Abstract

Genetic diversity of *Streptococcus pneumoniae* (*S. pneumoniae*) causes the emergence of non-vaccine serotype pneumococcal disease. This phenomenon becomes a global concern as the disease can spread easily in the population through inhalation and close contact. *S. pneumoniae* is well known as transformable bacteria. This bacterium can undergo biological natural transformation which capable to takes up exogenous DNA by horizontal gene transfer for integration and recombination of genome. *S pneumoniae* natural transformation is aided by competence-stimulating peptide (CSP) that induces the competence of bacteria. Objective of this study was to analyse the suicide plasmid which had been used in *S. pneumoniae* for horizontal gene transfer besides this mutated for gene transfer under quorum sensing. A total of 4 search engines, inclusive of Google scholar, PubMed, Science direct and NCBI general database were browsed with specific keywords (suicide, plasmid, s. pneumoniae, transformation). A total of 58 research articles were selected and were analysed for their mention methodologies, pheroypes, types of suicide plasmid used and significance of used method for gene transfer. The data was discussed with experts before analysed. The metaanalysis of all articles revealed that a total of 8 suicide plasmids have been reported to be used for horizontal gene transfer (pID701, pAUL-A, pVA891, pEVP3, pSF151, pSF152, pSF143 and pDL278), with the pID701 to be the most common. A total of three methods have been found to be used inclusive direct transformation of a DNA based product, direct transformation of plasmid and conjugation, with the most common to be transformation using suicide plasmid. The methods are subjected to be used for CSP1 and CSP2 as two reported pherotypes. Researchers nowadays aimed to manipulate *S. pneumoniae* transformation by inserting mutated *S. pneumoniae* gene through vector, suicide plasmid which can be transferred but cannot replicate in the bacteria. The homologous recombination process occurs once the mutated gene of suicide plasmid is integrated with wild type *S. pneumoniae*. The transformation of suicide plasmid into *S. pneumoniae* was used to integrate
with host DNA without damages. To the best of our knowledge, this is first analysis summarised, all the vital crucial suicide vectors used for S. pneumoniae for the first time besides comparison of protocols for DNA transfer.

**Keywords:** S. pneumoniae, suicide plasmid, vaccination, homologous recombination, Competence-stimulating peptide, pneumococcal disease

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