

Supplementary material

Table S1. Main bioactive peptides found in digested protein from chia seeds.

Peptide	Molecular mass (Da)	Potential biological activity	Sequence
NPGGGAPSGH	849.37	antiamnestic	PG
		ACE inhibitor	AP, GA, GH, GG, SG, PG
		antithrombotic	PG
		regulating	PG
HYGGPPGGCR	999.43	DPP-IV inhibitor	AP, GA, NP,GG
		antioxidative	GH, PG, PS
		antiamnestic	PG, GP
		ACE inhibitor	HY, YG, GP, GG, PG, YGG, GPP,PP
		antithrombotic	GP, PG
		immunomodulating	YG, YGG
LHNGGPPGGEY	999.43	regulating	GP, PG
		antioxidative	GPP
		DPP-IV inhibitor	GP,PP, PPG, GG, HY, PG, YG
		antiamnestic	GPGG, PG, GP
		ACE inhibitor	GP, GE, GG, NG, PG, EY
		antithrombotic	GP, PG, GPGG
DVNPGGPAPHPPWLSVNDL	1980.96	regulating	GP, PG, GPGG
		antioxidative	LH, LHN,GGE
		DPP-IV inhibitor	GP, EY, GE, GG, LH, NG, PG
		antiamnestic	PG, GP
		ACE inhibitor	GPA, GP, AP, GG, PG, PAP, PP, HP, PH, VNP, WL
		antithrombotic	GP, PG
TGPPRPALVFPHAVVP	1653.96	regulating	GP, PG
		antioxidative	PWL, PW
		DPP-IV inhibitor	GP, PP, AP, PA, HP, GPA, NP, WL, GG, ND, PG, PH, PW,SV
		antiamnestic	GP
		ACE inhibitor	VF, FP, PR, GP, RP, VP, TG, GPP, PP, PH, AV, TGP, AVV
		antithrombotic	GP
	stimulating	LV	
	regulating	GP	

		antioxidative inhibitor DPP-IV inhibitor	PHA, GPP PPRP GP, PP, PA, VP, VV, HA, FP, RP, AL, AV, LV, PH, TG, VR
NSSAQYSDPFLALH	1548.71	ACE inhibitor antioxidative Activating UBMP DPP-IV inhibitor	LA LH LA LA, FL, AL, DP, LH, PF, QY, YS
LPVFGGLAAEGNVVTYLH	1798.95	ACE inhibitor  neuropeptide antioxidative Activating UBMP DPP-IV inhibitor	VF, LAA, YL, LA, AA, GL, FG, EG YL LH, TY LA LA, LP, VV, GL, AA, AE, EG, LH, NV, PV, TY, VF, VT, YL
TPPGVGGFPWGGAMLGAQ	1698.91	antiamnestic ACE inhibitor  antithrombotic regulating antioxidative DPP-IV inhibitor	PG FP, GF, VG, GA, GV, WG, GG, LG, PG, PP, TP PG PG PWG, PW, WG PP, TP, FP, GA, PPG, WG, GF, GG, GV, ML, PG, PW, VG
APSPPVLGPP	930.52	antiamnestic ACE inhibitor  antithrombotic stimulating regulating antioxidative DPP-IV inhibitor	GP LGP, GP, AP, LG, GPP, PP GP VL GP GPP GP, PP, SP, VLGP, PS, PV, VL

Peptides sequenced by HPLC ESI-MS/MS with intensity at least 90%. Only sequences with antioxidative peptides (BIOPEP® database) are presented in the table. ACE inhibitor: angiotensin-converting-enzyme inhibitor; DPP IV inhibitor: dipeptidyl peptidase IV inhibitor; Activating UBMP: Activating ubiquitin-mediated proteolysis. Regulation: peptide regulating the stomach mucosal membrane activity. Stimulation: Stimulating vasoactive substance release or glucose uptake stimulating peptide. The amino acids are presented in one letter nomenclature.

1 **Table S2.** Sequencing data at the end of 8 weeks of treatment, according to each  
 2 experimental group.

Groups	Good's coverage	Raw	After filtering and		Normalized reads	
		Sequences	cleanup		Reads	OTUs
		Reads	Reads	OTUs	Reads	OTUs
AIN	0.9991 ±	174577 ±	92736 ±	286 ±	63108.56	286 ±
	0.0002	13417	9850.51	28.75	± 8.69	28.75
HF	0.9992 ±	167716 ±	91985.5 ±	275.9 ±	63115 ±	275,9 ±
	0.0002	8345	12153.81	37.05	7.32	37.05
AIN+DTP	0.9991 ±	169630 ±	85716.3 ±	272.1 ±	63106.9	272,1 ±
	0.0003	12472	10245.51	23.82	± 5.28	23.82
HF+DTP	0.9991 ±	167808 ±	80013.1 ±	272.9 ±	63110,1	272,9 ±
	0.0003	11758	10850.85	32.95	± 7.50	32.95

3 Values expressed as mean ± standard deviation, n=10 animals/group. AIN: normal diet  
 4 group; HF: high-fat diet group; AIN+DTP: Normal diet plus digested protein from chia  
 5 seed group; HF+DTP: high-fat diet plus digested protein from chia seed group; OUTs:  
 6 Operational Taxonomic Units.

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12 **Table S3.** Relative abundance of different taxonomic levels at the end of 8 weeks of  
 13 treatment, according to each experimental group.

Classification	Groups	AIN	HF	AIN+DTP	HF+DTP
		Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD
Phylum	Verrucomicrobiota_filo	2.44 $\pm$ 0.54 <sup>a</sup>	2.10 $\pm$ 0.65 <sup>a</sup>	1.63 $\pm$ 0.34 <sup>b</sup>	0.95 $\pm$ 0.28 <sup>c</sup>
	Desulfobacterota_filo	2.80 $\pm$ 0.65 <sup>bc</sup>	2.27 $\pm$ 0.52 <sup>c</sup>	2.93 $\pm$ 0.54 <sup>b</sup>	4.70 $\pm$ 1.50 <sup>a</sup>
	F_B_filo	6.15 $\pm$ 1.09 <sup>a</sup>	7.79 $\pm$ 1.29 <sup>a</sup>	6.14 $\pm$ 1.46 <sup>a</sup>	7.29 $\pm$ 1.82 <sup>a</sup>
Class	Verrucomicrobiae	2.44 $\pm$ 0.54 <sup>a</sup>	2.10 $\pm$ 0.65 <sup>a</sup>	1.63 $\pm$ 0.34 <sup>b</sup>	0.95 $\pm$ 0.28 <sup>c</sup>
	Desulfovibrionia	2.77 $\pm$ 0.59 <sup>bc</sup>	2.27 $\pm$ 0.52 <sup>bc</sup>	2.93 $\pm$ 0.54 <sup>b</sup>	4.70 $\pm$ 1.50 <sup>a</sup>
Order	Verrucomicrobiales	2.37 $\pm$ 0.57 <sup>a</sup>	2.10 $\pm$ 0.65 <sup>a</sup>	1.63 $\pm$ 0.34 <sup>b</sup>	0.95 $\pm$ 0.28 <sup>c</sup>
	Desulfovibrionales	2.77 $\pm$ 0.59 <sup>bc</sup>	2.27 $\pm$ 0.52 <sup>bc</sup>	2.93 $\pm$ 0.54 <sup>b</sup>	4.70 $\pm$ 1.50 <sup>a</sup>
Family	Atopobiaceae	0.74 $\pm$ 0.31 <sup>b</sup>	1.93 $\pm$ 0.49 <sup>a</sup>	1.48 $\pm$ 0.58 <sup>a</sup>	2.05 $\pm$ 0.79 <sup>a</sup>
	Akkermansiaceae	2.29 $\pm$ 0.64 <sup>a</sup>	2.10 $\pm$ 0.65 <sup>ab</sup>	1.63 $\pm$ 0.34 <sup>b</sup>	0.95 $\pm$ 0.28 <sup>c</sup>
	Desulfovibrionaceae	2.77 $\pm$ 0.59 <sup>b</sup>	2.27 $\pm$ 0.52 <sup>b</sup>	2.93 $\pm$ 0.54 <sup>b</sup>	4.70 $\pm$ 1.50 <sup>a</sup>
	Rikenellaceae	0.79 $\pm$ 0.25 <sup>c</sup>	1.06 $\pm$ 0.27 <sup>b</sup>	1.36 $\pm$ 0.26 <sup>a</sup>	1.45 $\pm$ 0.29 <sup>a</sup>
Genera	<i>Olsenella</i>	0.66 $\pm$ 0.25 <sup>c</sup>	1.25 $\pm$ 0.23 <sup>a</sup>	1.00 $\pm$ 0.28 <sup>b</sup>	1.30 $\pm$ 0.23 <sup>a</sup>
	<i>Dubosiella</i>	1.38 $\pm$ 0.46 <sup>b</sup>	3.27 $\pm$ 2.59 <sup>a</sup>	5.03 $\pm$ 1.89 <sup>a</sup>	4.89 $\pm$ 1.09 <sup>a</sup>
	<i>Roseburia</i>	0.35 $\pm$ 0.03 <sup>a</sup>	0.37 $\pm$ 0.05 <sup>a</sup>	0.14 $\pm$ 0.17 <sup>b</sup>	0.04 $\pm$ 0.11 <sup>b</sup>
	<i>Akkermansia</i>	2.29 $\pm$ 0.64 <sup>a</sup>	2.10 $\pm$ 0.65 <sup>ab</sup>	1.63 $\pm$ 0.34 <sup>b</sup>	0.95 $\pm$ 0.28 <sup>c</sup>
	<i>Oscillospiraceae_unclassified</i>	1.10 $\pm$ 0.54 <sup>b</sup>	0.77 $\pm$ 0.32 <sup>b</sup>	0.78 $\pm$ 0.29 <sup>b</sup>	1.76 $\pm$ 0.51 <sup>a</sup>
	<i>Alistipes</i>	0.79 $\pm$ 0.25 <sup>c</sup>	0.90 $\pm$ 0.20 <sup>b</sup>	1.07 $\pm$ 0.15 <sup>ab</sup>	1.18 $\pm$ 0.13 <sup>a</sup>

14 Values expressed as mean  $\pm$  standard deviation, n=10 animals/group. AIN: normal diet

15 group; HF: high-fat diet group; AIN+DTP: Normal diet plus digested protein from chia

16 seed group; HF+DTP: high-fat diet plus digested protein from chia seed group.

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