Supplemental Material

Circulating biomarkers of dairy fat and risk of incident diabetes mellitus among US men and women in two large prospective cohorts

Table S1. Fatty acids measured by gas-liquid chromatography and methodology to compute their relative concentrations.*

	Code	Carbon Name	Systematic Name	Trivial Name
Saturated	Sa	8:0	Octanoic Acid	
	Sb	10:0	Decanoic Acid	
	S1	12:0	Dodecanoic Acid	Lauric Acid, Laurosteanic Acid
	Sc	13:0	Tridecanoic Acid	
	S2	14:0	Tetradecanoic Acid	Myristic Acid
	S3	15:0	Pentadecanoic Acid	
	S4	16:0	Hexadecanoic Acid	Palmitic Acid, Aethalic Acid
	S5	17:0	Heptadecanoic Acid	Margaric Acid, Daturinic Acid
	S6	18:0	Octadecanoic Acid	Stearic Acid
	S7	19:0	Nonadecanoic Acid	
	S8	20:0	Eicosanoic Acid	Arachidic Acid, Icosanoic Acid, Arachic Acid
	S9	21:0	Heneicosanoic Acid	
	S10	22:0	Docosanoic Acid	Behenic Acid
	S11	23:0	Tricosanoic Acid	
	S12	24:0	Tetracosanoic Acid	Lignoceric Acid
Monounsaturated	M1	14:1n-5c	9c-Tetradecenoic Acid	Mysristoleic Acid
	M2	15:1n-5c	10c-Pentadecenoic Acid	from 14:1n-5
	M3	16:1n-7c	9c-Hexadecenoic Acid	Palmitoleic Acid, Zoomaric Acid, Physetoleic Acid
	M4	17:1n-7c	10c-Heptadecenoic Acid	from 16:1n-7
	M5	18:1n-12c	6c-Octadecenoic Acid	Petroselinic Acid
	M6	18:1n-9c	9c-Octadecenoic Acid	Oleic Acid, Rapinic Acid
	M7	18:1n-7c	11c-Octadecenoic Acid	
	M8	19:1n-9c	10c-Nonadecenoic Acid	from 18:1n-9
	M9	20:1n-12c	8c-Eicosenoic Acid	from 18:1(n-12)

	Code	Carbon Name	Systematic Name	Trivial Name
	M10	20:1n-9c	11c-Eicosenoic Acid	Gondoic Acid
	M11	20:1n-7	13ct-Eicosenoic	from 16:1n-7
	M12	24:1n-9c	15c-Tetrasenoic Acid	Nervonic Acid, Selacholeic Acid
Polyunsaturated- Omega-3	P3	18:3n-3c	9c,12c,15c-Octadecatrienoic Acid	Alpha-linolenic Acid
	P7	20:3n-3c	11c,14c,17c-Eicosatrienoic Acid	from 18:3(n-3)
	P10	20:5n-3c	5c,8c,11c,14c17c-Eicosapentaenoic Acid	EPA, Timnodonic Acid
	P11	22:3n-3c	13c,16c19c-Docosantrienoic Acid	
	P13	22:5n-3c	7c,10c,13c,16c,19c-Docosapentaenoic Acid	DPA
	P14	22:6n-3c	4c,7c,10c,13c,16c,19c-Docosahexaenoic Acid	DHA, Cervanic Aicd
Polyunsaturated- Omega-6	P1	18:2n-6cc	9c,12c-Octadecadienoic Acid	Linoleic Acid, Leinlic Acid, Telfairic Acid, Linolic Acid
	P2	18:3n-6c	6c,9c,12c-Octadecatrienoic Acid	Gamma-linolenic Acid, Gamolenic Acid
	P5	20:2n-6c	11c,14c-Eicosadienoic Acid	
	P6	20:3n-6c	8c,11c,14c-Eicosatrienoic Acid	Dihomogammalinolenic Acid
	P8	20:4n-6c	5c,8c,111c,14c-Eicosatetraenoic Acid	Arachidonic Acid
	P9	22:2n-6c	13c,16c-Docosadienoic Acid	from 20:2(n-6)
	P12	22:4n-6c	7c,10c,13c,16c-Docosatetraynoic Acid	Aolrenic Acid
Trans	T1	14:1n-5t	9t-Tetadecenoic Acid	Myristelaidic Acid
	T2	16:1n-7t	9t-Hexadecenoic Acid	Palmitelaidic Acid
	T3	18:1n-12t	6t-Octadecenoic Acid	Petroselaidic Acid, Tarelaidinic Acid
	T4	18:1n-9t	9t-Octadecenoic Acid	Elaidic Acid
	T5	18:1n-7t	11t-Octadecenoic Acid	Vaccenic Acid
	T6	18:2n-6t	9t,12t-Octadecadienoic Acid	Linolelaidic Acid
	T7	18:2n-6ct	9c,12t-Octadecadienoic Acid	
	T8	18:2n-6tc	9t,12c-Octadecadienoic Acid	
	T9	18:3n-3t	9t,12t,15t-Octadecatrienoic Acid	from 18:3(n-3)c
	T10	20:1n-9t	11t-Eicosenoic Acid	
	T11	20:2n-6t	11t,14t-Eicosadienoic Acid	from 20:2(n-6)c
Others	P4	18:2n-7c	9c,11t-Octadecadienoic Acid	CLA (C14), Rumenic Acid
	U3			
	C2		believed to be trans	

Code	Carbon Name	Systematic Name	Trivial Name
U12		believed to be trans	
U13		believed to be trans	
U14		believed to be trans	

*The fatty acid identification chart lists the fatty acids identified. Peaks that were below the detection limit were scored as a zero (0). From this list, we identified 57 peaks (pre-2009) whose chromatogram area was summed to constitute the total peak area (denominator) and then each individual peak was expressed in units of normalized area percent (i.e. percent of the total peak area).The total number of fatty acids evaluated post-2009 was 40 because fatty acids with almost always below detectable limits were removed, and several trans-isomers were summed together into a single variable.

METHODS

Details of ascertainment of covariates and other risk factors

Data on medical history, major risk factors and lifestyle habits were obtained in both cohorts via validated self-administered questionnaires, including on smoking and physical activity.[1-4] Usual alcohol use and dietary habits over the last year were assessed through validated semi-quantitative food frequency questionnaire.[5, 6] Self-reported height and weight were used to calculate body mass index (BMI), after confirming high age-adjusted correlation coefficients with technician-measured values height and weight (NHS and HPFS: r=0.97).[7] Family history of myocardial infarction (MI) or diabetes and (in women) menopausal status and postmenopausal hormone use were assessed through validated self-report. Hypercholesterolemia and hypertension were evaluated by self-report, with high demonstrated validity as compared with medical records in random subsamples.[8, 9]

Table S2. Multivariable adjusted baseline characteristics of 3,333 US men and women with fatty acid measurements and free of prevalent diabetes in the Nurses' Health Study and Health Professionals Follow-Up Study cohorts (pooled) according to quartiles of total plasma fatty acid biomarkers of dairy fat.

	Quartiles of 15:0				
	Q1	Q2	Q3	Q4	P-trend
Median, % of total fatty acids	0.11	0.14	0.16	0.21	-
Age, years	62.1	62.2	62.2	62.2	0.92
Sex, % male	14.3	19.9	29.4	37.0	<0.01
Race, % Caucasian	98.4	98.3	98.0	99.0	0.22
Body mass index, kg/m^2	25.3	25.6	25.9	25.3	0.98
Overweight or obese, %	46.9	48.8	54.9	47.6	0.71
Current smoking, %	10.9	8.5	9.6	9.3	0.50
Physical activity, MET-hours/week	24.8	25.8	24.8	24.7	0.77
Hypertension, %	23.6	22.0	22.3	19.0	0.05
Hypercholesterolemia, %	34.7	31.7	28.6	25.8	<0.001
Parental MI before 60 y, %	17.9	13.6	16.9	13.0	0.05
Family history of diabetes, %	22.5	25.4	24.0	26.2	0.21
Total dairy, servings/day	1.9	2.0	2.1	2.3	<0.001
Whole fat dairy, servings/day	0.77	0.83	0.99	1.21	<0.001
Low fat dairy, servings/day	1.2	1.2	1.1	1.1	0.07
Processed meats, servings/day	0.29	0.26	0.24	0.25	0.01
Unprocessed meats, servings/day	0.96	0.92	0.91	0.88	<0.001
Fruits, servings/day	1.7	1.8	1.7	1.7	0.73
Vegetables, servings/day	4.1	4.0	4.0	3.7	<0.001
Fish, servings/day	0.30	0.30	0.30	0.25	<0.01
Alcohol, servings/day	1.00	0.77	0.59	0.37	<0.001

	Quartiles of 17:0				
	Q1	Q2	Q3	Q4	P-trend
Median, % of total fatty acids	0.25	0.30	0.33	0.39	-
Age, years	61.9	62.0	62.4	62.5	0.06
Sex, % male	18.2	27.8	24.4	29.3	0.05
Race, % Caucasian	98.4	98.5	98.6	98.3	0.91
Body mass index, kg/m^2	25.8	25.8	25.5	25.0	<0.001
Overweight or obese, %	52.0	53.0	49.4	44.5	<0.01
Current smoking, %	11.7	8.4	9.0	9.3	0.20
Physical activity, MET-hours/week	25.4	25.5	25.2	23.9	0.28
Hypertension, %	24.1	20.0	23.2	19.5	0.15
Hypercholesterolemia, %	35.2	30.6	28.4	26.3	<0.001
Parental MI before 60 y, %	17.4	15.2	15.7	13.2	0.04
Family history of diabetes, %	24.2	25.3	24.4	24.1	0.87
Total dairy, servings/day	1.9	2.1	2.2	2.2	<0.001
Whole fat dairy, servings/day	0.77	0.94	1.01	1.10	<0.001
Low fat dairy, servings/day	1.2	1.2	1.1	1.1	0.14
Processed meats, servings/day	0.25	0.24	0.29	0.25	0.44
Unprocessed meats, servings/day	0.92	0.93	0.91	0.91	0.19
Fruits, servings/day	1.7	1.8	1.7	1.8	0.03
Vegetables, servings/day	4.0	4.0	3.9	3.9	0.17
Fish, servings/day	0.29	0.31	0.28	0.28	0.20
Alcohol, servings/day	0.98	0.67	0.58	0.47	<0.001

	Quartiles of t-16:1n-7				
	Q1	Q2	Q3	Q4	P-trend
Median, % of total fatty acids	0.12	0.15	0.19	0.25	-
Age, years	61.8	61.7	62.0	63.0	<0.01
Sex, % male	17.0	18.5	23.0	37.8	<0.001
Race, % Caucasian	98.6	98.5	98.6	98.2	0.61
Body mass index, kg/m^2	25.9	25.5	25.5	25.2	<0.001
Overweight or obese, %	54.4	49.2	49.2	46.2	<0.01
Current smoking, %	9.4	12.0	8.6	8.5	0.17
Physical activity, MET-hours/week	25.8	24.9	24.7	24.6	0.54
Hypertension, %	22.0	21.6	20.8	22.2	0.87
Hypercholesterolemia, %	34.8	30.0	27.8	28.1	0.01
Parental MI before 60 y, %	15.5	15.6	14.6	15.6	0.98
Family history of diabetes, %	26.4	22.6	25.3	23.5	0.34
Total dairy, servings/day	1.9	2.0	2.2	2.3	<0.001
Whole fat dairy, servings/day	0.71	0.86	1.01	1.21	<0.001
Low fat dairy, servings/day	1.2	1.2	1.2	1.1	<0.001
Processed meats, servings/day	0.26	0.25	0.28	0.25	0.48
Unprocessed meats, servings/day	0.95	0.93	0.92	0.88	<0.001
Fruits, servings/day	1.8	1.8	1.8	1.7	0.13
Vegetables, servings/day	4.1	3.9	3.9	3.9	0.49
Fish, servings/day	0.31	0.30	0.28	0.27	<0.01
Alcohol, servings/day	0.87	0.74	0.64	0.48	<0.001

	Quartiles of 14:0				
	Q1	Q2	Q3	Q4	P-trend
Median, % of total fatty acids	0.24	0.42	0.61	0.94	-
Age, years	61.6	61.9	62.9	62.2	0.11
Sex, % male	12.1	21.5	27.2	37.6	0.02
Race, % Caucasian	98.5	97.9	98.6	98.8	0.30
Body mass index, kg/m^2	24.9	25.4	25.9	25.9	<0.001
Overweight or obese, %	42.1	45.8	53.1	56.3	<0.001
Current smoking, %	6.4	9.7	10.1	11.9	<0.01
Physical activity, MET-hours/week	24.2	25.6	24.6	25.5	0.56
Hypertension, %	20.3	20.9	22.6	22.6	0.38
Hypercholesterolemia, %	29.3	28.6	30.7	31.4	0.46
Parental MI before 60 y, %	16.2	16.9	15.2	13.4	0.16
Family history of diabetes, %	22.9	23.0	24.2	27.7	0.05
Total dairy, servings/day	2.1	2.0	2.1	2.2	<0.01
Whole fat dairy, servings/day	0.88	0.89	0.95	1.08	<0.01
Low fat dairy, servings/day	1.2	1.1	1.2	1.1	0.55
Processed meats, servings/day	0.27	0.26	0.26	0.25	0.19
Unprocessed meats, servings/day	0.94	0.93	0.92	0.89	<0.01
Fruits, servings/day	1.7	1.7	1.8	1.7	0.94
Vegetables, servings/day	4.1	4.0	3.9	3.8	0.01
Fish, servings/day	0.30	0.30	0.29	0.27	0.01
Alcohol, servings/day	0.76	0.76	0.69	0.51	<0.001

Table S3. Partial Spearman correlations between plasma fatty acid biomarkers of dairy fat and dietary factors among 3,333 participants in the Nurses' Health Study and Health Professionals Follow-Up Study.*

	Plasma fatty acids			
	15:0	**17:0**	**t-16:1n-7**	**14:0**
Dietary Factors†				
Dairy fat	0.29	0.21	0.22	0.11
Whole-fat dairy	0.26	0.19	0.24	0.06
Low-fat dairy	0.13	0.08	0.06	0.04
Sugar-sweetened beverages	0.07	0.03	0.07	0.04
Refined grains	0.07	0.04	0.01	0.03
Sweets/desserts	0.03	0.02	0.08	-0.00
Alcohol	-0.17	-0.26	-0.10	0.02
French fries	0.00	0.01	0.06	-0.01
Potato (baked, boiled, mashed)	-0.01	0.00	0.00	-0.00
Potato or corn chips	-0.04	-0.05	-0.01	-0.02
Processed meat	0.01	0.07	0.07	-0.01
Unprocessed meat	0.01	0.08	0.08	-0.05
Plasma Fatty Acids‡				
15:0	1.0	0.57	0.50	0.59
17:0		1.0	0.50	0.10
t-16:1n-7			1.0	0.20
14:0				1.0

*Values are adjusted Spearman correlations based on pooling of individual-level data from both cohorts.

†Dietary habits were assessed using the average of self-reported consumption in 1986 and 1990 in the NHS, and 1990 and 1994 in the HPFS. Correlations with diet (N=2,717 due to missing dietary questionnaire data in some participants) were adjusted for age (years), sex, body mass index (kg/m^2), smoking (never, current, former, missing), fasting status at blood draw, consumption of total energy (kcal/day), and each of the other dietary factor in the table simultaneously. Dairy fat was excluded as a covariate when evaluating whole-fat or low-fat dairy foods.

‡Fatty acid intercorrelations (N=3,289) were adjusted for age and sex.

Table S4. Partial Spearman correlations between red blood cell fatty acids and dietary factors among 3,289 women and men in the Nurses' Health Study and Health Professionals Follow-Up Study.*

	Erythrocyte fatty acids			
	15:0	**17:0**	**t-16:1n-7**	**14:0**
Dietary factors†				
Dairy fat	0.16	0.11	0.20	0.10
Whole-fat dairy	0.16	0.13	0.21	0.08
Low-fat dairy	0.06	0.04	0.07	0.02
Sugar-sweetened beverages	0.04	0.02	0.04	0.04
Refined grains	0.03	-0.01	0.00	0.02
Sweets/desserts	0.01	0.01	0.06	0.01
Alcohol	-0.10	-0.17	-0.09	0.02
French fries	0.00	0.03	0.02	-0.01
Potatoes (baked, boiled, mashed)	0.01	0.01	0.04	-0.01
Potato or corn chips	-0.03	-0.04	-0.02	-0.02
Processed meat	0.03	0.07	0.06	0.02
Unprocessed meat	0.01	0.06	0.05	0.00
Erythrocyte fatty acids‡				
15:0	1.0	0.63	0.63	0.68
17:0		1.0	0.69	0.47
t-16:1n-7			1.0	0.48
14:0				1.0

*Values are adjusted Spearman correlations based on pooling of individual-level data from both cohorts. Compared with plasma fatty acids (N=3,333), 44 fewer subjects (N=3,289) had successful measures of erythrocyte fatty acids.

†Dietary habits were assessed using the average of self-reported consumption in 1986 and 1990 in the NHS, and 1990 and 1994 in the HPFS. Correlations with diet (N=2,717 due to missing dietary questionnaire data in some participants) were adjusted for age (years), sex, body mass index (kg/m^2), smoking (never, current, former, missing), fasting status at blood draw, consumption of total energy (kcal/day), and each of the other dietary factor in the table simultaneously. Dairy fat was excluded as a covariate when evaluating whole-fat or low-fat dairy foods.

‡Fatty acid intercorrelations (N=3,289) were adjusted for age and sex.

Table S5. Risk of incident diabetes according to red blood cell fatty acid biomarkers of dairy fat consumption among 3,289 men and women in the NHS (N=179 cases), HPFS (N=97 cases), and both cohorts combined.

	Cohort-specific fatty acid quartiles				
Fatty acid	**1**	**2**	**3**	**4**	**P for trend***
15:0, NHS					
% of total FA, median	0.08	0.11	0.14	0.18	
No. of cases	43	38	53	45	
Person-months	85,143	85,284	89,701	99,253	
Multivariable hazard ratio (95%CI) †	Reference	0.73 (0.46-1.16)	0.93 (0.60-1.43)	0.65 (0.39-1.09)	0.20
15:0, HPFS					
% of total FA, median	0.07	0.09	0.12	0.16	
No. of cases	20	21	26	30	
Person-months	58,160	57,184	60,933	57,792	
Multivariable hazard ratio (95%CI)	Reference	0.87 (0.46-1.65)	1.09 (0.58-2.05)	1.27 (0.65-2.48)	0.35
15:0, pooled	**Reference**	**0.78 (0.53-1.13)**	**0.98 (0.68-1.40)**	**0.83 (0.55-1.25)**	**0.63**
17:0, NHS					
% of total FA, median	0.31	0.37	0.42	0.59	
No. of cases	65	46	23	45	
Person-months	84,278	90,276	85,591	99,236	
Multivariable hazard ratio (95%CI)	Reference	0.66 (0.44-0.98)	0.30 (0.18-0.49)	0.37 (0.20-0.66)	<0.001
17:0, HPFS					
% of total FA, median	0.29	0.34	0.38	0.48	
No. of cases	25	23	19	30	
Person-months	58,563	54,066	61,510	59,930	
Multivariable hazard ratio (95%CI)	Reference	0.88 (0.49-1.61)	0.54 (0.28-1.04)	0.99 (0.47-2.09)	0.90
17:0, pooled	**Reference**	**0.72 (0.52-1.01)**	**0.37 (0.25-0.56)**	**0.54 (0.34-0.87)**	**<0.001**
t-16:1n-7, NHS					
% of total FA, median	0.11	0.14	0.17	0.22	
No. of cases	47	52	35	45	
Person-months	83,002	86,211	89,095	101,073	
Multivariable hazard ratio (95%CI)	Reference	1.03 (0.69-1.54)	0.65 (0.41-1.02)	0.60 (0.36-1.02)	0.02

t-16:1n-7, HPFS					
% of total FA, median	0.09	0.12	0.14	0.18	
No. of cases	20	26	19	32	
Person-months	58,671	57,636	57,138	60,624	
Multivariable hazard ratio (95%CI)	Reference	1.31 (0.72-2.39)	0.82 (0.42-1.59)	1.21 (0.61-2.39)	0.80
t-16:1n-7, pooled	**Reference**	**1.11 (0.80-1.55)**	**0.70 (0.48-1.02)**	**0.78 (0.51-1.18)**	**0.05**
14:0, NHS					
% of total FA, median	0.11	0.20	0.31	0.64	
No. of cases	32	50	37	60	
Person-months	80,336	85,653	92,087	101,305	
Multivariable hazard ratio (95%CI)	Reference	1.18 (0.74-1.87)	0.76 (0.45-1.29)	1.08 (0.61-1.88)	0.82
14:0, HPFS					
% of total FA, median	0.12	0.21	0.31	0.53	
No. of cases	14	20	30	33	
Person-months	57,996	58,816	60,816	56,441	
Multivariable hazard ratio (95%CI)	Reference	1.49 (0.70-3.14)	2.29 (1.10-4.78)	3.43 (1.51-7.77)	0.001
14:0, pooled	**Reference**	**1.26 (0.85-1.87)**	**1.11 (0.72-1.70)**	**1.56 (0.98-2.49)**	**0.13**

*Computed within each cohort by assigning the median level in each quartile to participants and evaluating this as a continuous variable. The pooled P-for-trend was calculated using generalized least squares trend (GLST) meta-analysis.[10]

†Adjusted for age (years), race (white, nonwhite), smoking status (never, former, current, missing), physical activity (METS/week), alcohol (servings/day), family history of diabetes (yes, no, missing), parental history of MI (yes, no, missing), hypercholesterolemia (yes, no), hypertension (yes, no), menopausal status in NHS (pre, post), postmenopausal hormone use in NHS (no, yes, missing), and consumption of fish (servings/day), processed meats (servings/day), unprocessed meats (servings/day), fruits (servings/day), vegetables (servings/day), whole grains (g/day), coffee (servings/day), sugar-sweetened beverages (servings/day), glycemic load (continuous), dietary calcium (mg/day), polyunsaturated fat (g/day), total energy (kcal/day), and plasma trans-18:1, trans-18:2, 16:0, and 18:0 (each as % of total fatty acids).

Table S6. Risk of incident diabetes according to red blood cell fatty acid biomarkers, evaluated continuously, among 3,289 men and women in the Nurses' Health Study (N=179 cases), Health Professionals Follow-Up Study (N=97 cases), and both cohorts combined.

Fatty acids	Results standardized to the difference between the midpoints of the highest vs. lowest quartiles (87.5th minus 12.5th percentiles)			
	NHS	**HPFS**	**Pooled**	**P-value**
15:0	range = 0.10*	range = 0.10		
Multivariable HR (95%CI) †	0.75 (0.50-1.12)	1.33 (0.98-1.80)	**1.08 (0.85-1.38)**	**0.53**
+ BMI ‡	0.73 (0.48-1.12)	1.37 (1.01-1.86)	**1.11 (0.86-1.42)**	**0.43**
17:0	range = 0.28	range = 0.19		
Multivariable HR (95%CI)	0.42 (0.26-0.68)	0.66 (0.29-1.53)	**0.47 (0.31-0.71)**	**<0.001**
+ BMI	0.57 (0.31-1.04)	0.88 (0.38-2.06)	**0.66 (0.40-1.08)**	**0.10**
t-16:1n-7	range = 0.11	range = 0.09		
Multivariable HR (95%CI)	0.76 (0.49-1.17)	0.87 (0.50-1.53)	**0.80 (0.57-1.13)**	**0.20**
+ BMI	0.86 (0.55-1.35)	0.95 (0.53-1.70)	**0.89 (0.63-1.27)**	**0.53**
14:0	Range = 0.53	Range = 0.41		
Multivariable HR (95%CI)	1.23 (0.98-1.54)	2.11 (1.31-3.39)	**1.36 (1.11-1.67)**	**0.003**
+ BMI	1.16 (0.91-1.46)	2.11 (1.30-3.42)	**1.30 (1.05-1.61)**	**0.02**

*The difference in % of total fatty acids between the midpoint of the highest vs. lowest quartile.

† Adjusted for age (years), race (white, nonwhite), smoking status (never, former, current, missing), physical activity (METS/week), alcohol (servings/day), family history of diabetes (yes, no, missing), parental history of MI (yes, no, missing), hypercholesterolemia (yes, no), hypertension (yes, no), menopausal status in NHS (pre, post), postmenopausal hormone use in NHS (no, yes, missing), and consumption of fish (servings/day), processed meats (servings/day), unprocessed meats (servings/day), fruits (servings/day), vegetables (servings/day), whole grains (g/day), coffee (servings/day), sugar-sweetened beverages (servings/day), glycemic load (continuous), dietary calcium (mg/day), polyunsaturated fat (g/day), total energy (kcal/day), and plasma trans-18:1, trans-18:2, 16:0, and 18:0 (each as % of total fatty acids).

‡ Further adjusted for body mass index (BMI, kg/m^2) as a potential mediator of confounder of the association.

Table S7. Risk of incident diabetes according to plasma fatty acid biomarkers of dairy fat after further adjustment for self-reported consumption of yogurt, cheese, or dairy fat as covariates in the NHS (N=184 cases), HPFS (N=93 cases), and both cohorts combined.

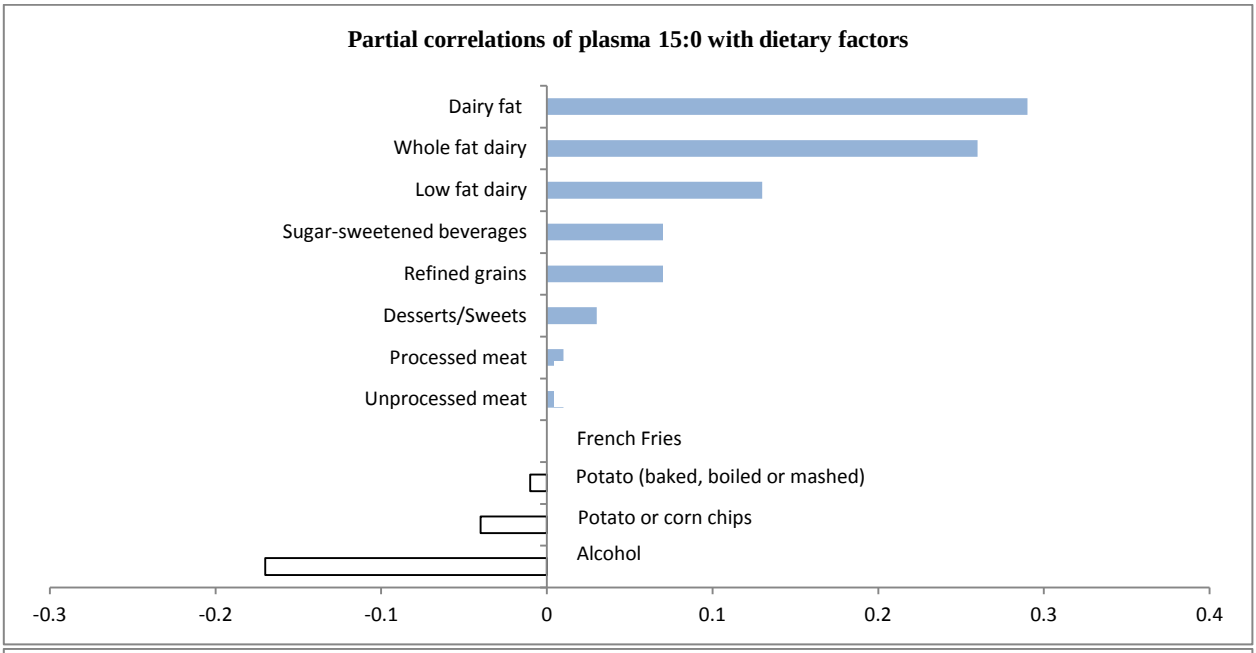
	Multivariable HR (95%CI) per increase in difference of the midpoint of the highest versus lowest quartiles (87.5^{th} minus 12.5^{th} percentiles)			
	Main results	Adding yogurt	Adding cheese	Adding dairy fat
15:0				
NHS	0.63 (0.42-0.92)	0.63 (0.43-0.94)	0.63 (0.42-0.93)	0.63 (0.42-0.94)
HPFS	0.61 (0.36-1.03)	0.62 (0.36-1.06)	0.60 (0.35-1.03)	0.56 (0.32-0.97)
Pooled	**0.62 (0.46-0.85)**	**0.63 (0.46-0.86)**	**0.62 (0.45-0.85)**	**0.61 (0.44-0.84)**
17:0				
NHS	0.71 (0.49-1.04)	0.72 (0.49-1.05)	0.72 (0.49-1.04)	0.72 (0.50-1.05)
HPFS	0.63 (0.39-1.02)	0.64 (0.39-1.03)	0.63 (0.39-1.02)	0.60 (0.37-0.99)
Pooled	**0.68 (0.50-0.91)**	**0.69 (0.51-0.93)**	**0.68 (0.51-0.92)**	**0.67 (0.50-0.91)**
t-16:1n-7				
NHS	0.52 (0.36-0.76)	0.53 (0.36-0.76)	0.52 (0.36-0.76)	0.53 (0.36-0.77)
HPFS	0.58 (0.36-0.93)	0.57 (0.35-0.92)	0.55 (0.34-0.90)	0.49 (0.30-0.82)
Pooled	**0.54 (0.40-0.73)**	**0.55 (0.41-0.73)**	**0.53 (0.40-0.71)**	**0.52 (0.38-0.70)**
14:0				
NHS	0.92 (0.64-1.32)	0.94 (0.65-1.35)	0.92 (0.64-1.33)	0.93 (0.64-1.34)
HPFS	0.61 (0.35-1.09)	0.63 (0.35-1.11)	0.61 (0.34-1.08)	0.56 (0.31-1.01)
Pooled	**0.82 (0.60-1.11)**	**0.84 (0.62-1.14)**	**0.82 (0.60-1.11)**	**0.81 (0.59-1.10)**

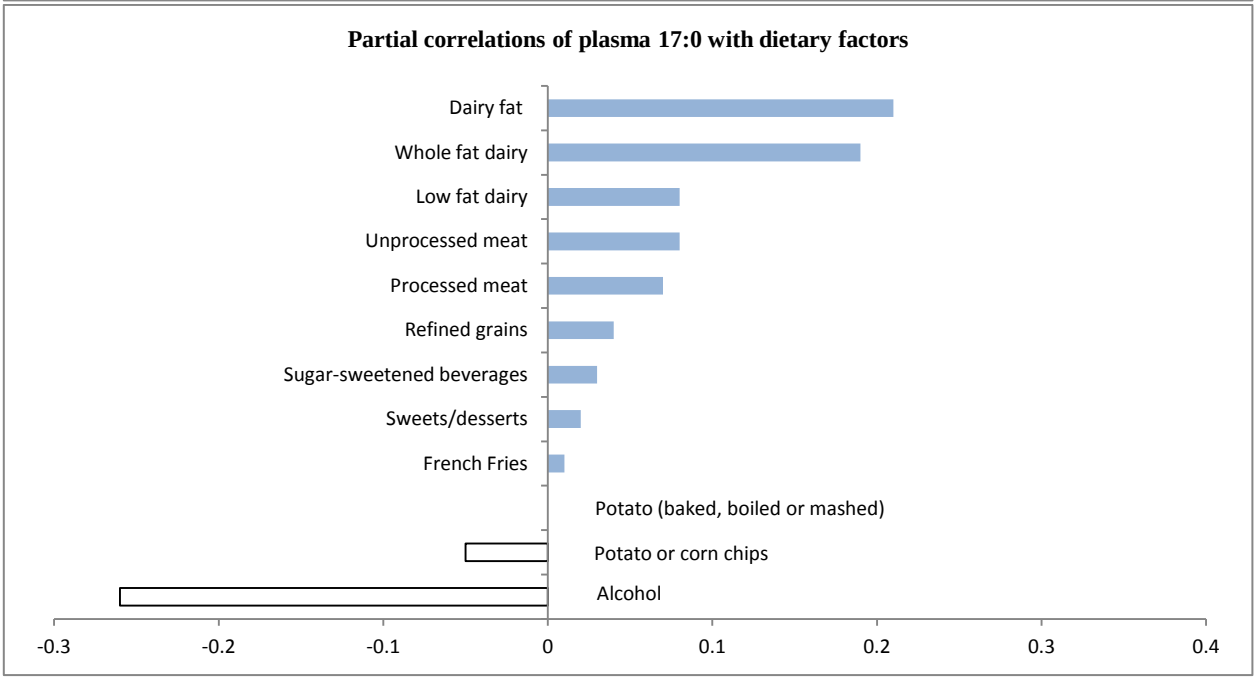
Adjusted for age (years), race (white, nonwhite), smoking status (never, former, current, missing), physical activity (METS/week), alcohol (servings/day), family history of diabetes (yes, no, missing), parental history of MI (yes, no, missing), hypercholesterolemia (yes, no), hypertension (yes, no), menopausal status in NHS (pre, post), postmenopausal hormone use in NHS (no, yes, missing), and consumption of fish (servings/day), processed meats (servings/day), unprocessed meats (servings/day), fruits (servings/day), vegetables (servings/day), whole grains (g/day), coffee (servings/day), sugar-sweetened beverages (servings/day), glycemic load (continuous), dietary calcium (mg/day), polyunsaturated fat (g/day), total energy (kcal/day), and plasma trans-18:1, trans-18:2, 16:0, and 18:0 (each as % of total fatty acids).

Table S8. Risk of incident diabetes according to plasma fatty acid biomarkers of dairy fat in sensitivity analyses excluding cases in the first 2 years of follow-up and restricting to the first 8 years of follow-up in the NHS (N=172 and 65 cases, respectively), HPFS (N=84 and 50 cases, respectively), and both cohorts combined.

	Results standardized to the difference between the midpoints of the highest vs. lowest quartiles (87.5th minus 12.5th percentiles)		
Fatty Acids	**Full follow-up**	**Excluding cases in the first 2 years**	**Restricting to the first 8 years**
15:0			
NHS	0.63 (0.42-0.92)	0.65 (0.43-0.97)	0.56 (0.29-1.06)
HPFS	0.61 (0.36-1.03)	0.76 (0.45-1.29)	0.71 (0.36-1.40)
Pooled	**0.62 (0.46-0.85)**	**0.69 (0.50-0.95)**	**0.63 (0.39-1.00)**
17:0			
NHS	0.71 (0.49-1.04)	0.75 (0.51-1.10)	0.66 (0.35-1.23)
HPFS	0.63 (0.39-1.02)	0.72 (0.45-1.17)	0.75 (0.40-1.39)
Pooled	**0.68 (0.50-0.91)**	**0.74 (0.55-1.00)**	**0.70 (0.45-1.10)**
t-16:1n-7			
NHS	0.52 (0.36-0.76)	0.58 (0.40-0.84)	0.28 (0.15-0.54)
HPFS	0.58 (0.36-0.93)	0.66 (0.39-1.09)	0.59 (0.31-1.12)
Pooled	**0.54 (0.40-0.73)**	**0.61 (0.45-0.82)**	**0.41 (0.26-0.64)**
14:0			
NHS	0.92 (0.64-1.32)	0.86 (0.59-1.25)	1.08 (0.58-2.00)
HPFS	0.61 (0.35-1.09)	0.67 (0.37-1.20)	0.71 (0.34-1.48)
Pooled	**0.82 (0.60-1.11)**	**0.80 (0.58-1.10)**	**0.91 (0.57-1.46)**

Values are hazard ratio (95%CI) adjusted for age (years), race (white, nonwhite), smoking status (never, former, current, missing), physical activity (METS/week), alcohol (servings/day), family history of diabetes (yes, no, missing), parental history of MI (yes, no, missing), hypercholesterolemia (yes, no), hypertension (yes, no), menopausal status in NHS (pre, post), postmenopausal hormone use in NHS (no, yes, missing), and consumption of fish (servings/day), processed meats (servings/day), unprocessed meats (servings/day), fruits (servings/day), vegetables (servings/day), whole grains (g/day), coffee (servings/day), sugar-sweetened beverages (servings/day), glycemic load (continuous), dietary calcium (mg/day), polyunsaturated fat (g/day), total energy (kcal/day), and plasma trans-18:1, trans-18:2, 16:0, and 18:0 (each as % of total fatty acids).


Partial correlations of plasma 15:0 with dietary factors
Dairy fat
Whole fat dairy
Low fat dairy
Sugar-sweetened beverages
Refined grains
Desserts/Sweets
Processed meat
Unprocessed meat
French Fries
Potato (baked, boiled or mashed)
Potato or corn chips
Alcohol
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4


Partial correlations of plasma 17:0 with dietary factors
Dairy fat
Whole fat dairy
Low fat dairy
Unprocessed meat
Processed meat
Refined grains
Sugar-sweetened beverages
Sweets/desserts
French Fries
Potato (baked, boiled or mashed)
Potato or corn chips
Alcohol
-0.3
-0.2
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0
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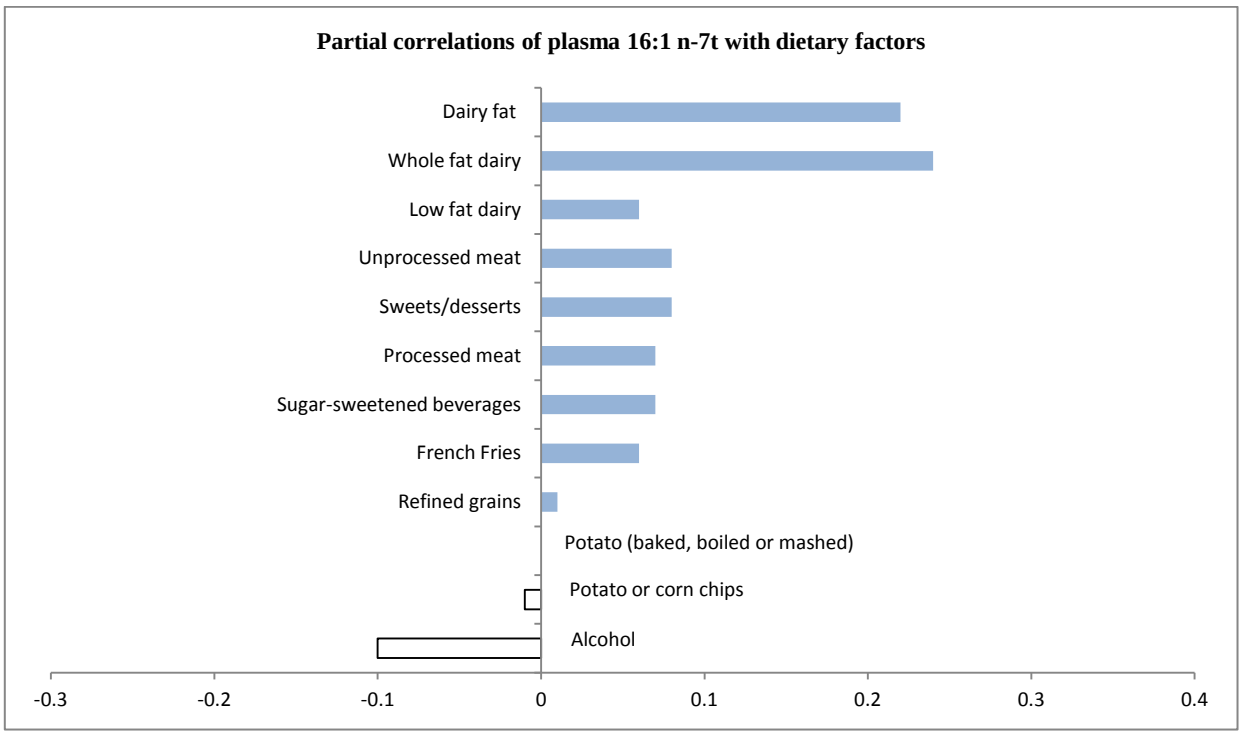
0.2
0.3
0.4



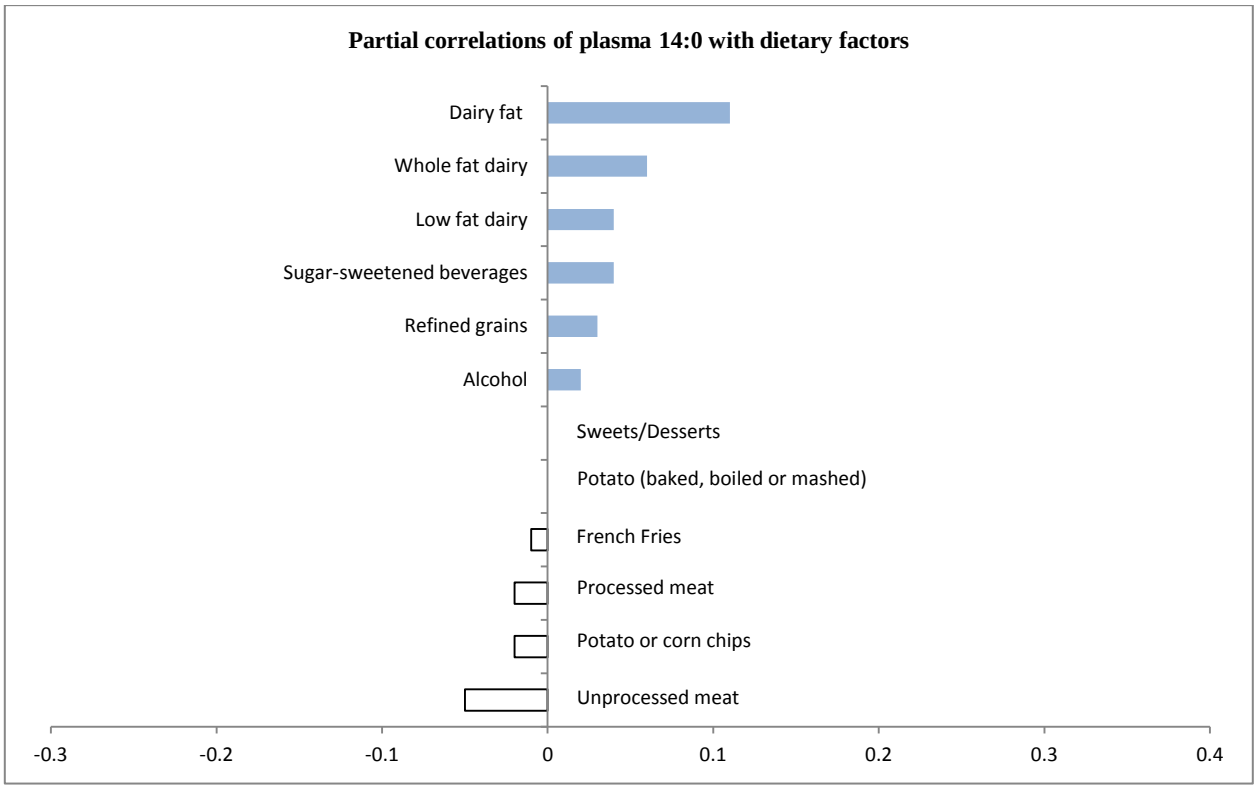


Figure S1. Partial Spearman correlations between plasma fatty acid biomarkers of dairy fat and dietary habits in the Nurses' Health Study and Health Professionals Follow-Up Study. Dietary habits assessed using the average of self-reported intake in 1986 and 1990 in NHS, and 1990 and 1994 in HPFS (total N=2,761). Correlations based on pooled individual-level data, adjusted for age (years), sex, body mass index (kg/m^2), smoking (never, current, former, missing), fasting status at blood draw, consumption of total energy (kcal/day), and each of the other dietary factor in the figure simultaneously. Dairy fat was excluded when evaluating whole-fat and low-fat dairy.

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