Supplementary Material

# Supplementary Figures

**1.1 Figure S1**



**Figure S1.** Central vein sizequantification (μm) in the liver. At least 5 central veins were randomly selected from pathologic tissue scan sections of the liver, and their sizes were measured by NanoZoomer Digital Pathology software to obtain the mean values. Compared with the CON group, \**p* < 0.05.

**1.2 Figure S2**

图示

低可信度描述已自动生成

**Figure S2.** Principal component analysis (PCA) score plots visualized the results from PCA discrimination analysis. A confidence ellipse indicates that the "true" samples in this group are distributed within this region at the 95% confidence level; beyond this region, the samples may be anomalous.

**1.3Figure S3**



**Figure S3.** Volcanic map of differential metabolites in positive ion mode. a: Low\_ALC vs CON (up 25, down 16), b: Medium\_ALC vs CON (up 33, down 25), c: Medium\_ALC vs Low\_ALC (up 16, down 15), d: HDPs\_ALC vs Low\_ALC (up 26, down 32), e: HDPs\_ALC vs Medium\_ALC (up 24, down 8).

# Supplementary Tables

**2.1 Table S1**

**Table S1**. The monosaccharide composition of the HDPs (mol%)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Fuc** | **Ara** | **Rha** | **Gal** | **Glc** | **Xyl** | **Man** | **Gal-UA** | **Glc-UA** |
| 0.55 | 11.41 | 5.15 | 14.15 | 60.66 | 2.48 | 2.90 | 2.10 | 0.62 |

The monosaccharide composition of HDPs by high performance anion exchange chromatography (HPAEC) is shown in Table S1. The results showed that the HDPs were acidic polysaccharides and complex in structure, and their major monosaccharide components consisted of fucose, rhamnose, arabinose, galactose, glucose, Xylose, mannose, galacturonic acid, and glucuronic acid, with the following percentages (mol%): 0.55%, 11.41%, 5.15%, 14.15%, 60.66%, 2.48, 2.9%, 2.10%, and 0.62%, respectively.

**2.2 Table S2**

**Table S2**. Alpha diversity analysis (n = 4).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Estimators** | **Con** | **Low\_ALC** | **Medium\_ALC** | **HDPs\_ALC** |
| ace | 376.8 ± 128.1 | 249.6 ± 126.3 | 137.0 ± 115.4**\*** | 242.7 ± 101.8 |
| chao | 357.6 ± 126.5 | 250.6 ± 124.3 | 126.5 ± 116.4**\*** | 236.9 ± 98.3 |
| shannon | 2.12 ± 0.675 | 2.11 ± 0.675 | 1.55 ± 0.578**\*** | 1.69 ± 0.131 |
| sobs | 297.5 ± 122.5 | 221.3 ± 122.5 | 108.8 ± 112.4**\*** | 215.8 ± 85.5 |

Compared with the CON group, \*p < 0.05.

**2.3 Table S3**

**Table S3**. Identified metabolites C00157 and C04230 involved in arachidonic acid metabolism, glycerophospholipid metabolism, and linoleic acid metabolism.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **KEGG**  **Compound ID** | **Metabolite** | **Metab ID** | **Formula** | **Retention time** | **HMDB Class** | **M/Z** |
| C00157 | PC(18:3(9Z,12Z,15Z)/20:0) | metab\_541 | C46H86NO8P | 7.21 | Glycerophospholipids | 834.60 |
| C00157 | PC(18:1(9Z)/14:1(9Z)) | metab\_1029 | C40H76NO8P | 6.34 | Glycerophospholipids | 730.54 |
| C00157 | PC(18:0/18:3(9Z,12Z,15Z)) | metab\_1220 | C44H82NO8P | 6.99 | Glycerophospholipids | 784.58 |
| C00157 | PC(16:1(9Z)/22:5(7Z,10Z,13Z,16Z,19Z)) | metab\_1274 | C46H80NO8P | 7.31 | Glycerophospholipids | 806.57 |
| C00157 | PC(16:0/18:2(9Z,12Z)) | metab\_1730 | C42H80NO8P | 7.19 | Glycerophospholipids | 758.57 |
| C00157 | GPCho(20:4/16:0) | metab\_1781 | C44H80NO8P | 6.99 | Glycerophospholipids | 804.55 |
| C00157 | PC(18:1(9Z)/22:6(4Z,7Z,10Z,13Z,16Z,19Z)) | metab\_1992 | C48H82NO8P | 6.44 | Glycerophospholipids | 832.58 |
| C00157 | PC(18:3(9Z,12Z,15Z)/22:5(7Z,10Z,13Z,16Z,19Z)) | metab\_4046 | C48H80NO8P | 7.00 | Glycerophospholipids | 830.57 |
| C00157 | PC(20:4(8Z,11Z,14Z,17Z)/16:1(9Z)) | metab\_4060 | C44H78NO8P | 7.21 | Glycerophospholipids | 780.55 |
| C00157 | PC(22:5(7Z,10Z,13Z,16Z,19Z)/14:0) | metab\_4078 | C44H78NO8P | 7.51 | Glycerophospholipids | 780.55 |
| C00157 | PC(18:2(9Z,12Z)/22:5(7Z,10Z,13Z,16Z,19Z)) | metab\_4093 | C48H82NO8P | 7.66 | Glycerophospholipids | 832.58 |
| C00157 | PC(18:3(9Z,12Z,15Z)/16:0) | metab\_4142 | C42H78NO8P | 7.61 | Glycerophospholipids | 756.55 |
| C04230 | PC(18:0/0:0) | metab\_575 | C26H54NO7P | 7.62 | Glycerophospholipids | 524.37 |
| C04230 | LysoPC(P-18:1(9Z)/0:0) | metab\_1367 | C26H52NO6P | 7.71 | Glycerophospholipids | 538.39 |
| C04230 | PC(16:0/0:0) | metab\_1591 | C24H50NO7P | 7.65 | Glycerophospholipids | 518.32 |
| C04230 | LysoPC(17:0/0:0) | metab\_1740 | C25H52NO7P | 7.16 | Glycerophospholipids | 510.35 |
| C04230 | LysoPC(20:2(11Z,14Z)/0:0) | metab\_1782 | C28H54NO7P | 6.99 | Glycerophospholipids | 548.37 |
| C04230 | 2-Lysophosphatidylcholine | metab\_1886 | C26H54NO7P | 6.67 | Glycerophospholipids | 546.35 |
| C04230 | LysoPC(20:5(5Z,8Z,11Z,14Z,17Z)/0:0) | metab\_1994 | C28H48NO7P | 6.44 | Glycerophospholipids | 542.32 |
| C04230 | LysoPC(18:1(11Z)/0:0) | metab\_4036 | C26H52NO7P | 6.89 | Glycerophospholipids | 522.35 |
| C04230 | LysoPC(20:1(11Z)/0:0) | metab\_4086 | C28H56NO7P | 7.62 | Glycerophospholipids | 550.39 |
| C04230 | LysoPC(20:4(8Z,11Z,14Z,17Z)/0:0) | metab\_5285 | C28H50NO7P | 7.55 | Glycerophospholipids | 588.33 |
| C04230 | LysoPC(15:0/0:0) | metab\_5297 | C23H48NO7P | 7.54 | Glycerophospholipids | 480.31 |
| C04230 | LysoPC(16:1(9Z)/0:0) | metab\_5622 | C24H48NO7P | 6.42 | Glycerophospholipids | 538.32 |
| C04230 | LysoPC(18:3(6Z,9Z,12Z)/0:0) | metab\_5675 | C26H48NO7P | 6.36 | Glycerophospholipids | 562.31 |
| C04230 | LysoPC(22:6(4Z,7Z,10Z,13Z,16Z,19Z)/0:0) | metab\_6583 | C30H50NO7P | 6.37 | Glycerophospholipids | 612.33 |
| C04230 | LysoPC(20:4(5Z,8Z,11Z,14Z)/0:0) | metab\_6672 | C28H50NO7P | 6.41 | Glycerophospholipids | 588.33 |
| C04230 | 1-Palmitoylphosphatidylcholine | metab\_6816 | C24H50NO7P | 6.67 | Glycerophospholipids | 540.33 |
| C04230 | LysoPC(16:0/0:0) | metab\_6867 | C24H50NO7P | 7.54 | Glycerophospholipids | 540.33 |