.05)		543	0.75 (0.66, 0.86)	
Shared metrics^b									
Smoking = Poor (0)	113	1.00 (Referent)	<0.0001	121	1.00 (Referent)	<0.0001	377	1.00 (Referent)	<0.0001
Intermediate (1)	15	0.99 (0.58, 1.70)		15	0.86 (0.50, 1.47)		42	0.76 (0.55, 1.04)	
Ideal (2)	452	0.46 (0.37, 0.57)		798	0.64 (0.52, 0.77)		2271	0.57 (0.51, 0.64)	
PA = Poor (0)	43	1.00 (Referent)	0.0108	82	1.00 (Referent)	0.0244	221	1.00 (Referent)	<0.0001
Intermediate (1)	154	0.95 (0.67, 1.33)		226	0.83 (0.64, 1.07)		676	0.91 (0.78, 1.06)	
Ideal (2)	383	0.76 (0.55, 1.04)		626	0.76 (0.60, 0.96)		1793	0.79 (0.68, 0.91)	
AHA metrics									
Diet score = Poor (0)	187	1.00 (Referent)	0.1267	223	1.00 (Referent)	0.2473	713	1.00 (Referent)	0.9173
Intermediate (1)	342	0.78 (0.65, 0.93)		653	1.26 (1.08, 1.48)		1782	1.05 (0.96, 1.15)	
Ideal (2)	51	0.97 (0.71, 1.33)		58	0.92 (0.68, 1.23)		195	0.92 (0.78, 1.08)	
Body weight = Poor (0)	114	1.00 (Referent)	0.2250	188	1.00 (Referent)	0.2559	500	1.00 (Referent)	0.6588
Intermediate (1)	255	0.90 (0.72, 1.13)		397	0.87 (0.73, 1.04)		1121	0.92 (0.82, 1.02)	
Ideal (2)	211	0.86 (0.68, 1.09)		349	0.88 (0.73, 1.06)		1069	0.99 (0.89, 1.11)	
FPG = Poor (0)	70	1.00 (Referent)	0.2918	167	1.00 (Referent)	<0.0001	382	1.00 (Referent)	<0.0001
Intermediate (1)	253	0.88 (0.67, 1.15)		373	0.51 (0.42, 0.61)		1095	0.64 (0.56, 0.72)	
Ideal (2)	257	0.85 (0.65, 1.11)		394	0.51 (0.42, 0.61)		1213	0.66 (0.58, 0.74)	
BP = Poor (0)	225	1.00 (Referent)	0.6280	475	1.00 (Referent)	<0.0001	1175	1.00 (Referent)	<0.0001
Intermediate (1)	245	0.91 (0.75, 1.09)		354	0.67 (0.58, 0.77)		1120	0.84 (0.77, 0.91)	
Ideal (2)	110	0.97 (0.77, 1.23)		105	0.49 (0.40, 0.61)		395	0.72 (0.64, 0.81)	
TC = Poor (0)	122	1.00 (Referent)	0.7717	185	1.00 (Referent)	0.0364	571	1.00 (Referent)	0.0271
Intermediate (1)	226	0.98 (0.78, 1.22)		364	1.08 (0.90, 1.29)		1035	1.00 (0.90, 1.10)	
Ideal (2)	232	1.03 (0.81, 1.29)		385	1.21 (1.00, 1.45)		1084	1.11 (1.00, 1.24)	

Abbreviations: ACS, American Cancer Society; AHA, American Heart Association; BP, blood pressure; CI, confidence interval; CV, cardiovascular; FPG, fasting plasma glucose; HR, hazard ratio; PA, physical activity; TC, serum total cholesterol

^a Adjusted for age (continuous), self-rated health (continuous), detailed smoking history (except models of smoking main effect), race/ethnicity, income, education, gender, and marital status; models of CV-specific and all-cause mortality were additionally adjusted for non-steroidal anti-inflammatory drug use and limitations in instrumental activities of daily living

^b Scores for smoking and physical activity were computed using identical criteria for both AHA and ACS guidelines

Web Table 4. Numbers of CHS participants achieving different levels of modified ACS health behavior, by number of ideal cardiometabolic risk factors in the AHA guidelines (n=3,491)

	Number of AHA cardiometabolic risk factor targets met (FPG, BMI, BP, TC)			
	0	1	2	3-4
Concordance with ACS health behavior guidelines	n	n	n	n
ACS behaviors sum (without smoking included) ^a				
0-4	72	100	62	38
5-6	437	675	547	286
7-8	247	441	364	222
ACS behaviors sum (with smoking included) ^b				
0-4	120	182	162	104
5-6	409	630	483	244
7-8	227	404	328	198

ACS, American Cancer Society; AHA, American Heart Association; BMI, body mass index; BP, blood pressure; CHS, Cardiovascular Health Study; FPG, fasting plasma glucose; TC, total cholesterol

^a ACS behaviors score is the sum of ACS sub-scores for alcohol consumption, physical activity, and diet

^b Smoking added to behaviors score in sensitivity analyses

Web Table 5. ACS health behaviors score modified to include smoking as predictor of all-cause mortality and incident CVD, by number of ideal cardiometabolic risk factors (n=3,491)

Concordance with ACS health behavior guidelines	No. of AHA cardiometabolic risk factor targets met (FPG, BMI, BP, TC)				P-for-interaction	Overall HR (95% CI) ^b
	0	1	2	3-4		
<u>All-cause mortality</u>					0.27	
ACS behaviors sum^a						
0-4	1.56 (1.21, 2.02)	1.49 (1.19, 1.88)	1.61 (1.27, 2.04)	2.05 (1.58, 2.67)		1.46 (1.31, 1.62)
5-6	1.03 (0.84, 1.26)	1.06 (0.88, 1.28)	1.26 (1.04, 1.52)	1.14 (0.91, 1.41)		1.18 (1.08, 1.28)
7-8	1.06 (0.85, 1.33)	0.87 (0.71, 1.07)	0.95 (0.77, 1.17)	1		1
P-continuous ^c	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001
<u>Incident CVD</u>					0.34	
ACS behaviors sum^a						
0-4	1.75 (1.30, 2.36)	1.37 (1.04, 1.80)	1.15 (0.86, 1.55)	1.33 (0.95, 1.86)		1.28 (1.12, 1.47)
5-6	1.27 (1.00, 1.60)	1.16 (0.93, 1.45)	1.10 (0.87, 1.38)	0.90 (0.68, 1.17)		1.05 (0.95, 1.16)
7-8	1.14 (0.87, 1.47)	1.15 (0.91, 1.45)	0.97 (0.76, 1.24)	1		1
P-continuous ^c	<0.001	0.004	<0.001	0.005		0.0002

ACS, American Cancer Society; AHA, American Heart Association; BMI, body mass index; BP, blood pressure; CHS, Cardiovascular Health Study; FPG, fasting plasma glucose; TC, total cholesterol

^a ACS behaviors sum is the sum of ACS sub-scores for alcohol consumption, physical activity, smoking, and diet

^b Hazard ratios derived from Cox proportional hazards models with predictors for ACS behaviors sum, the number of AHA cardiometabolic risk factor targets met, and the interaction between them, while adjusting for age, self-rated health, race/ethnicity, income, education, gender, marital status, limitations in instrumental activities of daily living, and use of non-steroidal anti-inflammatory drugs, antihypertensive drugs, oral hypoglycemic agents, insulin, and lipid-lowering drugs.

^c P-values for ACS behaviors sum effect estimates within strata of number of AHA cardiometabolic risk factor targets met were derived from interaction models in which the ACS behaviors sum was treated as a continuous measure.

Web References

1. Lloyd-Jones DM, Hong Y, Labarthe D, et al. Defining and setting national goals for cardiovascular health promotion and disease reduction: The American Heart Association's strategic impact goal through 2020 and beyond. *Circulation*. 2010;121(4):586–613.
2. Kushi LH, Doyle C, McCullough M, et al. American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Prevention Reducing the Risk of Cancer With Healthy Food Choices and Physical Activity. *CA. Cancer J. Clin.* 2012;62(1):30–67.