Online Supplementary

MATERIALS AND METHODS

The growth of *S. aureus* in a bacterial co-culture. To investigate whether the growth of *S. aureus* was influenced by *P. acnes*, *S. aureus* (1×10^7 CFU), *P. acnes* (1×10^7 CFU) or a co-culture of *P. acnes* and *S. aureus* (1:1 ratio with a total of 2×10^7 CFU) in 5 μl PBS were spotted on a Brucella broth agar plate and cultured under anaerobic conditions at 37°C for 2 days, respectively. All bacteria were collected and diluted $1:10^2$-$1:10^6$ with sterile PBS. For CFU counts, the diluted bacteria (5 μl) was subsequently spotted on a 3% TSB agar plate and cultured under anaerobic conditions at 37°C for 2 days. *P. acnes* did not grow in a TSB agar plate. Thus, bacterial colonies derived from a co-culture of *P. acnes* and *S. aureus* reflect the growth of *S. aureus*. No differences in CFUs between *S. aureus* and a co-culture of *P. acnes* and *S. aureus* suggest that *P. acnes* did not influence the growth of *S. aureus*.

The effect of anti-CAMP factor antiserum on *S. aureus*-induced skin lesions. *S. aureus* (1×10^7 CFU in 50 μl PBS) was pre-incubated with 5% (v/v) anti-CAMP factor antiserum at 25 ^{o}C for 1 h. Dorsal skins of ICR mice were injected subcutaneously with *S. aureus* (1×10^7 CFU in 50 μl PBS) or

antiserum-treated *S. aureus* (1×10^7 CFU in 50 μl PBS). Lesion sizes were examined two days after injection. Skin lesions of were measured and compiled statistics as described in MATERIALS AND METHODS.

TABLE S1. The sequenced peptides of *S. aureus* β-hemolysin via NanoLC-LTQ MS/MS.

Number	Peptide sequences	Amino acid
1	KDDTDLKLVSHNVYMLSTVLYPNWGQYK	38-65
2	DDTDLKLVSHNVYMLSTVLYPNWGQYK	39-65
3	LVSHNVYMLSTVLYPNWGQYK	45-65
4	RADLIGQSSYIKNNDVVIFNEAFDNGASDK	66-95
5	ADLIGQSSYIK	67-77
6	ADLIGQSSYIKNNDVVIFNEAFDNGASDK	67-95
7	NNDVVIFNEAFDNGASDK	78-95
8	EYPYQTPVLGR	103-113
9	SQSGWDKTEGSYSSTVAEDGGVAIVSK	114-140
10	SQSGWDKTEGSYSSTVAEDGGVAIVSKYPIK	114-144
11	TEGSYSSTVAEDGGVAIVSK	121-140
12	TEGSYSSTVAEDGGVAIVSKYPIK	121-144
13	IEKNGKNVHVIGTHTQSEDSR	170-190
14	NVHVIGTHTQSEDSR	176-190
15	NVHVIGTHTQSEDSRCGAGHDRK	176-198
16	EISDFVK	206-212
17	NIPKDETVYIGGDLNVNK	215-232
18	NIPKDETVYIGGDLNVNKGTPEFK	215-238
19	DETVYIGGDLNVNK	219-232
20	NLNVNDVLYAGHNSTWDPQSNSIAK	243-267
21	YNYPNGKPEHLDYIFTDK	268-285
22	YNYPNGKPEHLDYIFTDKDHK	268-288
23	PEHLDYIFTDK	275-285
24	QLVNEVVTEK	292-301
25	QLVNEVVTEKPK	292-303
26	PKPWDVYAFPYYYVYNDFSDHYPIK	302-326
27	PWDVYAFPYYYVYNDFSDHYPIK	304-326

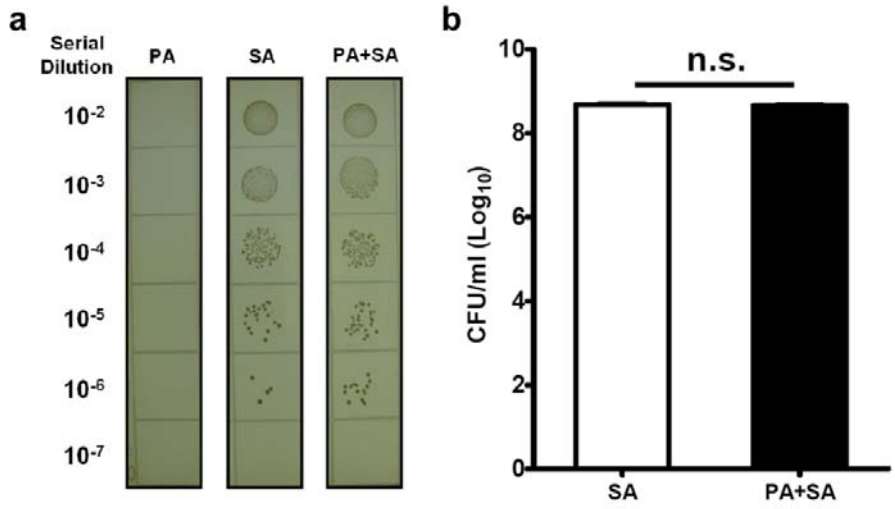

Figure s1

Figure S1. Co-culture of *P. acnes* with *S. aureus* does not influence the growth of *S. aureus*. (**a**) Bacteria [*P. acnes* (PA), *S. aureus* (SA) or the mixture of *P. acnes* and *S. aureus* (PA+SA)] grown on a Brucella broth agar were collected and diluted $1:10^2$-$1:10^6$ with sterile PBS. The diluted bacteria (5 μl) were then spotted on a 3% TSB agar plate and cultured under anaerobic conditions at 37°C for 2 days. *P. acnes* did not grow on a 3% TSB agar plate, indicating that the bacterial colonies on agar plates exclusively derived from *S. aureus*. (**b**) No significant differences between the CFU counts of *S. aureus* (SA) grown alone or with *P. acnes* (PA+SA). The “n.s.” denotes not significant (n=6 via Student’s *t*-test).

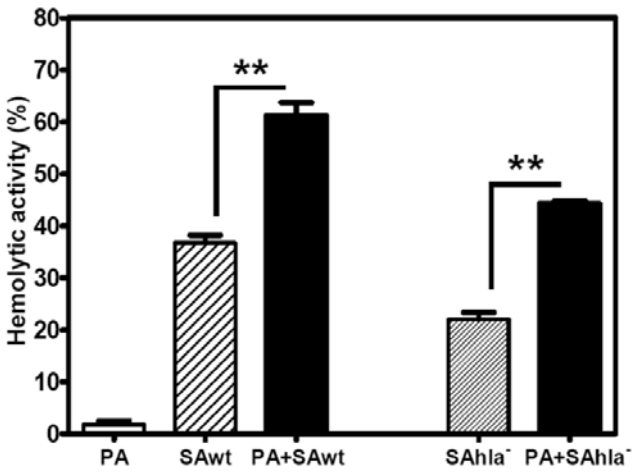

Figure s2

Figure S2. The α-hemolysin deficiency does not completely abolish the enhancement of hemolysis caused by the co-culture of *P. acnes* and *S. aureus*. Bacteria (2×10^7 CFU) [*P. acnes* (PA), wild-type *S. aureus* (SAwt), α-hemolysin deficient *S. aureus* (SAhla$^-$)] alone or *P. acnes* plus wild-type *S. aureus* (PA+SAwt) or α-hemolysin deficient *S. aureus* (PA+SAhla$^-$) in 1:1 ratio with a total of 2×10^7 CFU were incubated with sheep blood cells at 37^{o}C with end-over-end rotation for two days. Hemolytic activity was detected by measuring the absorbance of hemoglobin release was measured at 540 nm. Data are the mean ± SE (n=3, P< 0.005** by Student's *t*-test).

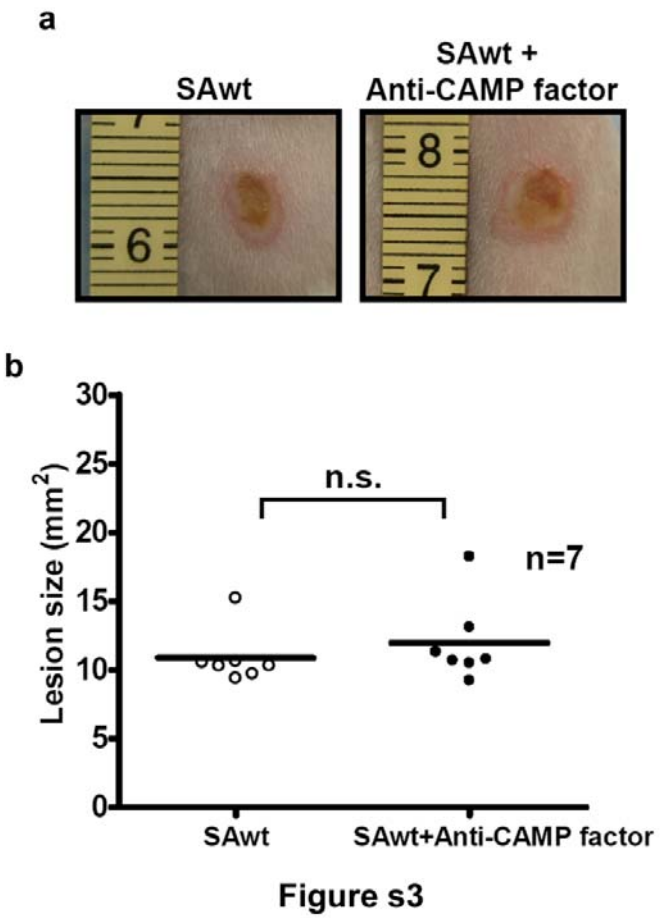

Figure S3. The anti-CAMP factor antiserum does not block the skin lesions induced by *S. aureus*. Wild-type *S. aureus* (1×10^7 CFU in 50 μl PBS) bacteria were incubated with or without 5% (v/v) anti-CAMP factor antiserum at 25 ^{o}C for 1 h. After incubation, the mixture of bacteria and antiserum were injected subcutaneously into the dorsal skins of ICR mice for two days. Skin lesions were measured as described in the legends of Figs. 4 and 6a. Representative photographs of dorsal skin lesions are shown. Data are means of two independent experiments (n=7). The "n.s." denotes not significant after Student's *t*-test analysis.