

Online-Only Supplemental Material

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Supplemental Table S1: The odds ratio and 95 % CIs for the association of dietary choline and betaine intake per 1 standard deviation increase as a continuous variable with the risk of type 2 diabetes

	<i>Overall</i>	<i>Female</i>	<i>Male</i>
<i>Choline</i>	<i>OR (95% CI)</i>	<i>OR (95% CI)</i>	<i>OR (95% CI)</i>
<i>Model 1</i>	1.06 (0.99, 1.14)	1.05 (0.95, 1.17)	1.06 (0.96, 1.17)
<i>Model 2</i>	1.00 (0.91, 1.11)	1.07 (0.94, 1.23)	0.94 (0.82, 1.08)
<i>Model 3</i>	1.00 (0.84, 1.18)	1.17 (0.91, 1.50)	0.92 (0.73, 1.15)
<i>Betaine</i>			
<i>Model 1</i>	0.96 (0.89, 1.03)	1.01 (0.91, 1.14)	0.91 (0.81, 1.02)
<i>Model 2</i>	1.00 (0.92, 1.10)	1.06 (0.93, 1.22)	0.94 (0.82, 1.08)
<i>Model 3</i>	0.99 (0.90, 1.09)	1.02 (0.88, 1.18)	0.96 (0.83, 1.11)

Abbreviations: BMI, body mass index; FBG, fasting blood glucose

Model 1 mutually adjusted for choline and betaine and further adjusted for age, sex (in overall models), race, log-BMI, education, smoking, and alcohol

Model 2 further adjusted for total calorie intake and FBG

Model 3 further adjusted for magnesium, vitamin B6, vitamin B12, methionine, animal fat, animal protein, and folate intake.

Supplemental Table S2: The odds ratio and 95 % CIs for the association of dietary choline and betaine intake with the risk of type 2 diabetes

<i>Choline Quartiles</i>	<i>Quartile 1</i>	<i>Quartile 2</i>	<i>Quartile 3</i>	<i>Quartile 4</i>	<i>P-value</i>
<i>Model 1</i>	1.00 (<i>Ref</i>)	1.09 (0.91, 1.30)	1.20 (1.00, 1.44)	1.23 (1.00, 1.51)	0.049
<i>Model 2</i>	1.00 (<i>Ref</i>)	1.06 (0.88, 1.28)	1.13 (0.93, 1.38)	1.15 (1.00, 1.48)	0.303
<i>Model 3</i>	1.00 (<i>Ref</i>)	1.07 (0.88, 1.28)	1.16 (0.92, 1.45)	1.22 (0.89, 1.66)	0.260
<i>Sensitivity Analysis</i>					
<i>Model 3</i>	1.00 (<i>Ref</i>)	1.18 (0.93, 1.50)	1.26 (0.96, 1.65)	1.26 (0.86, 1.84)	0.260
<i>Betaine Quartiles</i>					
<i>Model 1</i>	1.00 (<i>Ref</i>)	0.99 (0.83, 1.18)	1.03 (0.86, 1.23)	0.92 (0.75, 1.13)	0.401
<i>Model 2</i>	1.00 (<i>Ref</i>)	0.98 (0.82, 1.18)	1.08 (0.88, 1.31)	1.02 (0.81, 1.29)	0.812
<i>Model 3</i>	1.00 (<i>Ref</i>)	0.96 (0.80, 1.16)	1.04 (0.84, 1.27)	0.99 (0.77, 1.26)	0.930
<i>Sensitivity Analysis*</i>					
<i>Model 3</i>	1.00 (<i>Ref</i>)	0.95 (0.76, 1.19)	0.95 (0.75, 1.22)	1.04 (0.78, 1.38)	0.930

Abbreviations: BMI, body mass index; FBG, fasting blood glucose; Log, logarithm transformed

P-value is p for trend computed by modeling the quartile median of each nutrient as the predictor variable

Model 1 mutually adjusted for choline and betaine and further adjusted for age, sex, race, log-BMI, education, smoking, and alcohol

Model 2 further adjusted for total calorie intake and baseline FBG

Model 3 further adjusted for magnesium, vitamin B6, vitamin B12, methionine, animal fat, and folate intake

*In sensitivity analyses we limited estimates to participants without insulin resistance at baseline.

Supplemental Table S3: The odds ratio and 95 % CIs for the association of dietary choline and betaine intake with the risk of type 2 diabetes stratified by gender

<i>Female</i>					
<i>Choline Quartiles</i>	Quartile 1	Quartile 2	Quartile 3	Quartile 4	<i>P-value</i>
<i>Model 1</i>	1.00 (<i>Ref</i>)	1.19 (0.94, 1.50)	1.27 (0.99, 1.62)	1.36 (1.02, 1.80)	0.122
<i>Model 2</i>	1.00 (<i>Ref</i>)	1.27 (0.98, 1.64)	1.34 (1.01, 1.77)	1.56 (1.09, 2.24)	0.041
<i>Model 3</i>	1.00 (<i>Ref</i>)	1.36 (1.03, 1.79)	1.48 (1.06, 2.06)	1.87 (1.17, 3.00)	0.027
<i>Betaine Quartiles</i>					
<i>Model 1</i>	1.00 (<i>Ref</i>)	1.11 (0.88, 1.41)	1.29 (1.02, 1.65)	1.17 (0.88, 1.56)	0.502
<i>Model 2</i>	1.00 (<i>Ref</i>)	1.14 (0.88, 1.47)	1.47 (1.12, 1.92)	1.35 (0.97, 1.88)	0.091
<i>Model 3</i>	1.00 (<i>Ref</i>)	1.11 (0.85, 1.44)	1.39 (1.05, 1.84)	1.21 (0.86, 1.72)	0.282
<i>Male</i>					
<i>Choline Quartiles</i>	Quartile 1	Quartile 2	Quartile 3	Quartile 4	<i>P-value</i>
<i>Model 1</i>	1.00 (<i>Ref</i>)	1.00 (0.77, 1.29)	1.14 (0.88, 1.47)	1.15 (0.87, 1.53)	0.182
<i>Model 2</i>	1.00 (<i>Ref</i>)	0.90 (0.68, 1.18)	0.98 (0.73, 1.30)	0.87 (0.61, 1.24)	0.662
<i>Model 3</i>	1.00 (<i>Ref</i>)	0.89 (0.67, 1.18)	0.97 (0.71, 1.33)	0.89 (0.58, 1.37)	0.849
<i>Betaine Quartiles</i>					
<i>Model 1</i>	1.00 (<i>Ref</i>)	0.92 (0.72, 1.17)	0.85 (0.66, 1.10)	0.78 (0.59, 1.03)	0.054
<i>Model 2</i>	1.00 (<i>Ref</i>)	0.87 (0.66, 1.13)	0.80 (0.61, 1.06)	0.79 (0.57, 1.09)	0.192
<i>Model 3</i>	1.00 (<i>Ref</i>)	0.86 (0.66, 1.12)	0.79 (0.59, 1.05)	0.81 (0.58, 1.13)	0.271

Abbreviations: BMI, body mass index; FBG, fasting blood glucose; Log, logarithm transformed

P-value is p for trend computed by modeling the quartile median of each nutrient as the predictor variable

Model 1 mutually adjusted for choline and betaine and further adjusted for age, race, log-BMI, education, smoking, and alcohol

Model 2 further adjusted for total calorie intake and baseline FBG

Model 3 further adjusted for magnesium, vitamin B6, vitamin B12, methionine, animal fat, and folate intake