

# San Jose dogs, owners join DNA studies to help find cures

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Brewer, a 4-year-old golden retriever, hams it up as owner, Leona Messink, plays with him at their home in San Jose, Calif., on Wednesday, March 9, 2016. Messink has been enlisted to join a longterm genetic study known as the Morris Animal Foundation Golden Retriever Lifetime Study involving 3,000 owners and their dogs. The purpose of the study is to figure out why 60 percent of golden retrievers die from cancer. (Gary Reyes/Bay Area News Group) ( Gary Reyes )

SAN JOSE -- Leona and Dave Messink lost their first golden retriever, Riley, to cancer. Now they have Brewer, a gentle 4-year-old golden who loves people but retreats between his owners' legs in unfamiliar situations.

Brewer is healthy now but regularly submits to urine collection, nail clipping samples and a volley of other undignified tests while the Messinks take notes on everything he eats and everywhere he goes and send their records to scientists studying canine cancer.

The Messinks, from San Jose, are participating in one of a number of new studies focused on the genetics

of man's best friend. In 2005, researchers first sequenced the canine genome and unleashed science on dog genetics. Now, scientists are digging into the genetic bases of diseases that hound pet pooches.



Leona and Dave Messink play with Brewer, their 4-year-old golden retriever, at home in San Jose, Calif., on Wednesday, March 9, 2016. Leona has been enlisted to join a longterm genetic study known as the Morris Animal Foundation Golden Retriever Lifetime Study involving 3,000 owners and their dogs. The purpose of the study is to figure out why 60 percent of golden retrievers die from cancer. (Gary Reyes/Bay Area News Group) ( Gary Reyes )

The results could lead to healthier dogs -- and perhaps humans, too.

"We realize this research might not help Brewer," Leona Messink said, noting that scientific breakthroughs can take longer than a single dog's life, "but we're hoping it can help some future pups."

The studies already have revealed some surprising findings. In addition to uncovering genetic mutations that increase the risk for certain diseases, scientists have debunked the popular dogma that mixed-breed dogs are healthier than purebreds.

"I think there's a consensus growing that pet dogs are a model for genetics, and it's going to be growing faster soon," said Jessica Alfoldi, a scientist in the Broad Institute's Genome Sequencing and Analysis Program who has studied genomes in dogs and other animals.

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Pet dogs boast important virtues as a genetic model. There are lots of them -- an estimated 78 million in the U.S. -- and they suffer from many of the same diseases that humans do. What's more, purebred dogs -- which are heavily inbred -- tend to have less genetic variation than humans, allowing scientists to sniff out harmful gene mutations more easily. For similar reasons, many human genetic studies focus on relatively insular groups such as Icelanders, Mormons and Ashkenazi Jews.

Genetic studies call for dog owner participation. So far, pet owners such as the Messinks have answered the call, collaborating with vets to send scientists the data they need.

Brewer's data goes to Missy Simpson in Denver, who leads the Golden Retriever Lifetime Study for the

Morris Animal Foundation, the oldest veterinary nonprofit in the U.S. The project, which completed enrollment in 2015, is the first of its kind, following 3,000 young golden retrievers throughout their lives to monitor how genes and environmental factors influence their risk of cancer.

Simpson, who owns a scruffy black mutt named Jammies, chose to study goldens because of the breed's popularity and vulnerability to cancer -- 60 percent of all golden retrievers die from the disease.



Leona Messink is photographed with Brewer, her 4-year-old golden retriever, at their home in San Jose, Calif., on Wednesday, March 9, 2016. Messink has been enlisted to join a longterm genetic study known as the Morris Animal Foundation Golden Retriever Lifetime Study involving 3,000 owners and their dogs. The purpose of the study is to figure out why 60 percent of golden retrievers die from cancer. (Gary Reyes/Bay Area News Group) ( Gary Reyes )

Nearly 300 of the enrolled goldens were from California, more than from any other state. The owners, who call themselves the "3,000-strong family," for the 3,000 golden retrievers enrolled in the study, support one another on a Facebook page smattered with photos of golden retrievers.

"Our dogs are basically our children, our four-legged kids," Leona Messink said.

Despite golden retrievers' high vulnerability to cancer, Anita Oberbauer, a geneticist at UC Davis, has found that purebreds as a whole are not less healthy than mixed breeds.

Oberbauer's team analyzed over 27,000 dogs through electronic records and compared the frequency of genetic diseases in mutts versus purebred pups. She found that mixed breeds suffered just as much as pure breeds from 13 disorders, including hip dysplasia and cancer. In a follow-up study, the researchers found that increased vulnerability to other diseases did not apply to all purebred dogs but only to certain subgroups.

For example, the fact that golden retrievers are especially vulnerable to cancer does not mean all purebreds are. Because studies tend to focus on purebred dogs rather than mixed breeds, diseases in mutts get less play.

"The findings are really important to get out there to the public," said Kari Ekenstedt, professor at the

University of Minnesota's College of Veterinary Medicine, who was not involved in the studies. "There's a misconception out there that purebred dogs are automatically across the board less healthy than mixed dogs."

Even vet students may falsely believe mutts to be healthier than purebreds, Ekenstedt said.

If genetic research succeeds, the number of diseased purebreds and mutts could decrease. As scientists uncover genetically based genes, more and more breeders are getting their dogs genetically tested before breeding them. Oberbauer, who owns four Belgian shepherd dogs, said the dog research community makes a point of sharing data openly.

That collaboration may eventually expand into clinical trials for human medicine. The Broad Institute's Alfoldi said pharmaceutical companies are interested in rolling out promising cancer drugs to pet dogs during clinical testing -- rather than the current system of testing in humans and distributing to vets later. But to get the right drugs to the right dogs, companies need to wait for scientists to retrieve more genetic data.

That means continued cooperation from dogged researchers, pet owners and, of course, canines such as Brewer.

Dave Messink said he and his wife rely on the golden retriever study's Facebook page for motivation.

"My unfortunate belief is that it will become a support group over the years," he said. But right now, "there's a big sense of pride among the people who are in the study."

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## Doggie DNA studies

If you're interested in enrolling your dog in a genetics study, ask your veterinarian if any initiatives are looking for participants. For purebred dogs, you can also check with local breeding associations about study opportunities. If you're willing to pay for testing unassociated with any study, you can find online services that test for dog breed heritage or specific genes linked with disease, such as Paw Print Genetics, Wisdom Panel or DNA My Dog.



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