Tables:

Supplemental Table 1:

HV	Age	Sex	Race	SCORAD	CGN Isolates		
1	61	M	W	0	*R. mucosa*		
2	30	M	B	0	*R. mucosa*	*Pantoea septica*	*M. osloensis*
3	28	F	M	0	*R. mucosa*		
4	32	F	W	0	*R. mucosa*		
5	35	F	W	0	*R. mucosa*		
6	24	M	B	0		*P. aeruginosa*	
7	65	M	W	0	*R. mucosa*		
8	33	M	M	0	*R. mucosa*		
9	45	F	A	0	*R. mucosa*	*P. luteola*	
10	24	M	W	0		*Methylobacterium spp.*	
11	32	F	A	0		*Methylobacterium spp*	
12	35	M	A	0		*P. luteola*	*A. radioresistens*
13	26	F	W	0	*R. mucosa*	*P. oryzibhabitans*	
14	21	M	A	0	*R. mucosa*		
15	21	F	B	0	*R. mucosa*		
16	21	F	A	0	*R. mucosa*		
17	21	F	A	0	*R. mucosa*		
18	21	M	A	0	*R. mucosa*		
19	44	M	W	0	*R. mucosa*		
20	8	M	M	0	*R. mucosa*		
21	22	M	H	0	*R. mucosa*		
22	48	F	W	0	*R. mucosa*		
23	40	F	W	0	*R. mucosa*		
24	48	F	W	0	*R. mucosa*		
25	40	F	B	0	*R. mucosa*		
26	22	M	W	0		NONE	

AD	Age	Sex	Race	SCORAD at time of eval.	CGN Isolates		
1	9	M	W	4	*R. mucosa*		
2	8	M	A	45	*R. mucosa*		
3	5	M	A	56	*R. mucosa*		
4	16	M	A	33	*R. mucosa*		
5	21	M	A	16		*P. oryzibhabitans*	
6	12	F	B	8		*P. oryzibhabitans*	
7	19	F	W	16		*C. gilardii*	
8	6	M	W	14		NONE	
9	46	M	W	9		NONE	
10	16	F	W	2		NONE	
11	8	F	W	4		NONE	
12	11	M	B	18		NONE	
13	19	M	W	56		NONE	
14	51	M	M	13		NONE	
15	20	M	B	34		NONE	
16	33	F	W	1		NONE	
17	14	M	M	4		NONE	

Supplemental Table 1: Age, sex, race, SCORAD at time of swabbing, and CGN species isolated for each participant included in Figure 1A. Patients with atopic dermatitis all

carried a clinical diagnosis of atopic dermatitis at the time of evaluation at an Allergy and Immunology Clinic at NIH Clinical Center. HV = healthy volunteer, AD = atopic dermatitis, SCORAD = Scoring Atopic Dermatitis index scale, CGN = culturable Gram-negative, M = male, F = female, W = White, B = Black, H = Hispanic/Latino, A = Asian, M = Mixed.

Demographic	**Controls**	**Patients**	**Significance**
Number	26	17	--
Age			
Mean (range)	32.5 (8-65)	18.5 (5-51)	**
Sex (%)			
Male	50	70	NS
Female	50	30	
Race (%)			
White	42	47	NS
Black	15	18	
Hispanic	4	0	
Asian	27	24	
Other/Mixed	12	12	
SCORAD (range)	0 (0)	19.7 (1-56)	****

Supplemental Table 2: Demographics of controls and patients. Age, sex, race, and SCORAD for participants included in Figure 1. Significance determined by Student's t test (age, SCORAD) or Chi squared (sex, race). ** = $p < 0.01$, **** = $p < 0.001$, NS = not significant.

FIGURE S1

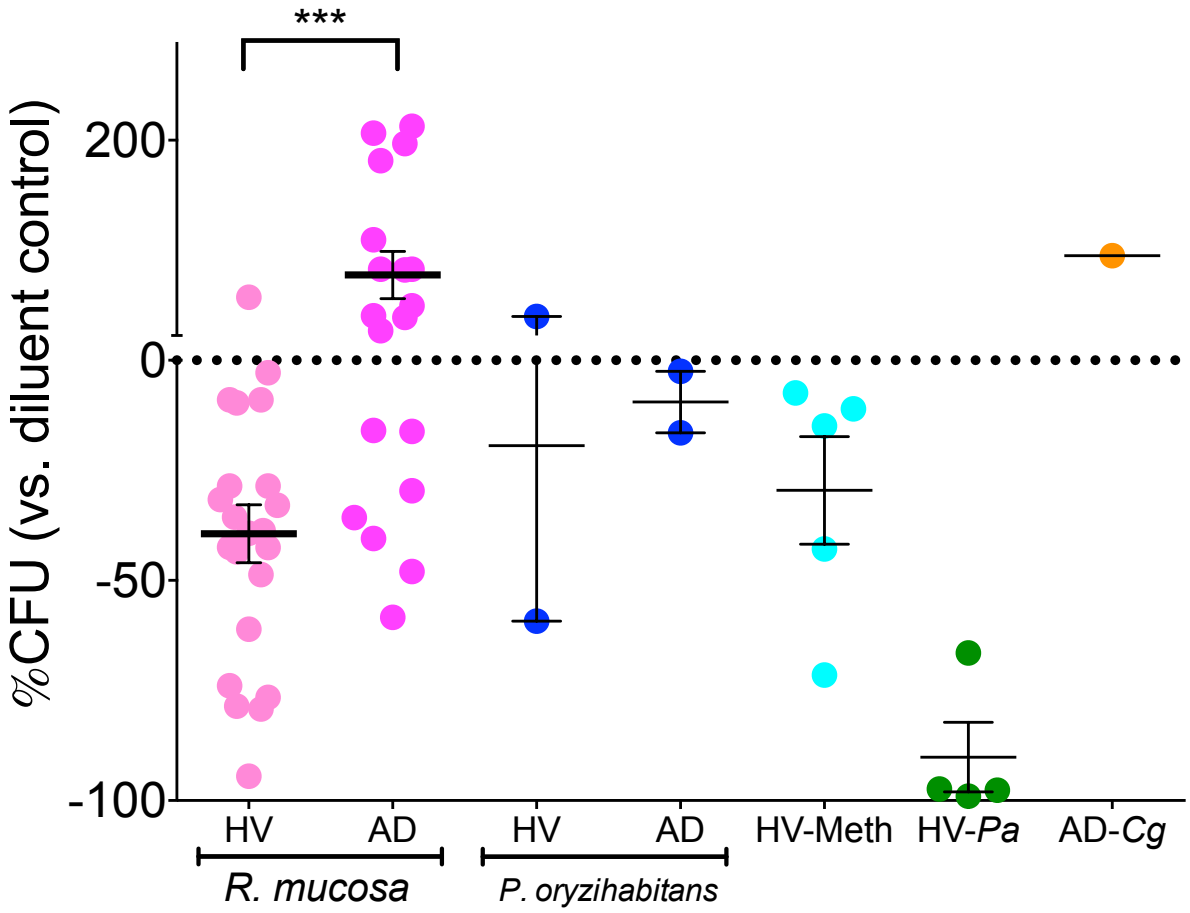


Fig. S1: Species analysis of data from Fig. 1B. Eight strains of *S. aureus* isolated from HV and AD patients were grown in the presence of either CGN supernatant or control media. Each data point represents the effect on *S. aureus* growth of supernatant from one CGN isolate compared to media control (HV isolates = 9, AD isolates = 7). Significance between R. mucosa isolates determined by Student t-test.

FIGURE S2

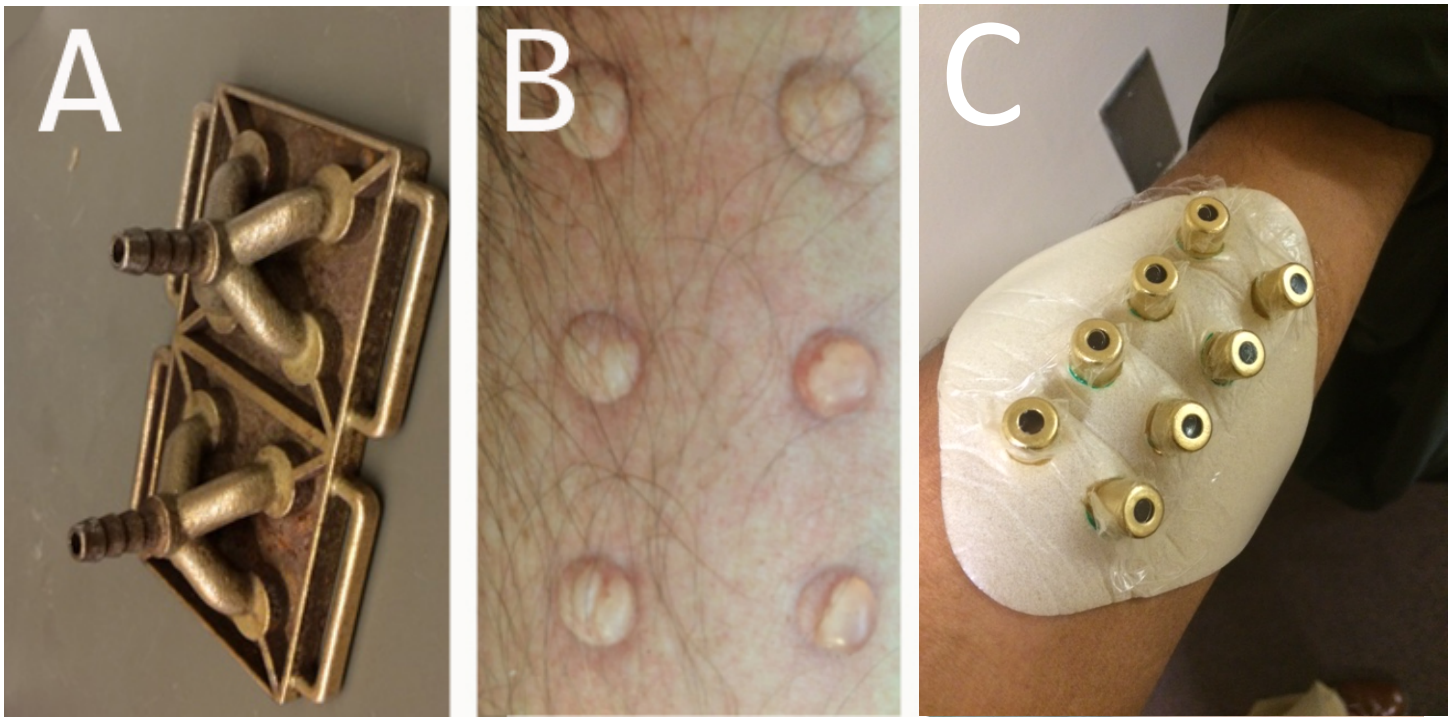


Fig. S2: Suction Blister Protocol
(A) Image of 3D printed blister induction device. (B) Blister results 2 hours after suction. (C) Challenge chamber placed over denuded blister areas, bacterial isolates placed via pipette into the center of each challenge cap.

FIGURE S3

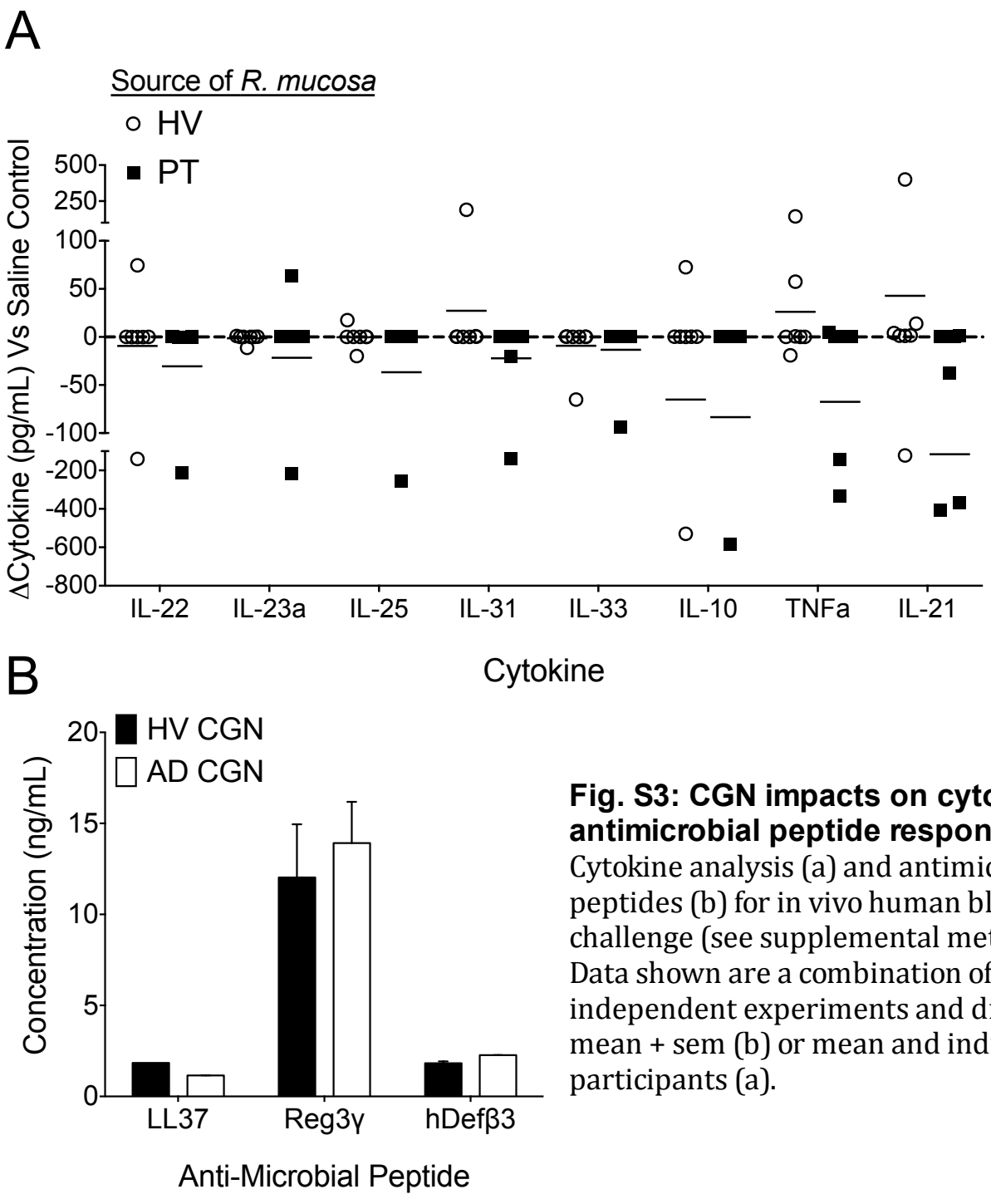
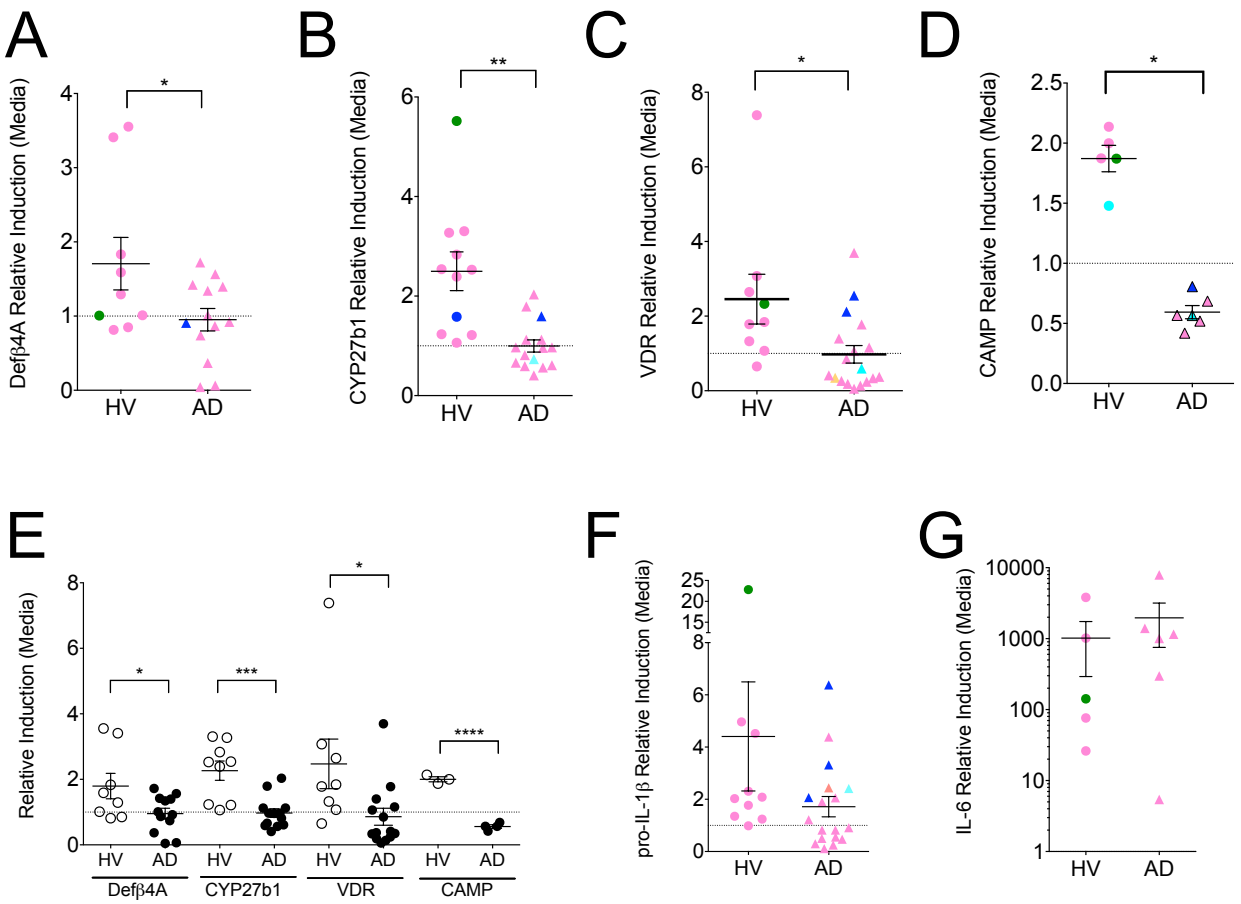


Fig. S3: CGN impacts on cytokine and antimicrobial peptide responses
Cytokine analysis (a) and antimicrobial peptides (b) for in vivo human blister challenge (see supplemental methods), N= 7. Data shown are a combination of five independent experiments and displayed as mean + sem (b) or mean and individual participants (a).

FIGURE S4



Bacterial species:

- *Roseomonas mucosa*
- *P. aeruginosa*
- *P. oryzihabitans*
- *C. gilardii*
- Methylobacterium

Fig. S4: CGN stimulate primary human keratinocytes. (A-D, F-G) Primary human foreskin keratinocytes were cultured to confluence. 1e7 CFU of Gram-negative bacteria were added per well. mRNA was harvested from the KC 24 hours later and analyzed by PCR. (E) Data from A-D reanalyzed with only *R. mucosa* results. Data is representative of three independent experiments and displayed as mean ± sem with individual dots representing KC cultured with distinct isolates. Significance determined by Student t-test within each gene marker. * = $p<0.05$, ** = $p>0.01$.

FIGURE S5

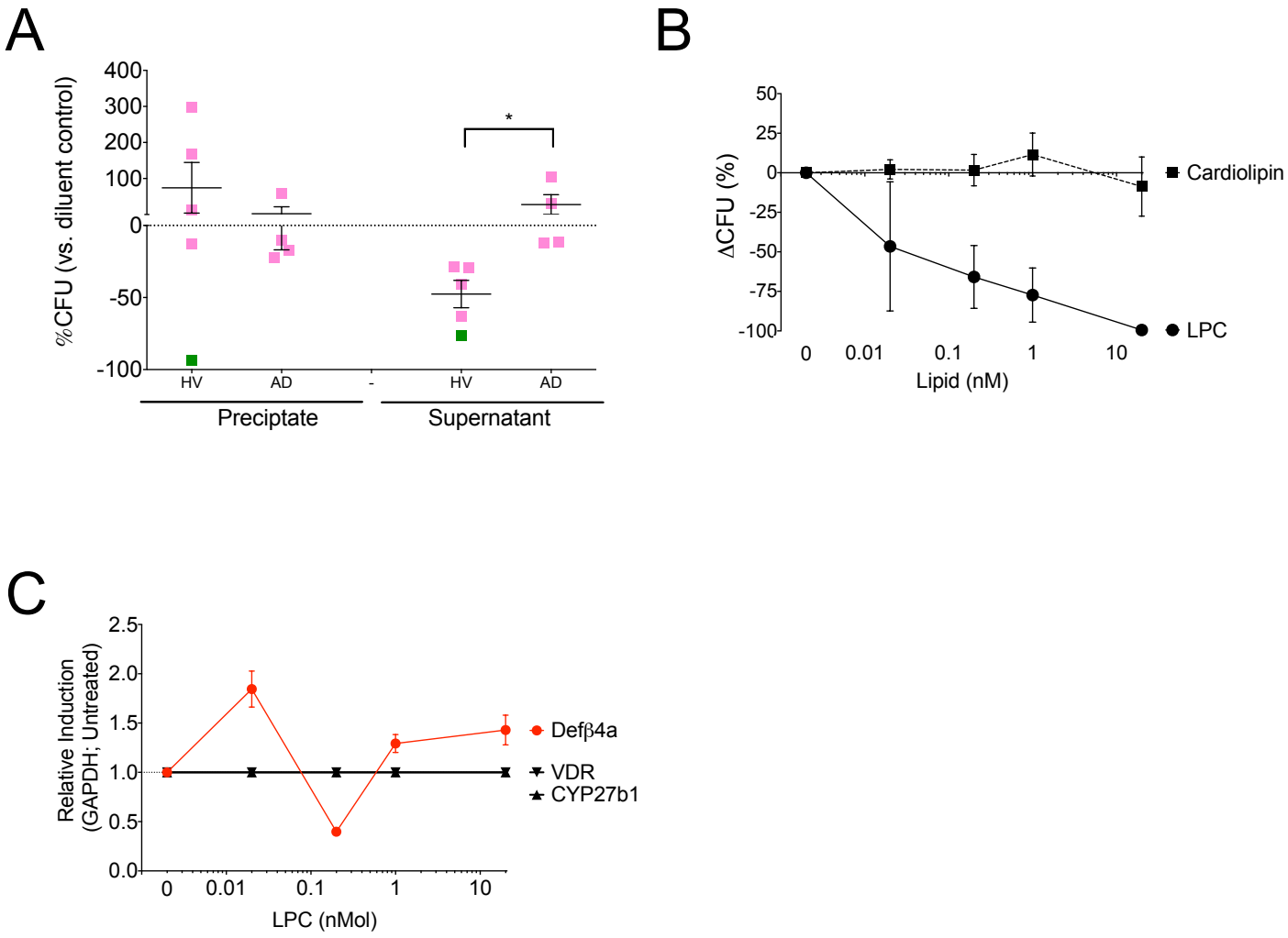


Fig. S5: Lipid classes isolated from HV-R. mucosa supernatants inhibit S. aureus growth. (A) Ammonium sulfate precipitation was performed on supernatants from R. mucosa and P. aeruginosa prior to evaluating the *S. aureus* (strain USA300) inhibition as performed in Fig. 1B. (B) Three isolates of *S. aureus* were cultured in the presence or absence of lysophosphatidylcholine (LPC) or cardiolipin with inhibition assessed as in Fig. 1B versus diluent (0). (C) Human foreskin keratinocytes were cultured in the presence or absence of LPC were assessed as in Fig. S3. Data is representative of three independent experiments and displayed as mean ± sem. Significance determined by ANOVA with Bonferroni's correction. * = $p<0.05$.

FIGURE S6

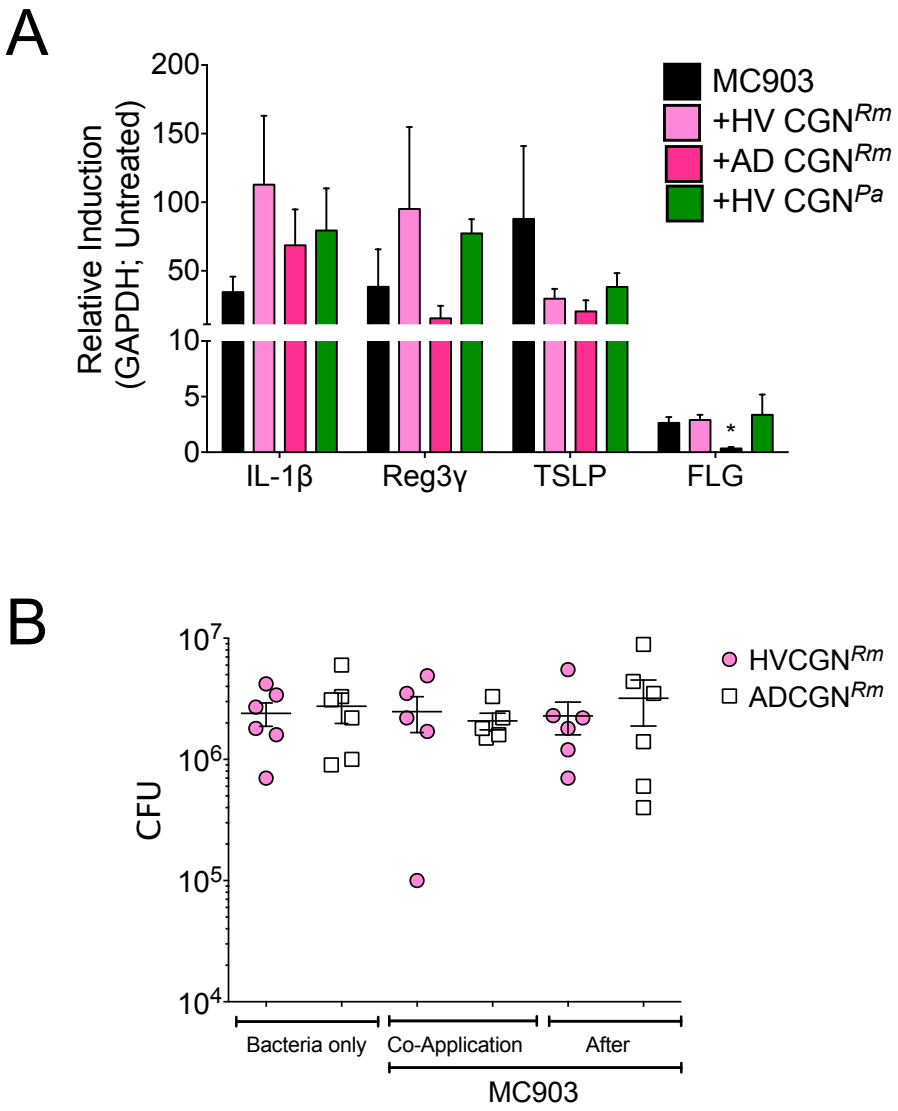


Fig. S6: CGN immune activitation and viability during and after MC903 challenge. Mice underwent MC903 treatment along with inoculation of Gram-negative isolates as shown. (A) mRNA was harvested from ears on day 14 and analyzed by PCR. (B) CGN culture yeilds from mice inoculated with *R. mucosa* without other intervention (as in Fig. 2C), during MC903 (as in Fig. S6A), or after MC903 application (as in Fig. 3C). Data shown are representative of three independent experiments and displayed as mean + sem. Significant difference from MC903 shown as calulated by ANOVA. * = $p<0.05$.