Production of DNA-microarray for rapid detection and diagnosis of TEM beta-lactamases resistant to extended spectrum beta-lactam antibiotics

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**SUMMARY**

The extended spectrum beta-lactamases (ESBLs) produced by many bacterial pathogens are resistant to extended-spectrum beta-lactam antibiotics by hydrolyzing the ß-lactam ring and breaking the structure of antibiotics. Of these ESBLs are TEM beta-lactamases. Nucleotide substitutions in some codons lead to amino acid changes that alters configuration of active center of beta-lactamases resulting in formation of many TEM variants resistant to broader spectrum beta-lactam antibiotics. In the present study, DNA-Microarray were fabricated for rapid detection and diagnosis of two TEM variants, namely TEM-116 anf TEM-8, by means of identification of single nucleotide polymorphisms (SNPs) at five positions in *bla*TEM-116 and *bla*TEM-8 target sequences. Based on perfect match and mismatch between oligonucleotide probes on microarray and fragments of target DNA during hybridation, the SNPs were determined and nucleotide substitutions (mutation) or conservation were also elucidated. In the *bla*TEM-116 sequence, bases G and C at SNP positions 82 and 182 were replaced by bases A and T, respectively that leads to amino acid substitutions at Val(82)Ile and Ala(182)Val, respectively. For *bla*TEM-8 gene, two bases C and G at SNP positions 162.1 and 236 were substituted by two bases A that also results in amino acid alterations at Arg(162)Ser and Gly(236)Ser, respectively.

*Keywords:* *bla*TEM, cyanine, DNA-Microarray, Extended spectrum beta-lactamases (ESBLs), perfect match and mismatch, single nucleotide polymorphisms (SNPs)

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