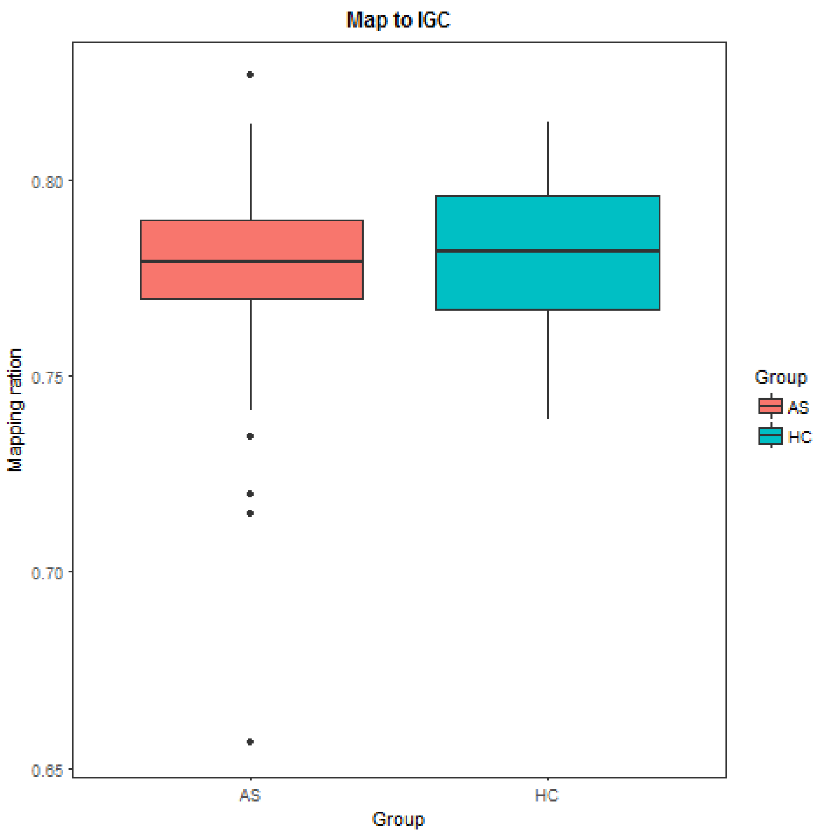

Figure S1. The mapping rate for AS patients and healthy controls compared to 11.4M integrated gene catalog (IGC). The mean mapping rate for all of the 150 samples was 77.80%, and that of AS patients (n=113, mean=77.73%, median=77.93%) was not significantly different from that of healthy controls (n=37, mean=78.03%, median=78.17%) (P=0.48, Wilcoxon rank sum test). Red and blue indicate the AS patients and healthy controls, respectively. Plotted are interquartile ranges (IQRs; boxes), medians (bold lines in the boxes), the lowest and highest values within 1.5 times IQR from the first and third quartiles (whiskers above and below the boxes), and outliers beyond the whiskers (black dots).

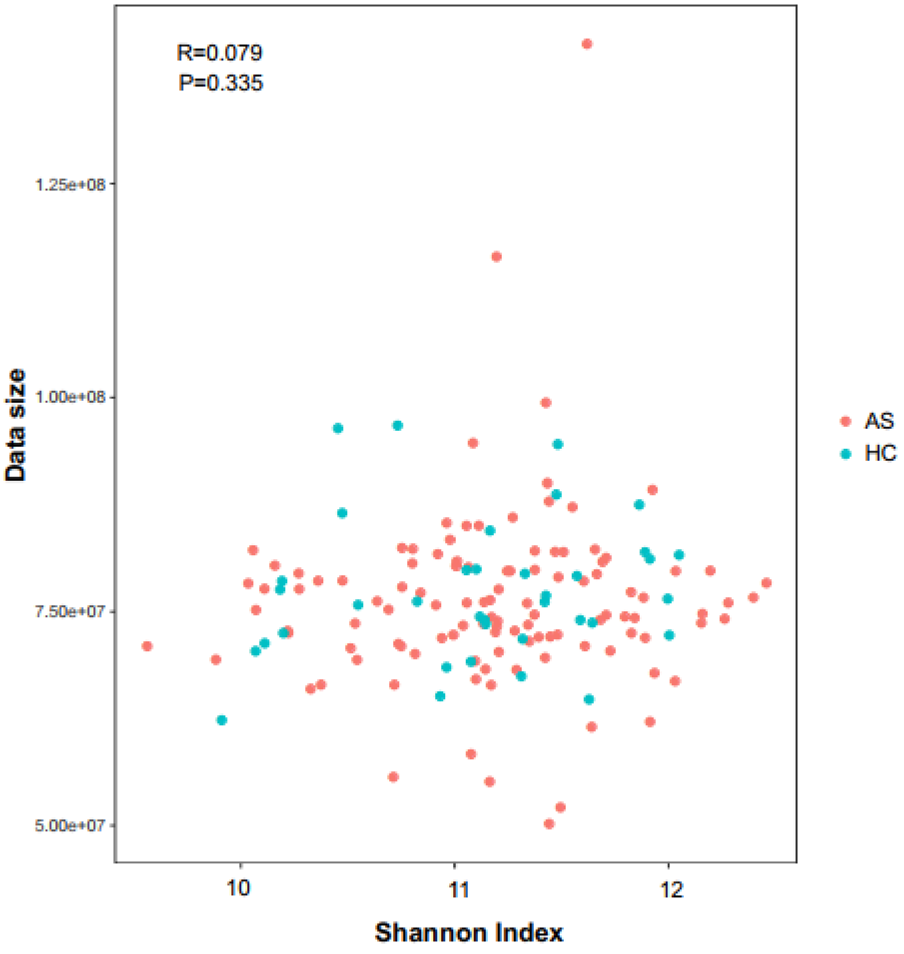

Figure S2. The scatter plot for Shannon index and mapping depth. The correlation between Shannon-Weiner index and mapping depth was 0.079, and the p value of it was 0.335. There was no distinct separation appearing between AS patients and healthy controls. Red and blue indicate the AS patients and healthy controls, respectively.

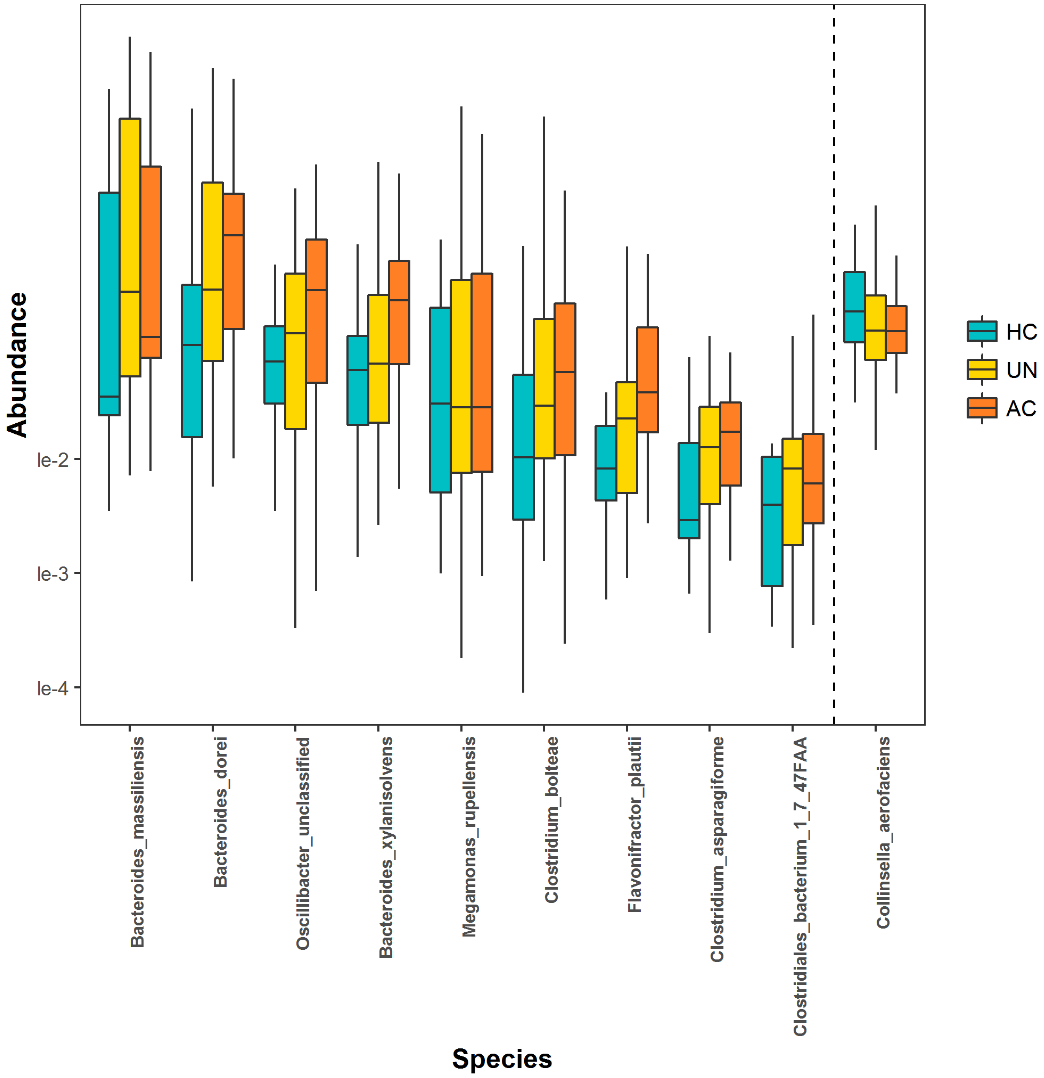

Figure S3. Species that were differentially abundant in healthy control group and two BASDAI groups. Species that significantly increased (left side of the dashed line) and decreased (right side of the dashed line) in AS patients were discovered based on species abundance profiles, and both AC group and UN group were significantly different from healthy control group (Kruskal-Wallis test). Orange, yellow, and blue represented correspondingly for the AC, UN and HC groups.

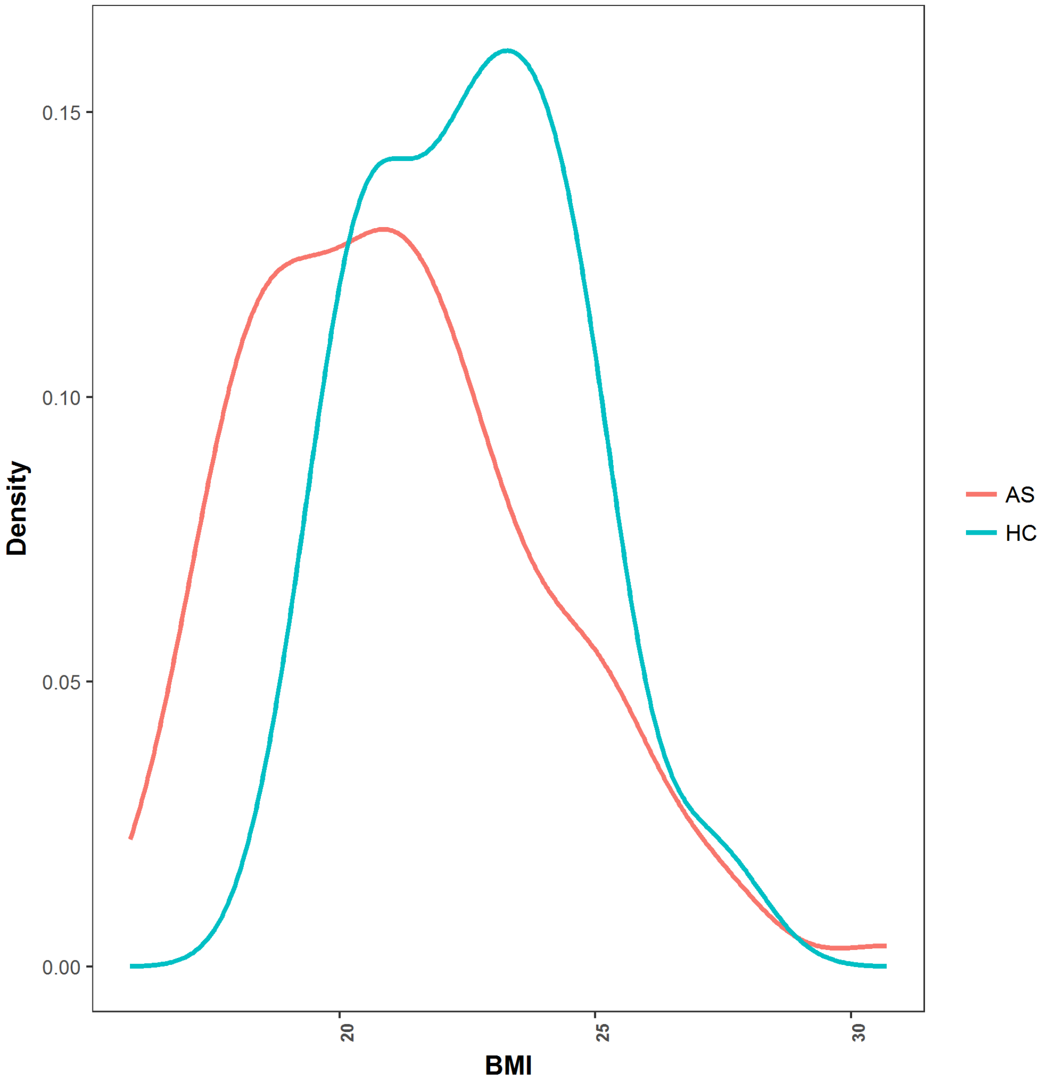

Figure S4. Higher BMI for healthy individuals than AS patients. The probability density plot showed a significant difference between the BMI of AS and healthy control group (P-value = 0. 001, Wilcoxon rank sum test). Red and blue represented correspondingly for the AS and HC group.

Table 1: Summary of the metadata for all participants

Phenotype	Df	Sums Of Sqs	Mean Sqs	F.Model	R^2	Pr (>F)
Age	34	10.67549	0.313985	1.02919	0.233295	0.327672
Sex	1	0.5407	0.5407	1.76969	0.011816	0.047952
Height	31	9.875621	0.318568	1.047571	0.215815	0.248751
BMI	131	40.47307	0.308955	1.051945	0.884471	0.293706
TCM	3	1.187772	0.395924	1.296892	0.025957	0.076923
Group	1	0.700942	0.700942	2.302318	0.015318	0.010989
BASDAI	2	0.926475	0.463237	1.518873	0.020247	0.044955