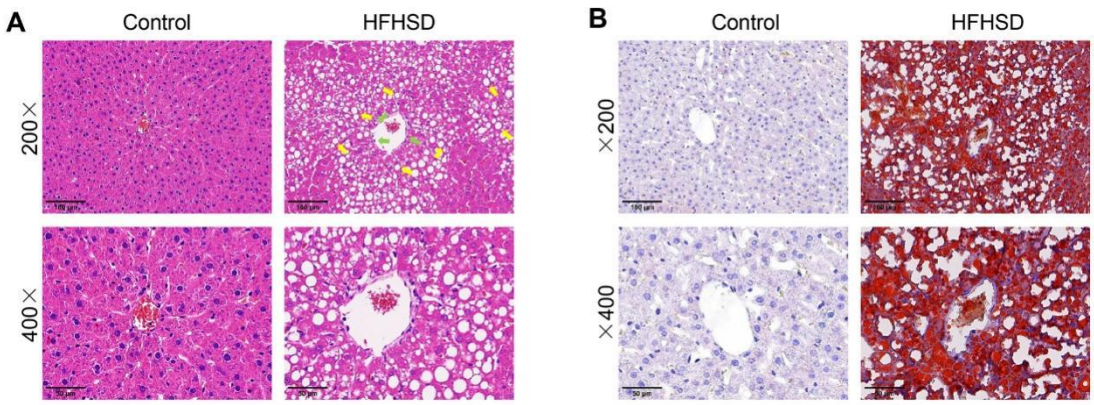
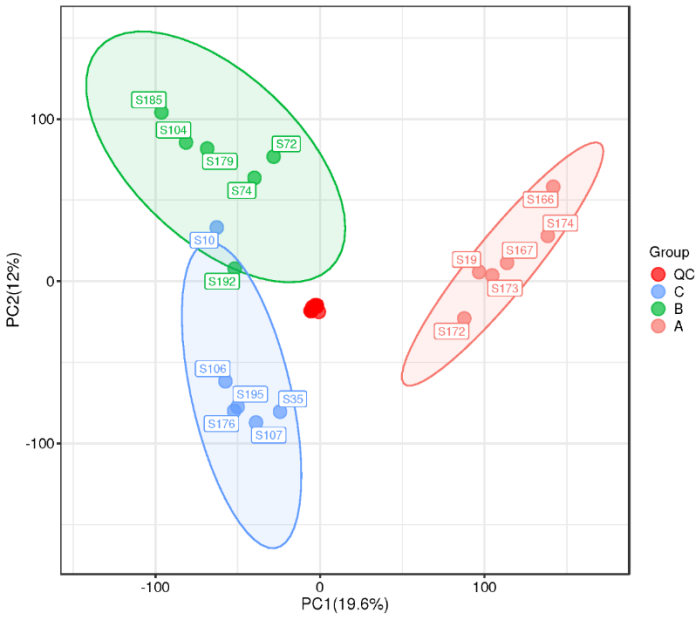
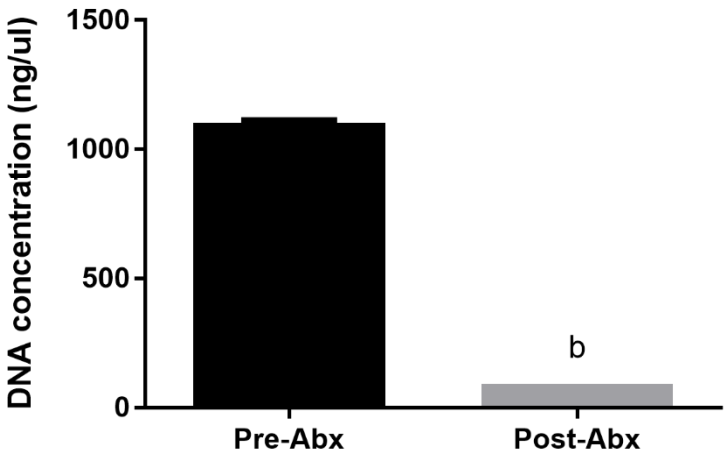


Supplementary Figure 1 Histochemical analysis of rat liver tissues after 8-week feeding period. A: Representative image of Hematoxylin and eosin staining, 100 × (200 μm); 400 × (50 μm), *n* = 3. Note: Yellow arrows indicate cavitation; green arrows indicate inflammatory cell infiltration; B: Representative image of Oil Red O staining, highlighting lipid droplets (in red), 100 × (200 μm); 400 × (50 μm), *n* = 3.



Supplementary Figure 2 Principal component analysis score plot of quality control samples from the hepatic metabolomics study. The tight clustering of QC samples indicates excellent instrument stability and high reproducibility of the LC-MS data throughout the acquisition process.



Supplementary Figure 3 Quantification of total bacterial DNA in fecal samples from untreated control mice (pre-Abx) and mice after the full course of combined antibiotic treatment (Post-Abx). $n = 3$. $^{b}P < 0.01$ *vs* pre-Abx. Results are presented as mean ± SD. Differences among groups were analyzed using one-way analysis of variance followed by Tukey's *post hoc* test.

THE DETAILS ABOUT THE LIQUID CHROMATOGRAPHIC AND MASS SPECTRUM CONDITIONS

Liquid chromatography conditions

The LC analysis was performed on a Vanquish UHPLC System (Thermo Fisher Scientific, USA). Chromatography was carried out with an ACQUITY UPLC ® HSS T3 (2.1×100 mm, 1.8 μm) (Waters, Milford, MA, USA). The column maintained at 40 ℃. The flow rate and injection volume were set at 0.3 mL/min and 2 μL, respectively. For LC-ESI (+)-MS analysis, the mobile phases consisted of (B2) 0.1% formic acid in acetonitrile (v/v) and (A2) 0.1% formic acid in water (v/v). Separation was conducted under the following gradient: 0~1 min，8% B2；1~8 min，8%~98% B2 8~10 min, 98% B2; 10~10.1 min, 98%~8% B2; 10.1~12 min, 8% B2. For LC-ESI (-)-MS analysis, the analytes was carried out with (B3) acetonitrile and (A3) ammonium formate (5mM). Separation was conducted under the following gradient: 0~1 min, 8% B3; 1~8 min, 8%~98% B3; 8~10 min, 98% B3; 10~10.1 min, 98%~8% B3; 10.1~12 min, 8% B3 (1).

Mass spectrum conditions

Mass spectrometric detection of metabolites was performed on Orbitrap Exploris 120 (Thermo Fisher Scientific, USA) with ESI ion source. Simultaneous MS1 and MS/MS (Full MS-ddMS2 mode, data-dependent MS/MS) acquisition was used. The parameters were as follows: sheath gas pressure, 40 arb; aux gas flow, 10 arb; spray voltage, 3.50 kV and -2.50 kV for ESI(+) and ESI(-), respectively; capillary temperature, 325 ℃; MS1 range, m/z 100-1000; MS1 resolving power, 60000 FWHM; number of data dependant scans per cycle, 4; MS/MS resolving power, 15000FWHM; normalized collision energy, 30%; dynamic exclusion time, automatic (2).

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