

# **SUPPLEMENTAL MATERIAL**

**Table S1.** Adherence to the treatments groups, reasons for discontinuation and GI adverse events over 24-wk follow-up.

|                             | Magnesium citrate | Magnesium oxide | Magnesium sulfate | Placebo  |
|-----------------------------|-------------------|-----------------|-------------------|----------|
| <i>Adherence</i>            |                   |                 |                   |          |
| Compliance*, %              | 96 ± 5            | 93 ± 8          | 94 ± 7            | 90 ± 15  |
| Reasons for discontinuation |                   |                 |                   |          |
| GI symptoms, n (%)          | 2 (4.3)           | 0 (0)           | 2 (4.3)           | 2 (7.7)  |
| Other symptoms, n (%)       | 0 (0)             | 1 (2.2)         | 0 (0)             | 0 (0)    |
| <i>GI adverse events†</i>   |                   |                 |                   |          |
| Flatulence, n (%)           | 4 (8.7)           | 2 (4.3)         | 2 (4.3)           | 2 (7.7)  |
| Stomach pain, n (%)         | 1 (2.2)           | 5 (10.9)        | 4 (8.7)           | 3 (11.5) |
| Mild diarrhea, n (%)        | 5 (10.9)          | 1 (2.2)         | 5 (10.9)          | 2 (7.7)  |
| Nausea, n (%)               | 3 (6.5)           | 2 (4.3)         | 2 (4.3)           | 1 (3.8)  |
| Bloating, n (%)             | 1 (2.2)           | 1 (2.2)         | 2 (4.3)           | 1 (3.8)  |
| Constipation, n (%)         | 2 (4.3)           | 0 (0)           | 0 (0)             | 0 (0)    |

\*Mean compliance (± SD) was calculated as the percentage of the total capsule intake (based on the returned capsules). †Derived from subjects' study diaries. GI; gastrointestinal.

**Table S2.** Effects of magnesium citrate, magnesium oxide and magnesium sulfate (vs placebo) on plasma minerals.

|                         | Magnesium citrate<br>(n=46) | Magnesium oxide<br>(n=46) | Magnesium sulfate<br>(n=46) | Placebo<br>(n=26) |
|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------|
| <b>Plasma calcium</b>   |                             |                           |                             |                   |
| 2-wk                    |                             |                           |                             |                   |
| Mean, mmol/L            | 2.25 ± 0.08                 | 2.26 ± 0.08               | 2.27 ± 0.07                 | 2.25 ± 0.12       |
| Difference vs placebo   | -0.02 (-0.01; 0.05)         | 0.03 (-0.00; 0.06)        | 0.02 (-0.01; 0.05)          | ..                |
| 12-wk                   |                             |                           |                             |                   |
| Mean, mmol/L            | 2.25 ± 0.07                 | 2.26 ± 0.09               | 2.28 ± 0.07                 | 2.26 ± 0.07       |
| Difference vs placebo   | -0.01 (-0.03; 0.04)         | 0.01 (-0.02; 0.04)        | 0.01 (-0.02; 0.04)          | ..                |
| 24-wk                   |                             |                           |                             |                   |
| Mean, m/s               | 2.27 ± 0.06                 | 2.28 ± 0.09               | 2.28 ± 0.07                 | 2.29 ± 0.08       |
| Difference vs placebo   | -0.00 (-0.03; 0.03)         | -0.01 (-0.04; 0.03)       | -0.02 (-0.05; 0.01)         | ..                |
| <b>Plasma potassium</b> |                             |                           |                             |                   |
| 2-wk                    |                             |                           |                             |                   |
| Mean, mmol/L            | 4.2 ± 0.4                   | 4.2 ± 0.3                 | 4.2 ± 0.3                   | 4.1 ± 0.2         |
| Difference vs placebo   | 0.1 (-0.1; 0.2)             | 0.1 (-0.1; 0.2)           | 0.0 (-0.1; 0.2)             | ..                |
| 12-wk                   |                             |                           |                             |                   |
| Mean, mmol/L            | 4.1 ± 0.3                   | 4.2 ± 0.4                 | 4.2 ± 0.3                   | 4.1 ± 0.3         |
| Difference vs placebo   | 0.0 (-0.2; 0.2)             | 0.1 (-0.1; 0.2)           | 0.0 (-0.1; 0.2)             | ..                |
| 24-wk                   |                             |                           |                             |                   |
| Mean, mmol/L            | 4.2 ± 0.4                   | 4.2 ± 0.3                 | 4.2 ± 0.4                   | 4.1 ± 0.2         |
| Difference vs placebo   | 0.1 (-0.1; 0.3)             | 0.1 (-0.1; 0.3)           | 0.1 (-0.1; 0.3)             | ..                |
| <b>Plasma sodium</b>    |                             |                           |                             |                   |
| 2-wk                    |                             |                           |                             |                   |
| Mean, mmol/L            | 140.0 ± 1.7                 | 140.0 ± 1.9               | 140.4 ± 1.2                 | 140.8 ± 1.4       |
| Difference vs placebo   | -0.3 (-1.1; 0.4)            | -0.6 (-1.3; 0.2)          | -0.3 (-1.0; 0.5)            | ..                |
| 12-wk                   |                             |                           |                             |                   |
| Mean, mmol/L            | 140.1 ± 2.4                 | 140.6 ± 1.8               | 140.5 ± 1.4                 | 140.6 ± 1.3       |
| Difference vs placebo   | 0.4 (-0.6; 0.9)             | 0.4 (-0.3; 1.2)           | 0.3 (-0.6; 0.9)             | ..                |
| 24-wk                   |                             |                           |                             |                   |
| Mean, mmol/L            | 139.8 ± 1.8                 | 140.4 ± 1.8               | 140.7 ± 1.8                 | 140.2 ± 1.3       |
| Difference vs placebo   | -0.1 (-0.9; 0.7)            | 0.4 (-0.4; 0.2)           | 0.6 (-0.2; 1.3)             | ..                |
| <b>Plasma albumin</b>   |                             |                           |                             |                   |
| 2-wk                    |                             |                           |                             |                   |
| Mean, g/L               | 43.2 ± 2.5                  | 44.3 ± 2.0                | 43.7 ± 2.5                  | 44.2 ± 5.5        |

|                          |                    |                     |                     |             |
|--------------------------|--------------------|---------------------|---------------------|-------------|
| Difference vs placebo    | -1.3 (-2.5; -0.1)  | -0.1 (-1.3; 1.1)    | -0.5 (-1.7; 0.7)    | ..          |
| 12-wk                    |                    |                     |                     |             |
| Mean, g/L                | 43.2 ± 2.2         | 43.8 ± 2.0          | 43.5 ± 2.1          | 43.4 ± 3.2  |
| Difference vs placebo    | -0.5 (-1.8; 0.7)   | 0.3 (-0.9; 1.6)     | 0.2 (-1.0; 1.4)     | ..          |
| 24-wk                    |                    |                     |                     |             |
| Mean, g/L                | 42.5 ± 2.4         | 43.7 ± 2.3          | 43.7 ± 2.1          | 43.3 ± 2.8  |
| Difference vs placebo    | -1.2 (-2.5; -0.0)* | 0.3 (-0.9; 1.5)     | 0.4 (-0.8; 1.7)     | ..          |
| <b>Plasma phosphate</b>  |                    |                     |                     |             |
| 2-wk                     |                    |                     |                     |             |
| Mean, mmol/L             | 1.02 ± 0.13        | 0.98 ± 0.15         | 0.97 ± 0.15         | 1.01 ± 0.14 |
| Difference vs placebo    | 0.02 (-0.03; 0.06) | -0.01 (-0.06; 0.03) | -0.02 (-0.06; 0.03) | ..          |
| 12-wk                    |                    |                     |                     |             |
| Mean, mmol/L             | 1.02 ± 0.15        | 0.99 ± 0.15         | 1.00 ± 0.14         | 0.97 ± 0.15 |
| Difference vs placebo    | 0.06 (0.01; 0.11)* | 0.03 (-0.02; 0.08)  | 0.06 (0.01; 0.11)*  | ..          |
| 24-wk                    |                    |                     |                     |             |
| Mean, mmol/L             | 1.02 ± 0.14        | 1.00 ± 0.15         | 0.99 ± 0.14         | 0.99 ± 0.14 |
| Difference vs placebo    | 0.04 (-0.01; 0.09) | 0.02 (-0.02; 0.07)  | 0.03 (-0.02; 0.08)  | ..          |
| <b>Plasma creatinine</b> |                    |                     |                     |             |
| 2-wk                     |                    |                     |                     |             |
| Median                   | 73 (67-83)         | 77 (65-85)          | 70 (66-83)          | 1.01 ± 0.14 |
| Difference vs placebo    | -0.0 (-0.0; -0.0)  | -0.01 (-0.03; 0.00) | -0.01 (-0.03; 0.00) | ..          |
| 12-wk                    |                    |                     |                     |             |
| Median                   | 74 (66-86)         | 77 (67-88)          | 72 (65-84)          | 0.97 ± 0.15 |
| Difference vs placebo    | -0.0 (-0.0; 0.0)   | -0.01 (-0.03; 0.01) | -0.01 (-0.02; 0.01) | ..          |
| 24-wk                    |                    |                     |                     |             |
| Median                   | 74 (65-83)         | 76 (63-87)          | 72 (64-81)          | 0.99 ± 0.14 |
| Difference vs placebo    | -0.0 (-0.0; 0.0)   | -0.00 (-0.02; 0.01) | -0.00 (-0.03; 0.01) | ..          |

Values are mean ± SD or median (interquartile range). Adjusted mean differences (95% CIs and) were obtained from linear mixed-effect models with age, sex, baseline value of the outcome of interest, time, intervention, and the interaction time × intervention as fixed effects. \*  $P < 0.05$  (two-sided  $P$  values).

**Table S3.** Effects of magnesium citrate, magnesium oxide and magnesium sulfate (vs placebo) on urinary minerals.

|                           | Magnesium citrate<br>(n=46) | Magnesium oxide<br>(n=46) | Magnesium sulfate<br>(n=46) | Placebo<br>(n=26) |
|---------------------------|-----------------------------|---------------------------|-----------------------------|-------------------|
| <b>Urinary calcium</b>    |                             |                           |                             |                   |
| 2-wk                      |                             |                           |                             |                   |
| Mean, mmol/24-h           | 4.9 ± 2.2                   | 6.0 ± 2.7                 | 5.4 ± 2.4                   | 4.5 ± 2.1         |
| Difference vs placebo     | 0.5 (-0.3; 1.4)             | 1.0 (0.1; 1.9)*           | 0.7 (-0.1; 1.6)             | ..                |
| 12-wk                     |                             |                           |                             |                   |
| Mean, mmol/24-h           | 5.0 ± 2.2                   | 5.8 ± 2.8                 | 5.3 ± 2.3                   | 4.1 ± 1.7         |
| Difference vs placebo     | 1.0 (0.1; 1.9)*             | 1.2 (0.4; 2.1)**          | 1.0 (0.1; 1.9)*             | ..                |
| 24-wk                     |                             |                           |                             |                   |
| Mean, mmol/24-h           | 4.8 ± 2.3                   | 5.9 ± 2.8                 | 5.3 ± 2.7                   | 4.1 ± 1.5         |
| Difference vs placebo     | 0.8 (-0.0; 1.7)             | 1.2 (0.4; 2.1)**          | 1.0 (0.1; 1.8)*             | ..                |
| <b>Urinary potassium</b>  |                             |                           |                             |                   |
| 2-wk                      |                             |                           |                             |                   |
| Mean, mmol/24-h           | 87.3 ± 25.0                 | 97.3 ± 28.1               | 93.2 ± 24.6                 | 80.4 ± 29.3       |
| Difference vs placebo     | 13.0 (0.4; 25.6)*           | 17.4 (4.8; 29.9)**        | 15.8 (3.3; 28.2)*           | ..                |
| 12-wk                     |                             |                           |                             |                   |
| Mean, mmol/24-h           | 88.9 ± 25.3                 | 98.0 ± 29.2               | 95.2 ± 32.4                 | 81.2 ± 24.6       |
| Difference vs placebo     | 11.7 (-0.9; 24.4)           | 16.4 (3.8; 28.9)*         | 14.8 (2.2; 27.3)*           | ..                |
| 24-wk                     |                             |                           |                             |                   |
| Mean, mmol/24-h           | 90.2 ± 26.3                 | 95.5 ± 27.6               | 94.9 ± 31.4                 | 79.7 ± 28.9       |
| Difference vs placebo     | 15.1 (2.4; 27.9)*           | 15.4 (2.8; 28.1)*         | 17.0 (4.4; 29.7)**          | ..                |
| <b>Urinary sodium</b>     |                             |                           |                             |                   |
| 2-wk                      |                             |                           |                             |                   |
| Mean, mmol/24-h           | 143.3 ± 53.1                | 151.8 ± 55.7              | 154.3 ± 66.5                | 138.3 ± 45.9      |
| Difference vs placebo     | 19.3 (-6.7; 45.2)           | 26.6 (0.7; 52.5)*         | 22.4 (-3.2; 47.9)           | ..                |
| 12-wk                     |                             |                           |                             |                   |
| Mean, mmol/24-h           | 135.7 ± 45.6                | 146.9 ± 51.2              | 159.8 ± 60.7                | 130.7 ± 41.6      |
| Difference vs placebo     | 17.4 (-8.8; 43.5)           | 26.2 (0.3; 52.2)*         | 34.4 (8.8; 60.1)**          | ..                |
| 24-wk                     |                             |                           |                             |                   |
| Mean, mmol/24-h           | 141.7 ± 45.5                | 153.0 ± 52.6              | 150.4 ± 57.4                | 131.2 ± 39.3      |
| Difference vs placebo     | 21.9 (-4.5; 48.3)           | 30.5 (4.4; 56.5)*         | 23.7 (-2.2; 49.6)           | ..                |
| <b>Urinary creatinine</b> |                             |                           |                             |                   |
| 2-wk                      |                             |                           |                             |                   |
| Mean,                     | 12.6 ± 3.5                  | 12.7 ± 4.0                | 13.1 ± 4.2                  | 12.6 ± 3.7        |

|                       |                 |                 |                  |            |
|-----------------------|-----------------|-----------------|------------------|------------|
| Difference vs placebo | 0.2 (-1.2; 1.5) | 0.3 (-1.1; 1.6) | 0.3 (-1.1; 1.6)  | ..         |
| 12-wk                 |                 |                 |                  |            |
| Mean,                 | 13.0 ± 3.6      | 12.9 ± 3.7      | 13.3 ± 4.0       | 12.6 ± 3.7 |
| Difference vs placebo | 0.5 (-0.8; 1.8) | 0.6 (-0.8; 1.9) | 0.5 (-0.8; 1.9)  | ..         |
| 24-wk                 |                 |                 |                  |            |
| Mean,                 | 12.6 ± 3.2      | 13.0 ± 3.8      | 12.7 ± 3.3       | 12.6 ± 3.5 |
| Difference vs placebo | 0.1 (-1.3; 1.4) | 0.7 (-0.6; 2.0) | -0.1 (-1.4; 1.3) | ..         |

Values are mean ± SD. Adjusted mean differences (95% CIs) were obtained from linear mixed-effect models with age, sex, baseline value of the outcome of interest, time, intervention, and the interaction time × intervention as fixed effects. \*  $P < 0.05$ , \*\*  $P < 0.01$  (two-sided  $P$  values).

**Table S4.** Effects of magnesium citrate, magnesium oxide and magnesium sulfate (vs placebo) on body composition.

|                            | Magnesium citrate<br>(n=46) | Magnesium oxide<br>(n=46) | Magnesium sulfate<br>(n=46) | Placebo<br>(n=26) |
|----------------------------|-----------------------------|---------------------------|-----------------------------|-------------------|
| <b>Weight</b>              |                             |                           |                             |                   |
| 2-wk                       |                             |                           |                             |                   |
| Mean, kg                   | 85.7 ± 12.9                 | 82.8 ± 12.0               | 86.0 ± 11.8                 | 85.5 ± 10.4       |
| Difference vs placebo      | -0.1 (-0.8; 0.6)            | 0.0 (-0.7; 0.8)           | -0.2 (-0.9; 0.5)            | ..                |
| 12-wk                      |                             |                           |                             |                   |
| Mean, kg                   | 86.6 ± 12.1                 | 83.0 ± 12.0               | 86.3 ± 12.0                 | 86.1 ± 9.8        |
| Difference vs placebo      | -0.1 (-0.8; 0.7)            | 0.2 (-0.6; 0.9)           | 0.3 (-0.4; 1.0)             | ..                |
| 24-wk                      |                             |                           |                             |                   |
| Mean, kg                   | 86.3 ± 12.7                 | 82.6 ± 12.0               | 86.5 ± 12.6                 | 85.9 ± 9.8        |
| Difference vs placebo      | 0.0 (-0.8; 0.7)             | 0.3 (-0.4; 1.0)           | 0.7 (-0.0; 1.4)             | ..                |
| <b>BMI</b>                 |                             |                           |                             |                   |
| 2-wk                       |                             |                           |                             |                   |
| Mean, kg/m <sup>2</sup>    | 28.6 ± 3.4                  | 27.5 ± 2.1                | 28.3 ± 2.8                  | 27.8 ± 2.5        |
| Difference vs placebo      | -0.0 (-0.3; 0.2)            | 0.0 (-0.2; 0.3)           | -0.1 (-0.3; 0.2)            | ..                |
| 12-wk                      |                             |                           |                             |                   |
| Mean, kg/m <sup>2</sup>    | 28.7 ± 3.4                  | 27.5 ± 2.1                | 28.5 ± 2.9                  | 27.6 ± 2.5        |
| Difference vs placebo      | -0.0 (-0.3; 0.2)            | 0.1 (-0.2; 0.3)           | 0.1 (-0.1; 0.3)             | ..                |
| 24-wk                      |                             |                           |                             |                   |
| Mean, kg/m <sup>2</sup>    | 28.6 ± 3.5                  | 27.5 ± 2.1                | 28.6 ± 3.0                  | 27.6 ± 2.5        |
| Difference vs placebo      | -0.0 (-0.3; 0.2)            | 0.1 (-0.1; 0.3)           | 0.2 (-0.0; 0.5)             | ..                |
| <b>Waist circumference</b> |                             |                           |                             |                   |
| 2-wk                       |                             |                           |                             |                   |
| Mean, cm                   | 96 ± 10                     | 94 ± 10                   | 96 ± 9                      | 96 ± 8            |
| Difference vs placebo      | -0.5 (-2.3; 1.3)            | 0.4 (-1.4; 2.2)           | 0.0 (-1.7; 1.8)             | ..                |
| 12-wk                      |                             |                           |                             |                   |
| Mean, cm                   | 97 ± 10                     | 93 ± 9                    | 97 ± 9                      | 97 ± 8            |
| Difference vs placebo      | -0.2 (-2.1; 1.6)            | -1.3 (3.2; 0.5)           | -0.1 (-1.9; 1.8)            | ..                |
| 24-wk                      |                             |                           |                             |                   |
| Mean, cm                   | 97 ± 10                     | 93 ± 9                    | 97 ± 10                     | 97 ± 8            |
| Difference vs placebo      | 0.1 (-1.8; 1.9)             | -1.9 (-3.7; -0.1)*        | 0.6 (-1.2; 2.4)             | ..                |
| <b>Hip circumference</b>   |                             |                           |                             |                   |
| 2-wk                       |                             |                           |                             |                   |
| Mean, cm                   | 110 ± 7                     | 107 ± 6                   | 107 ± 6                     | 107 ± 6           |

|                       |                  |                  |                  |            |
|-----------------------|------------------|------------------|------------------|------------|
| Difference vs placebo | -0.1 (-1.6; 1.4) | 0.4 (-1.1; 1.9)  | -0.2 (-1.7; 1.3) | ..         |
| 12-wk                 |                  |                  |                  |            |
| Mean, cm              | 109 ± 7          | 107 ± 6          | 107 ± 7          | 108 ± 6    |
| Difference vs placebo | -0.6 (-2.2; 0.9) | 0.2 (-1.4; 1.7)  | -0.1 (-1.7; 1.4) | ..         |
| 24-wk                 |                  |                  |                  |            |
| Mean, cm              | 109 ± 7          | 105 ± 6          | 107 ± 7          | 107 ± 6    |
| Difference vs placebo | -0.3 (-1.9; 1.2) | -0.6 (-2.1; 0.9) | -0.1 (-1.6; 1.5) | ..         |
| <b>Total body fat</b> |                  |                  |                  |            |
| 2-wk                  |                  |                  |                  |            |
| Mean, %               | 36.8 ± 8.1       | 34.6 ± 6.1       | 35.9 ± 8.3       | 34.1 ± 7.2 |
| Difference vs placebo | 0.1 (-0.9; 1.1)  | 0.6 (-0.4; 1.6)  | 0.3 (-0.6; 1.3)  | ..         |
| 12-wk                 |                  |                  |                  |            |
| Mean, %               | 36.6 ± 7.9       | 34.6 ± 6.5       | 35.8 ± 7.7       | 33.9 ± 7.7 |
| Difference vs placebo | 0.0 (-1.0; 1.0)  | 0.4 (-0.6; 1.4)  | 0.2 (-0.8; 1.2)  | ..         |
| 24-wk                 |                  |                  |                  |            |
| Mean, %               | 36.4 ± 7.7       | 34.9 ± 6.3       | 35.9 ± 7.7       | 34.3 ± 7.7 |
| Difference vs placebo | -0.3 (-1.3; 0.7) | 0.0 (-1.0; 1.0)  | 0.0 (-1.0; 1.0)  | ..         |

Values are mean ± SD. Adjusted mean differences (95% CIs) were obtained from linear mixed-effect models with age, sex, baseline value of the outcome of interest, time, intervention, and the interaction time × intervention as fixed effects.



**Table S5.** Energy and nutrient intakes after a 24-wk magnesium or placebo treatment.

|                           | Magnesium<br>citrate (n=46) | Magnesium<br>oxide (n=46) | Magnesium<br>sulfate (n=46) | Placebo<br>(n=26) |
|---------------------------|-----------------------------|---------------------------|-----------------------------|-------------------|
| <b>Energy,</b>            |                             |                           |                             |                   |
| Mean, kcal/day            | 1706 ± 406                  | 1767 ± 338                | 1732 ± 362                  | 1691 ± 419        |
| Difference vs placebo     | -70 (-81; 222)              | 108 (-41; 256)            | 62 (-89; 212)               | ..                |
| <b>Macronutrients</b>     |                             |                           |                             |                   |
| <b>Carbohydrate</b>       |                             |                           |                             |                   |
| Mean, g/day               | 172 ± 53                    | 180 ± 45                  | 182 ± 40                    | 178 ± 48          |
| Difference vs placebo     | 1 (-17; 19)                 | 5 (-13; 23)               | 6 (-11; 24)                 | ..                |
| <b>Protein</b>            |                             |                           |                             |                   |
| Mean, g/day               | 75 ± 16                     | 77 ± 17                   | 73 ± 16                     | 69 ± 19           |
| Difference vs placebo     | 7 (0; 15)*                  | 9 (2; 17)*                | 5 (-2; 12)                  | ..                |
| <b>Total fat</b>          |                             |                           |                             |                   |
| Mean, g/day               | 70 ± 21                     | 70 ± 17                   | 68 ± 21                     | 66 ± 24           |
| Difference vs placebo     | 6 (-3; 15)                  | 6 (-3; 15)                | 2 (-7; 12)                  | ..                |
| <b>Saturated FA</b>       |                             |                           |                             |                   |
| Mean, g/day               | 26 ± 9                      | 27 ± 7                    | 26 ± 9                      | 25 ± 12           |
| Difference vs placebo     | -2 (-2; 6)                  | 1 (-2; 5)                 | 1 (-3; 5)                   | ..                |
| <b>Monounsaturated FA</b> |                             |                           |                             |                   |
| Mean, g/day               | 23 ± 8                      | 23 ± 7                    | 22 ± 8                      | 21 ± 9            |
| Difference vs placebo     | 2 (-2; 6)                   | 2 (-1; 6)                 | 1 (-3; 4)                   | ..                |
| <b>Polyunsaturated FA</b> |                             |                           |                             |                   |
| Mean, g/day               | 13 ± 5                      | 14 ± 6                    | 13 ± 6                      | 12 ± 6            |
| Difference vs placebo     | 1 (-2; 3)                   | 1 (-1; 4)                 | 0 (-2; 3)                   | ..                |
| <b>Alcohol</b>            |                             |                           |                             |                   |
| Mean, g/day               | 6 ± 8                       | 9 ± 10                    | 8 ± 17                      | 9 ± 13            |
| Difference vs placebo     | -2 (-6; 2)                  | -2 (-5; 2)                | -2 (-6; 2)                  | ..                |
| <b>Dietary fiber</b>      |                             |                           |                             |                   |
| Mean, g/day               | 19 ± 5                      | 20 ± 6                    | 19 ± 4                      | 20 ± 7            |
| Difference vs placebo     | -1 (-3; 1)                  | -1 (-3; 1)                | -0 (-2; 2)                  | ..                |
| <b>Cholesterol</b>        |                             |                           |                             |                   |
| Mean, g/day               | 218 ± 83                    | 215 ± 85                  | 207 ± 104                   | 182 ± 78          |
| Difference vs placebo     | 39 (-3; 80)                 | 35 (-6; 75)               | 25 (-16; 66)                | ..                |
| <b>Micronutrients</b>     |                             |                           |                             |                   |
| <b>Magnesium</b>          |                             |                           |                             |                   |

|                       |                 |                 |                 |            |
|-----------------------|-----------------|-----------------|-----------------|------------|
| Mean, mg/day          | 306 ± 66        | 327 ± 94        | 311 ± 92        | 316 ± 117  |
| Difference vs placebo | 7 (-25; 39)     | -1 (-36; 30)    | 5 (-27; 37)     | ..         |
| <b>Sodium</b>         |                 |                 |                 |            |
| Mean, mg/day          | 2030 ± 648      | 2028 ± 627      | 2102 ± 691      | 1947 ± 633 |
| Difference vs placebo | -198 (-92; 489) | 167 (-118; 451) | 186 (-102; 473) | ..         |
| <b>Calcium</b>        |                 |                 |                 |            |
| Mean, mg/day          | 900 ± 271       | 947 ± 342       | 909 ± 384       | 940 ± 411  |
| Difference vs placebo | 41 (-87; 169)   | 4 (-121; 129)   | 56 (-71; 184)   | ..         |
| <b>Potassium</b>      |                 |                 |                 |            |
| Mean, mg/day          | 3040 ± 736      | 3130 ± 753      | 3000 ± 700      | 2951 ± 884 |
| Difference vs placebo | 162 (-102; 425) | 81 (-178; 340)  | 99 (-162; 361)  | ..         |

Values are mean ± SD. Adjusted mean differences (95% CIs) were obtained from linear mixed-effect models with age, sex, baseline value of the outcome of interest, time, intervention, and the interaction time × intervention as fixed effects. \*  $P < 0.05$  (two-sided  $P$  values for superiority tests and one-sided  $P$  values for non-inferiority tests).

**Table S6.** Effects of magnesium oxide and magnesium sulfate (vs magnesium citrate) on plasma minerals.

|                                 | Magnesium oxide<br>(n=46) | Magnesium sulfate<br>(n=46) | Magnesium citrate<br>(n=46) |
|---------------------------------|---------------------------|-----------------------------|-----------------------------|
| <b>Plasma calcium</b>           |                           |                             |                             |
| 2-wk                            |                           |                             |                             |
| Mean, mmol/L                    | 2.26 ± 0.08               | 2.27 ± 0.07                 | 2.25 ± 0.08                 |
| Difference vs magnesium citrate | 0.01 (-0.01; 0.03)        | 0.00 (-0.02; 0.02)          | ..                          |
| 12-wk                           |                           |                             |                             |
| Mean, mmol/L                    | 2.26 ± 0.09               | 2.28 ± 0.07                 | 2.25 ± 0.07                 |
| Difference vs magnesium citrate | 0.00 (-0.02; 0.02)        | 0.00 (-0.02; 0.03)          | ..                          |
| 24-wk                           |                           |                             |                             |
| Mean, m/s                       | 2.28 ± 0.09               | 2.28 ± 0.07                 | 2.27 ± 0.06                 |
| Difference vs magnesium citrate | -0.00 (-0.03; 0.02)       | -0.02 (-0.04; 0.00)         | ..                          |
| <b>Plasma potassium</b>         |                           |                             |                             |
| 2-wk                            |                           |                             |                             |
| Mean, mmol/L                    | 4.2 ± 0.3                 | 4.2 ± 0.3                   | 4.2 ± 0.4                   |
| Difference vs magnesium citrate | -0.0 (-0.1; 0.1)          | -0.0 (-0.2; 0.1)            | ..                          |
| 12-wk                           |                           |                             |                             |
| Mean, mmol/L                    | 4.2 ± 0.4                 | 4.2 ± 0.3                   | 4.1 ± 0.3                   |
| Difference vs magnesium citrate | 0.0 (-0.1; 0.2)           | 0.0 (-0.1; 0.1)             | ..                          |
| 24-wk                           |                           |                             |                             |
| Mean, mmol/L                    | 4.2 ± 0.3                 | 4.2 ± 0.4                   | 4.2 ± 0.4                   |
| Difference vs magnesium citrate | -0.0 (-0.1; 0.1)          | -0.0 (-0.1; 0.1)            | ..                          |
| <b>Plasma sodium</b>            |                           |                             |                             |
| 2-wk                            |                           |                             |                             |
| Mean, mmol/L                    | 140.0 ± 1.9               | 140.4 ± 1.2                 | 140.0 ± 1.7                 |
| Difference vs magnesium citrate | -0.2 (-0.8; 0.3)          | 0.1 (-0.5; 0.6)             | ..                          |
| 12-wk                           |                           |                             |                             |
| Mean, mmol/L                    | 140.6 ± 1.8               | 140.5 ± 1.4                 | 140.1 ± 2.4                 |
| Difference vs magnesium citrate | 0.3 (-0.3; 0.9)           | -0.0 (-0.6; 0.5)            | ..                          |
| 24-wk                           |                           |                             |                             |
| Mean, mmol/L                    | 140.4 ± 1.8               | 140.7 ± 1.8                 | 139.8 ± 1.8                 |
| Difference vs magnesium citrate | 0.5 (-0.1; 1.0)           | 0.7 (0.1; 1.2)              | ..                          |
| <b>Plasma albumin</b>           |                           |                             |                             |
| 2-wk                            |                           |                             |                             |

|                                 |                     |                     |             |
|---------------------------------|---------------------|---------------------|-------------|
| Mean, g/L                       | 44.3 ± 2.0          | 43.7 ± 2.5          | 43.2 ± 2.5  |
| Difference vs magnesium citrate | 1.2 (0.5 ; 1.9)**   | 0.8 (-0.0; 1.5)     | ..          |
| 12-wk                           |                     |                     |             |
| Mean, g/L                       | 43.8 ± 2.0          | 43.5 ± 2.1          | 43.2 ± 2.2  |
| Difference vs magnesium citrate | 0.8 (0.0; 1.5)      | 0.7 (-0.0; 1.4)     | ..          |
| 24-wk                           |                     |                     |             |
| Mean, g/L                       | 43.7 ± 2.3          | 43.7 ± 2.1          | 42.5 ± 2.4  |
| Difference vs magnesium citrate | 1.5 (0.8; 2.2)**    | 1.6 (0.9; 2.3)**    | ..          |
| <b>Plasma phosphate</b>         |                     |                     |             |
| 2-wk                            |                     |                     |             |
| Mean, mmol/L                    | 0.98 ± 0.15         | 0.97 ± 0.15         | 1.02 ± 0.13 |
| Difference vs magnesium citrate | -0.03 (-0.06; 0.00) | -0.03 (-0.07; 0.00) | ..          |
| 12-wk                           |                     |                     |             |
| Mean, mmol/L                    | 0.99 ± 0.15         | 1.00 ± 0.14         | 1.02 ± 0.15 |
| Difference vs magnesium citrate | -0.03 (-0.07; 0.00) | -0.00 (-0.04; 0.03) | ..          |
| 24-wk                           |                     |                     |             |
| Mean, mmol/L                    | 1.00 ± 0.15         | 0.99 ± 0.14         | 1.02 ± 0.14 |
| Difference vs magnesium citrate | -0.01 (-0.05; 0.02) | -0.01 (-0.05; 0.02) | ..          |
| <b>Plasma creatinine</b>        |                     |                     |             |
| 2-wk                            |                     |                     |             |
| Median                          | 77 (65-85)          | 70 (66-83)          | 73 (67-83)  |
| Difference vs magnesium citrate | -0.0 (-0.0; 0.0)    | -0.0 (-0.0; 0.0)    | ..          |
| 12-wk                           |                     |                     |             |
| Median                          | 77 (67-88)          | 72 (65-84)          | 74 (66-86)  |
| Difference vs magnesium citrate | 0.0 (-0.0; 0.0)     | 0.0 (-0.0; 0.0)     | ..          |
| 24-wk                           |                     |                     |             |
| Median                          | 76 (63-87)          | 72 (64-81)          | 74 (65-83)  |
| Difference vs magnesium citrate | 0.0 (-0.0; 0.0)     | 0.0 (-0.0; 0.0)     | ..          |

Values are mean ± SD or median (interquartile range). Adjusted mean differences (90% CIs) were obtained from linear mixed-effect models with age, sex, baseline value of the outcome of interest, time, intervention, and the interaction time × intervention as fixed effects. \*  $P < 0.05$ , \*\*  $P < 0.01$  (one-sided  $P$  values).

**Table S7.** Effects of magnesium oxide and magnesium sulfate (vs magnesium citrate) on urinary minerals.

|                                 | Magnesium oxide<br>(n=46) | Magnesium sulfate<br>(n=46) | Magnesium citrate<br>(n=46) |
|---------------------------------|---------------------------|-----------------------------|-----------------------------|
| <b>Urinary calcium</b>          |                           |                             |                             |
| 2-wk                            |                           |                             |                             |
| Mean, mmol/24-h                 | 6.0 ± 2.7                 | 5.4 ± 2.4                   | 4.9 ± 2.2                   |
| Difference vs magnesium citrate | 0.5 (-0.2; 1.1)           | 0.2 (-0.4; 0.8)             | ..                          |
| 12-wk                           |                           |                             |                             |
| Mean, mmol/24-h                 | 5.8 ± 2.8                 | 5.3 ± 2.3                   | 5.0 ± 2.2                   |
| Difference vs magnesium citrate | 0.2 (-0.4; 0.9)           | 0.0 (-0.6; 0.6)             | ..                          |
| 24-wk                           |                           |                             |                             |
| Mean, mmol/24-h                 | 5.9 ± 2.8                 | 5.3 ± 2.7                   | 4.8 ± 2.3                   |
| Difference vs magnesium citrate | 0.4 (-0.3; 1.0)           | 0.1 (-0.5; 0.8)             | ..                          |
| <b>Urinary potassium</b>        |                           |                             |                             |
| 2-wk                            |                           |                             |                             |
| Mean, mmol/24-h                 | 97.3 ± 28.1               | 93.2 ± 24.6                 | 87.3 ± 25.0                 |
| Difference vs magnesium citrate | 4.2 (-5.0; 13.4)          | 2.7 (-6.3; 11.6)            | ..                          |
| 12-wk                           |                           |                             |                             |
| Mean, mmol/24-h                 | 98.0 ± 29.2               | 95.2 ± 32.4                 | 88.9 ± 25.3                 |
| Difference vs magnesium citrate | 4.7 (-4.5; 1.0)           | 3.1 (-6.0; 12.2)            | ..                          |
| 24-wk                           |                           |                             |                             |
| Mean, mmol/24-h                 | 95.5 ± 27.6               | 94.9 ± 31.4                 | 90.2 ± 26.3                 |
| Difference vs magnesium citrate | 0.3 (-9.6; 8.9)           | 1.6 (-7.5; 10.6)            | ..                          |
| <b>Urinary sodium</b>           |                           |                             |                             |
| 2-wk                            |                           |                             |                             |
| Mean, mmol/24-h                 | 151.8 ± 55.7              | 154.3 ± 66.5                | 143.3 ± 53.1                |
| Difference vs magnesium citrate | 6.9 (-11.8; 25.6)         | 2.0 (-16.6; 20.7)           | ..                          |
| 12-wk                           |                           |                             |                             |
| Mean, mmol/24-h                 | 146.9 ± 51.2              | 159.8 ± 60.7                | 135.7 ± 45.6                |
| Difference vs magnesium citrate | 8.7 (-10.1; 27.6)         | 16.7 (-2.2; 35.7)           | ..                          |
| 24-wk                           |                           |                             |                             |
| Mean, mmol/24-h                 | 153.0 ± 52.6              | 150.4 ± 57.4                | 141.7 ± 45.5                |
| Difference vs magnesium citrate | 8.6 (-10.1; 27.4)         | 1.9 (-17.1; 20.8)           | ..                          |
| <b>Urinary creatinine</b>       |                           |                             |                             |
| 2-wk                            |                           |                             |                             |

|                                 |                 |                  |            |
|---------------------------------|-----------------|------------------|------------|
| Mean,                           | 12.7 ± 4.0      | 13.1 ± 4.2       | 12.6 ± 3.5 |
| Difference vs magnesium citrate | 0.1 (-0.9; 1.1) | 0.1 (-0.8; 1.1)  | ..         |
| 12-wk                           |                 |                  |            |
| Mean,                           | 12.9 ± 3.7      | 13.3 ± 4.0       | 13.0 ± 3.6 |
| Difference vs magnesium citrate | 0.1 (-0.9; 1.0) | 0.1 (-0.9; 1.0)  | ..         |
| 24-wk                           |                 |                  |            |
| Mean,                           | 13.0 ± 3.8      | 12.7 ± 3.3       | 12.6 ± 3.2 |
| Difference vs magnesium citrate | 0.6 (-0.3; 1.6) | -0.1 (-1.1; 0.9) | ..         |

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Values are mean ± SD. Adjusted mean differences (90% CIs) were obtained from linear mixed-effect models with age, sex, baseline value of the outcome of interest, time, intervention, and the interaction time × intervention as fixed effects.

**Table S8.** Effects of magnesium oxide and magnesium sulfate (vs magnesium citrate) on body composition.

|                                 | Magnesium oxide<br>(n=46) | Magnesium sulfate<br>(n=46) | Magnesium citrate<br>(n=46) |
|---------------------------------|---------------------------|-----------------------------|-----------------------------|
| <b>Weight</b>                   |                           |                             |                             |
| 2-wk                            |                           |                             |                             |
| Mean, kg                        | 82.8 ± 12.0               | 86.0 ± 11.8                 | 85.7 ± 12.9                 |
| Difference vs magnesium citrate | 0.1 (-0.4; 0.7)           | -0.1 (-0.6; 0.5)            | ..                          |
| 12-wk                           |                           |                             |                             |
| Mean, kg                        | 83.0 ± 12.0               | 86.3 ± 12.0                 | 86.6 ± 12.1                 |
| Difference vs magnesium citrate | 0.3 (-0.3; 0.8)           | 0.4 (-0.2; 0.9)             | ..                          |
| 24-wk                           |                           |                             |                             |
| Mean, kg                        | 82.6 ± 12.0               | 86.5 ± 12.6                 | 86.3 ± 12.7                 |
| Difference vs magnesium citrate | 0.3 (-0.2; 0.9)           | 0.8 (0.2; 1.3)*             | ..                          |
| <b>BMI</b>                      |                           |                             |                             |
| 2-wk                            |                           |                             |                             |
| Mean, kg/m <sup>2</sup>         | 27.5 ± 2.1                | 28.3 ± 2.8                  | 28.6 ± 3.4                  |
| Difference vs magnesium citrate | 0.0 (-0.1; 0.2)           | -0.0 (-0.2; 0.1)            | ..                          |
| 12-wk                           |                           |                             |                             |
| Mean, kg/m <sup>2</sup>         | 27.5 ± 2.1                | 28.5 ± 2.9                  | 28.7 ± 3.4                  |
| Difference vs magnesium citrate | 0.1 (-0.1; 0.3)           | 0.1 (-0.1; 0.3)             | ..                          |
| 24-wk                           |                           |                             |                             |
| Mean, kg/m <sup>2</sup>         | 27.5 ± 2.1                | 28.6 ± 3.0                  | 28.6 ± 3.5                  |
| Difference vs magnesium citrate | 0.1 (-0.1; 0.3)           | 0.2 (0.1; 0.4)*             | ..                          |
| <b>Waist circumference</b>      |                           |                             |                             |
| 2-wk                            |                           |                             |                             |
| Mean, cm                        | 94 ± 10                   | 96 ± 9                      | 96 ± 10                     |
| Difference vs magnesium citrate | 1.0 (-0.3; 2.2)           | 0.6 (-0.7; 1.9)             | ..                          |
| 12-wk                           |                           |                             |                             |

|                                 |                    |                  |            |
|---------------------------------|--------------------|------------------|------------|
| Mean, cm                        | 93 ± 9             | 97 ± 9           | 97 ± 10    |
| Difference vs magnesium citrate | -1.1 (-2.4; 0.2)   | 0.2 (-1.1; 1.5)  | ..         |
| 24-wk                           |                    |                  |            |
| Mean, cm                        | 93 ± 9             | 97 ± 10          | 97 ± 10    |
| Difference vs magnesium citrate | -2.0 (-3.2; -0.7)* | 0.5 (-0.8; 1.8)  | ..         |
| <b>Hip circumference</b>        |                    |                  |            |
| 2-wk                            |                    |                  |            |
| Mean, cm                        | 107 ± 6            | 107 ± 6          | 110 ± 7    |
| Difference vs magnesium citrate | 0.5 (-0.6; 1.6)    | -0.1 (-1.2; 1.0) | ..         |
| 12-wk                           |                    |                  |            |
| Mean, cm                        | 107 ± 6            | 107 ± 7          | 109 ± 7    |
| Difference vs magnesium citrate | 0.8 (-0.3; 1.9)    | 0.5 (-0.6; 1.6)  | ..         |
| 24-wk                           |                    |                  |            |
| Mean, cm                        | 105 ± 6            | 107 ± 7          | 109 ± 7    |
| Difference vs magnesium citrate | -0.3 (-1.4; 0.8)   | 0.3 (-0.8; 1.4)  | ..         |
| <b>Total body fat</b>           |                    |                  |            |
| 2-wk                            |                    |                  |            |
| Mean, %                         | 34.6 ± 6.1         | 35.9 ± 8.3       | 36.8 ± 8.1 |
| Difference vs magnesium citrate | 0.5 (-0.2; 1.2)    | 0.2 (-0.5; 1.0)  | ..         |
| 12-wk                           |                    |                  |            |
| Mean, %                         | 34.6 ± 6.5         | 35.8 ± 7.7       | 36.6 ± 7.9 |
| Difference vs magnesium citrate | 0.4 (-0.3; 1.1)    | 0.2 (-0.5; 0.9)  | ..         |
| 24-wk                           |                    |                  |            |
| Mean, %                         | 34.9 ± 6.3         | 35.9 ± 7.7       | 36.4 ± 7.7 |
| Difference vs magnesium citrate | 0.3 (-0.4; 1.0)    | 0.3 (-0.4; 1.0)  | ..         |

Values are mean ± SD. Adjusted mean differences (90% CIs) were obtained from linear mixed-effect models with age, sex, baseline value of the outcome of interest, time, intervention, and the interaction time × intervention as fixed effects. \*  $P < 0.05$  (one-sided  $P$  values).



**Table S9.** Energy and nutrient intakes after a 24-wk magnesium citrate, magnesium oxide or magnesium sulfate treatment.

|                                 | Magnesium oxide<br>(n=46) | Magnesium sulfate<br>(n=46) | Magnesium citrate<br>(n=46) |
|---------------------------------|---------------------------|-----------------------------|-----------------------------|
| <b>Energy,</b>                  |                           |                             |                             |
| Mean, kcal/day                  | 1767 ± 338                | 1732 ± 362                  | 1706 ± 406                  |
| Difference vs magnesium citrate | 38 (-70; 146)             | -8 (-118; 102)              | ..                          |
| <b>Macronutrients</b>           |                           |                             |                             |
| <b>Carbohydrate</b>             |                           |                             |                             |
| Mean, g/day                     | 180 ± 45                  | 182 ± 40                    | 172 ± 53                    |
| Difference vs magnesium citrate | 5 (-9; 18)                | 6 (-7; 19)                  | ..                          |
| <b>Protein</b>                  |                           |                             |                             |
| Mean, g/day                     | 77 ± 17                   | 73 ± 16                     | 75 ± 16                     |
| Difference vs magnesium citrate | 2 (-3; 7)                 | -2 (-7; 3)                  | ..                          |
| <b>Total fat</b>                |                           |                             |                             |
| Mean, g/day                     | 70 ± 17                   | 68 ± 21                     | 70 ± 21                     |
| Difference vs magnesium citrate | -0 (-7; 6)                | -3 (-10; 3)                 | ..                          |
| <b>Saturated FA</b>             |                           |                             |                             |
| Mean, g/day                     | 27 ± 7                    | 26 ± 9                      | 26 ± 9                      |
| Difference vs magnesium citrate | -1 (-3; 2)                | -1 (-4; 2)                  | ..                          |
| <b>Monounsaturated FA</b>       |                           |                             |                             |
| Mean, g/day                     | 23 ± 7                    | 22 ± 8                      | 23 ± 8                      |
| Difference vs magnesium citrate | 0 (-3; 3)                 | -1 (-4; 1)                  | ..                          |
| <b>Polyunsaturated FA</b>       |                           |                             |                             |
| Mean, g/day                     | 14 ± 6                    | 13 ± 6                      | 13 ± 5                      |
| Difference vs magnesium citrate | 0 (-1; 2)                 | -0 (-2; 1)                  | ..                          |
| <b>Alcohol</b>                  |                           |                             |                             |
| Mean, g/day                     | 9 ± 10                    | 8 ± 17                      | 6 ± 8                       |
| Difference vs magnesium citrate | 1 (-2; 3)                 | 0 (-3; 3)                   | ..                          |

| Dietary fiber                   |                 |                 |            |
|---------------------------------|-----------------|-----------------|------------|
| Mean, g/day                     | 20 ± 6          | 19 ± 4          | 19 ± 5     |
| Difference vs magnesium citrate | 0 (-1; 2)       | 1 (-1; 2)       | ..         |
| Cholesterol                     |                 |                 |            |
| Mean, g/day                     | 215 ± 85        | 207 ± 104       | 218 ± 83   |
| Difference vs magnesium citrate | -3 (-33; 26)    | -14 (-44; 16)   | ..         |
| Micronutrients                  |                 |                 |            |
| Magnesium                       |                 |                 |            |
| Mean, mg/day                    | 327 ± 94        | 311 ± 92        | 306 ± 66   |
| Difference vs magnesium citrate | -6 (-29; 17)    | -1 (-24; 21)    | ..         |
| Sodium                          |                 |                 |            |
| Mean, mg/day                    | 2028 ± 627      | 2102 ± 691      | 2030 ± 648 |
| Difference vs magnesium citrate | -35 (-239; 170) | -20 (-229; 190) | ..         |
| Calcium                         |                 |                 |            |
| Mean, mg/day                    | 947 ± 342       | 909 ± 384       | 900 ± 271  |
| Difference vs magnesium citrate | -36 (-129; 56)  | 15 (-77; 108)   | ..         |
| Potassium                       |                 |                 |            |
| Mean, mg/day                    | 3130 ± 753      | 3000 ± 700      | 3040 ± 736 |
| Difference vs magnesium citrate | -65 (-256; 125) | -56 (-245; 133) | ..         |

Values are mean ± SD. Adjusted mean differences (90% CIs) were obtained from linear mixed-effect models with age, sex, baseline value of the outcome of interest, time, intervention, and the interaction time × intervention as fixed effects.

**Figure S1.** Treatment effects of magnesium citrate, magnesium oxide and magnesium sulfate supplementation (vs placebo) on  $c-f$ PWV by subgroups of age, BMI, waist circumference, and  $c-f$ PWV in the intention-to-treat population using clinical relevant cut-off points. Longitudinal effects of magnesium supplementation on  $c-f$ PWV were quantified with linear mixed-effect models specifying intervention and the baseline value of  $c-f$ PWV as fixed effects.  $c-f$ PWV; carotid-to-femoral pulse wave velocity, BMI; body mass index.

