

Validation and utilization of genetic tests in dog breeding



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To be addressed

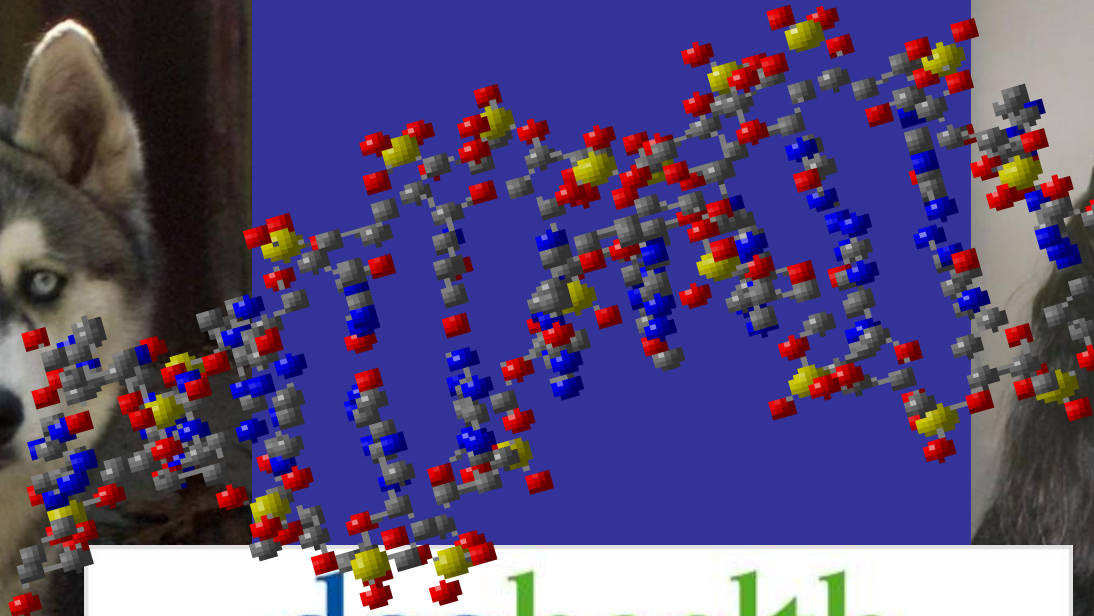
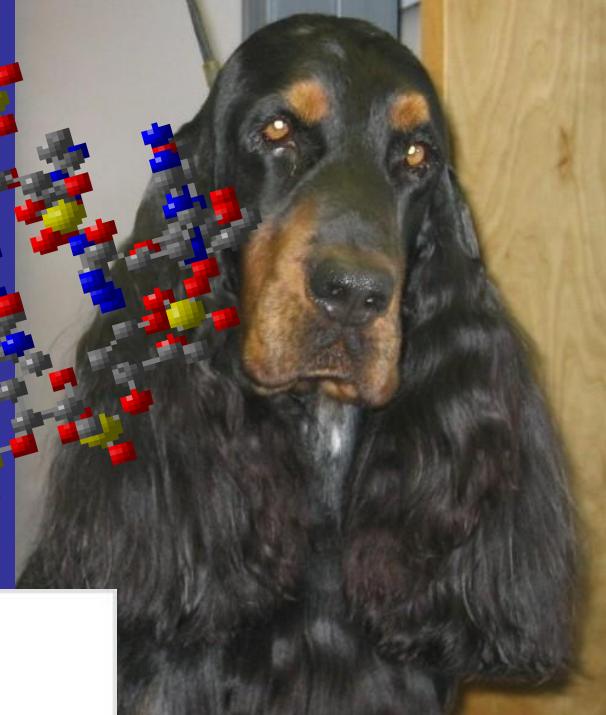
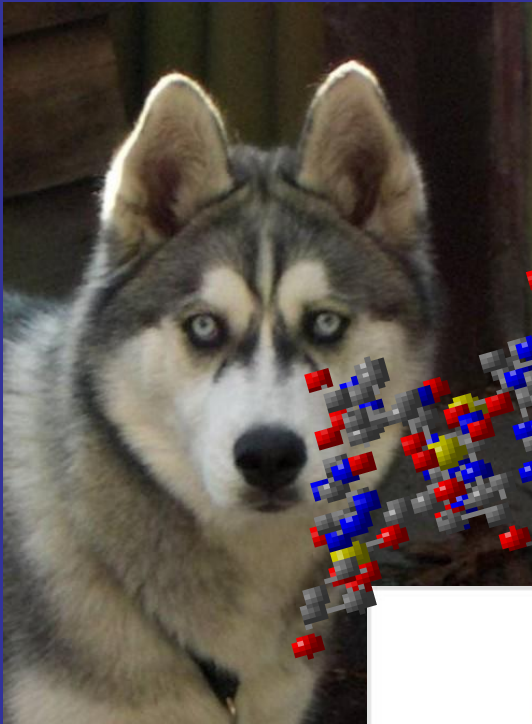
What are the potentials and risks with an abundance of genetic tests?

Who should validate a test and how?

Utilization of genetic tests in dog breeding requires strategies. Prepared by whom?

Is there a cost/benefit aspect to consider?

Validation and Utilization of Genetic Tests in Dog Breeding

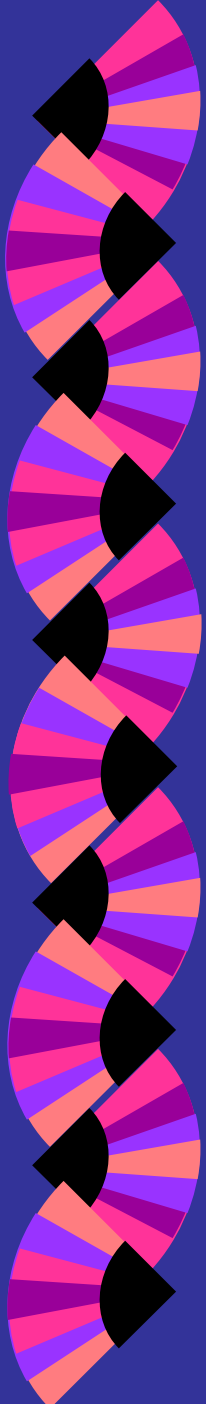


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BREEDING HEALTHIER DOGS -
FROM ATTENTION AND AWARENESS TO ACTION!

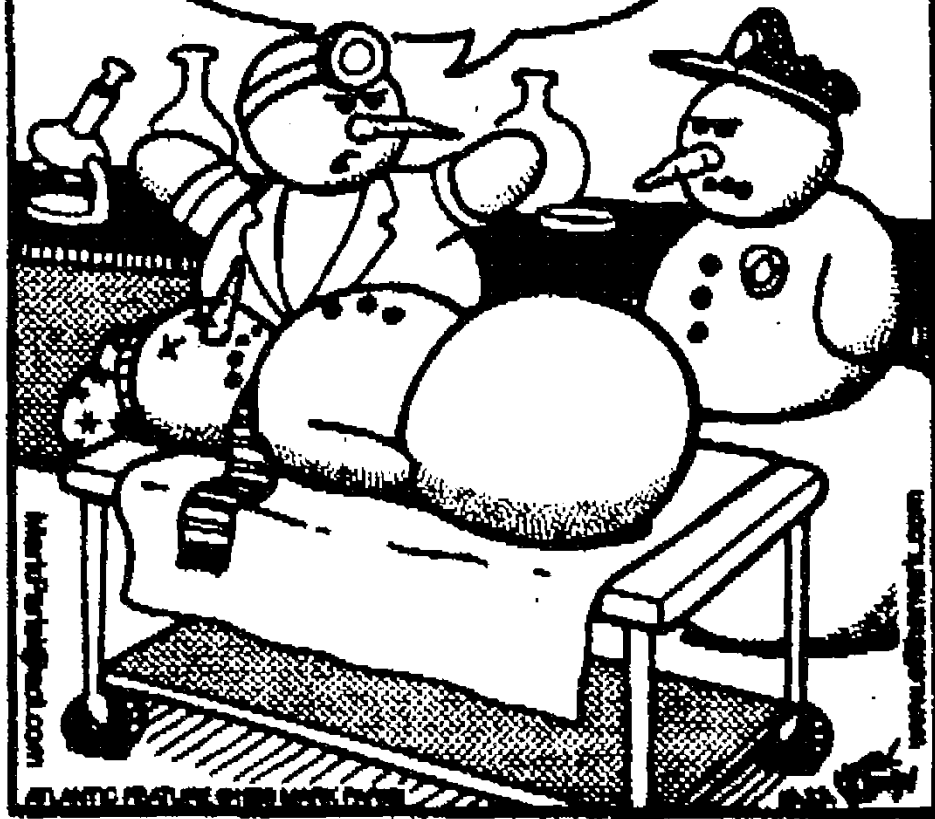
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off the mark By Mark Parisi

OF COURSE THE DNA TESTS WERE
INCONCLUSIVE! WHAT DO YOU WANT
FROM ME? NO TWO DARN SNOWFLAKES
ARE ALIKE!



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**LOOK AT YOUR
PATIENT!!!**





What are genetic tests?

- ◆ Anything that can identify heritable traits

Phenotypic Tests

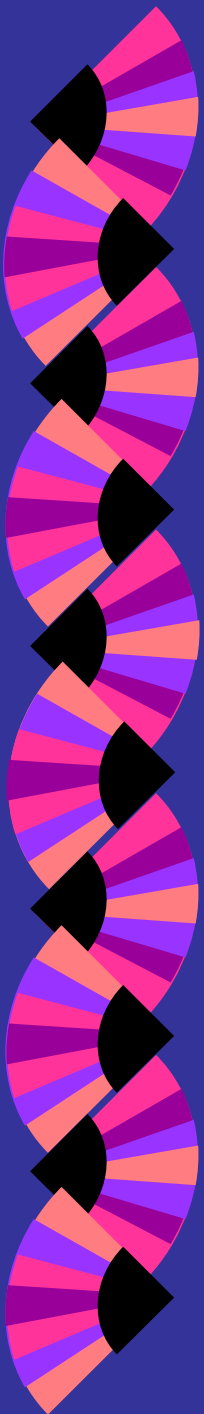
- ◆ Hip, Elbow, and Patella Evaluation
- ◆ Eye Examination
- ◆ Heart Evaluation
- ◆ Coagulation Disorder Testing
- ◆ Tumor Testing
- ◆ Bladder Stone Analysis
- ◆ Thyroid Testing
- ◆ Temperament Testing

Phenotypic tests may require a temporal period or certain conditions for valid testing

Genotypic (DNA) Tests

- ◆ Linked-marked based test
- ◆ Direct mutation based test
- ◆ Test for a susceptibility gene or risk factor

Responsibility of testing agency to provide information on the type of test and interpretation of results



Validation of DNA tests

- ◆ Is the test based on a causative or risk-associated mutation?
 - ◆ Is the test valid and correlated to the disease in;
 - ◆ The same breed in other countries/populations?
 - ◆ Other breeds?





Validation of DNA tests

- ◆ Peer-reviewed publication
 - ◆ Is it permissible to offer the test prior to publication?
 - ◆ If a test is not patented, publication allows any commercial lab to start offering the test
 - ◆ For-profit entities can patent their tests
 - ◆ Not-for-profit entities can establish low test prices that remove a profit incentive



Validation of DNA tests

- ◆ Is there a need for a non-competing entity that can do non-disclosure validation?
 - ◆ Validation of the specific test for the testing population
 - ◆ Validation in other populations
 - ◆ Validation of a new laboratory offering an established test (blind testing of known genotypes)
 - ◆ Laboratory quality control
 - ◆ Standardization

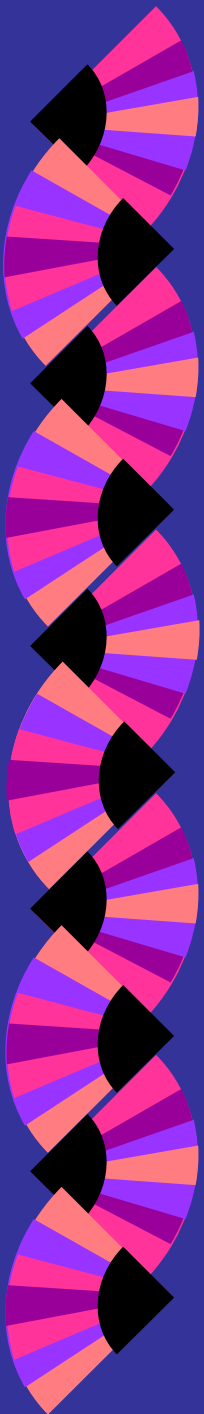


Validation of DNA tests

- ◆ Identification of the dog being tested
 - ◆ DNA parentage
 - ◆ Veterinary identification via microchip
- ◆ What about test results when there is not veterinary verification of identity?
 - ◆ Inability to enter results in health registry?
- ◆ What about clear by parentage/ancestry?
 - ◆ Only available with DNA parentage and veterinary verification of identity?
 - ◆ Otherwise test result only valid for one generation?

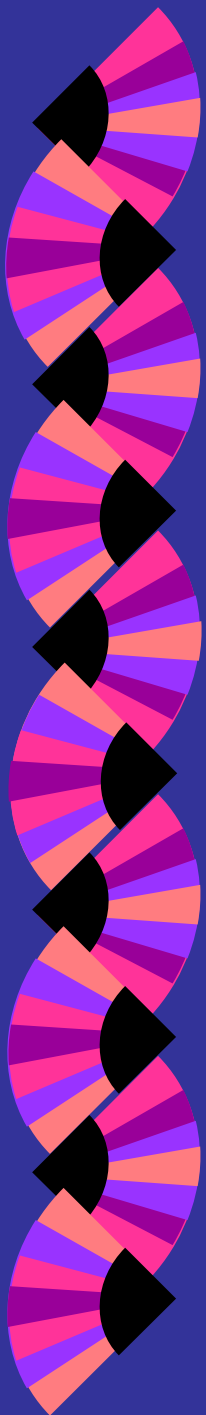
Utilization of DNA tests

- ◆ Is there a need for the genetic test?
 - ◆ Is it a common deleterious allele in the population?
 - ◆ Is the allele correlated to disease in other populations?



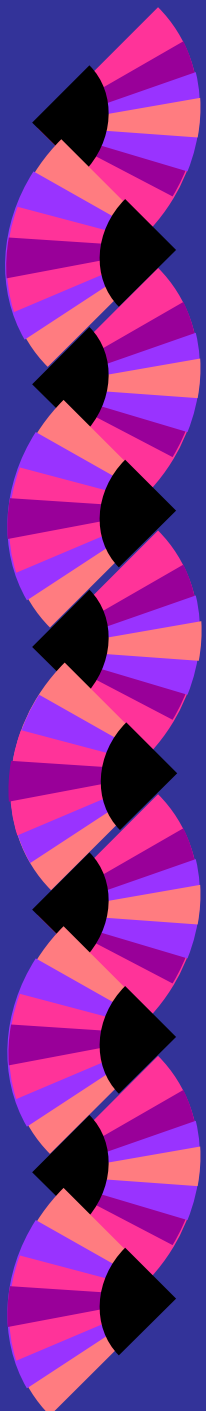
Utilization of DNA tests

- ◆ How long should a genetic test be recommended on a breed-wide basis?
 - ◆ Is there an allele frequency below which uniform testing is no longer beneficial (cost/benefit)



The Proper Use of Genetic Tests

Genetic Testing Should be Constructive,
and not Destructive to Breeds.





Utilization of DNA tests

- ◆ For fully penetrant monogenetic traits, the recommendation is always to breed quality carriers to normal-testing dogs
 - ◆ Prevents the production of affected offspring
 - ◆ Replace carrier parent with quality, normal-testing offspring.
 - ◆ Restrict introduction of new carriers into the breeding population



Utilization of DNA tests

- ◆ Linked-marker based genetic tests
 - ◆ Monitor families to ensure concordance with test results (recombination events)
- ◆ If a susceptibility or risk allele for a complex trait;
 - ◆ Low penetrance for a high frequency allele
 - ◆ Utilization effects on the gene pool
 - ◆ Need for specific genetic counseling recommendations
- ◆ Utilization of EBV and GBV for greater power and response to selection

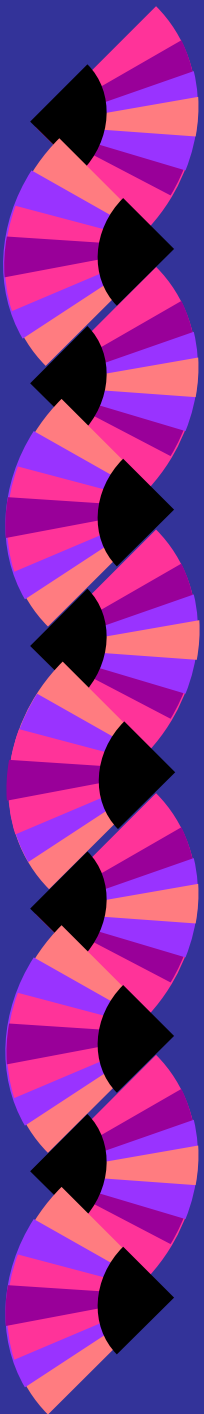


Each Stakeholder has a Role

- ◆ **Researcher**
 - ◆ Validation of mutation/test
- ◆ **Testing Laboratory**
 - ◆ Validation of methods and quality control
 - ◆ Explanation of test interpretation
 - ◆ Identification of non-concordant results
- ◆ **Registries**
 - ◆ Recording of test results and linking to pedigree databases
 - ◆ Establishing parent/ancestor tested normals

Each Stakeholder has a Role

- ◆ Parent Breed Club
 - ◆ Consulting with the other stakeholders and genetic counselors to establish;
 - ◆ Breeding recommendations
 - ◆ Population studies
 - ◆ Comprehensive breed & gene pool health strategies





Summation and Recommendations

- ◆ Establishment of a Testing/Validation Entity
 - ◆ Laboratory quality control
 - ◆ New test validation
 - ◆ Test population validation
- ◆ Establishment of a Central database with summing up of tests
 - ◆ But also a site where the scientific community can comment on results
- ◆ Uniform guidelines for sample and dog verification

Summation and Recommendations

- ◆ Use of Statistical Geneticists as Genetic Counselors to assist Parent Breed Clubs for the establishment of Breed Health Initiatives

