**Figure S1.** Participants flowchart

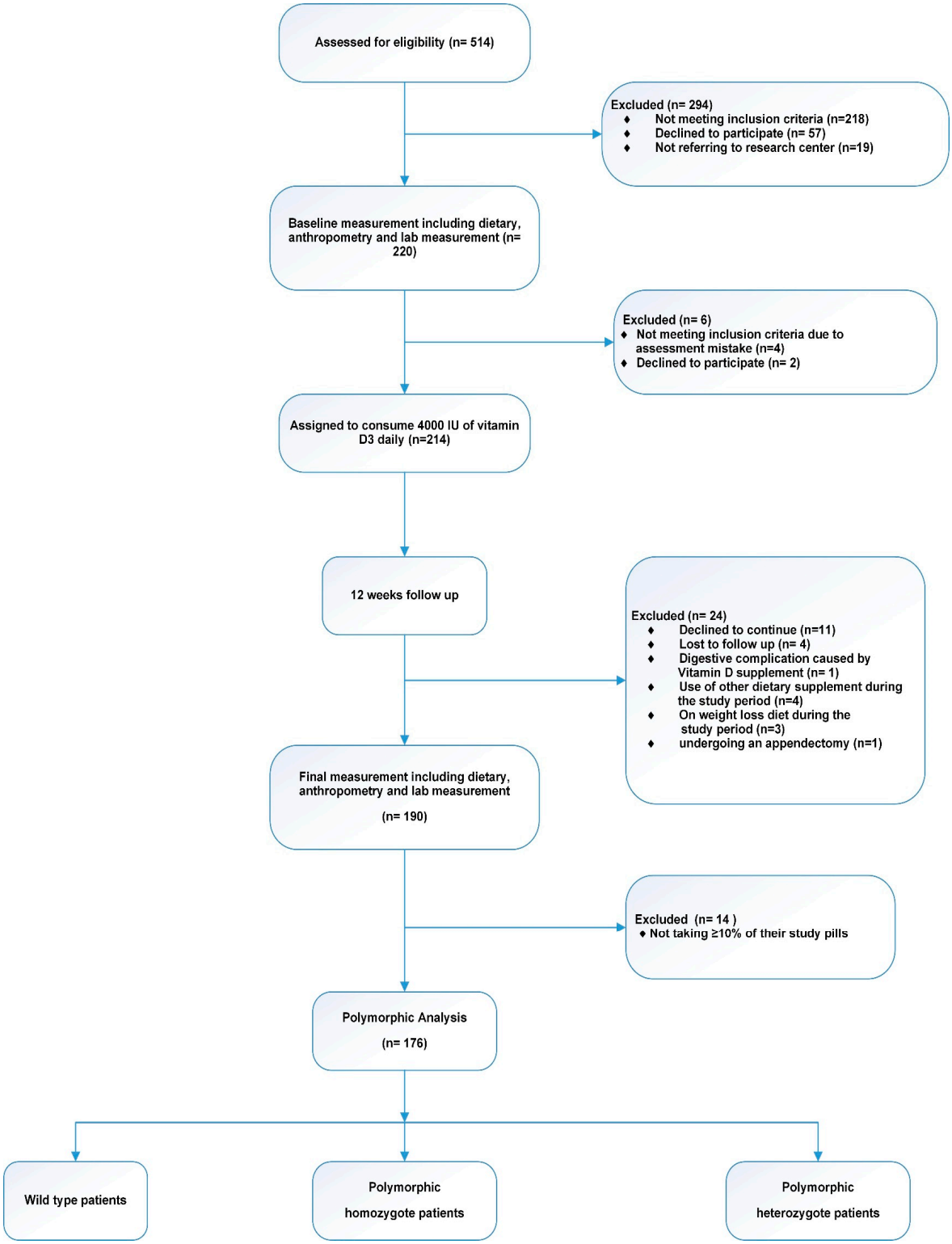
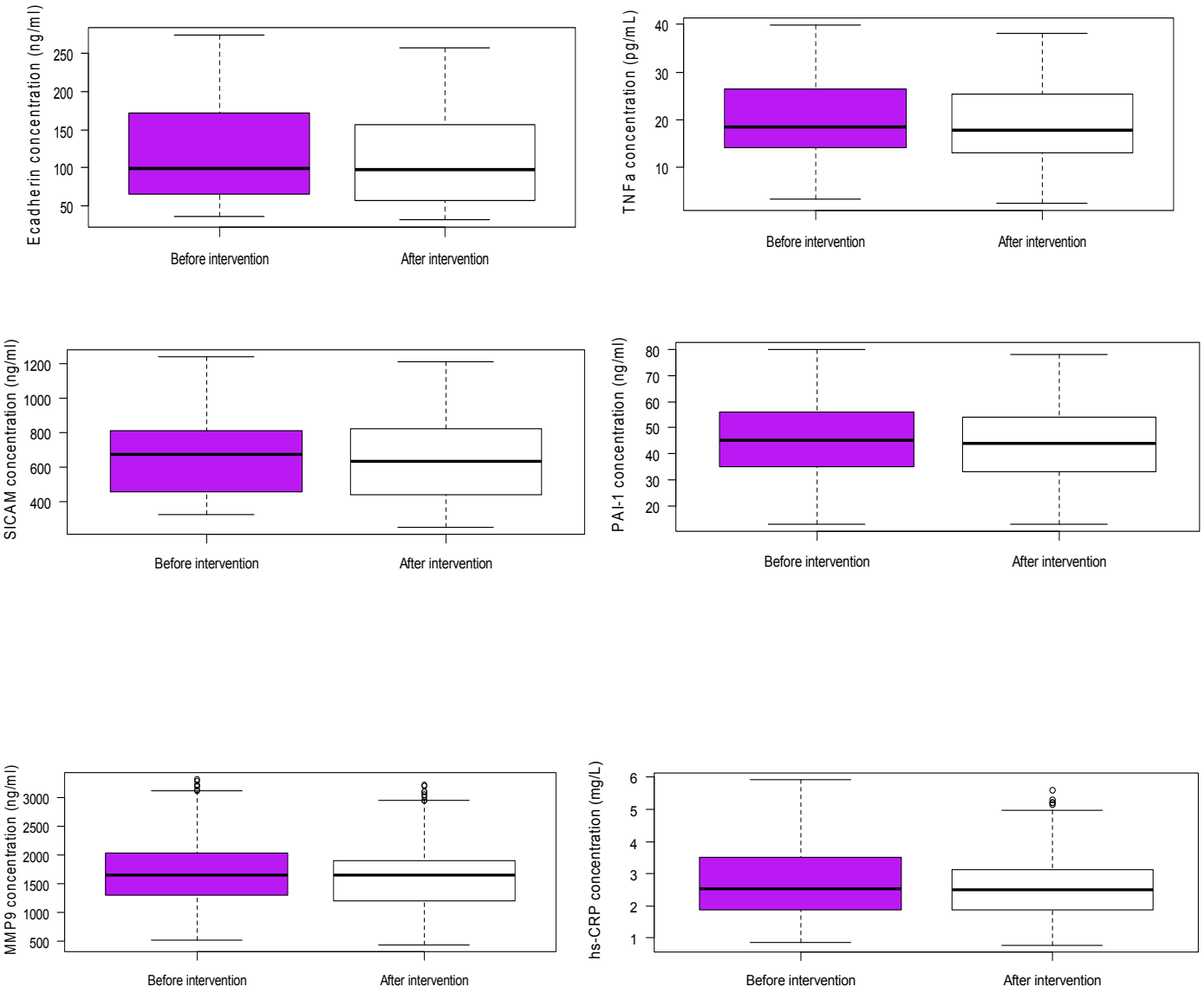


**Figure S2**. Graphical representation of changes in response variables before and after vitamin D3 supplementation (4000 IU/day) for 12 weeks.




MMP9, matrix metallopeptidase 9;
SICAM-1, soluble intercellular adhesion molecule-1; TNF$\alpha$, tumor necrosis factor$\alpha$; PAI-1, plasminogen activator inhibitor-1, hs-CRP, human high sensitivity C-reactive protein.

**Table S1**. Haplo.Score analysis of matrix metallopeptidase 9 (MMP9) changes after vitamin D supplementation (4000 IU/day) for 12 weeks

| **Haplotypes** | | | | | | **Hap-Freq** | **Hap-Score** | **P value*** |
|---|---|---|---|---|---|---|---|---|
| ***Cdx-2 FokI BsmI ApaI TaqI*** | Cdx2 | *FokI* | *BsmI* | *ApaI* | *TaqI* | | | <0.001 |
| 1 | G | f | b | A | t | 0.021 | -2.97 | 0.002 |
| 2 | G | F | b | a | T | 0.045 | -2.05 | 0.03 |
| 3 | G | f | b | a | T | 0.023 | -1.93 | 0.05 |
| 4 | G | f | b | A | T | 0.032 | -1.81 | 0.06 |
| 5 | G | f | B | a | T | 0.044 | -1.65 | 0.09 |
| 6 | G | f | B | A | T | 0.058 | -1.27 | 0.20 |
| 7 | G | f | B | A | t | 0.080 | -1.12 | 0.25 |
| 8 | G | F | B | A | t | 0.063 | -1.10 | 0.26 |
| 9 | G | F | B | A | T | 0.139 | -0.77 | 0.43 |
| 10 | G | F | b | A | T | 0.059 | -0.63 | 0.52 |
| 11 | G | F | B | a | t | 0.038 | -0.59 | 0.55 |
| 12 | G | F | b | A | t | 0.065 | -0.34 | 0.72 |
| 13 | G | F | B | a | T | 0.059 | -0.33 | 0.74 |
| 14 | A | f | B | a | T | 0.022 | 0.93 | 0.35 |
| 15 | A | F | b | a | T | 0.023 | 1.30 | 0.19 |
| 16 | A | F | B | a | T | 0.041 | 2.09 | 0.035 |
| 17 | A | f | b | A | T | 0.027 | 2.11 | 0.03 |
| 18 | A | F | B | A | t | 0.034 | 4.03 | <0.001 |
| 19 | A | F | B | A | T | 0.073 | 4.31 | <0.001 |
| ***Cdx2 FokI BsmI*** | | | | | | | | 0.04 |
| 1 | G | f | b | - | - | 0.097 | -8.944 | <0.001 |
| 2 | G | F | b | - | - | 0.16 | -2.223 | 0.02 |
| 3 | G | f | B | - | - | 0.188 | -1.571 | 0.11 |
| 4 | G | F | B | - | - | 0.303 | -0.424 | 0.67 |
| 5 | A | f | b | - | - | 0.021 | 0.785 | 0.43 |
| 6 | A | f | B | - | - | 0.021 | 1.105 | 0.26 |
| 7 | A | F | b | - | - | 0.044 | 1.748 | 0.08 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8 | A | F | B | - | - | 0.162 | 3.483 | <0.001 |
| ***FokI TaqI Cdx2*** | | | | | | | | <0.001 |
| 1 | G | f | - | - | T | 0.17 | -2.78 | 0.005 |
| 2 | G | f | - | - | t | 0.10 | -2.66 | 0.007 |
| 3 | G | F | - | - | T | 0.28 | -2.13 | 0.03 |
| 4 | G | F | - | - | t | 0.17 | -1.05 | 0.29 |
| 5 | A | f | - | - | T | 0.04 | 2.36 | 0.01 |
| 6 | A | F | - | - | t | 0.06 | 4.82 | <0.001 |
| 7 | A | F | - | - | T | 0.14 | 5.10 | <0.001 |

* P values were adjusted for age, baseline 25-hydroxy vitamin D (25(OH)D) and body mass index(BMI) and resulted from the false-discovery rate (FDR) methods.
Hap-Freq indicates the estimated frequency of the haplotype in the pool of all subjects.