

Cloning and expression of human growth hormone in *E. coli* system

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ABSTRACT

The human growth hormone (hGH) stimulates growth, cell reproduction and regeneration in humans. Recombinant hGH (rhGH) is approved for the treatment of multiple human diseases resulting from hGH deficiency. This study aimed to produce a system for production of rhGH using E. coli and pTXB1 expression system. The open reading frame (ORF) of hGH gene includes 573 base pairs was amplified by PCR cDNA clone, using specific primers containing restriction site terminals. The product was cloned into pTXB1 expression vector and transformed into BL21 bacterial cells. The chitin-binding domain (CBD) present in the intein-tag of pTXB1, allowed for the affinity purification of the fusion protein using chitin beads. The molecular weight of the purified protein was determined by SDS-PAGE which revealed a single band at 22 kDa. The purified protein identity was verified using mass spectrometry. Large scale recombinant protein production is becoming increasingly important for applications in the field of proteomics. This study is an initial step for large scale production of purified rhGH for medicinal use as a pharmaceutical product.

Key words: Recombinant human growth hormone, protein expression, pTXB1 system.

INTRODUCTION

The human growth hormone (GH or hGH), also known as somatotropin or somatropin, is a peptide hormone that stimulates growth, cell reproduction and regeneration in humans. It is a type of mitogen which is specific to certain kinds of cells. Growth hormone is a 191-amino acid, single-chain polypeptide that is synthesized, stored, and secreted by somatotrophic cells within the lateral wings of the anterior pituitary gland (Ranabir and Reetu 2011). Genes for human growth hormone, known as growth hormone 1

(somatotropin) and growth hormone 2, are localized in the q22-24 region of chromosome 17 and are closely related to human chorionic somatomammotropin (also known as placental lactogen) genes.

The hGH is synthesized as a precursor and released into the blood following post-translational modifications (Wojtowicz-Krawiec *et al.*, 2014). The major isoform of the hGH is a protein of 191 amino acids and a molecular weight of 22,124 Daltons. The structure includes four helices necessary for functional interaction with the GH receptor (Yi *et al.*, 2002).