



## Charlene Edinboro, D.V.M., Ph.D.

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### Professional Profile

Dr. Edinboro is a veterinary epidemiologist, with over 20 years of experience as an epidemiologist and over 35 years as a small animal veterinarian (DVM). Her research includes studies of dietary and environmental risk factors for feline hyperthyroidism, clinical trials of vaccine effectiveness in dogs and cats at humane shelters, and evaluation of the immune status impact of repeated vaccination on Great Danes.

Dr. Edinboro's research interests include small animal population disease control and companion animals as sentinels for human thyroid health. She also has over 20 years' experience as an aerospace systems engineer, primarily involving spacecraft control and satellite orbital software.

Dr. Edinboro's interest has led to participation on local and national committees examining the effects of environmental compounds (including endocrine disrupters and radiation used in treatment) on human and animal health, reflecting the "One Health" principle of the interconnectedness of animal, human, and environmental health, and the need for collaboration among veterinarians, physicians, and other scientists.

At Exponent, Dr. Edinboro provides in-house subject matter expertise regarding cows, horses, pigs, sheep, chickens, turkeys, deer, mice, dogs, and cats for questions about nutrition, husbandry, environmental contamination, adverse encounters with electronics, forensic analysis, and sentinel/surrogate species, as well as zoonotic and infectious diseases. Dr. Edinboro has analyzed an animal shelter's database to evaluate the impact of a community cat shelter-neuter-release program on the health of cats in the shelter. She managed a project involving mitigation of occupational exposure to Q-fever, a zoonotic disease. Dr. Edinboro applied all facets of her experience during a dairy inspection where use of robotic milking machines was thought to be associated with higher rates of mastitis following implementation. In cases of potential exposures of horses to PCBs, Dr. Edinboro reviewed evidence regarding neonatal foal morbidity and mortality, as well as potential stable contamination. She summarized literature for potential health effects of fiberboard for a potential new application in horse bedding. Dr. Edinboro reviewed laboratory animal thyroid data for a proposed new animal pharmaceutical product. She participated in safety evaluations of dog treat ingredients and proposed protein sources for pet food, in food-borne outbreak investigations, and in projects related to animal diseases potentially due to feeds (ingredient excesses or deficiencies) or environmental exposures.

In humans, Dr. Edinboro analyzed newborn screening data and potential perchlorate exposure in drinking water, supported an evaluation of the applicability of a screening test for occupational beryllium exposure, reviewed potential adverse health outcomes associated with dietary supplements, and summarized relationships between respiratory diseases and asbestos exposure. She has reviewed literature for potential health effects of fiducial marker use in several new applications and participated in other medical device projects. Dr. Edinboro prepared state-of-the-art reviews for reports and manuscripts on

occupational exposures to solvents and cancer outcomes; environmental perchlorate exposures and thyroid function, as well as smoking, cardiovascular disease, and magnetic field exposure.

Dr. Edinboro has been a member of the American Thyroid Association's Public Health Committee (2007-2011). She served two terms on the American Veterinary Medical Association's Committee on Environmental Issues (2012-2018), representing Small Animal Medicine and participating on several inter-entity subcommittees. Dr. Edinboro was the Section Editor for Epidemiology for the Journal of the American Animal Hospital Association between 2007 and 2020, and she has reviewed manuscripts for 20 additional journals.

Dr. Edinboro holds an active California veterinary license. As a small animal veterinarian, she has performed routine physical examinations and treatment, preventive care, routine surgeries, emergency medicine, and shelter animal medicine, including population disease control, forensics, zoonosis identification, and wildlife medicine. Dr. Edinboro is active with the Peninsula Veterinary Medical Association, serving twice as president, and she has been a liaison with a local animal rescue group, a large humane society, and the local county health department. She has volunteered as a feral cat spay/neuter clinic veterinarian.

As an aerospace engineer, Dr. Edinboro worked in areas of spacecraft control systems analysis, simulation software design and implementation, multimedia tool development and training, and all facets of systems engineering, including requirements analysis, implementation, integration and test, documentation development, and on-site customer support for a variety of applications. She identified key regressions in orbital software that impacted launch and mission operations, and worked with developers to correct these deficiencies in a timely manner. Dr. Edinboro was recognized with numerous client and mission awards, including two NASA Group Achievement Awards for the Voyager program.

### Academic Credentials & Professional Honors

Ph.D., Comparative Epidemiology, Purdue University, 2002

D.V.M., Veterinary Medicine, University of California, Davis, 1990

M.S., Aeronautics and Astronautics, Purdue University, 1976

B.S., Aeronautical and Astronautical Engineering, Purdue University, 1975

Sigma Xi, The Scientific Research Honor Society, 2023

Outstanding Aerospace Engineer, Purdue University, 2009

Oxford Laboratories Award for Excellence in the Advancement of Knowledge Concerning Small Animal Endocrinology, Society for Comparative Endocrinology, 2005

Recipient of Kenneth Scott Fellowship in Epidemiology and Animal Welfare, Purdue University, 1997-2001

Phi Zeta Veterinary Medicine Honor Society

NASA Group Achievement Award for Voyager Spacecraft System Design and Development

NASA Group Achievement Award for Voyager Flight Operations

American Institute of Aeronautics and Astronautics Outstanding Student Branch Member, Purdue University, 1975-1976

Sigma Gamma Tau Aerospace Engineering Honor Society

## Purdue University Special Merit and Alumni Association Scholarships

### Licenses and Certifications

Veterinarian License (CA)

### Prior Experience

Post-Doctoral Research Assistant, Purdue University, School of Veterinary Medicine, Department of Veterinary Pathobiology, 2001-2002

Teaching Assistant, Purdue University, School of Veterinary Medicine, Department of Veterinary Pathobiology, 1999

Graduate Research Assistant, Purdue University, School of Veterinary Medicine, Department of Veterinary Pathobiology, 1997-2001

Small animal part-time and relief veterinarian at private practices and two large humane shelters in the San Francisco Bay Area, 1990-1997, 2004-2013

Systems Engineer, Scitor Corporation, 1984-1986, summers 1987-1989, 1990-1997

Staff Engineer, Ultrasystems Defense and Space Systems, Inc., 1982-1984

Member of the Technical Staff, TRW Defense Systems Group, 1979-1982

Engineer R&D, Ford Aerospace and Communications Corporation, 1979

Engineer II, III, Computing Analyst III, Jet Propulsion Laboratory, California Institute of Technology, 1976-1979

### Professional Affiliations

American Veterinary Medical Association (Committee on Environmental Issues Member [2012-2018])

American Thyroid Association (Public Health Committee Member [2007-2011])

American Association of Food Safety and Public Health Veterinarians

Association for Veterinary Epidemiology and Preventive Medicine

Conference of Research Workers in Animal Diseases

Feline Veterinary Medical Association (formerly, American Association of Feline Practitioners)

Peninsula Veterinary Medical Association (all executive offices held [1995-1997], president [2008])

Center for Animal Protection and Education, Grass Valley, CA (Advisory Board Member, former Board Member)

### Languages

German

## Publications

Edinboro CH. Feral cat populations and feline retrovirus prevalence in San Mateo County, California in three time periods between 2001 and 2016. *Animals (Basel)*. 2022 Dec 9;12(24):3477. doi: 10.3390/ani12243477. PMID: 36552398; PMCID: PMC9774651.

Edinboro CH. Feline retroviral prevalence in feral cats on the San Francisco peninsula, 2001-2003, 2005-2007, and 2014-2016. (Abstract) *Journal of Veterinary Internal Medicine* 2018; 32(6):2262-2263.

Edinboro CH, Watson HN, Fairbrother A. Association between a shelter-neuter-return program and cat health at a large municipal animal shelter. *Journal of the American Veterinary Medical Association* 2016; 248(3):298-308.

Edinboro CH. Comparison of prevalence of feline leukemia and immunodeficiency viruses in feral cats on the San Francisco Peninsula, 2001-2003 and 2005-2007. (Abstract) *Journal of Veterinary Internal Medicine* 2013; 27(3):727.

Edinboro CH, Pearce EN, Pino S, Braverman LE. Iodine concentration in commercial cat foods from three regions of the USA, 2008-2009. *Journal of Feline Medicine and Surgery* 2013; 15(8):717-724. Epub ahead of print: 2013 Feb 25.

Baxter KJ, Levy JK, Edinboro CH, Vaden SL, Tompkins MB. Renal disease in cats infected with feline immunodeficiency virus. *Journal of Veterinary Internal Medicine* 2012; 26(2):238-243.

Edinboro CH. A "one medicine" example: humans as the model for a feline disease. (Abstract) *Thyroid* 2011; 21(s1):A-37.

Sisson JC, Freitas J, McDougall IR, Dauer LT, Hurley JR, Brierley JD, Edinboro CH, Rosenthal D, Thomas MJ, Wexler JA, Asamoah E, Avram AM, Milas M, Greenlee C. Radiation safety in the treatment of patients with thyroid diseases by radioiodine 131I: Practice recommendations of the American Thyroid Association. *Thyroid* 2011; 21:335-346.

Levy JK, Lappin MR, Glaser AL, Birkenheuer AJ, Anderson TC, Edinboro CH. Prevalence of infectious diseases in cats and dogs rescued following Hurricane Katrina. *Journal of the American Veterinary Medical Association* 2011; 238(3):311-317.

Greenlee MC, Burmeister LA, Butler RS, Edinboro CH, Morrison SM, Milas M. Current safety practices relating to I-131 administration for diseases of the thyroid: A survey of physicians and allied practitioners. *Thyroid* 2011; 21:151-160.

Edinboro CH, Scott-Moncrieff JC, Glickman LT. Feline hyperthyroidism: Potential relationship with iodine supplement requirements of commercial cat foods. *Journal of Feline Medicine and Surgery* 2010; 12(9):672-679.

Lechner ES, Crawford PC, Levy JK, Edinboro CH, Dubovi EJ, Caligiuri R. Prevalence of protective antibody titers for canine distemper virus and canine parvovirus in dogs entering a Florida animal shelter. *Journal of the American Veterinary Medical Association* 2010; 236(12):1317-1321.

Edinboro CH, Pearce EN, Pino S, Braverman LE. Is the iodine content of cat food responsible for "toxic nodular goiter" in older cats? (Abstract) *Thyroid* 2009; 19(s1):S-27.

Edinboro CH, Kelsh MA, Lau EC. Demographic comparisons of two- versus one-stage testing results for primary congenital hypothyroidism screening in California, 1997-1998. (Abstract) *Thyroid* 2008; 18(s1):S-53-S-54.

Goldkamp CE, Levy JK, Edinboro CH, Lachtara JL. Seroprevalences of feline leukemia virus and feline

immunodeficiency virus in cats with abscesses or bite wounds and rate of veterinarian compliance with current guidelines for retrovirus testing. *Journal of the American Veterinary Medical Association* 2008; 232(8): 1152-1158.

Levy JK, Edinboro CH, Glotfelty CS, Dingman, PA, West AL, Kirkland-Cady KD. Seroprevalence of *Dirofilaria immitis*, feline leukemia virus, and feline immunodeficiency virus in dogs and cats rescued from the 2005 Gulf Coast hurricane disaster. *Journal of the American Veterinary Medical Association* 2007; 231(2):218-225.

Edinboro CH. Companion animals may serve as sentinels of health risk — A review of thyroid diseases in three non-human species. (Abstract) *Thyroid* 2006; 16(9):908-909.

Buffler PA, Kelsh MA, Lau EC, Edinboro CH, Barnard JC, Rutherford GW, Daaboul JJ, Palmer L, Lorey FW. Thyroid function and perchlorate in drinking water: An evaluation among California newborns, 1998. *Environmental Health Perspectives* 2006; 114(5):798-804.

Mezei G, Cher D, Kelsh M, Edinboro C, Chapman P, Kavet R. Occupational magnetic field exposure, cardiovascular disease: mortality, and potential confounding by smoking. *Annals of Epidemiology* 2005; 15(8):622-629.

Edinboro CH, Scott-Moncrieff JC, Glickman LT. Review of iodine recommendations for commercial cat foods and potential impacts of proposed changes. (Abstract) *Thyroid* 2004; 14(9):722.

Edinboro CH, Scott-Moncrieff JC, Glickman LT. Environmental risk factors for feline hyperthyroidism: Pet cats as potential sentinels for public health. (Abstract) *Thyroid* 2004; 14(9):759.

Edinboro CH, Scott-Moncrieff JC, Janowitz EB, Thacker HL, Glickman LT. Epidemiologic study of relationships between consumption of commercial canned food and risk of hyperthyroidism in cats. *Journal of the American Veterinary Medical Association* 2004; 224(6):879-886.

Edinboro CH, Ward MP, Glickman LT. A placebo-controlled trial of two intranasal vaccines to prevent tracheobronchitis (kennel cough) in dogs entering a humane shelter. *Preventive Veterinary Medicine* 2004; 62(2):89-99.

Edinboro CH, Scott-Moncrieff JC, Tetrick M, Glickman LT. Dietary and environmental risk factors for clinical hyperthyroidism in pet cats. (Abstract) *Annals of Epidemiology* 2002; 12(7):509.

Edinboro CH. Dietary and environmental risk factors for feline hyperthyroidism. Dissertation. Department of Veterinary Pathobiology, Purdue University, 2002.

Edinboro CH, Janowitz LK, Guptill-Yoran L, Glickman LT. A clinical trial of intranasal and subcutaneous vaccines to prevent upper respiratory infection in cats at an animal shelter. *Feline Practice* 1999; 27(6):7-11, 13.

## **Book Chapter**

Edinboro CH. Veterinary epidemiology. In: *Encyclopedia of Epidemiology*. Boslaugh S (ed), Thousand Oaks, CA: Sage Publications, pp. 1079-1083, 2007.

## **Presentations**

Edinboro CH. Thyroid disease in veterinary populations (invited). Thyroid Cancer Survivor Group, July 2021.

Edinboro CH. AVEPM Calvin Schwabe Symposium: Small animals – Big data! (invited). 2020 Conference of Research Workers in Animal Diseases, December 2020.

Edinboro CH. Feline retroviral prevalence in feral cats on the San Francisco peninsula, 2001-2003, 2005-2007, and 2014-2016. 2018 American College of Veterinary Internal Medicine Forum, Seattle, WA, June 2018.

Edinboro CH. ICCIDD Iodine Deficiency Symposium: Iodine in veterinary populations (invited). American Thyroid Association 84th Annual Meeting, Coronado, CA, October-November 2014.

Edinboro CH. Comparison of prevalence of feline leukemia and immunodeficiency viruses in feral cats on the San Francisco Peninsula, 2001-2003 and 2005-2007. Poster, 2013 American College of Veterinary Internal Medicine Forum, Seattle, WA, June 2013.

Edinboro CH. Prevalence of feline leukemia and immunodeficiency viruses in feral cats on the San Francisco peninsula, 2001-2003 and 2005-2007. Peninsula Veterinary Medical Association (invited), Belmont, CA, November 2012.

Edinboro CH. Infectious diseases in animal shelters: continuing need for vaccination and vigilance. Poster, 3rd International Conference on Infectious Disease Dynamics, Boston, MA, November-December 2011.

Edinboro CH. Meet the Professor:  $^{131}\text{I}$  Radiation safety for patients: Current practices survey (invited). American Thyroid Association 81st Annual Meeting, Indian Wells, CA, October 2011.

Edinboro CH. A "one medicine" example: humans as the model for a feline disease. Poster, American Thyroid Association 81st Annual Meeting, Indian Wells, CA, October 2011.

Edinboro CH. Updates on risk factors for feline hyperthyroidism, or "not all those who wander are lost." Peninsula Veterinary Medical Association (invited), Belmont, CA, May 2011.

Edinboro CH. Endocrine disruption: How much is too much for the public's health? Topics in Public Health Seminar (invited), University of California, Davis, CA, May 2011.

Edinboro CH. Companion animals and humans as sentinels of health risk. Alltech 26th International Animal Health and Nutrition Symposium (invited), Lexington, KY, May 2010.

Edinboro CH. Perspectives of an aerospace systems engineering veterinary epidemiologist, or, a little bit of this and that. Invited, Seminar in Epidemiology, Purdue University, West Lafayette, IN, September 2009.

Edinboro CH, Pearce EN, Pino S, Braverman LE. Is the iodine content of cat food responsible for "toxic nodular goiter" in older cats? Poster, American Thyroid Association 80th Annual Meeting, West Palm Beach, FL, September 2009.

Edinboro CH. Animals as sentinels of human disease, and other musings on "One Medicine." Topics in Public Health Seminar (invited), University of California, Davis, CA, April 2009.

Edinboro CH, Kelsh MA, Lau EC. Demographic comparisons of two- versus one-stage testing results for primary congenital hypothyroidism screening in California, 1997-1998. Poster, American Thyroid Association 79th Annual Meeting, Chicago, IL, October 2008.

Edinboro CH. Prevalence of feline leukemia and immunodeficiency viruses in feral cats on the San Francisco peninsula. Epidemiology Graduate Seminar (invited), University of California, Davis, CA, November 2006.

Edinboro CH. Companion animals may serve as sentinels of health risk — A review of thyroid diseases in three non-human species. Poster, American Thyroid Association 77th Annual Meeting, Phoenix, AZ,

October 2006.

Edinboro CH. Prevalence of feline leukemia and immunodeficiency viruses in feral cats on the San Francisco peninsula. Poster, 8th International Feline Retrovirus Research Symposium, Washington, DC, October 2006.

Edinboro CH. Prevalence of feline leukemia and immunodeficiency viruses in feral cats in San Francisco Bay Area. 11th International Symposium for Veterinary Epidemiology and Economics, Cairns, Queensland, Australia, August 2006.

Edinboro CH. Prevalence of obesity in dogs and obesity and asthma in cats presented to North American veterinary school hospitals. Poster, 11th International Symposium for Veterinary Epidemiology and Economics, Cairns, Queensland, Australia, August 2006.

Edinboro CH. Clinical trials of intranasal vaccines to prevent respiratory diseases in animal shelters. Epidemiology Graduate Seminar, University of California, Davis, CA, May 2005.

Edinboro CH, Scott-Moncrieff JC, Glickman LT. Review of iodine recommendations for commercial cat foods and potential impacts of proposed changes. Poster, American Thyroid Association 76th Annual Meeting, Vancouver, BC, Canada, September-October 2004.

Edinboro CH, Scott-Moncrieff JC, Glickman LT. Environmental risk factors for feline hyperthyroidism: Pet cats as potential sentinels for public health. Poster, American Thyroid Association 76th Annual Meeting, Vancouver, BC, Canada, September-October 2004.

Edinboro CH. Dietary and environmental risk factors for feline hyperthyroidism, or "there and back again." Peninsula Veterinary Medical Association, Belmont, CA, March 2004.

Mezei G, Cher D, Kelsh M, Chapman P, Edinboro C, Kavet R. Cardiovascular deaths and occupational exposure to magnetic fields in the national mortality followback survey. Poster, Bioelectromagnetics Society Annual Meeting, Wailea, Maui, HI, June 2003.

Edinboro CH, Scott-Moncrieff JC, Tetrack M, Glickman LT: Dietary and environmental risk factors for clinical hyperthyroidism in pet cats. Poster, American College of Epidemiology Annual Meeting, Albuquerque, NM, September 2002.

Edinboro CH. Do endocrine disrupters in canned food linings cause hyperthyroidism? Epidemiologic evidence from an animal model. Interdepartmental Nutrition Program Seminar Series, Purdue University, September 2002.

Edinboro CH. Disease recognition, prevention, and shelter programming for animal health. Indiana Association of Animal Control Personnel Conference, Indianapolis, IN, October 1999.

## Research Grants

Post-Doctoral Research Assistant, Great Dane Health and Vaccine Study, Purdue University, School of Veterinary Medicine, Department of Veterinary Pathobiology (11/01-10/02)

Graduate Research Assistant, Purdue University, School of Veterinary Medicine, Department of Veterinary Pathobiology (8/97-11/01)

- Designed and conducted a controlled clinical trial to evaluate the efficacy of two intranasal vaccines for the prevention of upper respiratory disease (Kennel Cough) in dogs at a humane shelter
- Designed and conducted case-control and cross-sectional studies to identify dietary and environmental risk factors for feline hyperthyroidism (PhD Research)

## Peer Reviews

Journal of the American Animal Hospital Association - Past Section Editor for Epidemiology

American Journal of Veterinary Research

Animals

BMC Veterinary Research

Bioengineering

Ecotoxicology and Environmental Safety

Journal of the American Veterinary Medical Association

Journal of Feline Medicine and Surgery

Journal of Small Animal Practice

Journal of Toxicology and Environmental Health

Journal of Veterinary Internal Medicine

New Zealand Veterinary Journal

Preventive Veterinary Medicine

Scientific Reports

Thyroid

Toxicological Sciences

The Veterinary Journal

Veterinary Medicine International - Guest Editor for Small Animal Epidemiology issue

Veterinary Sciences

Veterinary Surgery

Viruses