Primary Health Care Guide to Common UK Parasitic Diseases

1st Edition

The *Primary Health Care Guide to Common UK Parasitic Diseases* is an authoritative, comprehensive source of guidance on pediculosis, scabies, toxocariasis and toxoplasmosis.

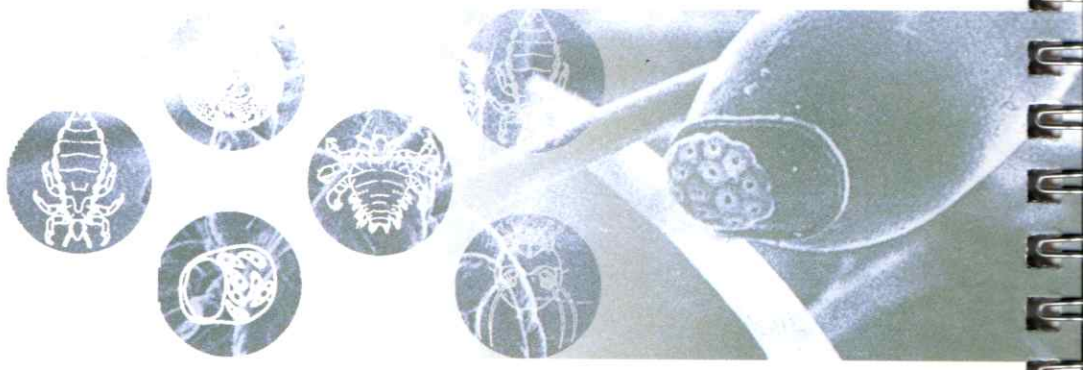
It offers easy-reference, practical advice on prevention, recognition and effective management within the context of an overall eradication strategy.

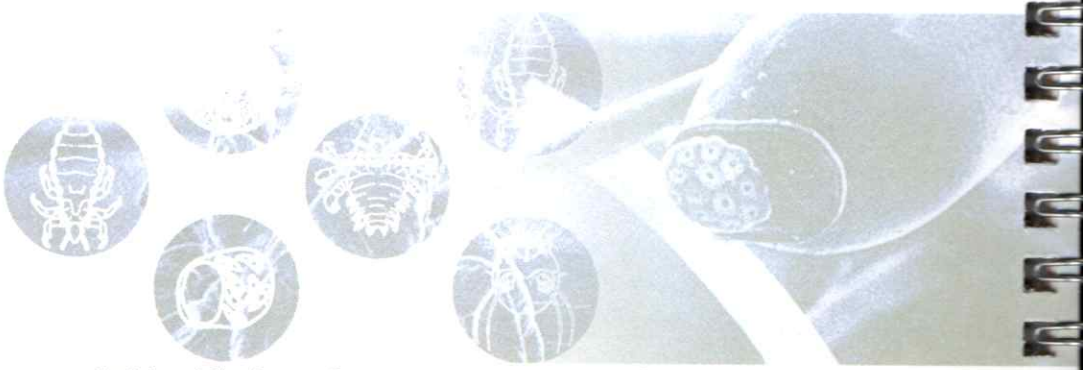
This unique *Guide* will appeal to any member of the primary health care team seeking 'state of the art' information on the key issues in the control of parasites relevant to the UK population. It has a place on the shelves in all community health settings and the health section of any library.



Edited by

José Figueroa
Susan Hall
Joanna Ibarra





community hygiene concern

Hygiene is the science and practice of maintaining health

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She began to develop ideas on solving the head lice problem when she encountered it repeatedly in her own family from 1979.
In 1988 she became co-founder of Community Hygiene Concern and initiator of the Worm Watch Programme (*Toxocara* roundworm). She developed the Bug Busting Programme (head lice) from 1989, in collaboration with health workers and schools.

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Currently she works full-time in small animal practice in Cornwall and teaches as an Associate at the Royal Veterinary College, University of London.

Community Hygiene Concern (CHC) is a charity set up to protect people and pets from parasites, drawing together the expertise of all relevant parties which will help achieve this aim.
The work of CHC has been part-funded by the Department of Health since 1990, with specific funding for the Bug Busting Programme since 1995.
The post of Programme Co-ordinator was funded by the King's Fund for 18 months 1990/91 and again for four years from July 1994.
In 1998 Community Hygiene Concern won one of the first ten IMPACT awards made by SmithKline Beecham, in partnership with the King's Fund, for excellence in community health.

IV Toxocariasis

Manice Stallbaumer

Human toxocariasis is infection with the larval stage of *Toxocara* species (dog or cat roundworm) which migrates through or lies dormant in human tissues, causing a range of responses from asymptomatic infection to severe disease, including loss of sight.

Toxocariasis can cause sight loss

1 Agent/s

Name: ***Toxocara canis*** (dog roundworm) and possibly ***Toxocara cati*** (cat roundworm)
Classification: Helminth, phylum ***Nematode*** (roundworms), order ***Ascarid*** (intestinal parasites)

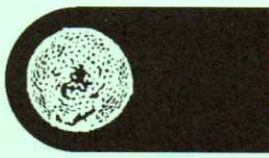
2 Frequency

Human toxocariasis is a disease of world-wide distribution. It is estimated that 2-3% of the British population may be infected[1] and more than 100 diagnoses of ocular disease are made each year, largely in children.[2]

More than 100 ocular cases p.a, largely children

3 Life Cycle

Toxocara passes through an egg stage and four larval stages before becoming an adult worm.



3.1 Definitive hosts

T. canis: Dogs, foxes and other wild Canidae
T. cati: Cats and other feline species

T. canis has a complex life cycle which has evolved so that all puppies are born infected with the parasite. The adult *T. canis* is a round-bodied worm, up to 10 cms long (figure 25) that lives in the small intestine of the dog and other Canidae (e.g. fox). Each full grown female produces thousands of microscopic eggs per day (figure 26, p 48); the eggs are expelled in the faeces and take at least 2 weeks to embryonate and become infective.

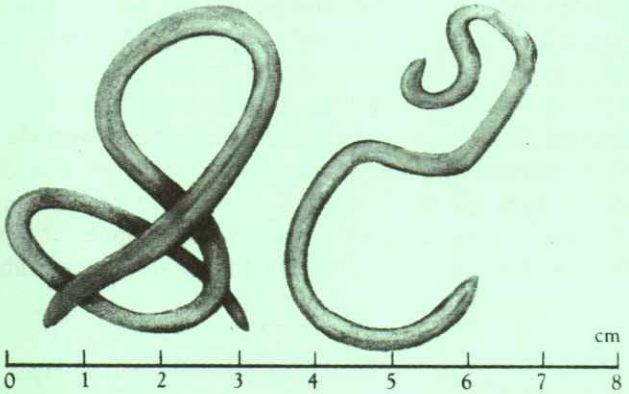


Figure 25: *Toxocara canis* adult worm
From 2cms to 10 cms long; tends to coil when expelled

Source: *Worms and your pet.* 1987. Beecham, London.
Courtesy of SmithKline Beecham, London.

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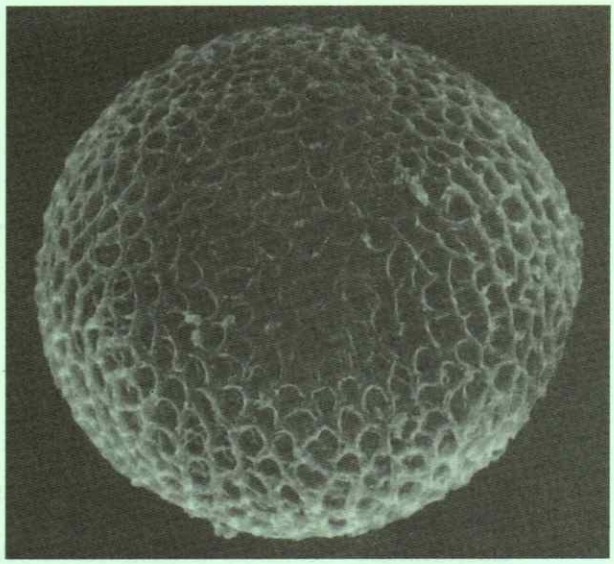


Figure 26: *Toxocara canis* egg (x 825)

Source: C. Guitton, Laboratoire de Biologie Animale, Centre Universitaire, Perpignan, France.

- **Puppies**

Puppies and pregnant bitch are the main sources of environmental contamination



The pregnant and lactating bitch and her puppies are the main sources of environmental contamination with *T. canis* eggs.

When infective eggs are ingested by a puppy, the larvae released will migrate via a hepatotracheal route to the small intestine, where they develop into adults over a period of about 4 weeks.

Puppies are also infected by larvae which are activated during the sixth week of pregnancy and migrate across the placenta. Puppies may start shedding eggs from as young as 2 weeks of age, and if left untreated, will continue to shed eggs for up to 6 months.

In addition, larvae may be passed on to puppies in the milk during lactation.

Puppies begin to spontaneously expel worms from about 6 weeks of age and the majority are free of adult worms by about 4 months of age.

- **Bitches**

Bitches frequently develop patent infections around the time of whelping.

- **Older dogs**

Older dogs occasionally have patent infection, but usually when they acquire infection the larvae migrate into the somatic tissues and become dormant. This also happens if eggs are swallowed by any warm-blooded non-canine host, including humans. These dormant larvae will be capable of infecting a canine host if they are ingested, e.g. a dog might eat an infected rabbit.

- **Cats**

The life cycle of ***T. cati*** is similar to, but simpler than, *T. canis* in the dog. Kittens are not infected transplacentally, but can be infected during lactation. Cats can develop patent infection repeatedly.

3.2 Intermediate hosts

All mammals, including humans, birds, possibly reptiles and insects can be transport hosts which permit the survival but not the further development of larval parasites in humans.

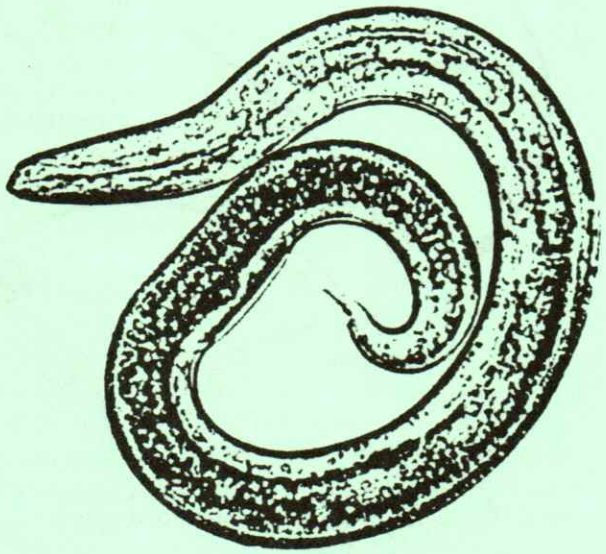
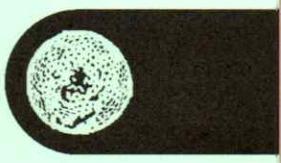


Figure 27: *Toxocara canis* second stage larva (x 250)

Source: J-P. Duclos, Laboratoire de Parasitologie, Faculté de Médecine Purpan, Toulouse, France

After embryonated eggs containing the second larval stage (L2) (figure 27) are swallowed, the microscopic larvae hatch in the gastrointestinal tract (duodenum), penetrate the intestinal wall and are carried in the blood stream to the liver and other organs, mainly the lungs, eyes, heart and brain. There, the larvae migrate, and eventually become dormant, unable to complete their life cycle and develop into adult worms.



3.3 Environment

Park / garden soil

Eggs in or on soil may survive for two years or more in moist conditions; they are fairly resistant to freezing and disinfectants, but desiccation renders them harmless.

Eggs can remain viable for at least two years in moist conditions

Contaminated water

Embryonated eggs may be present in water contaminated with dog/cat faeces. Disposal of pet faeces in the human sewage system is to be discouraged. The viability of eggs filtered into sludge is preserved; sludge must be treated at high temperatures if it is to be used safely as fertiliser.

4 Transmission

Toxocara must be swallowed to cause infection.

Toxocara must be swallowed to cause infection

- **Ingestion of embryonated (infective) eggs**

Embryonated eggs can be present in dog/cat faeces, soil and water. Infection occurs when contaminated hands are put in the mouth or convey food to the mouth, or if unwashed or inadequately washed contaminated salad or raw vegetables are eaten. Risk factors in children include geophagia, pica, thumb-sucking, and playing on ground contaminated with dog/cat faeces (see figure 28, p 50).

Playing on contaminated ground is a high infection risk

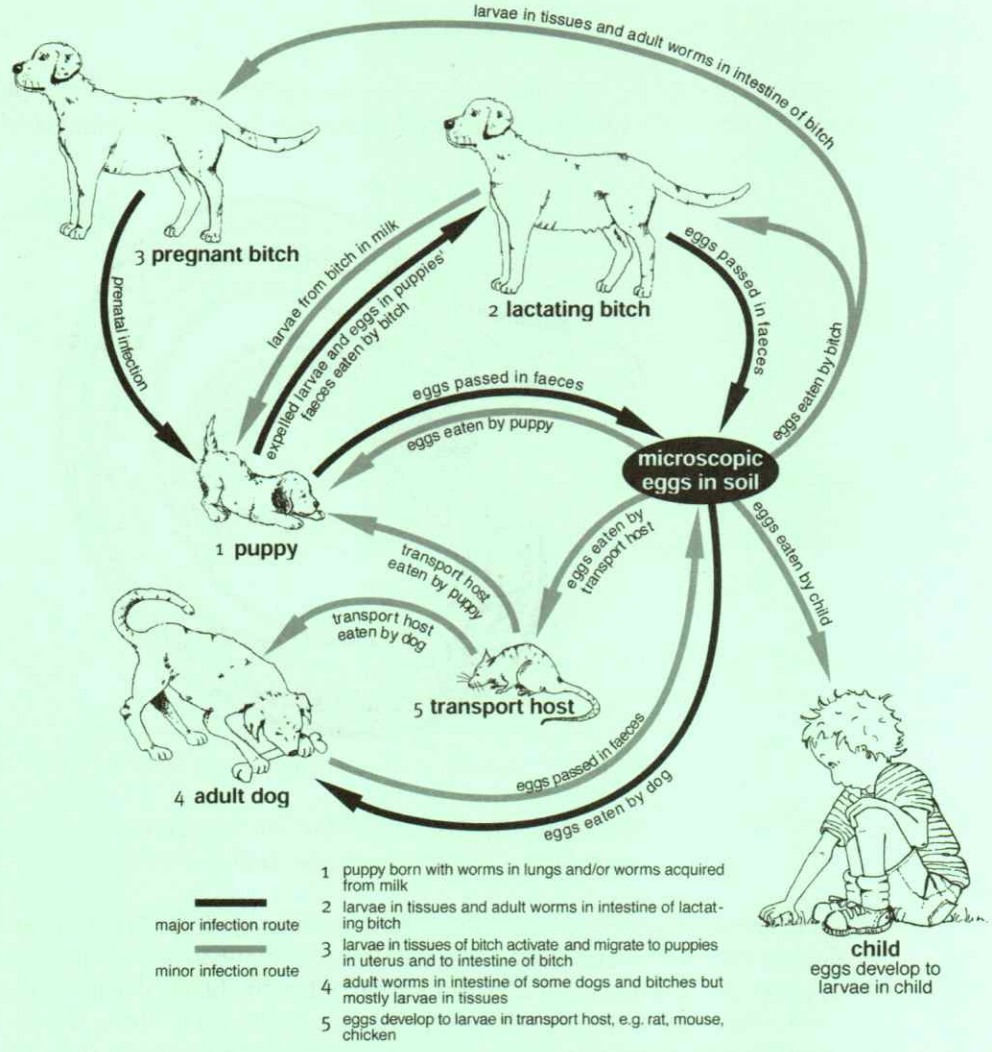


Figure 28: Life cycle of *Toxocara canis* and the chain of transmission to children

After Davies E. and Snow K. 1989. Illustrations by Lisa Kershaw.

Eggs in fresh faeces are not infective

Toxocara eggs are not infective for at least two weeks after shedding, therefore ingestion of ***fresh*** dog/cat faeces is not a route of transmission. The four factors required for development to infectivity are:

temperature 12-32ºC
humidity greater than 85%
shade (ultraviolet light is lethal)
oxygen.

- **Ingestion of intermediate host**

The ingestion of contaminated material originating from an intermediate host, e.g. undercooked chicken liver containing larvae L2, has been implicated as a source of infection.[3]

- **Handling infected animals**

Handling puppies and lactating bitches is a high infection risk

Domestic or occupational handling of infected animals poses a risk of infection. Handling puppies and lactating bitches represents a high risk of infection (see 3.1).

5 Clinical manifestations

Although clinical features vary widely, three syndromes are recognised: ocular larva migrans, toxocaral visceral larva migrans and covert toxocariasis.

5.1 Ocular toxocariasis (OT) or Ocular larva migrans (OLM)

Ocular toxocariasis may not be recognised until sight loss is investigated. When symptoms are noticeable, OLM is characterised by a retinal granuloma which forms when larvae become trapped in the eye during their somatic migration. Visual loss occurs from the effects of acute inflammation in the retina and optic nerve, while chronic disease may cause retinal fibrosis leading to tractional retinal detachment. Presenting symptoms include leucocoria, squint, pain in the eye, red eye and impaired vision. Granulomas are usually located in the macula or elsewhere in the posterior segment and may induce uveitis, or other signs. A single larva may cause unilateral blindness, bilateral signs occur in up to 3% of patients.[4] OLM is more often diagnosed in older children, between 5 to 12 years of age, with light infections.[2]

OLM is more easily confirmed

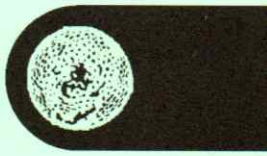
5.2 Toxocaral visceral larva migrans (VLM)

The disease is the result of larvae migrating through human tissues and the immune response they evoke. It is characterised by fever, malaise, cough and bronchospasm, abdominal pain and occasionally failure to thrive. Hepatosplenomegaly and bronchopulmonary signs and lymphadenopathy, frequently associated with eosinophilia, predominate. The disease is usually self limiting and is rarely diagnosed. VLM is more likely to occur in children under 5 years old, infected with large numbers of parasites.[2]

VLM and CT are rarely diagnosed

5.3 Covert toxocariasis (CT)

Covert toxocariasis may be subclinical or have a constellation of features associated with positive serology. It may manifest as transient childhood fevers, cough, sleep disturbances, abdominal pain, headaches and behavioural disturbances. Additionally, it can be associated with hepatomegaly, adenitis, and wheezing. Studies have found associations between seropositivity and epilepsy or atopy.



It is not known whether toxocariasis may be responsible for asthma symptoms, or if the atopic status in some asthmatic patients enhances the toxocaral antibody response.

6 Diagnosis

Toxocariasis should be considered in the differential diagnosis of the symptoms listed above and especially in recurrent abdominal pain which might otherwise be labelled as idiopathic. The absence of eosinophilia does not exclude toxocariasis.

Diagnosis is usually based on the combination of clinical symptoms and serological tests. The ELISA test is used for the detection of circulating antibodies to *T. canis* excretory-secretory (ES) antigen. A positive result is defined as an optical density (OD) greater than 0.25. The test does not distinguish between active disease and past infection.

Diagnosis is confirmed by a blood test

Testing is currently carried out at the following centres: Toxocara Reference Laboratory, London and Scottish Parasite Diagnostic Laboratory, see section 11, p 56 for addresses.

6.1 Testing in primary care

Serological testing should be undertaken in suspected cases of VLM or OLM. Similarly in patients with unexplained fever, seizures, chronic cough, eosinophilia, wheezing or other symptoms compatible with CT.

6.2 Testing of a child after ingestion of dog faeces

Frequently concerned parents ask their GP to check for toxocariasis in a child after ingestion of dog faeces.

- Fresh faeces do not contain embryonated eggs and therefore carry no risk from *Toxocara* - reassurance, not testing, is appropriate.

If *old* faeces have been swallowed serological testing should be performed at 3 weeks and 3 months

- If old faeces have been swallowed, serological testing should be performed 3 weeks after ingestion and repeated 3 months later. The patient and parents should be counselled so that they understand the relevance of testing and the possible sequelae.

7 Specific treatment and management

7.1 Ocular larva migrans (OLM)

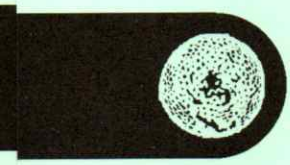
Prompt treatment of OLM is important

The prognosis of OLM depends on the prompt and accurate administration of treatment. A patient with suspected OLM should be referred to an ophthalmologist without delay.

7.2 Visceral larva migrans (VLM)

There is no specific treatment for VLM and CT

VLM is usually self limiting, there is no recognised specific anthelminthic therapy and if required, treatment is symptomatic to decrease the inflammatory response to larvae. Antihistamines, bronchodilators, corticosteroids and anti-inflammatory drugs may be life-saving in patients with severe acute lung, myocardium or CNS involvement.[3] Advice on treatment should be sought from the Toxocara Reference Laboratory.



8 Prevention and health promotion messages

8.1 Primary prevention

Prevention is vital

As treatment outcomes are uncertain, primary prevention is essential. Specific targets should be:

- Measures to impede the contamination of playgrounds and fields with dog faeces by implementation of hygienic dog faeces disposal.
- Measures directed at the prevention of accidental swallowing of embryonated eggs.

8.2 Target groups for health education

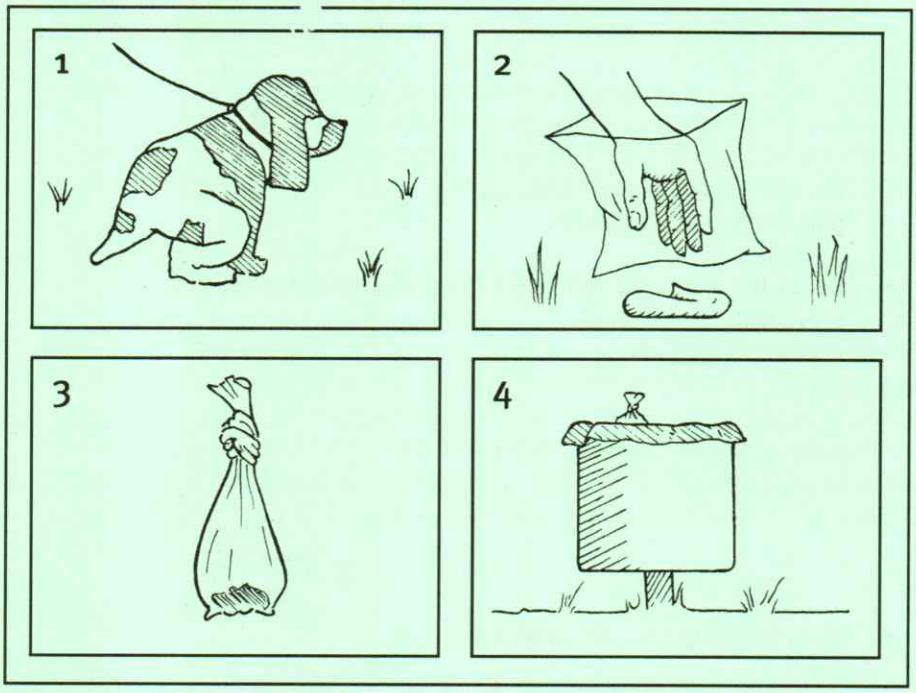
- Dog and cat owners, particularly dog breeders
- Parents
- School children
- Occupational health, people whose work puts them at risk

8.3 Key health education messages

- Eggs require a minimum of 2 weeks to embryonate, therefore dispose of all dog and cat faeces promptly and carefully (see Box 4: *Bag it and bin it!*). **Bag it and bin it!**
- Follow veterinary advice for correct worming procedures, particularly for breeding bitches and puppies and kittens during lactation.[5]
- Wash your hands especially after playing on parks or playgrounds where dogs are allowed, or after gardening in soil. **Hand washing**
- Prevent children from playing in fields which are frequented by foxes, and if fox faeces are found dispose them in the same way as for dog faeces.
- Prevent soil ingestion, keep a vigilant eye for toddlers eating soil (see Box 5: Play Safe from Toxocara Check List, p 54).

Toxocara

Don't turn a blind eye !
Bag it and bin it !



Box 4: *Bag it and bin it!*
(from Wormwatch poster, 1991)
Illustrations by William Baker.

Play Safe from Toxocara Check List

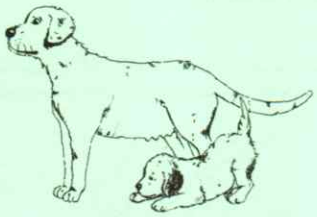
(advice for under-fives groups)

Young children are vulnerable to toxocariasis which can cause sight loss

Toxocariasis is caught by swallowing microscopic eggs passed in infected dog faeces

Viable eggs remain in/on soil after the faeces have weathered away

- Make sure you have a removable floor covering in your indoor play area
- Clean it at the end of the session
- Fold it in half before rolling it, to prevent the underneath lying against the upper side
- Supervise routine hand washing before eating
- Supervise handling of pets and hand washing afterwards



- Do not allow finger foods during play, particularly outdoors
- Be on the watch for toddlers eating soil, sand and grass and prevent it



- Keep sandpits covered when not in use
- Remind users who are also pet owners of their responsibilities

Hand washing for a group of young children:
It is important to use **running water to rinse**; soap helps loosen dirt, the force of the water dislodges it and carries it away safely. Shared bowls of water are a source of cross-contamination. Supervision is essential to check water is at a suitable temperature and washing is efficient. If there is any risk of scalding, it is preferable to use cold water.

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Box 5: Advice to Under-fives Groups

9 Legal considerations

9.1 Medicolegal

Attempts have been made to seek compensation from local authorities (LAs) for liability and damages in cases of loss of vision due to ocular toxocariasis, assuming that the infection was acquired after playing in a public place. It is not possible to prove the precise time of infection and evidence will be circumstantial, however several LAs have paid compensation (without accepting liability) and it is in their interest to promote preventive measures.

LAs can encourage measures to prevent fouling

9.2 Control of infection

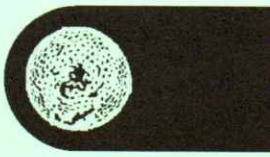
Toxocariasis is not a notifiable disease; however it assists researchers to report cases to the Toxocara Reference Laboratory and CHC (see 11 for addresses). Families wishing to share their experience of toxocariasis with other affected families should contact the CHC Help Line.

A duty of care is placed on LAs managing pet waste in large volumes (because it is likely to contain infection) to handle it safely and treat it as clinical waste. Several options are available including clinical waste incineration, landfill disposal on sites licensed to receive clinical waste and processing that inactivates infectivity.

10 Key issues of current concern

10.1 Dog registration

Many groups advocate dog registration as a means of educating dog owners in responsible ownership, enforcing measures to control dog fouling and a method of funding local authority measures that encourage owners to dispose of pet faeces safely.[6]



Dog registration is key to enforcement

10.2 Epidemiology of toxocariasis

The prevalence of toxocariasis in the UK remains undetermined, however, recent studies suggest that seroprevalence is higher in Eire than in other parts of the British Isles. This may be linked to higher toxocaral contamination of family gardens where children often play in Eire[7,8] or related to a pro-active interest in toxocariasis research.[9] The CHC Resource Project is engaged in ongoing research aimed at establishing the true incidence of toxocariasis in England and Ireland, to identify patterns of presentation and clusters of disease.

Research reveals the magnitude of the problem

10.3 Role of anthelminthics

The role of human anthelminthics in the treatment of VLM is still controversial; four day treatment with thiabendazole (25 mg/kg in two separate doses) does not appear to alter the course of eosinophilia or toxocaral antibody titres. Similarly, there were no differences in the efficacy of controlling clinical signs in patients treated with thiabendazole, mebendazole, albendazole and a placebo.[3] Diethylcarbamazine (DEC) has also been used with reduction in the mean values of eosinophils and specific toxocaral antibodies. More studies are needed in this field.

11 Educational resources and support

11.1 Leaflets / booklets

Picking up the problem: A positive approach to dog fouling. 1996. Compiled by The Tidy Britain Group (£11; check current availability).

The trade union, Unison, produces guidance for members working where toxocaral infection is a risk.

Toxocariasis is preventable poster/leaflet
Toxocara (roundworm) leaflet for pet owners
Please clear up after me! sticker



Available from CHC; send 3 x 2nd class stamps loose and a self addressed label for single copies and current price list to CHC, 160 Inderwick Road, London N8 9JT. *CHC Help Line* on 0181 341 7167 provides counselling to parents and pet owners worried about toxocariasis and supports affected families.

11.2 Useful addresses

The Toxocara Reference Laboratory
Hospital for Tropical Diseases
4 St Pancras Way
London NW1 0PE Tel: 0171 387 3209
(due to move to University College Hospital in 1998)

Scottish Parasite Diagnostic Laboratory
Stobhill General Hospital
Glasgow G21 3UW Tel: 0141 201 3000

Community Hygiene Concern Resource Project (open restricted hours)
160 Inderwick Road
London N8 9JT Tel: 0181 341 7167
Fax: 0181 292 7208
Key references on toxocariasis available for study by appointment.

The Tidy Britain Group
The Pier
Wigan WN3 4EX Tel. 01942 824 620

Unison
Health and Safety
1 Mabledon Place
London WC1H 9AJ Tel. 0171 388 2366

12 Further reading

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9 Figueroa JI, Stallbaumer M, Hartup C, *et al.* 1998. *The prevalence of toxocariasis in the British Isles, a preliminary report.* Report to the Department of Health and the King's Fund, London.