Electronic Supplementary Material (ESI) for Food & Function.

Supplementary Materials

Table S1 Primers information

Primer Name	Sequence (5'-3')
β-actin	F-5'--CCTTCCAGCAGATGTGGATCA-3'
	R-5'--CTCAGTAACAGTCCGCCTAGAA-3'
Ghrl	F-5'--GAAAGGAATCCAAGAAGCCACC-3'
	R-5'--GGAGCATTGAACCTGATTTCCA-3'
Pcsk1	F-5'--AGCTGGACCTTCATGTGATACC-3'
	R-5'--GCTAGCCTCTGGATCATAGTTGG-3'
Goat	F-5'--GTGCTGGTCTGTAATGGTGA-3'
	R-5'--GCAATGATGAGTTGGGTATG-3'
Agrp	F-5'--CTTTGGCGGAGGTGCTAGAT-3'
	R-5'--TGCGACTACAGAGGTTCGTG-3'
Npy	F-5'--TAGGTAACAAGCGAATGGG-3'
	R-5'--GAGATAGAGCGAGGGTCAG-3'
Pomc	F-5'--ACCTCACCACGGAAAGCAAC-3'
	R-5'--TCAGTCAAGGGCTGTTCATCTC-3'

Table S2 Differential metabolites between the ABA and FR group

Name	P-values	VIP values
2,4-di-tert-Butylphenol	0.00082	2.025914566
3-(4-Hydroxyphenyl)propionic acid	1.10E-05	2.421638491
3-Hydroxybutyric acid	0.007081	1.786648881
3-Methylsalicylic acid	0.006801	1.777759996
3-Phenyllactic acid	0.04162	1.363420845
4-Chlorophenol	0.018626	1.58541271
4-Ethylphenol	0.000314	2.156005781
4-Hydroxybenzaldehyde	0.031694	1.421736909
4-Phenylbutyric acid	0.041417	1.379175701
5-Hydroxyindole-3-acetic acid	0.00341	1.888700121
5-Hydroxylysine	0.027473	1.514478035
6-Gingerol	0.036999	1.381499671
8Z,11Z,14Z-Eicosatrienoic acid	0.021618	1.564966198
Acetylcholine	0.018224	1.482932919
Anandamide (AEA)	0.00131	1.98777474
Arachidonic acid	0.0288	1.527726028
Aspartylphenylalanine	0.026023	1.553896776
Azelaic acid	3.02E-06	2.483185446
Bilirubin	0.01034	1.687725373
Caffeic acid	0.014569	1.553846523
Carvedilol	0.010412	1.652928119
Chlorogenic acid	0.031019	1.487720269
Cholic acid	0.000455	2.084105753
Choline	0.000163	2.253260773
cis,cis-Muconic acid	0.018079	1.565359294
Creatine	0.000326	2.126632824
D-Carnitine	2.06E-05	2.387324875
Dodecanedioic acid	0.008352	1.669472796
Gabapentin	0.00123	1.989908178
Guanidinosuccinic acid	0.028934	1.461618301
Hexadecanamide	0.009218	1.73751955
Hexadecanedioic acid	0.018685	1.546448536
Hexanoylcarnitine	0.002826	1.81932675
Hypoxanthine	0.012633	1.611301722
Isoleucine	0.047159	1.388755156
Linoleoyl ethanolamide	0.033299	1.445790709
L-Saccharopine	0.028907	1.422362598
L-Threonine	0.033817	1.44397619
L-Tyrosine	0.017027	1.609856766
Myristic acid	2.79E-05	2.354983988
N-Acetylalanine	0.000803	2.078879229

N-Acetyl-L-methionine	0.01352	1.632567965
Palmitoylcarnitine	0.004094	1.84142905
Penbutolol	0.000635	2.068159767
Pentadecanoic acid	9.31E-05	2.257620068
Perindopril	0.000615	2.117114699
Phenylacetaldehyde	0.000746	2.065828624
Pipecolic acid	0.039574	1.426534804
Suberic acid	0.014412	1.606196815
Tetradecanedioic acid	0.001143	1.958864709
Thiamine	0.038795	1.41924004
Tridecylic acid	0.005539	1.732218932
Tyrosol	4.10E-05	2.34312349
Uracil	0.00372	1.838373878
Uric acid	0.033374	1.409524046
Vitamin E Acetate	0.032094	1.451070232
Xanthine	0.016959	1.548638037

Table S3 Differential metabolites between the ABA and ABA+P group

Name	P values	VIP values
3,5-Dihydroxybenzoic acid	0.007064	2.176553
3-tert-Butyladipic acid	0.041745	1.78273
4-Chlorophenol	0.038747	1.758657
4-Ethylphenol	0.041599	1.739441
5-Hydroxylysine	0.02463	1.819797
6-Gingerol	0.019327	1.885859
8Z,11Z,14Z-Eicosatrienoic acid	0.04984	1.689328
Anandamide (AEA)	0.024609	1.905776
Bilirubin	0.036426	1.712416
Cafestol	0.045623	1.700934
Chlorogenic acid	0.029052	1.888062
Fluoxetine	0.022101	1.924792
Gabapentin	0.000616	2.62333118
Glycyl-L-leucine	0.020155	1.917377
INH	0.009143	2.13192256
Leucylproline	0.021622	1.962753
Linoleic Acid	0.041779	1.794814
Linolenic Acid	0.039819	1.806837
L-Saccharopine	0.041971	1.652961
Methionine	0.003603	2.30559178
N6-Methyladenine	0.022864	1.870709
Penbutolol	0.0429	1.736262
Phenylacetaldehyde	0.036367	1.82244
Tyrosol	0.00443	2.3677183
Valylproline	0.021764	1.916081

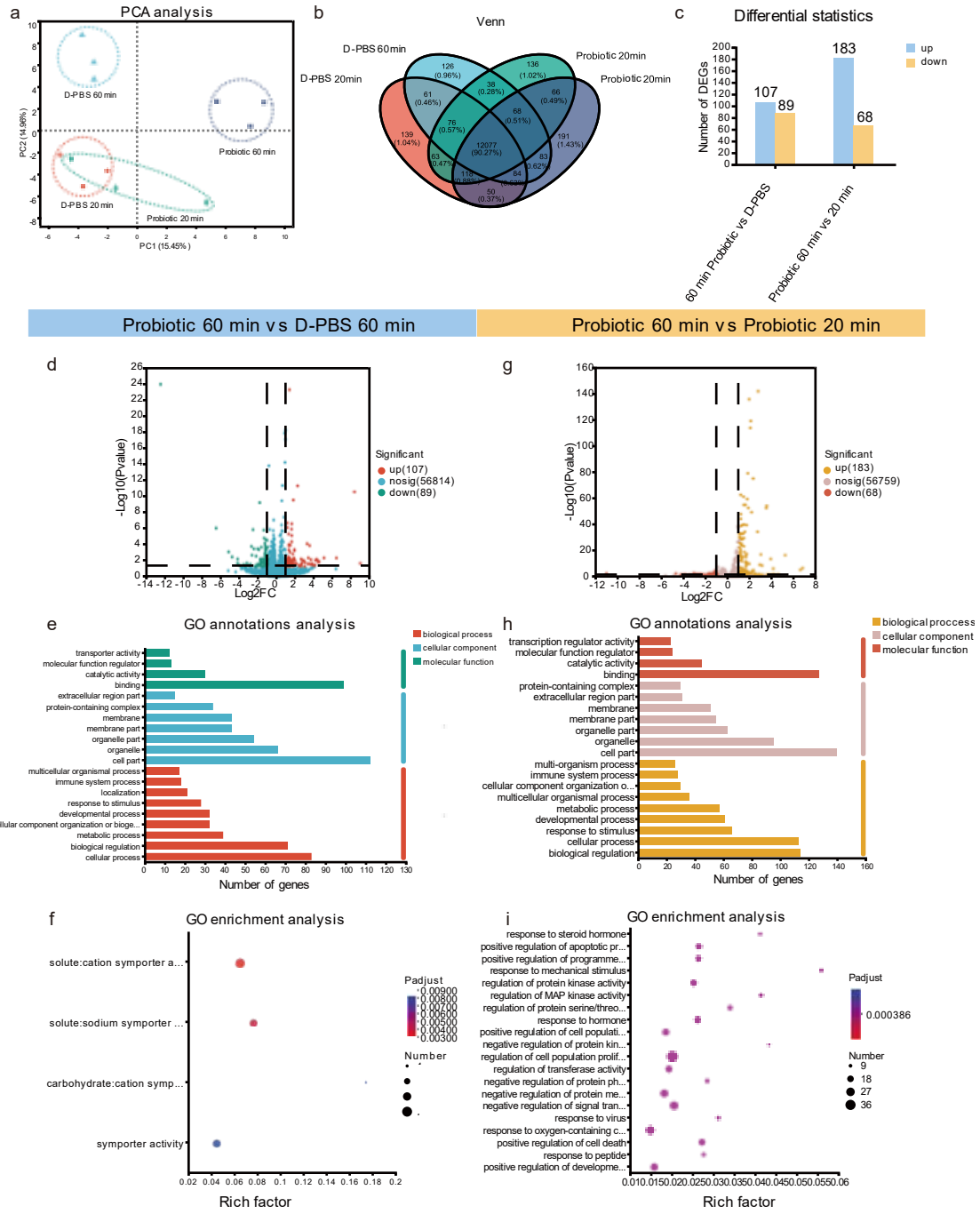

Figure S1. RNA-Seq analysis of probiotic intervention in intestinal organoids.

Intestinal organoids were subjected to a 20-minute and 60-minute exposure to both D-PBS and fermented supernatant, followed by collection for RNA sequencing. (a) PCA (Principal Component Analysis). (b) Venn analysis. (c) Differential expression statistics. (d) Volcano plot illustrating differential expression for the 60-minute probiotic and D-PBS intervention. (e) Gene Ontology (GO) annotations analysis for the 60-minute probiotic and D-PBS intervention. (f) GO enrichment analysis for the 60-minute probiotic and D-PBS intervention. (g) Volcano plot showing differential expression for the probiotic intervention at 60 minutes compared to 20 minutes. (h) GO annotations analysis for comparing 60-minute and 20-minute probiotic intervention. (i) GO enrichment analysis for comparing 60-minute and 20-minute probiotic intervention. Genes with $p < 0.05$ and FC > 2 are

identified as differentially expressed genes.

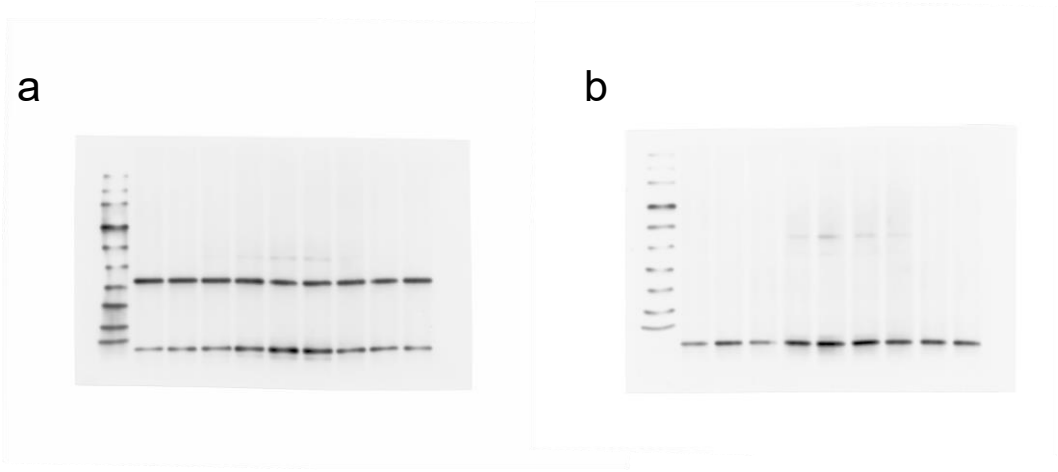

Figure S2. Protein expression of AgRP and NPY.