

**Manuscript:** Changes in dairy product consumption and risk of type 2 diabetes: results from three large prospective cohorts of U.S. men and women.

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**Supplementary Table 1: Age-adjusted initial intake and changes in dairy products according to baseline 4-year changes in total dairy product consumption.<sup>1</sup>**

	Changes in total dairy product consumption				
	Decrease		No change or relatively stable	Increase	
	>1.00 serving/d	>0.14 to 1.00 serving/d	±0.14 serving/d	>0.14 to 1.00 serving/d	>1.00 serving/d
<b>HPFS (n=34,224)</b>					
Participants, n	5,399	9,834	5,624	8,792	4,575
Initial total dairy intake, serving/d	3.70 (1.69)	1.89 (1.07)	1.38 (1.10)	1.41 (1.04)	1.70 (1.13)
Change in total dairy intake, serving/d	-2.01 (0.97)	-0.49 (0.24)	0.00 (0.08)	0.49 (0.24)	1.96 (0.93)
Initial low-fat dairy intake, serving/d	1.88 (1.55)	1.00 (0.91)	0.76 (0.89)	0.74 (0.82)	0.87 (0.85)
Change in low-fat dairy intake, serving/d	-0.87 (1.10)	-0.13 (0.47)	0.09 (0.37)	0.38 (0.50)	1.23 (1.07)
Initial high-fat dairy intake, serving/d	1.82 (1.63)	0.89 (0.72)	0.63 (0.68)	0.67 (0.67)	0.83 (0.82)
Change in high-fat dairy intake, serving/d	-1.09 (1.13)	-0.35 (0.47)	-0.09 (0.37)	0.10 (0.48)	0.68 (1.08)
Initial reduced-fat milk intake, serving/d	1.45 (1.44)	0.72 (0.82)	0.57 (0.82)	0.54 (0.75)	0.64 (0.77)
Change in reduced-fat milk intake, serving/d	-0.71 (1.03)	-0.08 (0.44)	0.06 (0.35)	0.24 (0.48)	0.94 (1.00)
Initial whole milk intake, serving/d	0.29 (0.80)	0.11 (0.36)	0.09 (0.33)	0.10 (0.36)	0.14 (0.43)
Change in whole milk intake, serving/d	-0.17 (0.51)	-0.06 (0.25)	-0.03 (0.22)	-0.03 (0.25)	0.00 (0.33)
Initial cheese intake, serving/d	0.89 (0.88)	0.58 (0.43)	0.40 (0.37)	0.42 (0.38)	0.49 (0.43)
Change in cheese intake, serving/d	-0.44 (0.62)	-0.21 (0.33)	-0.04 (0.25)	0.10 (0.34)	0.29 (0.61)
Initial low-fat cheese intake, serving/d	0.19 (0.37)	0.13 (0.20)	0.08 (0.15)	0.09 (0.16)	0.11 (0.19)
Change in low-fat cheese intake, serving/d	-0.08 (0.23)	-0.05 (0.17)	-0.01 (0.13)	0.02 (0.17)	0.05 (0.23)
Initial high-fat cheese intake, serving/d	0.71 (0.80)	0.45 (0.38)	0.32 (0.33)	0.33 (0.34)	0.38 (0.37)
Change in high-fat cheese intake, serving/d	-0.35 (0.57)	-0.16 (0.31)	-0.03 (0.24)	0.08 (0.31)	0.23 (0.56)
Initial cottage cheese intake, serving/d	0.18 (0.35)	0.12 (0.18)	0.07 (0.13)	0.08 (0.14)	0.10 (0.17)
Change in cottage cheese intake, serving/d	-0.07 (0.20)	-0.04 (0.15)	-0.01 (0.11)	0.02 (0.15)	0.04 (0.20)
Initial cream cheese intake, serving/d	0.08 (0.19)	0.05 (0.12)	0.04 (0.09)	0.04 (0.09)	0.04 (0.10)
Change in cream cheese intake, serving/d	-0.03 (0.13)	-0.02 (0.10)	0.00 (0.08)	0.01 (0.10)	0.03 (0.13)
Initial other cheese intake, serving/d	0.64 (0.77)	0.41 (0.35)	0.29 (0.31)	0.30 (0.31)	0.34 (0.35)
Change in other cheese intake, serving/d	-0.32 (0.56)	-0.15 (0.29)	-0.03 (0.22)	0.07 (0.29)	0.21 (0.54)
Initial yogurt intake, serving/d	0.14 (0.37)	0.09 (0.19)	0.05 (0.15)	0.06 (0.15)	0.07 (0.16)
Change in yogurt intake, serving/d	-0.06 (0.23)	-0.02 (0.16)	0.00 (0.13)	0.03 (0.17)	0.07 (0.24)
Initial cream intake, serving/d	0.48 (1.09)	0.09 (0.34)	0.06 (0.30)	0.06 (0.29)	0.10 (0.39)
Change in cream intake, serving/d	-0.33 (0.76)	-0.04 (0.22)	0.00 (0.16)	0.04 (0.22)	0.28 (0.73)
Initial ice cream intake, serving/d	0.26 (0.45)	0.18 (0.23)	0.13 (0.19)	0.14 (0.18)	0.16 (0.22)
Change in ice cream intake, serving/d	-0.11 (0.26)	-0.07 (0.19)	-0.02 (0.15)	0.01 (0.19)	0.05 (0.27)
Initial sherbet intake, serving/d	0.10 (0.31)	0.07 (0.16)	0.04 (0.11)	0.05 (0.12)	0.05 (0.14)
Change in sherbet intake, serving/d	0.01 (0.22)	0.02 (0.17)	0.04 (0.15)	0.08 (0.20)	0.12 (0.28)
<b>NHS (n=76,531)</b>					
Participants, n	13,641	21,225	10,366	19,562	11,737
Initial total dairy intake, serving/d	3.72 (1.54)	2.09 (1.07)	1.60 (1.11)	1.56 (1.03)	1.69 (1.04)
Change in total dairy intake, serving/d	-2.01 (0.95)	-0.50 (0.24)	0.00 (0.08)	0.50 (0.24)	1.94 (0.90)

Initial low-fat dairy intake, serving/d	1.95 (1.43)	1.15 (0.95)	0.91 (0.93)	0.87 (0.85)	0.93 (0.82)
Change in low-fat dairy intake, serving/d	-0.87 (1.09)	-0.11 (0.52)	0.14 (0.43)	0.48 (0.55)	1.42 (1.06)
Initial high-fat dairy intake, serving/d	1.77 (1.58)	0.93 (0.74)	0.69 (0.68)	0.69 (0.65)	0.76 (0.74)
Change in high-fat dairy intake, serving/d	-1.09 (1.14)	-0.39 (0.52)	-0.14 (0.43)	0.02 (0.53)	0.47 (1.02)
Initial reduced-fat milk intake, serving/d	1.36 (1.26)	0.77 (0.82)	0.64 (0.82)	0.59 (0.75)	0.62 (0.69)
Change in reduced-fat milk intake, serving/d	-0.63 (0.94)	-0.06 (0.48)	0.07 (0.38)	0.28 (0.53)	0.96 (0.93)
Initial whole milk intake, serving/d	0.21 (0.61)	0.11 (0.35)	0.08 (0.30)	0.08 (0.29)	0.10 (0.30)
Change in whole milk intake, serving/d	-0.12 (0.37)	-0.06 (0.24)	-0.04 (0.20)	-0.03 (0.22)	-0.01 (0.27)
Initial cheese intake, serving/d	0.91 (0.83)	0.63 (0.44)	0.47 (0.41)	0.47 (0.39)	0.50 (0.42)
Change in cheese intake, serving/d	-0.46 (0.62)	-0.23 (0.36)	-0.06 (0.29)	0.07 (0.37)	0.24 (0.60)
Initial low-fat cheese intake, serving/d	0.23 (0.38)	0.16 (0.22)	0.12 (0.19)	0.12 (0.18)	0.13 (0.20)
Change in low-fat cheese intake, serving/d	-0.10 (0.28)	-0.05 (0.21)	-0.01 (0.18)	0.03 (0.22)	0.07 (0.29)
Initial high-fat cheese intake, serving/d	0.68 (0.74)	0.47 (0.38)	0.35 (0.35)	0.35 (0.33)	0.37 (0.36)
Change in high-fat cheese intake, serving/d	-0.35 (0.57)	-0.18 (0.33)	-0.05 (0.27)	0.04 (0.34)	0.16 (0.54)
Initial cottage cheese intake, serving/d	0.21 (0.35)	0.15 (0.21)	0.10 (0.17)	0.11 (0.17)	0.12 (0.18)
Change in cottage cheese intake, serving/d	-0.10 (0.24)	-0.05 (0.18)	-0.01 (0.15)	0.01 (0.18)	0.04 (0.22)
Initial cream cheese intake, serving/d	0.10 (0.23)	0.07 (0.13)	0.05 (0.10)	0.05 (0.10)	0.05 (0.12)
Change in cream cheese intake, serving/d	-0.03 (0.20)	-0.01 (0.14)	0.01 (0.13)	0.03 (0.16)	0.05 (0.21)
Initial other cheese intake, serving/d	0.61 (0.70)	0.42 (0.35)	0.31 (0.33)	0.31 (0.31)	0.33 (0.34)
Change in other cheese intake, serving/d	-0.32 (0.54)	-0.16 (0.31)	-0.05 (0.25)	0.03 (0.32)	0.14 (0.53)
Initial yogurt intake, serving/d	0.23 (0.45)	0.14 (0.25)	0.09 (0.20)	0.10 (0.19)	0.11 (0.22)
Change in yogurt intake, serving/d	-0.10 (0.39)	-0.03 (0.24)	0.01 (0.19)	0.07 (0.26)	0.17 (0.47)
Initial cream intake, serving/d	0.55 (1.18)	0.11 (0.39)	0.08 (0.35)	0.07 (0.32)	0.11 (0.43)
Change in cream intake, serving/d	-0.37 (0.82)	-0.04 (0.25)	0.00 (0.19)	0.03 (0.24)	0.26 (0.71)
Initial ice cream intake, serving/d	0.24 (0.40)	0.18 (0.24)	0.13 (0.20)	0.14 (0.20)	0.14 (0.21)
Change in ice cream intake, serving/d	-0.12 (0.26)	-0.08 (0.21)	-0.03 (0.17)	-0.01 (0.20)	0.01 (0.24)
Initial sherbet intake, serving/d	0.13 (0.35)	0.08 (0.19)	0.06 (0.14)	0.06 (0.14)	0.07 (0.16)
Change in sherbet intake, serving/d	0.01 (0.26)	0.03 (0.21)	0.06 (0.19)	0.10 (0.24)	0.15 (0.30)

**NHS II (n=81,597)**

Participants, n	25,820	23,573	9,051	14,269	8,884
Initial total dairy intake, serving/d	3.51 (1.48)	1.89 (1.02)	1.46 (1.09)	1.55 (1.09)	1.71 (1.09)
Change in total dairy intake, serving/d	-2.18 (1.02)	-0.54 (0.25)	-0.01 (0.08)	0.48 (0.24)	2.03 (1.01)
Initial low-fat dairy intake, serving/d	2.16 (1.31)	1.10 (0.88)	0.87 (0.91)	0.92 (0.90)	1.01 (0.89)
Change in low-fat dairy intake, serving/d	-1.43 (1.10)	-0.30 (0.52)	0.06 (0.43)	0.38 (0.60)	1.30 (1.25)
Initial high-fat dairy intake, serving/d	1.35 (1.26)	0.78 (0.62)	0.60 (0.58)	0.63 (0.62)	0.71 (0.70)
Change in high-fat dairy intake, serving/d	-0.74 (0.99)	-0.25 (0.49)	-0.07 (0.43)	0.11 (0.58)	0.71 (1.25)
Initial reduced-fat milk intake, serving/d	1.68 (1.22)	0.76 (0.76)	0.62 (0.81)	0.63 (0.79)	0.67 (0.76)
Change in reduced-fat milk intake, serving/d	-1.33 (1.05)	-0.35 (0.49)	-0.09 (0.38)	0.07 (0.52)	0.79 (1.12)
Initial whole milk intake, serving/d	0.11 (0.44)	0.05 (0.21)	0.04 (0.20)	0.04 (0.19)	0.04 (0.21)
Change in whole milk intake, serving/d	-0.06 (0.23)	-0.03 (0.15)	-0.01 (0.12)	0.00 (0.14)	0.01 (0.18)
Initial cheese intake, serving/d	0.76 (0.67)	0.54 (0.40)	0.42 (0.36)	0.43 (0.36)	0.47 (0.40)
Change in cheese intake, serving/d	-0.29 (0.55)	-0.10 (0.35)	0.02 (0.29)	0.15 (0.39)	0.29 (0.63)
Initial low-fat cheese intake, serving/d	0.12 (0.25)	0.08 (0.16)	0.06 (0.13)	0.07 (0.15)	0.09 (0.17)
Change in low-fat cheese intake, serving/d	0.03 (0.27)	0.06 (0.23)	0.08 (0.23)	0.14 (0.30)	0.19 (0.42)

Initial high-fat cheese intake, serving/d	0.64 (0.61)	0.46 (0.36)	0.35 (0.33)	0.36 (0.33)	0.38 (0.37)
Change in high-fat cheese intake, serving/d	-0.32 (0.54)	-0.16 (0.36)	-0.07 (0.32)	0.01 (0.41)	0.09 (0.61)
Initial cottage cheese intake, serving/d	0.11 (0.21)	0.07 (0.13)	0.05 (0.10)	0.06 (0.11)	0.07 (0.12)
Change in cottage cheese intake, serving/d	-0.04 (0.16)	-0.02 (0.12)	0.00 (0.10)	0.02 (0.13)	0.03 (0.17)
Initial cream cheese intake, serving/d	0.09 (0.17)	0.06 (0.11)	0.05 (0.09)	0.05 (0.10)	0.06 (0.11)
Change in cream cheese intake, serving/d	-0.02 (0.15)	0.00 (0.12)	0.01 (0.12)	0.03 (0.14)	0.04 (0.17)
Initial other cheese intake, serving/d	0.57 (0.58)	0.41 (0.34)	0.32 (0.31)	0.32 (0.30)	0.35 (0.34)
Change in other cheese intake, serving/d	-0.23 (0.48)	-0.09 (0.31)	0.00 (0.25)	0.10 (0.34)	0.20 (0.54)
Initial yogurt intake, serving/d	0.19 (0.33)	0.13 (0.23)	0.09 (0.18)	0.11 (0.21)	0.13 (0.22)
Change in yogurt intake, serving/d	-0.04 (0.29)	0.01 (0.23)	0.05 (0.21)	0.12 (0.28)	0.19 (0.39)
Initial cream intake, serving/d	0.37 (0.95)	0.11 (0.39)	0.08 (0.35)	0.10 (0.39)	0.15 (0.46)
Change in cream intake, serving/d	-0.18 (0.67)	0.02 (0.28)	0.06 (0.26)	0.12 (0.39)	0.56 (1.00)
Initial ice cream intake, serving/d	0.15 (0.25)	0.11 (0.16)	0.08 (0.12)	0.09 (0.14)	0.09 (0.15)
Change in ice cream intake, serving/d	-0.05 (0.18)	-0.02 (0.15)	0.00 (0.12)	0.01 (0.15)	0.02 (0.18)
Initial sherbet intake, serving/d	0.17 (0.30)	0.13 (0.20)	0.10 (0.17)	0.11 (0.18)	0.12 (0.20)
Change in sherbet intake, serving/d	-0.06 (0.23)	-0.02 (0.19)	0.01 (0.17)	0.05 (0.22)	0.07 (0.27)

<sup>1</sup> Values are means(SD) or percentages and are standardized to the age distribution of the study population. HPFS: Health Professionals' Follow-up Study; NHS: Nurses' Health Study; NHS II: Nurses' Health Study II.

**Supplementary Table 2: HRs (95% CIs) for type 2 diabetes according to updated 4-year changes in intakes of whole milk, cream, ice cream, and sherbet.<sup>1</sup>**

	Changes in dairy product consumption			P values for trend
	Decrease	No change or relatively stable	Increase	
<b>Whole milk</b>	>0.07 serving/d	±0.07 serving/d	>0.07 serving/d	
<b>HPFS</b>				
Median change	-0.43	0.00	0.43	
Cases/person-years	121/28,448	2,097/460,310	82/16,023	
Model 1	1.05 (0.87, 1.26)	1.00	1.15 (0.92, 1.43)	0.68
Model 2	1.09 (0.83, 1.45)	1.00	1.04 (0.83, 1.31)	0.87
<b>NHS</b>				
Median change	-0.43	0.00	0.43	
Cases/person-years	337/66,304	5,469/1,078,202	187/34,335	
Model 1	1.18 (1.05, 1.32)	1.00	1.12 (0.96, 1.29)	0.17
Model 2	1.06 (0.89, 1.25)	1.00	1.01 (0.87, 1.18)	0.72
<b>NHS II</b>				
Median change	-0.43	0.00	0.43	
Cases/person-years	132/44,246	3,391/1,028,697	90/26,645	
Model 1	1.13 (0.95, 1.34)	1.00	1.06 (0.86, 1.31)	0.51
Model 2	1.10 (0.84, 1.45)	1.00	0.95 (0.77, 1.18)	0.38
<b>Pooled<sup>2</sup></b>				
Model 2	1.07 (0.94, 1.22)	1.00	1.00 (0.90, 1.12)	0.45
P for heterogeneity	0.95	-	0.85	0.85
<b>Cream</b>	>0.07 serving/d	±0.07 serving/d	>0.07 serving/d	
<b>HPFS</b>				
Median change	-0.43	0.00	0.43	
Cases/person-years	185/41,153	1,877/416,123	238/47,506	
Model 1	1.00 (0.86, 1.17)	1.00	1.09 (0.96, 1.25)	0.33
Model 2	1.04 (0.87, 1.24)	1.00	1.04 (0.90, 1.19)	0.90
<b>NHS</b>				
Median change	-0.43	0.00	0.43	
Cases/person-years	518/103,631	4,768/953,307	707/121,903	
Model 1	1.02 (0.93, 1.12)	1.00	1.12 (1.04, 1.21)	0.06
Model 2	0.99 (0.89, 1.09)	1.00	1.08 (1.00, 1.17)	0.08
<b>NHS II</b>				
Median change	-0.43	0.00	0.57	
Cases/person-years	471/128,058	2,543/790,263	599/181,267	
Model 1	1.07 (0.97, 1.18)	1.00	1.05 (0.96, 1.15)	0.95
Model 2	1.10 (0.97, 1.25)	1.00	1.02 (0.93, 1.12)	0.58
<b>Pooled<sup>3</sup></b>				
Model 2	1.03 (0.96, 1.11)	1.00	1.05 (0.99, 1.11)	0.45
P for heterogeneity	0.41	-	0.65	0.25
<b>Ice cream</b>	>0.07 serving/d	±0.07 serving/d	>0.07 serving/d	
<b>HPFS</b>				
Median change	-0.36	0.00	0.36	
Cases/person-years	311/64,792	1,730/385,547	259/54,441	
Model 1	1.12 (1.00, 1.27)	1.00	1.03 (0.91, 1.18)	0.27
Model 2	1.17 (1.00, 1.36)	1.00	0.98 (0.85, 1.12)	0.07
<b>NHS</b>				
Median change	-0.36	0.00	0.36	
Cases/person-years	783/150,840	4,479/902,845	731/125,157	
Model 1	1.15 (1.06, 1.24)	1.00	1.16 (1.07, 1.25)	0.98

Model 2	1.04 (0.94, 1.14)	1.00	1.02 (0.94, 1.10)	0.86
<b>NHS II</b>				
Median change	-0.36	0.00	0.36	
Cases/person-years	366/103,632	2,896/912,080	351/83,876	
Model 1	1.16 (1.04, 1.29)	1.00	1.32 (1.18, 1.47)	0.14
Model 2	1.11 (0.97, 1.28)	1.00	1.07 (0.95, 1.20)	0.90
<b>Pooled<sup>4</sup></b>				
Model 2	1.08 (1.01, 1.16)	1.00	1.02 (0.97, 1.09)	0.31
<i>P</i> for heterogeneity	0.41	-	0.58	0.32
<b>Sherbet</b>	>0.07 serving/d	±0.07 serving/d	>0.07 serving/d	
<b>HPFS</b>				
Median change	-0.36	0.00	0.36	
Cases/person-years	252/51,510	1,749/389,222	299/64,049	
Model 1	1.02 (0.89, 1.16)	1.00	1.08 (0.96, 1.23)	0.44
Model 2	1.01 (0.86, 1.18)	1.00	1.08 (0.95, 1.22)	0.36
<b>NHS</b>				
Median change	-0.36	0.00	0.36	
Cases/person-years	938/166,193	4,171/827,732	884/184,917	
Model 1	0.99 (0.92, 1.06)	1.00	0.99 (0.92, 1.06)	0.97
Model 2	0.97 (0.88, 1.07)	1.00	0.99 (0.92, 1.07)	0.81
<b>NHS II</b>				
Median change	-0.36	0.00	0.36	
Cases/person-years	414/132,142	2,868/867,500	331/99,947	
Model 1	1.02 (0.92, 1.13)	1.00	1.03 (0.92, 1.15)	0.98
Model 2	1.05 (0.93, 1.19)	1.00	0.94 (0.84, 1.05)	0.16
<b>Pooled<sup>5</sup></b>				
Model 2	1.00 (0.93, 1.07)	1.00	1.00 (0.94, 1.05)	0.90
<i>P</i> for heterogeneity	0.63	-	0.28	0.24

<sup>1</sup> Cox proportional hazards regression models were adjusted as follows. Model 1: adjusted for age, and stratified by calendar year in 4-year intervals. Model 2: model 1 + race (Caucasian, non-Caucasian), family history of diabetes, updated history of hypercholesterolemia and high blood pressure, initial and change in smoking status (never to never, never to current, past to past, current to past, current to current, missing indicator), menopausal status and postmenopausal hormone use (premenopausal, postmenopausal + current use, postmenopausal + past use, postmenopausal + never use, missing indicator, in NHS and NHS II) and oral contraceptive use (never, current, past, missing indicator, in NHS II), initial BMI (<21.0, 21.0-24.9, 25.0-29.9, 30.0-31.9, >32.0 kg/m<sup>2</sup>), initial and change in physical activity level (MET-h/wk, quintiles), initial and changes in energy and alcohol intakes (quintiles), initial and change in AHEI score (calculated without the alcohol component, quintiles), initial intake of model-specific dairy product (quintiles or tertiles), and initial and change in other dairy product intakes (quintiles). Results of the 3 cohorts were pooled using an inverse variance-weighted, fixed-effect meta-analysis. *P* for heterogeneity was assessed using the Q statistic.

<sup>2</sup> Whole milk *P* value for sex interaction = 0.85.

<sup>3</sup> Cream *P* value for sex interaction = 0.96.

<sup>4</sup> Ice cream *P* value for sex interaction = 0.87.

<sup>5</sup> Sherbet *P* value for sex interaction = 0.81.

Supplementary Table 3: HRs (95% CIs) for type 2 diabetes according to updated 4-year changes in different types of cheese.<sup>1</sup>

	Changes in cheese consumption			<i>P</i> values for trend
	Decrease	No change or relatively stable	Increase	
<b>Cottage cheese</b>	>0.07 serving/d	±0.07 serving/d	>0.07 serving/d	
<b>HPFS</b>				
Median change	-0.36	0.00	0.36	
Cases/person-years	221/44,344	1,863/418,663	216/41,774	
Model 1	1.12 (0.98, 1.29)	1.00	1.10 (0.95, 1.27)	0.81
Model 2	1.05 (0.89, 1.25)	1.00	1.01 (0.88, 1.17)	0.79
<b>NHS</b>				
Median change	-0.36	0.00	0.36	
Cases/person-years	749/142,235	4,598/918,498	646/118,109	
Model 1	1.05 (0.97, 1.13)	1.00	1.08 (1.00, 1.18)	0.65
Model 2	1.02 (0.93, 1.13)	1.00	1.05 (0.96, 1.14)	0.58
<b>NHS II</b>				
Median change	-0.36	0.00	0.36	
Cases/person-years	277/80,038	2,953/932,410	383/87,141	
Model 1	1.04 (0.92, 1.18)	1.00	1.23 (1.10, 1.36)	0.02
Model 2	1.12 (0.97, 1.30)	1.00	1.20 (1.08, 1.34)	0.09
<b>Pooled<sup>2</sup></b>				
Model 2	1.05 (0.98, 1.13)	1.00	1.09 (1.02, 1.15)	0.24
<i>P</i> for heterogeneity	0.58	-	0.08	0.39
<b>Cream cheese</b>	>0.07 serving/d	±0.07 serving/d	>0.07 serving/d	
<b>HPFS</b>				
Median change	-0.29	0.00	0.36	
Cases/person-years	129/23,387	2,016/455,418	155/25,976	
Model 1	1.24 (1.04, 1.48)	1.00	1.32 (1.12, 1.56)	0.23
Model 2	1.09 (0.90, 1.32)	1.00	1.17 (0.99, 1.38)	0.34
<b>NHS</b>				
Median change	-0.36	0.00	0.36	
Cases/person-years	896/166,114	3,861/827,510	1,236/185,218	
Model 1	1.00 (0.91, 1.09)	1.00	1.11 (1.03, 1.20)	0.03
Model 2	0.92 (0.83, 1.01)	1.00	1.09 (1.00, 1.18)	0.005
<b>NHS II</b>				
Median change	-0.36	0.00	0.36	
Cases/person-years	238/70,667	3,126/962,147	249/66,775	
Model 1	1.04 (0.91, 1.19)	1.00	1.30 (1.14, 1.48)	0.02
Model 2	0.99 (0.86, 1.15)	1.00	1.13 (0.99, 1.29)	0.15

<b>Pooled<sup>3</sup></b>						
Model 2	0.96 (0.89, 1.04)		1.00		1.11 (1.04, 1.18)	0.001
<i>P</i> for heterogeneity	0.25		-		0.71	0.94
<b>Other cheeses</b>	>0.07 serving/d		±0.07 serving/d		>0.07 serving/d	
<b>HPFS</b>						
Median change	-0.36		0.00		0.36	
Cases/person-years	536/120,655		1,132/264,696		632/119,430	
Model 1	1.09 (0.98, 1.21)		1.00		1.22 (1.11, 1.35)	0.04
Model 2	1.03 (0.92, 1.16)		1.00		1.15 (1.04, 1.27)	0.06
<b>NHS</b>						
Median change	-0.36		0.00		0.36	
Cases/person-years	1,896/357,130		2,531/518,817		1,566/302,895	
Model 1	1.02 (0.95, 1.08)		1.00		1.02 (0.95, 1.09)	0.97
Model 2	0.99 (0.91, 1.08)		1.00		0.98 (0.91, 1.05)	0.79
<b>NHS II</b>						
Median change	-0.36		0.00		0.36	
Cases/person-years	855/285,625		1,681/515,874		1,077/298,089	
Model 1	0.96 (0.88, 1.04)		1.00		1.08 (1.00, 1.16)	0.01
Model 2	0.94 (0.85, 1.03)		1.00		1.02 (0.94, 1.10)	0.13
<b>Pooled<sup>4</sup></b>						
Model 2	0.98 (0.93, 1.04)		1.00		1.03 (0.98, 1.08) <sup>‡</sup>	0.10
<i>P</i> for heterogeneity	0.38		-		0.04	0.20
<b>Low-fat cheese</b>	>0.50 serving/d	>0.07 to 0.50 serving/d	±0.07 serving/d	>0.07 to 0.50 serving/d	>0.50 serving/d	
<b>HPFS</b>						
Median change	-0.79	-0.29	0.00	0.29	0.79	
Cases/person-years	75/11,278	275/56,665	1,511/354,004	336/66,890	103/15,945	
Model 1	1.45 (1.15, 1.83)	1.08 (0.95, 1.23)	1.00	1.09 (0.96, 1.22)	1.37 (1.12, 1.67)	0.71
Model 2	1.40 (1.07, 1.83)	1.04 (0.89, 1.23)	1.00	1.08 (0.96, 1.22)	1.29 (1.05, 1.59)	0.43
<b>NHS</b>						
Median change	-0.79	-0.29	0.00	0.36	0.79	
Cases/person-years	225/40,950	917/167,280	3,695/745,769	861/173,927	295/50,915	
Model 1	0.99 (0.86, 1.14)	1.01 (0.94, 1.09)	1.00	0.97 (0.90, 1.05)	1.10 (0.97, 1.24)	0.66
Model 2	0.96 (0.79, 1.16)	0.97 (0.85, 1.10)	1.00	0.95 (0.84, 1.08)	1.07 (0.90, 1.27)	0.41
<b>NHS II</b>						
Median change	-0.79	-0.29	0.00	0.36	0.86	
Cases/person-years	145/34,471	449/123,878	2,183/704,324	615/176,576	221/60,340	
Model 1	1.16 (0.98, 1.37)	1.06 (0.95, 1.17)	1.00	1.13 (1.04, 1.24)	1.11 (0.97, 1.28)	0.35
Model 2	1.05 (0.86, 1.29)	1.02 (0.89, 1.16)	1.00	1.14 (1.04, 1.26)	1.08 (0.93, 1.25)	0.10
<b>Pooled<sup>5</sup></b>						
Model 2	1.08 (0.95, 1.22)	1.00 (0.93, 1.09)	1.00	1.07 (1.01, 1.14)	1.12 (1.02, 1.23)	0.05



<i>P</i> for heterogeneity	0.08	0.76	-	0.07	0.31	0.96
<b>High-fat cheese</b>	>0.50 serving/d	>0.07 to 0.50 serving/d	±0.07 serving/d	>0.07 to 0.50 serving/d	>0.50 serving/d	
<b>HPFS</b>						
Median change	-0.79	-0.29	0.00	0.29	0.79	
Cases/person-years	164/32,272	489/111,007	1,024/236,559	461/96,187	162/28,756	
Model 1	1.25 (1.06, 1.47)	1.07 (0.96, 1.19)	1.00	1.11 (0.99, 1.24)	1.31 (1.11, 1.55)	0.53
Model 2	1.09 (0.89, 1.34)	1.02 (0.90, 1.16)	1.00	1.04 (0.93, 1.17)	1.11 (0.93, 1.31)	0.62
<b>NHS</b>						
Median change	-0.79	-0.36	0.00	0.29	0.79	
Cases/person-years	379/87,874	1,330/281,990	2,602/510,136	1,275/228,341	407/70,500	
Model 1	0.93 (0.83, 1.04)	0.98 (0.92, 1.05)	1.00	1.05 (0.98, 1.12)	1.08 (0.97, 1.19)	0.01
Model 2	0.85 (0.74, 0.96)	0.92 (0.85, 0.99)	1.00	1.01 (0.94, 1.08)	1.00 (0.90, 1.11)	0.02
<b>NHS II</b>						
Median change	-0.79	-0.29	0.00	0.29	0.79	
Cases/person-years	313/101,960	765/266,103	1,424/431,919	742/213,277	369/86,330	
Model 1	1.06 (0.93, 1.19)	0.99 (0.90, 1.08)	1.00	1.09 (0.99, 1.19)	1.32 (1.18, 1.48)	0.0005
Model 2	0.92 (0.79, 1.08)	0.93 (0.84, 1.03)	1.00	1.06 (0.97, 1.16)	1.17 (1.04, 1.32)	0.0006
<b>Pooled<sup>6</sup></b>						
Model 2	0.92 (0.84, 1.00)	0.94 (0.89, 0.99)	1.00	1.03 (0.98, 1.08)	1.08 (1.00, 1.16)	0.0001
<i>P</i> for heterogeneity	0.11	0.35	-	0.71	0.13	0.24

<sup>1</sup> Cox proportional hazards regression models were adjusted as follows. Model 1: adjusted for age, and stratified by calendar year in 4-year intervals. Model 2: model 1 + race (Caucasian, non-Caucasian), family history of diabetes, updated history of hypercholesterolemia and high blood pressure, initial and change in smoking status (never to never, never to current, past to past, current to past, current to current, missing indicator), menopausal status and postmenopausal hormone use (premenopausal, postmenopausal + current use, postmenopausal + past use, postmenopausal + never use, missing indicator, in NHS and NHS II) and oral contraceptive use (never, current, past, missing indicator, in NHS II), initial BMI (<21.0, 21.0-24.9, 25.0-29.9, 30.0-31.9, >32.0 kg/m<sup>2</sup>), initial and change in physical activity level (MET-h/wk, quintiles), initial and changes in energy and alcohol intakes (quintiles), initial and change in AHEI score (calculated without the alcohol component, quintiles), initial intake of model-specific dairy product (quintiles or tertiles), and initial and change in other cheeses and dairy product intakes (quintiles). Results of the 3 cohorts were pooled using an inverse variance-weighted, fixed-effect meta-analysis. *P* for heterogeneity was assessed using the Q statistic. Low-fat cheese includes cottage cheese and other low-fat/reduced-fat/non-fat cheeses. High-fat cheese includes cream cheese and other high-fat cheeses.

<sup>2</sup> Cottage cheese *P* value for sex interaction = 0.89.

<sup>3</sup> Cream cheese *P* value for sex interaction = 0.60.

<sup>4</sup> Other cheeses *P* value for sex interaction = 0.26.

<sup>5</sup> Low-fat cheese *P* value for sex interaction = 0.04.

<sup>6</sup> High-fat cheese *P* value for sex interaction = 0.55.

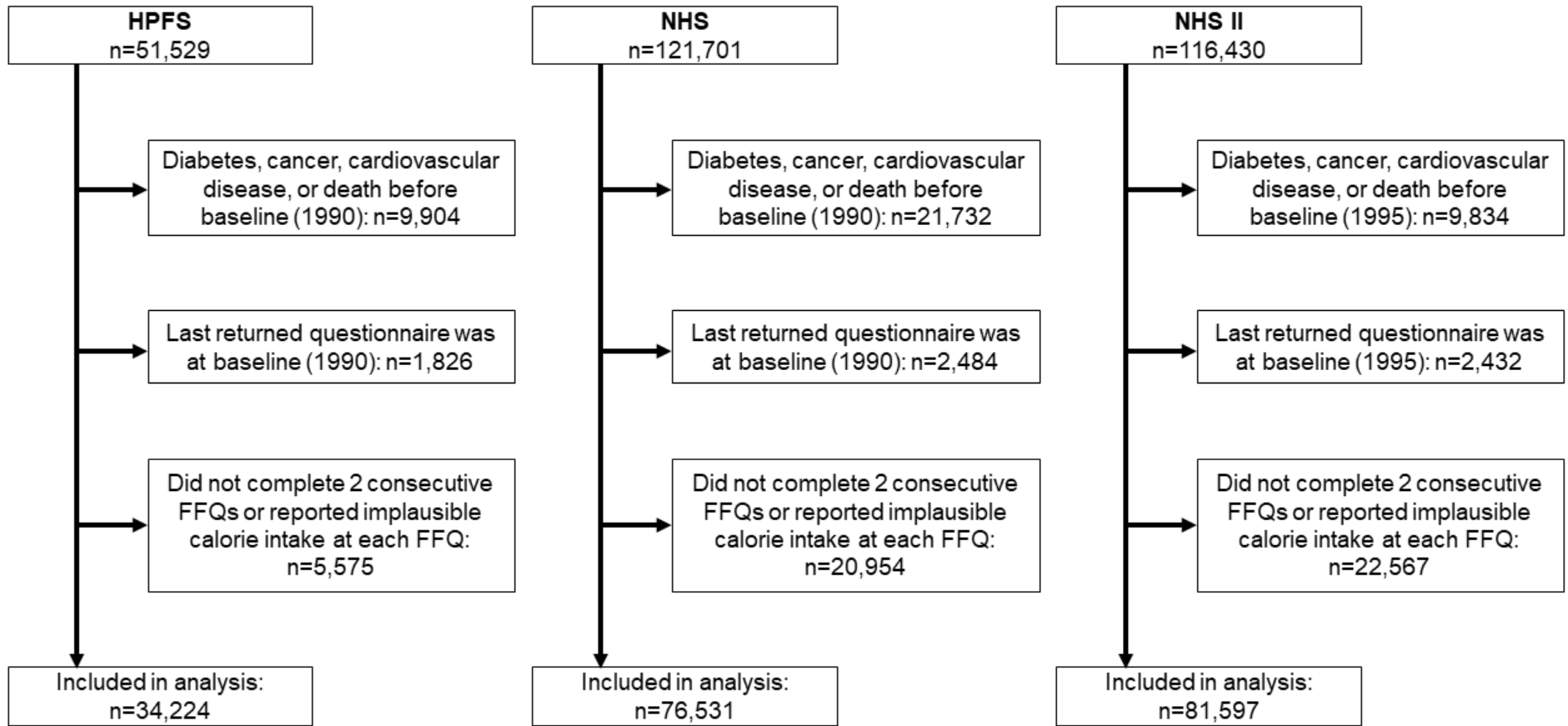
Supplementary Table 4: HRs (95% CIs) for type 2 diabetes according to updated 4-year changes in dairy product consumption with further adjustment for concurrent 4-year change in body weight.<sup>1</sup>

	Changes in dairy product consumption					P values for trend
	Decrease	No change or relatively stable		Increase		
<b>Total dairy</b>	>1.00 serving/d	>0.14 to 1.00 serving/d	±0.14 serving/d	>0.14 to 1.00 serving/d	>1.00 serving/d	
HPFS	1.14 (0.96, 1.35)	1.09 (0.95, 1.25)	1.00	1.11 (0.97, 1.26)	1.13 (0.97, 1.31)	0.86
NHS	1.07 (0.97, 1.19)	1.00 (0.92, 1.09)	1.00	1.03 (0.95, 1.13)	0.98 (0.89, 1.08)	0.16
NHS II	1.13 (0.99, 1.30)	0.93 (0.83, 1.05)	1.00	1.02 (0.91, 1.15)	0.93 (0.82, 1.06)	0.02
Pooled	1.10 (1.02, 1.19)	1.00 (0.94, 1.07)	1.00	1.05 (0.98, 1.11)	0.99 (0.93, 1.06)	0.02
P for heterogeneity	0.75	0.24	-	0.61	0.15	0.34
<b>Low-fat dairy</b>	>0.50 serving/d	>0.07 to 0.50 serving/d	±0.07 serving/d	>0.07 to 0.50 serving/d	>0.50 serving/d	
HPFS	1.06 (0.91, 1.24)	1.13 (0.98, 1.29)	1.00	1.05 (0.92, 1.20)	1.13 (0.99, 1.29)	0.48
NHS	1.05 (0.95, 1.15)	0.99 (0.90, 1.08)	1.00	0.99 (0.90, 1.09)	0.96 (0.88, 1.05)	0.05
NHS II	1.11 (0.97, 1.27)	1.00 (0.88, 1.13)	1.00	1.06 (0.94, 1.20)	0.99 (0.88, 1.12)	0.09
Pooled	1.07 (1.00, 1.15)	1.02 (0.95, 1.09)	1.00	1.02 (0.96, 1.09)	1.00 (0.94, 1.07)	0.04
P for heterogeneity	0.78	0.27	-	0.62	0.14	0.25
<b>High-fat dairy</b>	>0.50 serving/d	>0.07 to 0.50 serving/d	±0.07 serving/d	>0.07 to 0.50 serving/d	>0.50 serving/d	
HPFS	1.08 (0.91, 1.27)	0.92 (0.80, 1.04)	1.00	0.91 (0.80, 1.03)	0.99 (0.86, 1.14)	0.42
NHS	0.90 (0.80, 0.99)	0.92 (0.85, 1.00)	1.00	1.03 (0.95, 1.11)	0.98 (0.90, 1.07)	0.03
NHS II	1.16 (1.01, 1.32)	1.03 (0.92, 1.14)	1.00	1.04 (0.94, 1.15)	1.09 (0.98, 1.22)	0.96
Pooled	1.00 (0.93, 1.08)	0.95 (0.89, 1.00)	1.00	1.01 (0.95, 1.06)	1.02 (0.96, 1.08)	0.26
P for heterogeneity	0.006	0.24	-	0.19	0.29	0.13
<b>Reduced-fat milk (0-2%)</b>	>0.50 serving/d	>0.07 to 0.50 serving/d	±0.07 serving/d	>0.07 to 0.50 serving/d	>0.50 serving/d	
HPFS	0.97 (0.84, 1.12)	1.23 (1.08, 1.40)	1.00	1.16 (1.02, 1.31)	1.11 (0.97, 1.25)	0.29
NHS	1.09 (1.01, 1.18)	0.94 (0.86, 1.03)	1.00	0.98 (0.90, 1.06)	0.92 (0.85, 0.99)	0.003
NHS II	1.07 (0.95, 1.20)	1.00 (0.90, 1.12)	1.00	0.99 (0.89, 1.10)	0.99 (0.89, 1.10)	0.31
Pooled	1.06 (1.00, 1.13)	1.01 (0.95, 1.08)	1.00	1.02 (0.96, 1.08)	0.97 (0.92, 1.03)	0.03
P for heterogeneity	0.37	0.004	-	0.08	0.05	0.05
<b>Whole milk</b>	>0.07 serving/d		±0.07 serving/d		>0.07 serving/d	
HPFS	1.09 (0.83, 1.45)		1.00		1.04 (0.83, 1.31)	0.86
NHS	1.06 (0.89, 1.26)		1.00		1.01 (0.87, 1.17)	0.67
NHS II	1.10 (0.84, 1.44)		1.00		0.95 (0.76, 1.18)	0.38
Pooled	1.08 (0.95, 1.22)		1.00		1.00 (0.90, 1.12)	0.41
P for heterogeneity	0.97		-		0.84	0.86
<b>Yogurt</b>	>0.50 serving/d	>0.07 to 0.50 serving/d	±0.07 serving/d	>0.07 to 0.50 serving/d	>0.50 serving/d	
HPFS	0.99 (0.71, 1.39)	1.05 (0.88, 1.25)	1.00	0.87 (0.75, 1.01)	1.11 (0.86, 1.44)	0.59
NHS	1.03 (0.90, 1.18)	1.03 (0.94, 1.14)	1.00	0.96 (0.89, 1.03)	0.87 (0.78, 0.96)	0.004
NHS II	1.17 (0.97, 1.40)	1.04 (0.92, 1.17)	1.00	0.96 (0.88, 1.05)	0.93 (0.80, 1.07)	0.03
Pooled	1.07 (0.96, 1.19)	1.04 (0.97, 1.11)	1.00	0.95 (0.90, 1.00)	0.90 (0.84, 0.98)	0.0003
P for heterogeneity	0.51	0.99	-	0.46	0.20	0.84

<b>Total cheese</b>	>0.50 serving/d	>0.07 to 0.50 serving/d	±0.07 serving/d	>0.07 to 0.50 serving/d	>0.50 serving/d	
HPFS	1.13 (0.94, 1.36)	0.98 (0.87, 1.11)	1.00	1.04 (0.93, 1.16)	1.14 (0.98, 1.32)	0.41
NHS	0.89 (0.79, 1.00)	0.96 (0.89, 1.03)	1.00	0.96 (0.89, 1.03)	1.02 (0.93, 1.12)	0.15
NHS II	1.00 (0.87, 1.16)	0.96 (0.87, 1.06)	1.00	1.02 (0.93, 1.11)	1.19 (1.06, 1.32)	0.004
Pooled	0.97 (0.89, 1.05)	0.96 (0.91, 1.02)	1.00	0.99 (0.95, 1.04)	1.10 (1.03, 1.17)	0.002
<i>P</i> for heterogeneity	0.09	0.95	-	0.38	0.12	0.38
<b>Cottage cheese</b>	>0.07 serving/d		±0.07 serving/d		>0.07 serving/d	
HPFS	1.05 (0.88, 1.25)		1.00		1.02 (0.88, 1.18)	0.84
NHS	1.02 (0.92, 1.12)		1.00		1.06 (0.97, 1.15)	0.44
NHS II	1.10 (0.95, 1.27)		1.00		1.24 (1.11, 1.38)	0.02
Pooled	1.04 (0.97, 1.12)		1.00		1.10 (1.04, 1.17)	0.10
<i>P</i> for heterogeneity	0.66		-		0.04	0.23
<b>Cream cheese</b>	>0.07 serving/d		±0.07 serving/d		>0.07 serving/d	
HPFS	1.09 (0.90, 1.32)		1.00		1.17 (0.99, 1.38)	0.36
NHS	0.92 (0.83, 1.01)		1.00		1.08 (1.00, 1.17)	0.007
NHS II	1.00 (0.87, 1.16)		1.00		1.14 (1.00, 1.30)	0.16
Pooled	0.97 (0.90, 1.04)		1.00		1.11 (1.04, 1.18)	0.002
<i>P</i> for heterogeneity	0.24		-		0.64	0.96
<b>Other cheeses</b>	>0.07 serving/d		±0.07 serving/d		>0.07 serving/d	
HPFS	1.04 (0.92, 1.17)		1.00		1.14 (1.03, 1.26)	0.08
NHS	1.00 (0.92, 1.09)		1.00		0.97 (0.90, 1.04)	0.53
NHS II	0.95 (0.86, 1.04)		1.00		1.02 (0.94, 1.10)	0.19
Pooled	0.99 (0.94, 1.04)		1.00		1.02 (0.98, 1.07)	0.22
<i>P</i> for heterogeneity	0.46		-		0.03	0.16
<b>Low-fat cheese</b>	>0.50 serving/d	>0.07 to 0.50 serving/d	±0.07 serving/d	>0.07 to 0.50 serving/d	>0.50 serving/d	
HPFS	1.40 (1.07, 1.83)	1.04 (0.89, 1.23)	1.00	1.09 (0.96, 1.23)	1.29 (1.05, 1.59)	0.40
NHS	0.95 (0.78, 1.15)	0.97 (0.85, 1.10)	1.00	0.95 (0.84, 1.08)	1.08 (0.91, 1.28)	0.34
NHS II	1.04 (0.85, 1.28)	1.02 (0.89, 1.16)	1.00	1.16 (1.06, 1.28)	1.12 (0.97, 1.29)	0.03
Pooled	1.07 (0.94, 1.21)	1.00 (0.93, 1.09)	1.00	1.08 (1.01, 1.15)	1.14 (1.04, 1.26)	0.01
<i>P</i> for heterogeneity	0.07	0.74	-	0.04	0.39	0.84
<b>High-fat cheese</b>	>0.50 serving/d	>0.07 to 0.50 serving/d	±0.07 serving/d	>0.07 to 0.50 serving/d	>0.50 serving/d	
HPFS	1.10 (0.89, 1.34)	1.02 (0.90, 1.16)	1.00	1.04 (0.93, 1.16)	1.11 (0.93, 1.31)	0.67
NHS	0.85 (0.75, 0.97)	0.92 (0.85, 1.00)	1.00	1.01 (0.94, 1.08)	0.99 (0.88, 1.10)	0.04
NHS II	0.94 (0.80, 1.10)	0.95 (0.86, 1.05)	1.00	1.05 (0.96, 1.15)	1.18 (1.05, 1.33)	0.001
Pooled	0.92 (0.84, 1.01)	0.95 (0.90, 1.00)	1.00	1.02 (0.98, 1.08)	1.08 (1.00, 1.16)	0.0005
<i>P</i> for heterogeneity	0.12	0.37	-	0.75	0.08	0.25
<b>Cream</b>	>0.07 serving/d		±0.07 serving/d		>0.07 serving/d	
HPFS	1.04 (0.87, 1.24)		1.00		1.03 (0.90, 1.19)	0.93
NHS	0.99 (0.89, 1.09)		1.00		1.08 (1.00, 1.17)	0.09
NHS II	1.09 (0.95, 1.24)		1.00		1.02 (0.93, 1.12)	0.71
Pooled	1.03 (0.95, 1.10)		1.00		1.05 (0.99, 1.11)	0.40
<i>P</i> for heterogeneity	0.51		-		0.67	0.31
<b>Ice cream</b>	>0.07 serving/d		±0.07 serving/d		>0.07 serving/d	
HPFS	1.17 (1.00, 1.36)		1.00		0.97 (0.85, 1.11)	0.06

NHS	1.05 (0.96, 1.16)	1.00	1.00 (0.92, 1.09)	0.46
NHS II	1.15 (1.00, 1.32)	1.00	1.04 (0.93, 1.17)	0.41
Pooled	1.10 (1.03, 1.18)	1.00	1.01 (0.95, 1.07)	0.07
<i>P</i> for heterogeneity	0.43	-	0.73	0.49
<b>Sherbet</b>	>0.07 serving/d	±0.07 serving/d	>0.07 serving/d	
HPFS	1.00 (0.85, 1.17)	1.00	1.08 (0.95, 1.22)	0.31
NHS	0.97 (0.88, 1.06)	1.00	1.00 (0.93, 1.08)	0.61
NHS II	1.04 (0.92, 1.18)	1.00	0.96 (0.85, 1.07)	0.29
Pooled	0.99 (0.93, 1.06)	1.00	1.00 (0.95, 1.06)	0.78
<i>P</i> for heterogeneity	0.65	-	0.37	0.31

<sup>1</sup> Cox proportional hazards regression models were stratified by calendar year in 4-year intervals and adjusted for age, race (Caucasian, non-Caucasian), family history of diabetes, updated history of hypercholesterolemia and high blood pressure, initial and change in smoking status (never to never, never to current, past to past, current to past, current to current, missing indicator), menopausal status and postmenopausal hormone use (premenopausal, postmenopausal + current use, postmenopausal + past use, postmenopausal + never use, missing indicator, in NHS and NHS II) and oral contraceptive use (never, current, past, missing indicator, in NHS II), initial BMI (<21.0, 21.0-24.9, 25.0-29.9, 30.0-31.9, >32.0 kg/m<sup>2</sup>), initial and change in physical activity level (MET-h/wk, quintiles), initial and changes in energy and alcohol intakes (quintiles), initial and change in AHEI score (calculated without the alcohol component, quintiles), and initial intake of model-specific dairy product (quintiles or tertiles), and initial and change in other dairy product intakes (quintiles), and change in body weight (quintiles). † Results of the 3 cohorts were pooled using an inverse variance-weighted, fixed-effect meta-analysis. *P* for heterogeneity was assessed using the Q statistic.



**Supplementary Figure 1: Flow chart of participants.** FFQ: Food frequency questionnaire; HPFS: Health Professionals' Follow-up Study; NHS: Nurses' Health Study; NHS II: Nurses' Health Study II.