**Table S1** Significant biomarkers of differentially expressed metabolites in OP rats after ST treatment by metabolomics.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Rt(min)** | **Mode** | **Name** | **HMDB code** | **Chemical formula** | **m/z** | **OVX**  | **OVX+ALE** | **OVX+ST** | **Error** |
| 1 | 0.58  | M-H |  Lysine | HMDB0000182 | C6H14N2O2 | 145.10  | ↑ | ↓ | ⊕ | 1.6928  |
| 2 | 0.72  | M+H | Linoleic acid | HMDB0000673 | C18H32O2 | 281.25  | ↑ | ↓ | ⊕ | -0.2722  |
| 3 | 1.14  | M-H | 3-Hydroxybutyric acid | HMDB00357 | C4H8O3 | 103.04  | ↓ | ↑ | ⊕ | 2.7544  |
| 4 | 1.36  | M+H | Hippuric acid | HMDB00714 | C9H9NO3 | 180.06  | ↑ | ↓ | 　 | 1.3502  |
| 5 | 1.69  | M-H | 9E,11E-Octadecadienoic acid | HMDB0005047 | C18H32O2 | 279.23  | ↑ | ↓ | 　 | -1.3125  |
| 6 | 1.92  | M-H | Prostaglandin F2a | HMDB0001139 | C20H34O5 | 399.24  | ↑ | ↓ | ⊕ | 1.4901  |
| 7 | 2.33  | M-H | Taurocholic acid  | HMDB00036 | C26H45NO7S | 514.28  | ↓ | ↑ | ⊕ | 3.2343  |
| 8 | 2.61  | M+H | LysoPC(15:0) | HMDB10381 | C23H48NO7P | 482.32  | ↓ | ↑ | ⊕ | 1.9888  |
| 9 | 2.84  | M+H | L-Carnitine | HMDB0000062 | C7H15NO3 | 162.1141 | ↑ | ↓ | ⊕ | 1.3378  |
| 10 | 2.99  | M+H | Glucose | HMDB00122 | C6H12O6 | 181.0714  | ↑ | ↓ | ⊕ | -2.9741  |
| 11 | 3.39  | M+H | Arginine | HMDB03416 | C6H14N4O2 | 175.1193  | ↑ | ↓ | ⊕ | 2.2435  |
| 12 | 3.62  | M-H | Citric acid  | HMDB00094 | C6H8O7 | 191.0198  | ↓ | ↑ | ⊕ | -1.3542  |
| 13 | 3.90  | M-H | Corticosterone | HMDB01547 | C21H30O4 | 345.2052  | ↓ | ↑ | ⊕ | -3.5676  |
| 14 | 4.28  | M+H | S-Adenosylhomocysteine | HMDB00939 | C14H20N6O5S | 407.11  | ↑ | ↓ | 　 | 3.8609  |
| 15 | 4.56  | M-H | Ornithine | HMDB00214 | C5H12N2O2 | 131.08  | ↑ | ↓ | ⊕ | 3.2132  |
| 16 | 4.75  | M+H | Tryptophan | HMDB13609 | C11H12N2O2 | 205.10  | ↑ | ↓ | ⊕ | 1.1123  |
| 17 | 4.90  | M+H | Arachidonic acid | HMDB0001043 | C20H32O2 | 305.25  | ↑ | ↓ | ⊕ | -7.5142  |
| 18 | 5.22  | M+H | 18-Hydroxyarachidonic acid | HMDB0006245 | C20H32O3 | 321.24  | ↑ | ↓ | 　 | -4.7807  |
| 19 | 5.30  | M+H | Methionyl-Hydroxyproline | HMDB28974 | C10H18N2O4S | 263.11  | ↑ | ↓ | 　 | 1.6928  |
| 20 | 6.00  | M-H | Cer(d18:0/18:0) | HMDB11761 | C36H73NO3 | 566.55  | ↓ | ↑ | ⊕ | -4.7520  |
| 21 | 6.41  | M-H | Docosahexaenoic acid | HMDB0002183 | C22H32O2 | 327.23  | ↓ | ↑ | 　 | -8.2258  |
| 22 | 6.51  | M-H | Palmitic acid | HMDB0000220 | C16H32O2 | 255.23  | ↓ | ↑ | 　 | -5.2631  |
| 23 | 6.71  | M+H | 4-Oxoretinol | HMDB0012329 | C20H28O2 | 301.22  | ↓ | ↑ | 　 | 1.1284  |
| 24 | 7.09  | M-H | Glyceraldehyde | HMDB0001051 | C3H6O3 | 89.02  | ↓ | ↑ | 　 | 3.0329  |
| 25 | 7.73  | M-H | Glutamine | HMDB00641 | C5H10N2O3 | 145.06  | ↓ | ↑ | ⊕ | 2.3434  |
| 26 | 8.08  | M+H | Uric acid | HMDB00289 | C5H4N4O3 | 169.04  | ↓ | ↑ | ⊕ | 5.7271  |
| 27 | 8.31  | M+H | 8-HETE | HMDB04679 | C20H32O3 | 321.24  | ↓ | ↑ | ⊕ | 6.9467  |
| 28 | 9.69  | M-H | Estriol | HMDB0000153 | C18H24O3 | 311.1618 | ↑ | ↓ | ⊕ | 3.4462 |



Fig. S1 HPLC characteristic chromatography of Osthole. HPLC was performed on the column of Kromasil C18 column. The mobile phase was water -acetonitrile system (30:70) at the flow rate of 1.0 ml/min. The column temperature was 25 oC, and the injection volume was 10 ul. The detection wavelength were set at 322 nm.