Spironucleosis in Australian wild birds

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). *S. 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 to 10 μm x 2 to 4 μm with two anterior nuclei, six anterior and two posterior flagella. Cyst formation can occur.

Natural hosts

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, Victoria, 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 United Kingdom (Ladds 2009, Philbey et al 2002).

World distribution

*Spironucleus* has been found in captive Australian parrots in the U.K.

Occurrences in Australia

NSW, ACT, Victoria
**Epidemiology**

Prevalence in the wild population is unknown. Mortality rate of king parrots presented to Healesville Sanctuary, Victoria, 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.

**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.

**Laboratory diagnostic specimens**

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.
Laboratory procedures

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).

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 four to eight 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.

Surveillance and management

Wildlife disease surveillance in Australia is coordinated by the Wildlife Health Australia. The National Wildlife Health Information System (eWHIS) captures information from a variety of sources including Australian government agencies, zoo and wildlife parks, wildlife carers, universities and members of the public. Coordinators in each of Australia’s States and Territories report monthly on significant wildlife cases identified in their jurisdictions.

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).

Statistics

Limited information is available in the National Wildlife Health Surveillance Database (eWHIS). Cases reported in eWHIS include 43 records of king parrots from Victoria 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 Queensland suffering from spironucleosis.

Wildlife Health Australia is interested in receiving reports of this condition in wild birds in Australia (contact admin@wildlifehealthaustralia.com.au).
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.

Human health implications

None 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.

References and other information


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To provide feedback on this fact sheet

We are interested in hearing from anyone with information on this condition in Australia, including laboratory reports, historical datasets or survey results that could be added to the National Wildlife Health Information System. If you can help, please contact us at admin@wildlifehealthaustralia.com.au.

Wildlife Health Australia would be very grateful for any feedback on this fact sheet. Please provide detailed comments or suggestions to admin@wildlifehealthaustralia.com.au. We would also like to hear from you if you have a particular area of expertise and would like to produce a fact sheet (or sheets) for the network (or update current sheets). A small amount of funding is available to facilitate this.

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