

**Identification of the genetic determinants of
Salmonella enterica serotype Typhimurium
that may regulate the expression of the type 1
fimbriae in response to solid agar and static
broth culture conditions**

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摘要

Abstract

BACKGROUND: Type 1 fimbriae are the most commonly found fimbrial appendages on the outer membrane of *Salmonella enterica* serotype Typhimurium. Previous investigations indicate that static broth culture favours *S. Typhimurium* to produce type 1 fimbriae, while non-fimbriate bacteria are obtained by growth on solid agar media. The phenotypic expression of type 1 fimbriae in *S. Typhimurium* is the result of the interaction and cooperation of several genes in the *fim* gene cluster. Other gene products that may also participate in the regulation of type 1 fimbrial expression remain uncharacterized.

RESULTS: In the present study, transposon insertion mutagenesis was performed on *S. Typhimurium* to generate a library to screen for those mutants that would exhibit different type 1 fimbrial phenotypes than the parental strain. Eight-two mutants were obtained from 7,239 clones screened using the yeast agglutination test. Forty-four mutants produced type 1 fimbriae on both solid agar and static broth media, while none of the other 38 mutants formed type 1 fimbriae in either culture condition. The flanking sequences of the transposons from 54 mutants were cloned and sequenced. These mutants can be classified according to the functions or putative functions of the open reading frames disrupted by the transposon. Our current results indicate that the genetic determinants such as those involved in the fimbrial biogenesis and regulation, global regulators, transporter proteins, prophage-derived proteins, and enzymes of different functions, to name a few, may play a role in the regulation of type 1 fimbrial expression in response to solid agar and static broth culture conditions. A complementation test revealed that transforming a recombinant

plasmid possessing the coding sequence of a NAD(P)H-flavin reductase gene *ubiB* restored an *ubiB* mutant to exhibit the type 1 fimbrial phenotype as its parental strain.

CONCLUSION: Genetic determinants other than the *fim* genes may involve in the regulation of type 1 fimbrial expression in *S. Typhimurium*. How each gene product may influence type 1 fimbrial expression is an interesting research topic which warrants further investigation.