The rise of fluoroquinolone-resistant
*Neisseria gonorrhoeae*

Implications for treatment guidelines

David Farhi, Nicolas Dupin

Department of Dermatology and Venereology, Cochin Hospital, APHP, Faculté de Médecine Paris V, Paris, France

*Neisseria gonorrhoeae* (NG) is a gram-negative diplococcus, responsible for an acute sexually transmitted infection. NG infections may involve urethral, cervical, anorectal and pharyngeal sites. Complications include epididymoorchitis, pelvic inflammatory disease (endometritis, salpingitis), keratoconjunctivitis, tenosynovitis, septic arthritis, sepsis, endocarditis and meningitis. Untreated NG infection can lead to infertility, ectopic pregnancy and chronic pelvic pain [1]. In addition, NG infection increases the risk of HIV transmission.

The ideal treatment of NG infection should be safe, effective in 95% of the cases, affordable and available as a single-dose regimen. Ominously, since two decades, the array of antimicrobial agents that match up with these criteria has steadily decreased. Penicillinase producing NG was first reported in the United States in 1976 and since 1986 penicillin is no longer recommended for the treatment of NG. Similarly, high rates of tetracycline resistance have rendered this therapeutic option obsolescent since the early 1990s. Fluoroquinolone-resistant NG (FRNG) was first reported in 1992 in Australia [2], in 1994 in the United Kingdom [3] and in 1995 in the United States [4]. By 2004, rates of FRNG of 15% or higher have been reported in North America, Europe, Africa, Oceania and Asia [1]. In Western Europe, a prevalence of 30% FRNG has been reported in several countries. For instance, recent published rates of FRNG were 30% in France (2004) [5], 48% in Germany (2004) [6] and 59% in Austria (2002) [7].

Several mechanisms of antimicrobial resistance of NG have been described, and the corresponding genetic mutations seem chiefly chromosomally mediated. The key genes for quinolone resistance are GyrA and ParC, respectively encoding for bacterial DNA gyrase and topoisomerase IV. These enzymes, crucial for DNA synthesis and thus for bacterial growth, are blocked by quinolones. Several patterns of mutations of both enzymes have been associated with FRNG worldwide, with high geographical diversity [7].

In this issue of the Journal, Le Lin et al evaluated the rate of FRNG among cases of gonorrhoea infections reported by the network of laboratories in Geneva between 2002 and 2005. Consistent with international guidelines, FRNG were defined by a minimum inhibitory concentration >1 mg/L. Among 91 isolates, the rate of FRNG was 25% over the period 2002–2005, with a steep increase from 7% in 2002 to 47% in 2005. In addition, between 2002 and 2005 3% of the strains were intermediately resistant to ciprofloxacin. In multivariate analysis, the only factor significantly associated with FRNG was a history of sexual contact outside of Switzerland (OR: 7.0; 95% CI: 1.99–24.6, P <0.01).

In accordance with the World Health Organization recommendation that an antimicrobial associated with a resistance of 5% of strains should be abandoned, fluoroquinolones are no longer recommended for the treatment of NG in the United States since 2004 in men who have sex with men (MSM), and in the general population since 2007 [8]. Similarly, since 2005 in France, fluoroquinolones are no longer recommended as the first line treatment of NG in the general population [9]. The study of Le Lin et al brings further evidence that ciprofloxacin should be avoided in the first line treatment of gonorrhoea in Europe. Therefore, the main first line option is now represented by third generation cephalosporins, with ceftriaxone remaining the gold standard. However, in non pharyngeal gonorrhoea, oral cephalosporins such as cefixime are a reasonable option. In patients allergic to cephalosporins, treatment may rely on spectinomycin and azithromycin, since high cure rates – of 98% and 99%, respectively – have been reported in several studies [1].

**Key words:** *Neisseria gonorrhoeae*; antimicrobial resistance; ciprofloxacin; quinolones; men having sex with men; HIV
The rise of fluoroquinolone-resistant *Neisseria gonorrhoeae*

References


The many reasons why you should choose SMW to publish your research

**What Swiss Medical Weekly has to offer:**

- SMW’s impact factor has been steadily rising. The 2006 impact factor is 1.346.
- Open access to the publication via the Internet, therefore wide audience and impact
- Rapid listing in Medline
- LinkOut-button from PubMed with link to the full text website http://www.smw.ch (direct link from each SMW record in PubMed)
- No-nonsense submission – you submit a single copy of your manuscript by e-mail attachment
- Peer review based on a broad spectrum of international academic referees
- Assistance of professional statisticians for every article with statistical analyses
- Fast peer review, by e-mail exchange with the referees
- Prompt decisions based on weekly conferences of the Editorial Board
- Prompt notification on the status of your manuscript by e-mail
- Professional English copy editing

**International Advisory Committee**

Prof. K. E. Juhani Airaksinen, Turku, Finland
Prof. Anthony Bayes de Luna, Barcelona, Spain
Prof. Hubert E. Blum, Freiburg, Germany
Prof. Walter E. Haefeli, Heidelberg, Germany
Prof. Nino Kuenzli, Los Angeles, USA
Prof. René Lutter, Amsterdam, The Netherlands
Prof. Claude Martin, Marseille, France
Prof. Josef Patsch, Innsbruck, Austria
Prof. Luigi Tavazzi, Pavia, Italy

We evaluate manuscripts of broad clinical interest from all specialities, including experimental medicine and clinical investigation.

We look forward to receiving your paper!

**Guidelines for authors:**
http://www.smw.ch/set_authors.html

**All manuscripts should be sent in electronic form, to:**

EMH Swiss Medical Publishers Ltd.
SMW Editorial Secretariat
Farnburgerstrasse 8
CH-4132 Muttenz

Manuscripts: submission@smw.ch
Letters to the editor: letters@smw.ch
Editorial Board: red@smw.ch
Internet: http://www.smw.ch