# Fruit Fly Brains Provide Clues to Autism Research

January 29 2009

Linda Restifo and her UA research team are figuring out ways to improve drug treatment for those with mental retardation and autism. (Credit: Jeff Smith)

(PhysOrg.com) -- Linda L. Restifo of the Arizona Research Laboratory at The University of Arizona has developed a highly unique and promising methodology that uses fruit fly brains to screen for drugs that may increase the cognitive functionality of children with mental retardation or autism.

The fruit fly brain has similar proteins and developmental mechanism to those in human brains. Restifo of the laboratory's Division of Neurobiology is testing drugs that are already approved by the U.S. Food and Drug Administration to determine whether and how well those drugs can change the size or shape of genetically abnormal brain neurons.

"It's gratifying to think our research may identify drugs that help combat the behavioral and cognitive symptoms that affect children with mental retardation and autism," said Restifo, who is also a BIO5 Institute member and a UA professor of neurobiology, neurology and also cell biology and anatomy.

"The therapeutic strategy does not promise a cure for autism, bur rather the hope is to increase an individual's functionality," Restifo said.

In a recently completed experiment, Restifo and her research team found several dozen drugs that straighten out curly brain neurons.

The curliness resulted from lack of protein that is thought to be important to brain development. The resounding success of the proof-of-concept study suggests a novel strategy for finding safe and effective drug treatments for mental retardation and autism.

Restifo is the first to use primary neuron culture for drug screening of this type.

To conduct her research, Restifo and members of her lab monitor the size and shape of individual brain cells that have been dissected from the brain of a developing fruit fly at the maggot stage and allowed to grow in a laboratory culture dish.

Each group of cells is treated with a single drug. the drugs selected for use by Restifo come from a collection of about 1,000 known drugs, most of which are already approved by the FDA for other disease uses.

In the neuron bioassay, cells are grown for three days and then observed under the microscope for changes the drug has caused in the shape of the neurons.

"Nobody is using a brain neuron assay in this way for drug screening," Restifo said. "The small size and short life cycle of fruit flies is advantageous at this stage."

Restifo said, over several years, the research team intends to eventually move the experiments to human trials.

"Most assays don't have a drug development slant, and this has enormous potential as a demonstration project," said Michael Cusanovich, who directs the Arizona Research Laboratory.

At the same time Restifo's research has revealed that FDA-approved drugs that straighten out neuron curls, she has discovered that certain other drugs increase neuron curliness.

Restifo is also currently conducting research to determine if drugs that increase neuron curliness would serve as treatments against certain invasive cancers, such as malignant glioma, the most deadly type of brain cancer. She is using the same neuron-culture methodology for the cancer and the autism projects, in both cases seeking therapeutic agents that change the shape of the neurons from the fruit fly brain.

The laboratory is "proud to support Dr. Restifo's groundbreaking research," Cusanovich said. Over the long term, the fact the drugs in this study are being repurposed and are already FDA-approved could make this effort and attractive investment opportunity."

Provided by University of Arizona