

Supplemental Content

References

- 30s. Lindback, E., B. Gharizadeh, F. Ataker, et al., *DNA gyrase gene in Neisseria gonorrhoeae as indicator for resistance to ciprofloxacin and species verification*. Int J STD AIDS, 2005. **16**(2): p. 142-7.
- 31s. Tanaka, M., K. Takahashi, T. Saika, et al., *Development of fluoroquinolone resistance and mutations involving GyrA and ParC proteins among Neisseria gonorrhoeae isolates in Japan*. J Urol, 1998. **159**(6): p. 2215-9.
- 32s. Magooa, M.P., E.E. Muller, L. Gumede, et al., *Determination of Neisseria gonorrhoeae susceptibility to ciprofloxacin in clinical specimens from men using a real-time PCR assay*. Int J Antimicrob Agents, 2013. **42**(1): p. 63-7.
- 33s. Siedner, M.J., M. Pandori, L. Castro, et al., *Real-time PCR assay for detection of quinolone-resistant Neisseria gonorrhoeae in urine samples*. J Clin Microbiol, 2007. **45**(4): p. 1250-4.
- 34s. Li, Z., S. Yokoi, Y. Kawamura, et al., *Rapid detection of quinolone resistance-associated gyrA mutations in Neisseria gonorrhoeae with a LightCycler*. J Infect Chemother, 2002. **8**(2): p. 145-50.
- 35s. Hemarajata, P., S. Yang, O.O. Soge, et al., *Performance and Verification of a Real-Time PCR Assay Targeting the gyrA Gene for Prediction of*

- Ciprofloxacin Resistance in Neisseria gonorrhoeae*. J Clin Microbiol, 2016. **54**(3): p. 805-8.
- 36s. Peterson, S.W., I. Martin, W. Demczuk, et al., *Molecular Assay for Detection of Ciprofloxacin Resistance in Neisseria gonorrhoeae Isolates from Cultures and Clinical Nucleic Acid Amplification Test Specimens*. J Clin Microbiol, 2015. **53**(11): p. 3606-8.
- 37s. Zhao, L. and S. Zhao, *TaqMan real-time quantitative PCR assay for detection of fluoroquinolone-resistant Neisseria gonorrhoeae*. Curr Microbiol, 2012. **65**(6): p. 692-5.
- 38s. Vernel-Pauillac, F., T.R. Hogan, J.W. Tapsall, et al., *Quinolone resistance in Neisseria gonorrhoeae: rapid genotyping of quinolone resistance-determining regions in gyrA and parC genes by melting curve analysis predicts susceptibility*. Antimicrob Agents Chemother, 2009. **53**(3): p. 1264-7.
- 39s. Vernel-Pauillac, F., E.H. Ratsima, B. Guillard, et al., *Correlation between antibiotic susceptibilities and genotypes in Neisseria gonorrhoeae from different geographical origins: determinants monitoring by real-time PCR as a complementary tool for surveillance*. Sex Transm Infect, 2010. **86**(2): p. 106-11.
- 40s. Buckley, C., E. Tremblizki, B. Donovan, et al., *A real-time PCR assay for direct characterization of the Neisseria gonorrhoeae GyrA 91 locus associated with ciprofloxacin susceptibility*. J Antimicrob Chemother, 2016. **71**(2): p. 353-6.

- 41s. Dona, V., S. Kasraian, A. Lupo, et al., *Multiplex Real-Time PCR Assay with High-Resolution Melting Analysis for Characterization of Antimicrobial Resistance in Neisseria gonorrhoeae*. J Clin Microbiol, 2016. **54**(8): p. 2074-81.
- 42s. Pond, M.J., C.L. Hall, V.F. Miari, et al., *Accurate detection of Neisseria gonorrhoeae ciprofloxacin susceptibility directly from genital and extragenital clinical samples: towards genotype-guided antimicrobial therapy*. J Antimicrob Chemother, 2016. **71**(4): p. 897-902.
- 43s. Trembizki, E., N. Guy, R. Donovan, B. Kaldor, J. Lahra, M. Whiley, D, and GRAND study investigators, *Further evidence to support the individualised treatment of gonorrhoea with ciprofloxacin*. The Lancet, 2016. **16**(9): p. 981-1084.
- 44s. Deguchi, T., M. Yasuda, M. Nakano, et al., *Quinolone-resistant Neisseria gonorrhoeae: correlation of alterations in the GyrA subunit of DNA gyrase and the ParC subunit of topoisomerase IV with antimicrobial susceptibility profiles*. Antimicrob Agents Chemother, 1996. **40**(4): p. 1020-3.
- 45s. Ilina, E.N., V.A. Vereshchagin, A.D. Borovskaya, et al., *Relation between genetic markers of drug resistance and susceptibility profile of clinical Neisseria gonorrhoeae strains*. Antimicrob Agents Chemother, 2008. **52**(6): p. 2175-82.
- 46s. Horii, T., A. Monji, K. Uemura, et al., *Rapid detection of fluoroquinolone resistance by isothermal chimeric primer-initiated amplification of nucleic*

- acids from clinical isolates of Neisseria gonorrhoeae.* J Microbiol Methods, 2006. **65**(3): p. 557-61.
- 47s. Uthman, A., C. Heller-Vitouch, A. Stary, et al., *High-frequency of quinolone-resistant Neisseria gonorrhoeae in Austria with a common pattern of triple mutations in GyrA and ParC genes.* Sex Transm Dis, 2004. **31**(10): p. 616-8.
- 48s. Dewi, B.E., S. Akira, H. Hayashi, et al., *High occurrence of simultaneous mutations in target enzymes and MtrRCDE efflux system in quinolone-resistant Neisseria gonorrhoeae.* Sex Transm Dis, 2004. **31**(6): p. 353-9.
- 49s. Giles, J.A., J. Falconio, J.D. Yuenger, et al., *Quinolone resistance-determining region mutations and por type of Neisseria gonorrhoeae isolates: resistance surveillance and typing by molecular methodologies.* J Infect Dis, 2004. **189**(11): p. 2085-93.
- 50s. Sultan, Z., S. Nahar, B. Wretlind, et al., *Comparison of mismatch amplification mutation assay with DNA sequencing for characterization of fluoroquinolone resistance in Neisseria gonorrhoeae.* J Clin Microbiol, 2004. **42**(2): p. 591-4.
- 51s. Chaudhry, U., K. Ray, M. Bala, et al., *Mutation patterns in gyrA and parC genes of ciprofloxacin resistant isolates of Neisseria gonorrhoeae from India.* Sex Transm Infect, 2002. **78**(6): p. 440-4.
- 52s. Shigemura, K., T. Shirakawa, H. Okada, et al., *Rapid detection of gyrA and parC mutations in fluoroquinolone-resistant Neisseria gonorrhoeae by*

- denaturing high-performance liquid chromatography.* J Microbiol Methods, 2004. **59**(3): p. 415-21.
- 53s. Tanaka, M., T. Matsumoto, M. Sakumoto, et al., *Reduced clinical efficacy of pazufloxacin against gonorrhea due to high prevalence of quinolone-resistant isolates with the GyrA mutation. The Pazufloxacin STD Group.* Antimicrob Agents Chemother, 1998. **42**(3): p. 579-82.
- 54s. Tanaka, M., H. Nakayama, M. Haraoka, et al., *Susceptibilities of Neisseria gonorrhoeae isolates containing amino acid substitutions in GyrA, with or without substitutions in ParC, to newer fluoroquinolones and other antibiotics.* Antimicrob Agents Chemother, 2000. **44**(1): p. 192-5.
- 55s. Deguchi, T., M. Yasuda, M. Nakano, et al., *Rapid detection of point mutations of the Neisseria gonorrhoeae gyrA gene associated with decreased susceptibilities to quinolones.* J Clin Microbiol, 1996. **34**(9): p. 2255-8.
- 56s. Tanaka, M., H. Nakayama, M. Haraoka, et al., *Antimicrobial resistance of Neisseria gonorrhoeae and high prevalence of ciprofloxacin-resistant isolates in Japan, 1993 to 1998.* J Clin Microbiol, 2000. **38**(2): p. 521-5.
- 57s. Lindback, E., M. Rahman, S. Jalal, et al., *Mutations in gyrA, gyrB, parC, and parE in quinolone-resistant strains of Neisseria gonorrhoeae.* APMIS, 2002. **110**(9): p. 651-7.
- 58s. Gharizadeh, B., M. Akhras, M. Unemo, et al., *Detection of gyrA mutations associated with ciprofloxacin resistance in Neisseria gonorrhoeae by rapid*

- and reliable pre-programmed short DNA sequencing.* Int J Antimicrob Agents, 2005. **26**(6): p. 486-90.
- 59s. Lindback, E., M. Unemo, M. Akhras, et al., *Pyrosequencing of the DNA gyrase gene in Neisseria species: effective indicator of ciprofloxacin resistance in Neisseria gonorrhoeae.* APMIS, 2006. **114**(12): p. 837-41.
- 60s. Grad, Y.H., S.R. Harris, R.D. Kirkcaldy, et al., *Genomic epidemiology of gonococcal resistance to extended spectrum cephalosporins, macrolides, and fluoroquinolones in the US, 2000-2013.* J Infect Dis, 2016.