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**Rhodococcus Equi Pneumonia: Treatment Strategies**

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*Rhodococcus equi* (R. equi) pneumonia causes sporadically or endemically high losses in foals and consequently economic losses in breeding farms because of high morbidity and mortality. *R. equi* is a gram positive bacterium (Actinomycetales, group of mycolata, genus Rhodococcus) with a lipid-rich cell envelope. This cell envelope forms a permeability barrier to hydrophilic compounds and influences the resistance against many antibiotics. The mucolique acid-rich cell envelope provides furthermore the ability to survive and proliferate in the macrophages of foals. The gross lesions induced by *R. equi* in the lung of foals are multiple firm nodules that can merge in later course of disease. In some foals miliary pyogranulomatous lesions are observed (Martens et al. 1982).

When the diagnosis of *R. equi* pneumonia is made the antimicrobial treatment should be started as soon as possible. The choice of appropriate drugs is restricted to those showing the ability to penetrate into the lipid-rich membrane of pulmonary abscesses and into the macrophages. So although many antimicrobial agents reduce the growth of *R. equi* in vitro, this does not correlate to an efficacy in vivo. Consequently only lipophilic antimicrobials should be used to treat affected foals. A combination of Rifampin twice daily (10 mg/kg p.o.) with a macrolid antibiotic is the most effective treatment and has reduced the losses of foals dramatically. In the past, erythromycin was used but the adverse effects (colitis in foal and mare) are frequent and occasionally life-threatening (Stratton-Phelbs et al. 2000). Close related and new macrolids have been evaluated and used in the last 10 years and are much more appropriate. Azithromycin, clarithromycin and tulathromycin are all well tolerated and have been shown to reach and keep a high concentration in alveolar macrophages of foals (Jacks et al. 2001, Scheuch et al. 2007). Azithromycin is an azalide given once daily (10 mg/kg p.o.) and clarithromycin is a semisynthetic macrolid given twice daily (7.5 mg/kg p.o.).

The efficacy of erythromycin, azithromycin and clarithromycin in the treatment of foals with *R. equi* pneumonia has been compared in a retrospective study (Giguère et al. 2004). All foals except one in the azithromycin group were treated concurrently with rifampin. The results indicated that clarithromycin/rifampin was more effective than the other protocols. Our own experience does
not support this statement. In the north of Germany the combination azithromycin/rifampin seems to be more effective in the treatment of foals with *R. equi* pneumonia. This might be due to different strains of the pathogen probably showing a different susceptibility to the macrolids in different regions of the world.

Tulathromycin is a new injectable macrolide antibiotic for the treatment of pulmonary diseases of swine and cattle. A study was conducted on a breeding farm with endemic *R. equi* pneumonia to compare the efficacy of this new macrolid (Venner et al. 2007). 37 foals with sonographic evidence of lung abscesses were treated with tulathromycin (2.5 mg/kg BW i.m. once weekly, group 1) and 33 foals (group 2) with a combination of azithromycin (10 mg/kg BW oral once daily for the first seven days of therapy, thereafter every other day) and rifampin (10 mg/kg BW oral twice daily). 30 foals in each group were successfully treated without modifying therapy protocols until all clinical and sonographical signs of disease had subsided. Tulathromycin had to be administered for a mean 53 days, azithromycin/rifampin for 42 days. The following side effects were associated with tulathromycin (279 intramuscular injections): self-limiting diarrhoea in eleven foals, transient elevated temperature in six foals, and moderate swellings at the injection site in twelve foals. This study provides some evidence that tulathromycin is well tolerated and appears promising for the treatment of pulmonary abscesses in foals.

Duration of treatment of *R. equi* pneumonia in foals is of at least 4 weeks. Some foals need up to 8 to 12 weeks of treatment. The duration should be evaluated in each case individually considering clinical sonographical finding and blood leucocyte count. Only when no more abnormal results are found should therapy be interrupted. If a foal does not significantly respond to treatment within 10 to 14 days, a change of macrolids or a higher dosage should be considered. Pharmacological data show that it might be necessary to increase the dosage of macrolids, if these are given in combination with rifampin (Hoehensteiger 2005).

Overall the success of treatment in case of a *R. equi* pneumonia in a foal depends on the time of diagnosis in the course of the disease. The earlier a treatment is started, the smaller the pulmonary abscesses are and the better the prognosis. Furthermore the earlier a treatment is started, the lesser affected foals will shed the pathogen in their environment (Laemmer et al. 2008). This emphasizes the value of an early recognition of sick foals and importance of a close observation of foals on an endemic farm.
References