Spironucleosis in Australian wild birds

Fact sheet

December 2014

Introductory statement

Spironucleus is an enteric protozoite that was formerly classified as *Hexamita but* is now recognised as being a separate genus. It can be further subdivided into three groups, which infect saltwater fish, freshwater fish and terrestrial mammals such as birds, mice and non-human primates (Bailey et al 2010). *Spironucleus meleagridis* is an important cause of disease in turkeys, while *S. columbae* affects pigeons (Philbey et al 2002). This fact sheet describes the disease seen in Australian wild birds only.

Aetiology

Spironucleus is a pear-shaped protozoan of variable shape, approximately 6-10 µm x 2-4 µm with two anterior nuclei, six anterior and two posterior flagella. Cyst formation can occur.

Natural hosts

The natural hosts for *Spironucleus* are unknown. The organism causes disease most commonly in wild Australian king parrots (*Alisterus scapularis*) (Philbey et al 2002). One episode of disease was described in 12 wild galahs (*Eolophus roseicapilla*) at Venus Bay, Vic, in 2003 (Bunn and Woods 2003). The organism has also been recovered from the crop contents of clinically unaffected captive budgerigars (*Melopsittacus undulatus*) in Perth (McKeon et al 1997) and has been observed in faecal smears of emaciated cockatiels (*Nymphicus hollandicus*) and a scarlet-chested parrot (*Neophema splendida*) in aviaries in the UK (Ladds 2009, Philbey et al 2002).

World distribution

Spironucleus has been found in captive Australian parrots in the UK.

Occurrences in Australia

Spironucleus has been found NSW, ACT, Vic.

Epidemiology

Prevalence of *Spironucleus* in the wild population is unknown. Mortality rate of king parrots presented to Healesville Sanctuary, Vic, is approximately 85% (Scheelings pers. comm.). Incubation period is approximately 7 days. Transmission is by the faecal-oral route.

Affected king parrots are usually juveniles, with adults likely acting as subclinical carriers. Disease appears during the winter months possibly due to cooler weather conditions and decreased availability of food.

Spironucleus muris cysts are resistant to low temperature (-196°C), low pH (2.2), high osmotic pressure and desiccation (room temperature for 14 days), but are destroyed by exposure to heat (45°C for 30 minutes), 70% ethanol for 15 seconds, 4% formalin for one hour, 13% sodium hypochlorite for one day, 1% glutaraldehyde for one day or a saturated solution of zinc or sodium chloride for five minutes (Kunstyr and Ammerpohl 1978).

Clinical signs

Emaciation, diarrhoea, weakness, depression, and faecal matting around the vent. Death occurs, on average, four days after presentation (range one to 14 days) (Philbey et al 2002).

Diagnosis

Clinical signs. Faecal wet prep demonstrates large numbers of motile flagellated protozoa.

Laboratory diagnostic specimens and procedures

Faecal wet preparations or intestinal contents should be collected, kept warm and examined within 30 minutes for the presence of motile organisms. After this time, organisms can be difficult to find and identify.

A complete necropsy should be performed on birds that die and a selection of tissues collected into formalin. Tissues can be examined histologically for the presence of *Spironucleus* organisms.

Faeces or intestinal contents were cultured aerobically on TYM media supplemented with crop fluid. However, growth did not occur in Diamonds TYM media, modified TYM media, modified Giardia media, or RPMI-1640. The authors speculated that an unidentified growth factor may be present in crop fluid that is necessary for the in vitro growth of *Spironucleus*. It was reported that the InPouch system (JCU Tropical Biotechnology, Townsville) used to culture *Trichomonas* can also be used to culture *Spironucleus* (McKeon et al 1997, Cover et al 1994).

Pathology

Grossly affected birds are emaciated with dilated, fluid filled loops of bowel. Food is often present in the gizzard.

Histologically there is an enteritis characterised by infiltrations of lymphocytes and plasmacytes with variable numbers of protozoa in intestinal crypts. The protozoa stain weakly with PAS and Giemsa, are Gram negative and fail to stain with Ziehl-Neelsen (Ladds 2009, Philbey et al 2002).

Differential diagnoses

Differential diagnoses include other causes of emaciation, weakness and diarrhoea such as intestinal ascarids, other enteric protozoal, bacterial or viral infections and starvation.

Treatment

Survival rate is poor regardless of treatment and euthanasia may be the best option. If treatment is attempted birds can be administered 50 mg/kg metronidazole orally BID for five days or 6-10 mg/kg ronidazole orally SID for 10 days (Hawkins et al 2013), along with intravenous fluids, crop feeding and supplemental heat. Birds that do survive spend an average of 4-8 weeks in care before being released.

Prevention and control

Prevention and control are difficult in wild populations. Bird feeders should be discouraged or else the food should be changed daily and feeders disinfected with a 10% bleach solution.

Research

Virtually no research has been carried out on this disease and its possible effect on king parrot populations. The species of *Spironucleus* responsible for these infections has not been identified and it is unknown if the species which affects king parrots is also the one that has occasionally been found in other bird species. It is also unclear why the organism appears to cause regular mortalities in king parrots but appears to affect other species only rarely.

As the organism can be found in clinically unaffected birds research is required to determine what factors change the carrier state to one of clinical disease.

Treatment, rehabilitation and release rates are poor. More work is required to improve these outcomes.

Surveillance and management

There is no targeted surveillance program for *Spironucleus*. Anecdotally spironucleosis appears to have been affecting king parrots since at least 1984 (Philbey et al 2002).

Wildlife Health Australia administers Australia's general wildlife health surveillance system, in partnership with government and non-government agencies. Wildlife health data is collected into a national database, the electronic Wildlife Health Information System (eWHIS). Information is reported by a variety of sources including government agencies, zoo based wildlife hospitals, sentinel veterinary clinics, universities, wildlife rehabilitators, and a range of other organisations and individuals. Targeted surveillance data is also collected by WHA. See the WHA website for more information https://wildlifehealthaustralia.com.au/Our-Work/Surveillance and https://wildlifehealthaustralia.com.au/Our-Work/Surveillance/eWHIS-Wildlife-Health-Information-System.

We encourage those with laboratory confirmed cases of this condition in native Australian or feral animals to submit this information to the national system for consideration for inclusion in the national database. Please contact us at admin@wildlifehealthaustralia.com.au.

Statistics

Limited information is available in the National Wildlife Health Surveillance Database (eWHIS). Cases reported in eWHIS include 43 records of king parrots from Vic affected between June 2004 and May 2014, with 41 of these reports coming from the Yarra Valley. There are also two reports from July 2010 and May 2012 of little corellas (*Cacatua sanguinea*) in Darwin infected with *Spironucleus*. Birds in the first outbreak were also infected with psittacine circovirus and *Cryptosporidium* while those in the second outbreak had *Plasmodium* and psittacine circovirus infections. A single galah was recorded in May 2011 from Wamuran in Qld suffering from spironucleosis.

Human health implications

None human health implications have been reported.

Conclusion

A syndrome of wasting, diarrhoea and mortality in Australian king parrots is associated with a *Spironucleus* protozoan. Currently there is no information on the taxonomy or host specificity of the organism from this species of bird.

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Wildlife Health Australia recognises the Traditional Custodians of Country throughout Australia. We respectfully acknowledge Aboriginal and Torres Strait Islander peoples' continuing connection to land, sea, wildlife and community. We pay our respects to them and their cultures, and to their Elders past and present.

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References and other information

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