

# A celebration of the life of George Vande Woude

Sue VandeWoude<sup>a,1</sup> and Karen H. Vousden<sup>b</sup>

George F. Vande Woude Jr., a pioneer in retrovirology and molecular oncology, a tremendous scientific mentor, and an all-around versatile, exuberant human being, passed away on April 13, 2021. George was one of the first scientists to consider the molecular basis of cancer. He determined that long-terminal repeat segments linked to oncogenes could transform mammalian cells, and his laboratory defined the cellular functions of oncogenes *c-MOS* and *MET*. He was also one of the first to investigate the role of protein kinases in cell cycle regulation and to document p53 function in genomic stability, leading to novel therapies for many forms of cancer. Besides discoveries archived in more than 300 publications amassed over George's 45+-year career, he was an outstanding scientific administrator, able to balance the need for organization and scientific integrity with the urgency required to enable innovative research. This attribute may in fact have contributed as much to George's legacy as his laboratory's laudatory achievements, his skillful leadership and direct, intuitive communications facilitated the work of many researchers and laboratories to broadly advance scientific discovery.

George was an outstanding mentor, training more than 70 postdoctoral fellows, students, and visiting scientists. He organized the first "Oncogene Meeting" in 1985, which subsequently occurred annually for 20 years, and is commemorated by a series of annual meeting logos designed by Jamie Simon, which were recreated in posters and on tee shirts. This artwork often sported a likeness of George and his colleagues embedded in its representations; for example, for the 13th meeting logo "Src Wars" he appeared as Yoda, and for the 19th meeting in 2003, he was a wizard on "Hairy Powers." As the Oncogene Meeting evolved into a highly successful international cancer research meeting, programming continued to promote interactions between junior and senior scientists. The meeting was the venue for groundbreaking scientific reports and discoveries, and forged many life-long



George Vande Woude. Image credit: Van Andel Institute.

collaborations, career opportunities, and novel cancer treatments.

George was born on Christmas Day in 1935 in Brooklyn, New York, the son of Alice Leudesdorff Vande Woude and George F. Vande Woude Sr. He spent his childhood in Queens Village, New York, just a few blocks from Dorothy "Dot" Stapel, who became his wife in 1959. George attended Hope College in Holland, Michigan for 1 year before enlisting in the United States Army, where he was stationed in Baumholder, Germany. He subsequently completed his bachelor's degree at Hofstra University in New York, working his way through college by driving a beer truck and operating a floor-waxing company with his brother Michael.

<sup>a</sup>Department of Microbiology, Immunology, and Pathology, One Health Institute, Colorado State University, Fort Collins, CO 80523-1619; and  
<sup>b</sup>Cancer Research UK, Francis Crick Institute, London NW1 1AT, United Kingdom

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<sup>1</sup>To whom correspondence may be addressed. Email: Sue.vandewoude@colostate.edu.

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Cartoon rendering of George Vande Woude as Yoda. Reprinted with permission from Springer Nature (1), Copyright 2007.

George completed a master's in science and doctoral degrees in Biochemistry and a Physical Chemistry minor at Rutgers University in the laboratory of Frank Davis. His thesis was entitled *Cell Cycle, Histone Fractionation and the Basic Proteins of Tetrahymena Pyriformis: Re-Designing a New Brunswick Scientific Fermenter*. This work outlined methods for production of milligram quantities of *T. pyriformis* antigens. George was subsequently employed at the Plum Island Animal Disease Laboratory from 1964 to 1972, where he studied foot and mouth disease virus, and characterized viral capsid proteins, isoelectric point values, and pH inactivation mechanisms.

In 1971, George accepted a job at the National Cancer Institute (NCI) in Bethesda, Maryland, and at this point his career transitioned to the study of acute transforming retroviruses, oncogenes, and the cellular and molecular basis of oncogenesis.

George became the Director of Advanced Biosciences Laboratories (ABL) at the NCI in 1983 and over the next 12 years he developed the program into what was generally acknowledged to be the crown jewel of intramural NCI research. George recruited some of the most accomplished scientists in diverse fields of cancer biology, from retroviruses to mouse models. While the individual research was outstanding, what set the ABL program apart was the coherence and strong sense of community, which was fostered by George's passion, drive, and generosity. The success of the ABL program did not go unnoticed, and in 1995 George was appointed as special advisor to NCI Director Richard Klausner and was appointed Director of NCI's Division of Basic Sciences. In this role he established a peer-reviewed site-visit system to elevate and reward excellence. George worked tirelessly to help the Division of Basic

Sciences achieve its full potential, but despite this work load he continued to lead his own research group and made further ground-breaking contributions to our understanding of how *N*-methyl-*N*-nitroso-guanidine human osteosarcoma transforming tene (MET) contributes to cancer metastasis and the role of Moloney murine sarcoma viral (v-mos) oncogene (MOS) in meiotic cell cycle progression and oocyte maturation. At this time, he also made the remarkable discovery that Anthrax lethal factor functions by inactivating MEKs, kinases critical for normal signal transduction and cell survival.

In 1999, at the age of 64, when most people would be considering retirement, George was named Founding Director of the Van Andel Research Institute in Grand Rapids, Michigan. The institute was launched as a vision of Grand Rapids philanthropist Jay Van Andel. At the time of George's recruitment, there was little biomedical research activity occurring in the city of Grand Rapids. As he had done at ABL, George was able to recruit top-notch scientists and develop an internationally recognized research institute that received plaudits for graduate training programs and translational science. The establishment of the Institute fueled the growth of the "medical mile" along Michigan Avenue in Grand Rapids. By 2020, this included more than a dozen institutes and hospitals, including a new branch of Michigan State University's academic medical center. These additions to the city revitalized and rebranded its national and international impact.

George's high-impact contribution led to novel therapies for cancer treatment. Most advanced are approaches to target MET, the receptor tyrosine kinase for hepatocyte growth factor (HGF). Deregulated MET function contributes to the development of many cancers, and both small-molecule inhibitors and antibodies targeting MET and HGF are now in use in the treatment of lung cancer and other solid tumors.

George was coeditor and served on the Editorial Board for *Cancer Research* from 1997 to 2000, and was the founding editor of *Cell Growth & Differentiation* (1989–1996). With his colleague George Klein, he coedited the long-running and influential series *Advances in Cancer Research*. His skill as a scientific leader led him to serve on numerous science advisory and editorial boards, including those for the Memorial Sloan-Kettering Cancer Center in New York, St Jude Children's Hospital in Memphis, and the Samuel Lunenfeld Research Institute in Toronto. George's many scientific accolades include election to the National Academy of Sciences (1993), American Academy of Arts and Sciences (2006), American Association for Cancer Research Academy (2013), and the American Association for the Advancement of Science (2013), as documented in other extensive biographies. Beyond his scientific achievements, George was also known for hosting many visitors at Stoneridge Farm in Berryville, Virginia, and giving hayrides to international scientists, extended family, and children of all ages. George had a remarkable

list of other talents, which include rebuilding hog pens, fixing farm equipment, cutting wood, beekeeping, and refinishing furniture. George was an exuberant dancer, a practical joker, and enjoyed hunting and fishing, even if the bounty was not plentiful. George boasted that he “always wanted to be surrounded by beautiful women” when he spoke about his four daughters and wife Dorothy.

In a profession where congeniality is not always a highly selected trait, George’s colleagues unanimously acknowledge his empathetic and generous personality, as well as his contagious enthusiasm for conducting innovative science. George made innumerable connections for acquaintances, friends, relatives—and sometimes complete strangers with cancer—with leading oncologists, allowing dozens of patients to obtain

top-notch, cutting-edge therapies that often led to remission or cure. He was a big-hearted man, known for his bear hugs and belly laugh, his stubbornness, and convictions, all traits that lasted until his final days. He was a loving husband and father to his four daughters. Of all his accomplishments, the legacy George would be most proud of are the trainees who honed their critical-thinking skills and developed their scientific talent under his tutelage, and have gone on to become productive members of the scientific community, making innovative discoveries aiding the war on cancer. George truly cared about all the scientists—from postdoctorates to senior Principal Investigators—who worked with him. In return, their efforts to make George proud elevated everyone who was fortunate enough to know him.

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1 T. Hunter, J. Simon, A not so brief history of the Oncogene Meeting and its cartoons. *Oncogene* **26**, 1260–1267 (2007).