

## Supplementary Methods

### Validation of semi-quantitative food frequency questionnaires

These semi-quantitative food frequency questionnaires (FFQs) were validated against diet records among 173 participants of Nurses' Health Study (NHS) in 1980 and 127 participants of Health Professionals Follow-up Study (HPFS) in 1986.<sup>1,2</sup> Random-error corrected correlation coefficients between FFQ and diet record assessments of potato consumption were 0.66 for baked, boiled or mashed potatoes, 0.60 for French fries, and 0.77 for potato/corn chips in women;<sup>1</sup> or 0.65 for French fries, and 0.54 for potato/corn chips in men.<sup>2</sup> The corrected correlation coefficient for baked, boiled or mashed potatoes was not available in men due to large within-person variability; for baked, boiled or mashed potatoes, crude correlation and ratio of the within-person to between-person variance was 0.45 and 9.78, respectively.

### Definition of type 2 diabetes

A type 2 diabetes (T2D) diagnosis was confirmed if participants met at least one of the following criteria:<sup>3</sup> 1) one or more typical diabetes symptoms plus elevated blood glucose levels [fasting blood glucose levels  $\geq 140$  mg/dL (7.8 mmol/L), random blood glucose levels  $\geq 200$  mg/dL (11.1 mmol/L), or 2-hour blood glucose levels  $\geq 200$  mg/dL during oral-glucose-tolerance testing], 2) elevated blood glucose levels on two different occasions, or 3) using insulin or oral anti-diabetic medication. In June 1998, the cut-off point of fasting blood glucose level for the diagnostic criteria of diabetes was lowered to 126 mg/dL (7.0 mmol/L).<sup>4</sup>

### Assessment of covariates

In the biennial follow-up questionnaires, we inquired and updated information on anthropometric and lifestyle factors for chronic diseases, including body height and weight, cigarette smoking, physical activity, multivitamin use, and a family history of diabetes. Among NHS and NHSII participants, we ascertained menopausal status, post-menopausal hormone use, and oral contraceptive use (NHSII only). Body mass index was calculated as body weight (kg) divided by height squared ( $m^2$ ). Physical activity was estimated as a total of metabolic equivalent of task (MET) for each activity multiplied by time spent for each activity during a week (MET-hours/week). Based on the FFQ, we derived a score of alternate Healthy Eating Index (aHEI), an indicator of adherence to healthy eating behavior, summarizing consumption of 11 foods/nutrients (including consumption of vegetables, fruits, whole grains, sugar-sweetened beverage and fruit juice, nuts and legumes, red and processed meat, trans fat, long-chain n-3 fat, polyunsaturated fat, sodium, and alcohol).<sup>5</sup> In the current analysis, we calculated the aHEI score without including *trans* fat and polyunsaturated fat because French fries and potato chips were among major contributors to these components.

## SUPPLEMENTARY DATA

### Supplementary References

1. Salvini S, Hunter DJ, Sampson L, Stampfer MJ, Colditz GA, Rosner B, Willett WC. Food-based validation of a dietary questionnaire: the effects of week-to-week variation in food consumption. *Int J Epidemiol.* 1989;18:858-867.
2. Feskanich D, Rimm EB, Giovannucci EL, Colditz GA, Stampfer MJ, Litin LB, Willett WC. Reproducibility and validity of food intake measurements from a semiquantitative food frequency questionnaire. *J Am Diet Assoc.* 1993;93:790-796.
3. National Diabetes Data Group. Classification and diagnosis of diabetes mellitus and other categories of glucose intolerance. National Diabetes Data Group. *Diabetes.* 1979;28:1039-1057.
4. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care.* 1997;20:1183-1197.
5. Chiuve SE, Fung TT, Rimm EB, Hu FB, McCullough ML, Wang M, Stampfer MJ, Willett WC. Alternative dietary indices both strongly predict risk of chronic disease. *J Nutr.* 2012;142:1009-1018.

SUPPLEMENTARY DATA

**Supplementary Table 1.** Baseline consumption levels of individual potato foods according to total potato consumption

	Total potato consumption levels, serving/week				
	<1	1	2-4	5-6	≥7
Nurses' Health Study (1984)					
Baked, boiled or mashed potatoes, serving/week	0.35 (0.21)	0.77 (0.28)	1.89 (0.98)	3.43 (1.12)	7.28 (3.01)
French fries, serving/week	0.00 (0.07)	0.21 (0.21)	0.35 (0.42)	0.84 (0.77)	0.77 (1.19)
Nurses' Health Study II (1991)					
Baked, boiled or mashed potatoes, serving/week	0.35 (0.21)	0.70 (0.28)	1.33 (0.84)	3.08 (1.05)	6.37 (2.66)
French fries, serving/week	0.07 (0.14)	0.28 (0.28)	0.56 (0.42)	1.19 (1.05)	2.31 (2.31)
Health Professionals Follow-up Study (1986)					
Baked, boiled or mashed potatoes, serving/week	0.35 (0.21)	0.77 (0.28)	1.68 (0.98)	3.15 (1.19)	6.86 (3.85)
French fries, serving/week	0.00 (0.14)	0.21 (0.28)	0.49 (0.49)	1.26 (1.12)	1.96 (2.45)

SUPPLEMENTARY DATA

**Supplementary Table 2.** Hazard ratio and 95% confidence interval of type 2 diabetes for potato consumption, stratified by baseline body mass index, smoking status, physical activity, and modified aHEI score\*

	Total potato consumption levels, serving/week					Every 3 servings/week	P for interaction
	<1	1	2-4	5-6	≥7		
<b>Body mass index</b>							
<30 kg/m <sup>2</sup> †	276/168,171	835/434,065	4,512/1,663,312	3,320/1,117,687	249/75,706		
Adjusted HR	1.00	1.05 (0.92, 1.21)	1.17 (1.03, 1.32)	1.27 (1.12, 1.45)	1.50 (1.26, 1.80)	1.16 (1.10, 1.22)	
≥30 kg/m <sup>2</sup> †	164/14,052	486/41,290	2,442/177,236	2,284/150,193	203/11,631		
Adjusted HR	1.00	0.89 (0.74, 1.07)	0.89 (0.76, 1.05)	0.96 (0.81, 1.14)	1.09 (0.87, 1.35)	1.10 (1.03, 1.16)	<0.0001
<b>Smoking status</b>							
Never or past smoker†	399/163,391	1,198/429,330	6,345/1,671,453	5,034/1,126,948	403/74,230		
Adjusted HR	1.00	1.01 (0.90, 1.13)	1.06 (0.96, 1.18)	1.14 (1.02, 1.27)	1.34 (1.16, 1.55)	1.13 (1.09, 1.18)	
Current smoker†	40/19,132	142/48,350	668/179,661	558/141,585	50/12,185		
Adjusted HR	1.00	1.12 (0.78, 1.60)	1.14 (0.82, 1.59)	1.16 (0.83, 1.63)	1.29 (0.83, 1.99)	1.06 (0.94, 1.19)	0.69
<b>Physical activity</b>							
<9 MET-hours/week†	214/64,781	706/172,025	3,584/695,917	2,943/515,363	242/37,797		
Adjusted HR	1.00	1.06 (0.92, 1.24)	1.06 (0.92, 1.21)	1.11 (0.97, 1.28)	1.23 (1.01, 1.48)	1.08 (1.03, 1.14)	
≥9 MET-hours/week†	199/114,787	599/301,748	3,328/1,150,389	2,581/750,160	206/48,449		
Adjusted HR	1.00	0.96 (0.82, 1.12)	1.08 (0.94, 1.25)	1.18 (1.02, 1.37)	1.45 (1.19, 1.77)	1.17 (1.11, 1.24)	0.01
<b>aHEI score</b>							
Low (<median)†	193/52,537	599/161,864	3,954/882,041	4,054/829,551	369/65,071		
Adjusted HR	1.00	0.94 (0.79, 1.10)	0.95 (0.82, 1.10)	1.02 (0.88, 1.18)	1.19 (0.99, 1.43)	1.11 (1.06, 1.17)	
High (≥median)†	273/136,989	790/331,748	3,293/1,022,107	1,736/480,991	101/25,107		
Adjusted HR	1.00	1.03 (0.90, 1.19)	1.12 (0.99, 1.27)	1.20 (1.05, 1.37)	1.35 (1.06, 1.72)	1.14 (1.06, 1.21)	0.09

aHEI=alternate healthy eating index; HR=hazard ratio; MET=metabolic equivalent of task; NHS=Nurses' Health Study

\* Hazard ratios and 95% confidence intervals of type 2 diabetes were estimated in each cohort adjusting for age (years), ethnicity (Caucasian, African American, Hispanic, or Asian), body mass index at baseline (<23, 23.0-24.9, 25.0-26.9, 27.0-28.9, 29.0-30.9, 31.0-32.9, 33.0-34.9, 35.0-36.9, 37.0-38.9, 39.0-40.9, 41.0-42.9, 43.0-44.9, ≥45.0 kg/m<sup>2</sup>, or missing), smoking status [never, past, current (1-14, 15-24, or ≥25 cigarettes/day), or missing], alcohol intake (0, 0.1-4.9, 5.0-14.9 or ≥15.0 g/day for women, and 0, 0.1-4.9, 5.0-29.9 or ≥30.0 g/day for men), multivitamin use (yes or no), physical activity (<3, 3.0-8.9, 9.0-17.9, 18.0-26.9, ≥27.0 MET-hours/week, or missing), a family history of diabetes (yes or no), postmenopausal status and hormone use [pre-menopause, post-menopause (never, past, or current hormone use), or missing, for women], oral contraceptive use (never, past, current, or missing, for NHS II), total energy intake (kcal/day), and modified aHEI score (fifths). The estimates from all cohorts were pooled by fixed-effects meta-analysis.

† Case/person-year of observation.

SUPPLEMENTARY DATA

**Supplementary Table 3.** Hazard ratios (95% confidence intervals) of type 2 diabetes for potato consumption, results from sensitivity analyses\*

	Total potato consumption levels, serving/week					Every 3 servings/week
	<1	1	2-4	5-6	≥7	
Further adjusting for glycemic load other than potatoes <sup>†</sup>	1.00	1.01 (0.91, 1.12)	1.07 (0.97, 1.18)	1.15 (1.04, 1.27)	1.34 (1.17, 1.53)	1.13 (1.09, 1.18)
Adjusting for updated BMI instead of baseline BMI	1.00	1.01 (0.91, 1.12)	1.07 (0.97, 1.18)	1.15 (1.05, 1.27)	1.34 (1.17, 1.54)	1.13 (1.09, 1.18)
Using intake levels adjusted for energy intake by residual method	1.00	0.99 (0.88, 1.12)	1.09 (0.98, 1.21)	1.14 (1.03, 1.27)	1.33 (1.17, 1.51)	1.10 (1.07, 1.13)
Using simply updated intake levels	1.00	1.09 (1.02, 1.16)	1.12 (1.06, 1.18)	1.18 (1.11, 1.25)	1.30 (1.19, 1.42)	1.10 (1.07, 1.14)
Adjusting for individual dietary factors instead of aHEI <sup>‡</sup>	1.00	1.00 (0.90, 1.12)	1.05 (0.95, 1.16)	1.11 (1.00, 1.22)	1.21 (1.08, 1.36)	1.08 (1.05, 1.11)
Excluding incident T2D cases in the first two years of follow-up	1.00	0.99 (0.89, 1.11)	1.07 (0.97, 1.18)	1.14 (1.03, 1.26)	1.27 (1.12, 1.43)	1.10 (1.07, 1.14)

aHEI=alternate healthy eating index; BMI=body mass index; NHS=Nurses' Health Study

\* Hazard ratios and 95% confidence intervals of type 2 diabetes were estimated in each cohort adjusting for age (years), ethnicity (Caucasian, African American, Hispanic, or Asian), BMI at baseline (<23, 23.0-24.9, 25.0-26.9, 27.0-28.9, 29.0-30.9, 31.0-32.9, 33.0-34.9, 35.0-36.9, 37.0-38.9, 39.0-40.9, 41.0-42.9, 43.0-44.9, ≥45.0 kg/m<sup>2</sup>, or missing), smoking status [never, past, current (1-14, 15-24, or ≥25 cigarettes/day), or missing], alcohol intake (0, 0.1-4.9, 5.0-14.9 or ≥15.0 g/day for women, and 0, 0.1-4.9, 5.0-29.9 or ≥30.0 g/day for men), multivitamin use (yes or no), physical activity (<3, 3.0-8.9, 9.0-17.9, 18.0-26.9, ≥27.0 metabolic equivalent of task-hours/week, or missing), a family history of diabetes (yes or no), postmenopausal status and hormone use [pre-menopause, post-menopause (never, past, or current hormone use), or missing, for women], oral contraceptive use (never, past, current, or missing, for NHS II), total energy intake (kcal/day), and modified aHEI score (fifths). The estimates from all cohorts were pooled by fixed-effects meta-analysis.

<sup>†</sup> Residual of glycemic load was used as glycemic load other than potatoes estimated by including intakes of baked or mashed potatoes, French fries, and potato chips in the same regression model.

<sup>‡</sup> Adjusting for intake us of red meats, fishes, fruits, whole grains, nuts, coffee, fruit juices, and sugar-sweetened beverages (all fifths) instead of aHEI score.

SUPPLEMENTARY DATA

**Supplementary Table 4.** HRs (95% CIs) of type 2 diabetes for change in consumption of potato foods, results from sensitivity analyses.\*

	Change in potato consumption, serving/week					Every 3 servings/week	P value for trend
	Decreased $\geq 4.0$	Decreased 1.0-3.9	No change ( $\pm 0.9$ )	Increased 1.0-3.9	Increased $\geq 4.0$		
Further adjusting for initial and change values of glycemic load of overall diet	1.03 (0.93, 1.15)	0.96 (0.89, 1.03)	1.00	1.04 (1.00, 1.08)	0.99 (0.96, 1.02)	1.05 (1.01, 1.09)	0.01
Further adjusting for initial and change values of total carbohydrate intake	1.04 (0.93, 1.15)	0.96 (0.89, 1.03)	1.00	1.03 (0.99, 1.08)	0.99 (0.96, 1.02)	1.05 (1.01, 1.09)	0.02

CI=confidence interval; HPFS=Health Professionals Follow-up Study; HR=hazard ratio; NHS=Nurses' Health Study.

\* Hazard ratios and 95% confidence intervals of type 2 diabetes were estimated in each cohort adjusting for age, ethnicity (Caucasian, African American, Hispanic, or Asian), initial body mass index (<23, 23.0-24.9, 25.0-26.9, 27.0-28.9, 29.0-30.9, 31.0-32.9, 33.0-34.9,  $\geq 35.0$  kg/m<sup>2</sup>, or missing), smoking status (never-never, current-past, never/past-current, past-past, or current-current smoker), a family history of diabetes (yes or no), baseline values of multivitamin use (yes or no), postmenopausal status and hormone use [pre-menopause, post-menopause (never, past, or current post-menopausal hormone use), or missing], oral contraceptive use (never, past, current, or missing, for NHS II) and potato food intake, and initial values and changes of alcohol intake (for initial value, 0, 0.1-4.9, 5.0-14.9,  $\geq 15.0$  g/day, or missing for women, and 0, 0.1-4.9, 5.0-29.9,  $\geq 30.0$  g/day, or missing for men; for change value, fifths, or missing), physical activity (for initial value, <3, 3.0-8.9, 9.0-17.9, 18.0-26.9,  $\geq 27.0$  metabolic equivalent of task-hours/week, or missing; for change value, fifths, or missing), total energy intake (for initial value, kcal/day; for change value, fifths), and modified alternate Healthy Eating Index score (fifths for both initial and change value). The estimates from all cohorts were pooled by fixed-effects meta-analysis.

† Model 2 was adjusted for age, ethnicity (Caucasian, African American, Hispanic, or Asian), smoking status (never-never, current-past, never/past-current, past-past, or current-current smoker), a family history of diabetes (yes or no), baseline values of multivitamin use (yes or no), postmenopausal status and hormone use [pre-menopause, post-menopause (never, past, or current post-menopausal hormone use), or missing], oral contraceptive use (never, past, current, or missing, for NHS II) and potato food intake, and initial values and changes of alcohol intake (for initial value, 0, 0.1-4.9, 5.0-14.9,  $\geq 15.0$  g/day, or missing for women, and 0, 0.1-4.9, 5.0-29.9,  $\geq 30.0$  g/day, or missing for men; for change value, fifths, or missing), physical activity (for initial value, <3, 3.0-8.9, 9.0-17.9, 18.0-26.9,  $\geq 27.0$  metabolic equivalent of task-hours/week, or missing; for change value, fifths, or missing), total energy intake (for initial value, kcal/day; for change value, fifths), and modified alternate Healthy Eating Index score (fifths for both initial and change value).