Supplementary Table 1 Definition of selected characters.

Variables	Definition
Smoking	Smokers were those who have smoked at least one cigarette per day for 6 months or more and categorized as yes and no.
Alcohol drinking	Alcohol drinkers were those who have drunk alcohol at least once a week for 6 months or more and categorized as yes and no.
Tea drinking	Tea drinkers were those who have drunk tea at least once a week for 6 months or more and categorized as yes and no.
Dietary change	A change of diet habits before diagnosis and categorized as yes and no.
Physical activity	Physical activity (in metabolic equivalent hours per day (MET-hours/day)) was estimated using the updated 2011 Compendium of Physical Activities, based on work, commuting, household chores, and leisure-time exercise.

Supplementary Table 2 Selected clinical characteristics and associations with total mortality among ovarian cancer patients (N=635).

Characteristics	No. of deaths/total (%)	Adjusted HR * (95%CI)
Age at diagnosis		
≤50	39/232 (16.81)	1.00 (Ref)
>50	75/403 (18.61)	1.21 (0.71, 2.07)
Histological type		
Serous	80/430 (18.60)	1.00 (Ref)
Non-serous	34/205 (16.59)	0.83 (0.39, 1.78)
Histopathologic grade		
Well differentiated	4/47 (8.51)	1.00 (Ref)
Moderately differentiated	7/44 (15.91)	2.33 (0.31, 17.48)
Poorly differentiated	103/522 (19.73)	3.65 (0.42, 31.48)
FIGO stage		
I-II	37/306 (12.09)	1.00 (Ref)
III-IV	77/307 (25.08)	2.79 (1.51, 5.16)
Residual lesions		
No	74/499 (14.83)	1.00 (Ref)
<1 cm	28/99 (28.28)	2.12 (1.08, 4.15)
≥1 cm	12/37 (32.43)	3.11 (1.39, 6.98)
Comorbidities		
No	64/355 (18.03)	1.00 (Ref)
Yes	50/280 (18.86)	0.78 (0.47, 1.29)
Vimentin expression		
Negative	53/319 (16.61)	1.00 (Ref)

Positive	27/142 (19.01)	1.20 (0.66, 2.19)
PR expression		
Negative	54/238 (22.69)	1.00 (Ref)
Positive	42/290 (14.48)	0.73 (0.41, 1.31)
ER expression		
Negative	26/117 (22.22)	1.00 (Ref)
Positive	70/411 (17.03)	0.52 (0.24, 1.11)
WT-1 expression		
Negative	38/168 (22.62)	1.00 (Ref)
Positive	51/342 (14.91)	0.45 (0.24, 0.85)
P53 expression		
Negative	23/139 (16.55)	1.00 (Ref)
Positive	81/423 (19.15)	1.45 (0.78, 2.71)

CI, confidence interval; ER, Estrogen Receptor; HR, hazard ratio; PR, Progesterone Receptor; Ref, reference. WT-1, Wilms' tumour-1.

* Mutually adjusted for all other variables listed in the table.

Supplementary Table 3 Relative excess risk due to interaction (RERI) and 95% confidence interval (CI) for additive interaction between selected factors and dietary fat-soluble choline, water-soluble choline, total choline, and betaine intake.

Selected factors	RERI (95% CI) **			
	Higher fat-soluble choline * (>154.72 mg/day)	Higher water-soluble choline * (>45.86 mg/day)	Higher total choline * (>275.04 mg/day)	Higher betaine * (>49.22 mg/day)
Age at diagnosis (years) (>50)	-0.63 (-2.32, 1.06)	-1.28 (-3.84, 1.27)	-0.40 (-1.81, 1.01)	-0.11 (-1.11, 0.89)
Body mass index (kg/m^2) (≥25)	0.09 (-0.23, 0.40)	0.10 (-0.35, 0.52)	0.06 (-0.2, 0.38)	-0.03 (-0.39, 0.33)
Menopausal status (Yes)	0.18 (-0.48, 0.85)	-0.08 (-0.88, 0.72)	0.48 (0.06, 0.90)	-0.29 (-1.32, 0.75)
Alcohol drinking (Yes)	0.40 (-0.10, 0.91)	-0.24 (-1.75, 1.27)	0.29 (-0.41, 0.99)	0.44 (0.10, 0.78)
Histological type (non-serous)	-0.85 (-3.35, 1.65)	0.47 (-0.09, 1.04)	-0.28 (-1.92, 1.37)	-0.19 (-1.75, 1.37)
FIGO stage (III-IV)	0.14 (-0.86, 1.15)	0.57 (0.09, 1.04)	0.26 (-0.58, 1.11)	-0.31 (-1.99, 1.38)
Residual lesions (Yes)	0.36 (-0.23, 0.95)	0.44 (-0.02, 0.90)	0.35 (-0.25, 0.94)	0.45 (-0.03, 0.93)
Vimentin expression (Positive)	0.08(-1.04, 1.19)	-3.32 (-10.22, 3.58)	-2.64 (-8.14, 2.87)	0.03 (-1.03, 1.09)
PR expression (Positive)	0.22 (-0.29, 0.73)	-0.47 (-1.64, 0.70)	0.37 (-0.02, 0.76)	0.28 (-0.15, 0.71)
ER expression (Positive)	0.62 (0.28, 0.95)	0.07 (-0.68, 0.83)	0.39 (-0.13, 0.91)	0.11 (-0.64, 0.87)
WT_1 expression (Positive)	0.64 (0.39, 0.89)	0.25 (-0.26, 0.77)	0.44 (0.04, 0.84)	0.35 (-0.08, 0.78)
P53 expression (Positive)	0.02 (-1.04, 1.08)	-0.59 (-2.32, 1.14)	-0.74 (-2.84, 1.36)	-1.32 (-4.27, 1.63)

CI, confidence interval; ER, Estrogen Receptor; HR, hazard ratio; PR, Progesterone Receptor; Ref, reference; RERI, relative excess risk due to interaction; WT-1, Wilms' tumour-1.

*Adjusted for energy by the residual method.

** Test for interaction based on strata and dietary fat-soluble choline, water-soluble choline, total choline, and betaine intake.

Supplementary Table 4 Relative excess risk due to interaction (RERI) and 95% confidence interval (CI) for additive interaction between selected factors and dietary choline-containing compounds intake.

Selected factors	RERI (95% CI) **				
	Higher phosphatidylcholine * (>144.83 mg/day)	Higher sphingomyelin * (>10.17 mg/day)	Higher free choline * (>21.96 mg/day)	Higher glycerophospho-choline * (>15.59 mg/day)	Higher phosphocholine * (>6.33 mg/day)
Age at diagnosis (years) (>50)	-0.66 (-2.40, 1.07)	-0.24 (-1.43, 0.95)	-0.66 (-2.43, 1.10)	-0.02 (-0.78, 0.73)	-1.08 (-3.37, 1.20)
Body mass index (kg/m^2) (≥25)	0.09 (-0.23, 0.40)	0.07 (-0.27, 0.40)	0.09 (-0.22, 0.40)	-0.03 (-0.54, 0.49)	0.07 (-0.31, 0.44)
Menopausal status (Yes)	0.17 (-0.50, 0.85)	0.19 (-0.45, 0.84)	-0.24 (-1.33, 0.85)	0.34 (-0.09, 0.77)	0.04 (-0.69, 0.77)
Alcohol drinking (Yes)	0.40 (-0.10, 0.90)	0.52 (0.23, 0.82)	-1.94 (-6.11, 2.23)	-0.31 (-2.03, 1.40)	-0.32 (-1.94, 1.30)
Histological type (non-serous)	-0.89 (-3.45, 1.67)	-0.11 (-1.54, 1.31)	0.32 (-0.41, 1.05)	0.57 (0.01, 1.10)	0.53 (0.12, 0.94)
FIGO stage (III-IV)	0.15 (-0.84, 1.14)	0.50 (-0.04, 1.04)	0.51 (-0.01, 1.03)	0.58 (-0.47, 1.63)	0.42 (-0.23, 1.06)
Residual lesions (Yes)	0.37 (-0.22, 0.95)	0.59 (0.19, 0.98)	0.12 (-0.65, 0.89)	0.28 (-0.17, 0.74)	0.17 (-0.47, 0.81)
Vimentin expression (Positive)	0.12 (-0.92, 1.16)	0.11 (-0.93, 1.15)	-2.74 (-8.61, 3.14)	-0.50 (-2.54, 1.53)	-0.45 (-2.41, 1.51)
PR expression (Positive)	0.21 (-0.31, 0.72)	0.25 (-0.21, 0.71)	0.24 (-0.33, 0.80)	-0.62 (-1.68, 0.45)	-0.25 (-1.24, 0.74)
ER expression (Positive)	0.60 (0.26, 0.94)	0.41 (-0.08, 0.91)	0.52 (0.10, 0.94)	0.02 (-0.72, 0.77)	0.32 (-0.25, 0.89)
WT-1 expression (Positive)	0.65 (0.40, 0.89)	0.45 (0.08, 0.83)	0.59 (0.30, 0.89)	-0.45 (-1.38, 0.48)	0.00 (-0.74, 0.74)
P53 expression (Positive)	0.00 (-1.09, 1.09)	-0.32 (-1.82, 1.18)	-2.43 (-7.20, 2.33)	0.05 (-0.63, 0.74)	-0.37 (-1.89, 1.16)

CI, confidence interval; ER, Estrogen Receptor; HR, hazard ratio; PR, Progesterone Receptor; Ref, reference; RERI, relative excess risk due to interaction; WT-1, Wilms' tumour-1.

* Adjusted for energy by the residual method.

** Test for interaction based on strata and dietary choline-containing compounds intake.

Supplementary Table 5 Adjusted hazard ratio (HR) and 95% confidence interval (CI) for total mortality by total choline, individual choline-containing compounds and betaine intake after removing deaths occurring in 1 year of follow-up (N=600).

Characteristics	Tertiles of energy-adjusted intake **			Continuous †	P trend ‡
	I	II	III		
Free choline (Range, mg/d)	<19.71	19.71-24.45	24.45-51.50	□	□
Deaths, N (% of total deaths)	26 (32.91)	28 (35.44)	25 (31.65)	□	□
model 1	1.00 (Ref)	1.12 (0.66, 1.91)	0.80 (0.46, 1.39)	0.95 (0.73, 1.23)	0.40
model 2	1.00 (Ref)	1.28 (0.74, 2.22)	0.77 (0.44, 1.34)	0.93 (0.72, 1.19)	0.30
model 3	1.00 (Ref)	1.16 (0.66, 2.03)	0.78 (0.44, 1.38)	0.91 (0.70, 1.18)	0.35
Glycerophosphocholine (Range, mg/d)	<13.13	13.13-17.55	17.55-64.38	□	□
Deaths, N (% of total deaths)	26 (32.91)	26 (32.91)	27 (34.18)	□	□
model 1	1.00 (Ref)	0.87 (0.50, 1.50)	0.96 (0.56, 1.65)	1.04 (0.84, 1.28)	0.95
model 2	1.00 (Ref)	0.97 (0.54, 1.74)	0.96 (0.55, 1.67)	1.04 (0.85, 1.28)	0.90
model 3	1.00 (Ref)	1.05 (0.58, 1.90)	0.97 (0.56, 1.70)	1.07 (0.86, 1.32)	0.89
Phosphocholine (Range, mg/d)	<5.28	5.28-7.53	7.53-17.21	□	□
Deaths, N (% of total deaths)	29 (36.71)	22 (27.85)	28 (35.44)	□	□
model 1	1.00 (Ref)	0.70 (0.40, 1.23)	0.88 (0.52, 1.47)	0.87 (0.65, 1.16)	0.69
model 2	1.00 (Ref)	0.70 (0.40, 1.23)	0.82 (0.48, 1.39)	0.87 (0.66, 1.14)	0.52
model 3	1.00 (Ref)	0.73 (0.41, 1.31)	0.86 (0.50, 1.48)	0.88 (0.66, 1.16)	0.65
Phosphatidylcholine (Range, mg/d)	<116.99	116.99-171.96	171.96-362.92	□	□
Deaths, N (% of total deaths)	32 (40.51)	32 (40.51)	15 (18.99)	□	□
model 1	1.00 (Ref)	0.90 (0.55, 1.48)	0.43 (0.23, 0.79)	0.71 (0.52, 0.96)	0.01
model 2	1.00 (Ref)	0.81 (0.49, 1.34)	0.40 (0.22, 0.75)	0.72 (0.53, 0.97)	0.00

model 3	1.00 (Ref)	0.84 (0.50, 1.41)	0.41 (0.22, 0.78)	0.73 (0.54, 0.99)	0.01
Sphingomyelin (Range, mg/d)	<8.47	8.47-12.14	12.14-22.64	□	□
Deaths, N (% of total deaths)	29 (36.71)	31 (39.24)	19 (24.05)	□	□
model 1	1.00 (Ref)	1.02 (0.61, 1.70)	0.61 (0.34, 1.10)	0.78 (0.58, 1.03)	0.10
model 2	1.00 (Ref)	1.00 (0.60, 1.68)	0.63 (0.35, 1.14)	0.80 (0.61, 1.06)	0.12
model 3	1.00 (Ref)	1.11 (0.66, 1.89)	0.68 (0.38, 1.23)	0.83 (0.63, 1.10)	0.20
Water-soluble choline (Range, mg/d)	<39.63	39.63-49.27	49.27-117.37	□	□
Deaths, N (% of total deaths)	26 (32.91)	24 (30.38)	29 (36.71)	□	□
model 1	1.00 (Ref)	0.85 (0.48, 1.48)	0.98 (0.58, 1.67)	0.98 (0.77, 1.25)	0.99
model 2	1.00 (Ref)	0.86 (0.48, 1.54)	0.94 (0.55, 1.61)	0.97 (0.77, 1.23)	0.86
model 3	1.00 (Ref)	0.87 (0.48, 1.57)	0.92 (0.53, 1.59)	0.98 (0.77, 1.24)	0.80
Fat-soluble choline (Range, mg/d)	<125.22	125.22-183.84	183.84-389.56	□	□
Deaths, N (% of total deaths)	31 (39.24)	33 (41.77)	15 (18.99)	□	□
model 1	1.00 (Ref)	0.94 (0.57, 1.54)	0.43 (0.23, 0.81)	0.71 (0.52, 0.97)	0.01
model 2	1.00 (Ref)	0.86 (0.52, 1.43)	0.41 (0.22, 0.77)	0.73 (0.54, 0.98)	0.01
model 3	1.00 (Ref)	0.89 (0.53, 1.49)	0.42 (0.22, 0.80)	0.74 (0.55, 1.01)	0.01
Total Choline (Range, mg/d)	<245.60	245.60-310.02	310.02-523.38	□	□
Deaths, N (% of total deaths)	32 (40.51)	31 (39.24)	16 (20.25)	□	□
model 1	1.00 (Ref)	0.89 (0.54, 1.47)	0.45 (0.25, 0.83)	0.72 (0.55, 0.95)	0.01
model 2	1.00 (Ref)	0.79 (0.48, 1.32)	0.40 (0.21, 0.74)	0.71 (0.55, 0.93)	0.00
model 3	1.00 (Ref)	0.76 (0.45, 1.28)	0.39 (0.21, 0.73)	0.73 (0.55, 0.96)	0.00
Betaine (Range, mg/d)	<41.35	41.35-61.55	61.55-361.14	□	□
Deaths, N (% of total deaths)	23 (29.11)	26 (32.91)	30 (37.97)	□	□
model 1	1.00 (Ref)	1.01 (0.58, 1.78)	1.24 (0.72, 2.14)	1.02 (0.83, 1.25)	0.40

model 2	1.00 (Ref)	1.17 (0.65, 2.11)	1.32 (0.76, 2.30)	1.01 (0.83, 1.23)	0.34
model 3	1.00 (Ref)	1.14 (0.63, 2.04)	1.29 (0.74, 2.25)	0.99 (0.82, 1.21)	0.38

CI, confidence interval; HR, hazard ratio; Ref, reference.

* HR and 95% CI were calculated with the use of the Cox proportional hazards regression model.

** Adjusted for energy by the residual method.

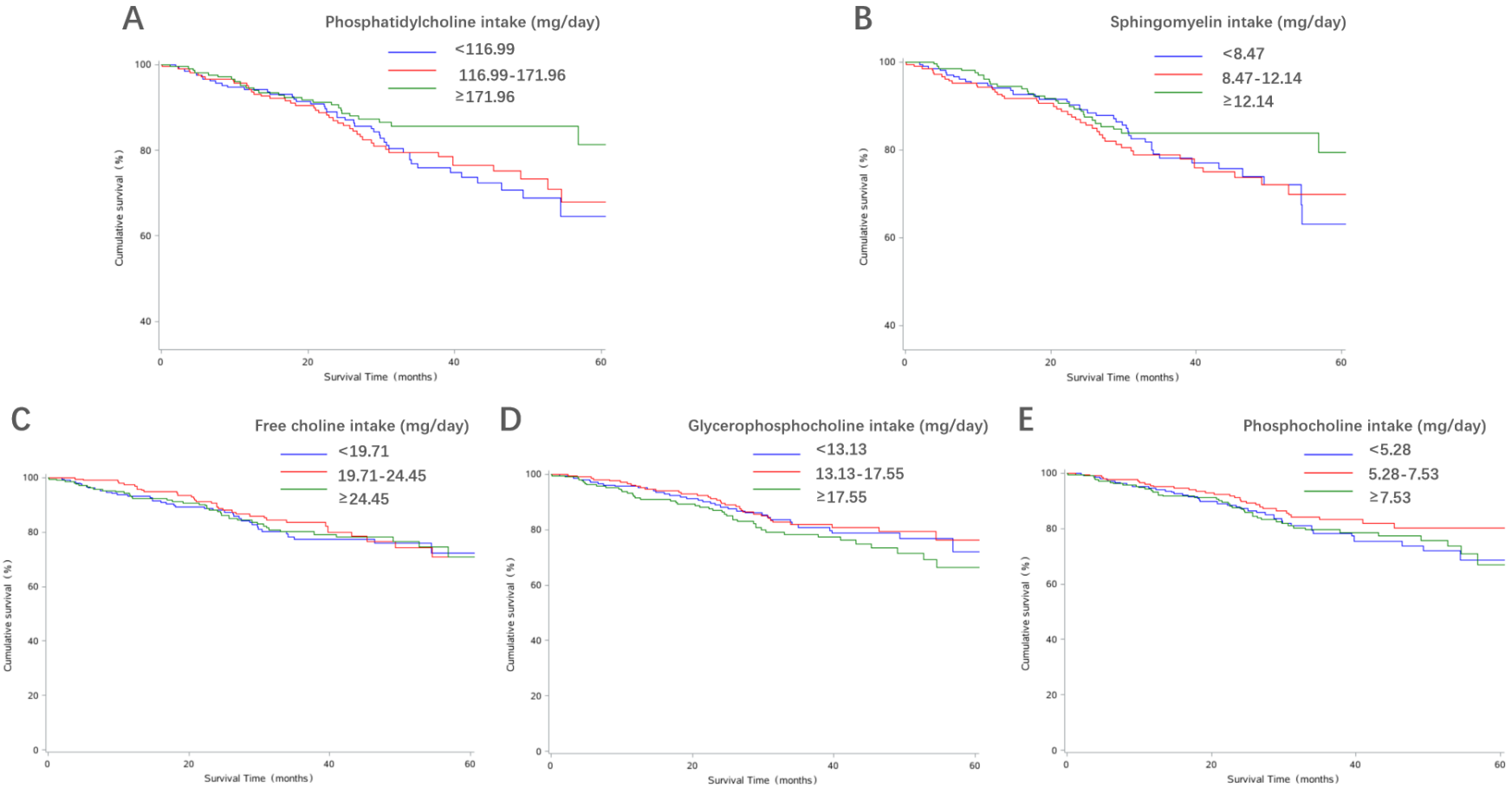
† Continuous intakes were calculated by per unit increase.

‡ Test for trend based on variables containing the median value for each tertile.

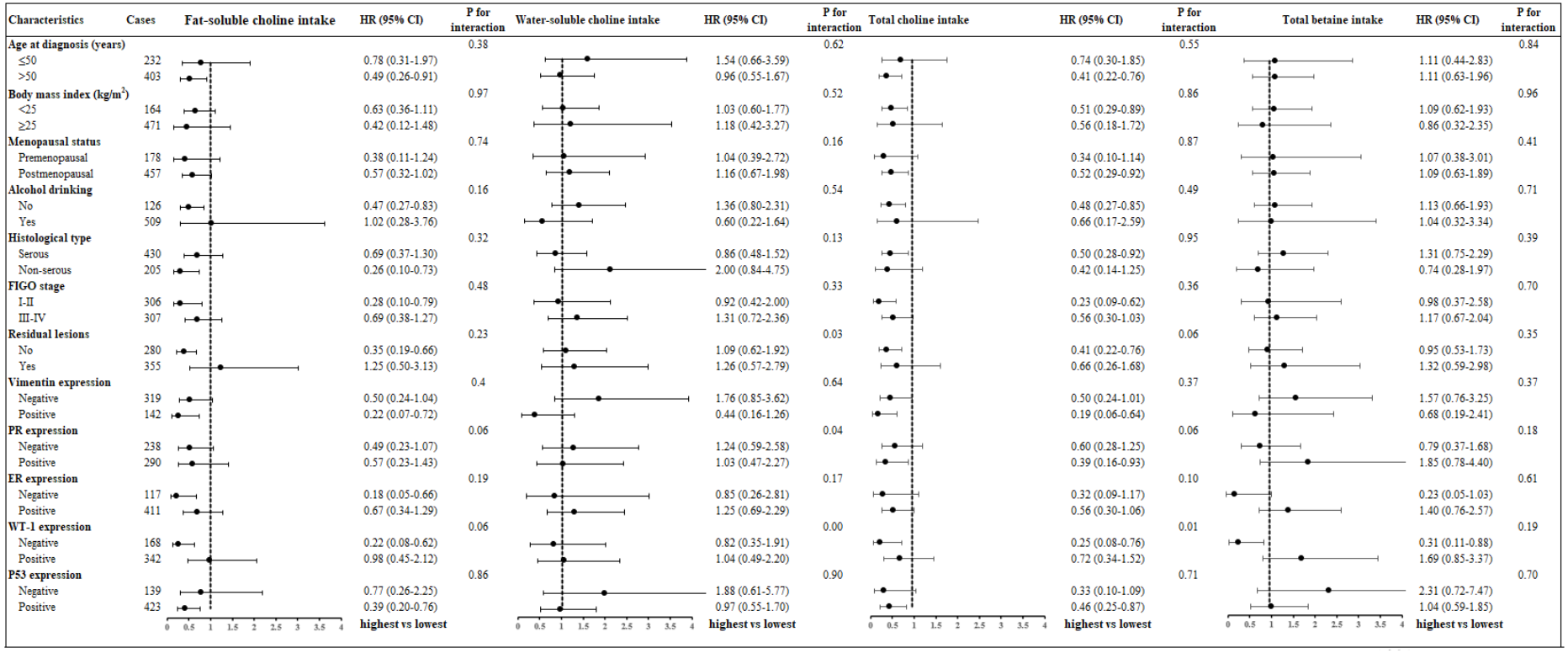
Model 1 adjusted for age at diagnosis and body mass index.

Model 2 adjusted for age at diagnosis, total energy intake, body mass index, alcohol drinking, diet change, education, income, physical activity, menopausal status, parity.

Model 3 adjusted for age at diagnosis, total energy intake, body mass index, alcohol drinking, diet change, education, income, physical activity, menopausal status, parity, comorbidities, FIGO stage, histological type, histopathologic grade, and residual lesions.



Supplementary Figure 1 Kaplan–Meier survival curves for phosphatidylcholine (A), sphingomyelin (B), free choline (C), glycerophosphocholine (D), and phosphocholine intake (E).

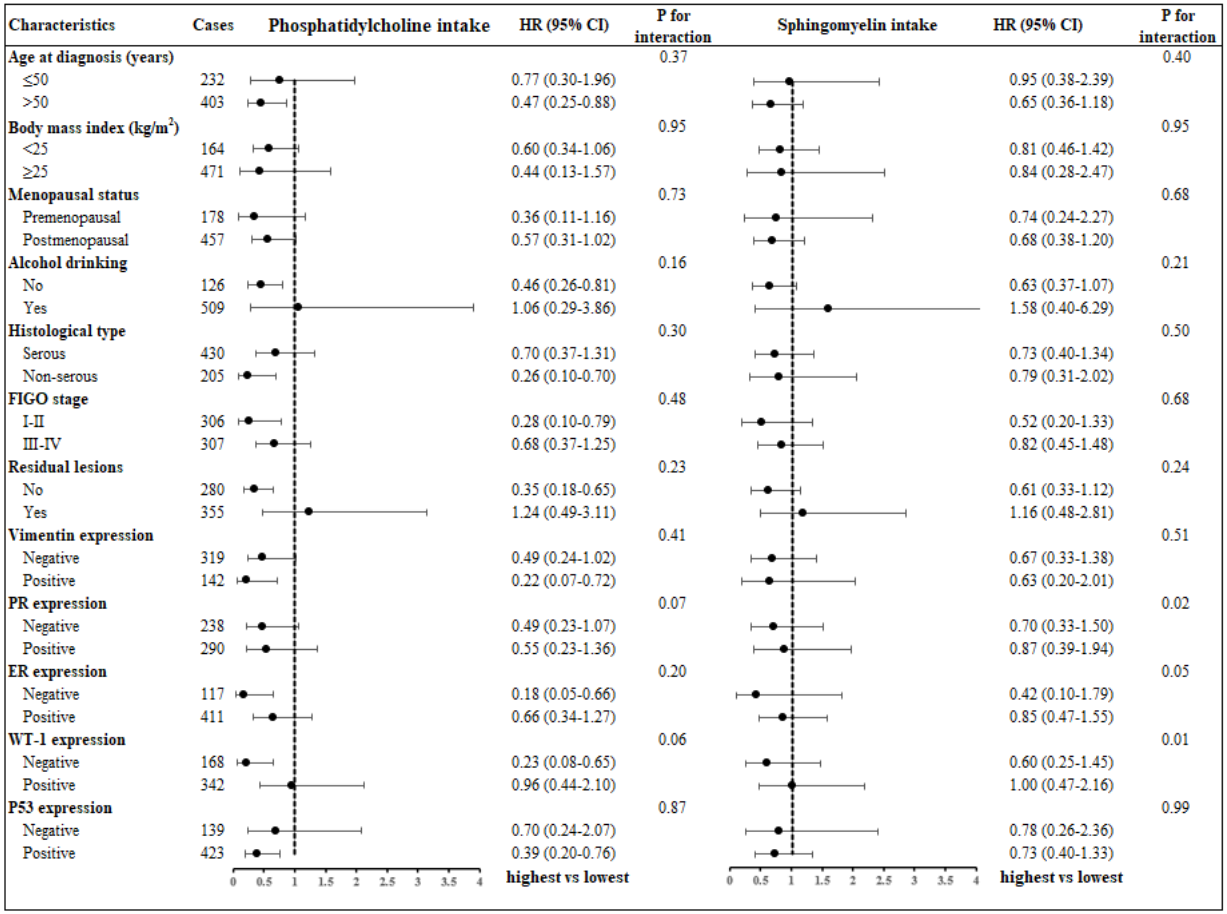


Supplementary Figure 2 Subgroup analyses for the association between dietary fat-soluble choline, water-soluble choline, total choline, betaine intake and total mortality of ovarian cancer for the highest vs. lowest category (n = 635).

Dietary fat-soluble choline, water-soluble choline, total choline, and betaine intake was adjusted for energy by the residual method. Data were presented as adjusted hazard ratio (HR) and 95% confidence intervals (CIs). The association were analyzed for each subgroup with the use of fully

adjusted Cox proportional hazards regression model. Cross-product terms were used to evaluate multiplicative interactions.

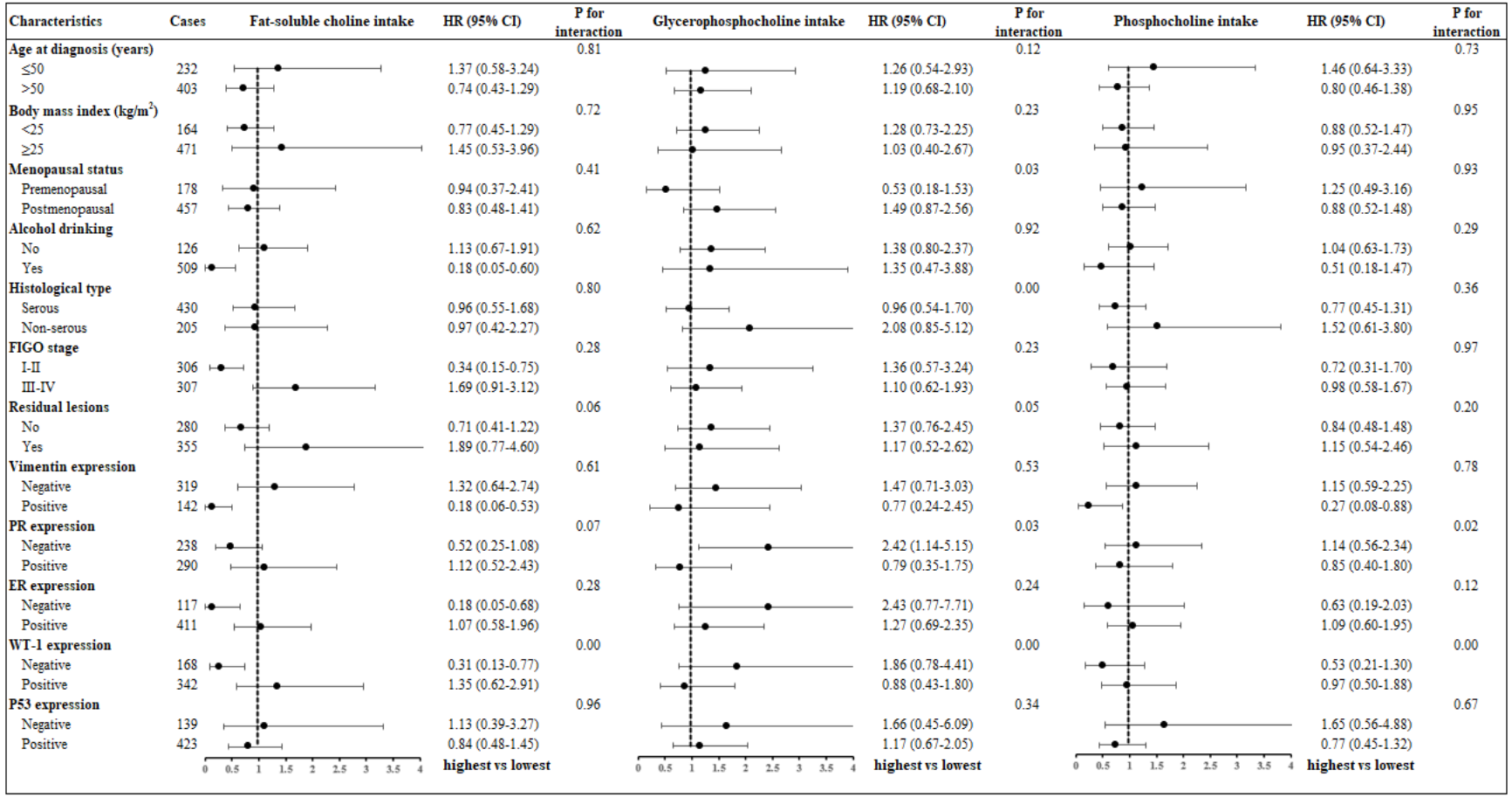
ER, Estrogen Receptor; PR, Progesterone Receptor; WT-1, Wilms' tumour-1.



Supplementary Figure 3 Subgroup analyses for the association between dietary phosphatidylcholine, and sphingomyelin intake and total mortality of ovarian cancer for the highest vs. lowest category (n = 635).

Dietary phosphatidylcholine, sphingomyelin intake was adjusted for energy by the residual method. Data were presented as adjusted hazard ratio (HR) and 95% confidence intervals (CIs). The associations were analyzed for each subgroup with the use of fully adjusted Cox proportional hazards regression model. Cross-product terms were used to evaluate multiplicative interactions.

ER, Estrogen Receptor; PR, Progesterone Receptor; WT-1, Wilms' tumour-1.



Supplementary Figure 4 Subgroup analyses for the association between dietary free choline, glycerophosphocholine, and phosphocholine intake and total mortality of ovarian cancer for the highest vs. lowest category (n = 635).

Dietary free choline, glycerophosphocholine, phosphocholine intake was adjusted for energy by the residual method. Data were presented as adjusted hazard ratio (HR) and 95% confidence intervals (CIs). The associations were analyzed for each subgroup with the use of fully adjusted Cox proportional hazards regression model. Cross-product terms were used to evaluate multiplicative interactions.

ER, Estrogen Receptor; PR, Progesterone Receptor; WT-1, Wilms' tumour-1.