Ultrastructural Observation of Nasal and Pulmonary Intracellular Pasteurella multocida A:3 in Rabbits

ABSTRACT

Sixteen 8- to 9-week-old Pasteurella multocida-free rabbits were divided into two equal groups. Eight rabbits in one group were inoculated intranasally with P. multocida type A:3. The other eight were inoculated intranasally with phosphate-bu¡ered saline and used as controls. Nasal swabs taken before and after inoculation were cultured for bacterial isolation. Post-mortem nasal swabs and lung samples were cultured for bacteriological isolation. Nasal mucosa and lung samples were collected and processed for transmission electron microscopy. Pasteurella multocida was isolated from the nasal cavity of all infected rabbits and from the lungs of four infected rabbits. Degenerative ultrastructural changes in epithelial cells and endothelial cells were seen in the infected rabbits. Deciliation of the cilated epithelium and hyperplasia of the goblet cells in the nasal mucosa were noted. Thickening of the alveolar septa due to hyperplasia of type II pneumocytes, swelling of the endothelial lining of capillaries and in¢ltration of in£ammatory cells were also observed. Intracellular invasion of the nasal epithelial cells and of type II pneumocytes by the organism was observed. Coccobacilli were observed in membrane-bound vacuoles in the cytoplasm of these cells. The vacuoles were adjacent to the host-cell mitochondria and some of these vacuoles appeared to be fused to the mitochondrial membrane. Some type I pneumocytes with intracellular membrane-bound vacuoles containing bacterial cells showed protrusions, which appeared to detach into the alveolar lumina. These results indicated that P. multocida serotype A:3 in rabbits can invade the epithelial cell and cause structural changes in the interstitium, epithelium and endothelium. Heterophils and macrophages appear to play important roles in tissue injury.

Keyword: alveolar septa, endothelium, epithelium, lung, Pasteurella multocida, pneumocytes, rabbits, ultrastructure