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First evidences of genetic transformation via natural competence in *Staphyloccus aureus*

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Abstract

Staphylococcus aureus has been known as a leading cause of nosocomial infections and food-borne diseases. The bacterium has an extraordinary ability to adapt to various environmental conditions and a notorious capacity to rapidly become resistant to virtually all antibiotics. However, the mechanisms to acquire the exogenous genetic materials encoding for virulence and resistance by natural transformation have not been detected yet. In this study, we have uncovered the two distinct mechanisms allowing the activation of a transcription sigma factor – SigH in the minor bacterial population, which trigger the development of competence machinery for DNA transformation. The first is a chromosomal gene duplication rearrangement occurring spontaneously at a low frequency [$\leq 10^{-5}$] generating a new chimeric *sigH* gene. The second involves in the post-transcriptional regulation through an upstream inverted repeat sequence, which effectively suppresses the expression of *sigH*. Importantly, for the first time, we have successfully detected the transfer of plasmid DNA and the transfer of full-length SCC*mec* type II element conferring methicillin and beta-lactam antibiotic resistance through natural competence in *sigH* expressing cells. Taken together, we propose a unique model for staphylococcal competence regulation by *sigH* that could help explain the acquisition of antibiotic resistance genes through horizontal gene transfer in this important pathogen.

Biography

Le Thuy Nguyen Thi got her master of Engineering of Biotechnological Processes in Cuba in 2009. She is currently a student of Leading graduate school doctoral program - Human Biology Program in the University of Tsukuba, Japan since 2012. She is a permanent researcher at Medical Biotechnological department of Biotechnology Center of Ho Chi Minh City, Vietnam. She is member of Japanese Society for Bacteriology and member of Asian Federation of Biotechnology (AFOB).