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The transfer of 'non-mobile' plasmid DNA in *Escherichia coli*

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Plasmid transfer, normally mediated by a mobile element on the conjugative plasmid or conserved DNA uptake machinery at the bacterial membrane, often promotes bacterial resistances to antibiotics and other adverse stresses. For example, the transfer of the recently emerging NDM-1 plasmid transforms a normal bacterium to a superbug which is able to inactivate all beta-lactam antibiotics. Plasmid transfer through conjugation has long been established in *Escherichia coli*. It has traditionally thought that this bacterium is not naturally transformable, although it has competence gene homologs potentially encoding a complete set of DNA uptake components. Our work established that a non-conjugative plasmid spontaneously enters *E. coli* on the surface of agar plates independent of the conserved DNA uptake machinery. We also showed that the transfer of plasmid on plates is regulated by a general stress response regulator RpoS and that the mutation of its lysine 173 significantly decreases the transformation rate. The abundant surface protein OmpA had previous been shown as a receptor for conjugation and bacteriophage infection. Our recent work demonstrated that OmpA blocks the transfer of plasmid on agar plates but promotes DNA transfer in Ca2+ solution, indicating that OmpA plays opposite roles in natural and artificial transformation. Together, our work has established a model for investigating the spread of non-conjugative plasmid transfer and provided two targets for controlling bacterial resistance caused by the transfer of the 'non-mobile' plasmid.

Biography

Dongchang Sun has completed his Ph.D. at the age of 29 years from Paul Sabatier University in France. He was a visiting scientist at University of British Columbia University in Canada. He is now the Principal Investigator in microbial pesticide at Zhejiang Academy of Agricultural Sciences in China and the lambda lunch member in NIH. He has published more than 8 papers in peer reviewed journals and has been awarded two patents.

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