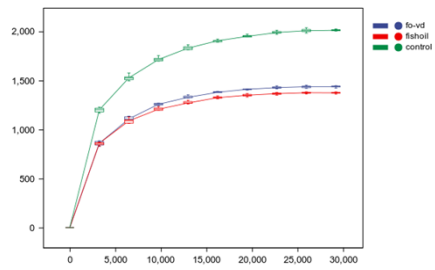
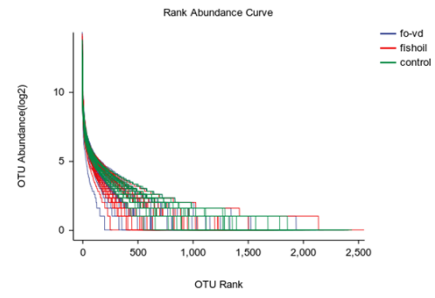


Supplementary Figure 1. The changes of microbial community richness, diversity and OTU level of three group after intervention.



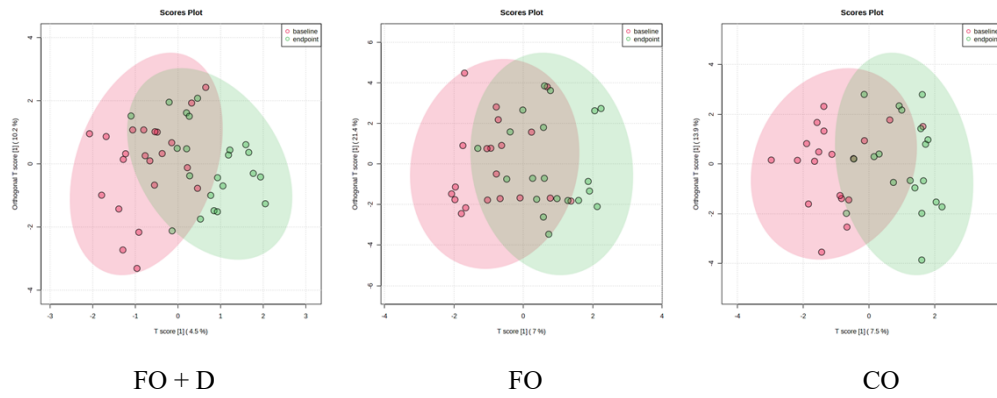
A



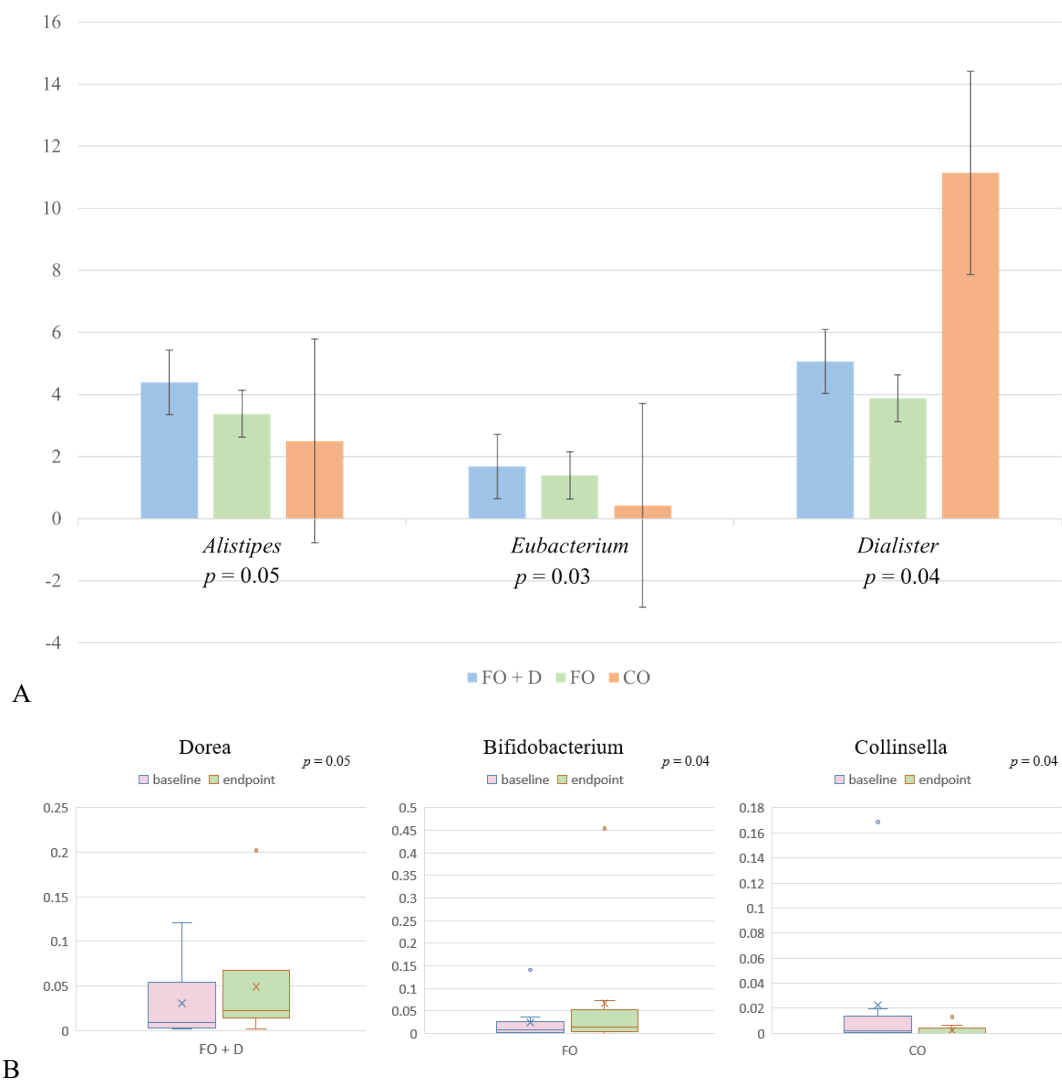
B

Supple

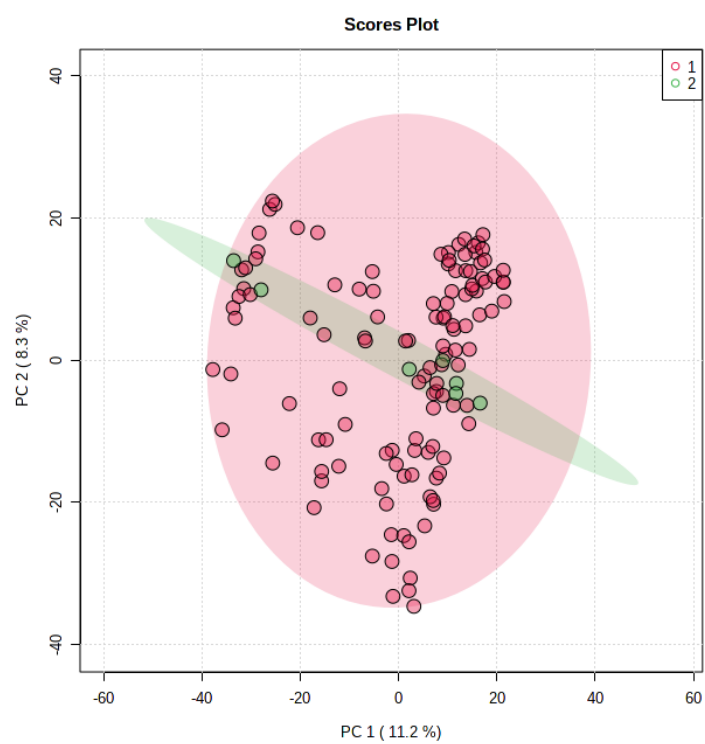
mentary Figure 2. Dilution curve (A) and rank abundance curve (B); fo-vd: fish oil plus vitamin D<sub>3</sub>; fo: fish oil.



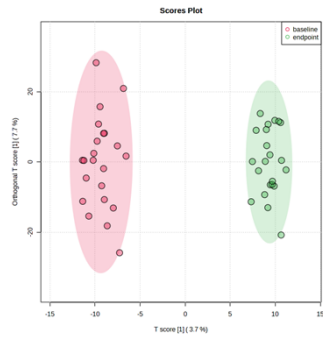
Supplementary Figure 3. OPLS-DA score plots comparing of the gut microbiota before and after the intervention in each group.



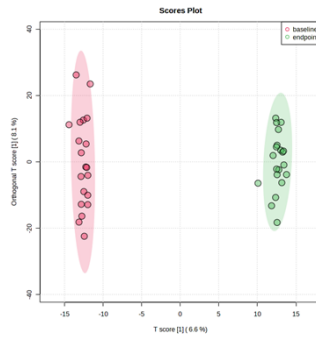
Supplementary Figure 4. A: Changes of gut microbiota among three groups; B: Changes of gut microbiota before and after intervention.



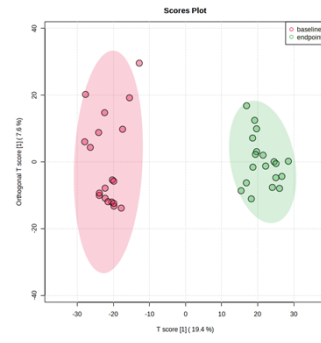
Supplementary Figure 5. PCA results of the sample and QC; 1 for all sample, 2 for quality control (QC).



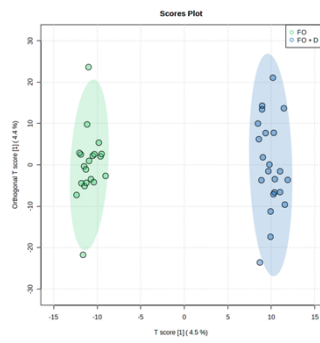
FO + D



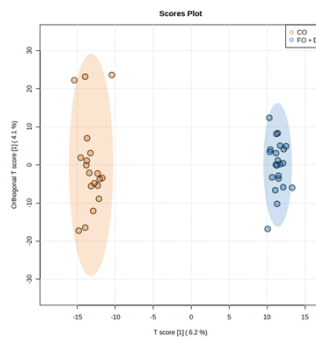
FO



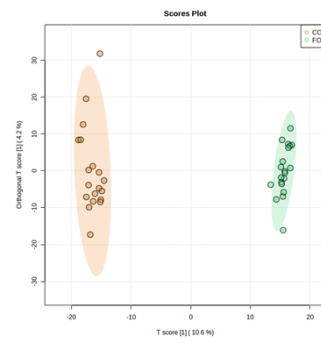
CO



FO + D vs FO

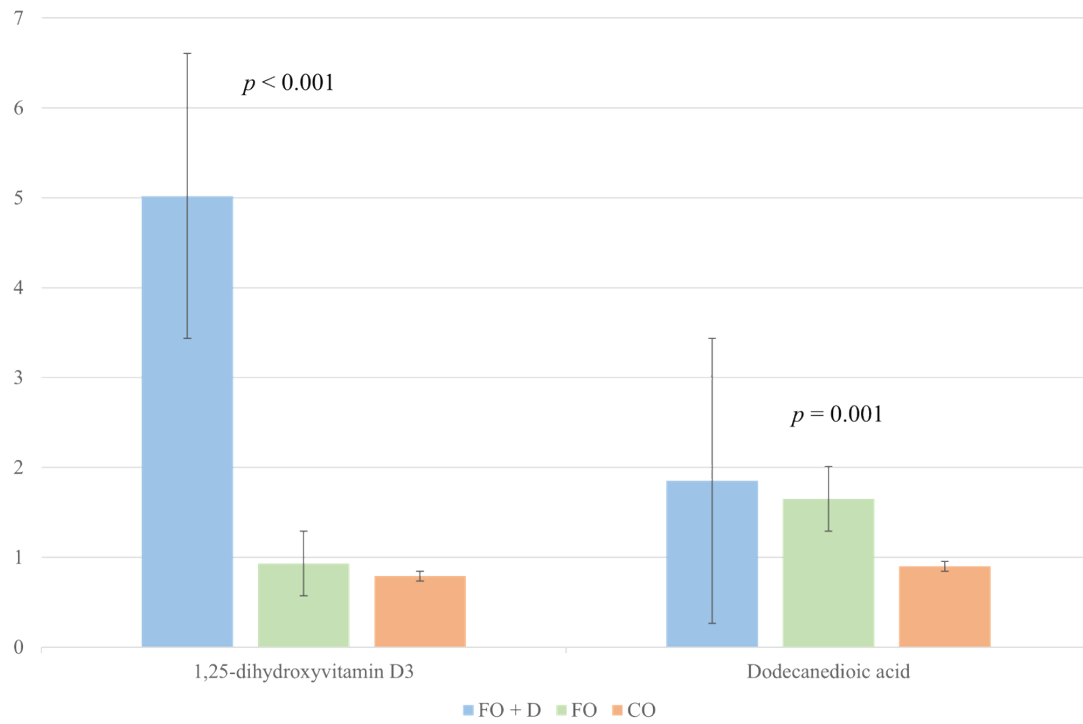


FO + D vs CO



FO vs CO

Supplementary Figure 6. OPLS-DA score plots comparing the fecal metabolites before and after the intervention in each group and the difference between two groups.



Supplementary Figure 7. Changes of fecal metabolites among three groups.