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.