



# Paw Prints

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Columnist

## Sniffing out disease

Any pet parent can tell you: pets are amazing. They're loyal, comfort us in tough times, and even lower a person's blood pressure.

Some animals seem to perform what seem like miracles, attracting attention for rescuing their pet parents from dangerous situations or predicting health problems before they occur, such as alerting humans to changes in their blood pressure.

And anyone who has ever spent time with a dog knows that dogs love sniffing! They sniff out hidden food, dirty socks, and the visitor who comes to the door. Some dogs work with police officers, soldiers and even scientists to put their "sniffers" to work.

Due to their superior sense of smell, dogs can smell in parts per trillion. For example, if you diluted less than a drop of blood into 20 Olympic-sized swimming pools, a dog would know that there was blood in the pool. Dogs smell like we see. We walk into a room and see the room; the dog sees it through his nose.

Dogs have been trained to sniff gunpowder, narcotics, missing persons, and now diseases.

Dogs' remarkable ability to sniff out disease is opening doors to earlier cancer detection and better understanding of the disease process itself.

Just the word cancer puts us in fear. It is an uncontrolled division of abnormal cells that destroy nearby healthy tissue.

Infectious diseases such as cholera, diphtheria, smallpox, pneumonia, tuberculosis, typhoid fever and yellow fever have long been known to produce signature odors.

Cancer also has an odor, and researchers now know one thing for sure: dogs can smell cancer.

Dogs are up front about this smelling stuff, greeting each other with a thorough sniff from tip to tail, quickly gathering a wealth of information through their noses.

Did you ever notice how your pooch shows intense interest in a new cut on your arm or leg?

They are inhaling volatile organic compounds, or VOCs. VOCs are chemicals coming from a living or once-living organism that can pass into the surrounding air. (Volatile means easily evaporated at normal temperatures.) A human body constantly emits an incredible variety of VOCs, some that are odorous and some that are not.

Most oncologists will tell you that humans can actually smell cancer in later stages through the patient's breath. If humans can pick up the odor in later stages, then of course a dog would be able to detect it in a human much earlier.

There are many published studies that prove dogs can detect cancer through breath samples.

Cancer has been the most recent focus of this sort of research. The earlier cancer is detected, the better the patient's chances are for survival. Dogs can detect certain cancers with high levels of accuracy long before some of the more traditional diagnostic methods.

The trick is identifying the signature VOC that relates to a specific type of cancer so that the dog can be trained to alert to it. Researchers are making great progress. Dogs have been trained to detect ovarian cancer in blood samples — distinguishing it from other gynecological cancers and from healthy samples.

Researchers from the Italian Ministry of Defense Military Veterinary Center in Grosseto were able to train two German shepherds, Liu and Zoey, to sniff out VOCs associated with prostate cancer in urine samples with 98 percent accuracy. The study was presented at the American Urological Association annual meeting.

Training dogs to smell cancer is done in the same way that bomb and narcotics dogs are trained, pairing the target odor with a high-value reward.

Dr. George Preti, a chemist at the Monell Chemical Senses Center in Philadelphia, has spent much of his career trying to isolate the volatile chemicals behind cancer's unique odor. He is working to isolate the chemical biomarkers responsible for ovarian cancer's subtle smell using high-tech spectrometers and chromatographs. Once he



PHOTO BY JODI SCHNEIDER MCNAMEE

Dogs have powerful sniffers that can even detect disease in humans.

identifies that compound, he will test whether dogs will respond to that chemical in the same way they respond to the actual ovarian cancer smell.

"I'm not embarrassed to say that a dog is better than my instruments," Dr. Preti

said.

So the next step will be to build a mechanical, hand-held sensor or an electronic nose that can detect that cancer chemical in the clinic.

And this is all possible because of man's best friend — the dog!



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