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Supplementary file

## Development and application of novel peptide-formulated nanoparticles for treatment of atopic dermatitis

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**Figure S1.** Assignment of CPP scores for the origin protein structure of each RMSP peptides using the IDDT platform. CPP score for TAT peptide (Positive control for cell penetrating peptide) is 1.0.



**Figure S2.** (a) Sequence of RMSP1 derived peptides and (b) its anti-inflammatory effect in RAW 264.7 cells.



Figure S3. Toxicity of Pal-RMSP1 peptide against HaCaT cell line.



Figure S4. The fluorescence spectrum of FITC-labeled peptide was measured. The fluorescence intensity of the peptide (concentration:  $20 \ \mu g/mL$ ) was measured with excitation at 495 nm and recorded in the range between 500-600 nm.



Figure S5. Change in particle size and PDI of peptide formulated nanoparticles.



**Figure S6.** The cellular uptake efficiency of FITC-labeled peptide with different formulations in HaCaT cells. The peptide concentration is  $25 \,\mu \text{g/mL}$ .



Figure S7. Changes in body weights after *in vivo* treatment with each sample.

Target gene	Primer sequence					
1.TNE	Forward: 5'-ACCTCCTCTCTGCCATCAAG-3'					
111 NF - a	Reverse: 5'-ATCCCAAAGTAGACCTGCCC-3'					
LΠ 10	Forward: 5'-CGAATCTCCGACCACCACTA-3'					
mL-ip	Reverse: 5'-AGCCTCGTTATCCCATGTGT-3'					
hII 6	Forward: 5'-AGTCCTGATCCAGTTCCTGC-3'					
IIIL-0	Reverse: 5'-CTACATTTGCCGAAGAGCCC-3'					
<b>ЬП 8</b>	Forward: 5'-TTCTGCAGCTCTGTGTGAAG-3'					
IIIL-0	Reverse: 5'-GTTCTTTAGCACTCCTTGGCA-3'					
LCCI 5	Forward: 5'-TATTCCTCGGACACCACACC-3'					
IICCL-5	Reverse: 5'-CAAAGACGACTGCTGGGTTG-3'					
LCCI 17	Forward: 5'-GCCATTCCCCTTAGAAAGCTG-3'					
IICCL-17	Reverse: 5'-CTTGTTGTTGGGGGTCCGAAC-3'					
LCCI 22	Forward: 5'-GAAGCCTGTGCCAACTCTCT-3'					
nCCL-22	Reverse: 5'-GGGAATCGCTGATGGGAACA-3'					
	Forward: 5'-GGATTTGGTCGTATTGGGCG-3'					
ngapdh	Reverse: 5'-ATCGCCCCACTTGATTTTGG-3'					
mII 21	Forward: 5'-ATACAGCTGCCGTGTTTCAG-3'					
IIIIL-31	Reverse: 5'-AGCCATCTTATCACCCAAGAA-3'					
mII 6	Forward: 5'-ACCACGGCCTTCCCTACTTC-3'					
IIIIL-0	Reverse: 5'-CTCATTTCCACGATTTCCCA-3'					
mCVCI 0	Forward: 5'-CTTGAGCCTAGTCGTGATAAC-3'					
IIICACL9	Reverse: 5'-CCAGCTTGGTGAGGTCTATC-3'					
	Forward: 5'-TTGAAGAAGAGCCCATCCTCTG-3'					
mit-ip	Reverse: 5'-GATCCACACTCTCCAGCTGC-3'					
mCCL 5	Forward: 5'- AGATCTCTGCAGCTGCCCTCA-3'					
IIICCL-5	Reverse: 5'- GGAGCACTTGCTGCTGGTGTAG-3'					
m IEN ar	Forward: 5'- ACTCAAGTGGCATAGATGTGGAAG-3'					
ΠΠΓΙΝ-γ	Reverse: 5'-GACGCTTATGTTGTTGCTGATGG-3'					
mCVCI 10	Forward: 5'- CCACGTGTTGAGATCATTGC-3'					
mCACL10	Reverse: 5'- AGTAGCAGCTGATGTGACC-3'					
TNE .	Forward: 5'- AGCCCCCAGTCTGTATCCTT-3'					
minr-α	Reverse: 5'- CTCCCTTTGCAGAACTCAGG-3'					
maß antin	Forward: 5'- GGCTGTATTCCCCTCCATCG-3'					
mp-actin	Reverse: 5'- CCAGTTGGTAACAATGCCAT-3'					

 Table S1. Primer sequences for qRT-PCR

**Table S2.** Statistical comparisons for expression of pro-inflammatory genes between cohorts in Figure 7. (By one-way ANOVA with Bonferroni's test for multiple comparisons. Statistical difference: \* (p < 0.05), \*\* (p < 0.01), and \*\*\* (p < 0.001). (Graphpad Prism, version 7.03).

	 Oxazı		$OX \Delta + Pred$	$OXA + P_{2}I_{-}PMSP1$	OXA + Pal-	OXA + Pal-
		Oxazololic	OXA + Htt		RMSP1/LP	RMSP1/DP
IL-1β	No treatment	***	ns	***	ns	**
	Oxazolone	-	***	***	***	* * *
	OXA + Pred		-	***	ns	ns
	OXA + Pal-RMSP1			-	* * *	***
	OXA + Pal-RMSP1/LP				-	ns
	OXA + Pal-RMSP1/DP					-
IL-6	No treatment	***	ns	ns	ns	ns
	Oxazolone	-	***	***	***	***
	OXA + Pred		-	ns	ns	ns
	OXA + Pal-RMSP1			-	ns	ns
	OXA + Pal-RMSP1/LP				-	ns
	OXA + Pal-RMSP1/DP					-
	No treatment	***	ns	ns	ns	ns
IL-31	Oxazolone	-	***	***	* * *	***
	OXA + Pred		-	ns	ns	ns
	OXA + Pal-RMSP1			-	ns	ns
	OXA + Pal-RMSP1/LP				-	ns
	OXA + Pal-RMSP1/DP					-
TNF-α	No treatment	***	ns	ns	ns	ns
	Oxazolone	-	***	***	* * *	***
	OXA + Pred		-	ns	ns	ns
	OXA + Pal-RMSP1			-	ns	ns
	OXA + Pal-RMSP1/LP				-	ns
	OXA + Pal-RMSP1/DP					-

IFN-γ	No treatment	*	ns	ns	ns	ns
	Oxazolone	-	ns	ns	ns	ns
	OXA + Pred		-	ns	ns	ns
	OXA + Pal-RMSP1			-	ns	ns
	OXA + Pal-RMSP1/LP				-	ns
	OXA + Pal-RMSP1/DP					-
CXCL9	No treatment	***	ns	ns	ns	ns
	Oxazolone	-	***	***	***	***
	OXA + Pred		-	ns	ns	ns
	OXA + Pal-RMSP1			-	ns	ns
	OXA + Pal-RMSP1/LP				-	ns
	OXA + Pal-RMSP1/DP					-
CXCL10	No treatment	ns	ns	ns	ns	ns
	Oxazolone	-	ns	ns	ns	ns
	OXA + Pred		-	ns	ns	ns
	OXA + Pal-RMSP1			-	ns	ns
	OXA + Pal-RMSP1/LP				-	ns
	OXA + Pal-RMSP1/DP					-
CCL5	No treatment	**	ns	ns	ns	ns
	Oxazolone	-	ns	ns	ns	ns
	OXA + Pred		-	ns	ns	ns
	OXA + Pal-RMSP1			-	ns	ns
	OXA + Pal-RMSP1/LP				-	ns
	OXA + Pal-RMSP1/DP					-