Roundworm genes used in disease research

Microscopic worms may help stop epilepsy, cancer

By Robert Stackhouse
THE BATTALION

A Texas A&M researcher is conducting a study to expand knowledge of how genetics may determine behavior in microscopic worms, and how this knowledge might be used to cure diseases such as epilepsy and even cancer.

Assistant professor of biology Dr. Luis Rene Garcia observes roundworms, a microscopic species of worm known as C. elegans, and watches for abnormal mating behavior caused by genetic abnormalities. He records the mutations that caused the erroneous behavior and studies them.

Studies involving roundworms have been conducted to locate evidence that certain genes result in certain types of behavior. Specifically, genetic material that results in seizures or the uncontrollable growth of cells has been the main focus of such studies. Understanding how this process operates will lead to the ability to use gene therapy to keep someone from developing cancer or from experiencing epileptic attacks.

Garcia said he uses this gene analysis to understand how behaviors are genetically specified.

He focuses on mating behavior because it is instinctive behavior that is automatically transmitted from one generation to the next. Garcia says he studies the roundworm in particular because it is a simple creature with simple biological systems.

"I chose to study this organism in particular because its nervous system is small. It has less than 400 neurons," he said of the species.

This quality of roundworm physiology makes it easy to link certain actions, such as mating behaviors, to specific neural cells. A short maturation process makes these tiny creatures ideal specimens as well, Garcia said.

"It grows rapidly from egg to adult in three days. I could perturb an example and get a result in two days," he said.

Certain mutations in these worms produce certain noticeable effects. These effects may include performing a behavior in the absence of stimuli, such as a mate.

"I mutate the males so that they can't perform the mating behavior correctly. Then, I look for males who display the behavior inappropriately," Garcia said.

The physical elements that control these behaviors in worms are similar to genes in higher-order organisms, such as humans, fellow researcher Dr. Maureen Barr said.

"The behaviors that he (Garcia) studies are how neurons and muscles communicate. The molecules themselves may be conserved in evolutionary terms," she said.

The genes that are observed by noting deficient behavior caused by mutation have homologs—genes that are similar to those of another species—in people in which mutations may have similar effects.

"When you mutate similar genes in higher organisms, you see seizures and pathologies," Garcia said.

Comparing genes from roundworms to homologous human genes is complicated, however, because human genes are more complicated than their roundworm counterparts.

"Molecules that regulate behavior in higher organisms may regulate more than one behavior," Garcia said.

Thus, different mutations of a gene could cause different disorders in worms and humans.

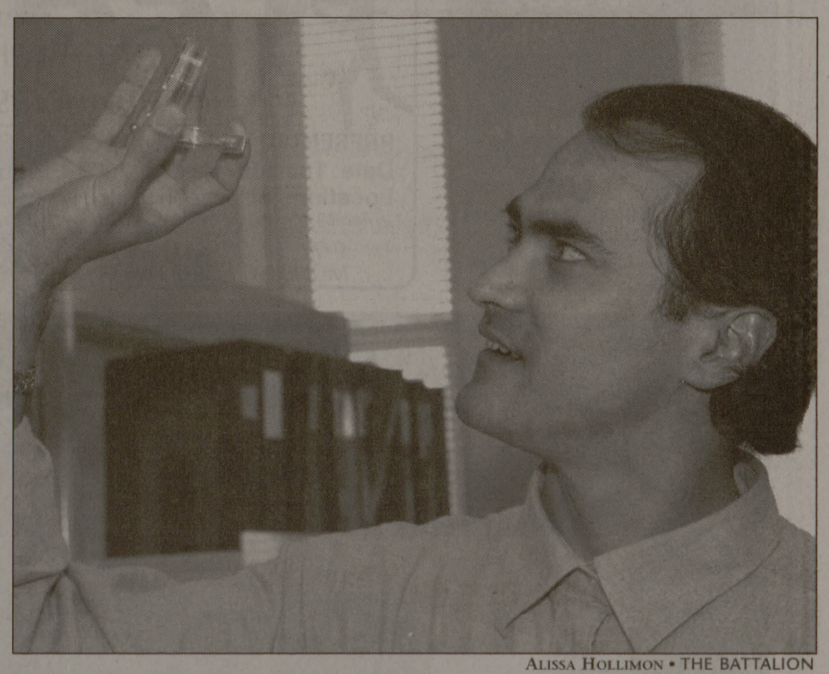
A firm understanding of malfunctioning genes in roundworms, however, could provide insight into understanding human neurological disorders such as epilepsy.

"(Garcia) is trying to build a model for seizures. He'll use C. elegans to figure out what types of genes are involved in epileptic seizures," Barr said.

Dr. Paul Sternberg of Cal-Tech's Biology Division said affected behavior is not the only thing that stands to be learned from research with C. elegans. Malfunctions with LET-23, a receptor homologous with the human receptor for epidermal growth factor, may show us how cancer develops.

"The types of mutations that activate LET-23-mediated signaling are analogous to mutations that contribute to human tumors by activating proto-oncogenes," Sternberg said. "Thus mutations that abolish gene function and result in increased LET-23-mediated signaling will define negative regulators and are analogous to tumor-suppressor genes."

Three genes that have been discovered using the LET-23-mediated signaling method have human homologues. Analysis of those genes will hopefully lead researchers to a tumor suppressor gene in humans, Sternberg said.



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Dr. Luis Rene Garcia, assistant professor of biology, looks at a sample of C. elegans, microscopic worms he is using to study how genes are passed from one generation to another.

Flu shots may prevent stroke, heart disease

By Stephanie Nano
THE ASSOCIATED PRESS

Flu shots may do more for the elderly than fend off the flu bug — they also protect against heart disease and stroke, new research shows.

Results of a large study of more than 286,000 elderly, appearing in Thursday's New England Journal of Medicine, show hospital stays for heart disease or stroke during two flu seasons were substantially reduced among those who got flu shots.

"Influenza may be even worse than we thought. And flu shots might be even better than we thought," said researcher Dr. Kristin Nichol of the Minneapolis Veterans Affairs Medical Center.

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New government figures show that influenza contributes to an average 36,000 annual U.S. deaths.

Flu shots are now recommended for all adults 50 and older. In 2001, about 63 percent of those over 65 were vaccinated in the United States.

The flu vaccine reduces deaths overall and prevents pneumonia in the elderly, and some small studies have suggested that they help ward off heart disease and strokes.

The researchers checked medical records for those over 65 enrolled in three managed-care plans in the Minneapolis, Portland, Ore., and New York City areas during two flu seasons — 1998-1999 and 1999-2000. Of the 140,055 people studied in the first flu season, 56 percent were vaccinated. In the second, 60 percent of the 146,328 enrollees got flu shots.

They compared hospital stays for those who got shots and those who didn't. Flu vaccination cut hospitalizations for heart disease by 19 percent both seasons, the findings showed. Hospital stays for stroke were reduced by 16 percent the first season and 23 percent the second.

"There are very few things we can do in medicine that provide these kinds of benefits over a very short period of time. This is huge," said Nichol.

Dr. William Schaffner, head of preventive medicine at Vanderbilt University School of Medicine, said the results need to be investigated further but reinforce an important message.

"It offers even more reassurance and affirmation as to the importance of getting your flu shot annually," said Schaffner.