Investigating the expression of recombinant protein of survivin in BL21 and C41 bacterial strains

Mahsa Tirmomenin, Farangis Ataei*, Saman Hosseinkhani

Department of Biochemistry, Faculty of Biological Sciences, Tarbiat Modares University, Tehran, Iran

Ataei_f@modares.ac.ir

ABSTRACT

One of the precise methods for producing recombinant proteins is expression in bacteria. In the last decade, producing these types of proteins has made significant progress in industry. The gram-negative bacteria Escherichia coli is known due to factors such as having an easy and cheap culture medium, short life cycle, and rapid growth and genetic expression. The main problem of this expression system is the production of non-functional proteins in the form of inclusion bodies, which unlike mammals, do not have organizations to achieve folding and post-translational motifs. To solve this problem, scientists often use methods such as changing the vector / changing the parameters of the culture medium from the recombinant host strain / changing the host, etc., to express and produce proteins at high levels. Our study focuses explicitly on survivin, the smallest protein member of the apoptosis inhibitor family. Survivin has been found in both the cytosol and mitochondria, which it is called a nuclear export signal, and it is also known as a tumor marker. Our study investigates the expression of recombinant protein (survivin) in BL21-and C41 expressing bacteria. We are particularly interested in the presence of two type inducers and comparing the expression of two bacterial strains from Escherichia coli BL21 and C41. This comparison is crucial to our research and provides valuable insights into survivin expression.

Method:

The pET-28a vector containing the wild-type survivin gene was transformed to *Escherichia coli BL21* expression and C41, separately. The expression of recombinant protein was induced with 0.5 mM IPTG and/or 4 mM lactose at the different times and temperatures (37, 30, 22, and 18 °C), in a shaker incubator. The protein expression levels were checked by 17.5% SDS PAGE gel.

Results:

Under all conditions, BL21-expressing bacteria produced protein in a significant amount of soluble form. Also, the expression of recombinant protein in the presence of IPTG inducer was greater than that of lactose as insoluble form. Also, the results showed that the expression in C41 bacteria is less than in BL21 bacteria, but higher level of protein was observed in soluble form in supernatant of lysed bacteria. This research contributed to optimizing expression parameters.

Keywords: Survivin, Expression, BL21-C41 bacteria, IPTG, Lactose