

Supplementary material to

CRISPR-Cas9 based electrochemical biosensor for the detection of *katG* gene mutations in isoniazid-resistant tuberculosis

Dika Apriliana Wulandari¹, Muhammad Ihda Hamli Liwaissunati Zein²,
Salma Nur Zakiyyah¹, Safri Ishmayana¹, Mehmet Ozsoz^{1,3}, Yeni Wahyuni Hartati^{1,4,*}
and Irkham^{1,4,*}

¹Departemen of Chemistry, Faculty of Mathematics and Natural Science, Universitas Padjadjaran, Sumedang 45363, Indonesia

²Department of Chemistry "Giacomo Ciamician", Alma Mater Studiorum – University of Bologna, Bologna 40126, Italy

³Department of Biomedical Engineering, Near East University, Mersin 99138, Turkey

⁴Study Center of Sensor and Green Chemistry, Faculty of Mathematics and Natural Science, Universitas Padjadjaran, Bandung 40132, Indonesia

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Table S1. The pattern of mutations in the *rpoB* gene among MDR-TB isolates from different geographical areas

Amino acid codon position	Nucleotide changes	Amino acid changes	Geographic region	Ref.
513	CAA → AAA CAA → CCA	Gln → Lys Gln → Pro	Honduras, Uganda	[1]
516	GAC → GTC	Asp → Val	China, Honduras, Iran, Romania, Uganda	
526	CAC → TGC CAC → CTC CAC → CGC CAC → TAC CAC → GAC	His → Cys His → Leu His → Arg His → Tyr His → Asp	Belarus, China, Honduras, Iran, Romania, Uganda	
531	TCG → CAG TCG → TTG TCG → TTC TCG → TGG	Ser → Gln Ser → Leu Ser → Phe Ser → Trp	Belarus, China, Honduras, Iran, Romania, Uganda	
471*	ATG → ATT	Met → Ile	Brazil (*associated with other mutated codons)	
475*	GTG → GGG	Val → Gly		
508*	ACC → CCC	Thr → Pro		
511	CTG → CCG	Leu → Pro		
513	CAA → CCA	Gln → Pro		
516	GAC → GTC	Asp → Val		
522*	TCG → TTC	Ser → Phe		
526	CAC → GAC CAC → TAC CAC → CGC CAC → TGC CAC → AAC	His → Asp His → Tyr His → Arg His → Cys His → Asn		
531	TCG → TTG TCG → TGG	Ser → Leu Ser → Trp		
533	CTG → CCG	Leu → Pro		
539*	TCA → TTC	Ser → Phe		
545	CTG → CCG	Leu → Pro		

Amino acid codon position	Nucleotide changes	Amino acid changes	Geographic region	Ref.
510	CAG → CCG	Gln → Arg	Myanmar	[3]
513	CAA → CCA	Gln → Pro		
516	GAC → GTC	Asp → Val		
	GAC → TAC	Asp → Tyr		
517	CAG → CCG	Gln → Pro		
526	CAC → TAC	His → Tyr		
	CAC → GAC	His → Asp		
	CAC → CGC	His → Arg		
	CAC → CTC	His → Leu		
531	TCG → TTG	Ser → Leu		
	TCG → TGG	Ser → Trp		
	TCG → TTT	Ser → Phe		
533	CTG → CCG	Leu → Pro	Indonesia (Central Java)	[4]
490	CAA → AAA	Gln → Lys		
511	CTG → CGG	Leu → Arg		
513	CAA → GAA	Gln → Glu		
	CAA → CCA	Gln → Pro		
516	GAC → GTC	Asp → Val		
526	CAC → CTC	His → Leu		
	CAC → TGC	His → Cys		
	CAC → TCC	His → Ser		
	CAC → TAC	His → Tyr		
531	TCG → TTG	Ser → Leu		
	TCG → CTG	Ser → Leu		
535	CCC → CAC	Pro → His	Vietnam	[5]
430	CTC → CCC	Leu → Pro		
432	CAG → AAG	Gln → Lys		
445	CAC → CTC	His → Leu		
446	AAG → CAG	Lys → Gln		
450	TCG → CTG	Ser → Leu		
452	CTC → CCC	Leu → Pro		
505	TTC → CTC	Phe → Leu		
513	CAA → GAA	Gln → Glu		
516	GAC → GTC	Asp → Val		
	GAC → TAC	Asp → Tyr		
	GAC → TTC	Asp → Phe		
522	TCG → GTG	Ser → Val	Zambia	[6]
526	CAC → TAC	His → Tyr		
	CAC → GAC	His → Asp		
	CAC → CTC	His → Leu		
	CAC → TGC	His → Cys		
531	TCG → TTG	Ser → Val		
	TCG → TGG	Ser → Leu		
	TCG → TTC	Ser → Phe		
516	GAC → GTC	Asp → Val		
526	CAC → AAC	His → Asn		
	CAC → GAC	His → Asp		
	CAC → TAC	His → Tyr		
531	TCG → TTG	Ser → Leu	Thailand (western region)	[7]
	TCG → TGG	Ser → Trp		
533	CTG → CCC	Leu → Pro	Thailand (northern region)	[8]
516	GAC → GTC	Asp → Val		
522	TCG → TTG	Ser → Val		
526	CAC → CGC	His → Arg		
	CAC → GAC	His → Asp		
	CAC → TAC	His → Tyr		
531	TCG → TTG	Ser → Leu		

Amino acid codon position	Nucleotide changes	Amino acid changes	Geographic region	Ref.
531	TCG → TTG	Ser → Leu	Pakistan	[9]
459	CTG → CGG	Leu → Arg		
463	CAG → CAC	Gln → His		
511	CTG → CCG	Leu → Pro		
513	CAA → CCA	Gln → Pro		
	CAA → CTA	Gln → Leu		
515	ATG → CTG	Met → Leu		
516	GAC → TAC	Asp → Tyr		
	GAC → GTC	Asp → Val		
522	TCG → TTG	Ser → Leu		
526	CAC → TAC	His → Tyr	China (eastern region)	[10]
	CAC → AAC	His → Asn		
	CAC → GAC	His → Asp		
	CAC → CGC	His → Arg		
	CAC → CTC	His → Leu		
	CAC → CAG	His → Gln		
531	TCG → TTG	Ser → Leu		
533	CTG → CCC	Leu → Pro		

Table S2. The pattern of mutations in the *katG* gene among MDR-TB isolates from different geographical areas

Amino acid codon position	Nucleotide changes	Amino acid changes	Geographic region	Ref.	
300	TGG → GGG	Trp → Gly	Iran	[1]	
315	AGC → ACC	Ser → Thr	Belarus, China, Honduras, Iran, Romania, Uganda		
	AGC → AAC	Ser → Asn			
	AGC → ATC	Ser → Ile			
	AGC → AGA	Ser → Arg			
385	CGG → CCG	Arg → Pro	Iran	[2]	
434	CAG → CCG	Gln → Pro	Uganda		
446	AGC → CGC	Ser → Arg	China		
315	AGC → ACC	Ser → Thr	Brazil		
	AGC → AAC	Ser → Asn			
	AGC → ACA	Ser → Thr			
	AGC → ATC	Ser → Ile			
463	CGG → CTG	Arg → Leu	India, Moldova, Filipina	[11]	
315	AGC → ACC	Ser → Thr			
285	GGC → CGC	Gly → Arg			
315	AGC → ACC	Ser → Thr			Myanmar
	AGC → AAC	Ser → Asn			
	AGC → ATC	Ser → Ile			
191	TGG → CGG	Trp → Arg	Vietnam	[5]	
234	GGC → CGC	Gly → Arg			
315	AGC → ACC	Ser → Thr			
315	AGC → ACC	Ser → Thr	Zambia	[6]	
	AGC → AAC	Ser → Asn			
329	GAC → GAA	Asp → Glu	Thailand (western region)	[7]	
315	AGC → ACC	Ser → Thr			
315	AGC → ACC	Ser → Thr	Thailand (northern region)	[8]	
299	GGC → AGC	Gly → Ser	Pakistan	[9]	
315	AGC → ACC	Ser → Thr			
241	CCC → CGC	Pro → Arg			
289	GAG → GGG	Glu → Gly	China (eastern region)	[10]	
391	GCT → GTT	Ala → Val			
315	AGC → ACC	Ser → Thr			

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