Supplementary Table 1. Primer sequences used for Real-time PCR analysis.

Gene name	Forward Sequence (5'-3')	Reverse Sequence (5'-3')
Gapdh	TGGTGAAGCAGGCATCTGAG	TGCTGTTGAAGTCGCAGGAG
ZO-1	GCCGCTAAGAGCACAGCAA	GCCCTCCTTTTAACACATCAGA
MUC-2	AGGGCTCGGAACTCCAGAAA	CCAGGGAATCGGTAGACATCG
Occludin	GGAGGACTGGGTCAGGGAATA	CGTCGTCTAGTTCTGCCTGT
PI-3K	GCAGAGGGCTACCAGTACAGA	CTGAATCCAAGTGCCACTAAGG
AKT	ATGAACGACGTAGCCATTGTG	TTGTAGCCAATAAAGGTGCCAT
iNOS	CAGGAAGAAATGCAGGAGATGG	TGTCCTGAACGTAGACCTTGG
NF-κB	CTGGGCACCAGTTCGATGG	TGACAGCATAAGGCACACACT

Supplementary Table 2. List of antibodies used.

Antibody name	Catalog number	Manufacturer
Anti-F4/80 antibody	ab6640	Abcam
Anti-Myeloperoxidase antibody	ab208670	Abcam
Anti-ZO1 tight junction protein	ab221547	Abcam
Anti-MUC2 antibody	ab272692	Abcam
Anti-Occludin antibody	ab216327	Abcam
Anti-TNF alpha antibody	ab6671	Abcam
PI3K/AKT signalling pathway panel	ab283852	Abcam
Anti-RAGE antibody	ab216329	Abcam
Anti-Prosurfactant Protein C antibody	ab211326	Abcam

Supplementary Figure 1. Heat map of differential metabolites in the top 30 of intestinal and lung tissues

As shown in Supplementary Figure 1A, compared with the NC group, the contents of pro-inflammatory metabolites (LPS 20:5, N-Acetylmuramic acid, N-Acetylmuramate, Cadaverine), endogenous cannabinoid-like substances and their related lipid mediators (Linoleoyl Ethanolamide, Palmitoyl Ethanolamide, N-Oleoylethanolamine, N-Linoleoyl Leucine, N-Palmitoyl Glutamine, N-Linoleoyl Methionine), amino acids and their metabolites (Thr, Norleucine, N-(3-Oxobutyl)-tyrosine, beta-Alanine), polyamines and their derivatives (N1-Acetylspermidine, N8-Acetylspermidine), nucleotide metabolites (2'-Deoxyuridine, 6,8-Dihydroxypurine), phospholipids

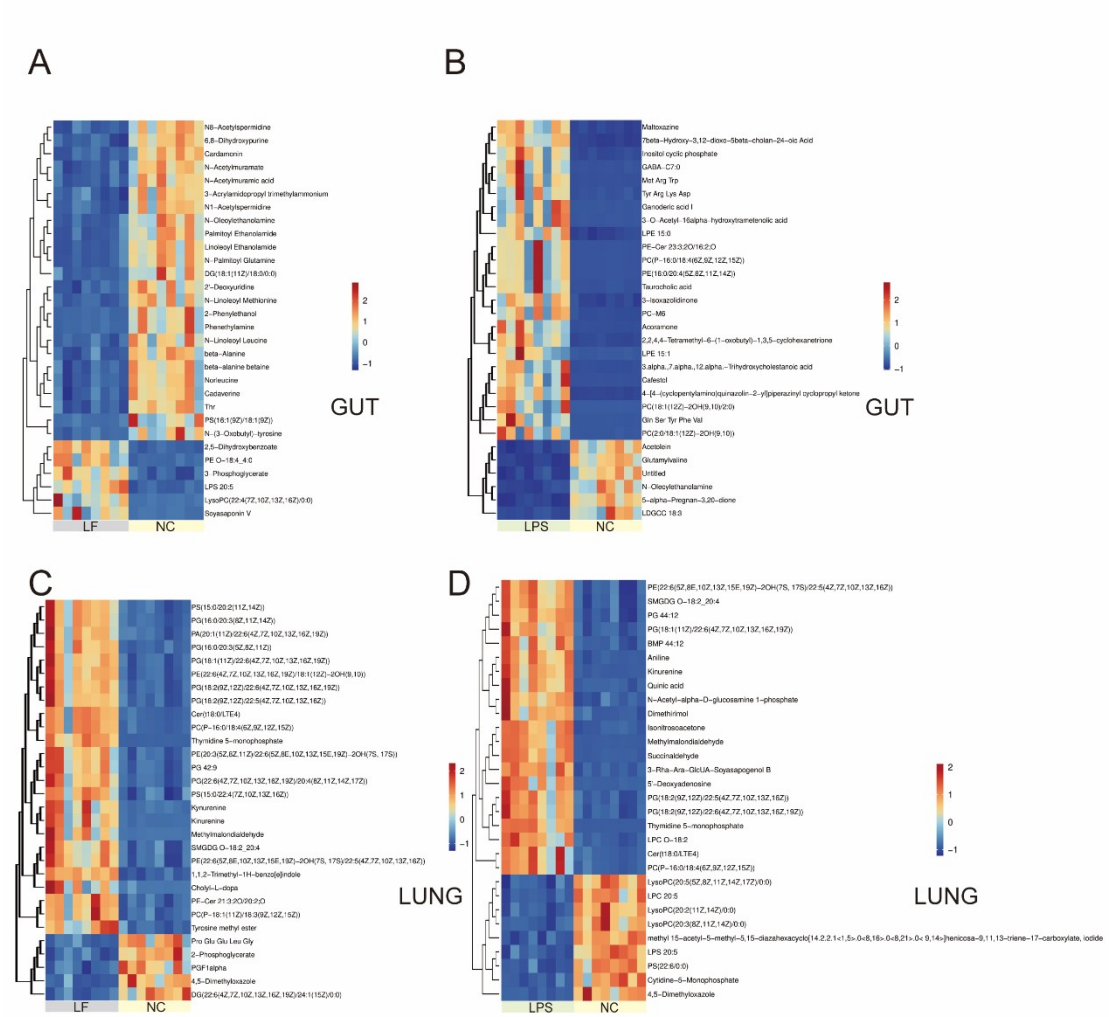
and their derivatives (PS(16:1(9Z)/18:1(9Z)), DG(18:1(11Z)/18:0/0:0)), aromatic compounds and phytochemicals (Cardamonin, Phenethylamine, 2-Phenylethanol) in the gut metabolites of the LF group decreased, while the contents of phospholipids (PE O-18:4_4:0, LysoPC(22:4(7Z,10Z,13Z,16Z)/0:0)) and 2,5-Dihydroxybenzoate, 3-Phosphoglycerate and Soyasaponin V increased.

As shown in Supplementary Figure 1B, compared with the NC group, the increased metabolites in the intestinal tract of the LPS group were lipids (LPE 15:0, PC(P-16:0/18:4(6Z,9Z,12Z,15Z))), and PE-Cer 23:3; 2O/16:2; O, PE(16:0/20:4(5Z,8Z,11Z,14Z)), PC(18:1(12Z)-2OH(9,10)/2:0), PC(2:0/18:1(12Z)-2OH(9,10)), bile acids and their derivatives (Tauroursodeoxycholic acid, 7beta-Hydroxy-3,12-dioxo-5beta-cholan-24-oic acid, 3.alpha.,7.alpha.,12.alpha.-Trihydroxycholestanoic acid), amino acids and short peptides (Tyr Arg Lys Asp, Met Arg Trp, Gln Ser Tyr Phe Val), signaling molecules and neuroactive substances (Inositol cyclic phosphate, GABA-C7:0), etc. The metabolites reduced in the intestinal tract of the LPS group were lipids (LDGCC 18:3, N-Oleoylethanolamine), steroid hormones (5-alpha-Pregnan-3,20-dione), short peptides (Glutamylvaline), etc.

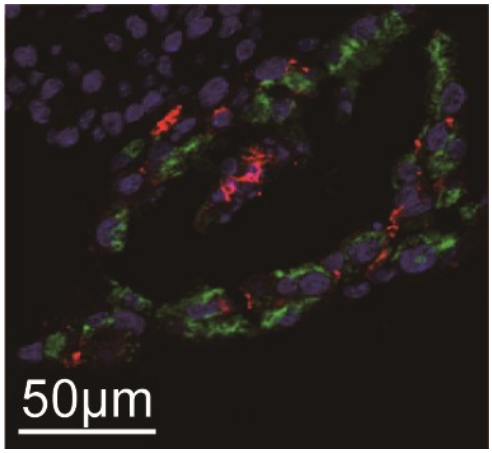
Compared with the NC group (Supplementary Figure 1C), the LF group had increased metabolites in lung tissue, mainly phospholipid (PC(P-18:1(11Z)/18:3(9Z,12Z,15Z)), PC(P-16:0/18:4(6Z,9Z,12Z,15Z)), PS(15:0/22:4(7Z,10Z,13Z,16Z)). The PG Chambers, PE (thus z (5 z, z 8, 11)/he (e 5 z, 8, 10 z, z, 15 e, z) 19-2 oh (7 s, s) 17), PE (" (e 5 z, 8, 10 z, z, 15 e, z) 19-2 oh (7 s, s) 17 / whoever (10 4 z, 7 z, z, z, z) of 16), PG (" (z, z, z, 10, 13, z z, z) 19/20:4 (z 8 z, 11, 14 z, z) of 17), PE (" (z, z, z, 10, 13, z z, z) 19/18:1 (z) - 2 oh (9, 10)), PG (16:0 / plot (z) 5 z, 8 z, 11), PS (15:0 again/(z, z) 14), PG (18:2 (z, z)/he (z, z, z, 10, 13, z z, z) 19) PG (16:0 / plot (8 z, z, z) 14), PG (now 11 (z)/he (z, z, z, 10, 13, z z, z) 19), PG ((z, z)/is not certain (z, z, z, 10, 13 z, z) of 16), Z PA (part (11)/he (z, z, z, 10, 13, z z, z) 19)), sheath (PE - Cer; therefore again 2 o /; O, Cer(t18:0/LTE4), SMGDG O-18:2_20:4), amino acids and their derivatives (Tyrosine methyl ester, Kynurenine, Cholyl-L-dopa), etc. The decreased metabolites were 2-Phosphoglycerate, DG(22:6(4Z,7Z,10Z,13Z,16Z,19Z)/24:1(15Z)/0:0), PGF1alpha, Pro Glu Glu Leu Gly, etc.

Compared with the NC group (Supplementary Figure 1D), compared with the NC group, the LPS group had increased metabolites in lung tissue, mainly phospholipids (PC(P-16:0/18:4(6Z,9Z,12Z,15Z)), LPC O-18:2, PG 44:12, and LPC O-18:2. PE(22:6(5Z,8E,10Z,13Z,15E,19Z)-2OH(7S, 17S)/22:5(4Z,7Z,10Z,13Z,16Z)), BMP 44:12, PG ((z, z)/is not certain (z, z, z, 10, 13 z, z) of 16), PG (18:2 (z, z)/he (z, z, z, 10, 13 z, z, z) 19), PG(18:1(11Z)/22:6(4Z,7Z,10Z,13Z,16Z,19Z)), sphingolipid (Cer(t18:0/LTE4), SMGDG O-18:2_20:4) oxidative stress and damage markers (Methylmalondialdehyde, SMGDG O-18:2_20:4) Succinaldehyde), and lysophosphatidylcholine was the main metabolite reduced

(LysoPC(20:5(5Z,8Z,11Z,14Z,17Z)/0:0), LPC 20:5, LysoPC(20:2(11Z,14Z)/0:0), LysoPC(20:3(8Z,11Z,14Z)/0:0)), PS(22:6/0:0), Cytidine-5-Monophosphate etc.



Supplementary Figure 1. A and B: Differentially expressed metabolites in the mouse gut top 30, LF vs. NC, LPS vs. NC. C and D: Differentially expressed metabolites in the mouse lung top 30, LF vs. NC, LPS vs. NC.



Supplementary Figure 2. Identification of alveolar organoids. The red signal represents the expression of RAGE, the green signal represents the expression of Prosurfactant Protein C, and the blue signal represents DAPI staining.