

MEDICAL NEWS

Dogs show potential as medical detectives in breast cancer

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FROM BIOLOGY

Breast cancer screening using urine samples based on the volatile organic compounds (VOCs) sensed by a trained dog is feasible, according to a preliminary study published in the journal *Biology* June 10.

“The extrapolation of our results to widespread implementation is still uncertain,” wrote Shoko Kure, MD, PhD, of Nippon Medical School in Tokyo, and colleagues. “However, even if few dogs could be trained to detect breast cancer, the result may open the door to a robust and inexpensive way to detect breast cancer.” They added that “dog cancer detection is entirely noninvasive, safe and easy for both patients and everyone.”

Early detection of breast cancer, which is the leading cause of death globally, is essential for more efficient treatment. While mammography can detect asymptomatic breast cancer and reduce mortality, it has a poor compliance, is less sensitive in dense breast tissue, detects nonmalignant lesions, and has not been shown to reduce mortality in women younger than 40. VOCs are emitted in the breath, blood, and urine, with different volatile patterns correlated with a variety of diseases including cancers,

which dogs can be trained to detect. Breast cancer screening by dog sniffing of the VOCs in urine samples has not been attempted.

Dogs have been used as medical detectives for several cancers and conditions. A study published in 2018 showed that trained dogs who were able to differentiate the specific odor from the metabolic waste of breast cancer in vitro could identify that of colorectal cancer, and vice versa. More recently, research showed that trained dogs could detect advanced prostate cancer in urine samples with high specificity and sensitivity. In this double-blinded pilot study, two dogs were trained to detect Gleason 9 prostate cancer in urine collected from biopsy-confirmed patients. The canine olfaction system was 71% sensitive and as much as 76% specific at detecting Gleason 9 cancer. Along with cancer, trained dogs have been shown to identify people with COVID-19, even those who were asymptomatic. In this study, dogs who sniffed swab samples of armpit sweat could identify which samples came from patients infected with COVID-19 with up to 100% accuracy, while ruling out infection with up to 99% accuracy.

The double-blind study by Dr. Kure aimed to assess the potential of VOCs in urine samples for breast cancer screening by using a single trained sniffer dog – in this case a 9-year-old female Labrador retriever. Urine samples from 40 patients with primary breast cancer and 142 patients with non-breast malignant diseases were included along with samples from 18 healthy volunteers. In 40 times out of 40 runs of the double-blind test, the dog correctly identified urine samples of patients with breast cancer, with 100% sensitivity and 100% specificity.

“The dog in this test successfully differentiated breast cancer from non-breast malignancies and healthy controls,” the authors wrote. “This is the

first, preliminary study indicating the feasibility of developing a new breast cancer screening method using urine samples based on VOCs.”

While the authors noted that the study was limited as it relied on one trained dog, they suggested that this method has potential in low-income countries where access to mammography is inadequate.

“Some well-trained sniffing dogs traveling around medically underserved [countries] all over the world could save many lives. Even when a healthy control was indicated by a trained dog, there would be a suspicion of undiagnosed/early-stage cancer, and the person would be advised to undergo medical screening,” the authors wrote.

The authors declared no conflicts of interest.

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