

# REPORT ON LEUKEMIA — A CURE THROUGH CATS

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## I. INTRODUCTION

Throughout history one of the closest animals to man has been the cat. The cat's desire to be with man has been one of man's greatest blessings, and now the similarities between man and the cat may lead to a cure for leukemia. This killing cancer that stalks man like a cat plays with a mouse also attacks the cat. The incredible resemblance of man has led researchers to make a closer examination of cat leukemia.

Of all animals currently under veterinary care, the cat develops the disease the most frequently.' Twelve years of records from Angell Memorial Hospital, Boston, Mass., indi-

cate that ten per cent of the cats diagnosed to have a blood disorder developed leukemia.' Although there are many clinical signs of leukemia, one of the best and easiest methods of diagnosis is from a blood smear. No other cancer is as readily analyzed as leukemia, and this fact leads many researchers to hope for a preventative vaccine.

Due mainly to a lack of monetary donations to research centers, feline medicine has fallen behind that of the more wealthy-supported dogs and horses. This lack of feline research makes human research more difficult. In the fall of 1969, a letter of request for cancerous material from cats was sent to the majority of cat breeders in the U. S. by the National Cancer Institute at Bethesda, Maryland, which has recently joined in the research of cat leukemia as a possible cure for human leukemia. Studies by individuals and some research institutes have been presented to the foundation for further study, but much remains to be learned.

Evidence points to a close relationship between genetics and the susceptibility of man and cat to leukemia. Environmental conditions also seem to play an important factor in lowering resistance to the cancerous cells, allowing the disease to run its course. Thus an unstoppable take-over by the disease occurs.

While at present no curative therapy exists, several methods of treatment have extended the lives of leukemia patients. Researchers hope that through the study of cat leukemia a cure for both man and cat can be found.



Mr. Chellevoid

## II. WHAT IS LEUKEMIA?

Leukemia is a malignant cancer that attacks the blood and vital organs of the body. Figures given by Fredi and Freireigh give U. S. leukemia deaths for 1961 as 12,783, of which 1,140 were under 15 years old. Not only is leukemia a killer, but its destructive power is increasing. Although there has been an increase in the ability to diagnose the disease, the following U. S. figures (deaths per 100,000 persons) represent a definite increase in case frequency: 2.3 in 1930, 3.8 in 1940, and 6.1 in 1961."

To live, man and cat must have enough red blood cells in their circulatory systems to carry the necessary oxygen and food throughout the body and remove waste. In nine out of ten cases of leukemia, the patient is found to have an increased white blood cell count. This increase ranges from only slightly above normal in some patients to twice the normal count in others.' Anemia usually accompanies leukemia, as a shortage of red blood cells creates a shortage of oxygen. Thus, unlike healthy blood, cancerous blood is unstable in composition.'

In general, an afflicted cat is listless and suffers from a noticeable loss of condition. Wounds do not heal, and throat, nose, and mouth infections are common. Internally the kidneys, liver, intestines, and spleen become infected. Vomiting and diarrhea have been reported, along with severe hemorrhaging.' These same general symptoms are also found in man.

## III. ETIOLOGICAL FACTORS

Exactly what agents cause leukemia is not known. Scientists have isolated a virus that causes leukemia in mice and chickens, but these research animals do not always yield results that apply to man. Cats, on the other hand, are larger and closer to man in habits and physiology.

Just as people inherit a tendency to contract leukemia, leukemic cats seem to have a genetic link. An example case is given by Holzworth of two cats both dying of leukemia at ten years of age, one a blood relation to the other. There are other cases, but due to lack of sufficient ancestral records on the cats in which leukemia has been observed, a direct causal relationship can not be established at this time. Of 140 cats observed to have leukemia at Angell Memorial, only two were Persians and a few were Siamese.<sup>7</sup> So many cases of human family leukemia have been observed, that a heredity link seems impossible to rule out. Sometimes the genetic link is observed to skip a generation or two of "victims" and then crop up again. This may be due to the X-chromosome carrier.

Another interesting thing that has been found to be almost invariably true is that men are more likely to contract the cancer than are women. In studying cats, Holzworth' notes that approximately twice as many males as females were observed to develop leukemia, and Cowdry' observed a similar ratio in deaths due to leukemia in men.

The ratio of males to females contracting leukemia can be partially explained by their genetic differences. In man and in cats the female sex is determined by two X chromosomes, and the male sex is determined by one X and one Y chromosome. Since the X chromosome is much larger than the Y chromosome, there are some genes present on the X chromosomes that have no corresponding genes on the Y. Therefore, a recessive factor in a female, that would cause no effect, proves overbearing in the male. The X chromosome, being the carrier, rules out the possibility of a male offspring of a diseased male being leukemic unless the female carries the weakness." This is true for hemophilia and other blood disorders and is probably true for leukemia as well.

Heredity is probably not the only cause of leukemia ; there is evidence that environmental conditions which weaken the body's resistance may be a factor. A case in point is that of a healthy young man of 19 I knew about. In order to finance his studies in college, he worked all summer in a cheese factory eight hours a day besides doing more than half of the farm work on a 180-acre farm. Needless to say, this is a tremendous strain for any individual. Leukemia attacked that fall and took its victim the following March. Perhaps Gary would have come down with the disease later in life without the strain. This no one can tell, but the facts remain. Here was a strong person whose body was weakened until the cancer could take over.

Although no direct correlation between environment and leukemia has been established for cats, general environmental effects were closely studied by Mark L. Morris of Morris Animal Foundation. In an article in **Cornell Veterinarian**, he related the results of a three-year study of environmental effects on cats. Using no vaccination, but only careful planning and a healthy, open environment near Topeka, Kansas, the cats under study were found not to develop many of the diseases that normally plague cats." Such an experiment is proof that healthy environment is one of the best preventative measures of common diseases. Whether this is true of leukemia awaits further study.

#### IV. TREATMENT WITHOUT A CURE

One of the basic problems with cat leukemia has been the lack of recognition as such. While a person can tell where it hurts, a cat can not. Cats have undergone treatment for weeks and even months before the true cause of affliction was known. Because of the delays in analysis, the true length of the disease is not known. Case histories varied from three days to several months in reports from The Ohio State University Veterinary Clinic. One cat was still alive after 33 months of observation and therapy." Holzworth, 1960, reports of reduced clinical signs in a 12-year-old male, giving him a longer life."

However, once diagnosis is certain, the course of treatment is the only thing left to consider." Leukemia in man, as well as in cats, is invariably fatal : only the struggle for life remains. The cycle of leu-

kemia is more like a Greek tragedy or Norse Mythology than anything like a fair fight.

One method of prolonging a patient's life is by X-ray therapy. This method is used on cats and humans." Successful treatment by X-rays led the Brookhaven National Laboratory to develop Extra-Corporeal Irradiation of the Blood (ECIB). Immense doses of radiation have been found to destroy leukemic cells, but not without harming the patient. However, after years of research with animals, a partial cure has been found to help some patients. The process developed at Brookhaven irradiates the blood outside of the body and returns it. Thus radiation-sensitive leukemia white cells are destroyed, while the red blood cells are relatively unaffected."

On the theory that thinning the blood inhibits cancer cells from clinging to cell walls, animals were fed different anticoagulants. So successful were these experiments, that the procedure is now being used on human patients. Researchers at The National Cancer Institute feel that, if the cancer can be slowed or even halted in development, a cure will be forthcoming."

Other researchers at the University of Michigan have developed an irradiated potato extract that retards the growth of tumors on plants and produces a higher crop yield." Whether such a serum can be developed for cancer in humans remains to be seen. Certainly there is hope, and that is all any leukemic patient now has.

One of the best and most successful treatments of the leukemic cat is the administration of cytotoxic agents. While these drugs destroy leukemic cell tissue, care must be taken to avoid irreversible toxicity in the patient. Nitrogen mustard derivatives such as chlorambucil and cyclophosphamide have been successfully employed to reduce clinical signs. As suggested by Dr. Loeb, treatment should be given for two consecutive weeks out of every four. This allows the cat to build up strength for the next drug dose. Since the leukemic cat is particularly susceptible to other infections, vitamins and antibiotics must be administered as supplementary treatment. Blood transfusions are important to restore the red blood cell count. However, care must be exercised, as shock from a blood transfusion can be very severe."

## V. CONCLUSION

Man's closeness to the cat lies deeper than simple inhabitation of the same dwelling. Genetic and environmental factors that are evidenced in one are also found in the other. These similarities, added to the fact that leukemia is three times more common in cats than in any other animal studied, make the cat a logical choice for further research.

Since leukemia can be diagnosed by a simple blood smear, hope exists for a preventative vaccine for cats and man. While present therapy is only palliative in nature, a curative treatment is hoped for in the near future.

## Biographical Note

I have been active in the cat fancy since 1966 with blue and silver Persians, helping to found the first CFA club in Arizona in 1967. For the past two years I have worked for Pet Pride as an Executive Field Director. My interest in leukemia is based partly on personal experience and also on an attempt to correct misconceptions and sensationalism concerning cat leukemia. As a senior Chemical Engineering student at Arizona State University, I plan to continue in my chosen field after graduation, eventually entering the area of research.

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