



Testicular Cancer Risk?

RACHEL'S ENVIRONMENT & HEALTH WEEKLY #436

---April 6, 1995---

News and resources for environmental justice.

Environmental Research Foundation

P.O. Box 5036, Annapolis, MD 21403

Fax (410) 263-8944; Internet: erf@rachel.clark.net

THE DOGS OF WAR

Somewhere between 2.6 and 3.8 million American men and women served in Vietnam during the years 1965 through 1971, the years when chemical herbicides were being used to denude the jungle and destroy enemy crops. Military records do not allow a more accurate determination of the true number who served. [1]

Alongside the humans serving in Vietnam, there were 3895 military working dogs, almost all of them purebred German shepherds. [2] (Among the 3895, there were 64 Labrador or golden retrievers used as trackers; the other 98.3 percent were German shepherds.) These dogs served as scouts, sentries, trackers, mine detectors, and tunnel explorers. About 91% of these dogs were "intact" (uncastrated) males.

When a military working dog dies, regardless of the circumstances of death or the duty location, an autopsy is performed by a veterinarian, and a standardized set of tissue specimens and organs are sent to the Armed Forces Institute of Pathology in Washington, D.C.

During the late 1980s, researchers compared autopsy records of 1167 military working dogs with Vietnam service against autopsy records of 791 military working dogs who served in the continental U.S. and saw no Vietnam service. In a separate study, the stateside dogs were also compared to 437 dogs that died in Okinawa, because many dogs that served in Vietnam were sent to Okinawa after the war. [3]

These studies showed that dogs who served in Vietnam were about twice as likely (1.8 times as likely) to have cancer of the testicles, compared to military working dogs who served only in the states. Likewise, military dogs that died in Okinawa were about twice as likely (2.2 times as likely) to have testicular cancer as dogs who served only in the states. A separate study was then conducted, excluding the dogs who had testicular cancer. Among the non-cancer dogs, there was clear evidence of significant deterioration of the testicles in those dogs who served in Vietnam (compared to dogs who served only in the U.S.): degeneration of the testicles, atrophy (shrinking) of the testicles, and evidence of a below-normal ability to produce sperm. Dogs have often served as sentinels of human disease.

Back in 1938, the well-known researcher W.C. Hueper showed that beta-naphthylamine caused bladder cancer in dogs. [4] In 1954, researchers showed that another industrial chemical, 4-aminodiphenyl, produced bladder cancer in dogs. [5] In 1980, a study of 8760 pet dogs showed that bladder cancer in dogs correlated with residence in industrialized counties in the U.S. and Canada; this same study showed that bladder cancer in men and women was similarly correlated with residence in industrialized areas. "The findings of this study suggest that the bladder cancer experience of pet dogs resembles that of human beings living in the same general locale," the study concluded. [6]

Pet dogs are particularly relevant in such studies because 40 million pet dogs share their owner's domestic environment yet do not indulge in behavior that could confuse or confound the interpretation of epidemiologic studies: dogs don't smoke, and they usually don't work. In 1983, a study of pet dogs with the asbestos-related lung disease, mesothelioma, showed that their disease correlated with household members who (a) worked in an asbestos-related job, or (b) had an asbestos-related hobby or (c) applied flea powder to their dog. [7]

For these reasons, the finding of testicular cancer and testicular dysfunction in dogs who served in Vietnam was an eye-opener, and it soon led to a comparison of 271 human veterans with testicular cancer to 259 veterans without testicular cancer, to see whether Vietnam service was

related to testicular cancer. This study revealed that, like dogs, human veterans of Vietnam were about twice as likely (2.5 times as likely), to have testicular cancer compared to veterans who did not serve in Vietnam. [8]

Naturally, the question occurs, what aspects of military service in Vietnam caused testicular cancer in men, and testicular cancer and dysfunction in military working dogs?

An obvious suspect is Agent Orange, which was sprayed in large quantities (11.2 million gallons, or 42.4 million liters) over 3.6 million acres (1.5 million hectares) of Vietnam. Agent Orange, named for the orange stripe on its 55-gallon storage containers, was a 50-50 mixture of two herbicides: 2,4,5-T and 2,4-D. One of these, 2,4,5-T, was banned in the U.S. about 1980 because evidence indicated that it could cause birth defects in humans; the other half of Agent Orange, 2,4-D, remains in wide use throughout the U.S. where it is popular for killing dandelions and other broad-leaf plants in lawns, and as an agricultural weed killer.

During manufacture, the herbicide 2,4,5-T becomes contaminated with dioxin unavoidably. According to the National Academy of Sciences, the average dioxin contamination in Agent Orange in Vietnam was 2 parts per million (ppm). An estimated total of 368 pounds of dioxin was sprayed onto Vietnam's land and people during the 7-year spray program. [9]

However, a recent study of Vietnam veterans that tried to estimate 2,4,5-T exposure and link it to testicular cancer found that only Navy men had elevated levels of testicular cancer associated with 2,4,5-T exposure; men in the other services showed no such effect of exposure to 2,4,5-T. [10] The authors of that study speculated that Navy men might also have been exposed to fuels (oil and gasoline), which previous studies have linked to testicular cancer.

The other half of Agent Orange, herbicide 2,4-D, is also a suspect. Although the manufacturers of 2,4-D claimed for years that their products were not contaminated with dioxin, this claim has now been shown to be false, using the manufacturers' own data. [11]

Dioxin has been shown to damage the reproductive organs and systems of many animal species, including men and women. [12]

A study of pet dogs in the U.S. found excess cancers (lymphomas) associated with 2,4-D lawn spraying. [13] And a study of 32 farmers who sprayed 2,4-D, compared to a control group of 25 unexposed farmers, revealed significant effects on the exposed farmers: diminished sperm count, increased number of sperm with poor motility (swimming ability); increased numbers of dead sperm; and increased numbers of malformed sperm. [14]

No federal agency keeps close track of pesticide use in the U.S.; however U.S. Environmental Protection Agency (EPA) estimates that farmers apply 25 to 30 million pounds (11.3 to 13.6 million kilograms) of "active ingredient" of 2,4-D each year in the U.S. Non-agricultural use of 2,4-D in the U.S. is estimated to total another 12 to 15 million pounds (5.4 to 6.8 million kilograms) of "active ingredient" per year. [15] The "active ingredient" of a pesticide is only 0.5% to 5% of the total formulation so these "active ingredient" amounts must be multiplied by anywhere from 20 to 200 to get the total 2,4-D formulation used each year. The bulk of the formulation is secret ingredients (called "inerts") which are, themselves, often toxic solvents. [16]

Other chemicals suspected of causing testicular cancer and dysfunction in dogs and humans who served in Vietnam are the antibiotic tetracycline and the pesticide malathion. Many military dogs in Vietnam suffered from ear infections and other diseases. [17] Therefore, many received one or more doses of tetracycline during their tour of duty. Tetracycline is strongly absorbed by sperm in mammals, and is known to cause testicular atrophy (shrinkage), and diminished sperm quality in humans and dogs.

The other suspicious candidate is malathion. The same military unit that sprayed Agent Orange also sprayed DDT and malathion extensively in the vicinity of U.S. troops, to reduce the dangers of malaria carried by mosquitoes. It has been reported that 44% of the land of southeast Asia, mainly Vietnam, was sprayed with malathion during the war. [18] Furthermore, military working dogs in Vietnam were dipped in a 0.5% solution of malathion to kill disease-carrying ticks. Malathion is known to cause testicular atrophy and damage to the sperm-generating cells of laboratory animals. [19]

Malathion is widely use throughout the U.S. today for mosquito control though not for fear of malaria. Mosquitoes are simply a nuisance. EPA estimates that 4 to 6 million pounds (1.8 to 2.7 million kilograms) of "active ingredient" of malathion are sprayed in the U.S. each year. The yearly total of malathion formulation sprayed is, again, 20 to 200 times this amount. Sperm count in men throughout the industrialized world appears to be dropping. Testicular cancer is the most prevalent cancer among white males between the ages of 25 and 34 years and the second most common in the 35-to-39 age group. The causes of testicular cancer are

thought to be environmental because the rates vary widely from one location to another. During the last 15 years, the rates have increased rapidly (2.3% to 3.4% per year) in many industrialized countries. [20]

It may take scientists many decades to tell us all we would like to know about a complex chemical like dioxin, or malathion. However, we already know enough to act: To guide our personal choices, and new public policies, to minimize the danger to ourselves, our families, and our communities, we need only to remember that chemicals not used cannot cause harm. This we can learn from the dogs of war.

Peter Montague

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**Excess of seminomas observed in Vietnam
service U.S. military working dogs.**

Hayes HM, Tarone RE, Casey HW, Huxsoll DL.

Division of Cancer Etiology, National Cancer Institute, National Institutes of Health, Bethesda, MD 20892.

During the Vietnam War, US military working dogs served with their companion dog handlers in close proximity, sharing common exposures to war-related activity, many zoonotic infectious agents, chemical pesticides, phenoxy herbicides, and extensive use of therapeutic drugs. To gain insight into the effects of the Vietnam experience, we investigated the occurrence of neoplasms (**tumors**) in military working dogs based on standard necropsy examination by the Armed Forces Institute of Pathology. We observed that these dogs experienced significant elevated risks for testicular seminoma (**cancer**) and, independently, testicular dysfunction. Experimental evidence shows testicular dysfunction and impaired spermatogenesis in laboratory animals exposed to phenoxy herbicides, dioxin, or tetracycline, and antibiotic used extensively in military working dogs in Vietnam. Because an unexplained significant decrease in sperm quality in Vietnam veterans has been observed by the Centers for Disease Control, further research is warranted if we are to clarify military service in Vietnam as a risk factor for testicular dysfunction. The testis should be made a priority site in the study of Vietnam experience-related cancers.

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Mil Med 1994 Nov: 159(11)-75

U.S. military working dogs with Vietnam service: definition and characteristics of the cohort.

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Epidemiology and Biostatistics Program, National Cancer Institute, Bethesda, MD 20892.

We verified and corrected inaccuracies in descriptive profile information on military working dogs (MWDs) that died from 1965 to 1980 and were reported in the Armed Forces Institute of Pathology Registry of Veterinary Pathology. Using other available military records, we determined which dogs served in Vietnam. Identified were 3,895 MWDs with a unique identity tattoo that served in Vietnam, of which 2,389 served exclusively with U.S. military forces and died in Vietnam. Another 479 Vietnam veteran MWDs completed their service elsewhere. This overall effort resulted in signalment corrections, generally age at death, in 21% of the Registry MWD accessions during the study period. The improved definition and characterization of the Vietnam cohort will lead to greater precision in epidemiologic investigations of the health effects from the Vietnam experience in U.S. military working dogs.

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A cohort study of the effects of Vietnam service on testicular pathology of U.S. military working dogs. By Hayes HM, Tarone RE, Casey HW.

Environmental Epidemiology Branch, National Cancer Institute, Bethesda, MD 20892, USA.

Using histopathologic diagnoses made on necropsy material from 3,024 military working dogs (MWDs) who died from 1968 to 1973, we analyzed the effect of military service in the Republic of Vietnam on testicular pathology. Among 1,048 MWDs that died in Vietnam and had no reported developmental risk factors for testicular disease, significant excesses of testicular

hemorrhage, epididymitis/orchitis, sperm granuloma, testicular degeneration, and seminoma (**cancer**) were evident. Among 126 MWDs with prior Vietnam service who died at other duty stations outside Vietnam from 1968 to 1973, significant excesses of testicular degeneration and seminoma (**cancer**) were likewise evident. Among 136 MWDs with prior Vietnam service that later died from 1974 to 1980, seminoma (**cancer**) continued to be diagnosed in significant excess. In each instance, the odds ratio for the association between Vietnam service and seminoma (**cancer**) was 2.0 or greater. Analysis of ever service by Corps Tactical Zones showed significant excesses of seminoma (**cancer**) with each Corps area of service compared to Vietnam-era MWDs, but risk was highest in I Corps, particularly at Da Nang AB Port and Da Nang AB Air Base. This finding with respect to I Corps is consistent with certain human studies in Vietnam veterans and points to the need for further investigation of possible environmental exposures, particularly those associated to a greater extent with service in I Corps.

PMID: 7659215 [PubMed - indexed for MEDLINE]

What does this mean to the handlers? When military dogs were killed, veterinarians performed a extensive necropsy (**autopsy**) on the dogs. Organs were removed, weighed, examined, and tissue samples were taken. The records and samples were returned to the US. Studies now show that the dogs had a higher rate of "testicular seminoma (**cancer**) and, independently, testicular dysfunction". Military dogs were the only casualties (in Vietnam) that had this in depth study of tissue samples. Human casualties were immediately returned to the US for burial. Were the dog handlers also affected? Handlers shared the same surroundings and often the same food and water. Were handlers exposed to the same circumstances that changed their dogs physically? Has extensive research been conducted on handlers assigned to those dogs that exhibited testicular seminoma (cancer)? The answer to that question is no. Not one handler has informed me that the government has chased him down to ask about his health. But then you can say the same thing in regards to all Vietnam veterans.

National Library of Medicine Web Site

For Health Studies Quoted: Type authors name "Hayes HM" in the search box of the above site. Search database for other information. Complete copy can be found in a medical libraries, if you wish to read it in full.

Hayes HM, Tarone RE, Casey HW, Jennings PB Jr, Hildebrandt PK, Reardon MJ.

Epidemiology and Biostatistics Program, National Cancer Institute, Bethesda, MD 20892.

We verified and corrected inaccuracies in descriptive profile information on military working dogs (MWDs) that died from 1965 to 1980 and were reported in the Armed Forces Institute of Pathology Registry of Veterinary Pathology. Using other available military records, we determined which dogs served in Vietnam. Identified were 3,895 MWDs with a unique identity tattoo that served in Vietnam, of which 2,389 served exclusively with U.S. military forces and died in Vietnam. Another 479 Vietnam veteran MWDs completed their service elsewhere. This overall effort resulted in signalment corrections, generally age at death, in 21% of the Registry MWD accessions during the study period. The improved definition and characterization of the Vietnam cohort will lead to greater precision in epidemiologic investigations of the health effects from the Vietnam experience in U.S. military working dogs.

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Handlers Bury Sentry Dog General, Brand # 6A39, Circa 1969-1970: (L-R) Thai Handler Boon Lert, Sgt Hammon (General's Handler) Thai Handler Ubol, Sgt Latham, Thai Handler Suwan, TSgt Langley "Dad" and Bill (Einstein) Switzer. Bill was the newest member of the section and helped dig General's grave.

Photos & Caption Courtesy of Bill Switzer

Below: Photo of Medical Card of General #6A39

Brand No:	6A39
Name:	GENERAL
Sex:	Male
Weight:	98
DOB:	Aug 62
DOD:	26 Dec 68
Place of Origin:	Thousands Oaks, Calif
Date of Acceptance:	July 66
Duty Location:	8th Security Police Sq. APO SF 96304
Hips:	Grade I left, right/normal
Cause of Death:	Euthanasia, 2 lb tumorous right testicle within abdomen (sertoli cell tumor)

Medical Cards (index cards) were maintained by Veterinary Service. Scanned photo of General's card is courtesy of Nemo's War Dog Heroes Memorial Committee. Cards were purchased by the committee under a Freedom of Information request.

What about the handlers?

" These studies showed that dogs who served in Vietnam were twice as likely (1.8 times as likely) to have cancer of the testicles, compared to military working dogs who served only in the states. Likewise military dogs that died in Okinawa were about twice as likely (2.2 times as likely) to have testicular cancer as dogs who served only in the states. A separate study was then conducted , excluding those dogs that had testicular cancer. Among the non-cancer dogs, there was clear evidence of significant deterioration of the testacies in those dogs who served in Vietnam (compared to dogs who served only in the US) : degeneration of the testacies, atrophy (shrinking) of the testicles, and evidence of below-normal ability to produce sperm."



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