

## PATHOGENESIS, EPIDEMIOLOGY AND TREATMENT OF PNEUMONIC PASTEURILLOSIS IN RABBITS

S Jasni, M.H. Al-Haddawi, M. Zamri-Saad, A.R. Mutalib and A.R. Sheikh-Omar

Faculty of Veterinary Medicine  
Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor,  
Malaysia

**Keywords:** pasteurillosis, pathogenesis, epidemiology, treatment, rabbits.

### Introduction

*Pasteurella multocida* is a Gram negative bacterium which is known to cause rhinitis and pneumonia in rabbits leading to high morbidity and mortality. Some virulent strains can also cause septicaemia, which results in acute and peracute deaths in affected rabbits. This would be a drawback to the rabbit industry and rabbits breeders who bred rabbits for human consumption and research purposes.

### Materials and Methods

Rabbits were divided into several groups and were infected intranasally with three different serotypes of *P. multocida*. Control groups were not infected. The rabbits were killed at day 14 and 21 post infection. Samples of the nasal mucosa, trachea, lungs and visceral organs were taken for bacteriology, histopathology and electron microscopy. Explants of the trachea, lungs and aorta were also infected with similar strains and the pattern of adhesion of the strains studied. Plasmid analysis, SDS-PAGE and polymerase chain reaction were also conducted on some serotypes.

### Results and Discussion

Some aspects of the pathogenesis, epidemiology and treatment of Pasteurellosis have been revealed. The serotypes of *P. multocida* isolated from rabbits in Malaysia were A:1, A:3, A:12, D:1 and D:3. Serotypes A:3, D:1 and D:3 were the serotypes that can cause septicaemia. Serotypes D:1 and D:3 were more virulent and were able to produce dermonecrotic toxin and acute deaths 2 days following experimental

infection and lesions in non-pulmonary organs. Serotypes A:1 and A:3 were associated with pneumonia and rhinitis. Six of 82 isolates were harbouring plasmids. There was no correlation between presence of common plasmids and serotypes, resistance to antimicrobial agents and anatomic sites from which the bacteria were cultured. Random amplification polymorphic DNA showed the presence of wide heterogeneity within *P. multocida* isolates. SDS-PAGE revealed over 40 protein bands and the high molecular weight bands showed striking homogeneity among isolates. All isolates were sensitive to the commonly used antibiotics *in vitro*, but some were sensitive to neomycin, penicillin, cloxacillin and tetracycline. *In vitro* experiments of adhesion and colonisation to tracheal mucosa, lung and aorta explants from freshly killed rabbits by *P. multocida* A:3 and D:1 were studied. Strain D was highly adherent to trachea and aorta explants compared to strain A. Ultrastructural studies showed ciliary destruction, deformation and desquamation in A:3, D:1 and D:3 infected rabbits. Bacterial cells were also observed closely adhered to damaged cilia and microvilli in the nasal cavity and trachea. Other electron microscopy observation includes hyperplasia of pneumocytes type II cells, swelling of bacterial lining of alveolar capillaries and infiltration of inflammatory cells. Intracellular invasion was also observed in the nasal epithelium and pneumocytes.

### Conclusions

*Pasteurella multocida* A:3 was pathogenic but did not cause mortality following experimental infection in rabbits and *P. multocida* serotypes D:1 and D:3 were highly pathogenic which cause mortality and colonisation in internal organs.

Capsular material seems to be involve in adherence of *P. multocida* to lung tissue at the early stage on infection but the toxin of the toxigenic strains plays a role in adhesion of these strains to mucosal surface of the respiratory tract and aorta. Adhesion of strain D to the aorta may explain the ability of strain D to cause septicaemia. Destruction of cilia and microvilli and induction of excessive mucus secretion damaged the defense mechanism and promote colonisation of *P. multocida* prior to pulmonary infection and production of lesions in the lung.