



By Jo McCulty

The equine gene chip, created through research led by Alicia Bertone, holds more than 3,200 expressed horse genes.

Ohio State creates first equine gene chip

By HOLLY WAGNER, Research Communications

Researchers at Ohio State have created the first DNA gene chip that contains thousands of genes for a horse and one of the first gene chips for a domestic animal.

The new chip houses more than 3,200 expressed horse genes on a sliver of glass about the size of a postage stamp. When researchers began developing this chip two years ago, only 200 horse genes were known. This new chip will allow researchers to scan an individual horse's genes at once to see which ones are active in a certain situation. For example, drug companies might use a gene chip to predict how a particular drug will affect an animal.

Since their invention nearly a decade ago, gene chips have revolutionized some basic approaches to research. Having a representative gene chip for a large animal could lead to better accuracy in studying human disease. Commercial gene chips already exist for humans, mice, rats, rice plants and a number of microorganisms.

"Although we rely on animal models to study human diseases, we really aren't sure what some of the genetic differences are between

those animal models and humans,"said Alicia Bertone, the professor of veterinary clinical sciences who led Ohio State's efforts in developing the equine gene chip.

"The genetic differences between humans and most animals are small -- in most cases, more than 90 percent of our DNA is similar,"Bertone said. Knowing which genes are similar can be a boon to researchers who use animal models to learn about human diseases.

"Gene chips can help uncover these key differences, giving us critical information before we launch into an experiment,"Bertone said. "The scientific community has invested a lot of money in animal models that don't truly represent the human situation, so having this kind of information is extremely beneficial."

Bertone developed the chip with the help of Weisong Gu, a post-doctoral researcher in veterinary clinical sciences at Ohio State. Gu created a computer program that helped him and Bertone discover and describe 3,088 horse genes. They added these genes to the 200 already-known genes to create the chip. To define the genes, the researchers compared sequences of horse DNA to already-known human genes. Bertone said there are likely thousands of more genes yet to be identified for the horse.

Data derived from the equine gene chip could give researchers insight into gene expression for specific equine -- and human -- diseases and conditions. For example, gene chips let researchers see how thousands of genes respond to an illness. This information can be used clinically to study disease in horses and in translational research from horse to human.

"The closer we can demonstrate that an animal model really mimics a human disease, the better off we are,"said Bertone, adding that horses are often used as models for orthopedic diseases, such as osteoarthritis and osteochondrosis -- a disease that inhibits bone growth. The equine gene chip also can be used to identify horse diseases such as equine protozoal myelitis (EPM), a debilitating neurological disease. Also, testing a drug or other therapy is typically done in large animals, such as horses, dogs and cats, before being tested on humans.

"More accurate animal models means we'll spend less money on and use fewer animals for finding cures,"Bertone said. "Billions of

dollars are invested in developing drugs that work really well in mice but fail in larger animal models and humans."

The new equine chip includes genes that regulate cell death, the cell cycle, cell signaling and development. The cost of the chip is around \$350 to \$450.

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