Effects of Collagen Hydrolysates on UV-induced Photoaging Mice: Gly-Pro-Hyp as a Potent Anti-photoaging Peptide

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Table S1. MRM Transitions in Identification and Quantification of Peptides in Rats Plasma

| Amino acid and peptides	Q1/(m/z)	Precursor type	Q3/(m/z)	DP/V	CE/V
Hyp	132.1	$[M+H]^+$	86.1	30	20
Leu-Hyp	245.1	$[M+H]^+$	132.1	53	19
Phe-Hyp	279.1	$[M+H]^+$	132.1	67	20
Pro-Hyp	229.1	$[M+H]^+$	132.1	47	18
Hyp-Gly	189.1	$[M+H]^+$	86.1	50	22
Gly-Pro-Hyp	286.1	$[M+H]^+$	127.1	70	22
Ala-Hyp-Gly	260.1	$[M+H]^+$	189.1	45	18
Leu-Hyp-Gly	302.2	$[M+H]^+$	189.1	66	22
Ser-Hyp-Gly	276.1	$[M+H]^+$	189.1	48	20

Notes: Q1, Q3, DP, and CE represent the precursor ion, the product ion, the declustering potential, and the collision energy, respectively. Peptide sequences are abbreviated with the three-letter amino acid code. Hyp represents hydroxyproline.

Table S2. Free Amino Acid Composition of the Collagen Hydrolysates with Lower Content of Gly-Pro-Xaa Tripeptides (LCH) and Higher Content of Gly-Pro-Xaa Tripeptides (HCH)

Amino acid	LCH (mg/g)	HCH (mg/g)
Aspartic acid (Asp)	1.54±0.21	0.19±0.01
Threonine (Thr)	8.16±0.51	0.15±0.01
Serine (Ser)	4.34±0.01	0.57±0.04
Glutamic acid (Glu)	2.87±0.35	0.46±0.05
Glycine (Gly)	11.9±0.47	0.15±0.01
Alanine (Ala)	17.42±0.41	2.61±0.01
Cysteine (Cys)	1.1±0.34	Not detected
Valine (Val)	11.2±0.19	2.54±0.08
Methionine (Met)	5.89±0.29	4.1±0.17
Isoleucine (Ile)	9.15±0.25	0.1±0.01
Leucine (Leu)	13.6±0.14	11.29±0.16
Phenylalanine (Phe)	29.22±0.84	25.82±0.97
Lysine (Lys)	8.71±0.18	6.36±0.43
Histidine (His)	2.96±0.32	6.06±0.32
Arginine (Arg)	23.1±0.34	1.02±0.08
Proline (Pro)	1.47±0.27	0.4±0.05
Total	**152.64±5.12**	**61.82±2.22**

Table S3. Targets Enriched in the Pathways with Top 10 -Log(P Value) in KEGG

Pathway Analysis

Pathway	-Log(P Value)	Count	Targets
Apoptosis	7.812081	8	JUN, CASP8, CTSL, CASP3, GZMB, FOS, CTSD, CTSB
IL-17 signaling pathway	5.685795	6	JUN, CASP8, CASP3, MMP3, FOS, PTGS2
TNF signaling pathway	5.271478	6	JUN, CASP8, CASP3, MMP3, FOS, PTGS2
Pathways in cancer	3.857512	8	ITGB1, CCNA2, JUN, CASP8, CASP3, MMP2, FOS, PTGS2
Estrogen signaling pathway	3.572739	5	JUN, MMP2, PRKCD, FOS, CTSD
Hepatitis B	3.307209	5	CCNA2, JUN, CASP8, CASP3, FOS
Pertussis	3.148507	4	ITGB1, JUN, CASP3, FOS
Leishmaniasis	3.131903	4	ITGB1, JUN, FOS, PTGS2
Kaposi sarcoma-associated herpesvirus infection	3.012531	5	JUN, CASP8, CASP3, FOS, PTGS2
Pathogenic Escherichia coli infection	2.987651	5	ITGB1, JUN, CASP8, CASP3, FOS

(A)

(B)
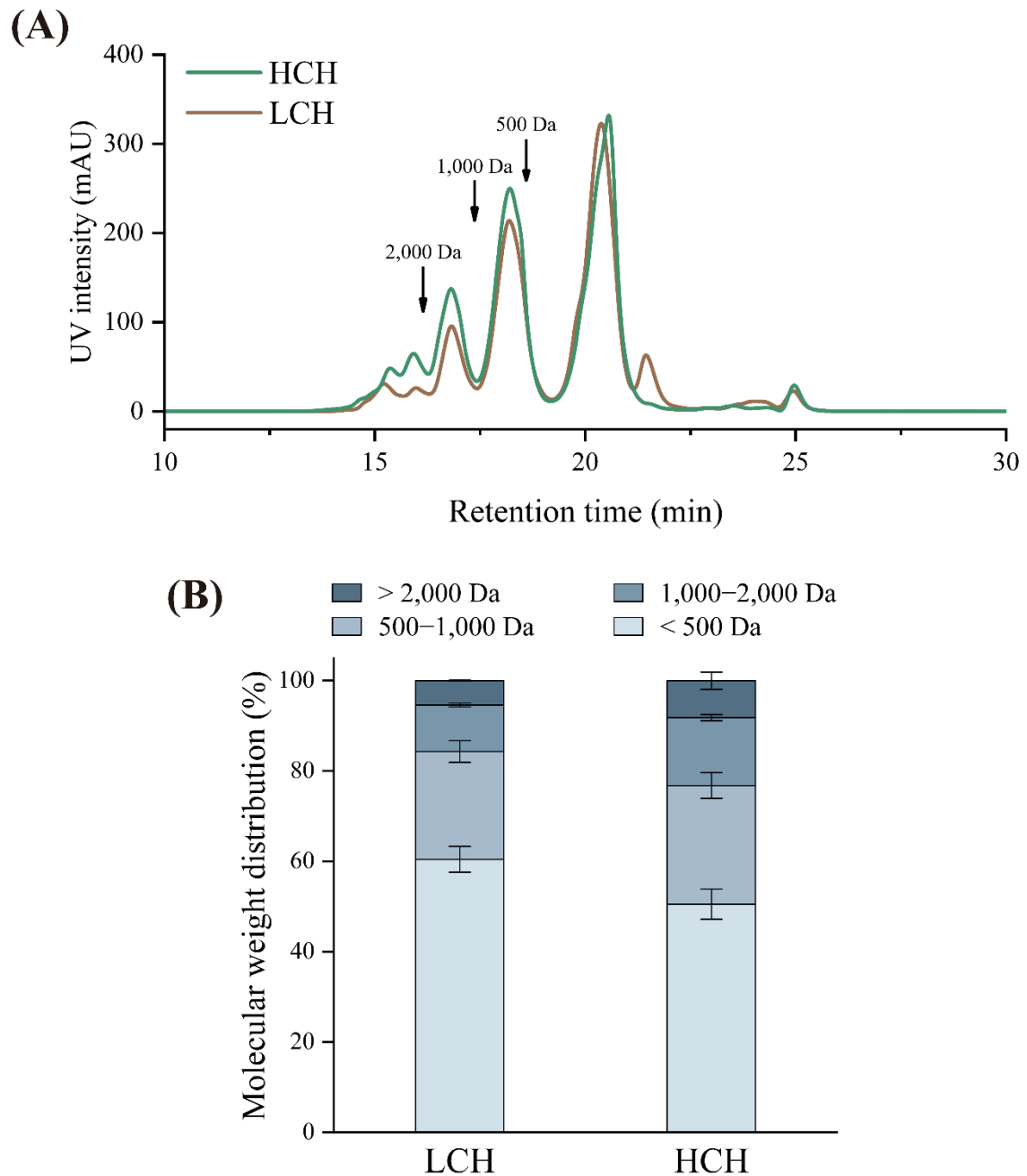
Figure S1. Chromatogram of collagen hydrolysates with lower content of Gly-Pro-Xaa tripeptides (LCH) and higher content of Gly-Pro-Xaa tripeptides (HCH) by size exclusion chromatography using a TSKgel G2000 SWXL analytical column (GEL LOT 502R) (300 mm × 7.8 mm) (A). Molecular weight distribution of components in LCH and HCH (B).
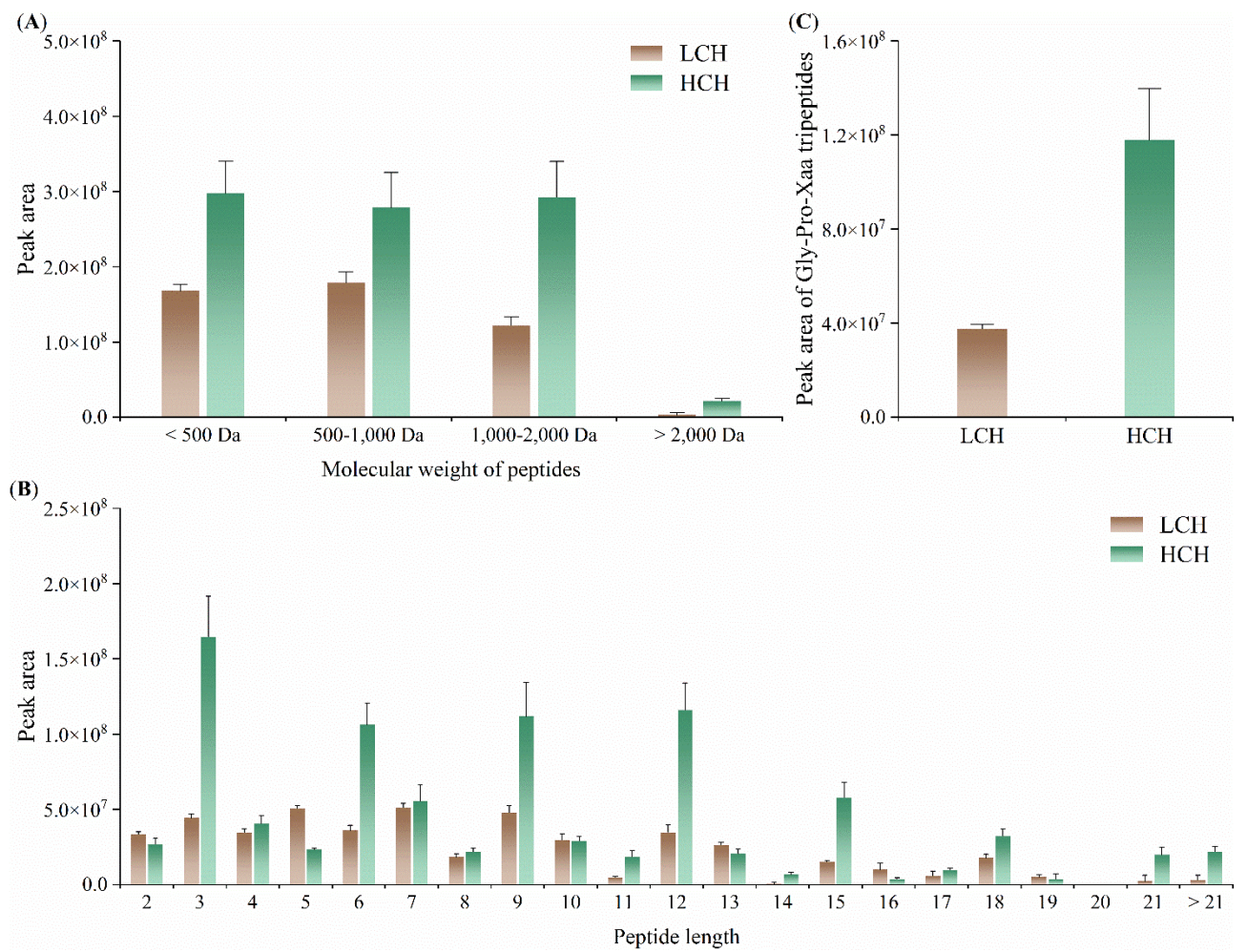
Figure S2. Peak area of peptides with peak intensity $> 5 \times 10^4$ in LCH and HCH according to molecular weight (A) and length (B). Column diagram of peak area of Gly-Pro-Xaa tripeptides in LCH and HCH (C).