

## Article

# Relationships between skin carotenoid levels and metabolic syndrome

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Supplementary Table 1. Demographic data of study participants stratified by age quartiles

|                         | Age ≤ 50   |            |                 | 50 < Age ≤ 59 |            |                 | 59 < Age ≤ 66 |            |                 | 66 < Age   |            |                 |
|-------------------------|------------|------------|-----------------|---------------|------------|-----------------|---------------|------------|-----------------|------------|------------|-----------------|
|                         | Non-MetS   | MetS       | <i>P</i> -value | Non-MetS      | MetS       | <i>P</i> -value | Non-MetS      | MetS       | <i>P</i> -value | Non-MetS   | MetS       | <i>P</i> -value |
| N                       | 453        | 16         |                 | 462           | 39         |                 | 375           | 49         |                 | 371        | 47         |                 |
| Age (years)             |            |            |                 |               |            |                 |               |            |                 |            |            |                 |
| Mean ± SD               | 43.4 ± 5.8 | 46.8 ± 3.7 | 0.0200*         | 55.1 ± 2.6    | 55.8 ± 2.6 | 0.0903          | 62.8 ± 2.1    | 62.7 ± 1.8 | 0.6791          | 71.8 ± 4.0 | 71.6 ± 3.7 | 0.8059          |
| range                   | 22, 50     | 40, 50     |                 | 51, 59        | 51, 59     |                 | 60, 66        | 60, 66     |                 | 67, 90     | 67, 80     |                 |
| Sex                     |            |            |                 |               |            |                 |               |            |                 |            |            |                 |
| Men, n (%)              | 199 (43.9) | 14 (87.5)  | 0.0006*         | 205 (44.4)    | 31 (79.5)  | <0.0001**       | 163 (43.5)    | 35 (71.4)  | 0.0002**        | 172 (46.4) | 40 (85.1)  | <0.0001**       |
| Women, n (%)            | 254 (56.1) | 2 (12.5)   |                 | 257 (55.6)    | 8 (20.5)   |                 | 212 (56.5)    | 14 (28.6)  |                 | 199 (53.6) | 7 (14.9)   |                 |
| Smoking habit           |            |            |                 |               |            |                 |               |            |                 |            |            |                 |
| Yes, n (%)              | 31 (6.8)   | 4 (25.0)   | 0.0249*         | 12 (2.6)      | 2 (5.1)    | 0.2985          | 13 (3.5)      | 4 (8.2)    | 0.1206          | 4 (1.1)    | 1 (2.1)    | 0.4509          |
| No, n (%)               | 422 (93.2) | 12 (75.0)  |                 | 450 (97.4)    | 37 (94.9)  |                 | 362 (96.5)    | 45 (91.8)  |                 | 367 (98.9) | 46 (97.9)  |                 |
| Antihypertensive agents |            |            |                 |               |            |                 |               |            |                 |            |            |                 |
| Yes, n (%)              | 15 (3.3)   | 6 (37.5)   | <0.0001**       | 39 (8.4)      | 21 (53.9)  | <0.0001**       | 67 (17.9)     | 36 (73.5)  | <0.0001**       | 112 (30.2) | 38 (80.9)  | <0.0001**       |

|                                |              |              |               |              |             |               |              |              |               |              |              |               |
|--------------------------------|--------------|--------------|---------------|--------------|-------------|---------------|--------------|--------------|---------------|--------------|--------------|---------------|
| No, n (%)                      | 438 (96.7)   | 10 (62.5)    |               | 423 (91.6)   | 18 (46.2)   |               | 308 (82.1)   | 13 (26.5)    |               | 259 (69.8)   | 9 (19.1)     |               |
| Antihyperlipidemic agents      |              |              |               |              |             |               |              |              |               |              |              |               |
| Yes, n (%)                     | 8 (1.8)      | 5 (31.3)     | <0.000<br>1** | 43 (9.3)     | 22 (56.4)   | <0.000<br>1** | 62 (16.5)    | 25 (51.0)    | <0.000<br>1** | 106 (28.6)   | 31 (66.0)    | <0.000<br>1** |
| No, n (%)                      | 445 (98.2)   | 11 (68.8)    |               | 419 (90.7)   | 17 (43.6)   |               | 313 (83.5)   | 24 (49.0)    |               | 265 (71.4)   | 16 (34.0)    |               |
| Insulin usage                  |              |              |               |              |             |               |              |              |               |              |              |               |
| Yes, n (%)                     | 3 (0.7)      | 2 (12.5)     | 0.0103*       | 6 (1.3)      | 5 (12.8)    | 0.0007*<br>*  | 15 (4.0)     | 9 (18.4)     | 0.0006*<br>*  | 23 (6.2)     | 5 (10.6)     | 0.2261        |
| No, n (%)                      | 450 (99.3)   | 14 (87.5)    |               | 456 (98.7)   | 34 (87.2)   |               | 360 (96.0)   | 40 (81.7)    |               | 348 (93.8)   | 42 (89.4)    |               |
| BMI (kg/m <sup>2</sup> )       |              |              |               |              |             |               |              |              |               |              |              |               |
| Mean ± SD                      | 22.3 ± 3.3   | 29.5 ± 2.8   | <0.000<br>1** | 22.1 ± 3.0   | 27.6 ± 3.6  | <0.000<br>1** | 22.3 ± 3.0   | 26.4 ± 3.2   | <0.000<br>1** | 22.0 ± 2.7   | 25.7 ± 2.5   | <0.000<br>1** |
| range                          | 16, 44       | 25, 36       |               | 16, 34       | 23, 42      |               | 14, 36       | 22, 35       |               | 15, 33       | 22, 33       |               |
| Body fat percentage (%)        |              |              |               |              |             |               |              |              |               |              |              |               |
| Mean ± SD                      | 24.7 ± 6.5   | 31.6 ± 6.0   | <0.000<br>1** | 24.1 ± 6.3   | 30.1 ± 6.8  | <0.000<br>1** | 24.2 ± 6.7   | 29.2 ± 7.8   | <0.000<br>1** | 23.1 ± 6.4   | 26.5 ± 6.0   | 0.0008*<br>*  |
| range                          | 9, 58        | 20, 46       |               | 11, 48       | 21, 50      |               | 8, 55        | 17, 49       |               | 8, 45        | 18, 45       |               |
| Waist circumference (cm)       |              |              |               |              |             |               |              |              |               |              |              |               |
| Mean ± SD                      | 79.1 ± 8.7   | 97.1 ± 6.0   | <0.000<br>1** | 79.5 ± 8.6   | 96.6 ± 9.0  | <0.000<br>1** | 81.1 ± 8.2   | 93.6 ± 6.8   | <0.000<br>1** | 80.4 ± 7.9   | 92.4 ± 5.2   | <0.000<br>1** |
| range                          | 62, 120      | 86, 111      |               | 61, 117      | 86, 132     |               | 60, 111      | 85, 116      |               | 59, 111      | 85, 104      |               |
| Systolic Blood pressure (mmHg) |              |              |               |              |             |               |              |              |               |              |              |               |
| Mean ± SD                      | 109.8 ± 13.8 | 127.1 ± 12.1 | <0.000<br>1** | 114.2 ± 14.7 | 128.1 ± 9.5 | <0.000<br>1** | 120.1 ± 14.0 | 125.2 ± 13.5 | 0.0162*       | 123.0 ± 14.4 | 130.3 ± 13.2 | 0.0012<br>**  |

|                                 |           |             |               |           |               |               |           |               |               |         |               |               |         |
|---------------------------------|-----------|-------------|---------------|-----------|---------------|---------------|-----------|---------------|---------------|---------|---------------|---------------|---------|
|                                 | range     | 84, 174     | 98, 144       |           | 82, 164       | 104, 148      |           | 80, 168       | 90, 160       |         | 86, 194       | 102, 160      |         |
| Diastolic blood pressure (mmHg) |           |             |               |           |               |               |           |               |               |         |               |               |         |
|                                 | Mean ± SD | 69.3 ± 10.0 | 85.6 ± 10.7   | <0.0001** | 72.4 ± 10.3   | 80.9 ± 9.3    | <0.0001** | 73.5 ± 8.8    | 76.6 ± 8.7    | 0.0223* | 71.1 ± 9.3    | 75.2 ± 10.1   | 0.0044* |
|                                 | range     | 50, 104     | 70, 110       |           | 48, 110       | 58, 96        |           | 48, 100       | 60, 94        |         | 42, 100       | 56, 98        |         |
| Heart rate (bpm)                |           |             |               |           |               |               |           |               |               |         |               |               |         |
|                                 | Mean ± SD | 62.0 ± 9.1  | 62.3 ± 7.1    | 0.9064    | 61.4 ± 9.5    | 68.9 ± 8.5    | <0.0001** | 64.0 ± 10.1   | 61.1 ± 9.3    | 0.0575  | 64.0 ± 10.0   | 63.5 ± 12.0   | 0.7827  |
|                                 | range     | 38, 111     | 50, 77        |           | 40, 125       | 55, 92        |           | 40, 104       | 41, 86        |         | 43, 117       | 46, 91        |         |
| Skin carotenoid                 |           |             |               |           |               |               |           |               |               |         |               |               |         |
|                                 | Mean ± SD | 340 ± 101.8 | 315.9 ± 107.0 | 0.3522    | 366.5 ± 116.5 | 327.7 ± 108.6 | 0.0455*   | 380.1 ± 124.5 | 329.7 ± 116.5 | 0.0076* | 433.4 ± 131.8 | 371.2 ± 110.6 | 0.0021* |
|                                 | range     | 136, 778    | 186, 579      |           | 83, 749       | 185, 745      |           | 132, 974      | 167, 686      |         | 137, 847      | 220, 772      |         |

Comparison between metabolic syndrome and non-metabolic syndrome groups by using unpaired student t test for continuous data and by using Fisher's exact probability test for categorical data. The \* and \*\* correspond to the significance levels at 5% ( $P < 0.05$ ) and 1% ( $P < 0.01$ ), respectively. MetS, Metabolic syndrome; N, number of participants; SD, standard deviation; bpm, beats per minute.