

Supplementary Material

Healthy Lifestyle Factors Associated With Lower Risk of Colorectal Cancer Irrespective of Genetic Risk

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Supplementary Table 1. Composition and points of the diet quality score, based on responses from the DACHS study food frequency questionnaire. The diet quality score ranged from 0 (lowest) to 50 (highest).

Food groups	Food frequency questionnaire responses						Total Max.
	<i>Multiple times per day</i>	<i>Once per day</i>	<i>Multiple times per week</i>	<i>Once per week</i>	<i>Less than once per week</i>	<i>Never</i>	
<i>Red and processed meat¹</i>	0	1	2	3	4	5	5
<i>Fish</i>	5	4	3	2	1	0	5
<i>Wholegrains²</i>	10	8	6	4	2	0	10
<i>Dairy foods³</i>	10	8	6	4	2	0	10
<i>Fruit</i>	10	8	6	4	2	0	10
<i>Vegetables/salad</i>	10	8	6	4	2	0	10
							50

¹ Red and processed meat: fresh pork, beef etc., sausages made from beef or pork, luncheon meats (e.g. salami/sliced sausage) and ham.

² Wholegrains and wholegrain products: e.g. wholegrain bread, muesli, other wholegrain products

³ Dairy foods: cheese or quark, yoghurt, milk

Supplementary Table 2. Description and prevalence of the lifestyle factors in the DACHS study population.

Lifestyle factor	Points	Description	Prevalence in the DACHS study population					
			Cases			Controls		
			Male n (%)	Female n (%)	Total n (%)	Male n (%)	Female n (%)	Total n (%)
Smoking	0	Smoking: current smoker or former smoker (≥ 30 pack years)	691 (28)	256 (16)	947 (23)	398 (22)	148 (13)	546 (18)
	1	Non-smoking: never smoker or former smoker (< 30 pack years)	1795 (72)	1350 (84)	3145 (77)	1448 (78)	1038 (87)	2486 (82)
Alcohol intake	0	Did not meet recommendations on alcoholic drinks ¹	997 (40)	230 (14)	1227 (30)	608 (33)	202 (17)	810 (27)
	1	Met recommendation on alcoholic drinks ¹	1489 (60)	1376 (86)	2865 (70)	1238 (67)	984 (83)	2222 (73)
Diet quality	0	Unhealthy diet quality: diet score < 34 ²	1751 (70)	913 (57)	2664 (65)	1113 (60)	510 (43)	1623 (54)
	1	Healthy diet quality: diet score ≥ 34 ²	735 (30)	693 (43)	1428 (35)	733 (40)	676 (57)	1409 (46)
Physical activity	0	Did not meet physical activity guidelines ³	385 (15)	260 (16)	645 (16)	214 (12)	140 (12)	354 (12)
	1	Met physical activity guidelines ³	2101 (85)	1346 (84)	3447 (84)	1632 (88)	1046 (88)	2678 (88)
Body Mass Index	0	Overweight or obese (BMI $\geq 25\text{kg/m}^2$)	1874 (75)	967 (60)	2841 (69)	1264 (69)	601 (51)	1865 (61)
	1	Healthy weight (18.5 $<$ BMI $< 25\text{kg/m}^2$)	612 (25)	639 (40)	1251 (31)	582 (31)	585 (49)	1167 (39)

¹World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) (2007) Recommendation on alcoholic drinks: $\leq 24\text{g/day}$ men, $\leq 12\text{g/day}$ women

²Diet score in the highest 40%

³The WHO Global Recommendations on Physical Activity for Health (2010) recommend adults to engage in at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate and vigorous intensity physical activity (At least ~ 500 MET minutes)

Supplementary Table 3. Association between the healthy lifestyle score and colorectal cancer in the DACHS study by history of colonoscopy, use of NSAIDs, family history of CRC, age, and CRC stage.

	Lifestyle factors	Colorectal cancer		P _{interaction}		
		n _{cases} (%)/n _{controls} (%)	OR (95% CI) [†]			
History of colonoscopy						
Yes	0 or 1	51(7)/71(5)	1.00 (Ref.)	0.06		
	2	153(21)/255(17)	0.84 (0.55-1.27)			
	3	254(35)/523(35)	0.64 (0.43-0.95)			
	4	213(29)/423(29)	0.64 (0.43-0.97)			
	5	63(9)/206(14)	0.40 (0.25-0.65)			
	Per 1 point increase in score		0.83 (0.76-0.91)			
	P trend		0.0001			
	No	0 or 1	315 (9)/90(6)		1.00 (Ref.)	
No	2	825(25)/264(17)	0.86 (0.65-1.14)			
	3	1159 (35)/524(34)	0.61 (0.47-0.79)			
	4	814(24)/466(30)	0.48 (0.37-0.63)			
	5	230 (7)/207(13)	0.31 (0.23-0.43)			
	Per 1 point increase in score		0.74 (0.70-0.79)			
	P trend		<0.0001			
	Regular use of NSAIDs					
	Yes	0 or 1	113(11)/67(7)		1.00 (Ref.)	0.80
2		260(26)/173(18)	0.93 (0.63-1.35)			
3		377(37)/353(37)	0.65 (0.46-0.94)			
4		215(21)/268(28)	0.50 (0.34-0.73)			
5		52(5)/89(9)	0.37 (0.22-0.60)			
Per 1 point increase in score			0.76 (0.69-0.84)			
P trend			<0.0001			
No		0 or 1	244(8)/91(5)	1.00 (Ref.)		
No	2	711(24)/377(16)	0.81 (0.61-1.08)			
	3	1017(34)/686(34)	0.60 (0.45-0.79)			
	4	801(27)/611(30)	0.53 (0.40-0.71)			
	5	236(8)/320(16)	0.32 (0.24-0.45)			
	Per 1 point increase in score		0.78 (0.73-0.82)			
	P trend		<0.0001			
	Family history of CRC					
	Yes	0 or 1	49(8)/9(3)	1.00 (Ref.)		
2		148(25)/49(15)	0.68 (0.30-1.53)			
3		225(38)/112(34)	0.44 (0.20-0.97)			
4		137(23)/115(35)	0.29 (0.13-0.64)			
5		37(6)/46(14)	0.19 (0.08-0.47)			
Per 1 point increase in score			0.66 (0.56-0.77)			
P trend			<0.0001			

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	Lifestyle factors	Colorectal cancer		P _{interaction}
		n _{cases} (%)/n _{controls} (%)	OR (95% CI) ¹	
No	0 or 1	317 (9)/152(6)	1.00 (Ref.)	0.16
	2	835(24)/470(17)	0.85 (0.67-1.08)	
	3	1190(34)/933(35)	0.63 (0.50-0.79)	
	4	894(26)/775(29)	0.56 (0.44-0.71)	
	5	257(7)/368(14)	0.35 (0.27-0.46)	
	Per 1 point increase in score		0.79 (0.74-0.83)	
	P trend		<0.0001	
	Age			
<70	0 or 1	207(10)/84(5)	1.00 (Ref.)	0.07
	2	529(25)/271(17)	0.85 (0.62-1.16)	
	3	683(33)/556(36)	0.54 (0.40-0.72)	
	4	513(24)/440(28)	0.50 (0.37-0.68)	
	5	163(8)/207(13)	0.37 (0.26-0.53)	
	Per 1 point increase in score		0.78 (0.72-0.83)	
	P trend		<0.0001	
	≥70	0 or 1	159(8)/77(5)	
2		454(23)/248(17)	0.84 (0.60-1.17)	
3		734(37)/491(33)	0.71 (0.52-0.98)	
4		518(26)/451(31)	0.57 (0.41-0.79)	
5		132(7)/207(14)	0.30 (0.21-0.45)	
Per 1 point increase in score			0.77 (0.71-0.82)	
P trend			<0.0001	
CRC Stage				
I	0 or 1	63(7)/161(5)	1.00 (Ref.)	0.07
	2	220 (23)/519(17)	1.12 (0.80-1.59)	
	3	346(37)/1047(35)	0.86 (0.62-1.20)	
	4	245(26)/891(29)	0.72 (0.51-1.02)	
	5	73(8)/414(14)	0.48 (0.32-0.72)	
	Per 1 point increase in score		0.81 (0.75-0.87)	
	P trend		<0.0001	
	II	0 or 1	137(11)/161(5)	
2		321(26)/519(17)	0.72 (0.54-0.96)	
3		442(35)/1047(35)	0.48 (0.37-0.63)	
4		276(22)/891(29)	0.35 (0.26-0.46)	
5		81(6)/414(14)	0.23 (0.16-0.33)	
Per 1 point increase in score			0.69 (0.65-0.75)	
P trend			<0.0001	

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	Lifestyle factors	Colorectal cancer		P _{interaction}
		n _{cases} (%)/n _{controls} (%)	OR (95% CI) ¹	
III	0 or 1	100(8)/161(5)	1.00 (Ref.)	
	2	296(23)/519(17)	0.93 (0.68-1.26)	
	3	437(34)/1047(35)	0.70 (0.52-0.93)	
	4	354(27)/891(29)	0.63 (0.46-0.85)	
	5	108 (8)/414(14)	0.42 (0.29-0.60)	
	Per 1 point increase in score		0.81 (0.76-0.87)	
	P trend		<0.0001	
IV	0 or 1	65 (11)/161(5)	1.00 (Ref.)	
	2	144 (25)/519(17)	0.72 (0.50-1.04)	
	3	183 (32)/1047(35)	0.48 (0.33-0.68)	
	4	152 (26)/891(29)	0.45 (0.31-0.66)	
	5	33 (6)/414(14)	0.21 (0.13-0.35)	
	Per 1 point increase in score		0.73 (0.66-0.80)	
	P trend		<0.0001	

¹Adjusted for matching factors age and sex; and the factors school education, family history of CRC, history of colonoscopy, participation in a health check-up, ever regular use of NSAIDs

Abbreviations: CI: confidence intervals; CRC: colorectal cancer; NSAIDs: non-steroidal anti-inflammatory drugs; OR: odds ratio; Ref.: Reference.

Supplementary Table 4. Association between combinations of the healthy lifestyle factors (prevalence >5%) and risk of colorectal cancer in the DACHS study

Number of lifestyle factors	SMK	ALCO	DIET	PA	BMI	Prevalence (controls) N (%)	Colorectal cancer	
							OR (95% CI) ¹	OR (95% CI) ²
0 or 1						161 (5.3%)	1.00 (Ref.)	1.00 (ref.)
2						213 (7.0%)	0.76 (0.59-0.98)	0.87 (0.67-1.14)
3						521 (17.2%)	0.64 (0.52-0.80)	0.69 (0.55-0.87)
						153 (5.0%)	0.43 (0.32-0.58)	0.51 (0.37-0.69)
4						269 (8.9%)	0.51 (0.40-0.66)	0.53 (0.41-0.69)
						481 (15.9%)	0.45 (0.36-0.57)	0.52 (0.41-0.66)
5						414 (13.7%)	0.28 (0.22-0.36)	0.33 (0.26-0.43)

¹Model 1 adjusted for matching factors age and sex

²Model 2 adjusted for matching factors age and sex; and the factors school education, family history of CRC, history of colonoscopy, participation in a health check-up, ever regular use of NSAIDs

Abbreviations: ALCO: alcohol; CI: confidence intervals; OR: odds ratio; PA: physical activity; Ref.: Reference; SMK: smoking.