

- Multidrug-Resistant Tuberculosis [J]. *J Clin Microbiol*, 2003, 41 (3) : 1235–1239.
- [9] ZHENG C, LI S, LUO Z, et al. Mixed Infections and Rifampin Heteroresistance among *Mycobacterium tuberculosis* Clinical Isolates [J]. *J Clin Microbiol*, 2015, 53 (7) : 2138–2147. DOI: 10.1128/JCM.03507-14.
- [10] FORD C, YUSIM K, IOERGER T, et al. Mycobacterium tuberculosis—heterogeneity revealed through whole genome sequencing [J]. *Tuberculosis (Edinb)*, 2012, 92 (3) : 194–201. DOI: 10.1016/j.tube.2011.11.003.
- [11] MANKIEWICZ E, LIIVAK M. Phage types of mycobacterium tuberculosis in cultures isolated from Eskimo patients [J]. *Am Rev Respir Dis*, 1975, 111 (3) : 307–312.
- [12] VAN RIE A, VICTOR T C, RICHARDSON M, et al. Reinfestation and mixed infection cause changing *Mycobacterium tuberculosis* drug-resistance patterns [J]. *Am J Respir Crit Care Med*, 2005, 172 (5) : 636–642.
- [13] ZETOLA N M, SHIN S S, TUMEDI K A, et al. Mixed *Mycobacterium tuberculosis* complex infections and false-negative results for rifampin resistance by GeneXpert MTB/RIF are associated with poor clinical outcomes [J]. *J Clin Microbiol*, 2014, 52 (7) : 2422–2429. DOI: 10.1128/JCM.02489-13.
- [14] ZHANG X, ZHAO B, HUANG H, et al. Co-occurrence of amikacin-resistant and -susceptible *Mycobacterium tuberculosis* isolates in clinical samples from Beijing, China [J]. *J Antimicrob Chemother*, 2013, 68 (7) : 1537–1542. DOI: 10.1093/jac/dkt082.
- [15] 刘永安, 李学瑞, 刘永生. 结核分枝杆菌耐药机制与检测技术研究进展 [J]. 中国畜牧兽医, 2017, 44 (6) : 1884–1889. DOI: 10.16431/j.cnki.1671-7236.2017.06.043
- [16] KUMAR P, BALOONI V, SHARMA B K, et al. High degree of multi-drug resistance and hetero-resistance in pulmonary TB patients from Punjab state of India [J]. *Tuberculosis (Edinb)*, 2014, 94 (1) : 73–80. DOI: 10.1016/j.tube.2013.10.001.
- [17] VAN DEUN A, AUNG K J, BOLA V, et al. Rifampin drug resistance tests for tuberculosis: challenging the gold standard [J]. *J Clin Microbiol*, 2013, 51 (8) : 2633–2640. DOI: 10.1128/JCM.00553-13.
- [18] ZHANG Z, WANG Y, PANG Y, et al. Comparison of different drug susceptibility test methods to detect rifampin heteroresistance in *Mycobacterium tuberculosis* [J]. *Antimicrob Agents Chemother*, 2014, 58 (9) : 5632–5635. DOI: 10.1128/AAC.02778-14.
- [19] VAN DEUN A, BARRERA L, BASTIAN I, et al. *Mycobacterium tuberculosis* strains with highly discordant rifampin susceptibility test results [J]. *J Clin Microbiol*, 2009, 47 (11) : 3501–3506. DOI: 10.1128/JCM.01209-09.
- [20] CHAN R C, HUI M, CHAN E W, et al. Genetic and phenotypic characterization of drug-resistant *Mycobacterium tuberculosis* isolates in Hong Kong [J]. *J Antimicrob Chemother*, 2007, 59 (5) : 866–873.
- [21] ZHANG Z, WANG Y, PANG Y, et al. Ethambutol resistance as determined by broth dilution method correlates better than sequencing results with embB mutations in multidrug-resistant *Mycobacterium tuberculosis* isolates [J]. *J Clin Microbiol*, 2014, 52 (2) : 638–641. DOI: 10.1128/JCM.02713-13.
- [22] FOLKWARDSEN D B, SVENSSON E, THOMSEN V Ø, et al. Can molecular methods detect 1% isoniazid resistance in *Mycobacterium tuberculosis*? [J]. *J Clin Microbiol*, 2013, 51 (5) : 1596–1599. DOI: 10.1128/JCM.00472-13.
- [23] MAYER C, TAKIFF H. The Molecular Genetics of Fluoroquinolone Resistance in *Mycobacterium tuberculosis* [J]. *Microbiol Spectr*, 2014, 2 (4) : MGM2-0009–2013. DOI: 10.1128/microbiolspec.MGM2-0009-2013.
- [24] EILERTSON B, MARURI F, BLACKMAN A, et al. High proportion of heteroresistance in gyrA and gyrB in fluoroquinolone-resistant *Mycobacterium tuberculosis* clinical isolates [J]. *Antimicrob Agents Chemother*, 2014, 58 (6) : 3270–3275. DOI: 10.1128/AAC.02066-13.
- [25] SUN G, LUO T, YANG C, et al. Dynamic population changes in *Mycobacterium tuberculosis* during acquisition and fixation of drug resistance in patients [J]. *J Infect Dis*, 2012, 206 (11) : 1724–1733. DOI: 10.1093/infdis/jis601.
- [26] KARAHAN Z C, AKAR N. Restriction endonuclease analysis as a solution for determining rifampin resistance mutations by automated DNA sequencing in heteroresistant *Mycobacterium tuberculosis* strains [J]. *Microb Drug Resist*, 2005, 11 (2) : 137–140.
- [27] DE OLIVEIRA M M, DA SILVA ROCHA A, CARDOSO OELEMANN M, et al. Rapid detection of resistance against rifampicin in isolates from Brazilian patients using a reverse-phase hybridization assay [J]. *J Microbiol Methods*, 2003, 53 (3) : 335–342.
- [28] ENGSTRÖM A, HOFFNER S, JURÉEN P. Detection of heteroresistant *Mycobacterium tuberculosis* by pyrosequencing [J]. *J Clin Microbiol*, 2013, 51 (12) : 4210–4212. DOI: 10.1128/JCM.01761-13.
- [29] KÖSER C U, FEUERRIEGEL S, SUMMERS D K, et al. Importance of the genetic diversity within the *Mycobacterium tuberculosis* complex for the development of novel antibiotics and diagnostic tests of drug resistance [J]. *Antimicrob Agents Chemother*, 2012, 56 (12) : 6080–6087. DOI: 10.1128/AAC.01641-12.
- [30] FOLKWARDSEN D B, THOMSEN V Ø, RIGOUTS L, et al. Rifampin heteroresistance in *Mycobacterium tuberculosis* cultures as detected by phenotypic and genotypic drug susceptibility test methods [J]. *J Clin Microbiol*, 2013, 51 (12) : 4220–4222. DOI: 10.1128/JCM.01602-13.
- [31] PANG Y, LIU G, WANG Y, et al. Combining COLD-PCR and high-resolution melt analysis for rapid detection of low-level, rifampin-resistant mutations in *Mycobacterium tuberculosis* [J]. *J Microbiol Methods*, 2013, 93 (1) : 32–36. DOI: 10.1016/j.mimet.2013.01.008.
- [32] GAO X, LI J, LIU Q, et al. Heteroresistance in *Mycobacterium tuberculosis* is an important factor for the inconsistency between the results of phenotype and genotype drug susceptibility tests [J]. *Chin J Tuberc Respir Dis*, 2014, 37 (4) : 260–265.
- [33] MARTÍN A, HERRANZ M, NAVARRO Y, et al. Evaluation of