**SUPPLEMENTARY MATERIAL**

**Table S.1** Composition of the different experimental diets sorted according to total carotenoid content

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **Diet 1** | **Diet 2** | **Diet 3** | **Diet 4** | **Diet 5** | **Diet 6** |
|  |  |  |  |  |  |  |
| **No. of subjects** (men / women) | 0 / 61 | 29 / 17 | 37 / 31 | 26 / 0 | 26 / 0 | 37 / 0 |
| **Age** (years) | 38.3 ± 17.1 a,b | 49.9 ± 14.2 c | 41.9 ± 7.3 a | 49.3 ± 11.7 c | 49.3 ± 11.7 c | 32.4 ± 14.9 b |
| **Weight** (kg) | 63.5 ± 8.8 a | 86.4 ± 15.0 b | 85.4 ± 15.8 b | 98.4 ± 18.3 c | 97.1 ± 18.3 c | 73.6 ± 8.5 d |
| **BMI** (kg/m2) | 23.6 ± 2.9 a | 30.0 ± 4.2 b | 29.4 ± 4.4 b | 32.4 ± 5.3 c | 31.1 ± 5.3 c | 23.6 ± 2.7 a |
| **Waist circumference** (cm) | 81.1 ± 8.8 a | 104.2 ± 9.9 b | 113.1 ± 12.4 b | 111.5 ± 12.0 c | 110.9 ± 11.7 c | 80.9 ± 8.8 a |
| **Plasma cholesterol** (mmol/L) |  |  |  |  |  |  |
| Total | 5.24 ± 0.98 a | 4.68 ± 0.90 b | 5.03 ± 0.70 a,b | 5.00 ± 1.10 a,b | 4.64 ± 1.06 a,b | 4.75 ± 0.93 a,b |
| LDL | 3.12 ± 0.82 a | 2.83 ± 0.75 c | 3.23 ± 0.60 a | 3.37 ± 1.03 a | 3.04 ± 0.96 a | 3.06 ± 0.81 a |
| HDL | 1.69 ± 0.37 a | 1.13 ± 0.29 b | 1.15 ± 0.26 b | 0.86 ± 0.18 c | 0.84 ± 0.19 c | 1.26 ± 0.23 b,d |
| **Plasma triglycerides** (mmol/L) | 0.96 ± 0.46 a | 1.58 ± 0.82 b | 1.44 ± 0.55 b | 1.69 ± 0.57 b | 1.67 ± 0.54 b | 0.94 ± 0.40 a |
|  |  |  |  |  |  |  |
| **Duration** (weeks) | 4 | 4 | 5 | 5 | 5 | 4 |
| **Energy** (kcal/day) | 2267 ± 274 a | 2813 ± 524 b | 2920 ± 525 b | 3148 ± 462 c | 3170 ± 443 c | 3197 ± 526 c |
|  |  |  |  |  |  |  |
| **Lipids** (% energy) | 33 | 36 | 32 | 34 | 32 | 37 |
| Total (g/day) | 83.1 ± 10.1 a | 113.4 ± 21.1 b | 103.8 ± 18.7 c | 119.0 ± 17.5 b | 112.7 ± 15.8 b | 131.5 ± 21.7 b |
| Saturated (g/day) | 25.7 ± 3.1 a | 24.4 ± 4.6 a,b | 21.8 ± 3.9 b | 45.5 ± 6.7 c | 23.7 ± 3.3 a,b | 65.8 ± 10.8 d |
| Monounsaturated (g/day) | 36.0 ± 4.4 a | 35.8 ± 6.7 a | 58.8 ± 10.6 b | 46.0 ± 6.8 c | 63.8 ± 8.9 d | 42.0 ± 6.9 e |
| Polyunsaturated (g/day) | 15.1 ± 1.8 a | 44.8 ± 8.4 b | 15.4 ± 2.8 a | 18.2 ± 2.7 c | 16.7 ± 2.3 a,c | 16.3 ± 2.7 a,c |
|  |  |  |  |  |  |  |
| **Carbohydrates** (% energy) | 54 | 48 | 50 | 48 | 50 | 50 |
| Total (g/day) | 308.4 ± 37.3 a | 346.8 ± 64.7 b | 365.2 ± 65.6 b,c | 380.9 ± 56.0 c,d | 396.4 ± 55.4 d | 400.5 ± 66.0 d |
| Fibre (g/day) | 25.6 ± 3.1 a | 39.5 ± 7.4 b | 49.3 ± 8.9 c | 25.1 ± 3.7 a | 53.6 ± 7.5 e | 26.6 ± 4.4 a |
|  |  |  |  |  |  |  |
| **Proteins** (% energy) | 15 | 16 | 17 | 17 | 17 | 14 |
| Total (g/day) | 85.0 ± 10.3 a | 116.1 ± 21.7 b,c | 124.1 ± 22.3 c | 133.8 ± 19.7 d | 134.7 ± 18.8 d | 111.9 ± 18.4 b |
|  |  |  |  |  |  |  |
| *(Table S.2, continued)* |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| **Carotenoids** |  |  |  |  |  |  |
| Total (mg/day) | 17.65 ± 2.14 a | 25.50 ± 4.75 b | 28.56 ± 5.13 c | 29.42 ± 4.32 c | 31.00 ± 4.34 c | 37.31 ± 6.14 d |
| -carotene (mg/day) | 1.26 ± 0.15 a | 2.15 ± 0.40 b | 1.81 ± 0.33 c,d | 1.64 ± 0.24 c | 1.96 ± 0.28 d | 4.25 ± 0.70 e |
| -carotene (mg/day) | 4.52 ± 0.55 a | 11.10 ± 2.07 b | 9.51 ± 1.71 c | 5.67 ± 0.83 d | 10.33 ± 1.44 e | 10.91 ± 1.80 b,e |
| -cryptoxanthin (mg/day) | 0.55 ± 0.07 a | 0.23 ± 0.04 b | 1.65 ± 0.30 c | 0.66 ± 0.10 d | 1.79 ± 0.25 e | 0.24 ± 0.04 b |
| Lutein + zeaxanthin (mg/day) | 2.62 ± 0.32 a | 5.55 ± 1.04 b | 6.20 ± 1.11 c | 3.19 ± 0.47 d | 6.73 ± 0.94 e | 3.45 ± 0.57 d |
| Lycopene (mg/day) | 8.67 ± 1.05 a | 6.46 ± 1.21 b | 9.39 ± 1.69 a,c | 18.25 ± 2.68 d | 10.20 ± 1.43 c | 18.46 ± 3.04 d |
| Retinol (mg/day) | 0.41 ± 0.05 a | 0.43 ± 0.08 a | 0.29 ± 0.05 c | 0.69 ± 0.10 d | 0.32 ± 0.04 c | 1.19 ± 0.20 e |

Values are presented as means ± SD.

Macronutrient intakes reported as % of daily energy have no SD because all subjects (within a specific diet) consumed the same diet.

Means with same letters are not statistically different.

**SUPPLEMENTARY MATERIAL**

**Table S.2** Spearman correlations between physical and metabolic characteristics and plasma carotenoid concentrations in men and women

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Plasma carotenoid concentrations | | | | | | | | | | | | | |
| **Men** | Total | | -carotene | | -cryptoxanthin | | Lycopene | | Lutein | | -carotene | | Zeaxanthin | |
| Age | -0.02 |  | -0.15 |  | -0.02 |  | -0.05 |  | 0.23 | \*\*\* | -0.05 |  | 0.39 | ††† |
| Weight | -0.36 | ††† | -0.43 | ††† | -0.15 |  | -0.21 | \*\* | -0.01 |  | -0.34 | ††† | -0.08 |  |
| BMI | -0.43 | ††† | -0.49 | ††† | -0.22 | † | -0.23 | \*\*\* | 0.02 |  | -0.44 | ††† | 0.14 |  |
| Waist circumference | -0.44 | ††† | -0.51 | ††† | -0.23 | \*\*\* | -0.24 | \*\*\* | 0.03 |  | -0.45 | ††† | 0.14 |  |
| Total cholesterol | 0.58 | ††† | 0.39 | ††† | 0.54 | ††† | 0.40 | ††† | 0.32 | ††† | 0.37 | ††† | 0.29 | †† |
| LDL-cholesterol | 0.54 | ††† | 0.36 | ††† | 0.52 | ††† | 0.36 | ††† | 0.31 | ††† | 0.33 | ††† | 0.27 | † |
| HDL-cholesterol | 0.45 | ††† | 0.45 | ††† | 0.17 | \* | 0.29 | †† | 0.06 |  | 0.43 | ††† | -0.08 |  |
| Cholesterol/HDL-cholesterol | 0.02 |  | -0.12 |  | 0.24 | \*\*\* | 0.07 |  | 0.17 | \* | -0.13 |  | 0.28 | †† |
| Triglycerides | -0.09 |  | -0.22 | \*\* | 0.09 |  | -0.06 |  | 0.16 | \* | -0.15 | 1 | 0.22 | \*\*\* |
|  |  | |  |  |  |  |  |  |  |  |  |  |  |  |
| **Women** |  | |  | |  | |  | |  | |  | |  | |
| Age | 0.25 | \*\* | 0.18 |  | 0.17 |  | 0.02 |  | 0.13 |  | 0.32 | † | 0.31 | ††† |
| Weight | -0.28 | \*\*\* | -0.29 | \*\*\* | -0.07 |  | -0.46 | ††† | -0.02 |  | -0.20 | \* | 0.01 |  |
| BMI | -0.25 | \*\* | -0.29 | \*\*\* | -0.01 |  | -0.48 | ††† | 0.03 |  | -0.12 |  | 0.09 |  |
| Waist circumference | -0.23 | \* | -0.31 | †† | -0.02 |  | -0.51 | ††† | 0.09 |  | -0.12 |  | 0.12 |  |
| Total cholesterol | 0.52 | ††† | 0.39 | ††† | 0.33 | \*\*\* | 0.47 | ††† | 0.25 | \*\* | 0.37 | ††† | 0.42 | ††† |
| LDL-cholesterol | 0.49 | ††† | 0.36 | \*\*\* | 0.36 | \*\*\* | 0.32 | † | 0.16 |  | 0.43 | ††† | 0.34 | †† |
| HDL-cholesterol | 0.33 | †† | 0.33 | †† | 0.15 |  | 0.49 | ††† | 0.13 |  | 0.15 |  | 0.19 | 1 |
| Cholesterol/HDL-cholesterol | -0.00 |  | -0.07 |  | 0.08 |  | -0.21 | \* | 0.03 |  | 0.07 |  | 0.11 |  |
| Triglycerides | -0.16 |  | -0.21 | \* | -0.15 |  | 0.04 |  | 0.19 | \* | -0.28 | \*\*\* | 0.18 | 1 |
|  |  | |  |  |  |  |  |  |  |  |  |  |  |  |

\**p*<0.05; \*\* *p*<0.01; \*\*\* *p*<0.005; † *p*<0.001; †† *p*<0.0005; ††† *p*<0.0001

1 p between 0.05 and 0.06

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**Table S.3** Specific carotenoid concentrations in men and women following statistical adjustment

for body weight as well as LDL and HDL-cholesterol concentrations

|  |  |  |  |
| --- | --- | --- | --- |
| Plasma carotenoids | Women | Men | *p* |
| *Adjusted for body weight* |  |  |  |
|  -carotene (mol/l) | 0.24 ± 0.01 | 0.25 ± 0.01 | 0.36 |
| -carotene (mol/l) | 0.54 ± 0.02 | 0.47 ± 0.02 | **0.046** |
| -cryptoxanthin (mol/l) | 0.17 ± 0.01 | 0.15 ± 0.01 | **0.035** |
| Lutein (mol/l) | 0.27 ± 0.01 | 0.23 ± 0.01 | **0.0084** |
| Lycopene (mol/l) | 0.32 ± 0.01 | 0.29 ± 0.01 | 0.13 |
| Zeaxanthin (mol/l) | 0.070 ± 0.002 | 0.064 ± 0.002 | 0.07 |
|  |  |  |  |
| *Adjusted for LDL-cholesterol* |  |  |  |
|  -carotene (mol/l) | 0.27 ± 0.01 | 0.23 ± 0.01 | **0.0068** |
| -carotene (mol/l) | 0.59 ± 0.02 | 0.44 ± 0.02 | **<0.0001** |
| -cryptoxanthin (mol/l) | 0.18 ± 0.01 | 0.15 ± 0.01 | **<0.0001** |
| Lutein (mol/l) | 0.27 ± 0.01 | 0.23 ± 0.01 | **0.0002** |
| Lycopene (mol/l) | 0.35 ± 0.01 | 0.28 ± 0.01 | **<0.0001** |
| Zeaxanthin (mol/l) | 0.071 ± 0.002 | 0.064 ± 0.002 | **0.013** |
|  |  |  |  |
| *Adjusted for HDL-cholesterol* |  |  |  |
|  -carotene (mol/l) | 0.22 ± 0.01 | 0.27 ± 0.01 | **0.021** |
| -carotene (mol/l) | 0.52 ± 0.02 | 0.49 ± 0.02 | 0.32 |
| -cryptoxanthin (mol/l) | 0.17 ± 0.01 | 0.15 ± 0.01 | 0.15 |
| Lutein (mol/l) | 0.26 ± 0.01 | 0.24 ± 0.01 | 0.60 |
| Lycopene (mol/l) | 0.30 ± 0.01 | 0.31 ± 0.01 | 0.06 |
| Zeaxanthin (mol/l) | 0.069 ± 0.002 | 0.065 ± 0.002 | 0.23 |
|  |  |  |  |
| *Adjusted for HDL-cholesterol and body weight* | | | |
|  -carotene (mol/l) | 0.21 ± 0.01 | 0.27 ± 0.01 | **0.0012** |
| -carotene (mol/l) | 0.51 ± 0.03 | 0.50 ± 0.02 | 0.82 |
| -cryptoxanthin (mol/l) | 0.17 ± 0.01 | 0.16 ± 0.01 | 0.27 |
| Lutein (mol/l) | 0.26 ± 0.01 | 0.24 ± 0.01 | 0.08 |
| Lycopene (mol/l) | 0.29 ± 0.02 | 0.31 ± 0.01 | 0.32 |
| Zeaxanthin (mol/l) | 0.069 ± 0.002 | 0.065 ± 0.002 | 0.24 |
|  |  |  |  |

Values are presented as means ± standard error of the mean