**Table S1**

Results of Multivariate Analysis by Linear Models.

| Variables | Coefficient | Correlation direction | *P* value |
|---|---|---|---|
| *g_Eubacterium* | 0.068 | Positive | <0.001 |
| *g_Blautia* | 0.068 | Positive | <0.001 |
| *g_Ruminococcus* | 0.041 | Positive | 0.018 |
| *g_Dorea* | 0.039 | Positive | <0.001 |
| *g_Bifidobacterium* | 0.034 | Positive | 0.045 |
| *g_Fusicatenibacter* | 0.030 | Positive | <0.001 |
| *g_Anaerostipes* | 0.023 | Positive | <0.001 |
| *g_Streptococcus* | 0.021 | Positive | <0.001 |
| *g_Lachnospira* | 0.017 | Positive | <0.001 |
| *g_Coprococcus* | 0.014 | Positive | 0.008 |
| *g_Coprobacillus* | 0.014 | Positive | <0.001 |
| *g_Veillonella* | 0.013 | Positive | 0.002 |
| *g_Romboutsia* | 0.013 | Positive | 0.001 |
| *g_Dialister* | 0.011 | Positive | 0.200 |
| *g_Tyzzerella* | 0.009 | Positive | <0.001 |
| *g_Intestinibacter* | 0.009 | Positive | <0.001 |
| *g_Enterococcus* | 0.007 | Positive | <0.001 |
| *g_Lactobacillus* | 0.007 | Positive | <0.001 |
| *g_Eggerthella* | 0.006 | Positive | 0.022 |
| *g_Clostridioides* | 0.006 | Positive | 0.006 |
| *g_Klebsiella* | 0.005 | Positive | 0.433 |
| *g_Butyrivibrio* | 0.005 | Positive | 0.020 |
| *g_Holdemanella* | 0.005 | Positive | <0.001 |
| *g_Shigella* | 0.004 | Positive | 0.036 |
| *g_Citrobacter* | 0.003 | Positive | 0.020 |
| *g_Mycoplasma* | 0.002 | Positive | 0.006 |
| *g_Turicibacter* | 0.002 | Positive | 0.008 |
| *g_Mitsuokella* | 0.002 | Positive | <0.001 |
| *g_Azospirillum* | −0.001 | Negative | 0.063 |
| *g_Pseudoflavonifractor* | −0.005 | Negative | 0.001 |
| *g_Paraprevotella* | −0.005 | Negative | 0.028 |
| *g_Ornithobacterium* | −0.006 | Negative | <0.001 |
| *g_Intestinimonas* | −0.007 | Negative | 0.023 |
| *g_Parasutterella* | −0.012 | Negative | 0.005 |
| *g_Flavonifractor* | −0.014 | Negative | 0.006 |
| *g_Sutterella* | −0.014 | Negative | 0.181 |
| *g_Bilophila* | −0.015 | Negative | 0.067 |
| *g_Butyricicoccus* | −0.017 | Negative | <0.001 |
| *g_Oscillibacter* | −0.052 | Negative | 0.005 |
| *g_Prevotella* | −0.142 | Negative | 0.025 |

Confounders: age, diabetes mellitus (DM), total cholesterol (TC) and male gender.

**Table S2**

Results of the linear model with covariate adjustment.

| Variables | β | *P* value |
|---|---|---|
| Palmitic acid | 17.05 | <0.001 |
| Tetracosahexaenoic acid | 10.78 | <0.001 |
| Linoleic acid | 8.75 | <0.001 |
| Arachidonic acid | 7.31 | <0.001 |
| Oleic acid | 3.25 | <0.001 |
| Stearic acid | 3.05 | <0.001 |
| $\alpha$-Linolenic acid | 1.21 | <0.001 |
| cis-gondoic acid | 0.59 | <0.001 |
| Adrenic acid | −4.66 | 0.134 |

Covariate: age, diabetes mellitus (DM), total cholesterol (TC) and male gender.

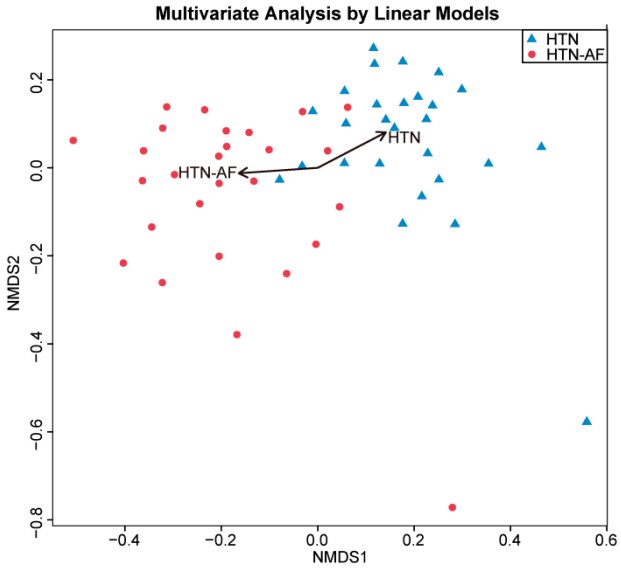


**Figure S1.** Multivariate Analysis by Linear Models (MaAsLin) adjusted for potential confounders (total cholesterol, gender, diabetes mellitus, and age) showed remarkable differences in GM between the two groups.

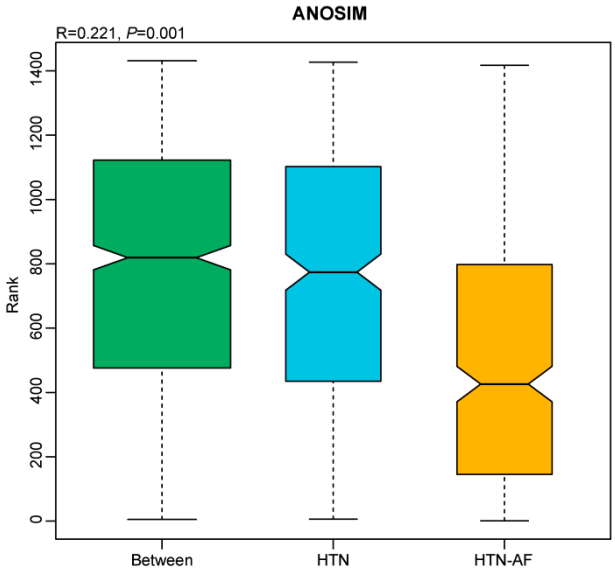


**Figure S2.** Anosim analysis of KEGG orthology between the HTN and HTN-AF groups.