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Nov. 18, 1998

Memorandum to /Note adressée à: John Worgan
Head, OEAS

From/De: Jason Lin
Evaluation Officer, OEAS

Subject/Objet: **Health Evaluation Division's Assessment of EPA's Review of Applicator Exposure to Fipronil**

This memo is an assessment of the USEPA reviews of an exposure study for commercial pet groomers during application of fipronil:

> *Dermal and Inhalation Exposure of Commercial Pet Groomers During Application of Frontline Spray Treatment.* N. Meo, C. Gonzalez, T. Mester. Nov. 12, 1997. Performing Laboratory: ABC Laboratories, California. Sponsor: Merial Inc.
>
> *Dermal Exposure of Commercial Pet Groomers During Application of Frontline Top Spot.* N. Meo, C. Gonzalez, T. Belcher. Nov. 3, 1997. Performing Laboratory: ABC Laboratories, California. Sponsor: Merial Inc.

Versar Inc. performed the review of the above study, on contract for the EPA:

> Memo to J. Evans, EPA from H.-M. Chou, Versar Inc. Dated April 27, 1998. *Review of the Exposure Study - Dermal and Inhalation Exposure of Commercial Pet Groomers During Application of Frontline Spray Treatment (MRID #444333-02)"* (Attachment 1)

This memo is an assessment of the EPA and Versar's review of the applicator exposure study submitted by Merial to support registration of Frontline Spray Treatment and Frontline Top Spot.

PMRA Summary

Frontline Spray Treatment

Sixteen groomers/treatment applicators were included in this study. Each replicate applied treatments to eight dogs of varying weight, size, and hair length within a typical working day.

Work clothing consisted of a long-sleeved smock, long pants and short-sleeved shirt. Dermal exposure was quantified using 100% cotton whole-body dosimeters underneath work clothing, 100% cotton gloves worn underneath the PPE latex gloves, and facial swabs. Inhalation exposure was measured using a personal air pump connected with a cassette containing fiber filter and a cellulose support pad followed by a Chromosorb vapor collection tube.

The product was applied at the rate of four pumps per kg of dog body weight, the maximum label rate. The amount of ai applied per replicate ranged from 859 mg to 2,959 mg (mean of 1,773 mg), and the sampling time per replicate ranged from 38 to 72 minutes (mean of 56 minutes).

A method validation study on sampling media using GC analysis was conducted to determine laboratory recoveries (method accuracy), method precision, limit of quantification (LOQ), and limit of detection (LOD). Field recovery data were also collected but storage stability results were not reported.

Field recoveries ranged from 81.6% to 105.8%. The average laboratory recoveries (method accuracy) based on the method validation study ranged from 72.9% to 106% with the lower 95 percent confidence limit greater than 70 percent. Method precision, measured as the percent relative standard deviation of the mean laboratory recoveries (RSD), ranged from 2.12% to 10.35%. Limit of detection was determined as 0.192 ng/mL, and limit of quantification (LOQ) was determined as 0.576 ng/mL.

In this worker exposure study, most of the requirements contained in Subdivision U of the 1996 EPA Pesticide Assessment Guidelines were met. Inhalation exposure was almost negligible at 0.06% of dermal exposure. Dermal exposure averaged 0.024 mg/kg bw/day based on treatment of 8 dogs per day.

The following is a breakdown of the amount of residues found on various monitored parts of the body (n=16):

Forearms	1265.3 µg
Upper arms	163.5 µg
Chest	44.17 µg
Back	1.08 µg
Lower body	175.2 µg
Face	6.72 µg
Both Hands	12.82 µg
Inhalation	0.94 µg

The results indicate that the forearms of the groomers received by far the most exposure even with the one layer of protection (i.e., long-sleeved smock over a short-sleeved shirt). This was followed by the upper arms and lower body. The hands received very little exposure, most likely due to the protection of the latex gloves.

A survey conducted by Merial indicated that professional groomers used Frontline Spray Treatment on an average of 2.24 animals per day during peak flea season. Based on this estimate and the results of the applicator study, a dermal exposure estimate of 0.0067 mg/kg bw/day was derived for professional groomers.

Since there is no survey for pet owners, an estimate of 1 animal treated per day will be assigned. Based on this estimate, a dermal exposure estimate of 0.003 mg/kg bw/day was derived for pet owners using Frontline Spray Treatment.

Frontline Top Spot

Sixteen groomers/treatment applicators were included in this study. Each replicate applied treatments to eight dogs of varying weight, size, and hair length within a typical working day.

Work clothing consisted of a long-sleeved smock, long pants and short-sleeved shirt. Dermal exposure was quantified using 100% cotton whole-body dosimeters underneath work clothing, 100% cotton gloves worn underneath the PPE latex gloves, and facial swabs. Inhalation exposure was not measured in this study, but is most likely to be negligible when taking into account the low volume of formulation involved and the method of application.

Frontline Top Spot contains 9.7% fipronil and was applied at the following rates: 0.67 mL, 1.34 mL, and 2.68 mL for dogs weighing up to 10 kg, 10-20 kg, and 20-40 kg, respectively. Assuming use of the 1.34 mL product on a 15 kg dog, 130 mg of ai would be applied. Application was performed as per label instructions: the pipettes are to be opened at the tip, followed by placement of the applicator through the animal's hair to the skin level; the entire contents are then squeezed out on one or two spots on the back of the neck or between shoulder blades. Total time for treatment applications to the eight dogs for each of the 16 groomers ranged between 14 and 32 minutes of the typical work day.

A method validation study on sampling media using GC analysis was conducted to determine laboratory recoveries (method accuracy), method precision, limit of quantification (LOQ), and limit of detection (LOD). Field recovery data were also collected but storage stability results were not reported.

Field recoveries ranged from 79% to 103%. The average laboratory recoveries (method accuracy) based on the method validation study ranged from 89% to 111%. Limit of detection was determined as 0.192 ng/mL, and limit of quantification (LOQ) was determined as 0.576 ng/mL.

In this worker exposure study, most of the requirements contained in Subdivision U of the 1996 EPA Pesticide Assessment Guidelines were met. Dermal exposure averaged 0.0014 mg/kg bw/day based on treatment of 8 dogs per day.

The following is a breakdown of the amount of residues found on various monitored parts of the body (n=16):

Forearms	12.11 µg
Upper arms	13.3 µg
Chest	7.36 µg
Back	1.12 µg
Lower body	7.45 µg
Face	3.75 µg
Both Hands	8.16 µg

The data indicate that the forearms and upper arms of the groomers received by far the most exposure even with the one layer of protection (i.e., long-sleeved smock over a short-sleeved shirt).

A survey conducted by Merial indicated that professional groomers used Frontline Top Spot on an average of 1.66 animals per day during peak flea season. Based on this estimate and the results of the applicator study, a dermal exposure estimate of 0.00029 mg/kg bw/day was derived for professional groomers.

Since there is no survey for pet owners, an estimate of 1 animal treated per day will be assigned. Based on this estimate, a dermal exposure estimate of 0.00018 mg/kg bw/day was derived for pet owners using Frontline Top Spot.

Study Author's Conclusions

Versar only looked at the applicator study for Frontline Spray Treatment. However, the Top Spot study is sufficiently similar that a separate study was deemed to be unnecessary. They concluded:

"Generally, low levels of fipronil were detected in all 16 applicators and ranged from approximately 102.4 to 4403 µg, with a mean of 1670 µg, and medians between 1004 and 1119 µg. The amount of fipronil delivered by the 16 applicators during a replicate ranged from 859 to 2959 µg."

EPA Conclusions

The EPA concurred with Versar's conclusion that the study was of good quality and that it met most of the requirements contained in Subdivision U of the Pesticide Assessment Guidelines. Certain limitations of the study are listed on pages 7-8 of the Versar report (see Attachment 1).

From the results of the Frontline Spray Treatment study, the arithmetic mean representing total dermal exposure was 0.024 mg/kg bw/day based on treatment of 8 animals per day. In their risk assessment, the EPA adopted a chronic exposure estimate of 0.005 mg/kg bw/day based on professional groomers treating 1.7 animals per day. For adults treating a pet in a residential situation, the above estimate of 0.024 mg/kg bw/day was divided by 8, to arrive at an exposure estimate of 0.003 mg/kg bw/day.

EPA did not examine the results of the Frontline Top Spot study since the spray product is expected to have a much higher exposure potential than the spot-on product.

PMRA Health Evaluation Division Conclusions

Frontline Spray Treatment

The Health Evaluation Division concurs with the review conducted by Versar for the fipronil applicator exposure study and can derive an exposure estimate using this study.

An extensive survey conducted by Merial indicated that professional groomers use Frontline Spray Treatment on an average of 2.24 animals per day. Based on this estimate and the results of the applicator study, a dermal exposure estimate of 0.0067 mg/kg bw/day was derived for professional groomers.

Since there is no survey for pet owners, an estimate of 1 animal treated per day will be assigned. Based on this estimate, a dermal exposure estimate of 0.003 mg/kg bw/day was derived for pet owners using Frontline Spray Treatment.

Frontline Top Spot

An extensive survey conducted by Merial indicated that professional groomers use Frontline Top Spot on an average of 1.66 animals per day. Based on this estimate and the results of the applicator study, a dermal exposure estimate of 0.00029 mg/kg bw/day was derived for professional groomers.

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Summary

The following table summarizes the exposure estimates for the various application scenarios:

Product	Professional Groomer	Pet Owner
Frontline Spray Treatment	0.0067 mg/kg bw/day	0.003 mg/kg bw/day
Frontline Top Spot	0.00029 mg/kg bw/day	0.00018 mg/kg bw/day

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Health Evaluation Division's Evaluation of Fipronil Applicator Exposure Study Using EPA's Data Evaluation Report (DER)

Submission No.: S95-1152; S96-1005

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Date: Dec 14, 98