

# IN FOCUS: Canine neosporosis

Neosporosis is most commonly reported as an ascending paralysis of puppies but may present as a wide variety of clinical signs in dogs of all ages. It was first described in the 1980s but analysis of stored tissues revealed it occurred at least as early as the 1950s. *Neospora caninum* is a protozoal parasite, closely related to *Toxoplasma gondii*. It has a world-wide distribution. Prevalence of infection (not disease) in dogs varies from 0.5% to over 30%. *N. caninum* also occurs naturally in cattle (where it is an important cause of abortion), sheep, goats, deer and horses. Experimental infections have been reported in many species but no natural cases have yet been reported in cats or humans.

## LIFE CYCLE

We have only recently started to understand the life cycle of *N. caninum* but from what we know it appears to be similar to *T. gondii*. Both definitive hosts (in which sexual reproduction occurs) and intermediate hosts (in which asexual reproduction occurs) have been identified. Dogs and at least one other member of the *Canis* family (the coyote) are definitive hosts. They shed oocysts in their faeces when they feed on tissues from an infected intermediate host – normally cattle. From what we know so far, dogs infected in this way shed oocysts but do not normally develop a systemic infection, may not seroconvert and rarely show clinical signs. Transplacental transmission can occur in dogs – a bitch infected with bradyzoites can transmit the infection to her puppies *in utero*. In this instance no oocysts would be detected in the faeces, but this is the route of infection which it is thought leads to disease.

## WHICH DOGS ARE AT RISK OF DISEASE?

Dogs of any age may develop neosporosis though cases occur more commonly in puppies. It is not known whether infection also causes stillbirths and abortions. Any breed or type of dog may be affected. Cases occur in single pet households through to large kennels and in dogs from both rural and urban areas. No sex predilections have been found.

## CLINICAL SIGNS

Most commonly disease presents as a hindlimb paresis, which progresses to paralysis, forelimb weakness and difficulty in swallowing and breathing resulting in death or euthanasia. The course of the disease is variable, with peracute cases dying within a week of the first signs, to a much more chronic form which gradually progresses over several weeks. One or both hindlimbs may be affected. In about half of cases a rigid extension of stifle and/or hock develops. Incontinence is uncommon initially but may develop later. Fever and inappetence are rare with most dogs remaining bright and alert until the end stages.

Dogs may also present with other signs including paresis/paralysis of forelimb(s) only, ataxia, gait abnormalities, altered behaviour, blindness, head tilt, tremors, seizures, pneumonia, myocarditis (may cause sudden death) and/or nodular/ulcerative dermatitis.

## DIAGNOSIS

**Serology** - the indirect fluorescent antibody test (IFAT) is usually used to measure antibodies to *N. caninum*. A titre of 1:50 or more is considered positive evidence of exposure to *N. caninum*, but not necessarily of disease. Virtually all confirmed cases of clinical neosporosis have had high titres (1:800 or more). Although a few clinically normal dogs have had titres up to 1:12800, a titre of 1:800 or more in a dog with clinical signs is good supportive evidence of neosporosis. Most titres fall over a period of weeks following treatment. However, antibodies remain detectable for many months or even years. Test titre results depend on many factors and the above information relates mainly to the IFAT used at Test-A-Pet and not necessarily to tests carried out by other labs.

**Radiography, haematology, clinical biochemistry and CSF analysis** may be used to rule out differential diagnoses. **Immunohistochemical staining of biopsies** (particularly of muscle, skin in dermatological cases and sections of brain and spinal cord post-mortem) confirm the diagnosis.

**DNA tests**, such as polymerase chain reaction (PCR) techniques are likely to be more widely available in the future.

## TREATMENT

- Clindamycin [11-22mg/kg twice daily] or
- Potentiated sulphonamides [15mg/kg twice daily] +/- Pyrimethamine (**Daraprim** 25mg, anti-malarial drug) [1mg/kg once daily].

Treatment should be instituted as soon as possible. There should be some improvement within a few days but treatment should continue until the dog has fully recovered or no further clinical improvement is seen (2 - 9 weeks). **Supportive treatment**, e.g. NSAIDs or low doses of corticosteroids, plus good nursing care e.g. bladder expression, and physiotherapy are also beneficial.

About half of appropriately treated dogs should make a full or functional **recovery**, although many are left with an odd gait, muscle wastage or roached back. Rigid hyperextension is the sign least likely to be reversed. Peracute and very chronic cases are the least likely to respond.

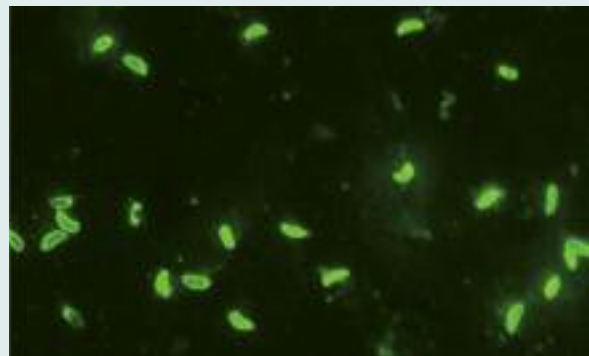
**Relapses** may occur, but these generally respond well to a further short course of treatment.

There is also evidence that some, generally more mildly affected, dogs make a spontaneous recovery.

## CONTROL AND PREVENTION

**Transmission** of the parasite from an infected, but clinically normal bitch to her puppies is an important route of infection. The number of puppies infected in each litter

## Below: Positive *Neospora caninum* IFAT result



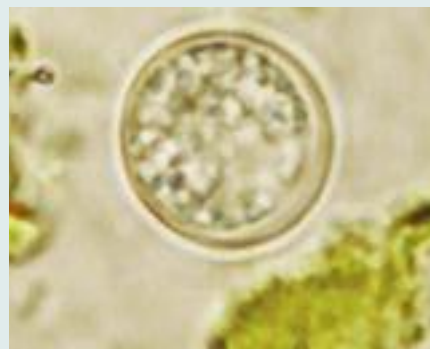
varies from none to all of the litter, with overall about 20% pups seropositive. Fewer than half of these infected pups will develop clinical signs. Transmission can occur repeatedly over several consecutive litters. Neosporosis is more likely in pups born to bitches with high titres. Attempts at **preventative treatment** whether of seropositive but apparently normal littermates of a clinical case or of bitches during pregnancy to block pre-natal infection of pups have generally been unsuccessful. **Post-natal** infection in dogs may occur through the ingestion of raw meat which can result in oocyst shedding. Finally, although post-natal infection does occur, it is still not known whether disease in adult dogs is due to a recent infection or a relapse of congenital infection.

## SUMMARY

- Usually neuromuscular disease (ascending paralysis), but wide range of signs possible.
- Most commonly reported in puppies and young dogs, but may occur at any age.
- Worldwide occurrence. No breed or sex predilections.
- Serology is a most useful diagnostic test.
- Examination of biopsy or post-mortem tissues confirms.
- Treatment results in functional recovery in many cases.
- Control/prevention is difficult but bitches with high antibody titres should not be bred from.

## Neospora testing at Test-A-Pet

- *Neospora caninum* IFAT.
- Sample required: 0.5ml serum.
- Results are available within two working days of us receiving the sample.
- For more information, please see page four of this newsletter and our website.



Above: *Neospora caninum* oocyst