Potential Probiotic Therapy of Inhibitory Commensal S. epidermidis on Decolonization/Treatment of MRSA and C. acnes and Their Infections

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Studying human nasal colonization among 250 healthy participants in Shanghai, China, we found the nasal colonization rate of S. aureus and S. epidermidis was 19% and 97.1% respectively. S. epidermidis was confirmed as the predominant nasal commensal. The distribution of nasal colonization was: 18.6% SA+SE+, 78.5% SA-SE+, 2% SA-SE-, and 0.4% SA+SE- (SA=S. aureus, SE=S. epidermidis). MRSA nasal colonization is an endemic risk factor for many life-threatening diseases. Intriguingly, there are more than 80% of people in our study capable of evading S. aureus colonization. The purpose of this study is to elucidate this evasion mechanism and explore its potential application. We observed a strong negative correlation between colonization of inhibitory S. epidermidis strains (biofilm inhibitory ability>25%) and co-colonization of S. aureus. Absence of inhibitory S. epi. significantly increased colonization rate of S. aureus (P<0.001, odds ratio=17.5). Supernatants of inhibitory S. epi. were found to not only inhibit the biofilm formation, but also the growth of MRSA. Inhibitory S. epi. supernatants inhibited MRSA biofilm formation by 60% in a dose-dependent manner and inhibited the growth of MRSA by 30%. Inhibitory S. epi. cells can completely inhibit the growth of MRSA by co-culturing. Both inhibitory S. epi. supernatants and cells also showed inhibition effects on C. acnes growth. PMSF neutralization tests, PCR, and DNA sequencing confirmed the inhibitory factor was Epidermidis Serine Protease. Our study provided scientific data to support probiotic applications of inhibitory S. epi. for decolonization and treatment of MRSA and C. acnes.

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