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EFFECTIVE PRODUCTION OF HUMAN EGF AND VEGF IN *ESCHERICHIA COLI*

Background/Aim. Recombinant Vascular Endothelial Growth Factor (rhVEGF) and Epidermal Growth Factor (rhEGF) are extremely important for biomedical research and regenerative medicine. The bacterial expression systems offer a cost-effective platform for their production; however, achievement of soluble, biologically active forms remains a significant challenge. The aim was to develop and optimize the *E. coli*-based expression systems for rhVEGF and rhEGF and to obtain both proteins in soluble, active form. **Methods.** Target genes were cloned into the pET-24b vector and expressed in *E. coli* BL21 Rosetta (DE3). Two expression induction methods, IPTG-mediated induction and autoinduction, were tested and compared for each recombinant protein. The expression profiles were analyzed by SDS-PAGE. Purification of rhEGF-His and rhVEGF-His was achieved by metal-affinity chromatography; while tag-free rhEGF was purified by ion-exchange chromatography. Biological activity of both purified rhEGF variants was assessed using a 3T3 fibroblast cell viability assay. **Results.** Both induction approaches enabled successful expression of rhVEGF and rhEGF. SDS-PAGE analysis showed that autoinduction at 37 °C yielded a higher proportion of soluble rhVEGF compared to IPTG-based induction. In contrast, IPTG-based induction at 30 °C was more effective for soluble rhEGF production. Assessment of biological activity using 3T3 fibroblasts demonstrated that both purified rhEGF preparations remained functional, with the non-tagged protein promoting cell viability approximately 30% more effectively than the His-tagged form. **Conclusions.** Autoinduction at 37 °C is the preferred strategy for production of soluble rhVEGF in the pET-24b/BL21 Rosetta system, whereas IPTG-based induction at 30 °C is more suitable for rhEGF. The successful expression and purification of rhEGF in two distinct forms were achieved, and both variants retained biological activity. The non-tagged protein demonstrated greater bioactivity than the His-tagged counterpart. These results provide a basis for scalable bacterial production of clinically relevant recombinant growth factors.

Keywords: VEGF, EGF, *Escherichia coli*, autoinduction, IPTG, pET-24b, protein purification, biological activity.

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