



**2006 Canine Health Foundation
National Parent Club Canine Health
Conference**

Proceedings and Summary

The Story So Far

The Canine Health Foundation

- Founded in 1995
- \$15 million in research grants
- Sixth biennial Parent Club Conference
- Research network from Netherlands to California
- Mission: *To develop significant resources for basic and applied health programs with emphasis on canine genetics to improve the quality of life for dogs and their owners.*



The Story So Far

Alliances Make It Possible

- American Kennel Club
- Nestlé Purina PetCare Company
- Canine Health Information Center (CHIC)
- Orthopedic Foundation for Animals

The Story So Far

The 2005 Parent Club Conference

- Sequencing of the canine genome
 - A huge opportunity to move forward
 - They said it couldn't be done...
 - Complete sequence released in December 2005
- Donations have never mattered more
- Other ways for clubs, individuals to help
 - Send samples (*but check first!*)
 - Conduct health surveys
 - Raise awareness



The Story So Far

AKC CHF Research Grants

- Biennial survey identifies five top health concerns
 - Last survey: Cancer, eye disease, epilepsy, hip dysplasia, thyroid disease
- RFP to 2,500 researchers world-wide
- Peer review
- Funding so far: More than 50 institutions in eight countries
- ACORN grants: up to one year, \$12,000





'The Next Big Thing' Is Now

Sequencing the Canine Genome

- Human health benefits from canine research
 - Parallels between canine, human diseases
 - Closer match to humans than traditional research species
 - Detailed pedigrees lead to quicker results
- Dogs benefit from human health funding



'The Next Big Thing' Is Now

Sequencing the Canine Genome

"The idea is to approach breeds that have dogs that are of interest, and to use free living dogs" for the research. This avoids ethical concerns and costs less than working with laboratory mice.

-- Karl Lark, PhD

'The Next Big Thing' Is Now

Case Study

The Portuguese Water Dog

- The ideal research subject
 - Small population
 - Excellent pedigree records
 - 30 founders
 - 10 responsible for 90% of the gene pool
- Closer attention from corporate sponsors, NIH
- **Everybody wins**

'The Next Big Thing' Is Now

Sequencing the Canine Genome

"The dog has a much closer genome to the human. More than 300 human genetic diseases are found in dogs. The different breeds are genetic isolates, so they're very important and very hard to find in humans."

-- Karl Lark, PhD

'The Next Big Thing' Is Now

Sequencing the Canine Genome

“People are mutts,” and flagging heritable risk factors is less straightforward in human research “because of the genetic background of cross-breeding that we have.”

-- Dr. Jaime Modiano



'The Next Big Thing' Is Now

Sequencing the Canine Genome

“The real bottleneck now is getting samples, and samples that are accurately characterized. The rest is easier than it used to be.”

-- Kerstin Lindblad-Toh, PhD



Major Findings

Results on the Horizon

- Canine cancer
- Neuronal ceroid lipofuscinosis (NCL) and Batten's disease
- Stem cells: Mending heart failure
- Epilepsy and canine neurologic disease

Major Findings

Canine Cancer

- Most serious canine disease
- Primary tumors often metastasize before they are diagnosed
- Human genome: 27,000 cancer-related aberrations
- Canine genome: Chromosomes harder to identify, but five linked to non-Hodgkins lymphoma

Major Findings

Canine Cancer

Non-Hodgkins Lymphoma

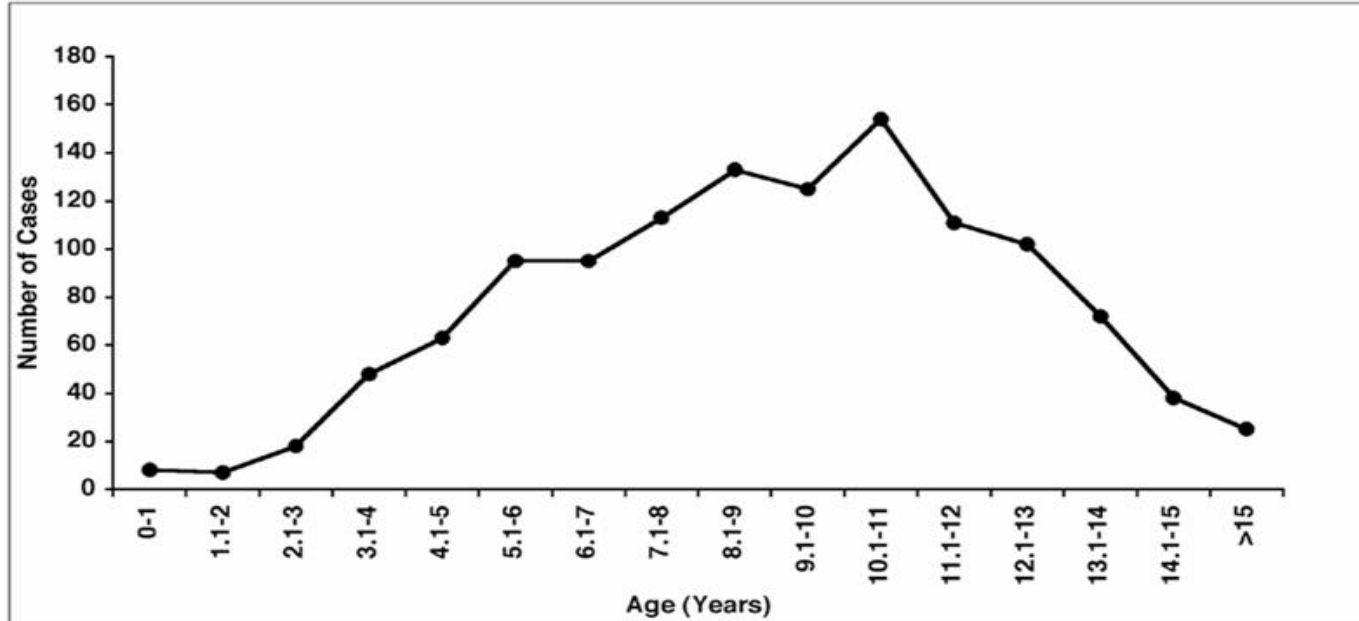
- Lifetime risk of 1:10 to 1:20 in dogs, 1:50 in humans
- One-year canine survival rate: 55%
- Breeds at highest risk
 - Boxers, Goldens, Labradors, Scottish Terriers, Basset Hounds, Saint Bernards, Dobermans
 - All middle-aged dogs
- Specific genes: A work in progress



Major Findings

Canine Cancer

Lymphoproliferative Disease and Age



Major Findings

Canine Cancer

Prevention and Treatment

- Dogs and humans: Similar incidence, age of onset, location, progression, outcome
- Shared environment, shared susceptibility
- Canine cancer on the rise
 - Environmental factors?
 - Longer lifespans?
- *'Life is the single highest risk factor...'*

Major Findings

Working with Cancer Researchers

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Major Findings

Working with Cancer Researchers

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***(blood or tissue samples; please
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***(blood or tissue samples; please
contact before sending)***

Major Findings

Canine Cancer

Proper procedures matter!

- *Work with sample coordinators*
- Match available sample to current need
- Send samples *quickly*
- Send reference samples from older, unaffected dogs
- Pay attention to waiver provisions
- *Fill out consent forms in full*

Major Findings

Canine Cancer

Mark your calendar!

AKC CHF Canine Cancer Conference
Chicago, IL
September 15-17, 2006

More information: www.akcCHF.org



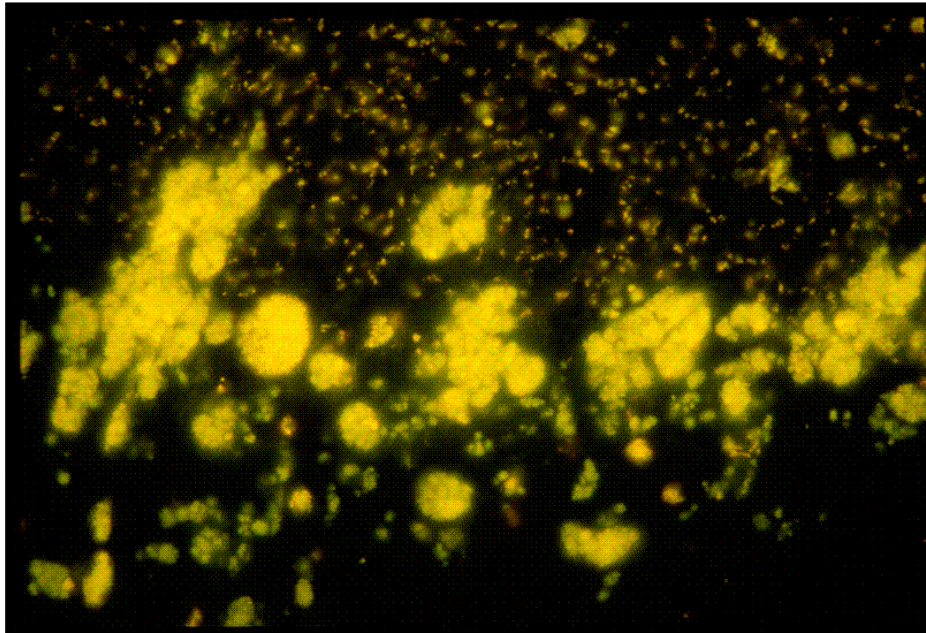
Major Findings

Neuronal Ceroid Lipofuscinosis (NCL)

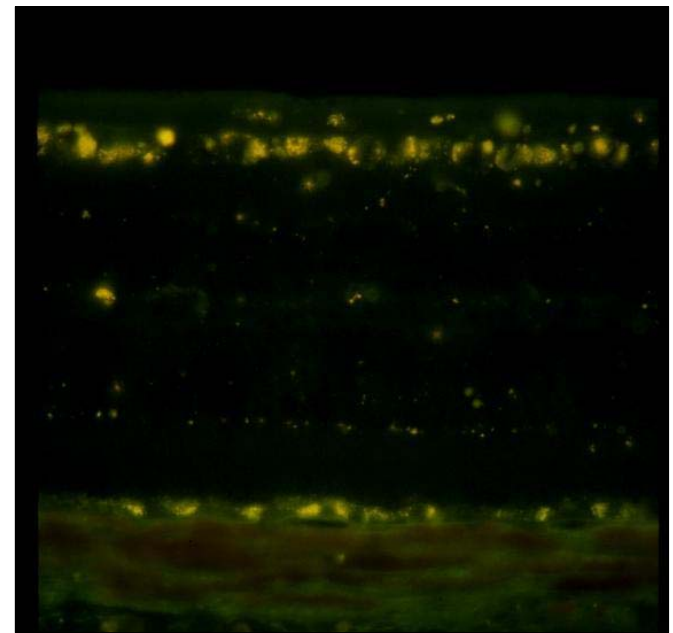
- Multiple breeds
- Linked to Batten's disease in humans
- Major symptoms: Mobility problems, dementia, blindness
- Benefits of canine research: 30 generations of DNA, shorter breeding cycle
- Tests show fluorescent yellow material in cerebellum, retina

Major Findings

Neuronal Ceroid Lipofuscinosis (NCL)



Cerebellum



Retina

Major Findings

Stem Cells

Mending heart disease

- *'The body's innate repair tool'*
- Two key characteristics
 - Self-renewing
 - Able to differentiate
- Clinical treatments 10 to 15 years away
- Human health results apply to dogs, too

Major Findings

Stem Cells

Mending heart disease

- Progression of heart disease
 - Inflammatory response may be a first sign
 - Scarring of the heart
 - Heart can't compensate; cells fail
- Cell therapy for damaged hearts
 - Dosage rates matter
 - A measure of success: Ability to pump blood

Major Findings

Canine Neurologic Diseases

- *‘Striking at the essence of the animal’*
- Help is on the way for...
 - Movement disorders
 - Epilepsy/storage diseases
 - Degenerative myelopathy

Major Findings

Canine Neurologic Diseases

Movement disorders

- Cerebellar ataxia
 - DNA marker found in English Pointers
 - Staffordshire Bull Terrier research may help Old English Sheepdogs
- Progressive Neuronal Abiotrophy
 - Common in Kerry Blues, in Chinese Crested
 - Possible similarity to Parkinson's in humans

Major Findings

Canine Neurologic Diseases

Epilepsy/storage disorders

- Cases in miniature wirehaired Dachshunds linked to a form of human epilepsy
- Storage disorder symptoms linked to abnormal accumulation in brain: Seizures, generalized weakness, blindness
- Neonatal encephalopathy in Standard Poodle
- “Chinook seizure”
- Link to NCL in sheep and mice

Major Findings

Canine Neurologic Diseases

Degenerative myelopathy

- Begins at age eight or nine
- Poor coordination leads to paralysis, spinal degeneration
- Current and pending studies involve German Shepherds, Corgis
- Existence and characterization of disease is controversial; causes are under study
- *Solid evidence is needed*

Major Findings

Better Knowledge of Chronic Conditions

- Diabetes
- Hypothyroidism
- Centronuclear myopathy
- Pancreatic acinar atrophy
- Dermatomyositis

Major Findings

Better Knowledge of Chronic Conditions

- Nutrition and metabolism
 - Osteoarthritis
 - Protein metabolism
- Assisted reproduction
- Behavior and temperament
- Canine vaccination

Major Findings

Diabetes

- High prevalence in dogs and humans
- Incidence has more than tripled since 1970
 - 50,000 amputations, 50,000 cases of blindness projected for 2005
- Many cases may go undiagnosed
- Susceptibility varies widely among breeds

Major Findings

Hypothyroidism

- Commonly diagnosed...and misdiagnosed?
- Susceptible breeds: Golden Retrievers, Doberman Pinschers, Irish Setters, Miniature Schnauzers, Cocker Spaniels, Airedales
- Diagnosis more difficult in dogs than in humans
- Treatment without clear diagnosis may suppress pituitary, damage heart
- No value in routine or pro-active screening

Major Findings

Centronuclear Myopathy

- Previously known as muscular myopathy
- Prevalent in Labradors
- Clinical signs begin at one month of age
- Dogs can live 8.5 years and reproduce, but never regain mobility
- Carriers have included national winners
- Breeder awareness is crucial
- 'White list' identifies dogs with no predisposition

Major Findings

Pancreatic Acinar Atrophy

- Degenerative disease of the pancreas
- Curtails enzymes required to digest food
- Prevalent in German Shepherds, Rough Collies
- Diagnostic test is 100% accurate
- Treatment is expensive, but 95% effective
- Late onset makes it impossible to identify carriers before they breed
- Researchers are seeking a molecular signpost

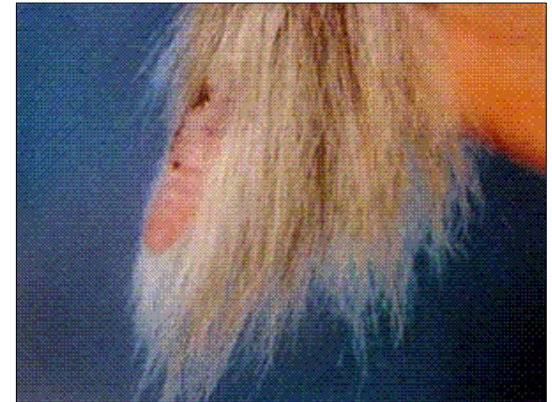
Major Findings

Dermatomyositis

- Degenerative skin and muscle disease
- Prevalent in Collies, less so in Shetland Sheepdogs
- Some similarity to muscular dystrophy
- Abnormal chromosome may be linked to merle coloring

Major Findings

Dermatomyositis



Major Findings

Nutrition and Metabolism

Osteoarthritis

- Most common joint disease in dogs and humans
- 20% prevalence, 70% in older dogs
- Nutritional approaches can manage obesity, reduce inflammation
- *'Humans are good research models for dogs'*

Major Findings

Nutrition and Metabolism

Protein metabolism

- Dogs need 20 different amino acids, 10 from diet
- Inadequate protein impairs growth
- Research supports low energy, moderate protein diet for large breed puppies
- High protein for older dogs supports lean muscle mass
- Severe calorie restriction reduces lean muscle

Major Findings

Assisted Reproduction

- Poor timing is still the biggest issue
- Two drug groups can manipulate the reproductive cycle
 - Drugs have pros and cons
 - Costs are high
- Embryo transfer: Careful synchronization, or larger breeding colonies
- Canine cloning: One clone required three years, 123 embryo transfers

Major Findings

Behavior and Temperament

- Major cause of euthanasia
- Temperament eliminates 30-50% of service dogs
- C-BARQ Assessment questionnaire: Seeking a reliable measurement standard
 - 152 questions
 - >3,000 owners and breed club members
- 11 traits were common to most dogs
- Study identified differences among breeds

Major Findings

Canine Vaccination

- More vaccines available, but adverse events may be understated
- Research requires large population, long study period
 - 3.5 million doses to 1.2 million dogs led to 4,678 events
 - Highest prevalence in Dachshunds, Pugs, Boston Terriers, Miniature Pinschers, Chihuahuas
 - Adverse events increased 25% for each additional vaccine on the same occasion

Major Findings

How Far Do We Go??

- Health conditions may be genetically linked to desirable or necessary traits
- Breed clubs may not recognize dogs with important characteristics removed
- Alternative: For recessive traits, breed dogs with abnormal genes to normal, cleared dogs

What's Next?

A World of Opportunities

- Health committees
- Health surveys
- DNA testing
- *Fundraising*

What's Next?

Health Committees

- Independent structure
- Close relationship with Parent Club
- Committee activities
 - Educational seminars and publications
 - DNA clinics
 - Fundraising
 - Research support
- Parent Clubs and breed foundations: *'The backbone of disease-specific research'*

What's Next?

Health Surveys

- Basic principles for survey design
 - Set goals and stick to them
 - Define acceptable proof
 - Anticipate barriers and build in solutions
 - Choose a method
 - Include healthy dogs
 - Test forms for accuracy, ease of use

What's Next?

Health Surveys

- Barriers to a successful survey: People, not technology
 - Confidentiality
 - Breed reputation
 - Low participation rates
 - Inclusion of pet population in addition to “fancy”
 - Complexity of online surveys
- Club leadership is essential
- CHF is here to help

What's Next?

DNA and the American Kennel Club

- AKC department formed in 1997
- Compliance audit
 - 83,000 DNA samples during routine inspections
 - Compliance up from 87% to >95%
- Voluntary DNA certification
 - Owner collects cheek swab
 - Lab processes results
 - AKC provides DNA certificate
- Conditional registration

What's Next?

AKC-CHF Fundraising *MEETING THE CHALLENGE*

- We need your support
 - Contributions
 - Volunteers to tell the story
- **CALL US TODAY!**

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