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A comparison of two biosensing recognition elements using SPR for the detection of drug-resistant genes

The burden of tuberculosis (TB) infections is disproportionately high in low-income and resource-limited settings. This disparity exacerbates the emergence of multidrug-resistant (MDR) and extensively drug-resistant (XDR) My-cobacterium tuberculosis (Mtb), the bacterium that causes TB. Early detection and treatment of TB remain key strategies to reduce the spread and disease progression, particularly for the detection of drug-resistant forms. There-fore, optical-based diagnostic devices could solve this problem. Surface plasmon resonance (SPR) biosensors offer various advantages including rapid analysis, high specificity, and sensitivity as well as requiring small amounts of samples for analysis. For this study, two multidrug-resistant genes, namely, catalase-peroxidase (KatG) and enoyl reductase (InhA) were detected using a custom-built surface plasmon resonance (SPR) setup. Biotinylated and thio-lated deoxyribonucleic acid (DNA) probes, specific for the two genes (KatG and InhA), were used as biorecognition elements to capture KatG and InhA target DNA. The SPR setup was used for the analysis of the binding interactions occurring on the gold-coated slides. The SPR biosensor setup indicated binding interactions through the changes in reflected intensities. The reflected intensities indicated the differences in the resonance angle between each ex-perimental test. This is the initial step to identifying the best characterization of DNA as biorecognition elements for detecting drug-resistant mutations using an SPR-based setup.

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