Improvement of extracellular secretion efficiency of recombinant protein from Escherichia coli: signal peptide fusion, surfactants addition, and phospholipase

ABSTRACT

The secretion of heterologous proteins into Escherichia coli cell culture media offers significant advantages for downstream processing, which can avoid the production of inclusion bodies, cost and time savings, and endotoxin reduction. However, E. coli does not secrete proteins into the extracellular medium naturally or under standard laboratory conditions. For this reason, several recombinant protein secretion strategies are carried out for targeting the protein to translocate into the extracellular environment to obtain the target proteins in an optimal amount. One important component of these strategies for E. coli is the secretion of proteins across phospholipid membranes. Thus, improving its secretion efficiency in E. coli is a main challenge that must first be solved. The generated efficient strategies that have been studied for improving extracellular protein secretion in E. coli are the use of signal peptides to translocate the target proteins across the cytoplasmic membrane into the periplasmic space and release the target protein into the culture media during the secretion process, the mechanical disruption by the addition of surfactants in growth media to chemically permeabilize the cell and the coexpression systems using phospholipase C to increase membrane permeability through its phospholipid hydrolysis activity.

Keyword: Extracellular; Phospholipase C.; Protein; Signal peptide; Surfactant; Escherichia coli