

# CANCER SNIFFING DOGS

(1) Did you ever notice that dogs explore the world with their nose? They are always sniffing everything in their surroundings and the first thing they want to do when greeting other dogs or humans is to smell them. Dogs have an extraordinary sense of smell. While humans have only 5 million olfactory receptors (the sensors that detect smell), dogs can have 200 million if not more. The bloodhound has over 300 million olfactory receptors, making it the dog breed with the most smelling power. When a dog sniffs you it can tell what you ate for your last meal, where you were in the last hour, your mood and your general health. Dogs have been trained to use their noses to track down escaped prisoners, to track foxes during fox hunts and to find hidden drugs at borders and airports, but can they be trained to smell cancer? The amazing answer is...Yes! They just need to smell your breath.

(2) Breathing is so natural we don't think much about it until we are either holding our breath, breathing hard due to exercise or when we smell bad breath. However, a simple sample of someone's breath contains thousands of airborne chemicals from within the body that reveal a lot about a person beyond what type of toothpaste they used in the morning. Our cells, healthy and diseased ones alike, will produce chemicals that are excreted and



cancer. Even more amazingly, some dogs have been trained to detect specific types of cancers.

(3) The training of a cancer sniffing dog is complex because they have to be able to isolate the cancer compounds among thousands of other smells in the breath sample. They are trained by being rewarded with food when they detect breath samples containing the target cancer compounds. However, how will the dog know that it's being rewarded for identifying a sample with the target, and not for the mint flavor or the bacon odor in that sample? This is why scent detection training involves exposing dogs to thousands of breath samples until they can distinguish the difference between healthy people, cancer patients, and patients with other types of diseases.

(4) For example what if a dog was given 5 breath samples. Samples 2 and 3 contain the cancer compounds, but all samples contain the odor of mint. The dog will only be rewarded when she correctly identifies sample 2 and 3, but will not be rewarded when she mistakenly identifies samples 1, 4 and 5. This helps teach the dog that the mint flavor is not the target smell. This example only contains mint as the distracting non-target smell, but real samples will contain thousands of distracting smells. You can see why training can get complicated and requires special trainers and special dogs.

(5) Another complication is that dogs who want to work are very eager to please and can be excitable when they get to work. A dog may be able to detect the proper target smell, but she



released in our breath. Alcohol breathalysers have been used for years to determine a person's blood alcohol content without the need to take a sample of anyone's blood. When it comes to cancer, different types of cancer tumor cells will produce different types of compounds (alkanes and aromatic compounds) that healthy cells won't produce. The concentration of these compounds can be very low, but a well-trained cancer sniffing dog can detect them in the breath of a patient with



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might be so excited that she can't calmly communicate which sample she has identified. Her general happy desire to bark and paw the ground needs to be trained to be exhibited only when ready to identify the target. Certain breeds of dogs like Labrador Retrievers and German Shepherds are a great combination of great sniffers and easily trained workers that co-operate well with humans.

(6) What is the benefit of using a cancer sniffing dog over other methods of cancer detection? For one thing, a dog's sense of smell can be so sensitive that they can detect cancer even at the earliest stages when medical

technology is incapable of detecting it. Another thing is that it provides a less invasive method of screening. A typical procedure to diagnose cancer is to do a biopsy which involves removing tissue from a suspected tumor or cancerous area. This procedure can be painful and sometimes even a bit risky. A third reason is that it is much cheaper than using costly medical equipment and expertise.

(7) If dogs can smell cancer, what other medical conditions can they detect? Currently, research is being done on the ability of dogs to detect the onset of seizures and to detect a drop in blood sugar levels of diabetics.

## Article Questions

- 1) What makes a dog a great animal for detecting scents? How do they compare to humans in their ability to detect scents?

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- 2) How is a sample of breath from a patient capable of revealing that the patient has cancer?

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- 3) What is the main difficulty in getting a dog to recognize the target cancer smells?

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- 4) What are the three arguments for using cancer sniffing dogs to detect cancer as opposed to using the current medical technologies?

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- 5) Besides detecting cancer, what other things can a dog detect for or find with its nose?

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