

Supplemental Appendix:

Coffee, tea, caffeine, and other dietary information

Of note, a coding error led to data being unavailable on the intake of 14 foods (fruit juice, dark/white grains, fruit, salty snacks, other vegetables, leafy green vegetables, yogurt, potato, red meat, high fat and processed meat, high-fat dairy, desserts, cottage cheese and legumes) for approximately 25% of MESA participants. As the majority of these participants were from two MESA field centers, the data may not be missing at random. To avoid bias in the sample, these 14 nutritional variables for this portion of MESA participants only, imputation was conducted using sequential chained regression implemented specifying multinomial or ordinal regression, with one model for all 14 items. In all cases, the imputation model accounted for basic demographics. The subsequent imputed dataset was used for this analysis, and has been approved by the MESA Steering Committee.

Computed Tomography

Details of the MESA methods for computed tomography scanning and interpretation have been described previously.¹⁶ Briefly, the protocol involved the acquisition of two computed tomography scans at each center with either a cardiac-gated electron-beam computed tomography scanner (Chicago, Los Angeles, New York) or multidetector computed tomography system (Baltimore, Forsyth County, St Paul). Images were read at a central reading center by either a radiologist or cardiologist who

was blinded to participant information. The Agatston method¹⁷ was used to determine coronary artery calcium scores with the mean of the two scans used for analyses. Repeat coronary artery calcium scans occurred from 2002-2004 during Exam 2 (n=2914), from 2004-2006 during Exam 3 (n=2925), from 2005-2007 during Exam 4 (n=1349), and from 2010-2012 during Exam 5 (n=3304). Participants not scanned before the proceeding exam were prioritized for the next exam.

Covariates

Cardiovascular risk factors of interest included systolic and diastolic blood pressure, use of antihypertensive medications, lipid-lowering medication, anti-diabetic medication, body mass index, smoking (never, former, current), family history of cardiovascular disease, diabetes mellitus, high-density lipoprotein cholesterol, total cholesterol, and triglycerides. Medical history, medications, anthropomorphic, demographic data, and physical examination were completed on Exam 1.¹³ Family history of coronary heart disease was obtained during Exam 2. Diabetes mellitus was defined as a fasting glucose level ≥ 126 mg/dL or treatment for diabetes medications.

After a 12-hour fast, lipid measurements were taken at baseline and performed at the Collaborative Studies Clinical Laboratory at Fairview-University Medical Center (Minneapolis, MN). The inflammatory biomarkers examined included C-reactive protein and fibrinogen, which were collected with fasting blood, processed, and stored at the Laboratory for Clinical Biochemistry Research, University of Vermont (Burlington, VT).

Education level included less than high school, high school or equivalent, and college/graduate/professional school. Data on physical activity was obtained from the MESA Typical Week Physical Activity Survey and described previously.¹⁸

Supplemental Table 1. Sensitivity analysis: Association between tea, prospective coronary artery calcium ratio and incident cardiovascular events among non-Chinese-American participants.

Coronary Artery Calcium Progression Ratio*			
	None	<1 cup	≥ 1 cups
N people / n visits	3331/8395	1549/4020	519/1336
Model 1	1.00	0.90 (0.79, 1.03)	0.68 (0.56, 0.83)
Model 2	1.00	0.94 (0.82, 1.08)	0.71 (0.57, 0.87)
Model 3	1.00	0.96 (0.84, 1.10)	0.73 (0.59, 0.89)
Model 4	1.00	0.95 (0.84, 1.09)	0.73 (0.59, 0.89)
Hazard Ratio for Cardiovascular Event†			
N event/n total	438 / 3327	166 / 1548	47 / 519
IR per 1000 py	8.9	6.4	4.9
Model 1	1.00	0.87 (0.73, 1.05)	0.67 (0.50, 0.91)
Model 2	1.00	0.90 (0.75, 1.10)	0.71 (0.51, 0.99)
Model 3	1.00	0.91 (0.75, 1.10)	0.76 (0.55, 1.06)
Model 4	1.00	0.91 (0.75, 1.10)	0.76 (0.55, 1.06)

*Coronary artery calcium ratio derived from mixed effect regression models using

$\log_e(\text{calcium}+1)$ as the outcome

† Hazard ratio derived from Cox regression models

Model 1: age, sex, race/ethnicity, education, and number of follow-up years.

Model 2: model 1 + smoking (never, former, current), physical activity, total fat, alcohol consumption, fruits quartiles, vegetables quartiles, red meat quartiles

Model 3: model 2 + systolic and diastolic blood pressures, use of antihypertensive medications, lipid-lowering medication, anti-diabetic medication, body mass index, family history of coronary heart disease, diabetes, high-density lipoprotein cholesterol, total cholesterol, triglyceride

Model 4: model 3 + C-reactive protein, and fibrinogen

Supplemental Table 2. Prospective: Coronary artery calcium ratio (95% CIs)* by categories of coffee and tea consumption among **non-smokers (n = 3,294)**

Daily coffee consumption			
Log (CAC+1 score)	None	<1 cup	≥ 1 cup
N people / n visits	1002/2523	823/2138	1339/3463
Model 1	1.00	1.20 (0.99, 1.45)	1.10 (0.92, 1.31)
Model 2	1.00	1.19 (0.98, 1.45)	1.07 (0.89, 1.29)
Model 3	1.00	1.20 (0.99, 1.45)	1.06 (0.89, 1.27)
Model 4	1.00	1.21 (1.00, 1.47)	1.06 (0.89, 1.27)
Daily tea consumption			
Log (CAC+1 score)	None	<1 cup	≥ 1 cup
N people / n visits	1723/4371	976/2574	458/1158
Model 1	1.00	1.05 (0.89, 1.24)	0.80 (0.64, 1.00)
Model 2	1.00	1.07 (0.90, 1.27)	0.80 (0.63, 1.01)
Model 3	1.00	1.07 (0.90, 1.27)	0.79 (0.63, 0.99)
Model 4	1.00	1.06 (0.90, 1.26)	0.78 (0.62, 0.98)
Caffeine consumption (mg/day)			
Log (CAC+1 score)	1st Tertile (<55)	2nd Tertile (55-<167)	3rd Tertile (167-1354)
N people / n visits	1336/3383	1116/2870	842/2207
Model 1	1.00	1.13 (0.95, 1.33)	0.91 (0.76, 1.10)
Model 2	1.00	1.09 (0.91, 1.30)	0.89 (0.72, 1.08)
Model 3	1.00	1.05 (0.88, 1.25)	0.85 (0.70, 1.04)
Model 4	1.00	1.02 (0.85, 1.22)	0.84 (0.69, 1.03)

*Derived from mixed effect regression models using $\log_e(\text{CAC}+1)$ as the outcome

Model 1: age, sex, race/ethnicity, education, and number of follow-up years.

Model 2: model 1 + smoking (never, former, current), physical activity, total fat, alcohol consumption, fruits quartiles, vegetables quartiles, red meat quartiles

Model 3: model 2 + systolic and diastolic blood pressures, use of antihypertensive medications, lipid-lowering medication, anti-diabetic medication, body mass index, family history of coronary heart disease, diabetes, high-density lipoprotein cholesterol, total cholesterol, triglyceride

Model 4: model 3 + C-reactive protein, and fibrinogen

Supplemental Table 3. Prospective: Coronary artery calcium ratio (95% CIs)* by categories of coffee and tea consumption among **former smokers (n = 2,389)**

Daily coffee consumption			
Log (CAC+1 score)	None	<1 cup	1 cup
N people / n visits	429/1077	513/1309	1324/3384
Model 1	1.00	0.99 (0.75, 1.32)	1.13 (0.88, 1.45)
Model 2	1.00	1.02 (0.76, 1.36)	1.08 (0.83, 1.40)
Model 3	1.00	0.96 (0.72, 1.27)	1.10 (0.86, 1.42)
Model 4	1.00	0.96 (0.72, 1.27)	1.10 (0.86, 1.42)
Daily tea consumption			
Log (CAC+1 score)	None	<1 cup	1 cup
N people / n visits	1323/3334	670/1735	266/679
Model 1	1.00	0.87 (0.70, 1.08)	0.66 (0.49, 0.90)
Model 2	1.00	0.88 (0.70, 1.09)	0.71 (0.51, 0.98)
Model 3	1.00	0.89 (0.72, 1.10)	0.75 (0.55, 1.03)
Model 4	1.00	0.89 (0.72, 1.10)	0.76 (0.55, 1.04)
Caffeine consumption (mg/day)			
Log (CAC+1 score)	1st Tertile (<55)	2nd Tertile (55-<167)	3rd Tertile (167-1354)
N people / n visits	656/1634	795/2005	938/2442
Model 1	1.00	0.79 (0.63, 0.99)	1.04 (0.83, 1.32)
Model 2	1.00	0.71 (0.55, 0.91)	0.96 (0.74, 1.23)
Model 3	1.00	0.73 (0.57, 0.93)	0.97 (0.76, 1.24)
Model 4	1.00	0.73 (0.58, 0.94)	0.97 (0.76, 1.24)

*Derived from mixed effect regression models using $\log_e(\text{CAC}+1)$ as the outcome

Model 1: age, sex, race/ethnicity, education, and number of follow-up years.

Model 2: model 1 + smoking (never, former, current), physical activity, total fat, alcohol consumption, fruits quartiles, vegetables quartiles, red meat quartiles

Model 3: model 2 + systolic and diastolic blood pressures, use of antihypertensive medications, lipid-lowering medication, anti-diabetic medication, body mass index, family history of coronary heart disease, diabetes, high-density lipoprotein cholesterol, total cholesterol, triglyceride

Model 4: model 3 + C-reactive protein, and fibrinogen

Supplemental Table 4. Prospective: Coronary artery calcium ratio (95% CIs)* by categories of coffee and tea consumption among **current smokers (n = 818)**

Daily coffee consumption			
Log (CAC+1 score)	None	<1 cup	≥1 cup
N people / n visits	122/311	154/360	493/1212
Model 1	1.00	1.02 (0.60, 1.71)	0.86 (0.55, 1.35)
Model 2	1.00	1.12 (0.65, 1.94)	0.95 (0.59, 1.51)
Model 3	1.00	1.02 (0.60, 1.75)	0.88 (0.55, 1.40)
Model 4	1.00	1.01 (0.59, 1.73)	0.91 (0.57, 1.44)
Daily tea consumption			
Log (CAC+1 score)	None	<1 cup	≥1 cup
N people / n visits	513/1252	178/432	74/189
Model 1	1.00	0.73 (0.50, 1.08)	0.78 (0.43, 1.40)
Model 2	1.00	0.77 (0.52, 1.14)	0.83 (0.45, 1.54)
Model 3	1.00	0.81 (0.55, 1.19)	0.84 (0.46, 1.54)
Model 4	1.00	0.80 (0.54, 1.17)	0.78 (0.43, 1.41)
Caffeine consumption (mg/day)			
Log (CAC+1 score)	1st Tertile (<55)	2nd Tertile (55-<167)	3rd Tertile (167-1354)
N people / n visits	179/458	253/583	386/968
Model 1	1.00	0.92 (0.60, 1.40)	0.81 (0.54, 1.21)
Model 2	1.00	0.87 (0.56, 1.38)	0.79 (0.51, 1.25)
Model 3	1.00	0.82 (0.52, 1.28)	0.75 (0.48, 1.18)
Model 4	1.00	0.82 (0.52, 1.27)	0.76 (0.49, 1.20)

*Derived from mixed effect regression models using $\log_e(\text{CAC}+1)$ as the outcome

Model 1: age, sex, race/ethnicity, education, and number of follow-up years.

Model 2: model 1 + smoking (never, former, current), physical activity, total fat, alcohol consumption, fruits quartiles, vegetables quartiles, red meat quartiles

Model 3: model 2 + systolic and diastolic blood pressures, use of antihypertensive medications, lipid-lowering medication, anti-diabetic medication, body mass index, family history of coronary heart disease, diabetes, high-density lipoprotein cholesterol, total cholesterol, triglyceride

Model 4: model 3 + C-reactive protein, and fibrinogen

Supplemental Table 5. Prospective: Coronary artery calcium ratio (95% CIs)* by categories of coffee and tea consumption among **female (n=3,425)**

Daily coffee consumption			
Log (CAC+1 score)	None	<1 cup	1 cup
N people / n visits	853/2137	793/2040	1632/4117
Model 1	1.00	1.18 (0.97, 1.43)	1.21 (0.99, 1.48)
Model 2	1.00	1.14 (0.94, 1.39)	1.10 (0.90, 1.35)
Model 3	1.00	1.13 (0.93, 1.37)	1.13 (0.92, 1.38)
Model 4	1.00	1.13 (0.93, 1.37)	1.11 (0.91, 1.36)
Daily tea consumption			
Log (CAC+1 score)	None	<1 cup	1 cup
N people / n visits	1778/4408	1046/2740	447/1126
Model 1	1.00	1.02 (0.87, 1.19)	0.90 (0.69, 1.18)
Model 2	1.00	1.07 (0.92, 1.26)	0.97 (0.73, 1.28)
Model 3	1.00	1.08 (0.93, 1.27)	0.98 (0.74, 1.28)
Model 4	1.00	1.08 (0.92, 1.26)	0.98 (0.75, 1.29)
Caffeine consumption (mg/day)			
Log (CAC+1 score)	1st Tertile (<55)	2nd Tertile (55-<167)	3rd Tertile (167-1354)
N people / n visits	1207/3061	1169/2932	1049/2683
Model 1	1.00	1.01 (0.82, 1.24)	1.16 (0.94, 1.43)
Model 2	1.00	1.01 (0.81, 1.26)	1.12 (0.90, 1.41)
Model 3	1.00	0.96 (0.77, 1.19)	1.10 (0.88, 1.37)
Model 4	1.00	0.96 (0.78, 1.20)	1.10 (0.88, 1.37)

*Derived from mixed effect regression models using $\log_e(\text{CAC}+1)$ as the outcome

Model 1: age, sex, race/ethnicity, education, and number of follow-up years.

Model 2: model 1 + smoking (never, former, current), physical activity, total fat, alcohol consumption, fruits quartiles, vegetables quartiles, red meat quartiles

Model 3: model 2 + systolic and diastolic blood pressures, use of antihypertensive medications, lipid-lowering medication, anti-diabetic medication, body mass index, family history of coronary heart disease, diabetes, high-density lipoprotein cholesterol, total cholesterol, triglyceride

Model 4: model 3 + C-reactive protein, and fibrinogen

Supplemental Table 6. Prospective: Coronary artery calcium ratio (95% CIs)* by categories of coffee and tea consumption among **males (n=3,083)**

Daily coffee consumption			
Log (CAC+1 score)	None	<1 cup	≥ 1 cup
N people / n visits	701/1776	699/1771	1527/3947
Model 1	1.00	1.10 (0.86, 1.40)	1.01 (0.78, 1.31)
Model 2	1.00	1.13 (0.88, 1.45)	1.01 (0.78, 1.32)
Model 3	1.00	1.07 (0.84, 1.37)	0.98 (0.76, 1.28)
Model 4	1.00	1.07 (0.84, 1.37)	0.99 (0.76, 1.28)
Daily tea consumption			
Log (CAC+1 score)	None	<1 cup	≥ 1 cup
N people / n visits	1784/4555	779/2003	353/903
Model 1	1.00	0.84 (0.69, 1.03)	0.68 (0.47, 0.98)
Model 2	1.00	0.87 (0.71, 1.07)	0.65 (0.44, 0.95)
Model 3	1.00	0.90 (0.74, 1.10)	0.67 (0.46, 0.98)
Model 4	1.00	0.89 (0.72, 1.09)	0.65 (0.45, 0.95)
Caffeine consumption (mg/day)			
Log (CAC+1 score)	1st Tertile (<55)	2nd Tertile (55-<167)	3rd Tertile (167-1354)
N people / n visits	967/2420	996/2528	1120/2939
Model 1	1.00	0.90 (0.69, 1.17)	0.90 (0.69, 1.17)
Model 2	1.00	0.93 (0.69, 1.24)	0.87 (0.65, 1.16)
Model 3	1.00	0.89 (0.67, 1.17)	0.81 (0.61, 1.07)
Model 4	1.00	0.86 (0.65, 1.15)	0.80 (0.60, 1.06)

*Derived from mixed effect regression models using $\log_e(\text{CAC}+1)$ as the outcome

Model 1: age, sex, race/ethnicity, education, and number of follow-up years.

Model 2: model 1 + smoking (never, former, current), physical activity, total fat, alcohol consumption, fruits quartiles, vegetables quartiles, red meat quartiles

Model 3: model 2 + systolic and diastolic blood pressures, use of antihypertensive medications, lipid-lowering medication, anti-diabetic medication, body mass index, family history of coronary heart disease, diabetes, high-density lipoprotein cholesterol, total cholesterol, triglyceride

Model 4: model 3 + C-reactive protein, and fibrinogen

Supplemental Table 7. Hazard ratios between coffee and incident “hard” cardiovascular event

Coffee	None	<1 cup	≥ 1 cups
N event/n total	102 / 1552	140 / 1492	266 / 3156
IR per 1000 py	6.0	8.7	7.7
Model 1	1.00	1.40 (1.08, 1.81)	1.11 (0.88, 1.41)
Model 2	1.00	1.36 (1.04, 1.78)	0.98 (0.76, 1.27)
Model 3	1.00	1.36 (1.03, 1.78)	0.99 (0.76, 1.27)
Model 4	1.00	1.36 (1.04, 1.79)	1.00 (0.77, 1.29)
Tea			
	None	<1 cup	≥ 1 cup
N event/n total	338 / 3558	130 / 1824	42 / 800
IR per 1000 py	8.9	6.4	4.9
Model 1	1.00	0.85 (0.69, 1.04)	0.61 (0.43, 0.84)
Model 2	1.00	0.89 (0.72, 1.11)	0.61 (0.43, 0.88)
Model 3	1.00	0.91 (0.73, 1.13)	0.64 (0.45, 0.92)
Model 4	1.00	0.89 (0.72, 1.11)	0.63 (0.44, 0.90)
Caffeine			
	1st Tertile (<55)	2nd Tertile (55-<167)	3rd Tertile (167-1354)
N event/n total	164 / 2172	208 / 2165	161 / 2166
IR per 1000 py	6.9	7.9	8.7
Model 1	1.00	1.19 (0.96, 1.46)	0.99 (0.79, 1.25)
Model 2	1.00	1.10 (0.88, 1.38)	0.82 (0.64, 1.06)
Model 3	1.00	1.09 (0.87, 1.36)	0.81 (0.63, 1.05)
Model 4	1.00	1.08 (0.86, 1.35)	0.81 (0.62, 1.05)

Model 1: age, sex, race/ethnicity, and education.

Model 2: model 1 + smoking (never, former, current), physical activity, total fat, alcohol consumption, fruits quartiles, vegetables quartiles, red meat quartiles

Model 3: model 2 + systolic and diastolic blood pressures, use of antihypertensive medications, lipid-lowering medication, anti-diabetic medication, body mass index, family history of coronary heart disease, diabetes, high-density lipoprotein cholesterol, total cholesterol, triglyceride

Model 4: model 3 + C-reactive protein, and fibrinogen