

Pengujian Kandidat Oligonukloetida untuk Mendeteksi Penyakit MDR-TB = Assessment of Oligonucleotide Candidates for MDR-TB Disease Detection

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Abstrak

Tuberkulosis merupakan penyakit yang disebabkan oleh infeksi bakteri *Mycobacterium tuberculosis* dan menjadi beban global karena tingginya angka kematian. Terapi antibiotik 6 bulan menyebabkan kemungkinan adanya resistansi terhadap antibiotik lini pertama (rifampisin dan isoniazid) yang disebut sebagai Multidrug-Resistant TB (MDR-TB). Kasus MDR-TB paling banyak disebabkan oleh mutasi spontan bakteri *Mycobacterium tuberculosis* pada gen *rpoB*, gen *katG*, dan promotor *mabA-inhA*. Deteksi cepat MDR-TB bisa dilakukan dengan metode Polymerase Chain Reaction (PCR) dengan pemilihan primer yang akurat untuk mendeteksi mutasi gen *Mycobacterium tuberculosis*. Spesifitas tiga primer yang telah didesain diuji menggunakan kontrol positif DNA dan pengujian in-silico dengan BLAST. Hasil pengujian secara in-silico dan visualisasi gel elektroforesis menunjukkan primer *rpoB*, *katG*, dan *inhA* spesifik mendeteksi gen target dengan nilai E-value BLAST pada rentang 10-40–10-59. Pengujian limit deteksi primer *inhA* menunjukkan spesifitas primer bisa mendeteksi bakteri hingga konsentrasi 1 bakteri/mL. Hasil penelitian menyimpulkan primer *rpoB*, *katG*, dan *inhA* spesifik terhadap gen target mutasi dan dapat digunakan sebagai primer deteksi dini PCR.

.....Tuberculosis is a disease caused by infection with the bacterium *Mycobacterium tuberculosis* and poses a global burden due to its high mortality rate. The six-month antibiotic therapy increases the possibility of resistance to first-line antibiotics (rifampicin and isoniazid), known as Multidrug-Resistant TB (MDR-TB). Most cases of MDR-TB are caused by spontaneous mutations in *Mycobacterium tuberculosis* in the *rpoB* gene, the *katG* gene, and the *mabA-inhA* promoter. Rapid detection of MDR-TB can be done using the Polymerase Chain Reaction (PCR) method with accurately selected primers to detect mutations in *Mycobacterium tuberculosis* genes. The specificity of the three designed primers was tested using positive DNA controls and in-silico testing with BLAST. The results of in-silico testing and gel electrophoresis visualization showed that the *rpoB*, *katG*, and *inhA* primers specifically detected the target genes with BLAST E-values ranging from 10-40 to 10-59. The limit of detection testing for the *inhA* primer showed that the primer specificity could detect bacteria at concentrations as low as 1 bacterium/mL. The study concluded that the *rpoB*, *katG*, and *inhA* primers are specific to the target mutation genes and can be used as early detection primers for PCR.