Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. RRs of AMD according to quintiles of predicted plasma carotenoid scores and calculated intakes in NHS

	Advanced AMD						Intermediate AMD			
	Predicted plasma level				¶Calculated intake		Predicted plasma level			¶Calculated intake
Quintiles (median, µg/L)	Person-years	Cases	Age-adjusted RR	Multivariate RR (95% CI)	Quintiles (median, ug)	Multivariate RR (95% CI)	Cases	Age-adjusted RR	Multivariate RR (95% CI)	Multivariate RR (95% CI)
Lutein/Zeaxanthin										
Q1 (152)	221,930	175	1 (Ref.)	1 (Ref.)	1,408	1 (Ref.)	206	1 (Ref.)	1 (Ref.)	1 (Ref.)
Q2 (161)	222,331	151	0.83	0.83 (0.66,1.03)	2,098	0.84 (0.67,1.04)	198	0.93	0.96 (0.78,1.16)	0.82 (0.67,1.00)
Q3 (169)	222,557	175	0.93	0.92 (0.74,1.14)	2,680	0.78 (0.63,0.98)	192	0.87	0.91 (0.74,1.11)	0.91 (0.74,1.11)
Q4 (179)	222,865	157	0.83	0.81 (0.64,1.01)	3,389	0.72 (0.57,0.91)	188	0.84	0.89 (0.72,1.09)	0.93 (0.76,1.14)
Q5 (198)	222,585	115	0.60	0.59 (0.46,0.76)	4,834	0.68 (0.54,0.87)	199	0.88	0.94 (0.76,1.16)	0.90 (0.72,1.11)
p for trend			<.0001	<.0001		0.003		0.16	0.53	0.73
β-cryptoxanthin										
Q1 (59)	221,975	150	1 (Ref.)	1 (Ref.)	80	1 (Ref.)	187	1 (Ref.)	1 (Ref.)	1 (Ref.)
Q2 (65)	222,325	158	0.92	0.98 (0.78,1.23)	128	0.79 (0.62,0.99)	170	0.81	0.86 (0.70,1.06)	0.96 (0.78,1.18)
Q3 (72)	222,623	151	0.80	0.87 (0.69,1.10)	171	0.85 (0.68,1.07)	214	0.94	1.02 (0.84,1.25)	1.01 (0.82,1.24)
Q4 (89)	222,625	172	0.84	0.94 (0.75,1.17)	218	0.82 (0.66,1.03)	204	0.83	0.93 (0.76,1.14)	0.93 (0.76,1.15)
Q5 (93)	222,720	142	0.64	0.74 (0.58,0.93)	297	0.70 (0.55,0.88)	208	0.79	0.92 (0.75,1.13)	0.98 (0.79,1.20)
p for trend			0.0001	0.01		0.009		0.04	0.66	0.79
Lycopene										
Q1 (354)	222,439	203	1 (Ref.)	1 (Ref.)	3,322	1 (Ref.)	264	1 (Ref.)	1 (Ref.)	1 (Ref.)
Q2 (370)	222,454	173	1.03	1.01 (0.82,1.24)	4,693	1.05 (0.85,1.29)	205	0.92	0.92 (0.77,1.11)	1.01 (0.84,1.21)
Q3 (383)	222,524	147	1.01	0.98 (0.79,1.21)	5,814	1.03 (0.84,1.28)	190	0.97	0.97 (0.80,1.17)	0.93 (0.76,1.13)
Q4 (400)	222,622	124	0.95	0.91 (0.72,1.14)	7,205	0.76 (0.60,0.97)	158	0.88	0.88 (0.72,1.08)	1.01 (0.83,1.23)
Q5 (438)	222,229	126	1.10	1.04 (0.82,1.30)	9,909	1.04 (0.83,1.29)	166	1.04	1.03 (0.84,1.25)	1.05 (0.86,1.28)
p for trend			0.57	0.99		0.60		0.80	0.88	0.61
α-carotene										
Q1 (51)	221,588	163	1 (Ref.)	1 (Ref.)	323	1 (Ref.)	191	1 (Ref.)	1 (Ref.)	1 (Ref.)
Q2 (55)	222,435	174	0.93	0.99 (0.79,1.22)	507	0.72 (0.58,0.91)	190	0.88	0.92 (0.75,1.13)	1.00 (0.81,1.23)
Q3 (58)	222,649	156	0.76	0.83 (0.66,1.04)	681	0.81 (0.65,1.01)	204	0.87	0.94 (0.77,1.16)	1.07 (0.87,1.33)
Q4 (65)	222,787	154	0.74	0.82 (0.65,1.03)	932	0.81 (0.65,1.01)	184	0.77	0.85 (0.69,1.05)	1.18 (0.96,1.45)
Q5 (79)	222,810	126	0.57	0.64 (0.50,0.82)	1,429	0.61 (0.48,0.77)	214	0.84	0.96 (0.78,1.18)	1.05 (0.85,1.30)
p for trend			<.0001	0.0001		0.0007		0.12	0.80	0.51

β-carotene									
Q1 (198)	221,515	145	1 (Ref.)	1 (Ref.)	2,278	1 (Ref.)	175	1 (Ref.)	1 (Ref.)
Q2 (215)	222,388	167	1.00	1.01 (0.81,1.27)	3,312	1.07 (0.85,1.34)	192	0.95	0.97 (0.79,1.20)	1.05 (0.85,1.29)
Q3 (231)	222,589	164	0.92	0.96 (0.76,1.21)	4,220	1.07 (0.84,1.34)	210	0.98	1.03 (0.84,1.27)	1.12 (0.90,1.38)
Q4 (254)	222,858	139	0.74	0.78 (0.61,1.00)	5,353	0.84 (0.65,1.08)	190	0.85	0.92 (0.74,1.15)	1.10 (0.89,1.36)
Q5 (315)	222,917	158	0.83	0.88 (0.69,1.13)	7,584	0.86 (0.66,1.11)	216	0.94	1.04 (0.83,1.29)	1.02 (0.81,1.28)
p for trend			0.02	0.15		0.05		0.49	0.74	0.97
β-carotene from food									
Q1 (200)	214,856	151	1 (Ref.)	1 (Ref.)	2,151	1 (Ref.)	170	1 (Ref.)	1 (Ref.)	1 (Ref.)
Q2 (215)	214,310	160	0.91	0.90 (0.72,1.13)	3,092	0.98 (0.78,1.24)	179	0.91	0.93 (0.75,1.16)	0.84 (0.68,1.04)
Q3 (229)	212,920	147	0.78	0.78 (0.61,0.99)	3,913	0.91 (0.72,1.15)	191	0.91	0.96 (0.77,1.19)	0.98 (0.80,1.21)
Q4 (248)	211,231	151	0.78	0.78 (0.61,0.99)	4,907	0.78 (0.61,0.99)	185	0.86	0.94 (0.75,1.17)	0.97 (0.78,1.20)
Q5 (289)	208,284	135	0.66	0.66 (0.51,0.85)	6,759	0.66 (0.51,0.85)	205	0.91	1.02 (0.81,1.28)	0.91 (0.73,1.14)
p for trend			0.0003	0.001		0.0002		0.44	0.69	0.80
Total carotene from food									
Q1 (253)	214,758	152	1 (Ref.)	1 (Ref.)	2,668	1 (Ref.)	175	1 (Ref.)	1 (Ref.)	1 (Ref.)
Q2 (271)	214,258	170	0.94	0.94 (0.75,1.18)	3,865	1.05 (0.83,1.31)	174	0.84	0.87 (0.70,1.08)	0.90 (0.73,1.12)
Q3 (289)	213,028	140	0.73	0.73 (0.58,0.93)	4,927	0.91 (0.72,1.15)	201	0.92	0.98 (0.79,1.21)	1.08 (0.87,1.32)
Q4 (313)	210,987	146	0.73	0.74 (0.58,0.95)	6,274	0.75 (0.59,0.96)	175	0.78	0.85 (0.68,1.06)	0.95 (0.77,1.18)
Q5 (366)	208,570	136	0.65	0.66 (0.51,0.86)	8,855	0.70 (0.54,0.90)	205	0.87	0.98 (0.79,1.23)	0.99 (0.79,1.23)
p for trend			<.0001	0.001		0.0003		0.29	0.83	0.95
[§]Total carotenoid index									
Q1 (9)	222,083	174	1 (Ref.)	1 (Ref.)	8	1 (Ref.)	218	1 (Ref.)	1 (Ref.)	1 (Ref.)
Q2 (12)	221,393	172	0.95	0.97 (0.78,1.20)	12	0.89 (0.71,1.11)	166	0.73	0.76 (0.62,0.93)	0.98 (0.80,1.21)
Q3 (15)	234,719	160	0.79	0.81 (0.65,1.01)	15	0.75 (0.60,0.94)	214	0.84	0.90 (0.74,1.09)	1.00 (0.81,1.22)
Q4 (18)	208,544	137	0.74	0.77 (0.61,0.97)	18	0.77 (0.61,0.96)	177	0.77	0.84 (0.68,1.03)	1.08 (0.88,1.33)
Q5 (21)	225,528	130	0.64	0.67 (0.53,0.86)	22	0.69 (0.55,0.87)	208	0.81	0.92 (0.75,1.13)	1.03 (0.83,1.26)
p for trend			<.0001	0.0003		0.001		0.09	0.76	0.60

Multivariate models were adjusted for: age (continuous), BMI (<18.5, 18.5-23, 23-25, 25-30, 30-35, ≥ 35 kg/m2), pack-years of smoking (never, 1-9, 10-24, 25-44, 45-64, ≥65y), physical activity (<3, 3-8.9, 9-17.9, 18-26.9, ≥27 MET-h/wk), current aspirin use (≥1 tablets/wk or none), history of hypertension, diabetes and cardiovascular diseases, postmenopausal status and menopausal hormone use (never, current and past), dietary variables including aHEI (excluding fruits and vegetables), alcohol intake, DHA and ALA (all in quintiles).

[§] Total carotenoid index was created by summing the quintile score of each carotenoid.

[¶] Models were additionally adjusted for total calorie intake (in quintiles).

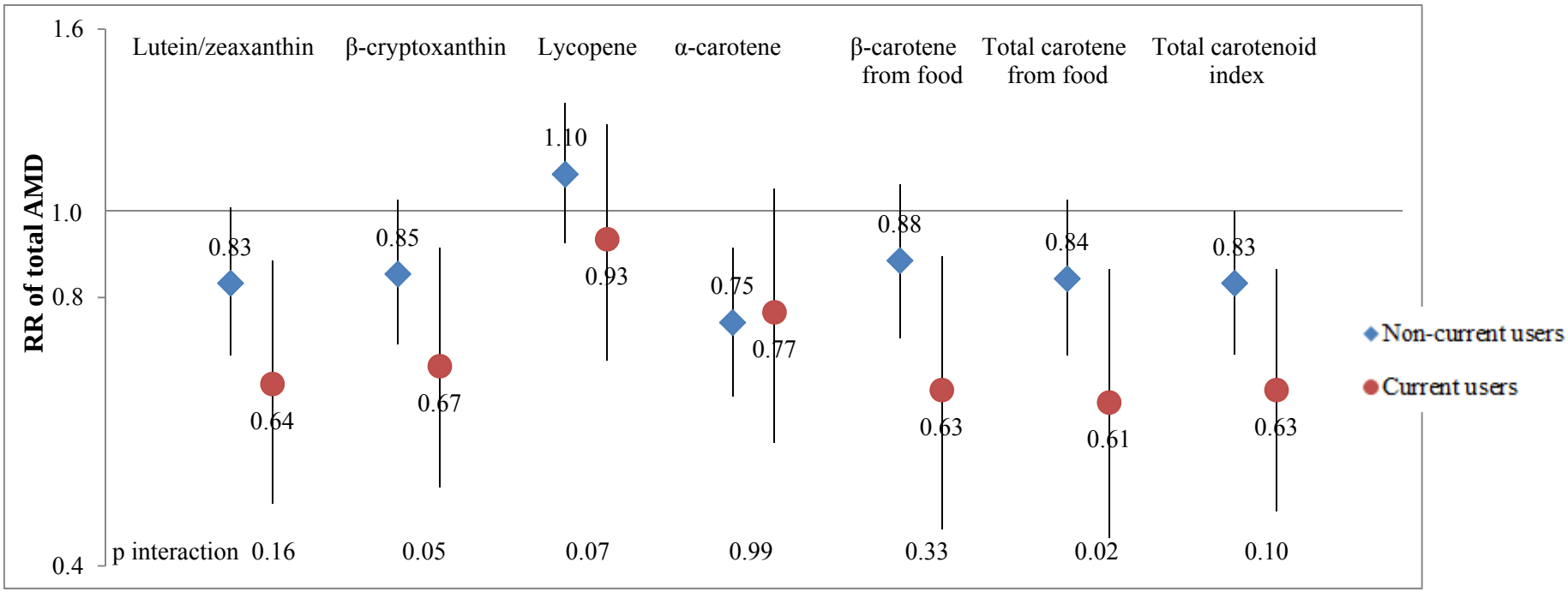
eTable 2. RRs of AMD according to quintiles of predicted plasma carotenoid scores and calculated intakes in HPFS

	Advanced AMD						Intermediate AMD			
	Predicted plasma level				Calculated intake		Predicted plasma level			Calculated intake
Quintiles (median, μg/L)	Person-years	Cases	Age-adjusted RR	Multivariate RR (95% CI)	Quintiles (median, ug)	Multivariate RR (95% CI)	Cases	Age-adjusted RR	Multivariate RR (95% CI)	Multivariate RR (95% CI)
Lutein/Zeaxanthin										
Q1 (151)	98,632	78	1(Ref.)	1(Ref.)	1,511	1(Ref.)	72	1(Ref.)	1(Ref.)	1(Ref.)
Q2 (161)	99,238	65	0.76	0.81 (0.58,1.13)	2,313	1.05 (0.75,1.47)	72	0.94	1.01 (0.72,1.40)	1.27 (0.92,1.76)
Q3 (169)	99,631	79	0.92	0.98 (0.71,1.35)	3,012	1.06 (0.75,1.49)	79	1.00	1.07 (0.77,1.48)	1.13 (0.81,1.58)
Q4 (180)	99,764	73	0.82	0.88 (0.63,1.23)	3,864	1.06 (0.75,1.50)	81	0.98	1.04 (0.75,1.44)	1.06 (0.75,1.50)
Q5 (203)	99,651	50	0.53	0.59 (0.41,0.86)	5,629	1.08 (0.75,1.55)	74	0.86	0.92 (0.66,1.30)	1.20 (0.84,1.70)
p for trend			0.001	0.01		0.71		0.41	0.62	0.65
β-cryptoxanthin										
Q1 (58)	98,452	67	1(Ref.)	1(Ref.)	82	1(Ref.)	71	1(Ref.)	1(Ref.)	1(Ref.)
Q2 (65)	99,347	63	0.80	0.87 (0.61,1.23)	141	0.94 (0.67,1.34)	69	0.84	0.90 (0.64,1.26)	0.98 (0.71,1.36)
Q3 (72)	99,481	72	0.78	0.86 (0.61,1.21)	194	0.90 (0.63,1.26)	82	0.86	0.93 (0.67,1.29)	0.90 (0.65,1.25)
Q4 (80)	99,868	74	0.72	0.82 (0.58,1.15)	253	0.88 (0.62,1.25)	83	0.77	0.87 (0.62,1.20)	0.83 (0.59,1.16)
Q5 (99)	99,767	69	0.62	0.73 (0.51,1.04)	358	0.75 (0.52,1.07)	73	0.62	0.70 (0.50,0.99)	0.72 (0.51,1.01)
p for trend			0.006	0.09		0.10		0.004	0.04	0.03
Lycopene										
Q1 (346)	99,214	115	1(Ref.)	1(Ref.)	3,259	1(Ref.)	105	1(Ref.)	1(Ref.)	1(Ref.)
Q2 (364)	99,328	82	0.91	0.94 (0.70,1.25)	5,079	0.96 (0.71,1.29)	79	0.96	1.01 (0.75,1.36)	0.92 (0.68,1.24)
Q3 (379)	99,617	61	0.81	0.84 (0.61,1.15)	6,609	0.84 (0.60,1.16)	74	1.07	1.13 (0.83,1.53)	1.11 (0.82,1.50)
Q4 (400)	99,563	47	0.71	0.74 (0.52,1.04)	8,599	0.79 (0.56,1.12)	65	1.08	1.13 (0.83,1.55)	1.13 (0.82,1.55)
Q5 (450)	99,195	40	0.69	0.70 (0.49,1.02)	12,589	0.93 (0.66,1.30)	55	1.04	1.07 (0.76,1.49)	1.04 (0.75,1.45)
p for trend			0.02	0.03		0.46		0.65	0.58	0.56
α-carotene										
Q1 (50)	98,248	60	1(Ref.)	1(Ref.)	345	1(Ref.)	77	1(Ref.)	1(Ref.)	1(Ref.)
Q2 (54)	99,174	67	0.94	1.00 (0.70,1.43)	551	1.02 (0.73,1.43)	59	0.67	0.75 (0.53,1.06)	0.81 (0.58,1.13)
Q3 (58)	99,716	79	1.03	1.16 (0.82,1.64)	753	0.84 (0.59,1.20)	70	0.70	0.83 (0.59,1.15)	0.67 (0.47,0.95)
Q4 (65)	99,752	76	0.91	1.05 (0.74,1.49)	1,069	0.85 (0.60,1.20)	82	0.78	0.92 (0.66,1.27)	1.04 (0.76,1.42)
Q5 (82)	100,026	63	0.67	0.80 (0.55,1.15)	1,713	0.88 (0.62,1.25)	90	0.75	0.89 (0.64,1.23)	0.83 (0.60,1.15)
p for trend			0.01	0.12		0.41		0.43	0.95	0.85

β-carotene									
Q1 (192)	98,210	69	1(Ref.)	1(Ref.)	2,439	1(Ref.)	58	1(Ref.)	1(Ref.)
Q2 (210)	99,137	73	0.81	0.88 (0.63,1.22)	3,666	1.00 (0.72,1.39)	75	1.05	1.15 (0.81,1.63)	0.85 (0.60,1.19)
Q3 (228)	99,549	66	0.69	0.77 (0.54,1.10)	4,782	0.74 (0.52,1.06)	83	1.06	1.23 (0.87,1.74)	1.03 (0.75,1.43)
Q4 (256)	99,826	76	0.71	0.83 (0.59,1.18)	6,257	0.89 (0.63,1.26)	87	1.00	1.19 (0.84,1.69)	0.84 (0.60,1.19)
Q5 (351)	100,195	61	0.58	0.69 (0.48,1.00)	9,409	0.86 (0.59,1.24)	75	0.85	1.00 (0.69,1.45)	0.93 (0.65,1.31)
p for trend			0.005	0.08		0.44		0.18	0.58	0.78
β-carotene from food									
Q1 (194)	90,917	66	1(Ref.)	1(Ref.)	2,273	1(Ref.)	55	1(Ref.)	1(Ref.)	1(Ref.)
Q2 (209)	90,665	53	0.64	0.69 (0.47,0.99)	3,362	0.95 (0.67,1.35)	55	0.82	0.90 (0.62,1.31)	0.92 (0.64,1.32)
Q3 (223)	90,047	71	0.76	0.85 (0.60,1.21)	4,315	0.86 (0.60,1.24)	65	0.86	0.99 (0.68,1.43)	0.90 (0.62,1.30)
Q4 (242)	88,893	72	0.69	0.81 (0.57,1.16)	5,502	1.06 (0.74,1.51)	83	1.02	1.20 (0.83,1.72)	1.13 (0.79,1.60)
Q5 (285)	86,289	55	0.49	0.60 (0.40,0.88)	7,758	0.75 (0.50,1.11)	82	0.89	1.04 (0.71,1.51)	0.94 (0.65,1.36)
p for trend			0.0008	0.04		0.24		0.93	0.51	0.93
Total carotene from food									
Q1 (246)	90,945	65	1(Ref.)	1(Ref.)	2,728	1(Ref.)	57	1(Ref.)	1(Ref.)	1(Ref.)
Q2 (265)	90,639	59	0.71	0.78 (0.54,1.12)	4,030	0.80 (0.56,1.15)	57	0.81	0.91 (0.62,1.32)	0.79 (0.55,1.13)
Q3 (282)	89,870	68	0.72	0.83 (0.58,1.18)	5,241	0.86 (0.61,1.23)	58	0.74	0.86 (0.59,1.25)	0.74 (0.52,1.06)
Q4 (307)	88,928	72	0.70	0.83 (0.58,1.18)	6,823	0.84 (0.59,1.20)	87	1.03	1.22 (0.85,1.74)	0.99 (0.71,1.40)
Q5 (364)	86,430	53	0.48	0.58 (0.39,0.87)	10,034	0.78 (0.53,1.13)	81	0.84	1.00 (0.68,1.44)	0.82 (0.57,1.18)
p for trend			0.0003	0.02		0.29		0.87	0.60	0.76
Total carotenoid index									
Q1 (9)	96,159	72	1(Ref.)	1(Ref.)	8	1(Ref.)	73	1(Ref.)	1(Ref.)	1(Ref.)
Q2 (12)	98,756	74	0.87	0.92 (0.66,1.28)	18	0.70 (0.49,1.00)	61	0.73	0.80 (0.57,1.12)	0.87 (0.62,1.21)
Q3 (15)	108,051	84	0.84	0.93 (0.67,1.28)	15	0.99 (0.72,1.36)	90	0.91	1.03 (0.75,1.42)	0.91 (0.66,1.26)
Q4 (18)	96,109	64	0.68	0.78 (0.55,1.11)	18	0.84 (0.60,1.18)	76	0.81	0.94 (0.67,1.32)	1.02 (0.74,1.40)
Q5 (21)	97,841	51	0.52	0.61 (0.42,0.89)	22	0.80 (0.56,1.12)	78	0.78	0.93 (0.66,1.31)	0.91 (0.66,1.27)
p for trend			0.0001	0.009		0.36		0.29	0.99	0.85

Multivariate models were adjusted for the same variables as eTable 1 except postmenopausal status and hormone use and additionally adjusted for race (Caucasian v.s. non- Caucasian)

eFigure 1. Predicted plasma carotenoid scores and RRs of total AMD according to current menopausal hormone use status among postmenopausal women

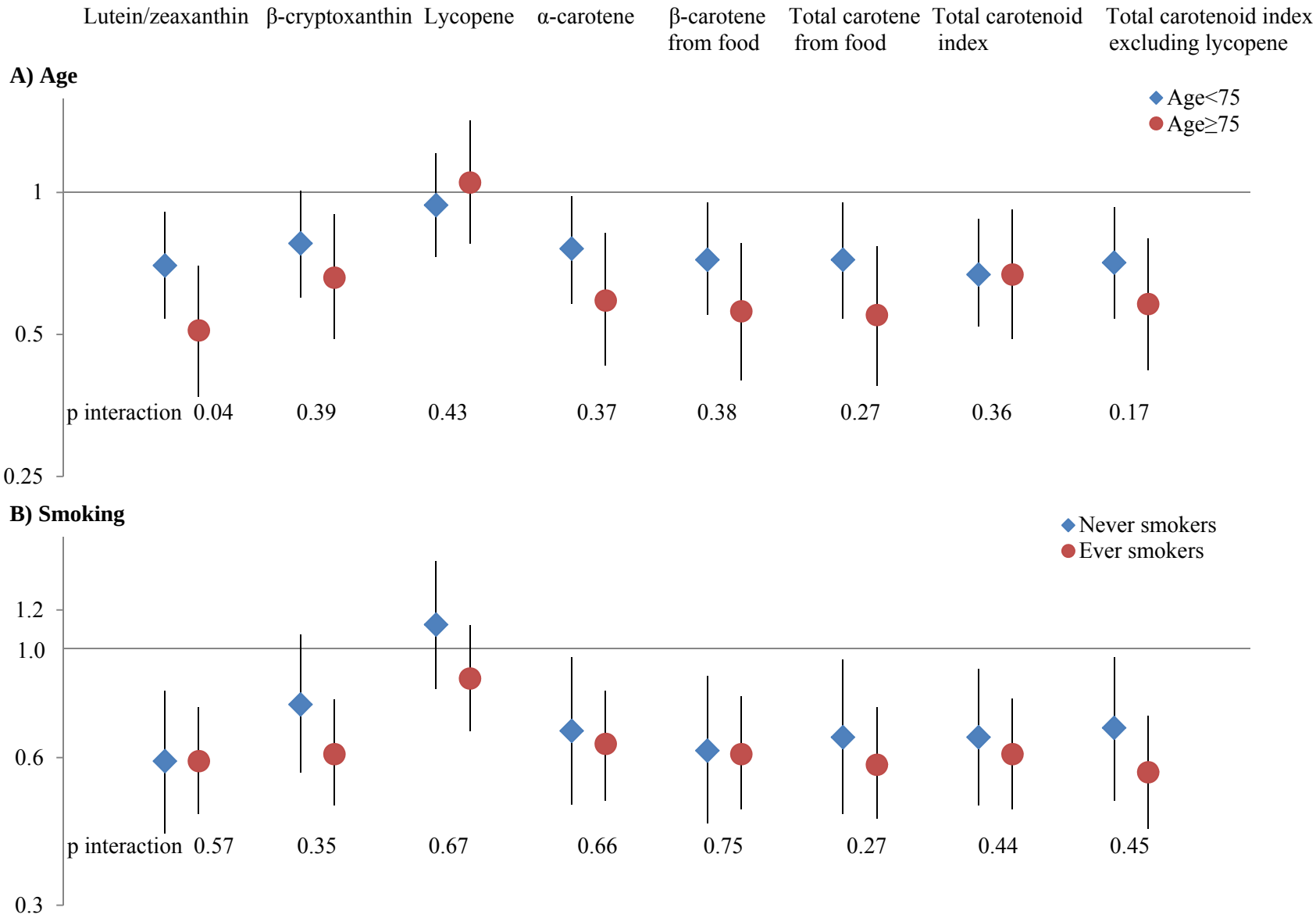


There were 1,221 cases in non-current users group and 413 cases in current users group

All the RRs were comparing the fifth to the bottom quintile

Multivariate models were adjusted for: age (continuous), BMI (≥30 kg/m2), pack-years of smoking (never, 1-9, 10-24, 25-44, 45-64, ≥65y), physical activity (<3, 3-8.9, 9-17.9, 18-26.9, ≥27 MET-h/wk), current aspirin use (≥1 tablets/wk or none), aHEI (excluding fruits and vegetables)

eFigure 2. Predicted plasma carotenoid scores and pooled RRs of advanced AMD according to A) age and B) smoking status



A) Multivariate models were adjusted for the same variables as in supplement Figure 1 and additionally adjusted for race in HPFS; 651 cases in age<75 group (477 from NHS and 174 cases from HPFS); 467 cases in age≥75 group (296 from NHS and 171 cases from HPFS).

B) Multivariate models were adjusted for the same variables as in A) except pack-year of smoking; 425 cases in never smokers group (289 from NHS and 136 cases from HPFS); 693 cases in ever smokers group (484 from NHS and 209 cases from HPFS)