



# TRAINING DOGS TO DETECT MALIGNANT OVARIAN CANCER

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## EARLY DETECTION AND OVARIAN CANCER

Ovarian cancer is extremely difficult to diagnose in its earliest stages and is the fifth-leading cause of cancer-related deaths in women<sup>1</sup>. However, ovarian cancer, when detected in its earliest stages, is especially treatable, with a five-year survival rate of over 90%<sup>1</sup>. There is currently no effective diagnostic tool to detect early-stage ovarian cancer. In fact, 60% of patients are diagnosed after the cancer has progressed and metastasized to another part of the body<sup>2</sup>. Likewise, only 15% of ovarian cancers are detected

at stage-I, where the survival rate is the highest<sup>3</sup>. The five-year survival rate of stage-IV ovarian cancer is only 17%<sup>3</sup>.

## SCENT-BASED DETECTION

In collaboration with Monell Chemical Senses Center, the University of Pennsylvania Physics Department, and the Penn Medicine's Division of Gynecologic Oncology, the Working Dog Center has developed a research initiative to examine the mechanisms behind olfactory-based (sense of smell) ovarian cancer detection.

*Continued on next page.*

**“We know that dogs have a powerful sense of smell, and we are harnessing this ability to inform us on our path to making an early detection device for ovarian cancer.”**

— Jennifer Essler, PhD

Penn Vet Working Dog Center at the University of Pennsylvania

## ABOUT THE CENTERS:

The Penn Vet Working Dog Center, established in 2012, is an innovative hub of research and training for detection dogs. Detection dogs are used in a wide spectrum of applications, ranging from sniffing out substances and detecting explosives to finding missing people<sup>1</sup>. Detection dogs have been instrumental in detection related to certain medical conditions; for example, the dogs from the Working Dog Center have shown the ability to alert diabetic individuals of abnormal measures of blood sugar<sup>4</sup>.

Monell Chemical Sense Center, created in 1967 in Philadelphia, is a non-profit scientific institute that engages in interdisciplinary research to “advance scientific understanding of the mechanisms and functions of the chemical senses to benefic human health and wellbeing<sup>5</sup>.”



This research will help to develop a technological instrument to detect early-stage ovarian cancer. In this cutting-edge initiative, “cancer detection dogs” are trained to use their incredible sense of smell to create this early cancer detection system. Detection dogs can smell abnormalities related to significant medical events, such as the onset of cancer and the associated metabolism of cancer cells.

Using their expertise in sense-related science, research collaborators from The Monell Chemical Senses Center are analyzing the odorants released from cancerous tissue and following biological mechanisms related to the development of ovarian cancer. Employing detection dogs to sniff out the differences in plasma samples between individuals with ovarian cancer and healthy individuals or individuals with benign tumors, the collaboration team has found that ovarian cancer has a unique volatile organic compound, which gives off a unique odor recognizable by the detection dogs.

Present and future research will work to develop a technological tool to detect early-stage ovarian cancer via the presence of its unique odorant. This diagnostic tool will act as an “electronic nose” early detection system.



## ABOUT CPHI

The Center for Public Health Initiatives was founded in 2007 by the University of Pennsylvania to act as an interdisciplinary public health center that brings together faculty, staff, and students from across Penn’s campus. The mission of CPHI is to educate and train new and emerging public health leaders, foster multi-disciplinary collaborations, and promote excellence in public health research and community partnerships.

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## REFERENCES

1. “Saint Germain Catering Sponsors Dog Training for Ovarian Cancer Detection at Penn Vet’s Working Dog Center.” PRWeb Newswire, May 21, 2013. General OneFile.
2. “PENN VET WORKING DOG CENTER COLLABORATING ON OVARIAN CANCER DETECTION STUDY.” States News Service, May 1, 2013. Academic OneFile.
3. American Cancer Society. “Survival Rates for Ovarian Cancer, by Stage.” [Www.cancer.org](http://www.cancer.org).
4. “Penn Vet Working Dog Center.” <http://www.vet.upenn.edu/research/centers-initiatives/penn-vet-working-dog-center>
5. <https://www.monell.org/>