

## ABCD GUIDELINES ON:

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The following recommendations have been formulated by the European Advisory Board on Cat Diseases.



The European Advisory Board on Cat Diseases is an independent panel of 17 veterinarians from ten European countries, with an expertise in immunology, vaccinology and/or feline medicine. The ABCD was set up to compile guidelines for the prevention and management of major feline infectious disease in Europe based on current scientific knowledge and available vaccines.

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## 9. Chlamydomphila Felis infection in cats

### 9.1 Bacterial properties

*Chlamydomphila felis* is a gram-negative rod-shaped coccoid bacterium. It has a cell wall which lacks peptidoglycan. It is an obligate intracellular parasite that lacks the ability to replicate autonomously [Becker, 1978]. *Chlamydomphila* is a genus within the family Chlamydiaceae of the order Chlamydiales. The genome of *Chlamydomphila felis* has been sequenced recently [Azuma et al 2006]. There is extensive homology between Chlamydia species. The membrane contains important families of proteins; the major outer membrane proteins (MOMPs) and polymorphic outer membrane proteins (POMPs). The organism attaches to sialic acid receptors of cells. It has a unique pattern of replication within cells, involving reticulate bodies (RB) and elementary bodies (EB). The latter represent the infectious forms of the micro-organism that are released following cell lysis. Some *Chlamydomphila felis* isolates appear to contain plasmids and this may be related to their pathogenic ability. [Everson et al, 2003].

### 9.2 Epidemiology

Since *Chlamydomphila felis* has ability is unable to survive outside the host, transmission requires close contact between cats and transfer of ocular secretions is probably the most important method of infection. *Chlamydomphila felis* infection is most common in multicat environments, particularly breeding catteries, and therefore the prevalence of infection may be more common among pedigree cats [Wills et al, 1987]. The majority of cases occur in young cats, particularly under one year of age. *Chlamydomphila felis* is the infectious organism most frequently associated with conjunctivitis in cats and is isolated from up to 30% of affected cats, particularly in those with chronic conjunctivitis [Wills et al, 1988]. Serological surveys have shown that 10% or more of unvaccinated household pets have antibodies against *Chlamydomphila* [Gunn-Moore et al, 1995, Lang, 1992].

Prevalence studies by PCR in cats with ocular or URTD signs have resulted in 12 to 20%. Prevalence in normal cats is low, by PCR some studies show less than 2-3% in cats without clinical signs [Di Francesco et al, 2004].

There is some evidence for zoonotic potential but there is no epidemiological evidence that *C felis* represents a significant zoonotic risk. Conjunctivitis caused by *C felis* was reported in an HIV-infected patient [Hartley 2001].

### **9.3 Pathogenesis and Clinical signs**

Chlamydia target mucosal tissues and the primary target for *Chlamydomphila felis* is the conjunctiva. The incubation period is generally 2-5 days. In the first day or two after clinical signs develop, unilateral ocular disease may be seen, but this generally progresses to become bilateral. There can be intense conjunctivitis with extreme hyperaemia of the nictitating membrane, blepharospasm and ocular discomfort. Ocular discharges are initially watery but later become mucoid or mucopurulent. Chemosis of the conjunctiva is a characteristic feature of chlamydiosis. Respiratory signs are generally minimal with *Chlamydomphila* infections. In cats with respiratory disease but without concurrent ocular signs, *C felis* infection is unlikely. Ocular complications such as adhesions of the conjunctiva, may occur but keratitis and corneal ulcers are not generally associated with infection. Transient fever, inappetence and weight loss may occur shortly after infection, although most cats remain well and continue to eat. Chlamydial organisms can be isolated from the vagina and rectum of cats, but it is unclear whether venereal transmission occurs. Although there is circumstantial evidence that chlamydomphila may cause abortion, there is no evidence of a link with gastro-intestinal disease.

Most cats cease conjunctival shedding at around 60 days after infection, although some cats may continue to harbour persistent infection [O'Dair et al 1994] and *C felis* has been isolated from the conjunctiva of untreated cats for up to 215 days after experimental infection [Wills, 1986].

### **9.4 Immunity**

#### **9.4.1 Passive immunity**

Infected cats develop antibodies and kittens appear to be protected initially for the first one or two months of life by maternally derived antibodies [Wills, 1986].

#### **9.4.2 Active immunity**

The nature of the protective immune response to *Chlamydomphila* infection is uncertain. However cellular immune responses are believed to play a crucial role in protection [Longbottom & Livingstone, 2004]. The major outer membrane proteins (MOMPs) and polymorphic outer membrane proteins (POMPs) are important targets for protective immune responses in other species [Longbottom & Livingstone, 2004] and have been shown to exist in the cat [Harley et al 2007].

## **9.5 Diagnosis**

### **9.5.1 Demonstration of organism**

It is possible to identify infection by culture but PCR techniques are now the preferred option for diagnosing *Chlamydomphila* infection. Such techniques are extremely sensitive and avoid problems with poor viability of the organisms. Ocular swabs are generally used for isolation but organisms may also be detected in vaginal swabs, abortuses and rectal swabs, although these are seldom used diagnostically. Since the organism is intracellular, it is necessary to obtain good quality ocular swabs that include conjunctival cells .

Other techniques for demonstrating the organism are less sensitive and less reliable than PCR. Chlamydial antigen tests based on detecting group specific antigen using ELISA or similar techniques are available. It is also possible to stain conjunctival smears with Giemsa stain to check for inclusions, but this technique is very unreliable for diagnosis since Chlamydial inclusions may be confused with other basophilic inclusions [Streeten 1985].

### **9.5.2 Serology**

Antibody detection can confirm the diagnosis of infection in unvaccinated cats. immunofluorescent techniques are usually used for determining antibody titres but ELISA techniques can also be used to assess serological responses. Some cross reactivity with other bacteria occurs such that low IF titres of up to 1:32 are generally considered to be negative. Established active or recent infections are associated with high titres often of 1:512 or greater. Serology can be particularly useful to establish whether infection is endemic in a group. It can also be of value in investigating cases with chronic ocular signs. A high titre suggests that chlamydomphila may be an aetiological factor whereas a low titre discounts likely chlamydomphila involvement.

## **9.6 Treatment**

Chlamydomphila infection in cats can be treated very effectively with antibiotics. Systemic antibiotics are more effective than local treatment [Sparkes et al, 1999]. Tetracyclines are generally regarded as the antibiotics of choice for chlamydial infections [Dean et al 2005]. Doxycycline has the advantage of requiring only a single daily dose and is most frequently used at a dosage of 10 mg/kg orally. Recent studies have shown that treatment must be maintained for 4 weeks to ensure elimination of the organism [Dean et al 2005]. In some cats recrudescence may be noted some time after discontinuation of therapy. Continuation of treatment for two weeks after resolution of clinical signs is

recommended. Tetracyclines have potential side effects in young cats although these appear to be less common with doxycycline than oxytetracycline. Alternative antibiotics may be considered if this is a concern. Fluoroquinolones are effective against *Chlamydia* [Gerhardt et al., 2007; Hartmann et al., 2008], but a 4-week course of therapy with clavulanic acid potentiated amoxicillin may represent the safest choice in young kittens [Sturgess et al, 2001].

## **9.7 Vaccination**

Both inactivated and modified live vaccines based on whole *Chlamydia* organism are available as part of multivalent vaccine preparations. Vaccines are effective in protecting against disease but not against infection [Wills et al, 1987]. No reliable data are available to compare efficacy of inactivated versus modified live vaccines.

Vaccination should be considered for cats at risk of exposure to infection, particularly in multicat environments, and if there has been a previous history of Chl infection.

Vaccination of kittens generally begins at 8-10 weeks of age with a second injection 3-4 weeks later. Limited information is available about the duration of immunity. There is some evidence that previously infected cats can become vulnerable to re-infection after a year or more. Annual boosters are recommended for cats that are at continued risk of exposure to infection.

## **9.8 Disease Control in Specific Situations**

### **9.8.1 Shelters**

*Chlamydia* can be a significant cause of disease in rescue shelters but is generally a less significant problem than respiratory viruses. Vaccination should be considered if there has been a previous history of Chlamydial disease in the shelter. Since close contact is necessary for transmission and the organism has MGP: low viability outside the host, single housing of cats and routine hygiene measures should avoid cross infection. Whenever cats are maintained together longer term, they should be vaccinated regularly.

### **9.8.2 Breeding catteries**

In catteries with endemic *Chlamydia* infection, the first step is generally treatment of all cats in the household with doxycycline for at least 4 weeks to attempt to eliminate the infection. In some cattery cats a minimum of 6 to 8 weeks has been shown to be necessary to eliminate natural infection. Once clinical signs have been controlled, cats

should be vaccinated to provide protection against disease should re-infection of the cattery occur.

### **9.8.3 Immunocompromised cats**

Immunocompromised cats should only be vaccinated when it is deemed absolutely necessary, and then an inactivated vaccine should be used

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