SHORT ARTICLE

Failure of Mycoplasma pneumoniae infection to confer protection against Mycoplasma genitalium: observations from a mouse model

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Mycoplasma pneumoniae and M. genitalium are genomically distinct but share antigens that induce some serological cross-reactivity. Therefore, the possibility that \textit{M. pneumoniae} infection of the human respiratory tract might provide immunity to \textit{M. genitalium} infection of the genital tract was considered. Because of the difficulty of assessing this proposition in man, it was evaluated experimentally in a mouse model. Female BALB/c mice were susceptible to infection of the vagina with \textit{M. pneumoniae}, whereas those infected previously in the oropharynx with \textit{M. pneumoniae} were completely immune to infection of the vagina with this mycoplasma. However, all mice with such a respiratory tract infection were susceptible to infection of the vagina with \textit{M. genitalium}. The findings suggest that an \textit{M. pneumoniae} infection of the human respiratory tract is unlikely to influence infection of the genital tract by \textit{M. genitalium}.

Introduction

\textit{Mycoplasma pneumoniae} is a well-known human pathogen that infects early in life, often without causing overt disease at this time [1]. Re-infection during adolescence or in later life results in a spectrum of respiratory disease, sometimes culminating in pneumonia [1]. \textit{M. genitalium}, discovered two decades ago [2], is strongly associated with non-gonococcal urethritis, in a manner largely independent of \textit{Chlamydia trachomatis} [3]. Although this mycoplasma has been recovered from the respiratory tract, together with \textit{M. pneumoniae} [4], its predilection is apparently for the genital tract. \textit{M. pneumoniae} and \textit{M. genitalium} are genomically distinct, but they have a similar morphology, similar metabolic features and share various antigens that induce some serological cross-reactivity [5]. Therefore, it is plausible that resistance to genital tract infection with \textit{M. genitalium} might occur in man as a consequence of previous respiratory infection with \textit{M. pneumoniae}, particularly as the latter infection is very likely to occur first.

Earlier studies in a murine model showed that experimental infection of the oropharynx with \textit{M. pneumoniae} protects partially against re-infection of the oropharynx and, more strikingly, protects completely against subsequent attempted infection of the genital tract with this mycoplasma [6]. It is also possible to infect the genital tract of mice with \textit{M. genitalium} [7], so that this small animal model can be used to determine whether a respiratory tract infection with \textit{M. pneumoniae} might protect the genital tract against infection with \textit{M. genitalium}.

Materials and methods

Mice

Female BALB/c mice (6–8 weeks old) were screened for, and considered to be free of, indigenous mycoplasmas before being caged in groups of five. They were inoculated subcutaneously with progesterone (Depo-Provera; Upjohn Ltd) 2.5 mg in a 0.1-ml volume on four occasions, at weekly intervals [6].

Media

The glucose-containing medium used for the cultivation of \textit{M. pneumoniae} or its isolation from murine specimens has been described previously [8], as has the medium (SP4) for the cultivation of \textit{M. genitalium} [9].

Experimental procedures

Mice, anaesthetised by an intraperitoneal injection of a mixture of Hypnorm and Hypnol, were inoculated
intranasally with 50 μl of medium containing 2.5 × 10^7 colour-changing units (ccu) of M. pneumoniae strain NY12763 [6]. Unanaesthetised mice were inoculated intravaginally, immediately after the second inoculation of hormone, with 50 μl of medium containing the same strain of M. pneumoniae (2.5 × 10^7 ccu) or M. genitalium strain G37 (2.5 × 10^6 ccu).

Throat and vaginal specimens were collected as described previously [6], with a nasopharyngeal swab which was rotated to abrade epithelial cells, and the contents were expressed in 1.8 ml of glucose-contain-
ing mycoplasmal broth medium. M. pneumoniae organisms were detected and their number estimated as described previously [6] and M. genitalium organ-
isms were detected by means of a specific PCR assay, also as described previously [10].

Results and discussion

All of 10 hitherto un inoculated mice became infected in the vagina after intravaginal challenge with M. pneumoniae, the organisms persisting in large numbers (10^5–10^7 ccu) for at least 35 days. Another 10 mice became infected in the oropharynx with M. pneumo-

References

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