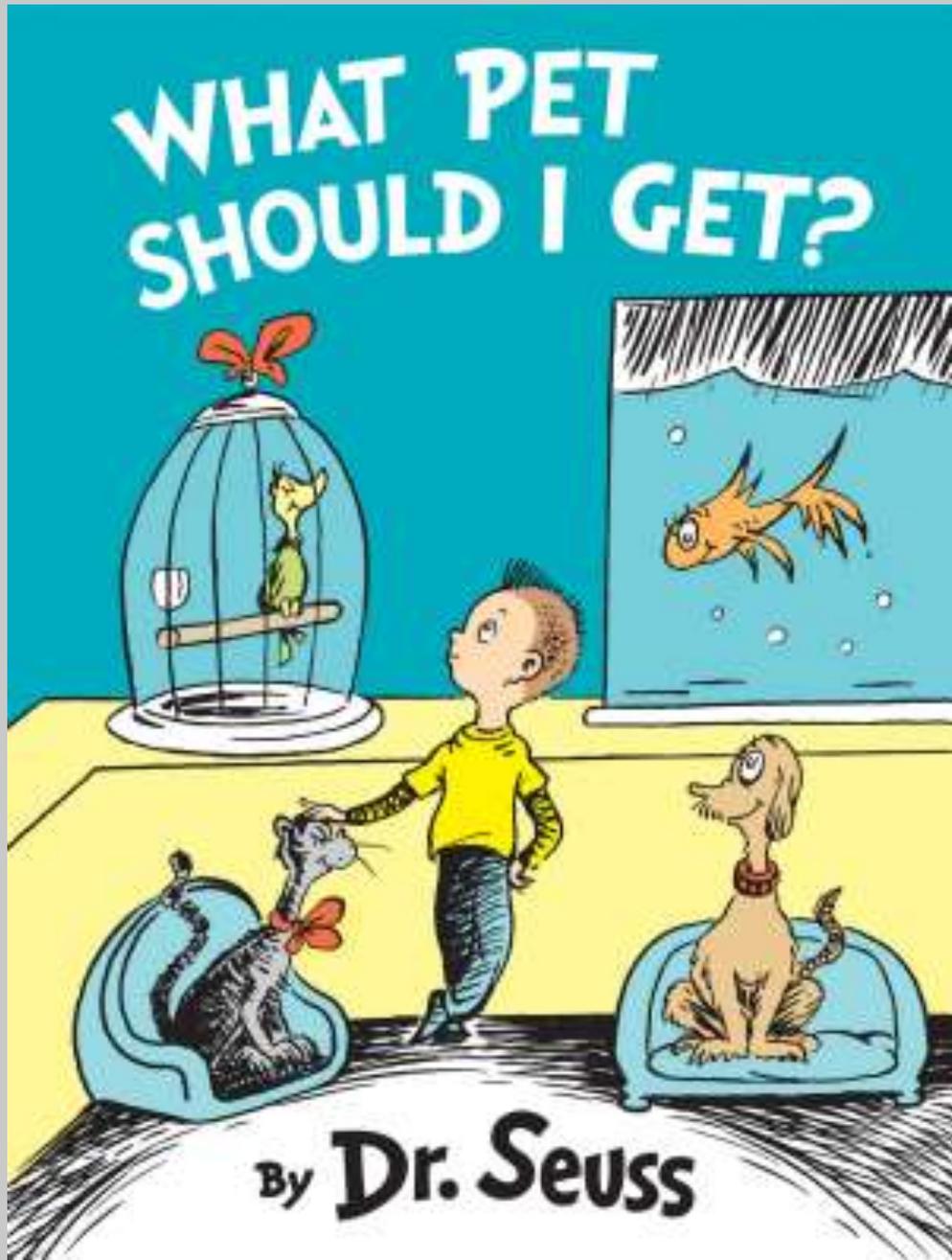


# Collaborative research to advance the health of all family members – people and pets



Patricia N. Olson, DVM, PhD, DACT, DACAW



## Definitions

Animal (large, small)

Pet

Pocket Pet

Companion Animal

Livestock

Wildlife/Zoo



# Pets as family members – Harris Poll 2011

(n = 2,184 adults)

Seven in ten surveyed had a dog (69%) and half had a cat (51%)

92% of dog owners, and 91% of cat owners, considered their pet to be a family member

>50% of owners surveyed allowed the animal to sleep in their beds

Companion animals (pets) also share the air we breathe, the toxins we are exposed to, the water we drink, and often the foods that we eat

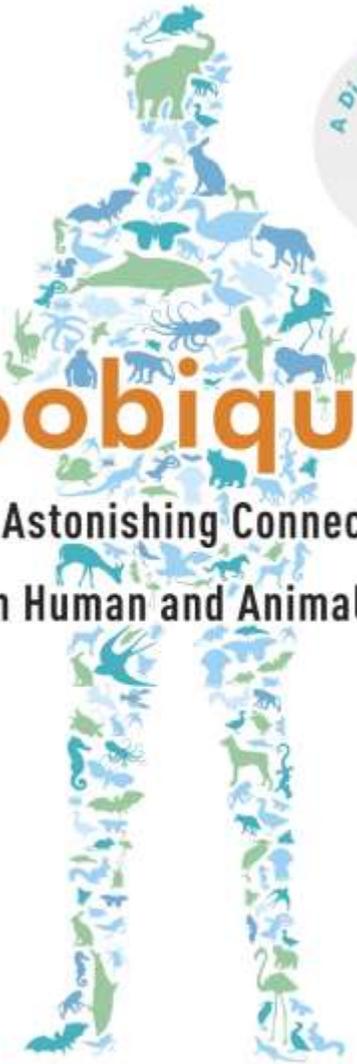


"Full of fascinating stories. . . I was beguiled." —ATUL GAWANDE, M.D.

A Discover Magazine  
**BEST  
BOOK  
OF THE  
YEAR**

# Zoobiquity

The Astonishing Connection  
Between Human and Animal Health



BARBARA NATTERSON-HOROWITZ, M.D.  
and KATHRYN BOWERS



**Barbara Natterson-Horowitz,  
Professor, Division of Cardiology,  
UCLA**



**Kathryn Bowers, Fellow, New  
America Foundation,  
Washington, DC**

Announcing...

# ZOOBIQUITY BOSTON

April 25, 2015, 7:50 a.m. to 6:00 p.m.



HUMAN AND ANIMAL HEALTH IN A CHANGING GLOBAL ENVIRONMENT



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SPORTS MEDICINE



Jointly Provided by:

Tufts University School of Medicine, Tufts Clinical and Translational Science Institute,  
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- ❖ Boston University Clinical and Translational Science Institute
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- ❖ UMass Center for Clinical and Translational Science and University of Massachusetts Medical School
- ❖ Massachusetts Institute of Technology, Division of Comparative Medicine
- ❖ Massachusetts Medical Society
- ❖ Massachusetts Veterinary Medical Association
- ❖ Massachusetts Department of Public Health

For details, visit <http://zoobiquity.com/>  
or contact [vetceinfo@tufts.edu](mailto:vetceinfo@tufts.edu) or 508-887-4723.



## Zoonotic diseases

75% of all emerging diseases in the past three decades originated in animals

**IMPROVING THE HEALTH OF PEOPLE,  
ANIMALS, PLANTS AND OUR ENVIRONMENT**



**1918 Influenza Pandemic resulted in  
> 40 million deaths worldwide  
Role of avian, porcine, equine  
influenza?**

**PREPARING TO MEET THE HEALTH  
NEEDS OF A GROWING POPULATION**





Bertha Schwichtenberg and Gustav Schulz

## 1918 Spanish Flu

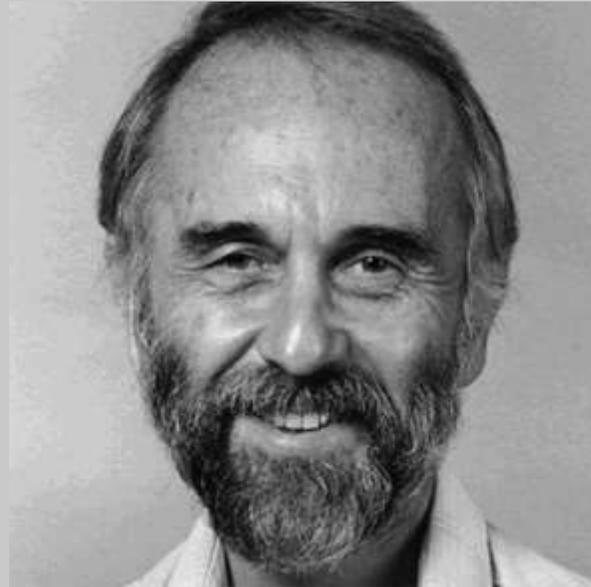
- One of the deadliest disasters in modern history
- Killing 3-5% of the world's population
- While “traditional” influenza outbreaks generally killed children, the elderly or the ill, the 1918 epidemic killed young, healthy adults
- Young pregnant women were at-risk
- The close quarters and massive troop movements of WWI perhaps hastened the pandemic



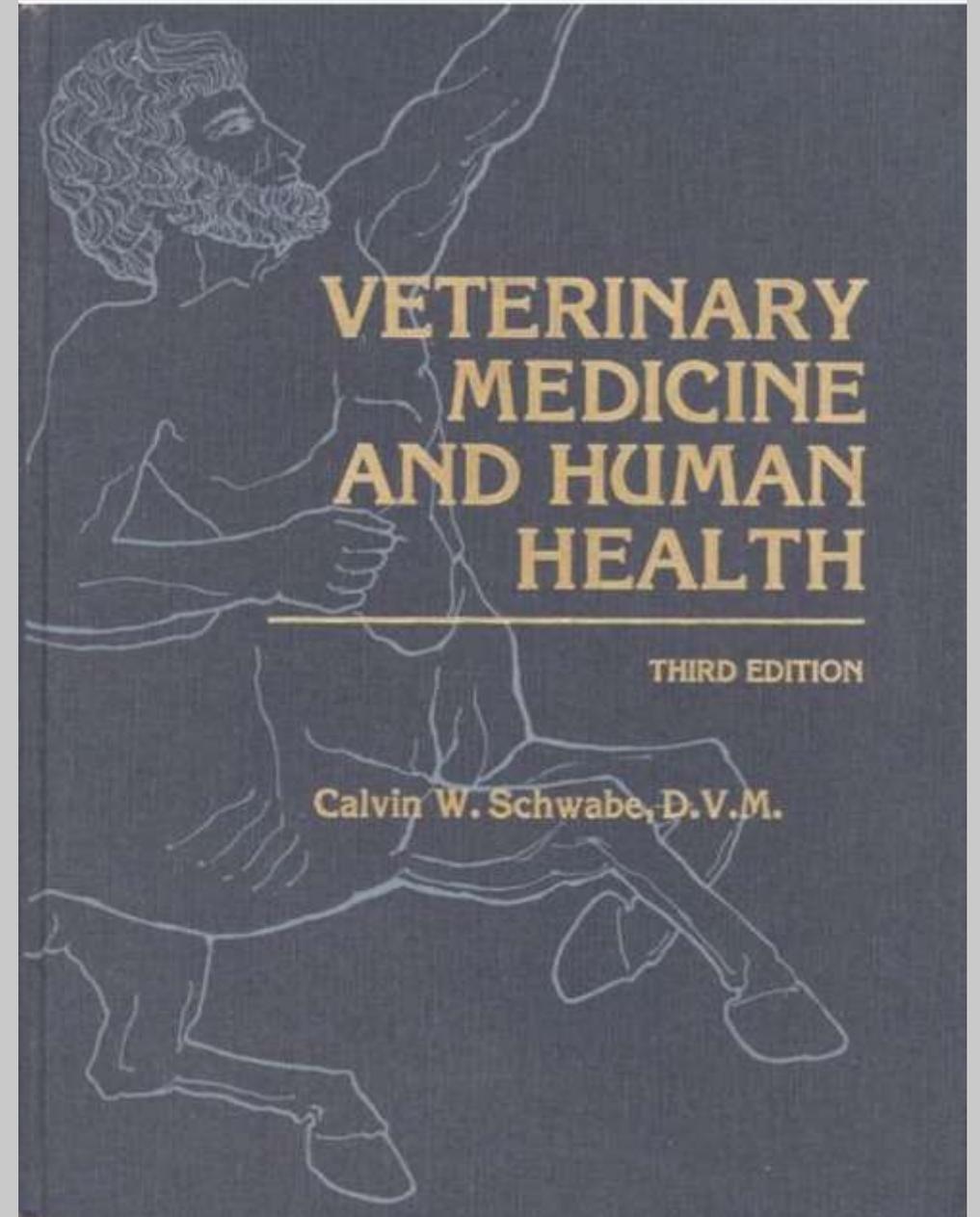
Soldiers at Fort Riley, Kansas, during flu pandemic

# One Medicine

The concept of "One Medicine" embodies the view that human and veterinary medicine are dependent on an overlapping collection of biological characteristics, technologies and research discoveries. The phrase "One Medicine" is credited to Dr. Calvin Schwabe (1927–2006), a veterinary epidemiologist and parasitologist in his textbook "Veterinary Medicine and Human Health" – written in 1984



Dr. Calvin Schwabe, UCD



# The One Health Company

theonehealthcompany.com



The One Health Company is a new model of contract research: one that not only dramatically improves the predictive accuracy of medical knowledge from pre-clinical testing but also provides pets with beneficial cutting edge therapies to improve their wellness.



Oncovet Clinical Research



The logo for Petplan pet insurance, featuring the text "Petplan" in a large, white, sans-serif font and "pet insurance" in a smaller, white, sans-serif font below it, all on a yellow background.



Ben Lewis, Founder & CEO  
(also Founder, 4Vets – Brazil)



Christina Lopez, Founder & President (doctoral work in ethics, global leader award)

# University of Pennsylvania One Health Award



Nicola Mason



Yvonne Paterson

Nicola Mason, University of Pennsylvania's College of Veterinary Medicine & Yvonne Paterson, University of Pennsylvania's Perelman School of Medicine received 2013 One Health Award

Working collaboratively to address the potential use of *Listeria monocytogenes* to induce immune responses against tumors



# Animals share our diseases

- 50% of dogs over the age of two years will develop cancer
- 53% of adult dogs and 55% of cats in the US are obese or overweight (Assoc. for Pet Obesity Prevention)
  - Diabetes mellitus increased by 32% in dogs and 16% in cats from 2006 to 2011 (Banfield 2011 Report – State of Pet Health)
- Parallels exist between respiratory syncytial virus (RSV) disease in neonatal calves and children (Sacco et al., Viruses. 2012, Dec; 4(12):3731-53)
- How can drug-resistant tuberculosis be reduced in children and animals?
- Can medical marijuana help dogs and children with intractable epilepsy?
- Epidemiological risk factors for various orthopedic diseases?



**NIH-NCI-Center for Cancer Research's  
Comparative Oncology Program**

# Animals give us clues

Different risk factors to disease, severity of disease, control of disease



West Highland Terrier –  
Pulmonary fibrosis



Golden Retriever –  
Hemangiosarcoma,  
Lymphosarcoma, Mast  
cell cancer,  
Osteosarcoma



Grey Horses -  
Melanoma

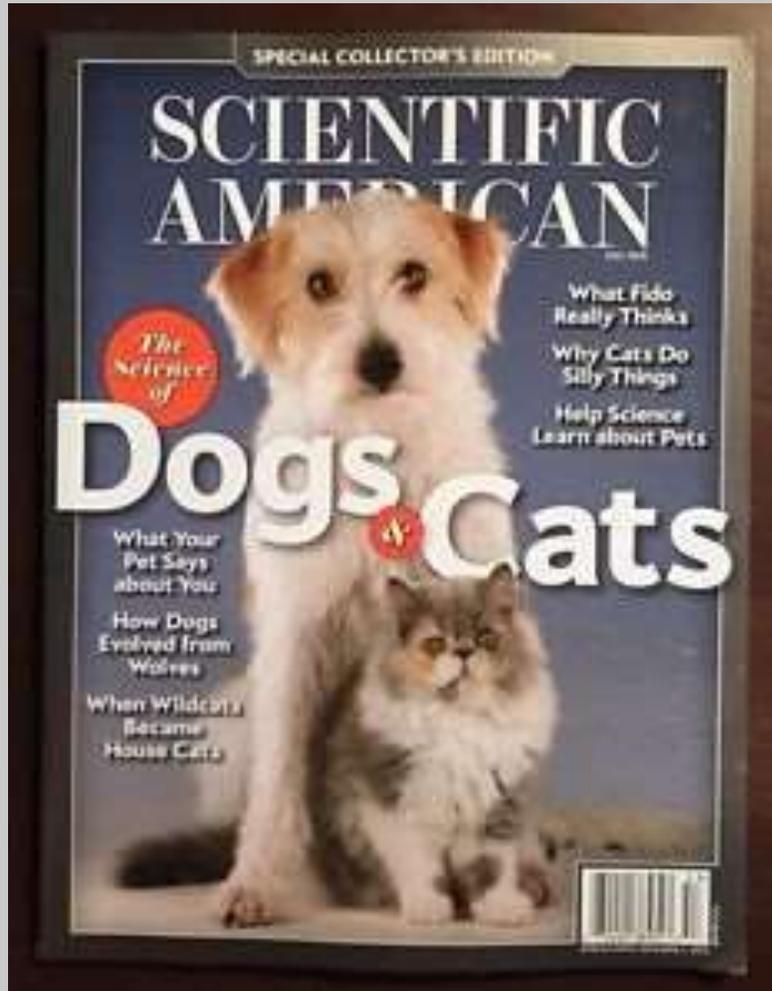


Cats – FIV, FeLV, FIP



Dolphins – “Pre-  
diabetes”

# Scientific American – The Science of Dogs & Cats



<http://www.scientificamerican.com/magazine/special-editions/2015/09-01/>

Special Edition – Fall 2015

- Cancer Clues from Pet Dogs
- The Inner Life of Cats
- A Case for Cat Contraception
- The Science of Friendship
- The Dog is Too Fat

# Both ends of the leash

Both Ends of the Leash — The Human Links to Good Dogs with Bad Genes

Elaine A. Ostrander, Ph.D.

N Engl J Med 2012; 367:636-646 August 16, 2012 DOI: 10.1056/NEJMra1204453

Genome Sequence, comparative analysis and haplotype structure of the domestic dog

Kerstin Lindblad-Toh et al. (> 100 co-authors)

Nature 438, 803-819, December 2005



Clues abound through breed diversity in dogs

# Tuberculosis

Prevalence of TB in captive elephants (1994-2001)

2.9% - African elephants

16.4% - Asian elephants

K. Orloski, USDA, APHIS, Veterinary Services, April 5-6, 2011



TB has not been eradicated in dairy cows in the U.S.

*Mycobacterium bovis*

Wildlife may contribute (e.g., deer, badgers)



**Badgers associated with TB in UK dairy cows**



**Children at-risk for TB when therapy discontinues early**

Camelids now considered susceptible to TB, such as llamas and alpacas

# Malaria

January 2015 - Smithsonian scientists mapped the genome of the Hawaiian honeycreeper

Honeycreepers who live at low elevation areas in Hawaii — where malaria and the transmitting mosquitoes are prevalent — seem to tolerate the disease

Honeycreepers who reside in points of high elevation - where malaria and mosquitoes are rare - are highly susceptible



***What's the difference?***

# Cancer

Naked mole rats seem very resistant to cancer,  
living over 30 years

A protein newly found in the naked mole rat may help explain its  
unique ability to ward off cancer

PNAS January 27, 2015 vol. 112 no. 4

Risk of osteosarcoma different between AKC  
greyhounds and racing greyhounds

Osteosarcoma is a common cause of death in retired racing  
greyhounds. In direct comparison, osteosarcoma is rarely seen in  
AKC registered greyhounds

<http://www.coutovetconsultants.com/blog/greyhound-osteosarcoma.html>



Photo of naked mole rat – National Geographic



# Cancer

Tasmanian devil – threatened as a species due to non-viral infectious facial cancer



Catalina Island foxes – population decline - Santa Catalina Island foxes have an unusually high prevalence of ear canal cancer, whereas foxes on the other Catalina islands are not affected



Dogs – Anatolian shepherd – tongue cancer threatening the work of Cheetah conservation





Sweden, Norway, Denmark & UK



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a Nationwide Insurance® company

**ASPCA** PET HEALTH INSURANCE

**EMBRACE**  
PET INSURANCE

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Medical insurance for your pet.



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“hello  
**Petplan**  
goodbye  
vet bills”

< 3% pets insured in U.S.  
~ 20% pets insured in U.K.  
~ 80% dogs insured in Sweden



Optimum Wellness Plans®

# Epilepsy in Dogs

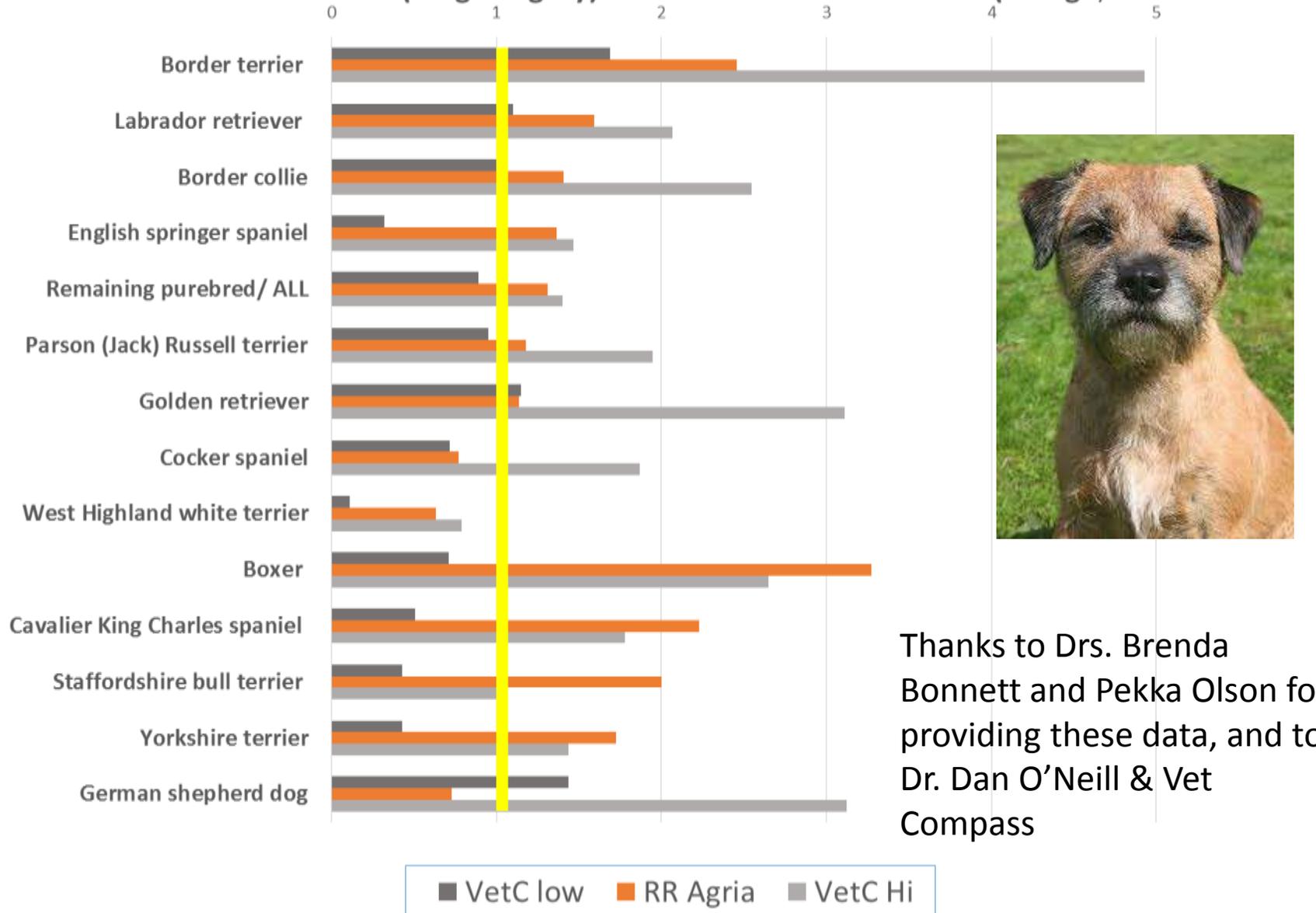
Risk in various breeds compared to baseline (yellow line) for mixed breeds.

Orange is estimate from Swedish Insurance data.

Grey lines are upper and lower confidence limits from UK data.

e.g.: Border Terriers have increased risk of epilepsy compared to mixed breeds...approx. 2.5 times.

Relative Risk compared to Mixed Breeds (yellow) for Epilepsy:  
UK vet data (range in grey) and Swedish insurance data (orange)



Thanks to Drs. Brenda Bonnett and Pekka Olson for providing these data, and to Dr. Dan O'Neill & Vet Compass

# Diabetes Mellitus in Dogs

Risk for Diabetes Mellitus

Breeds of dogs compared to rate in Mixed Breeds

Not age adjusted



Burmese cats also at risk for diabetes mellitus in some parts of the world

Increased Risk	Approx. Equal Risk	Decreased Risk	>1.5X less
Samoyed >6X	Petit Basset Griff Vend	American Cocker Span	>1.5
Finnish Hound >4X	Dachshunds Standard	Dalmatian	>1.5
Finnish Lapphund >2	Poodle Medium	Soft Coated Wheaten Terrier	>1.5
Finnish Spitz >2	Whippet	Staffordshire Bull Terrier	>1.5
Springer Spaniel >2	Danish-Swedish Farmdog	Bearded Collie	>2
Swedish Elkhound >2	Labrador Retriever	Border Terrier	>2
West Highland White Terrier >2	Norwegian Elkhound Grey	Chinese Crested	>2
Border Collie >2	Cavalier King Charles Span	Cocker Spaniel	>2
Drever >2	Parson Russell Terrier	German Pointers	>2
Bichon Frise >2		Shih Tzu	>2
Cairn Terrier >2		Dachshunds, Min	>2
Rottweiler >1.5		German Shepherd	>2
Schnauzers Miniature >1.5		Jack Russell Terrier	>2
Beagle >1.5		Poodle Standard	>2
Bichon Havanais >1.5		Yorkshire Terrier	>2
Hamilton Hound >1.5		Flat Coated Retriever	>6
Poodle Min & Toy >1.5		Golden Retriever	>6
		Nova Scotia DTR	>6
		Rhodesian Ridgeback	>6
		Shetland Sheepdog	>6
		Welsh Springer Span	>6X less

# Respiratory Disease in Dogs



For Pneumonia (combined with bronchitis and tracheitis)

All Breeds : incidence 12 per 10,000 DYAR

Mixed Breeds: 7 per 10,000 DYAR

High Risk: >20 per 10,000 DYAR

Great Dane  
Pomeranian  
French Bulldog  
Irish Red Setter  
Schnauzers Giant  
Poodle Standard  
Shetland Sheepdog  
Leonberger  
Pug  
Finnish Spitz  
Rhodesian Ridgeback  
Münsterländer Small  
Portuguese Water Dog  
Rottweiler  
Yorkshire Terrier  
Malinois  
Greyhound  
Cane Corso  
Bichon Frise

Low Risk: <6 per 10,000 DYAR

Jack Russell Terrier  
Border Collie  
Dalmatian  
For Terrier  
East Siberian Laika  
White Swiss Shepherd Dog  
American Staffordshire Terrier  
Shih Tzu  
Australian Kelpie  
Newfoundland  
Bichon Havanais  
Finnish Hound  
Dachshund Miniature  
Lhasa Apso

# Framingham Study in Dogs (Golden Retriever Lifetime Study)



# Clinical trials in animals with naturally occurring diseases

Meeting The Role of Clinical Studies for Pets with Naturally Occurring Tumors in Translational Cancer Research - June 8-9, 2015



- *Could clinical trials in pet animals reduce R&D time for human drug development? Could the animals also benefit?*
- *What guidelines should be developed and followed to verify that animal welfare and owner consent is optimal?*
- *How would regulatory agencies view data collected from clinical trials using pet animals?*

# Members of the Comparative Oncology Trials Consortium

**Auburn University**  
Auburn, AL

**North Carolina State University**  
Raleigh, NC

**Tufts University**  
North Grafton, MA

**University of Guelph**  
Guelph, ON Canada

**University of Pennsylvania**  
Philadelphia, PA

**Colorado State University**  
Ft. Collins, CO

**Purdue University**  
West Lafayette, IN

**University of California**  
Davis, CA

**University of Illinois**  
Urbana, IL

**University of Tennessee**  
Knoxville, TN

**Kansas State University**  
Manhattan, KS

**Texas A&M University**  
College Station, TX

**University of Florida**  
Gainesville, FL

**University of Minnesota**  
St. Paul, MN

**University of Wisconsin**  
Madison, WI

**Michigan State University**  
East Lansing, MI

**The Ohio State University**  
Columbus, OH

**University of Georgia**  
Athens, GA

**University of Missouri**  
Columbia, MO

**Washington State University**  
Pullman, WA



**Zoeyia** - is the positive inverse of zoonosis; how animals keep us physically & emotionally well



**The World Health Organization defines health as “a state of complete physical, mental and social well being and not merely the absence of disease or infirmity”**



**Kate Hodgson, DVM,  
MHSc, CCMED,  
University of Toronto**

# Animals share our lives

- People often refuse to evacuate during disasters without their animals, sometimes risking their own lives or those of rescue workers
- PETS Act, 2006 (Pets Evacuation and Transportation Standards Act) – requires state and local emergency preparedness operational plans to consider household pets and service animals





# Animals give us better health



*Eunice Kennedy Shriver* National Institute  
of Child Health and Human Development



# Research helps validate intuition

- Dog owners are less likely to suffer from depression than those without pets.
- People with dogs have lower blood pressure in stressful situations than those without pets. One study even found that when people with borderline hypertension adopted dogs from a shelter, their blood pressure declined significantly within five months.
- Playing with a dog or cat can elevate levels of serotonin and dopamine, which calm and relax.
- Pet owners have lower triglyceride and cholesterol levels (indicators of heart disease) than those without pets.
- Heart attack patients with dogs survive longer than those without.
- Pet owners over age 65 make 30 percent fewer visits to their doctors than those without pets.
- <http://www.helpguide.org/articles/emotional-health/the-health-benefits-of-pets.htm>



[http://www.heart.org/HEARTORG/GettingHealthy/Owning-a-Pet-May-Protect-You-from-Heart-Disease\\_UCM\\_453586\\_Article.jsp](http://www.heart.org/HEARTORG/GettingHealthy/Owning-a-Pet-May-Protect-You-from-Heart-Disease_UCM_453586_Article.jsp)

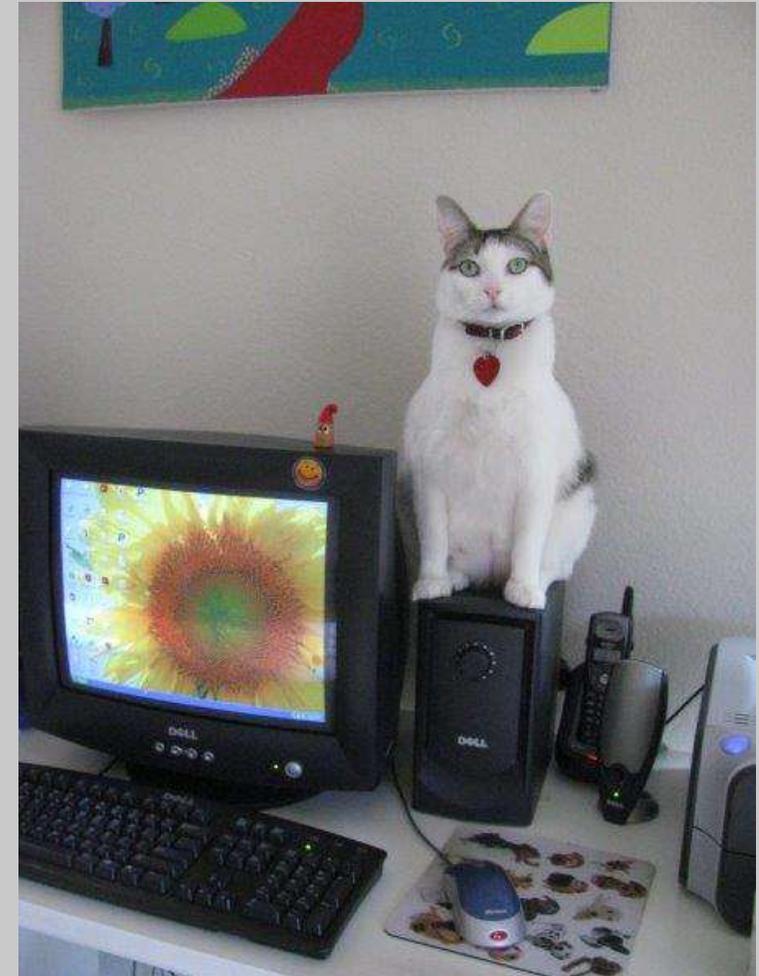
# Karen Allen Study – Cardiovascular Reactivity and the Presence of Pets, Friends, and Spouses: The Truth About Cats and Dogs

Psychosomatic Medicine 64:727-739 (2002)

Cardiovascular reactivity was examined among 240 married couples, half of whom owned a pet

Mental arithmetic and cold pressor tests were performed in one of four randomly assigned social support conditions: alone, with pet or friend (friend present for non-pet owners), with spouse, with spouse and friend/pet

People with pets had lower resting heart rate and blood pressure; lowest reactivity and fastest recovery was observed in the pet-present conditions



# Cats, Kids & Asthma

Prolonged cat ownership and early life exposure to cats may have a protective effect against early asthma indicators, such as wheeze, as children reach age five. "While the study design does not allow us to recommend early cat ownership to prevent asthma, it does seem to indicate that avoidance of cats to prevent the development of asthma is not advised. However, once a child has asthma and is allergic to cats, the recommendation would still be to find a new home for the cat," said Matthew Perzanowski, PhD, assistant professor of Environmental Health Sciences at the Mailman School of Public Health and lead author and investigator on the research.

Columbia University School of Public Health



# One Health, One Medicine, One Literature

Mary M. Christopher, ScienceTranslationalMedicine.org, 2 September 2015, 1-3

- Stubborn silos: “veterinary” versus “medical” literature
- Failure to consider the broad literature can result in narrow context, omissions, and errors
- Collaboration amongst medical and veterinary pathologists critical for accurate phenotypes and for distinguishing similarities and differences
- “Peer” reviewers for manuscripts should have expertise beyond their own specific field
- Veterinary medical editors now part of the World Association of Medical Editors (WAME)



Dr. Mary M. Christopher, UCD

# Time for a new medical research model?

- We will learn from the > 60,000 vertebrate species (tremendous evolutionary clues to prevent and treat disease in humans and beyond)
- Teams will be created, using experts from around the world, to address significant health issues
  - Medical, veterinary, wildlife researchers and others will be part of national and international teams
- We will advance the health of all family members through strategic, collaborative and humane research





Rising 14,692 feet into the air, the Matterhorn is located between Switzerland and Italy

It was the last Alpine peak to be summited – remained an impossible trek for decades (mostly from the Italian side)

Edward Whymper of London, an artist hired to make sketches of the mountains between Switzerland and Italy, asked a question on why the Matterhorn had never been attempted from Switzerland? Might the “terrible-appearing” face of stone from the northeast be an illusion?



July 13, 1865 – Whymper and six others set out on an unlikely journey that would amaze all – a hidden “staircase” of ridges leading them to the top. Whymper was 25 years old.

**What are the illusions in research that need to be overcome? How can our professions increase collaboration, strategies and successful outcomes? How can both people and animals be helped?**



# Summary

*Animals and people have evolved together and share many of the same risk factors for health and disease*

*The urgency of disease prevention and development of gentler/more efficacious therapies requires a new collaborative model whereby the medical and veterinary profession work strategically together*



***“Always the more beautiful answer who asks  
the more beautiful question”***

***E.E. Cummings***