

Supplementary Materials

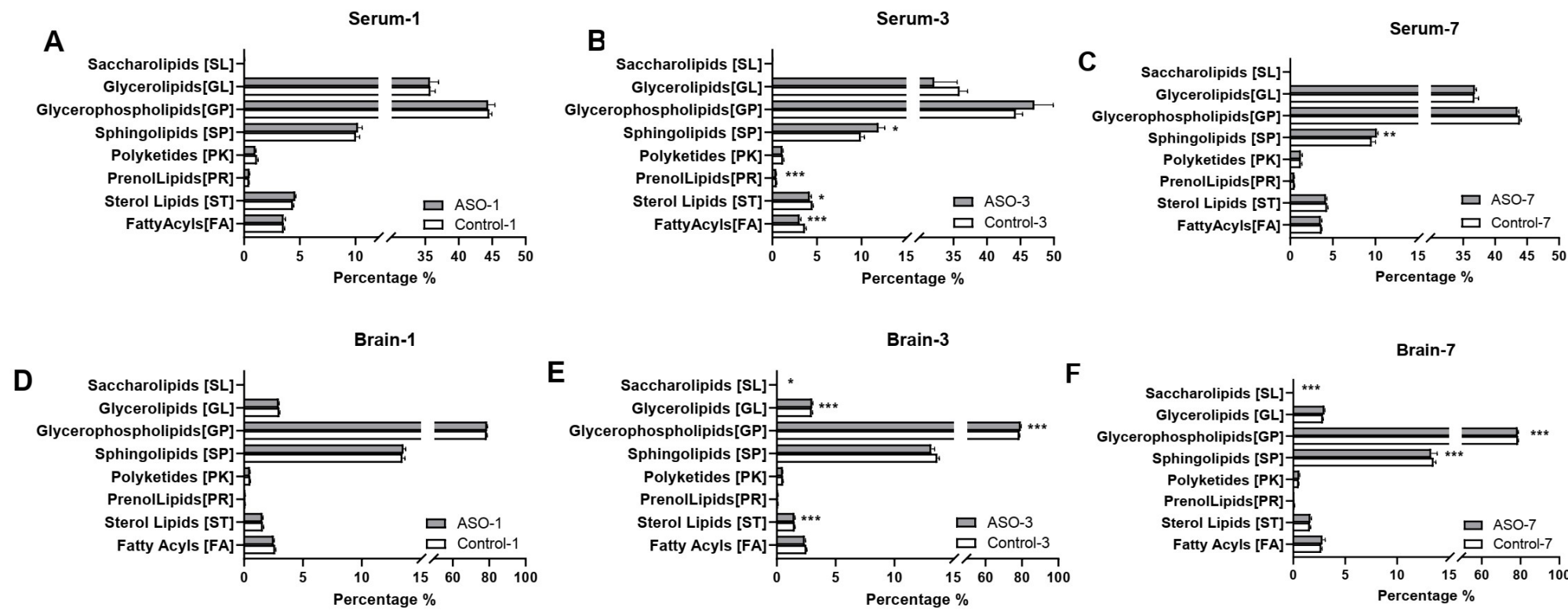


Figure S1. Lipid composition changes in serum and brain after ASO supplementation for different days. (A) The composition of serum or brain lipids after ASO supplementation on the 1st (A, D), 3rd (B, E), and 7th (C, F) days. Compared to the control, * indicates a P -value < 0.05 , **, P -value < 0.01 and ***, P -value < 0.001 .

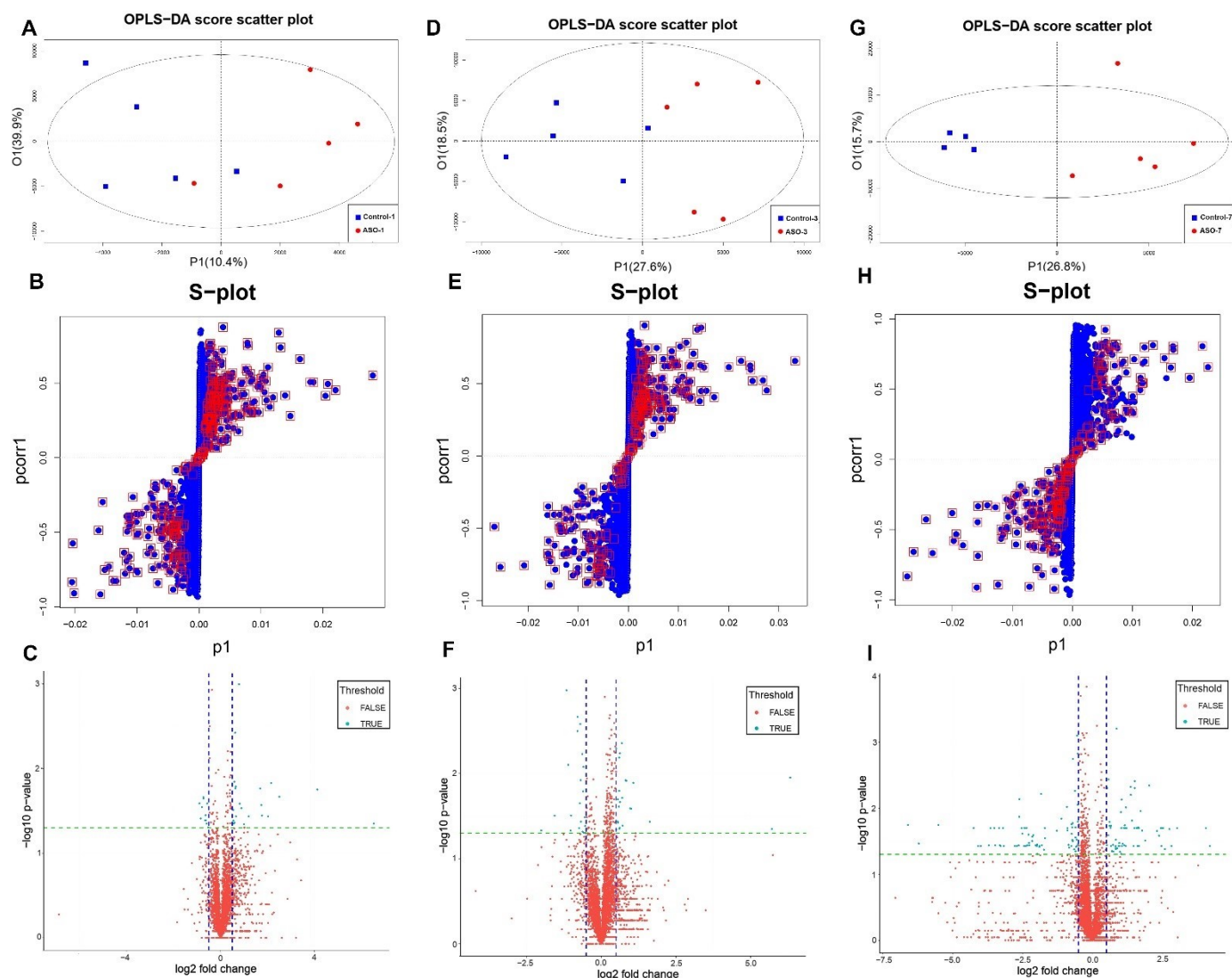


Figure S2. Feature selection of brain based on multivariate analysis of ASO supplementation on the 1st (A-C), 3rd (D-F) and 7th (G-I) days. (A, D, G) OPLS-DA score scatter plot of brain lipidomics. (B, E, H) S-plot for brain metabolites selection based on covariant and correlation. p1: covariance of projection-based OPLS-DA model, pcorr1: correlation of projection-based OPLS-DA model (C, F, I) Volcano plots showing both the *P*-value and fold change of metabolites. In volcano figures, TRUE (blue) represents the metabolite that matched the filter criteria, and FALSE (red) represents the metabolite that did not match the filter criteria.

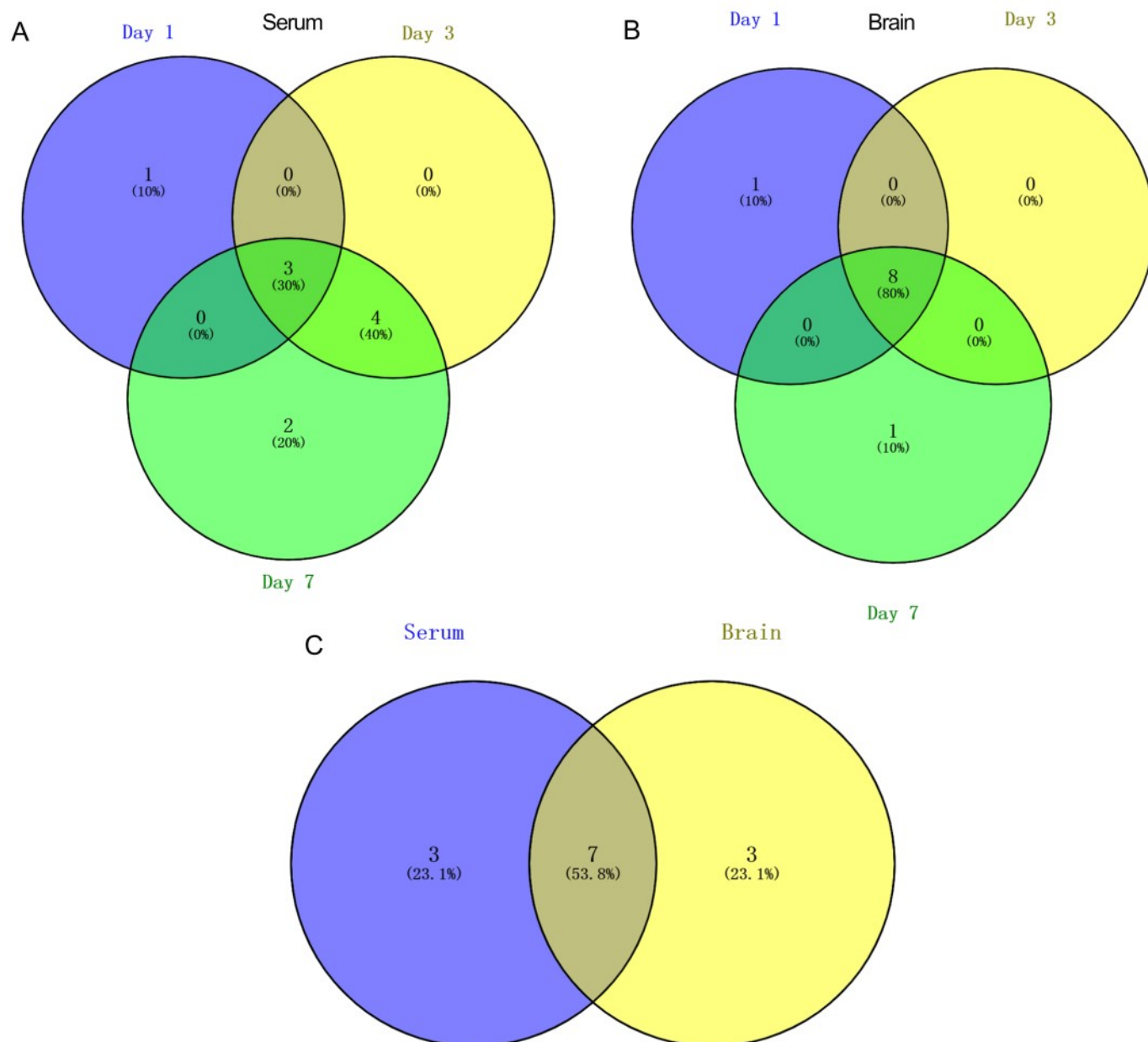


Figure S3. Venn diagram application on Pathway analysis in serum (A) and brain (B) on the 1st, 3rd, 7th day, and all pathways in serum and brain (C).

Table S1. Nutrition information of ASO

Nutrition information	per 100 g	NRV%
Energy	3700 KJ	44
Protein	0 g	0
Fat	100 g	167
——Saturated fatty acid	8 g	40
——Monounsaturated fatty acid	54 g	
——Polyunsaturated fatty acid	38 g	
Cholesterol	0 mg	0
Carbohydrate	0 g	0
Sodium	0 g	0

Table S2. Summary of lipid biomarkers in serum.

M/Z	Significant Metabolites	Fold change (ASO /Control)	<i>P</i>	VIP	Time
10.25_797.6552m/z	SM(d17:1/24:1)	1.617	0.0002	5.966	3rd day
12.87_647.6197n	Cer(d18:1/24:1(15Z))	2.070	0.0005	5.265	3rd day
10.25_797.6552m/z	SM(d17:1/24:1)	1.404	4.73E-05	5.525	7th day
11.08_854.6729m/z	GalCer(d18:1/24:1(15Z))	1.520	0.0163	1.360	7th day
12.87_647.6197n	Cer(d18:1/24:1(15Z))	1.683	0.0068	4.373	7th day

Table S3. Summary of lipid biomarkers in brain.

M/Z	Significant Metabolites	Fold change (ASO /Control)	P	VIP	Time
10.60_842.6081m/z	PC(O-18:0/22:5(7Z,10Z,13Z,16Z,19Z))	1.132	2.76E-07	5.056	1st day
12.73_730.5758m/z	PE(O-18:0/18:1(9Z))	1.230	2.76E-07	5.791	1st day
12.89_933.5417m/z	PI(22:4(7Z,10Z,13Z,16Z)/18:1(9Z))	0.803	0.0238	2.244	1st day
12.92_856.5142m/z	PE(22:6(4Z,7Z,10Z,13Z,16Z,19Z)/20:4(5Z,8Z,11Z,14Z))	1.659	0.0396	1.318	1st day
13.19_868.6887m/z	PC(22:1(13Z)/20:1(11Z))	1.086	0.0158	1.173	1st day
5.11_762.5084m/z	PE(16:0/20:3(8Z,11Z,14Z))	1.254	0.0396	5.661	1st day
5.94_819.5321m/z	LBPA(18:1(9Z)/18:1(9Z))	1.234	0.0476	1.658	1st day
6.52_830.4891m/z	PS(20:2(11Z,14Z)/18:3(9Z,12Z,15Z))	0.896	0.0079	1.021	1st day
11.95_774.6354m/z	PC(O-18:0/18:1(9Z))	1.428	0.0317	3.917	3rd day
12.31_729.5671n	PE(O-18:0/18:2(9Z,12Z))	1.227	0.0396	4.645	3rd day
13.36_843.6702n	PC(22:0/18:1(9Z))	1.243	0.0079	4.114	3rd day
6.32_784.5872m/z	PC(18:3(9Z,12Z,15Z)/18:0)	1.086	0.0317	1.305	3rd day
8.20_786.6030m/z	PE(21:0/18:2(9Z,12Z))	1.232	0.0158	4.654	3rd day
8.39_790.5614m/z	PS(18:1(9Z)/18:0)	1.147	0.0238	2.934	3rd day
8.74_744.5899m/z	PC(O-16:0/18:2(9Z,12Z))	1.350	2.76E-07	3.447	3rd day
9.12_746.6066m/z	PC(O-16:0/18:1(9Z))	1.167	0.0317	5.903	3rd day
9.48_702.5446m/z	PE(P-16:0/18:1(9Z))	1.183	0.0158	3.348	3rd day
10.12_772.5854m/z	PC(17:0/18:1(9Z))	1.126	2.76E-07	3.163	3rd day
10.26_868.6510m/z	PC(P-18:1(9Z)/22:2(13Z,16Z))	1.154	0.0079	1.582	3rd day
10.31_839.6480n	PC(20:2(11Z,14Z)/20:1(11Z))	1.136	0.0238	1.250	3rd day
12.25_728.5608m/z	PE(P-18:0/18:1(9Z))	1.222	0.0079	12.47	3rd day
12.73_730.5758m/z	PE(O-18:0/18:1(9Z))	1.279	2.76E-07	4.895	3rd day
13.19_756.5911m/z	PE(P-18:0/20:1(11Z))	1.279	0.0079	8.631	3rd day
13.30_914.6860m/z	PC(24:1(15Z)/18:1(9Z))	1.228	2.76E-07	3.475	3rd day
13.34_828.6481m/z	PC(21:0/18:1(9Z))	1.233	0.0079	1.376	3rd day
13.61_900.7107m/z	PC(P-18:1(9Z)/24:0)	1.183	2.76E-07	1.114	3rd day
13.79_916.7018m/z	PC(18:0/24:1(15Z))	1.273	2.76E-07	4.601	3rd day
5.06_807.4959m/z	PI(18:1(9Z)/14:0)	1.278	0.0476	6.579	3rd day
6.35_810.5294m/z	PS(18:2(9Z,12Z)/20:2(11Z,14Z))	1.140	2.76E-07	6.285	3rd day
7.52_698.5141m/z	PE(P-16:0/18:2(9Z,12Z))	1.226	2.76E-07	1.589	3rd day
8.05_863.5691m/z	PI(18:0/18:1(9Z))	1.142	2.76E-07	1.489	3rd day
8.30_701.5143m/z	PA(18:1(9Z)/18:0)	1.170	2.76E-07	2.437	3rd day
8.56_775.5482m/z	PG(18:1(9Z)/18:0)	1.077	2.76E-07	5.472	3rd day
9.41_700.5296m/z	PE(O-16:0/18:2(9Z,12Z))	1.260	2.76E-07	9.241	3rd day
9.53_726.5454m/z	PE(P-18:0/18:2(9Z,12Z))	1.192	0.0317	11.64	3rd day
9.96_842.5969m/z	PE(22:0/18:3(9Z,12Z,15Z))	1.117	0.0317	1.255	3rd day
4.80_876.5592m/z	PI(16:0/18:2(9Z,12Z))	0.871	0.0238	1.280	7th day
7.12_838.5698m/z	PC(18:2(9Z,12Z)/19:0)	0.895	0.0476	1.051	7th day
8.39_790.5614m/z	PS(18:1(9Z)/18:0)	0.752	2.76E-06	3.542	7th day
9.12_746.6066m/z	PC(O-16:0/18:1(9Z))	0.892	2.76E-06	4.518	7th day
1.04_509.2889m/z	PA(20:1(11Z)/0:0)	0.702	2.76E-06	1.093	7th day
11.56_910.6532m/z	PC(24:1(15Z)/18:3(9Z,12Z,15Z))	1.145	2.76E-06	1.026	7th day
11.85_759.6117n	PE(O-18:0/20:1(11Z))	0.838	2.76E-06	2.519	7th day
12.25_728.5608m/z	PE(P-18:0/18:1(9Z))	0.780	2.76E-06	10.29	7th day

12.73_730.5758m/z	PE(O-18:0/18:1(9Z))	0.760	2.76E-06	3.317	7th day
12.89_933.5417m/z	PI(22:4(7Z,10Z,13Z,16Z)/18:1(9Z))	1.604	0.0317	1.641	7th day
4.60_832.5140m/z	PS(22:6(4Z,7Z,10Z,13Z,16Z,19Z)/18:1(9Z))	0.831	2.76E-06	3.571	7th day
5.06_769.5040m/z	LBPA(16:0/18:1(9Z))	0.858	0.0158	7.268	7th day
5.06_807.4959m/z	PI(18:1(9Z)/14:0)	0.766	0.0079	6.855	7th day
5.11_796.5255n	PG(18:1(9Z)/20:4(5Z,8Z,11Z,14Z))	0.771	0.0238	6.118	7th day
5.99_834.5312m/z	PS(18:2(9Z,12Z)/22:4(7Z,10Z,13Z,16Z))	0.814	2.76E-06	8.438	7th day
6.35_810.5294m/z	PS(18:2(9Z,12Z)/20:2(11Z,14Z))	0.840	2.76E-06	6.487	7th day
7.72_838.5613m/z	PE(22:4(7Z,10Z,13Z,16Z)/18:1(9Z))	0.815	2.76E-06	6.875	7th day
8.30_701.5143m/z	PA(18:1(9Z)/18:0)	0.816	2.76E-06	1.905	7th day
8.56_775.5482m/z	PG(18:1(9Z)/18:0)	0.899	2.76E-06	6.307	7th day
9.41_700.5296m/z	PE(O-16:0/18:2(9Z,12Z))	0.855	0.0396	5.883	7th day
4.80_876.5592m/z	PI(16:0/18:2(9Z,12Z))	0.871	0.0238	1.280	7th day
7.12_838.5698m/z	PC(18:2(9Z,12Z)/19:0)	0.895	0.0476	1.051	7th day
