NEWS RELEASE

Media Contacts: Dr. Matthew Breen, 919/513-1467 or
matthew_breen@ncsu.edu
Greg Thomas, News Services, 919/515-3470 or
greg_thomas@ncsu.edu

Aug. 12, 2003

Dog Genome Research Breeds Benefits for Pets and Owners

FOR IMMEDIATE RELEASE

Man's best friend could soon become one of man's greatest allies against disease.

Researchers at the North Carolina State University College of Veterinary Medicine and the Whitehead Institute at the Massachusetts Institute of Technology have begun work to sequence the canine genome. "The project has tremendous implications for improving the health and welfare of dogs and humans," says Dr. Matthew Breen, associate professor of genomics at NC State and co-investigator of the project.

Having the canine genome sequenced will help researchers isolate disease-causing genes in both species. According to Breen, hundreds of years of inbreeding have resulted in dog breeds that have very little genetic variation, and this makes it much easier to find defective genes. That's important, since Breen says that some dog breeds are highly predisposed to cancer.

Breen theorizes that the genes that cause cancer in dogs will also play a role in causing cancer in humans. "The dog is a very good model system for studying cancer – the genomes of humans and dogs are very similar and are both exposed to the same environmental factors. Our dogs eat our table scraps, they live in our homes, they breathe the same air, they walk across the same pesticide-covered lawns and parklands that we do," he said.

"The beauty of having the canine genome sequenced is that we can then take the entire dog genome, align it with the human genome and perform detailed comparisons at the DNA level," Breen added. "This means that whatever genetic research we do in humans, we can do in dogs and vice versa. We'll have a reciprocal benefit."

Breen's role in the project is to anchor the genome sequence.

"A genome is too large to be decoded in its entirety. You've got to break it down into manageable pieces," Breen said. To read the DNA, or genetic information, the chromosomes are

-more-

cut into tiny pieces, which are then read individually and pasted back together. That work will be done at the Whitehead Institute. Those researchers will then pass that information to Breen, who will finish anchoring the genomic sequence. “The information in a genome is often compared to the information in a book. If you regard the pieces of the genome as the pieces of paper that result from passing all the pages of a book through a paper shredder, the scientists at the Whitehead Institute will analyze each shred and then assemble the pieces back into pages. My role is to put all the pages back together in proper order,” Breen said.

Knowing where disease-causing genes reside can also help prevent the unintended breeding of those genes. “The gene that makes your dog a nice color might be sitting right next to a gene that causes cancer,” Breen said. “Because of the way genes are inherited, the closer the genes are the more likely they will be inherited together. Most dog diseases seem to demonstrate autosomal-recessive mode of inheritance. That means that an offspring must be given two copies of the bad gene – one each from mother and father – for that individual to be affected. Knowing that two adult dogs are carriers of the bad gene can prevent diseases from being passed on.”

“The dog genome sequence will be a powerful basic resource that will rapidly propel the discovery of disease genes forward in both the dog and human," says Dr. Kerstin Lindblad-Toh, lead researcher at the Whitehead Institute/MIT Center for Genome Research. “We are pleased to be working with NC State on this project. Anchoring the dog assembly to the chromosomes is vitally important for being able to compare the dog genome to other organisms such as humans and mice.”

Sequencing the dog genome – mapping all 2.8 billion bits of genetic information – will take about a year. The Whitehead Institute received its funding from the National Human Genetics Research Institute. “Much of the groundwork that puts me in the position to be able to anchor the genome assembly for The Whitehead Institute was done with funding from the Canine Health Foundation,” Breen said.

- thomas -