**Supplementary Table S2.** Intake of energy and nutrients in Japanese children and adolescents (*n* 2849) according to free sugar intake: the 2016 National Health and Nutrition Survey, Japan (excluding energy misreporters)a,b

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | <2.5%Ec | | 2.5 to <5%Ec | | 5 to <10%Ec | | ≥10%Ec | | *P*d |
| *n* (%) | 588 | (20.6) | 835 | (29.3) | 979 | (34.4) | 447 | (15.7) |  |
| Energy (kJ) | 7344 | 77 | 7671 | 64 | 7814 | 59† | 7822 | 88§ | <0.001 |
| Macronutrients |  |  |  |  |  |  |  |  |  |
| Protein |  |  |  |  |  |  |  |  |  |
| Absolute intake (g) | 65.6 | 0.8 | 68.9 | 0.6 | 67.1 | 0.6 | 61.5 | 0.9||¶ | <0.001 |
| Intake per 4184 kJ (g) | 37.4 | 0.2 | 37.7 | 0.2 | 36.0 | 0.2†‡ | 32.8 | 0.3§||¶ | <0.001 |
| %E | 15.0 | 0.1 | 15.1 | 0.1 | 14.4 | 0.1†‡ | 13.1 | 0.1§||¶ | <0.001 |
| Fat |  |  |  |  |  |  |  |  |  |
| Absolute intake (g) | 59.9 | 0.9 | 61.8 | 0.7 | 62.3 | 0.7 | 58.5 | 1.0 | 0.246 |
| %E | 30.3 | 0.3 | 29.9 | 0.2 | 29.7 | 0.2 | 27.7 | 0.3§||¶ | <0.001 |
| SFA |  |  |  |  |  |  |  |  |  |
| Absolute intake (g) | 19.3 | 0.3 | 20.0 | 0.3 | 21.0 | 0.3† | 20.0 | 0.4 | 0.074 |
| %E | 9.9 | 0.1 | 9.8 | 0.1 | 10.0 | 0.1 | 9.5 | 0.1 | 0.085 |
| Carbohydrates |  |  |  |  |  |  |  |  |  |
| Absolute intake (g) | 230.5 | 2.7 | 243.1 | 2.3 | 252.7 | 2.1† | 268.4 | 3.1§||¶ | <0.001 |
| %E | 53.0 | 0.3 | 53.4 | 0.2 | 54.5 | 0.2† | 58.1 | 0.3§||¶ | <0.001 |
| Micronutrients |  |  |  |  |  |  |  |  |  |
| n-6 PUFA (g) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 9.7 | 0.2 | 10.0 | 0.1 | 9.7 | 0.1 | 8.8 | 0.2||¶ | <0.001 |
| Intake per 4184 kJ | 5.5 | 0.1 | 5.4 | 0.1 | 5.2 | 0.1 | 4.7 | 0.1§||¶ | <0.001 |
| n-3 PUFA (g) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 1.9 | 0.0 | 2.0 | 0.0 | 1.9 | 0.0 | 1.6 | 0.1§||¶ | <0.001 |
| Intake per 4184 kJ | 1.1 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 0.8 | 0.0§||¶ | <0.001 |
| Dietary fibre (g) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 10.9 | 0.2\* | 12.0 | 0.2 | 11.6 | 0.2 | 10.8 | 0.2|| | 0.083 |
| Intake per 4184 kJ | 6.4 | 0.1 | 6.7 | 0.1 | 6.3 | 0.1‡ | 5.9 | 0.1§||¶ | <0.001 |
| Vitamin A (µg RAE)e |  |  |  |  |  |  |  |  |  |
| Absolute intake | 502 | 37 | 580 | 31 | 486 | 28 | 481 | 42 | 0.205 |
| Intake per 4184 kJ | 298 | 17 | 313 | 14 | 268 | 13 | 265 | 19 | 0.041 |
| Vitamin D (µg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 5.9 | 0.3 | 6.1 | 0.2 | 5.7 | 0.2 | 4.9 | 0.3 | 0.009 |
| Intake per 4184 kJ | 3.4 | 0.2 | 3.4 | 0.1 | 3.2 | 0.1 | 2.6 | 0.2 | <0.001 |
| Vitamin E (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 5.7 | 0.1 | 6.1 | 0.1 | 6.0 | 0.1 | 5.6 | 0.1|| | 0.050 |
| Intake per 4184 kJ | 3.4 | 0.0 | 3.4 | 0.0 | 3.3 | 0.0 | 3.0 | 0.1§||¶ | <0.001 |
| Vitamin K (µg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 179 | 5 | 187 | 4 | 171 | 4 | 146 | 6§|| | <0.001 |
| Intake per 4184 kJ | 104 | 3 | 105 | 2 | 93 | 2 | 81 | 3§|| | <0.001 |
| Thiamin (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 1.02 | 0.02 | 1.03 | 0.01 | 1.00 | 0.01 | 0.91 | 0.02§||¶ | <0.001 |
| Intake per 4184 kJ | 0.58 | 0.01 | 0.56 | 0.01 | 0.53 | 0.01† | 0.48 | 0.01§||¶ | <0.001 |
| Riboflavin (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 1.11 | 0.02 | 1.19 | 0.01 | 1.18 | 0.01 | 1.10 | 0.02|| | 0.152 |
| Intake per 4184 kJ | 0.64 | 0.01 | 0.66 | 0.01 | 0.64 | 0.01 | 0.59 | 0.01§||¶ | <0.001 |
| Niacin (mg NE)f |  |  |  |  |  |  |  |  |  |
| Absolute intake | 24.9 | 0.4 | 26.2 | 0.3 | 25.3 | 0.3 | 23.2 | 0.4||¶ | <0.001 |
| Intake per 4184 kJ | 14.2 | 0.1 | 14.3 | 0.1 | 13.5 | 0.1‡ | 12.3 | 0.2§||¶ | <0.001 |
| Vitamin B6 (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 1.18 | 0.02 | 1.24 | 0.01 | 1.19 | 0.01 | 1.10 | 0.02|| | <0.001 |
| Intake per 4184 kJ | 0.68 | 0.01 | 0.68 | 0.01 | 0.64 | 0.01†‡ | 0.59 | 0.01§||¶ | <0.001 |
| Vitamin B12 (µg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 5.1 | 0.2 | 5.0 | 0.2 | 4.8 | 0.2 | 4.4 | 0.2 | 0.022 |
| Intake per 4184 kJ | 2.9 | 0.1 | 2.7 | 0.1 | 2.6 | 0.1 | 2.3 | 0.1 | <0.001 |
| Folate (µg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 249 | 5 | 271 | 4 | 255 | 4 | 237 | 6|| | 0.005 |
| Intake per 4184 kJ | 146 | 2 | 150 | 2 | 139 | 2‡ | 130 | 3§|| | <0.001 |
| Pantothenic acid (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 5.8 | 0.1 | 6.2 | 0.1 | 5.9 | 0.1 | 5.4 | 0.1||¶ | <0.001 |
| Intake per 4184 kJ | 3.3 | 0.0 | 3.4 | 0.0 | 3.2 | 0.0†‡ | 2.9 | 0.0§||¶ | <0.001 |
| Vitamin C (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 84.3 | 2.1 | 88.8 | 1.8 | 86.0 | 1.6 | 83.5 | 2.4 | 0.394 |
| Intake per 4184 kJ | 49.3 | 1.1 | 49.8 | 0.9 | 47.5 | 0.9 | 46.5 | 1.3 | 0.025 |
| Sodium (g NaCl equivalent) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 7.7 | 0.1\* | 8.3 | 0.1 | 8.3 | 0.1† | 7.8 | 0.1 | 0.599 |
| Intake per 4184 kJ | 4.5 | 0.1 | 4.6 | 0.0 | 4.5 | 0.0 | 4.2 | 0.1||¶ | <0.001 |
| Potassium (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 2176 | 30\* | 2365 | 25 | 2315 | 23 | 2078 | 35||¶ | <0.001 |
| Intake per 4184 kJ | 1267 | 12 | 1312 | 10 | 1260 | 9‡ | 1129 | 13§||¶ | <0.001 |
| Calcium (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 511 | 10\* | 569 | 8 | 580 | 8† | 518 | 11¶ | 0.910 |
| Intake per 4184 kJ | 299 | 5 | 318 | 4 | 318 | 4 | 285 | 5||¶ | 0.014 |
| Magnesium (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 222 | 3\* | 243 | 3 | 234 | 2 | 212 | 4||¶ | <0.001 |
| Intake per 4184 kJ | 129 | 1 | 135 | 1 | 127 | 1‡ | 115 | 2§||¶ | <0.001 |
| Phosphorus (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 984 | 12\* | 1051 | 10 | 1033 | 10 | 940 | 14||¶ | <0.001 |
| Intake per 4184 kJ | 565 | 4 | 578 | 3 | 558 | 3‡ | 505 | 5§||¶ | <0.001 |
| Iron (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 6.1 | 0.1\* | 6.7 | 0.1 | 6.5 | 0.1 | 6.1 | 0.1|| | 0.201 |
| Intake per 4184 kJ | 3.6 | 0.0 | 3.7 | 0.0 | 3.5 | 0.0 | 3.3 | 0.0§||¶ | <0.001 |
| Zinc (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 8.3 | 0.1 | 8.6 | 0.1 | 8.3 | 0.1 | 7.5 | 0.1§||¶ | <0.001 |
| Intake per 4184 kJ | 4.7 | 0.0 | 4.7 | 0.0 | 4.4 | 0.0†‡ | 4.0 | 0.0§||¶ | <0.001 |
| Copper (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 1.00 | 0.01\* | 1.07 | 0.01 | 1.02 | 0.01 | 0.94 | 0.01||¶ | <0.001 |
| Intake per 4184 kJ | 0.58 | 0.00 | 0.59 | 0.00 | 0.55 | 0.00†‡ | 0.51 | 0.01§||¶ | <0.001 |
| Manganese (mg) |  |  |  |  |  |  |  |  |  |
| Absolute intake | 2.6 | 0.0 | 2.7 | 0.0 | 2.5 | 0.0 | 2.4 | 0.0§|| | <0.001 |
| Intake per 4184 kJ | 1.5 | 0.0 | 1.5 | 0.0 | 1.4 | 0.0†‡ | 1.3 | 0.0§|| | <0.001 |

%E, percent of energy intake; RAE, retinol activity equivalent; NE, niacin equivalent

a All values are adjusted means and standard errors unless otherwise indicated

b In total, 70 subjects were excluded as energy misreporters

c Tukey–Kramer test was conducted with adjustment for sex, age, and weight status (underweight; normal; or overweight and obese). P <0.001 for difference between: <2.5%E and 2.5 to <5%E\*, 5 to <10%E and <2.5%E†, 5 to <10%E and 2.5 to <5%E‡, ≥10%E and <2.5%E§, ≥10%E and 2.5 to <5%E||, and ≥10%E and 5 to <10%E¶. There was no difference between <2.5%E and 2.5 to <5%E.

d A linear regression was conducted using the median value of each category of free sugars intake (1.5, 3.7, 6.8, and 12.7%E) as a continuous variable with adjustment for same variables used in Tukey–Kramer test

e 1 µg RAE = sum of retinol (µg) + β-carotene (µg) × 1/12 + α-carotene (µg) × 1/12 + β-cryptoxanthin (µg) × 1/24

f 1 mg NE = niacin (mg) + protein (mg)/6000