Parasitol Res (2003) 90: S140 – S141 DOI 10.1007/s00436-003-0918-2

Evaluation of the Efficacy of a Combination of Imidacloprid and Moxidectin against Immature *Toxocara cati* in Cats

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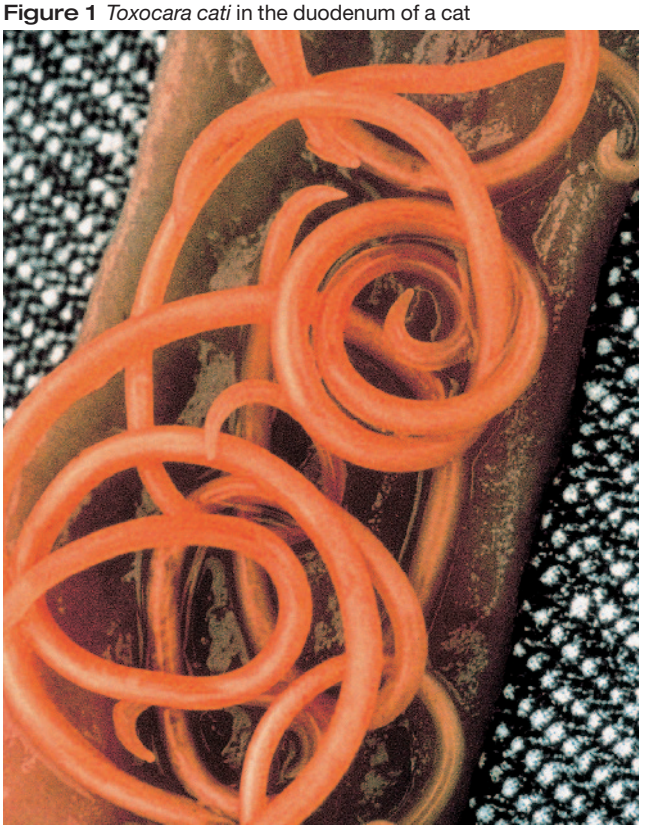
INTRODUCTION

From a veterinary medical perspective, optimum control of preventable diseases has always been a higher priority than disease therapy. Today, especially in small animal medicine, this objective can only be achieved by providing a product to the pet owner in an easy-to-administer formulation. The combination of 1% Moxidectin and 10% Imidacloprid in a spot-on formulation for dermal application fulfills these criteria. The combination product has been developed by Bayer, using the neonicotinyl insecticide, Imidacloprid, and the macrocyclic lactone, Moxidectin. It is intended to provide a treatment for, and prophylaxis against, fleas and a range of nematode infections of cats. It is desirable to control and treat not only established adult gastrointestinal parasites, but also the developmental stages including L4 and immature adults of *T. cati*. The importance of controlling feline parasitism is not only to relieve clinical symptoms in infected cats, but also to minimize the zoonotic potential of larval nematode infections in man (Sprent, 1956).

Figure 1 *Toxocara cati* in the duodenum of a cat



Moxidectin is related to the milbemycins and is believed to exert its effect in the same way as the milbemycins and avermectins. All appear to cause paralysis of susceptible parasite species by altering chloride conductance into cells. It was originally believed that this was brought about by activity of the molecules at the GABA receptors (McKellar and Benchaoui, 1996). However, after further investigation, it is understood that ivermectin and milbemycin D bind to glutamate-gated chloride channels in nematodes, where they can potentiate glutamate or cause an increase of conductance in the absence of glutamate (Martin, 1996).

STUDY DESIGN

A controlled laboratory study was conducted to evaluate the efficacy of a novel formulation of Imidacloprid + Moxidectin against fourth stage larvae and immature adult *Toxocara cati* infection in cats. Thirty-two animals experimentally infected with *T. cati* were treated topically with a formulation to provide at least 10 mg/kg of Imidacloprid and 1 mg/kg of Moxidectin one time in a controlled anthelmintic evaluation. The four treatment groups were as follows: 1. Imidacloprid + Moxidectin (treated on Day 14, necropsied on Day 19), 2. Placebo (treated on Day 14, necropsied on Day 19), 3. Placebo (treated on Day 24, necropsied on Day 29), and 4. Imidacloprid + Moxidectin (treated on Day 24, necropsied on Day 29). During the five day post-treatment period, cats were observed daily for clinical changes to eyes, feces, respiration, behavioral attitude, locomotion/musculature, and skin conditions. At the end of the five-day observation period, the animals were necropsied and the remaining worms were recovered and counted. At necropsy, alimentary contents and saline incubates of the small intestine were collected, preserved, and examined microscopically. Nematodes were recovered, counted, and identified to genus, species, and stage of development.

RESULTS

Topical administration of Imidacloprid + Moxidectin proved safe in cats as evidenced by no adverse clinical signs post-treatment. The geometric mean number of *Toxocara cati* larvae for the Day 19 necropsy was 36.9 for Placebo and 1.0 for the combination of Imidacloprid + Moxidectin. The geometric mean number of *Toxocara cati* adults for the Day 29 necropsy was 59.2 for the placebo and 1.0 for the combination of Imidacloprid + Moxidectin. Efficacy for the treatment group that was necropsied on Day 19 (larvae) was 97.2%, while the efficacy for the treatment group that was necropsied on Day 29 was 98.3%.

DISCUSSION

Infections with gastrointestinal nematodes, esp. *Toxocara cati* are significant and have been recorded not only in stray cats (Coman et al. 1981, Yamaguchi et al, 1996) but also in cats kept as pet animals (Hellmann et al. 2002). Fleas comprise the major ectoparasitc infestation of both cats and dogs worldwide (Rust and Dryden 1997). The combination of these two active parasiticides provides a product to control and prevent infection with both fleas and *Toxocara cati* in cats.

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