

Table S1. The major composition of high fat diet

high fat diet Components	g	kcal	high fat diet	mass ratio g%	energy ratio kcal%
casein	258.45	1033.80	protein	26	20
cysteine	3.88	15.52	carbohydrates	26	20
maltodextrin	161.53	646.12	fat	35	60
sucrose	88.91	355.64	total		100
cellulose	64.61	0	kcal/g	5.24	
soybean oil	32.31	290.79			
lard	316.60	2849.40			
mineral mixture M1002	12.92	0			
monocalcium phosphate	16.80	0			
calcium carbonate	7.11	0			
potassium citrate	21.32	0			
vitamin mixture V1001	12.92	51.68			
bitartrate	2.58	0			
choline					
edible blue dye	0.065	0			
total	1000	5242.95			

Table S2. The major composition of maintenance diet

Maintenance Diet		Nutritional guarantees	
Components			
Protein source	soybean meal, fishmeal	Water%	≤ 10.0
Fat source	vegetable oil	Crude protein%	≥ 18.0
Fiber source	rice husk	Crude fat%	≥ 4.0
Carbohydrate source	corn, secondary flour	Crude fiber%	≤ 5.0
Vitamins	VA,VD,VE,VB1,VB2,VB6,p antothenic acid, etc.	Crude ash%	≤ 8.0
Minerals	monocalcium phosphate, etc.	Calcium%	1.0 ~ 1.8
		Phosphorus%	0.6 ~ 1.2

Table S3. Related gene primer sequences

Gene	Forward nucleotide sequence primers (5'-3')	Reverse nucleotide sequence primers (5'-3')
<i>Occludin</i>	GTGGATCCCCAGGAGGCTAT	CGGTCCATCTTTCTTCGGGT
<i>Claudin1</i>	GCTGTCATCGGGGGCATAAT	CACTAATGTCGCCAGACCTGAA
<i>ZO-1</i>	GCCAGCTTTAAGCCTCCAGA	TGGCTTCGCTTGAGGTTTCT
<i>MUC2</i>	CAATGAGACCTGGTGGCTGT	CCAGTGCAGTAGCAGTCACA
<i>MUC4</i>	CCTCCTCCTGCTACCTGTAAAT	CCATCGGTGATGCTTGTCT
<i>TNF-α</i>	GTGGAAGTGGCAGAAGAGGCA	AGAGGGAGGCCATTTGGGAAC
<i>PI3K</i>	AGGCATACCCTAAACTATTCAGC	TGCATGGTTAAGCCAACATCC
<i>AKT</i>	ATGTGGATCAGCGAGAGTCC	GCAGCGGATGATAAAGGTGT
<i>NF-κB</i>	GGCCCCGATGAGTACTTGG A	CTTGTTGAGCTGCAAGGGATGC
<i>β-actin</i>	GGCTGTATTCCCTCCATCG	CCAGTTGGTAACAATGCCATG

Table S4. Group differences OPL-SD model parameter table

Model	R ² X	R ² Y	Q ²
Pos CON <i>vs</i> T2DM	0.683	0.991	0.806
Neg CON <i>vs</i> T2DM	0.649	0.995	0.836
Pos T2DM <i>vs</i> SUC	0.56	0.94	0.738
Neg T2DM <i>vs</i> SUC	0.616	0.998	0.745
Pos T2DM <i>vs</i> MOG	0.682	0.998	0.892
Neg T2DM <i>vs</i> MOG	0.673	0.998	0.894
Pos T2DM <i>vs</i> ST	0.618	0.998	0.828
Neg T2DM <i>vs</i> ST	0.646	0.997	0.824
Pos T2DM <i>vs</i> TGS	0.652	0.998	0.697
Neg T2DM <i>vs</i> TGS	0.399	0.97	0.729
Pos T2DM <i>vs</i> ERT	0.652	0.992	0.751
Neg T2DM <i>vs</i> ERT	0.603	0.997	0.722

Note: CON group, control group; T2DM group, type 2 diabetes mellitus group; SUC group, sucrose group; MOG group, mogroside V group; ST group, stevioside group; TGS group, sucralose/4,1',6'-trichlorogalactosucrose group; ERT group, erythritol group. Pos, Positive mode; Neg, Negative mode.

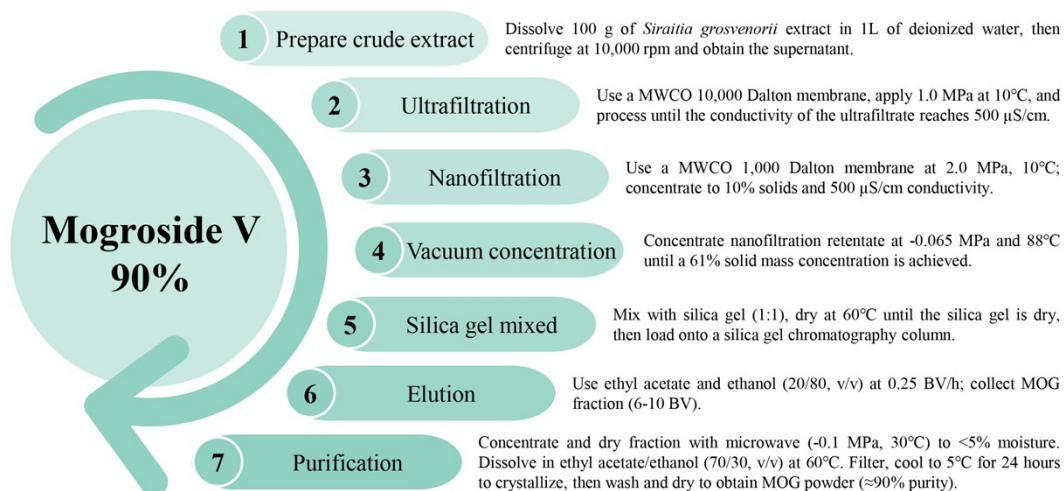


Figure S1. Mogroside V 90% Process Flow Diagram

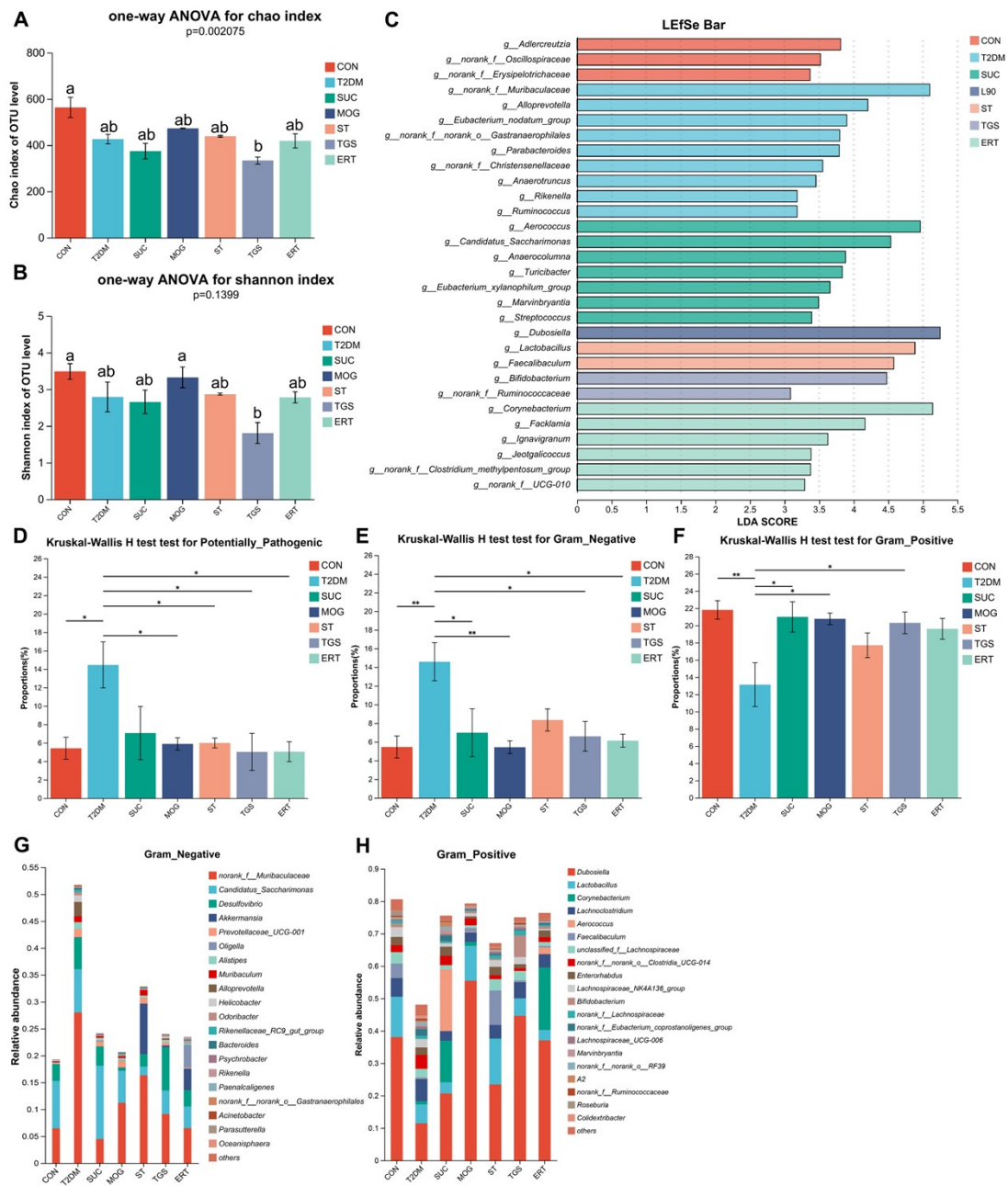


Figure S2. The effect of different sucrose substitutes on alpha indexes and bugbase analysis of gut microbiota in T2DM mice. **(A)** Chao index. **(B)** Shannon index. **(C)** LefSe discriminative bar plot. **(D)** Potentially_Pathogenic. **(E)** Gram_negative. **(F)** Gram_positive. **(G)** Bugbase contribution (Gram_Negative). **(H)** Bugbase contribution (Gram_positive). CON group, control group; T2DM group, type 2 diabetes mellitus group; SUC group, sucrose group; MOG group, mogroside V group; ST group, stevioside group; TGS group, sucralose/4,1',6'-trichlorogalactosucrose group; ERT group, erythritol group. * $p < 0.05$. ** $p < 0.01$. LefSe, linear discriminant analysis effect size.

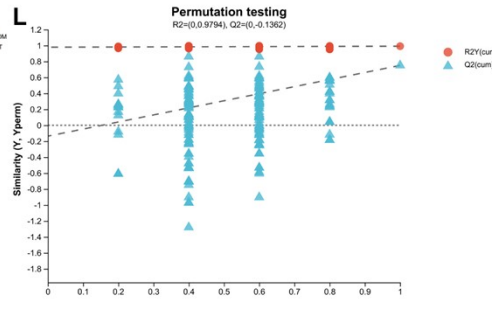
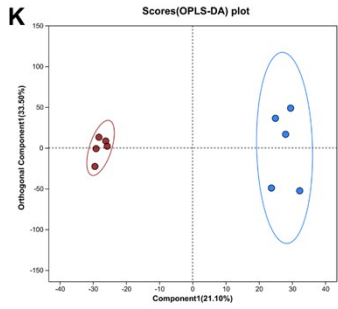
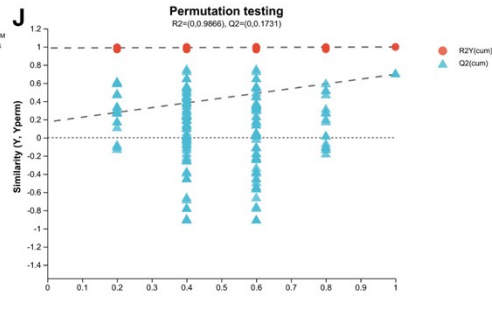
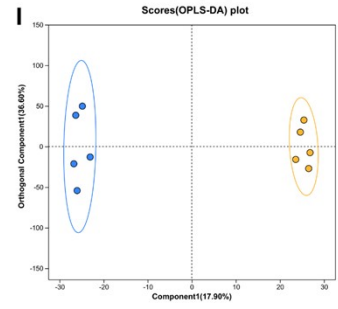
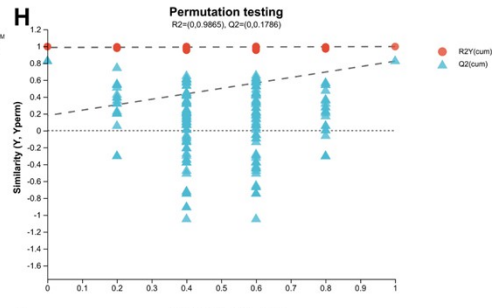
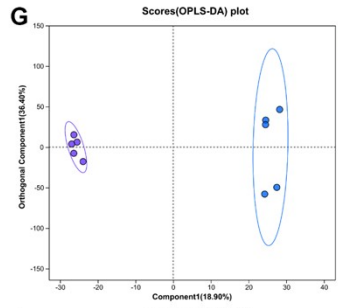
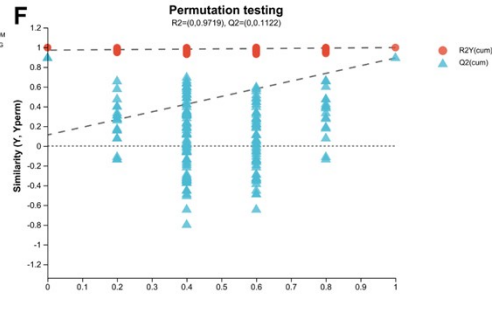
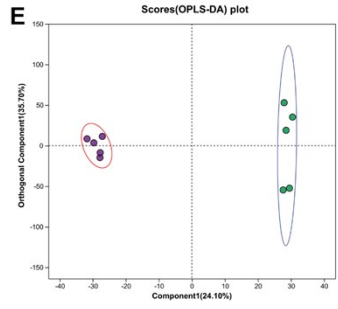
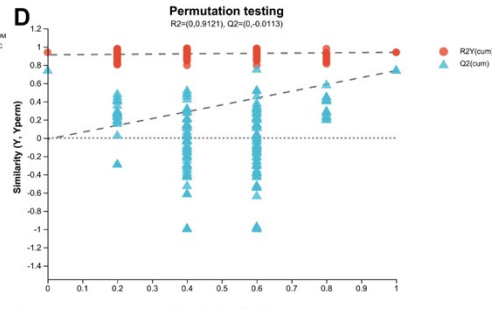
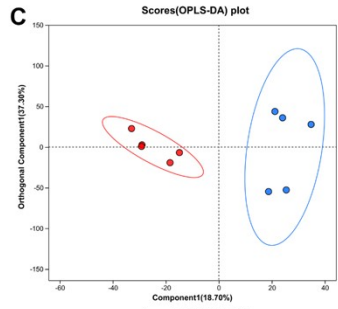
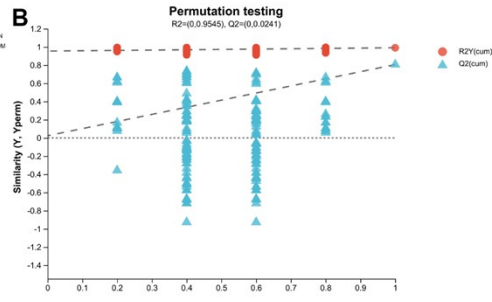
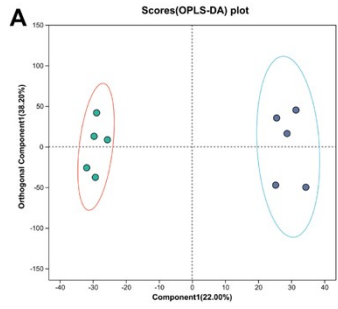


Figure S3. The effect of various sugar substitutes on the OPLS-DA model of cationic colonic contents in T2DM mice. OPLS-DA score plots **(A)** CON vs. T2DM. **(C)** T2DM vs. SUC. **(E)** T2DM vs. MOG. **(G)** T2DM vs. ST. **(I)** T2DM vs. TGS. **(K)** T2DM vs. ERT. 200 substitution test chart **(B)** CON vs. T2DM. **(D)** T2DM vs. SUC. **(F)** T2DM vs. MOG. **(H)** T2DM vs. ST. **(J)** T2DM vs. TGS. **(L)** T2DM vs. ERT. CON group, control group; T2DM group, type 2 diabetes mellitus group; SUC group, sucrose group; MOG group, mogroside V group; ST group, stevioside group; TGS group, sucralose/4,1',6'-trichlorogalactosucrose group; ERT group, erythritol group.

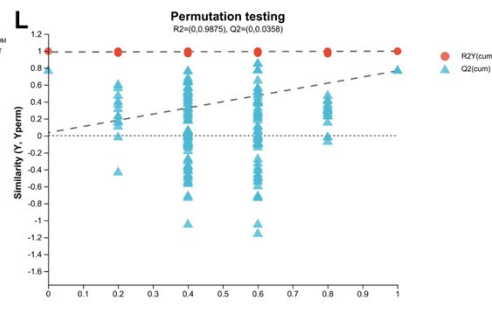
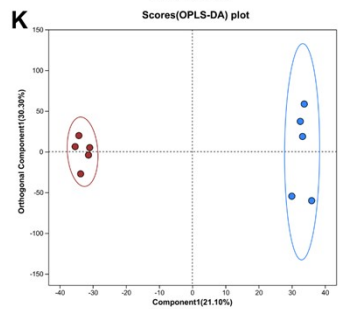
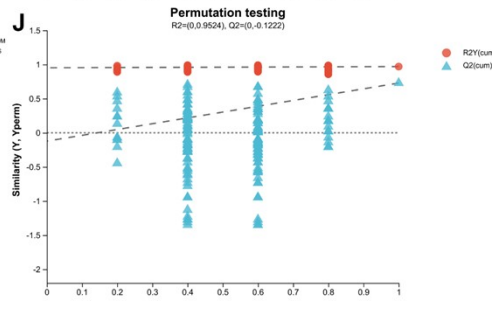
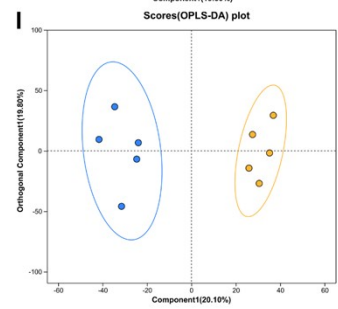
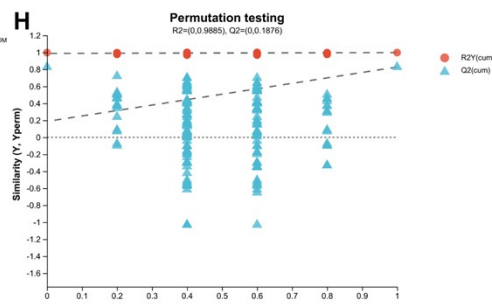
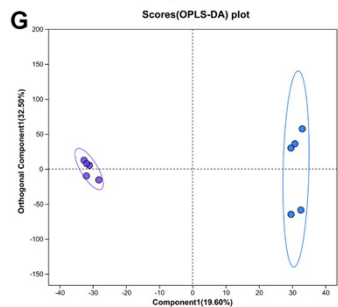
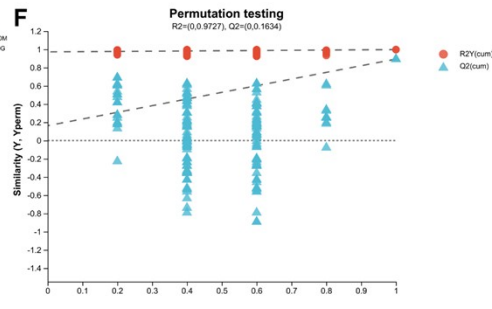
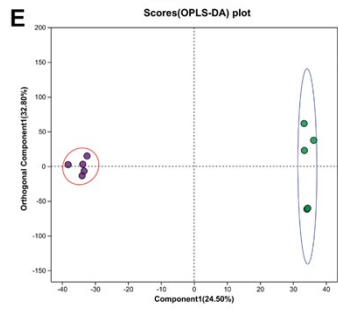
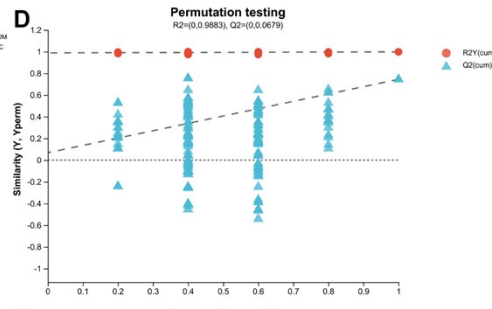
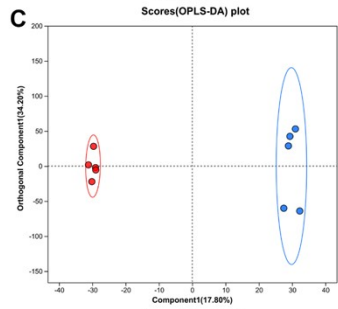
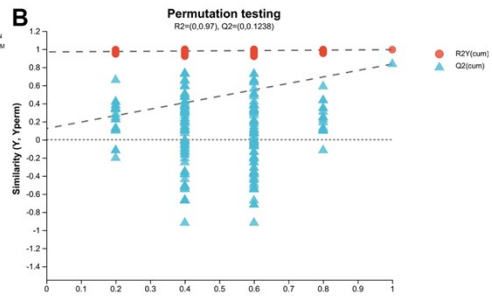
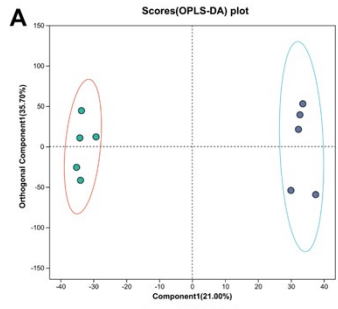


Figure S4. The effect of various sugar generations on OPLS-DA model of anions colonic contents in T2DM mice. OPLS-DA score plots **(A)** CON vs. T2DM. **(C)** T2DM vs. SUC. **(E)** T2DM vs. MOG. **(G)** T2DM vs. ST. **(I)** T2DM vs. TGS. **(K)** T2DM vs. ERT. 200 substitution test charts **(B)** CON vs. T2DM. **(D)** T2DM vs. SUC. **(F)** T2DM vs. MOG. **(H)** T2DM vs. ST. **(J)** T2DM vs. TGS. **(L)** T2DM vs. ERT. CON group, control group; T2DM group, type 2 diabetes mellitus group; SUC group, sucrose group; MOG group, mogroside V group; ST group, stevioside group; TGS group, sucralose/4,1',6'-trichlorogalactosucrose group; ERT group, erythritol group.