

Pseudomonas pseudomallei infection in camels

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We read with interest the report on melioidosis in camels by Bergin and Torenbeeck (1991).

In January 1990, we isolated *Pseudomonas pseudomallei* from a camel at Mingela, northern Queensland, which had a severe, purulent bronchopneumonia. A β -haemolytic *Escherichia coli* was also isolated from the lung. This camel differed in its clinical presentation from the animal described by Bergin and Torenbeeck (1991) from which *P. pseudomallei* was isolated by the Rockhampton Veterinary Laboratory. The attending veterinarian found the 8-years-old bull camel to be pyrexia, distressed, dehydrated and disinterested in its environment. Ataxia, particularly of the hind limbs, was evident when attempts were made to move it.

Treatment was initiated using long acting penicillin and phenylbutazone, but the camel died 2 days later. At necropsy, a fibrinous pleuropneumonia was seen. Sections of lung received from the camel demonstrated varying stages of the disease. Initially there was a marked congestion of the alveolar septae and occasionally a few polymorphs, macrophages, red blood cells and small amounts of fibrin within the alveolar lumina. With progression of the disease, increased numbers of cells, mainly neutrophils, were present within the alveoli and these were admixed with fibrin and oedema fluid. In areas where changes were most advanced, the alveolar septae had undergone degeneration and necrosis to leave consolidated areas with numerous purulent foci. Bronchioli were frequently plugged with degenerating polymorphs and debris. A necrotising vasculitis was also noticed.

The results of the case from Mingela were compared with the bacteriological and histological findings from tissues received at this laboratory from the Cooktown case referred to by Bergin and Torenbeeck (1991).

In both cases a severe purulent bronchopneumonia was present from which *P. pseudomallei* was isolated. Histological changes observed in the lungs of both animals were consistent and showed the presence of large numbers of neutrophils. This finding, especially in the case of the Cooktown camel, from which the organism was isolated in pure culture, suggests that the immune response of camels to *P. pseudomallei* resembles more closely that of sheep (Laws and Hall 1963) than that of pigs, goats or horses. In acute melioidosis in these latter species, cells occupying the alveoli have been reported as mainly lymphocytes or mononuclear cells. Only when organisms other than *P. pseudomallei* were isolated was a marked neutrophilic infiltrate seen (Omar 1963).

Melioidosis is a recurring problem in animals in northern Queensland. The causative agent, *P. pseudomallei*, was first isolated in 1948 from sheep at Winton (Cottew *et al* 1952). Since then there have been reports of melioidosis in goats (Lewis and Olds 1952), pigs (Olds and Lewis 1955; Laws and Hall 1964; Thomas *et al* 1981), horses (Laws and Hall 1963; Ladds *et al* 1981), cattle (Laws and Mahoney 1962), a tree kangaroo (Thomas 1981), birds (Thomas *et al* 1978; Thomas *et al* 1980) and a koala (Ladds *et al* 1990). In domestic species such as goats

(Omar 1963) and sheep (Laws and Hall 1963) the lungs are the most common site of natural infection. From the cases to date it would appear that the lungs are also the predilection site for *P. pseudomallei* in camels. The presence of nervous signs in the Mingela camel may have been due to localisation of the organism in the CNS. This, although rare, has been documented for other species (Laws and Hall 1963; Ladds *et al* 1981) and may have easily been overlooked on necropsy because lesions are often not obvious macroscopically (Laws and Hall 1963).

Treatment of clinical cases of melioidosis is generally unsatisfactory as animals often relapse when therapy is discontinued. Antibiotic sensitivities performed at this laboratory on the two *P. pseudomallei* isolates showed that these strains were susceptible to tetracycline, had an intermediate resistance to ampicillin and neomycin and a total resistance to streptomycin and gentamycin.

P. pseudomallei is a soil organism, which occurs mainly in tropical and subtropical regions. (Howe *et al* 1971). Infections in grazing animals have a seasonal incidence and appear to be related to the movement of the organism from the deeper to the more superficial layers of the soil with heavy rainfall (Thomas *et al* 1979; Thomas and Forbes-Faulkner 1981). The case of *P. pseudomallei* in the Mingela camel was associated with the movement of the herd from the drier inland areas to the wet, tropical coastal region, and a period of heavy rainfall.

Susceptibility to infection with *P. pseudomallei* in man has been linked to underlying disease processes such as diabetes, malnutrition and stress (Leelarasamee and Bovornkitti 1989). It is possible that a concurrent burden of *Haemonchus* spp (1200 epg) found in our case may have increased the susceptibility of the camel to infection. Although melioidosis had not been reported in camels in Australia before the article of Bergin and Torenbeeck (1991), it was not the first case of *P. pseudomallei* to be isolated from this species. Druedener *et al* (1984) reported a case of melioidosis in camels in Malaysia, although the clinical manifestations were not recorded.

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