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Strategies used for genetically modifying bacterial genome: site-directed mutagenesis, gene inactivation, and gene over-expression

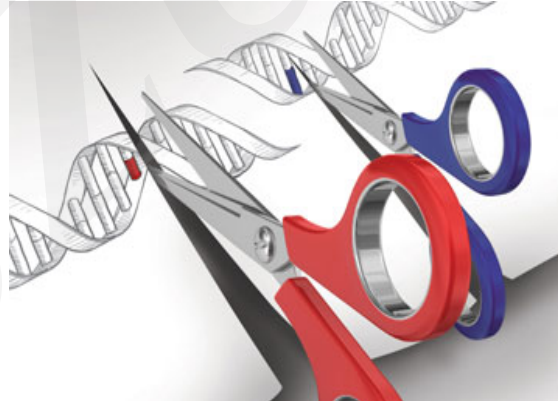
Key words: *Escherichia coli*, *Corynebacterium glutamicum*,
DNA manipulation, Site-directed mutagenesis,
Gene inactivation, Gene over-expression

Research Summary

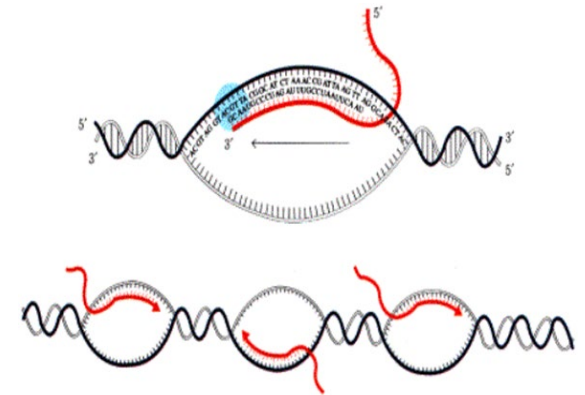
The current review summarizes the common strategies used for genetically modifying *E. coli* and *C. glutamicum* genome, including site-directed mutagenesis, gene inactivation and gene over-expression. Moreover, the technical problems of multi-layered DNA manipulation were also discussed.



Site-directed mutagenesis



Gene inactivation

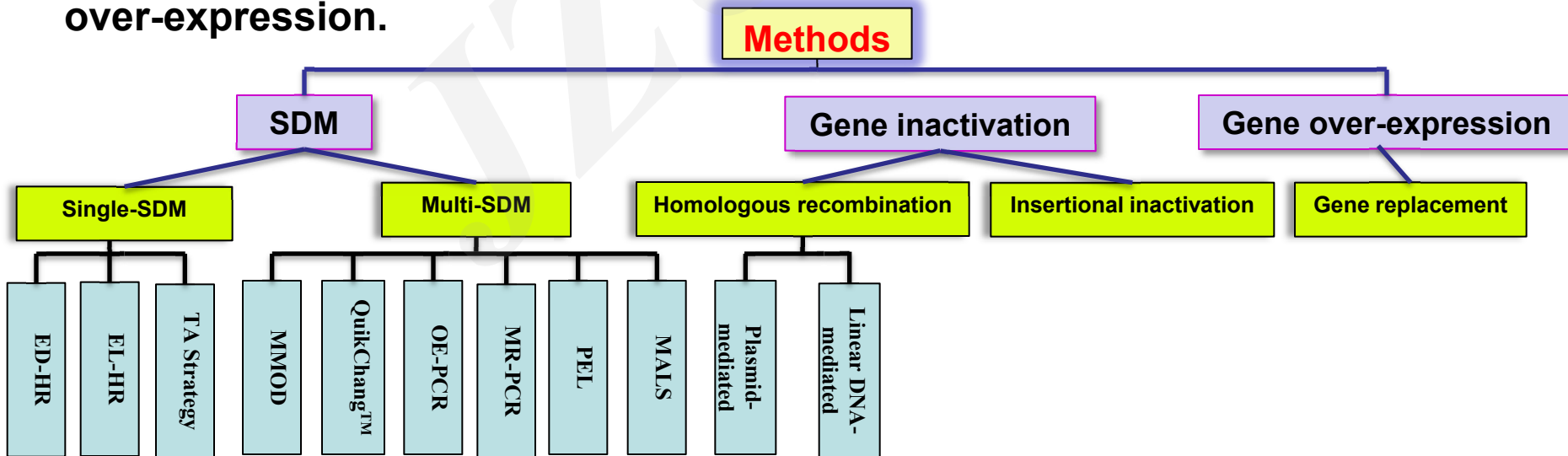
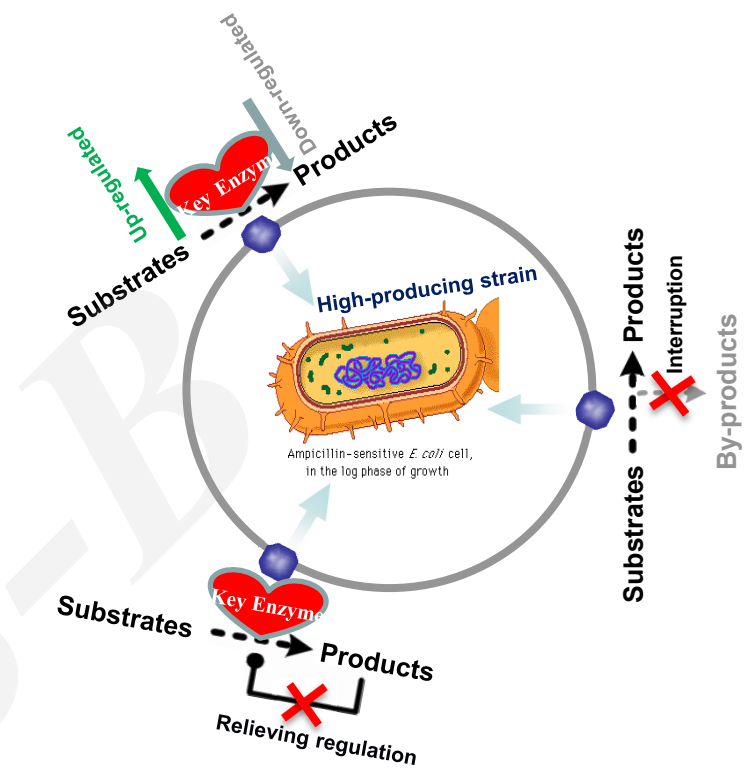


Gene over-expression

Innovation points

- **Introducing** the application of directed DNA manipulation in modifying the *E. coli* and *C. glutamicum* genome for constructing high-producing strains.

- **Summarizing** the updated research progress of DNA manipulation methods, including site-directed mutagenesis, gene inactivation and gene over-expression.



Innovation points

- **Pointing** out the protocols and the crucial aspects of this methods.

- **Emphasizing** the difference of these methods in the theoretical basis, the scope of application and the innovation points, for example Table 1.

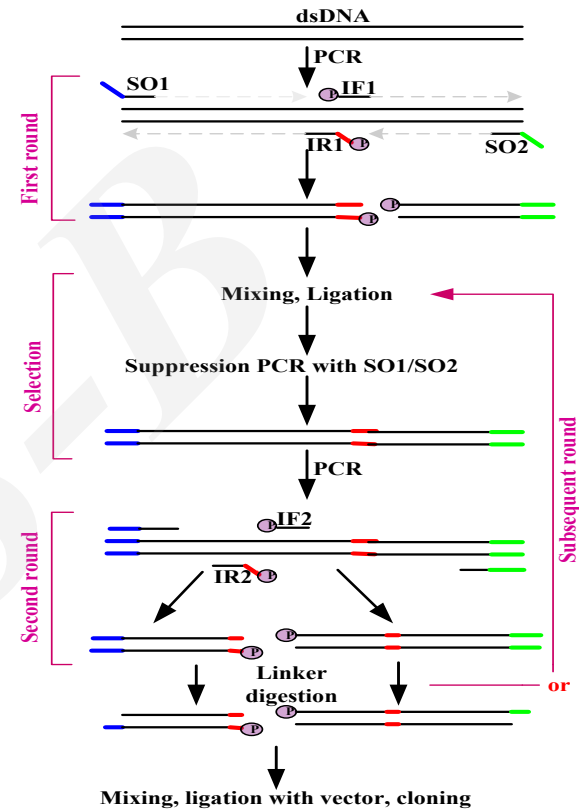


Fig. 4A

Table 1 | Comparison of above-mentioned methods in vitro SDM.