Is there a value to supporting research outside of your breed?

One of the most common concerns of breed clubs is that their breed is not specifically being utilized in a particular study. Sometimes this leads to the interpretation that the research being done does not have application to their personal dogs. Many clubs hold out for the definitive research study that will utilize their breed and solve their greatest health concerns. CHF asked five recognized researchers in canine health whether there is value to supporting research outside of a specific breed, for health problems that cross all breeds such as cancer and infectious disease, as well as diseases that appear to segregate within specific breeds, such as bloat, heart and ophthalmic diseases. It is evident to most dog owners that broad-based studies that focus on novel diagnostics and treatment strategies could have an impact across breeds, but is there value in collaborative funding when the goal is to identify the genetic basis for disease? Are there examples where identification of genetic mutations in one breed have facilitated discovery in other breeds?

An excellent example of potential collaborative funding power is aortic stenosis, a serious heart defect that leads to sudden cardiac death in many large breed dogs including Golden Retrievers, Newfoundlands and Rottweilers. Each of these breeds has some subtle breed-specific differences in disease phenotype which suggested that the disease is likely a bit different between the breeds. Dr. Kathryn Meurs, a Cardiologist and Associate Dean of Research and Dr. Josh Stern a Cardiologist at North Carolina State University, started their research into aortic stenosis in Newfoundlands and Golden Retrievers. In both of these breeds the results pointed to the same chromosomal location for a defect. Dr. Meurs believes that, "Although we have not yet found the exact defect, this work demonstrated to us that this is probably the same disease in each breed and that identification of the causative mutation in these breeds will allow faster identification in other breeds." Quite often research is initiated in more common breeds simply for sample size collection, but Dr. Meurs is confident that her research in Goldens, Rottweilers and Newfoundlands will have an impact on other breeds such as the Bouvier des Flandres, Dogue de Bordeaux, Flat-Coated Retriever, German Shorthaired Pointer, Great Dane, Greyhound, and Miniature Bull Terrier. Similarly, Dr. Danika Bannasch, Professor of Genetics at University of California, Davis School of Veterinary Medicine, notes that ancestral mutations are more likely to be shared across related breeds and points to Dalmatian hyperuricosuria (urinary stones) as a prime example. Research for this disease was funded and discovered based on samples from one breed, but the mutation occurs in many other breeds and the test was rapidly transferable to other breeds with urinary stone disease.

Dr. Jaime Modiano, Perlman Professor of Oncology and Comparative Medicine at the University of Minnesota Masonic Cancer Center, extends these observations into the realm of cancer and provides two relevant examples from his research. Dr. Modiano says, "In the case of lymphomas, there are probably more than 20 subtypes of this condition, about six of which are commonly seen in dogs. As it turns out, the subtype of lymphoma tells us more about the disease and its behavior than the breed of origin. So, studying one type of lymphoma in a breed removes some of the heterogeneity (and thus the uncertainty) in the experimental system, and makes the results more readily interpretable, and applicable to many breeds." Evidence of this was found in a recent study performed by his research group in which they characterized molecular subtypes of lymphoma, developing a simple test to classify the tumors, and showing the clinical benefit of reaching that diagnosis. Dr. Modiano points out that, "Even though the work was biased to include more Goldens than other breeds because of sample availability, the results seem to be broadly applicable to almost any breed." Finally, Dr. Modiano points out that osteosarcoma has similarities related to breed of origin, but these are not the principal drivers of tumor behavior. What Dr. Modiano and his team learned from tumors of Rottweilers allowed them to develop a system to organize bone tumors into different categories of aggressiveness that may respond to different treatments. Dr. Modiano emphasizes that this will likely apply to dogs from any breed that is diagnosed with osteosarcoma.

Data from the laboratory of Dr. Matthew Breen, professor of genomics at North Carolina State University, further supports the concept that genetic studies are highly transferable across breeds. Dr. Breen's primary focus is on identifying genomic signatures in canine cancers. Importantly, he is using this information to create personalized medicine strategies for dogs with cancer. Dr. Breen states that, "In general, if we begin the discovery process working with a few select breeds that have a remarkably high incidence of a particular cancer, we are more likely to be able to obtain the number of cases needed to power a study in a shorter period of time. That said, once we have identified genomic changes associated with key factors, such as subtype and prognosis, we are then able to quickly assess other breeds for the presence of the characteristic genetic signatures." Dr. Breen feels that collaborative funding is a very efficient way for them to launch studies that ultimately will have maximum impact on the health of many breeds. Case in point is when Dr. Breen and his team developed a test to predict duration of first remission in canine lymphoma patients; much of the earlier work was performed with samples from select breeds, simply because they could access sufficient sample numbers. With preliminary data from these few breeds, the study then expanded to include all breeds and they were able to produce an assay that is breed-independent.

Finally, Dr. Urs Giger, Charlotte Newton Sheppard Professor at of the University of Pennsylvania, School of Veterinary Medicine, points out the power of One Medicine Research and its translation to humans and multiple breeds of dog. Dr. Giger cites research into Storage Disorders, a group of hereditary disorders causing abnormalities in the skeleton, eyes, and/or central nervous system as an excellent example. Storage disorders have been recognized in people and dogs for many decades. While considered orphan (very rare) disorders in people, some of them occurred more frequently in certain canine breeds, for example mucopolysaccharidosis in Schipperkes and Miniature Pinschers. Originally dogs were studied as disease models for humans. "If it were not for the original breed-specific studies done for the sake of human patients we would have never understood the underlying genetic component of disease in any species. Ultimately the study of storage disease in one breed led to the research of related storage disorders in various breeds. Thanks to those founding studies we now understand genetic-based errors of metabolism in multiple breeds including Miniature Pinschers, Miniature Schnauzers, and Miniature Poodles."

Collaborative research funding clearly becomes a powerful tool to solve our greatest canine health problems. As CHF strives to be responsive to our breed clubs, our goal is to initiate projects and then facilitate translation of results across all relevant breeds. Individually each breed's footprint in canine health is relatively small, but the impact when we all work together is significant progress toward dogs living longer, healthier lives.