

BALTIMORE, Sept. 10, 2021 /PRNewswire/ -- New research from an international team of scientists – and two specially trained dogs – have scientifically validated the ability for man's best friend to 'sniff-out' prostate cancer in men – more accurately than the electronic nose (e-nose), an artificial sensing device used to detect odors and flavors. The study was presented during a virtual press session, which was moderated by AUA spokesperson, Dr. Stacy Loeb, urologic oncologist at NYU Langone Health and the Manhattan Veterans Affairs. The recording is now available for [viewing](#).

For decades, law enforcement and the military have used dogs to help locate bombs and drugs. It should then be no surprise that **a dog's intricate sense of smell has captured the interest of the medical world.** In recent years, new findings have emerged to indicate dogs are capable of accurately detecting the onset of epileptic seizures as well as malignancies of the breast and lung.

While humans have roughly five million olfactory cells in their noses, dogs have about 200 million. While it is still unknown what the dogs are actually able to smell, researchers do believe they are able to pick up the odor of volatile organic compounds (VOCs), which are released into the urine by prostate tumors.

Study Details:

Researchers investigated the level of accuracy at which two highly-trained explosion detection German Shepard dogs can recognize prostate cancer-specific VOCs in urine samples compared to a new type of e-nose specifically developed to detect prostate cancer.

The study consisted of 126 participants who were placed in one of two groups: a prostate cancer group (n=66) and a control group (n=60). The prostate cancer group was exclusive to men with prostate cancer, ranging from early stage to late state disease. The control group included both men and women, some of which had cancer, some who did not, but no one within the control group had prostate cancer.

Results showed:

- The two dogs were able to detect VOCs in the urine of the study subjects with an accuracy of nearly 98 percent. Sensitivity and specificity for each German Shepard were nearly 99 percent and 98 percent respectively.
- The e-nose was able to detect prostate cancer with an accuracy of 84 percent. Sensitivity and specificity were 85 percent and 82 percent respectively.
- When only men aged 45 years were considered, the two dogs were able to detect prostate cancer with an accuracy of nearly 99 percent while the e-nose had an accuracy level of 82 percent.

"We all know the sense of smell is a superpower for dogs," said Dr. Loeb. "Seeing this superpower put to the test against advanced technology is fascinating. In a world full of technology, it appears dogs are better able to naturally screen for prostate cancer than our most advanced technology. Hopefully science and technology can learn more from them in the near future and finally catch up."

The full abstract of this study can be viewed:

<https://www.auajournals.org/doi/10.1097/JU.0000000000002027.17>

About the American Urological Association: *Founded in 1902 and headquartered near Baltimore, Maryland, the American Urological Association is a leading advocate for the specialty of urology, and has more than 22,000 members throughout the world. The AUA is a premier urologic association, providing invaluable support to the urologic community as it pursues its mission of fostering the highest standards of urologic care through education, research and the formulation of health policy.*

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Title: A Double Blind, Prospective Study for Prostate Cancer Diagnosis in Urine Sample: Accuracy of the Electronic Nose Compared to Highly Trained Dogs.

INTRODUCTION AND OBJECTIVES: The diagnostic accuracy in urine sample for prostate cancer (PCa) in highly trained dogs was studied and high performance in terms of sensitivity and specificity was demonstrated. What dogs are able to smell is still unknown but is thought that could be volatile organic compounds (VOCs). However, in clinical practice, using dogs for PCa diagnosis is problematical to be applied. Electronic noses were developed and widely used for the different fields of industries. Thanks to the collaboration between Humanitas hospitals group and Natta Institute of Politecnico di Milano have been developed a new type of electronic nose (e-nose) with specific feature for detecting PCa. The aim of this study is to compare the PCa diagnosis accuracy

of e-nose versus highly trained dogs in urine sample.

METHODS: This is an ongoing, double-blind, prospective cohort study. Urine samples were collected consecutively from patients divided into 2 groups: (PCa Group): Men with biopsyproven PCa (any stage and grade); (Control group) Healthy men and women affected by different benign and malignant pathologies without PCa. Each patient filled 2 urine containers with 30cc and then frozen. The first samples were transferred to the military veterinary center of the Italian Ministry of Defense in Grosseto (CEMIVET), where 2 German Shepherd Explosion Detected Dogs, trained to identify PCa voes in urine, "tested" them. The second samples were transferred to the Natta Institute of Politecnico di Milano to be analyzed by e-nose.

RESULTS: Overall, 126 subjects were included in the study: 66 (52.4%) in PCa Group, 60 (47.6%) in Control group. The median age (years) for group 1 was 64 (IQR 60-68), and 46 (24.5-65) for group 2. In group 2, 15 (25.0%) were women and 45 (75.0%) men. For dog 1 the sensitivity (SE) was 100% (95% CI 98.0-100) and the specificity (SP) 98.2% (95% CI 97.2-99.3). For dog 2 SE it was 97.6% (95% CI 95.6.0-98.9) and SP 96.9% (95% CI 95.9-98.1). When only men aged =45 years are considered, for dog 1 SE was 100% (95%CI 98.9-100) and SP 97.0% (95% CI 96.0-98.1), while for dog 2 SE it was 97.1% (95% CI 94.0-98.2) and SP 96.0 (95% CI 94.5-97.2). Overall, e-nose SE was 85.0% (95% CI 83.0-93.1) and SP 82.0% (95%CI 76.0-85.7). When considering only men aged =45 years, the SE was 84.0% (95% CI 82.3-93.5) and the SP 80.0% (95% CI 77.2-84.6).

CONCLUSION: The diagnostic performance of the e-nose in recognizing specific PCa VOCs in urine samples is high and promising. Our study is ongoing and the development of e-nose is still improving. Nevertheless, the diagnostic performance of dogs is amazing and fascinating, the e-nose has the potential to become a feasible, easily reproducible, low cost, highly accurate test to be applied in clinical practice.

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