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Poison on Pets II

Toxic Chemicals in Flea and Tick Collars

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Table of Contents

Executive Summary

Americans spend more than $1 billion each year on products designed to kill fleas and ticks on household pets, especially dogs and cats.[1] While some of these products are safe, others leave harmful chemical residues on our pets' fur and in our homes. These chemicals are highly hazardous to animals and humans, can damage the brain and nervous system, and cause cancer.[2] A first-of-its-kind study by NRDC shows that high levels of pesticide residue can remain on a dog's or cat's fur for weeks after a flea collar is put on an animal. Residue levels produced by some flea collars are so high that they pose a risk of cancer and damage to the neurological system of children up to 1,000 times higher than the EPA's acceptable levels.

Children are particularly at risk from these pesticides because their neurological and metabolic systems are still developing. They are also more likely than adults to put their hands in their mouths after petting an animal, and so are more likely to ingest the hazardous residues. We found that residues from two pesticides used in flea collars—tetrachlorvinphos and propoxur, among the most dangerous pesticides still legally on the market—were high enough to pose a risk to both children and adults who play with their pets.

Residues from two pesticides used in flea collars were high enough to pose a risk to both children and adults who play with their pets.

California has already determined that one of these pesticides, propoxur, causes cancer and that consumer warnings are required. NRDC is suing major manufacturers and retailers of flea collars with propoxur to make them comply with this requirement or pull the products from California shelves. However, California's laws are not enough—the Environmental Protection Agency (EPA) should step in to ban these dangerous products nationwide. Retailers should help keep pets and families safe by pulling products that contain tetrachlorvinphos and propoxur from their shelves.

Keep Your Pets and Family Safe and Flea-Free

1. Avoid using flea control products with dangerous pesticides by giving your pet regular baths with a pesticide- free pet shampoo, and using a flea comb between baths. Launder your pet's bedding in hot water and vacuum carpets regularly to eliminate flea eggs that could be hidden there.

2. If you do need to use a chemical flea control product, the safest options are generally those dispensed as a pill. These usually contain the least toxic chemicals, and better still they don't leave a residue on your pet or in your home.

3. Check the label. If you do need to buy an off-the-shelf flea and tick product, avoid flea collars that list tetrachlorvinphos or propoxur as active ingredients. Other products to avoid include permethrin-based products, and tick-control products containing amitraz. Instead, opt for products whose labels list lufenuron, spinosad, methoprene, or pyriproxyfen. These are common and effective insect growth regulators.

4. Visit greenpaws.org for a comprehensive list of brand-name products with their chemical ingredients and more information about health risks from pesticides.

Flea and Tick Collars Contain Dangerous Chemicals

Two dangerous pesticides—tetrachlorvinphos and propoxur—are common ingredients in flea and tick collars:

Tetrachlorvinphos (TCVP) is an organophosphate pesticide and is toxic to the nervous system. Young children are particularly susceptible because their brains are still developing, and their ability to metabolize these chemicals is impaired relative to adults. In addition, TCVP is designated by EPA as a likely human carcinogen.[3]

Propoxur is a chemical in the N-methyl carbamate class of insecticides, which is closely related to the organophosphates. In addition to its neurological toxicity, propoxur is a known human carcinogen. In August 2006, California added it to a list of chemicals known to the state to cause cancer.[4]

Both tetrachlorvinphos and propoxur interfere with an essential enzyme (acetylcholinesterase) that normally controls messaging between nerve cells. The result of exposure is spasmodic overexcitation of the nervous system; this is the mechanism by which fleas and ticks are killed. In large doses, these chemicals can also harm or kill cats, dogs, and in extreme poisoning cases even humans. More commonly, at lower levels of exposure, these chemicals cause a variety of poisoning symptoms, many of which can mimic common illnesses; these include nausea, vomiting, diarrhea, wheezing, sweating, and tearing eyes. More severe poisoning can cause muscle twitching, drooling, seizures, respiratory paralysis, and death. Some recent research indicates that exposure to this type of pesticide can impair children's neurological development, resulting in pervasive disorders that may include delays in motor development and attention deficit/ hyperactivity disorder.[5,6]

NRDC Study Finds Pesticide Residues from Pet Collars That Pose Neurological and Cancer Risks

NRDC's study found that after only three days, 50 percent of the pets wearing collars with tetrachlorvinphos had enough residue on their fur to pose neurological risks exceeding the U.S. EPA's acceptable dose level for toddlers who spend an average amount of time with their pet. (The EPA level is considered to be without appreciable harm.) For toddlers who have a lot of contact with a pet or have multiple pets, 80 percent of the dogs and 100 percent of the cats had residue that exceeded acceptable levels.

After three days, 100 percent of the pets wearing collars containing the pesticide propoxur had residues on their fur posing a neurological risk to toddlers, with residues that exceeded acceptable levels for those spending an average amount of
time touching a pet. After 14 days, 75 percent of the pets we tested still had residue levels of propoxur that exceeded the acceptable amount for average contact with a pet, and 100 percent had residue levels that could be dangerous for children with a lot of contact. The propoxur collars were also found to contaminate indoor household air, meaning that the hazardous pesticide could be inhaled as well as absorbed through the skin and ingested from direct contact with the pet.

NRDC calculations reveal that the levels of propoxur on the fur of the dogs in our study could also increase the risk of cancer. For adults we found a cancer risk of 56 to 558 excess cancers per million people exposed—50 to 500 times greater than what the EPA considers acceptable for pesticides. When we used EPA guidelines to calculate the increased risks associated with exposures in children, cancer risk soared to 157 to 1,566 excess cancers per million, more than 1,000 times higher than the EPA's acceptable levels.

Although our study was small, the fact that the residue levels were so high indicates a problem that needs to be addressed by manufacturers, retailers, and government agencies.

The EPA Must Keep Consumers Safe from Toxic Pesticides in Pet Products

In spite of the known adverse effects of these pesticides on children, and although there are safer alternatives available, both tetrachlorvinphos and propoxur are still legal for sale to consumers to control fleas on pets. As relatively inexpensive flea control options, they remain on the shelves and many consumers are unaware of the dangers posed by these products.

Moreover, the agency's assessments of their risks are flawed. For example, in one case the agency makes the unreasonable assumption that a child touches a pet only once per hour, and only with one hand.[7] This overlooks the reality that many children spend hours each day with their pets, hugging them with both hands or even sleeping with them, resulting in eight hours or more of contact with their pet.

NRDC's testing and more careful calculations reveal that the EPA's decision to leave these products on the market may create a significant health risk to pet owners, most notably young children. The availability of many safer alternatives for flea and tick control render the continued use of these pesticides in pet products unnecessary. The EPA must reconsider the safety of these products and remove them from the market.

CHAPTER 1

NRDC Finds Hazardous Chemical Residue Levels on Pet Fur

NRDC conducted an original study of pesticide residues on pet fur using real-world conditions. This study was designed to estimate exposure to the pesticides tetrachlorvinphos and propoxur from flea collars. Our findings show that after dogs and cats had worn flea collars for three days, there were substantial pesticide residues on their fur that could be transferred to a person's hand. The residues remained for the entire duration of the two-week study. Based on the product labels, which say that the collars are active for 180 days, we expect there to be significant pesticide residue on pet fur for months.

The only prior studies of the safety of flea and tick collars were risk assessments done by the EPA, which did not actually measure pesticide residue levels on pets wearing flea collars. Our data show that the EPA's risk assessments were flawed and made incorrect assumptions, including underestimating the pesticide residue levels on pet fur. Our recalculation of the health risks using the EPA methods and the new residue data show significant neurological and cancer risks.

Study Methods

Our first round of sampling involved 14 pets (nine dogs and five cats). Two dogs from a single household also participated in a second round of sampling, resulting in a total of 16 samples. The sample size for this study, while small, is larger than or equivalent to the studies used by the EPA to determine exposure to pesticides from flea collars and in the same range as other studies conducted to determine the hazards of pesticides.[8,9,10,11]

Four different commercially available flea collars were used, two containing TCVP (Hartz Advanced Care 3 in 1 Control Collar for Cats and Hartz Advanced Care 2 in 1 Reflecting Flea & Tick Collar for Dogs) and two containing propoxur (Zodiac Flea & Tick Collar for dogs and Bio Spot Flea and Tick Collar for dogs).[12,13] In total, 10 pets and six pets were wiped for residues of TCVP and propoxur, respectively, after wearing a collar for three days; five and four pets were tested for TCVP and propoxur, respectively, after 14 days of wearing a collar.

Pesticide residues were sampled using a protocol based on the methods published in a previous study.[14] Residues were collected on microfiber filters moistened to simulate human perspiration.[15] A rectangular area below the collar and around the pet's shoulders was wiped thoroughly for one minute with the moistened filter to simulate petting. The fur wipe samples were analyzed by a commercial laboratory using standard EPA methods. Measured residue levels were compared to the EPA's acceptable levels using standard exposure and risk assessment methodologies for cancer and non-cancer effects. Because children's behavior with their pets can vary, we calculated two scenarios that approximate
an average and high level or contact with a pet. The average contact scenario was based on the EPA Standard Operating Procedure for Exposure Assessments and includes a child playing with a pet for two hours a day, while the high contact scenario reflects eight hours per day, including sleeping of contact with one or more pets. In addition, we gathered
data on 10 years of calls to the California Poison Control System and tabulated the calls about flea control pesticides, including those in flea collars. (See Appendix A online at http://www.nrdc.org/health/poisononpets/ for more details on sampling methods and study design.)

Child Poisoning Linked to Use of Flea Control Product*

In August 1999, a two-year-old boy was rushed by his parents to the emergency department of a hospital in Modesto, California. The child had had a seizure and was unresponsive; he had severe muscle weakness, no reflexes, strange eye movements, abnormal pupils, irregular breathing, and a rapid heart rate. Routine laboratory results were all normal; a brain MRI showed no abnormalities and an EEG showed diffuse slowing of brain activity. The child was put on a respirator and admitted to the intensive care unit. The father reported that he had used Zodiac Flea Spray, which contained a carbamate pesticide, in the house a few days previously.

The laboratory reported that the child's level of a critical enzyme, cholinesterase, was severely depressed. Cholinesterase in the blood was less than one-tenth the normal level, and in the child's red blood cells it was less than half of what is considered minimally normal. Cholinesterase is essential for transmission of nerve signals in the body. It is also the target of certain pesticides, including carbamate chemicals in flea sprays and collars. When cholinesterase levels in the blood drop, as in this child, a variety of severe medical problems occur. However, the symptoms of carbamate poisoning in young children are often different from those seen in adults, and this can confuse health care providers.[a] Adults may develop vomiting, diarrhea, profuse sweating, tearing eyes, and muscle twitching, along with more serious neurological symptoms. Poisoned children often come to the hospital with flaccid muscles, seizures, and coma—just as this child had.

Over the course of a week, the child slowly recovered with treatment; he resumed breathing on his own and gradually woke up. He was discharged from the hospital after 10 days, and tube feedings were stopped several days later. The record indicates that he recovered from this event. Information about long-term impacts, however, is unavailable.

*Case report obtained from the California Poison Control System confidential database and provided to NRDC without personal identifying information.

[a] Lifshitz, M., Shahak, E., Sofer, S. "Carbamate and Organophosphate Poisoning in Young Children." Pediatric Emergency Care, 1999. 15(2):102-3.

Pets Poisoned by Tetrachlorvinphos (TCVP) Flea Collars*

On June 10, 2007, a woman from Sonora, California called the National Pesticide Information Center (NPIC) to report a problem. Three days ago, she had placed a Hartz Advanced Care 2 in 1 collar on her six- month-old Chihuahua. Two days later, the dog would not eat or drink. Then the dog began "vomiting foam," having diarrhea, and became "listless and weak." The woman removed the collar, but the dog's symptoms did not resolve. When she phoned, she was upset and crying because she was on disability and could not afford to take her dog to the vet. NPIC staff determined that this incident was related to TCVP and assigned it a certainty index of "probable" when it was reported to the EPA. There was no information about whether the dog survived.

In 2005, a woman from Memphis, Tennessee called the NPIC to report that one of her cats had died and the other was seriously ill as a result of a flea collar. She placed flea collars containing TCVP on her two cats two weeks previously. By the next day, both cats stopped eating and "started acting disoriented." The older cat collapsed several days later and "couldn't stand up." She took the cat to the vet who said "the cat's kidneys had shut down," and the cat died around midnight that night. Initially the vet said the cat "had probably just died of old age," but the next morning her other cat was "meowing a lot, twitching, and then collapsed." At this point the vet started asking questions. The vet identified the cat's symptoms as being caused by the active ingredient in the flea collar (tetrachlorvinphos). When she called, the cat was in critical condition and the vet was not sure if the cat would pull through. There was no more information about what happened.

*Case reports selected from a special report *Animal Incidents Involving Tetrachlorvinphos.* Report Number: EPA—KFa 09/19/2008, prepared by the National Pesticide Information Center (NPIC) for the US Environmental Protection Agency.

Study Results Show Hazardous Levels of Pesticides on Pet Fur

Although residue levels varied among the pets in this study, the pesticide residue on the pets after three and fourteen days was high enough, in many cases, to exceed the acceptable level established by EPA to protect the developing brains of young children. In addition, the levels of propoxur residue pose a significant cancer risk, especially to children.

Neurological (Non-Cancer) Risk from Exposure to Pesticide Residues in Flea Collars

Tetrachlorvinphos

- After three days, three out of five dogs (60 percent) and two out of five cats (40 percent) had residue levels that would exceed the EPA's acceptable dose of TCVP for toddlers spending an average amount of time with a pet.

- For toddlers who have a lot more contact with a pet or have multiple pets, four out of five (80 percent) of the residue levels on dogs, and five out of five (100 percent) on cats, exceeded the acceptable level.

- After 14 days, none of the pets had residue levels that exceeded the acceptable level for average contact with a pet, while two out three dogs (67 percent) and two out of two cats (100 percent) had residue levels that could be dangerous for children who have a lot of contact with a pet.

TABLE 1: LEVELS OF TCVP RESIDUE FOUND AFTER ONE MINUTE OF PETTING

PET	DAY	AVERAGE RESIDUE[16] (µg / WIPE)	MAXIMUM RESIDUE (µg / WIPE)	NUMBER OF PETS TESTED	PETS EXCEEDING ACCEPTBLE LEVEL — TODDLERS WITH AVERAGE CONTACT	PETS EXCEEDING ACCEPTBLE LEVEL — TODDLERS WITH HIGH CONTACT
DOG	0	0.85	3.65[17]	5	Not Applicable	
	3	57.98	95.8	5	60%	80%
	14	5.67	9.01	3	0%	67%
CAT	0	0.02	0.05	5	Not Applicable	
	3	43.40	110	5	40%	100%
	14	8.19	9.16	2*	0%	100%

* One cat in the 14-day group developed dermatitis under the collar, so the collar was removed early, leaving only two cats at 14 days.

Propoxur

- After three days, six out of the six dogs (100 percent) had residue levels wiped from their fur that would exceed the EPA's acceptable dose for toddlers spending an average amount of time with a pet.

- After 14 days, three out the four dogs (75 percent) had residue levels exceeding the acceptable level for average contact with a pet, while four out of four (100 percent) had residue levels that could be dangerous for children having a lot of contact with a pet.

TABLE 2: LEVELS OF PROPOXUR RESIDUE FOUND AFTER ONE MINUTE OF PETTING

PET	DAY	AVERAGE RESIDUE (µg / WIPE)	MAXIMUM RESIDUE (µg / WIPE)	NUMBER OF PETS TESTED	PETS EXCEEDING ACCEPTBLE LEVEL — TODDLERS WITH AVERAGE CONTACT	PETS EXCEEDING ACCEPTBLE LEVEL — TODDLERS WITH HIGH CONTACT
DOG	0	0.06	0.37	6	Not Applicable	
	3	280.32	1080	6	100%	100%
	14	50.36	90	4	75%	100%

Cancer Risk from Exposure to Pesticide Residues from Flea Collars

Propoxur is a known human carcinogen. Using the EPA's cancer potency calculations and the results from our study, we found that daily lifetime exposure to the levels of propoxur residue found on dogs wearing flea collars could significantly increase the risk of cancer.[18] According to our assessment, the cancer risk for an adult would be in the range of 56 to 558 excess cancers per million people, depending on whether there is inadvertent contact with the collar in addition to contact with the pet's fur. These risk levels greatly exceed the levels at which health warnings are required in California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (commonly known as Proposition 65) of 10 cancers per million people exposed.

The cancer risk to children, calculated according to the EPA's Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens, is much greater. According to our assessment, the cancer risk would be in the range of 157 - 1,566 excess cancers per million children, depending on whether or not there is inadvertent contact with the collar in addition to contact with the pet's fur.

We also assessed the cancer risk from lifetime exposure to tetrachlorvinphos residues from flea collars. Using the EPA's cancer potency calculations and the results from our study, we found a risk level for adults of 4 excess cancers per million people exposed. When we considered the increased risks associated with exposures in children, the calculated risk was 10 in a million children exposed.

TABLE 3: CANCER RISK FROM FLEA COLLARS EXCEEDS THE EPA'S ACCEPTABLE LEVEL

				ADULTS ONLY		INCLUDES CHILDREN'S EXPOSURE
SCENARIO	TESTING DAYS	AVERAGE RESIDUE LEVEL (µg / CM²)	NUMBER OF PETS	DAILY DOSE (MG/KG)	CANCER RISK PER MILLION	CANCER RISK PER MILLION
PROPOXUR						
FUR ONLY	14	0.53	4	0.02	56	157
COLLAR CONTACT INCLUDED*	14	5.28	2	0.15	558	1,566
TETRACHLORVINPHOS						
FUR ONLY	14	0.07	10	0.002	4	10

*RESIDUE CONCENTRATION ASSUMES HALF-TIME CONTACT WITH COLLAR.

Flea Collars Can Also Contaminate Indoor Air

NRDC also performed indoor air testing to determine the concentration of propoxur in a room following the use of a flea collar. We found an average airborne level of propoxur of 0.5 ng/m^3 over eight hours in a small room with a pet wearing a flea collar. The EPA has not determined an acceptable level for propoxur in air and has assumed in risk assessment documents that this pesticide is never inhaled, so there are no benchmarks for comparison. Although we don't know what levels might be found in a home where a flea collar is regularly used, our testing shows that flea collars can be a source of pesticide vapor in indoor air. This has not been properly accounted for in the EPA's risk assessments, suggesting that there may have been an undercounting of the risks to pet owners from use of the collars.

NRDC's History of Protecting Pets and Pet Owners from Chemical Exposure

In November 2000, NRDC released a groundbreaking report, "Poisons on Pets."[a] This report identified organophosphate (OP) insecticides as the most dangerous class of insecticides in flea and tick control products. At that time, OPs were among the most widely used pesticides in the United States, with up to 77 million pounds used annually—60 million pounds for agriculture and 17 million pounds for nonagriculture uses including pest control on pets, lawns, gardens, and golf courses.[b] In a four-year study, Americans reported 63,000 accidental residential poisonings from OPs, 40 percent involving children under the age of six.[c] Poisoning symptoms can range from nausea and wheezing to seizures and even death. The long-term effects of OP exposure can be severe as well. "Poisons on Pets" reviewed scientific studies that found that small exposures to an OP pesticide led to the loss of brain cells in specific parts of the brain and caused behavioral changes as well as changes in brain wave measurements.[d]

At the time "Poisons on Pets" was written, seven organophosphate insecticides were legally and commonly used in flea and tick control products despite the known risks that they posed. Since then, six of these chemicals have been completely or largely removed from the residential market, marking significant strides in consumer protection. However, one of these insecticides, tetrachlorvinphos, is still legally and commonly used in pet products.[e]

STATUS OF SEVEN TOXIC PESTICIDES COMMONLY USED IN PET PRODUCTS IN 2000

CHLORPYRIFOS	Banned for residential use except for ant and roach baits in child- resistant packaging, effective December 31, 2001.[f]
DIAZINON	Banned for residential use, effective December 31, 2004.[g]
DICHLORVOS (DDVP)	Banned for use on pets, effective June 27, 2007. There may still be old products available in stores under the brands Sergeant's Sentry Collars and Alco Flea Collars. Allowed for other residential uses, including pest strips.[h]
MALATHION	Voluntarily removed by manufacturers from indoor use in 2006[i]
NALED	Voluntarily removed by manufacturers from indoor use in 2002.[j]
PHOSMET	Legal for products for dogs.[k] However, no pet products currently sold in the United States contain it.
TETRACHLORVINPHOS (TCVP)	Still legal for residential uses, including use on pets.[l]

[a] Natural Resources Defense Council. "Poisons on Pets: Health Hazards From Flea and Tick Products." November 2000. Available at http://www.nrdc.org/health/effects/pets/pets.pdf

[b] U.S. EPA. Staff Background Paper #5.1: Summary of Organophosphate Pesticide Usage, handout to the Tolerance Reassessment Advisory Committee (TRAC), May 27, 1998. Available at http://www.epa.gov/oppfead1/trac/sumry5-1.htm

[c] "Poisons on Pets," p. 29.

[d] Ibid, p. 33.

[e] U.S. EPA (2006). Interim Tolerance Reassessment Eligibility Decision and Reregistration Eligibility Addenda for Tetrachlorvinphos.

[f] Federal Register, January 25, 2001 (Vol. 66, No. 17), pp. 7753–7759.

[g] EPA Reregistration Eligibility Decision for Diazinon, May 2004. Available at http://www.epa.gov/pesticides/reregistration/REDs/diazinon_red.pdf.

[h] EPA Reregistration Eligibility Decision for Dichlorvos (DDVP). June 2006. Available at http://www.epa.gov/pesticides/reregistration/REDs/ddvp_red. pdf.

[i] EPA Reregistration Eligibility Decision for Malathion. July 2006. Available at http://www.epa.gov/pesticides/reregistration/REDs/malathion_red.pdf.

[j] Federal Register, January 10, 2002 (Vol. 67, No. 7), pp. 1348–1351.

[k] EPA Reregistration Eligibility Decision for Phosmet. October 2001. Available at http://www.epa.gov/pesticides/reregistration/REDs/phosmet_red.pdf.

[l] U.S. EPA (2006). Interim Tolerance Reassessment Eligibility Decision and Reregistration Eligibility Addenda for Tetrachlorvinphos.

CHAPTER 2

The EPA Has Failed To Regulate Hazardous Pet Products

The EPA is charged by law with protecting the public from hazardous pesticides. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1972 and the Food Quality Protection Act (FQPA) of 1996, the EPA is responsible for reviewing the safety of pesticides, particularly for children, and for barring uses that could result in unacceptable risks. The EPA evaluates potentially hazardous pesticides by performing risk assessments. Unfortunately, the EPA has consistently used faulty assumptions in these assessments, resulting in serious underestimates of the harm these chemicals can cause to human health.

EPA's Flawed Safety Assessments Put People's Health at Risk

The EPA's risk assessments for pet products assume that all toddlers (children aged one to six years) weigh 33 pounds, have contact with only one treated pet per day for no more than one hour per day, and would never put anything in their mouth other than their fingers.[19,20] EPA's assumptions don't apply to many—or even most—children, and therefore don't protect them. For example:

- More than 90 percent of one-year-olds weigh less than 25 pounds (and therefore receive a larger relative dose of pesticide than EPA's 33 pound "typical" child);
- Many families have more than one pet and would reasonably be expected to treat all household pets for fleas at the same time;
- Many children spend hours each day with their pets or even sleep with them; and
- Any parent will tell you that toddlers put more than just their fingers in their mouth![21]

In addition to these flawed general assumptions, the specific EPA risk assessments for tetrachlorvinphos and propoxur are inadequate. For example, the 2006 assessment of indoor residential use of tetrachlorvinphos failed to set exposure limits to protect the most highly exposed children, knowingly leaving an estimated 120,000 toddlers (one- and two-year-olds) exposed

to TCVP at levels that exceed the agency's own allowable limits.[22] In addition, the EPA's assessments of propoxur have been marked by a failure to consider all relevant routes of exposure. The 1997 final assessment of the safety of propoxur in pet products omitted any evaluation of the hazards from pesticide residues on pets through skin contact or through children's hand-to-mouth activity.[23] Ten years later, EPA's second evaluation, in the 2007 draft N-methyl carbamate pesticide cumulative risk assessment, failed to evaluate any risk posed by inhaling the pesticide, despite information suggesting that pesticide vapors were released into the air. This assessment also seriously underestimated children's exposure to pesticide residues from flea collars via hand-to-mouth activity because of faulty assumptions about children's interactions with their pets. In addition, the EPA evaluation of the safety of propoxur failed to include adequate safety factors to protect infants and children.[24]

Further, EPA estimates of pesticide residues on pet fur are not based on any relevant data. Their estimates relied on an industry study submitted by Pfizer Animal Health (1998) that was not peer reviewed or published, and the study protocol is not available in the EPA's files. The Pfizer study evaluated the exposures of 16 professional pet groomers
shampooing dogs with a completely different pesticide, rather than the exposures of families living with pets wearing flea collars. Thus the industry study was scientifically shaky and likely irrelevant to pesticide residues from flea collars.

Children Are Most Vulnerable to Flea Collar Poisoning

From 1998 through 2007, the California Poison Control System (CPCS) received approximately 4,322 calls related to flea control products. Of these, 6.6 percent (287) involved exposure to a flea collar. Due to limitations in the search capabilities of the CPCS database and the fact that many poisoning cases are managed without consultation with the CPCS, it is likely that this total is lower than the actual number of cases. However, the CPCS data highlight the hazards of flea collars and the vulnerability of young children to these products.

The cases related to flea collars showed a disproportionate impact on young children compared with flea control products as a whole. Of flea collar exposure cases, over half (56 percent) involved a child under the age of five; of these, one-quarter were children under age two. By comparison, for flea control products as a whole, 37 percent involved children under age five, and 16 percent of these involved children under age two. Oral exposure was the primary route documented for nearly three-quarters (74 percent) of the flea collar cases but only 46 percent of flea control products as a whole.

Lack of specific pesticide coding in the data made it difficult to determine which pesticides were responsible for the exposures and effects documented. However, a substantial fraction (37 percent) of the cases related to flea collars were recorded as involving organophosphates and carbamates, compared with 10 percent for flea control products as a whole. Very few poison center cases involved the safer alternative products; for example, only 1 percent were known to involve exposure to flea control products in the "insect growth regulator" class.

CHAPTER 3

Conclusion And Recommendations For Keeping Pets and People Safe

Although our study is relatively small, the testing performed by NRDC scientists involved a larger sample than ones used by the EPA, and the results are reliable. Elevated residues were not an anomaly or a testing error noted in only one or two pets. Rather, high levels of pesticide residue were common, and these results are likely to reflect a much larger problem in the many cats and dogs wearing these types of flea collars.

Our review of the safety of flea collars containing two dangerous pesticides, tetrachlorvinphos and propoxur, revealed seriously flawed assessments by the EPA, unsafe levels of residues on pet fur, and multiple incidents of poisoning experienced by young children and pets. The availability of less dangerous alternatives for flea and tick control render the continued use of hazardous pesticides in pet products an unnecessary risk to pets and family members, particularly children.

Recommendations for Government, Retailers, and Consumers

NRDC recommends the following:

- The EPA should ban the use of tetrachlorvinphos and propoxur in pet products because of the health hazards posed by these chemicals and the high levels of residue on pet fur.

- Retailers should remove flea collars that contain tetrachlorvinphos and propoxur from their shelves and promote safer alternatives for flea control.

- Consumers should avoid using the most dangerous pesticides to control fleas on pets. This especially includes tetrachlorvinphos and propoxur. NRDC recommends using non-chemical methods, such as flea combing and bathing, to reduce flea populations as a first step. When necessary, flea products that contain insect growth regulators, such as
  S-methoprene and pyriproxyfen, or are administered as a pill, such as lufenuron, nitenpyram, and spinosad, are strongly preferred options. For severe flea infestations or when pets are allergic to the bites of fleas, pet owners may sometimes need to use a lower-risk insecticide. See NRDC's product guide (available at greenpaws.org) for more information on pesticides used in pet products.

How to Control Fleas More Safely

Effective ways to prevent a flea infestation on a cat or dog include using a flea comb, vacuuming frequently, mowing areas of the lawn where the pet spends the most time, and washing the pet and its bedding regularly. Cats that are not allowed to roam outdoors will not get fleas.

Regular combing of a pet can help reduce fleas and also helps monitor the success of a flea control program. Fleas caught in the comb should be drowned in soapy water. Flea combs can be bought in most pet stores. Fleas are commonly found at the base of a pet's tail, around the neck, in the groin, on the back of the legs, and in the middle of the back. Adult fleas are tiny, dark, and wingless. They create "flea dirt"—droppings that look like pepper grains and turn dark red if placed on a piece of paper and moistened with a drop of water. If flea dirt is present, one can be fairly sure the pet has fleas, even if a live one is not found.

Vacuuming eliminates fleas and eggs from carpets, floors, and crevices and from under or on furniture. Immediately after vacuuming, the vacuum bag should be thrown away to prevent fleas from escaping and reinfesting the area. Severe infestations may require professional steam cleaning of carpets.

Keeping grass and shrubbery clipped short in areas where the pet spends time will increase dryness and exposure to sunlight, which will help reduce the flea problem. Nematodes— available at garden supply stores—can be used as a nonchemical, biological aid to help control fleas in these areas.

Baths are a great way to control fleas since any regular pet shampoo (without pesticides) will get rid of fleas. Pet bedding should also be washed every couple of weeks. Fleas tend to accumulate in bedding, so care should be taken not to spread the flea eggs and larvae contained in it.

Insect growth regulators (IGRs) are a relatively safe and effective way to prevent flea problems when additional control options are needed, because they stop the next generation of adult fleas from developing. Products with IGRs are available as sprays for pet bedding and carpets, spot applications, collars, and pills. Pills leave no residue of any chemical on the pet or in the house. Many IGR products contain a traditional insecticide as well, so care should be taken to find a product that contains the IGR only.

For more information on how to keep your pets safe, visit www.greenpaws.org.

Endnotes

[1] Kansas State University press release. "K-State Expert Says Fleas Can Be an Itchy Situation." November 16, 1999.
Available at http://www.mediarelations.k-state.edu/WEB/News/NewsReleases/listfleas11169.html.

[2] California's Safe Drinking Water and Toxic Enforcement Act of 1986. List of developmental toxicants and carcinogens available at http://www.oehha.ca.gov/prop65/prop65_list/files/P65single092807.pdf. U.S. EPA Reregistration Eligibility Decision: Propoxur. August 1997. Available at http://www.epa.gov/oppsrrd1/
REDs/2555red.pdf,. U.S. EPA Reregistration Eligibility Decision: Tetrachlorvinphos. July 2006. Available at http:// www.epa.gov/opp00001/reregistration/REDs/tcvp_red.pdf

[3] U.S. EPA. Chemicals Evaluated for Carcinogenic Potential by the Office of Pesticide Programs. Sept. 24, 2008.

[4] California Health and Safety Code, section 25249.5 *et seq.*, commonly known as Proposition 65.

[5] Although this type of study had not yet been conducted on tetrachlorvinphos, similarities in the toxicity and behavior of these chemicals in the body raise similar concerns about childhood exposures.

[6] Rauh, V.A., Garfinkel, R., Perera, F.P., *et al.* "Impact of Prenatal Chlorpyrifos Exposure on Neurodevelopment in the First 3 Years of Life Among Inner-City Children." *Pediatrics*, December 2006 (Vol. 118, No. 6), pp 1845–1859. Robin M. Whyatt, et al. "Prenatal Insecticide Exposures and Birth Weight and Length among an Urban Minority Cohort." *Environmental Health Perspectives.* July 2004. (Vol 112, No. 10) pp 1125-1132)

[7] U.S. EPA (2007). Revised N-Methyl Carbamate Cumulative Risk Assessment (draft).

[8] McKeown, K. "Determination of Dislodgeability of Tetrachlorvinphos (TCVP) From the Fur of Dogs Following the Application of an Insecticide Powder, Pump Spray or Aerosol," lab project number 2001-3:1555. Unpublished study prepared by Hartz Mountain Corp.(2001) and used in the EPA cumulative risk assessment of organophosphates.

[9] Mester, T. "Dermal Exposure and Inhalation Exposure to Carbaryl by Commercial Pest Groomers During Application of Adams Carbaryl Flea and Tick Shampoo," lab project number 97649: 2405Z-60-97-109: 44088. Unpublished study prepared by ABC Laboratories California (1998) and used in the EPA cumulative risk assessment of n-methyl carbamates.

[10] Chambers, J.E., Boone, J.S., Davis, M.K., Moran, J.E., and Tyler, J.W. "Assessing Transferable Residues From Intermittent Exposure to Flea Control Collars Containing the Organophosphate Insecticide Chlorpyrifos." *Journal of Exposure Science and Environmental Epidemiology*, 2007. 17(7): 656–666.

[11] The pets were all healthy and lived in 10 households that did not have young children, pregnant women, or prior use of flea collars. Informed consent was obtained from all of the pet owners.

[12] Other flea collars containing propoxur include: Adams Flea and Tick Collar, Bansect Flea and Tick Collar, Scratchex Color-Full Formula 5 Flea & Tick Collar, Sentry Dual Action Flea & Tick Collar, Sergeant's Dual Action Flea & Tick Collar, Vet Kem Powerband Flea & Tick Collar, and Zema Dual Action Flea & Tick Collar. Other flea collars containing tetrachlorvinphos include Americare Rabon Flea and Tick Collar.

[13] All flea collars were purchased at Petco.

[14] Chambers, J.E., Boone, J.S., Davis, M.K., Moran, J.E., and Tyler, J.W. "Assessing Transferable Residues From Intermittent Exposure to Flea Control Collars Containing the Organophosphate Insecticide Chlorpyrifos. *Journal of Exposure Science and Environmental Epidemiology, 2007*. 17(7): 656–666.

[15] Surfactant solution used to simulate human perspiration in California EPA DPR Guidance for Determination of Dislodgeable Foliar Residue. Worker Health and Safety Branch, Health and Safety Report HS-1600. Revision February 20, 2002.

[16] Due to our small sample size, the average value reported is an approximation. Further testing is needed to gain a more precise estimate of average residue levels.

[17] Measured levels of pesticide residue on pets prior to application of the flea collars may have been due to exposure to other products containing these pesticides or contact with other animals treated with flea control products outside of the home. Dogs in particular may be likely to be in contact with treated areas or animals outside of the home, such as a dog park.

[18] U.S. EPA. Reregistration Eligibility Decision: Propoxur. EPA 738-R-97-009.

[19] U.S. EPA (2006). Organophosphate Cumulative Risk Assessment.

[20] U.S. EPA (2007). Revised N-Methyl Carbamate Cumulative Risk Assessment (draft).

[21] "Poisons on Pets," p 10.

[22] NRDC comments on EPA Organophosphate Cumulative Risk Assessment (October 2, 2006). EPA docket number EPA-HQ-OPP-2006-0618.

[23] U.S. EPA (1997). Reregistration Eligibility Decision: Propoxur. EPA 738-R-97-009.

[24] NRDC comments on EPA Revised N-Methyl Carbamate Cumulative Risk Assessment (November 26, 2007). EPA docket number EPA-HQ-OPP-2007-0935.

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