

**ANALISIS MIKROEKSPRESI PROTEIN ANTIGEN *TUBERCULOSIS*  
ESAT-6, Rv1196, Rv2660c, DAN Rv0125 DALAM SISTEM EKSPRESI  
*Escherichia coli* BL21(DE3)**

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**INTISARI**

*Tuberculosis* (TB) merupakan penyakit paling mematikan di dunia yang disebabkan oleh infeksi bakteri *Mycobacterium tuberculosis*. Vaksin *Bacillus Calmette-Guerin* (BCG) yang umum digunakan dinilai tidak efektif dan masih menjadi kontroversi akibat efek samping yang ditimbulkan berbeda untuk setiap orang, sehingga dibutuhkan vaksin yang lebih efektif. Penelitian ini bertujuan untuk mengoptimasi ekspresi protein imunogenik ESAT-6, Rv1196, Rv2660c, dan Rv0125 sebagai kandidat vaksin dengan variasi konsentrasi IPTG (0,3; 0,5; 0,7; 1 mM) pada *Escherichia coli* BL21(DE3). Konsentrasi IPTG memberikan pengaruh terhadap kualitas ekspresi protein yang ditunjukkan dengan ketebalan pita sehingga dapat disimpulkan ekspresi protein Rv1196 optimal dengan induksi IPTG 0,5 mM perlakuan 4 jam 37°C; Rv2660c optimal dengan induksi IPTG 0,3 mM perlakuan 4 jam 37°C. ESAT-6 dan Rv0125 tidak berhasil terekspresikan dengan baik sehingga tidak dapat ditentukan konsentrasi IPTG paling optimal.

Kata kunci: Ekspresi, Protein Antigen, *Mycobacterium tuberculosis*, *Escherichia coli* BL21(DE3), IPTG

**MICROEXPRESSION ANALYSIS OF ESAT-6, Rv1196, Rv2660c, AND Rv0125 TUBERCULOSIS COMPLEX ANTIGEN PROTEIN IN THE EXPRESSION SYSTEM OF *Escherichia coli* BL21(DE3)**

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***ABSTRACT***

Tuberculosis (TB) is the world's deadliest disease caused by infection with the bacteria *Mycobacterium tuberculosis*. The commonly used *Bacillus Calmette-Guerin* (BCG) vaccine is considered ineffective and is still controversial due to the side effects that are different for each person, so a more effective vaccine is needed. This study aims to optimize the expression of immunogenic proteins ESAT-6, Rv1196, Rv2660c, and Rv0125 as vaccine candidates with variations in IPTG concentration (0.3; 0.5; 0.7; 1 mM) in *Escherichia coli* BL21(DE3). IPTG concentration has an effect on the quality of protein expression as indicated by the thickness of the band, so it can be concluded that Rv1196 protein expression is optimal with IPTG induction of 0.5 mM treatment of 4 hours 37°C; Rv2660c is optimal with IPTG induction of 0.3 mM treatment of 4 hours 37°C. ESAT-6 and Rv0125 were not successfully expressed properly so that the most optimal IPTG concentration could not be determined.

Key words: Expression, *Mycobacterium tuberculosis*, *Escherichia coli* BL21(DE3), IPTG