HPLC details

Appendix 1. Calibrators Preparation

Calibrator	Concentration	Preparation
1	0.5 mM	10 μL of 0.05 M working solution + 950 μL HPLC water
2	1 mM	20 μL of 0.05 M working solution + 950 μL HPLC water
3	2.5 mM	50 μL of 0.05 M working solution + 950 μL HPLC water
4	5 mM	10 μL of 0.5 M working solution + 950 μL HPLC water
5	10 mM	20 μL of 0.5 M working solution + 950 μL HPLC water
6	25 mM	50 μL of 0.5 M working solution + 950 μL HPLC water
7	50 mM	10 μL of stock solution + 950 μL HPLC water

Appendix 2. Mobile Phase Transition Program by Gradient Method

| Time (min)	MF* A (%)	MF* B (%)	Flow Rate(mL/min)
0.0	100		1.25
8.0	100		1.25
8.5	80	20	1.25
13.0	80	20	1.25
13.5	100		1.25
18.0	100		1.25

*MF: mobile phase

Butyrate

Appendix 3. Intergroup Comparison Test of Butyrate Levels and Statistical Characteristics of Each Group

Group A	Group B	Lower Limit	A-B	Upper Limit	P-Value
NDC	DC	1.2166	4.6723	8.1281	0.01077
NDC	CET	0.30389	3.7597	7.2154	0.033717
NDC	HIIT	-2.4848	0.971	4.4268	0.80549
DC	CET	-4.3684	-0.91267	2.5431	0.83165
DC	HIIT	-7.1571	-3.7013	-0.24556	0.036351
CET	HIIT	-6.2444	-2.7887	0.66711	0.11952

	Aver.	STD	SE
NDC	11.731	1.785756	1.031006
DC	7.058667	0.448171	0.258752
CET	7.971333	0.371927	0.214732
HIIT	10.76	1.859866	1.073794
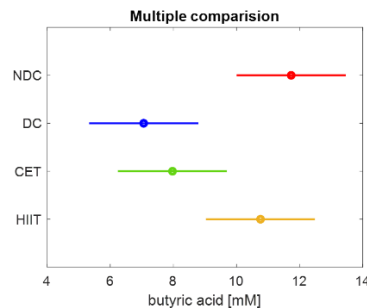
Appendix 4. Analysis of Exercise Intervention Effects on Cecal Butyrate Concentration via One-Way ANOVA

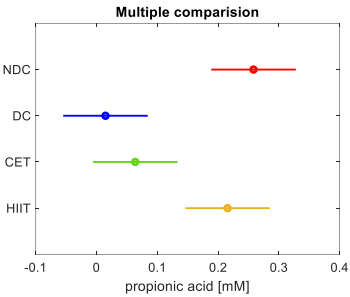| Source	SS	df	MS	F	Prob>F
Columns	44.4136	3	14.8045	8.48	0.0073
Error	13.9744	8	1.7468		
Total	58.388	11			

Note: The ANOVA table shows the between-groups variation (Columns) and within-groups variation (Error). SS is the sum of squares, and df is the degrees of freedom. The total degrees of freedom is total number of observations minus on. The between-groups degrees of freedom is number of groups minus one. The within-groups degrees of freedom is total degrees of freedom minus the between groups degrees of freedom. MS is the mean squared error, which is SS/df for each source of variation. The F-statistic is the ratio of the mean squared errors. The p-value is the probability that the test statistic can take a value greater than the value of the computed test statistic. The small p-value indicates that differences between column means are significant.

propionate

Appendix 5. Intergroup Comparison Test of Propionate Levels and Statistical Characteristics of Each Group

Group A	Group B	Lower Limit	A-B	Upper Limit	P Value
NDC	DC	0.10459	0.24367	0.38275	0.0022492
NDC	CET	0.055586	0.19467	0.33375	0.0088414
NDC	HIIT	-0.96414	0.042667	0.18175	0.76316
DC	CET	-0.18808	-0.049	0.09008	0.68377
DC	HIIT	-0.34008	-0.201	-0.06192	0.0073412
CET	HIIT	-0.29108	-0.152	-0.01292	0.032981

	Aver.	STD	SE	
NDC	0.258333	0.044859	0.025899	
DC	0.014667	0.005033	0.002906	
CET	0.063667	0.067099	0.03874	
HIIT	0.215667	0.069118	0.039905	

Appendix 6. Analysis of Exercise Intervention Effects on Cecal Propionate Concentration via One-Way ANOVA

Source	SS	df	MS	F	Prob>F
Columns	0.12375	3	0.04125	14.58	0.0013
Error	0.02263	8	0.00283		
Total	0.14638	11			

Note: The ANOVA table shows the between-groups variation (Columns) and within-groups variation (Error). SS is the sum of squares, and df is the degrees of freedom. The total degrees of freedom is total number of observations minus on. The between-groups degrees of freedom is number of groups minus one. The within-groups degrees of freedom is total degrees of freedom minus the between groups degrees of freedom. MS is the mean squared error, which is SS/df for each source of variation. The F-statistic is the ratio of the mean squared errors. The p-value is the probability that the test statistic can take a value greater than the value of the computed test statistic. The small p-value indicates that differences between column means are significant.