Fig. S1. The relative abundance of the top 10 gut microbiota at the phylum level (A, C) and genus level (B, D) in the colitis mice pre-treated and post-treated with *L. paraplantarum* LR-1 biofilm and planktonic cells (n=6).

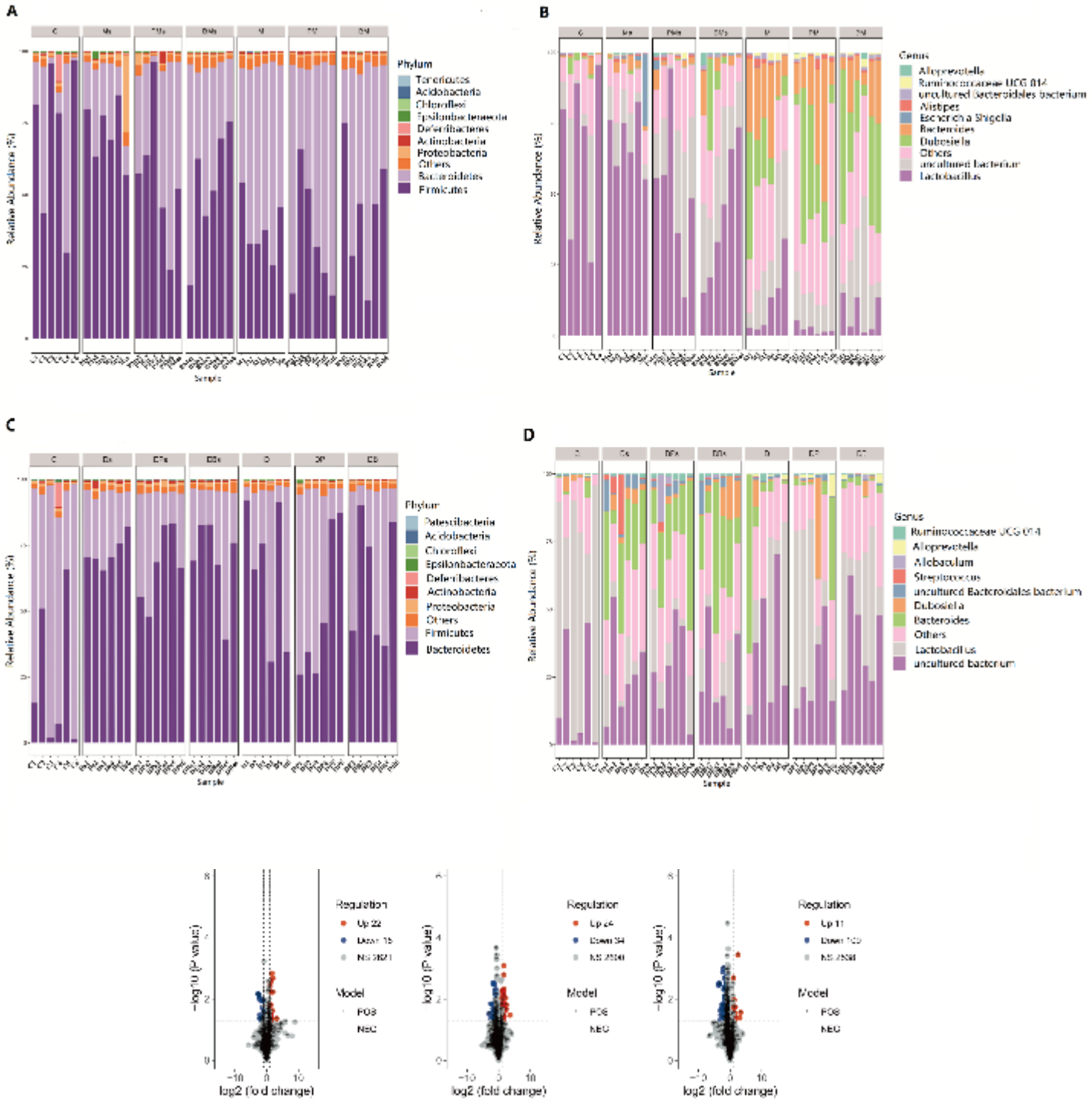

Fig. S2. The differential metabolites in the M vs. C (A), PM vs. C (B), BM vs. C (C), PM vs. M (D), BM vs. M (E), and BM vs. PM (F) group comparisons of the intestinal content of the colitis mice pre-treated with *L. paraplantarum* LR-1 biofilm and planktonic cells. The D vs. C (G), DP vs. C (H), DB vs. C (I), DP vs. C (J), DB vs. D (K), and DB vs. DP (L) group comparisons of the intestinal content of the colitis mice treated with *L. paraplantarum* LR-1 biofilm and planktonic cells. The different metabolites between the two groups were selected using Student's t-test (P<0.05). In the volcano, the red and blue dot represents an up-regulation (fold change>2.0 and P<0.05) and down-regulation (fold change< 0.5 and P<0.05) metabolite, respectively, while the gray dot represents no significant metabolite (|$\log_2$ fold change|<1.0 or P>0.05). In addition, label "+" and "-" indicates positive and negative mode, respectively.

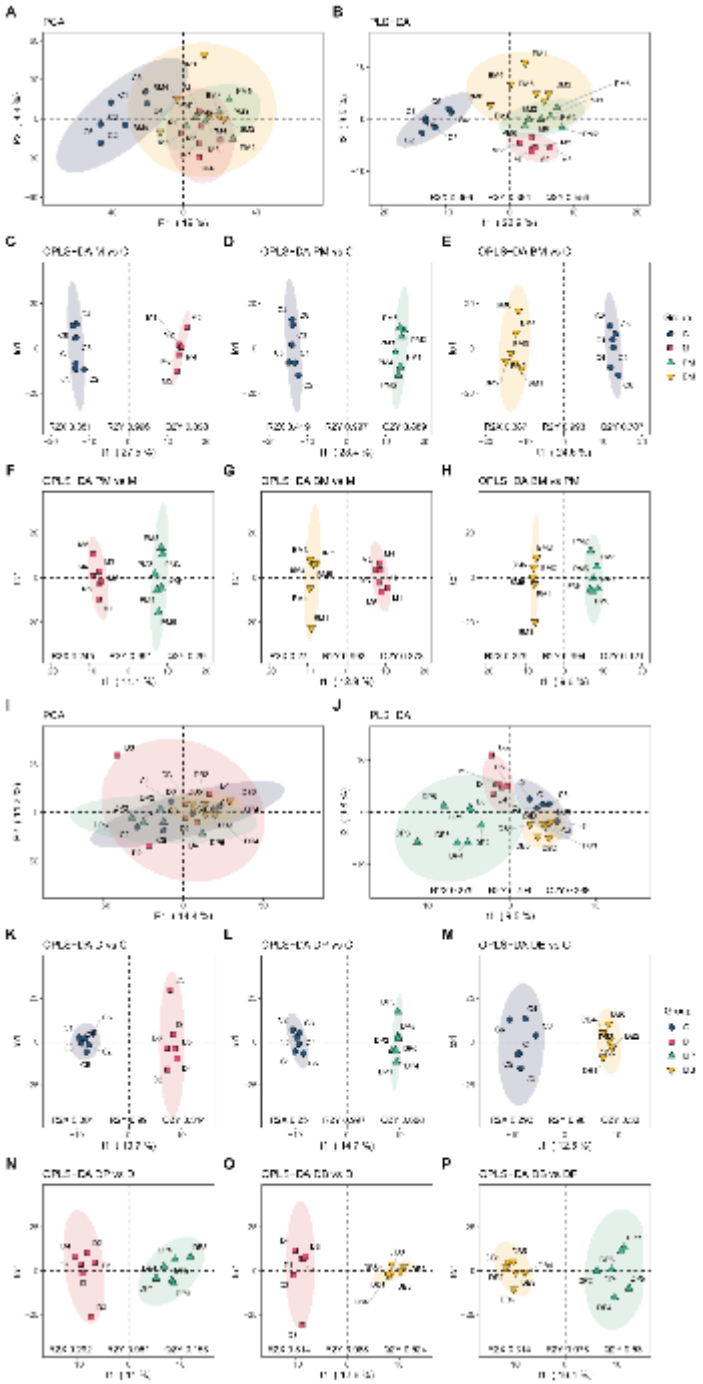

Fig. S3. The PCA (A), PLS-DA (B), and OPLAS-DA of the metabolites in the M vs. C (C), PM vs. C (D), BM vs. C I, PM vs. M (F), BM vs. M (G), and BM vs. PM (H) group comparisons during

the preventive evaluation experiment. The PCA (I), PLS-DA (J), and OPLAS-DA of the metabolites in the D vs. C (K), DP vs. C (L), DB vs. C (M), DP vs. D (N), DB vs. D (O), and DB vs. DP (P) group comparisons during the therapeutic evaluation experiment (n=6). The ellipses represent 95% confidence intervals around the centroid of each data cluster.

Table S1 Mice colon histological score system

Inflammatory infiltration depth	Tissue damage degree	Mucosal damage degree	Score
No evidence	No evidence	No evidence	0
Mucous layer	Local damage	Low level of goblet cell loss	1
Submucosa layer	Erosion and ulcer	Moderate level of goblet cell and crypt loss	2
Muscularis mucosae	Large range damage	High level of goblet cell and crypt loss	3

Table S2 Detailed information of the code names and metabolites in correlation analysis of the preventive experiment.

Code name	Metabolites
M1	S-Adenosylmethionine
M2	S-methyl-5'-thioadenosine
M3	Diacetylrhein
M4	2-Hydroxyphenylacetic acid
M5	2,5-dimethoxy-4-ethylamphetamine
M6	Acetylnorfentanyl
M7	Benzeneethanamine,3,5-dimethoxy-.alpha.-methyl-4-propoxy-
M8	Benzoic acid, 4-[(1s)-1-[[5-chloro-2-(4-fluorophenoxy)benzoyl]amino]ethyl
M9	Bisphenol a
M10	Bisphenol b
M11	Desmethylverapamil
M12	Flufenacet
M13	N-benzyl-n-methylpiperidin-3-amine
M14	Tyramine
M15	Zinniol
M16	Gambogic acid
M17	Doxepin
M18	N-acetylputrescine
M19	(S)-2-aminobutyric acid
M20	.gamma.-l-glu-.epsilon.-l-lys
M21	2-phenylpiperidine-2-acetamide
M22	3-aminobutanoic acid
M23	3-aminohexanoic acid
M24	4-amino-4-methylpentanoic acid
M25	Ala-Ala-Arg
M26	Ala-Lys
M27	Arg-Asn
M28	Arg-Asn-Arg
M29	Arg-Asn-Lys
M30	Arg-glu
M31	Arg-glyM
M32	Arg-Lys
M33	Arg-Lys-Lys
M34	Arg-Pro
M35	Arg-Pro-Pro
M36	Arg-Trp
M37	Arginine
M38	Asn-Gly-Lys
M39	Asn-Leu
M40	Aspartic acid
M41	Bradykinin hydroxyproline
M42	D-Ornithine
M43	Dihydrofolic acid
M44	DL-arginine
M45	DL-Lysine
M46	Glu-Arg
M47	Glu-Asn-Arg
M48	Glu-Lys
M49	Gly-pro-arg-pro-amide
M50	lle-Asp
M51	lle-Leu-Arg
M52	lle-Leu-Lys
M53	L-citrulline
M54	L-Glutamine
M55	L-ng-monomethylarginine
M56	L-thiocitrulline
M57	Lys-Ala
M58	Lys-Gln
M59	Lys-Glu

M60	Lys-Gly
M61	Lys-Leu-Arg
M62	Lys-lys
M63	Lys-Pro
M64	Lys-Thr
M65	Lys-Val-Lys
M66	Lysine
M67	Mi-fluoro-dl-phenylalanine
M68	N-.alpha.-(tert-butoxycarbonyl)-l-valine
M69	N-acetylhistidine
M70	N-arachidonoyl-.gamma.-aminobutyric acid
M71	N-fructosyl pyroglutamate
M72	N6,N6,N6-Trimethyl-L-lysine
M73	Ng,ng-dimethyl-l-arginine
M74	Ornithine
M75	Pyroglu-Glu-Lys
M76	Ser-Arg
M77	Ser-Cys-Lys
M78	Ser-Leu-Ile-Gly-Lys-Val-Amide
M79	Ser-Lys
M80	Thiazolidine-4-carboxylic acid
M81	Thr-Arg
M82	Thr-Arg-Lys
M83	Thr-Lys
M84	Thr-Ser-Lys
M85	Trp-Lys
M86	val-Arg-Lys
M87	Val-Asn
M88	val-Asp-Arg
M89	Val-Lys
M90	val-Thr-Arg
M91	Quinine
M92	Entacapone
M93	Orotate
M94	Vitamin c
M95	Cabergoline
M96	Ergonovine
M97	Lsd
M98	(2e,4e)-hexa-2,4-dienoic acid
M99	(z)-5,8,11-trihydroxyoctadec-9-enoic acid
M100	1,2-dihydroxyheptadec-16-en-4-yl acetate
M101	15-cyclohexylpentanorprostaglandin f2.alpha.
M102	15-deoxy-delta-12,14-pgj2
M103	15-ketoprostaglandin f2.alpha.
M104	Dodecanedioic acid
M105	Esfenvalerate
M106	Ethylmalonic acid
M107	Heptadecanoic acid
M108	Limaprost
M109	Misoprostol (free acid)
M110	Oleic acid methyl ester
M111	Prostaglandin e1
M112	Prostaglandin f2.alpha
M113	3,5,7-trihydroxy-4'-methoxyflavone
M114	7-hydroxyflavanone
M115	1-palmitoylglycerol
M116	1-hexadecyl-2-azelaoyl-sn-glycero-3-phosphocholine
M117	1-myristoyl-2-hydroxy-sn-glycero-3-phosphoethanolamine
M118	1-palmitoyl-2-hydroxy-sn-glycero-3-phosphoethanolamine
M119	1-palmitoyl-2-linoleoyl-sn-glycero-3-phospho-(1'-rac-glycerol)
M120	1-Stearoyl-sn-glycerol 3-phosphocholine(LPC(18:0))
M121	1,2-diarachidonoyl-sn-glycero-3-phosphocholine
M122	1,2-dioleoyl-sn-glycero-3-phospho-(1'-myo-inositol-3',4 '-bisphosphate)

M123	1,2-dioleoyl-sn-glycero-3-phosphoethanolamine-n-methyl
M124	2-(5-oxovaleryl)phosphatidylcholine
M125	sn-Glycerol 3-phosphoethanolamine
M126	Harmaline
M127	1-methylxanthine
M128	Adenine
M129	N6-methyladenine
M130	Phenol,4-[2-[[2-benzo[b]thien-3-yl-9-(1-methylethyl)-9h-purin-6-ylJamino]ethyl]-
M131	1h-indole-3-carboxylic acid，1-(4-hydroxypentyl)-,8-quinolinyl ester
M132	1h-indole-3-propanoic acid
M133	Indole-3-carboxaldehyde
M134	Indole-3-carboxylic acid
M135	Melatonin
M136	Genistein 7-o-beta-d-glucoside-6"-o-malonate
M137	Tetramethrin
M138	Alpha-ketoisovaleric acid
M139	1,3-dicyclohexylurea
M140	Thiosultap
M141	Guanidinopropionic acid
M142	N-(4-chlorophenyl)-4-piperidinamine
M143	Sphingosine
M144	(e)-n-[2-[3-acetamido-4,5-dihydroxy-6-(hydroxymethyl)oxan-2-ylJoxy-6-[2-[5-(2,4-dioxopyrimidin-1-y/)-3,4-dihydroxyoxolan-2-yl]-2-hydroxyethyl]-4,5-dihydroxyoxan-3-yl]-13-methyltetradec-2-enamide
M145	.alpha.-d-galactose 1-phosphate
M146	2-methyl-3-buten-2-ol
M147	4-oxo-2-nonenal
M148	alpha-D-Glucose 1-phosphate
M149	Arbutin
M150	Blood group a trisaccharide
M151	Blood group b trisaccharide
M152	Clofibric acid acyl-.beta.-d-glucuronide
M153	Cynarin
M154	D-ribose
M155	D-ribulose 5-phosphate
M156	Disialyllacto-n-tetraose
M157	G2f
M158	Glyceric acid
M159	Enniatin b
M160	Cisapride
M161	Norepinephrine
M162	p-Hydroxyphenylacetic acid
M163	3'-hydroxyrepaglinide
M164	N1,n1,n2-trimethyl-n2-(4-piperidinyl)-1,2-ethanediamine
M165	Trans-3-methylfentanyl
M166	[(2s,3r,4s,5s,6r)-3,4,5-trihydroxy-6-[(2r,3r,4s,5s,6r)-3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yloxymethylJoxan-2-yl](4as,6as,6br,9r,10s,12ar,14bs)-10-[(2s,3r,4s,5s)-4,5-dihydroxy-3-[(2s,3r,4r,5r,6s)-3,4,5-trihydroxy-6-methyloxan-2-ylJoxyoxan-2-yl]oxy-9-(hydroxymethyl-2,2,6a,6b,9.12a-hexamethyl-1,3,4,5,6,6a,7,8,8a,10,11,12,13,14b-tetradecahydropicene-4a-carboxylate
M167	[5-acetyloxy-3-(hydroxymethyl)-2-oxo-6-propan-2-ylcyclohex-3-en-1-y/] 3-methylpentanoate
M168	Alisol a 24-acetate
M169	Asiatic acid
M170	Beta-carotene-3,4,3'4'-tetrol
M171	Cabazitaxel (jevtana)
M172	Crocin ii
M173	Gibberellin a4
M174	1-methyladenosine
M175	Adenosine
M176	Deoxyadenosine
M177	3-aminopyridine
M178	2',3'-dideoxycytidine
M179	Uridine

M180	Cytidine 2',3'-cyclic phosphate
M181	Atalaphylline
M182	N-acetyldihydrosphingosine
M183	(4r)-4-((1r,3s,5s,7r,9s,10s,12s,13r, 14s,17r)-1,3,7,12-tetrahydroxy-10,13-dimethylhexadecahydro-1h-cyclopenta[a]phenanthren-17-yl)pentanoic acid
M184	(5.alpha.)-androstane-3,11,17-trione
M185	.beta.-estradiol 3,17-dipropionate
M186	[17-(2,6-dihydroxy-6-methyl-3-oxoheptan-2-yl)-3-hydroxy-4,4,9,13,14-pentamethyl-2-[3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yl]oxy-2,3,7,8,10,11,12,15,16,17-decahydro-1h-cyclopenta[ajphenanthren-16-yl]acetate
M187	3beta,7alpha-dihydroxy-5beta-cholan-24-oic acid
M188	4-androstene-11.beta.,17.beta.-diol-3-one
M189	5.alpha.-androstan-3.alpha.,17.beta.-diol-17.beta.-glucuronide
M190	7.alpha.,12.alpha.-dihydroxy-5.beta.-cholestan-3-one
M191	Alpha-solanine
M192	Chenodeoxycholate
M193	Chlormadinone acetate
M194	Corticosterone
M195	Estra-1,3,5(10),7-tetraene-3,17.beta.-diol
M196	Fusidic acid
M197	GlycocholateM198: Hydrocortisone
M198	Hydrocortisone
M199	Polyphyllin e
M200	Pseudojervine
M201	Quinestrol
M202	Testosterone decanoate
M203	Tomatine
M204	Triamcinolone diacetate
M205	Coproporphyrin l
M206	3-(methylthio)-1-propanol
M207	Melamine
M208	1',4-sophorolactone 6',6-diacetate
M209	1-o-hexadecyl-2-o-acetyl-sn-glyceryl-3-phosphory(n,n,n-trimethyl)hexanolamine
M210	1-Stearoyl-2-hydroxy-sn-glycero-3-phosphoethanolamine
M211	1-Stearoyl-sn-glycerol 3-phosphocholine
M212	15-keto-PGE1
M213	3-Amino-3-(4-hydroxyphenyl)propanoate
M214	4-acetamidobutanoate
M215	Acetyl Tyrosine Ethyl Ester
M216	Ajmalicine
M217	alpha-Guanidinoglutaric Acid
M218	Bafilomycin b1
M219	Chlorothricin
M220	D-Arabinono-1,4-lactone
M221	D-Pipecolinic acid
M222	Dipivefrine
M223	Epirubicin
M224	G2fs2 neuac
M225	His-Lys
M226	Huperzine b
M227	Kendomycin
M228	Lys-Leu
M229	Metaflumizone
M230	Mitragynine
M231	Morphine-6-glucuronide
M232	N,n-dimethylguanosine
M233	N,N-Dimethylsphingosine
M234	N1-Acetylspermidine
M235	NG,NG-dimethyl-L-arginine(ADMA)
M236	Oligomycin b
M237	Pyrrolidinium, 1-[(7r)-7-(acetyloxy)-4-hydroxy-4-oxido-3,5,9-trioxa-4-phosphapentacos-1-y]-1-methyl-, inner salt
M238	Vincamine

Table S3 Detailed information of the code names and metabolites in correlation analysis of the therapeutic experiment.

Code name	Metabolites
M1	Triamifos
M2	Dantrolene
M3	3-hydroxyanthranilic acid
M4	Amisulpride n-oxide
M5	Citalopram
M6	Dibutyl phthalate
M7	Leonurine
M8	Milnacipran
M9	Probucol
M10	Pyridaben
M11	Zinniol
M12	Decahydrogambogic acid
M13	Thioridazine
M14	2-(2-methoxyethoxy)acetic acid
M15	3-methyl-l-histidine
M16	4-amino-4-methylpentanoic acid
M17	4-hydroxy-l-isoleucine
M18	Ala-Cys-Arg
M19	Ala-Val
M20	Arg-Asn
M21	Arg-GIn
M22	Arg-gly
M23	Arg-Lys
M24	Arg-ProM
M25	Arg-Pro-Pro
M26	Arg-Ser-Arg
M27	Benalaxyl
M28	Bradykinin hydroxyproline
M29	Captopril
M30	Carbobenzyloxy-l-norvalyl-l-norleucine
M31	Creatine
M32	Dihydrofolic acid
M33	Dl-homocysteine
M34	GIn-ser
M35	Gly-Val
M36	L-leucyl-l-leucine methyl ester
M37	Lys-lys
M38	Lys-Pro
M39	N-(.alpha.-linolenoyl)tyrosine
M40	N-acetyl-l-aspartic acid
M41	N-acetylcadaverine
M42	N-acetylglutamine
M43	N-arachidonoyl-.gamma.-aminobutyric acid
M44	N-fructosyl pyroglutamate
M45	O-Phospho-L-homoserine
M46	Phe-pro
M47	Pro-Thr
M48	Pyroglu-pro
M49	RaltitrexedM50: Stachydrine
M50	Stachydrine
M51	Thr-Ala
M52	Thyrotropin-releasing hormone
M53	Trp-Asn-Arg
M54	Trp-Tyr
M55	Val-Pro
M56	Val-Trp
M57	Haploperoside c acetate
M58	(2r,3r,4r,5r,6s)-2-[[(2r,3s,4s,5r,6r)-6-[1,7-bis(4-hydroxyphenyl)heptan-3-yloxy]-3,4,5-trihydroxyoxan-2-yl]methoxy]-6-methyloxane-3,4,5-triol

M59	1-palmitoyl-2-linoleoyl-rac-glycerol
M60	1,2-dilinoleoylglycerol
M61	15-oxo-11z,13e-eicosadienoic acid
M62	16,16-dimethyl-6-ketoprostaglandin e1
M63	17-phenyltrinor-13,14-dihydroprostaglandin a2
M64	3-hydroxybutyrylcarnitine
M65	3-hydroxyoleylcarnitine
M66	5,8,11,14-eicosatetraynoic acid
M67	Acetylcarnitine
M68	Ascorbyl stearate
M69	L-palmitoylcarnitine
M70	Limaprost
M71	Methyl hexadecanoate
M72	Monolinolenin (9c,12c,15c)
M73	Myristoyl-l-carnitine
M74	Oieic acid methyl ester
M75	Oleoyl-l-carnitine
M76	Prostaglandin f2.alpha.
M77	Stearoylcarnitine
M78	1-[2,4,6-trihydroxy-3-[7-hydroxy-2-(4-hydroxyphenyl)-3,4-dihydro-2h-chromen-4-yl]phenyl]dodecan-1-one
M79	Epimedin a
M80	Flavonol base + 4o, o-hex-dhex-pen
M81	Mgmg 18:2
M82	1-(1,2r-dioctanoylphosphatidyl)inositol-3,4-bisphosphate
M83	1-(1z-hexadecenyl)-sn-glycero-3-phosphocholine
M84	1-o-hexadecyl-2-o-(5z,8z,11z,14z,17z-eicosapentaenoyl)-sn-glyceryl-3-phosphorylcholine
M85	1-palmitoyl-2-lauroyl-sn-glycero-3-phosphorylcholine
M86	1-stearoyi-2-hydroxy-sn-glycero-3-phosphocholine
M87	1,2-distearoyl-sn-glycero-3-phospho-l-serine
M88	2-arachidonoyl-1-palmitoyl-sn-glycero-3-phosphoethanolamine
M89	Pg 32:1
M90	Pi 36:4
M91	Beta-hydroxybutyrate
M92	Pravastatin
M93	Scopolamine
M94	5'-phosphoribosyl-5-amino-4-imidazolecarboxamide (aicar)
M95	1-methylxanthine
M96	Phenol,4-[2-[[2-benzo[b]thien-3-yl-9-(1-methylethyl)-9h-purin-6-yl]amino]ethyl]-
M97	1h-indole-3-ethanamine,5-methoxy-n-methyl-n-(1-methylethyl)-
M98	Ala-Ala
M99	Indoleacetic acid
M100	N-Acetylserotonin
M101	Genistein 7-o-beta-d-glucoside-6''-o-malonate
M102	4-ketopimelic acid
M103	1,3-dicyclohexylurea
M104	1-o-hexadecyl-2-deoxy-2-thio-s-acetyl-sn-glyceryl-3-phosphorylcholine
M105	Betaine aldehyde
M106	Guanidine
M107	L-carnitine
M108	Rac-4-(methylamino)-1-(3-pyridyl)-1-butanol
M109	SphingosineM110: Angoroside a
M110	Angoroside a
M111	Blood group h trisaccharide
M112	Catalpol
M113	D-(+)-mannose
M114	D-pinitol
M115	D-Threitol
M116	D-xylose
M117	Disialyllacto-n-tetraose
M118	Dronedarone
M119	G2f
M120	Galacto-n-biose

M121	Glyceraldehyde
M122	N-acetyl-.beta.-d-mannosamine
M123	Nga3
M124	Trifluperidol
M125	(2s,3s,4s,5r,6r)-6-[[(2s,3r,4r,6ar,6bs,8as,14br)-2-hydroxy-4-(hydroxymethyl)-4,6a,6b,11,11,14b-hexamethyl-8a-[(2s,3r,4s,5s,6r)-3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yl]oxycarbonyl-1,2,3,4a,5,6,7,8,9,10,12,12a,14,14a-tetradecahydropicen-3-yl]oxy]-3,4,5-trihydroxyoxane-2-carboxylic acid
M126	.alpha.-hederin
M127	2,5,8,9-tetracetoxy-15-hydroxy-3-benzoyloxyacetoxy-7-isobutyroyloxy-14-oxojatropha-6(17),11e-dien
M128	3-deacetylsalannin
M129	Anthranoyllycoctonine
M130	Beta-carotene-3,4,3'4'-tetrol
M131	Coenzyme q1
M132	NcGc00169093-01
M133	Pristanic acid
M134	Steviolbioside
M135	Methopterine
M136	Niacinamide
M137	Cytidine-5'-monophospho-n-acetylneuraminic acid
M138	Cytidine monophosphate n-acetylneuraminic acid
M139	Thymidine 5'-monophosphate
M140	2-hydroxy-6-methylquinoline-3-carbaldehyde
M141	N-acetyldihydrosphingosine
M142	N-octanoylsphingosine
M143	Sm d34:1
M144	Sm d34:2
M145	(4r)-4-((1r,3s,5s,7r,9s,10s,12s,13r,14s,17r)-1,3,7,12-tetrahydroxy-10,13-dimethylhexadecahydro-1h-cyclopenta[a]phenanthren-17-yl)pentanoic acid
M146	.alpha.-solanine
M147	5alpha-androstan-17beta-ol-3-one
M148	7.alpha.-hydroxydehydroepiandrosteronep
M149	Oxytocin
M150	Pseudojervine
M151	Taurocholic acidpT
M152	Tetrahydrocorticosterone
M153	Tomatine
M154	Triamcinolone diacetate
M155	Trillin
M156	Bilirubin
M157	Urobilin
M158	(-)-Naringenin
M159	1-Myristoyl-sn-glycero-3-phosphocholine
M160	1-o-hexadecyl-2-o-acetyl-sn-glyceryl-3-phosphory(n,n,n-trimethyl)hexanolamine
M161	1-Stearoyl-2-hydroxy-sn-glycero-3-phosphoethanolamine
M162	1,3-cyclobutanedicarboxylic acid, 2,4-dipheny-, 1-(1-naphthalenyl) ester,(1.beta.,2r,3.alpha.,4r)-
M163	2',3'-di-o-acetyladenosine
M164	2',4',6'-trimethoxychalcone
M165	4-hydroxy-1-(2-hydroxyethyl)-2,2,6,6-tetramethylpiperidine
M166	Acetyl-DL-Valine
M167	Arg-Cys
M168	Chlorothricin
M169	Cholesterol 3-sulfate
M170	Cinchonine
M171	Cylindrospermopsin
M172	Diffractaic acid
M173	Digalacturonic acid
M174	Erucifoline
M175	Gemcitabine
M176	Indole-2-carboxylic acid
M177	Jasmine lactone

M178	Kendomycin
M179	N-Stearoylsphingosine (Ceramide C18)
M180	Nocardamine
M181	Phthalic acid Mono-2-ethylhexyl Ester
M182	Rabelomycin
M183	Secoisolariciresinol diglucoside
M184	Thalsimidine