NEWS

Modeling captures mouse habitat's effect on neurons

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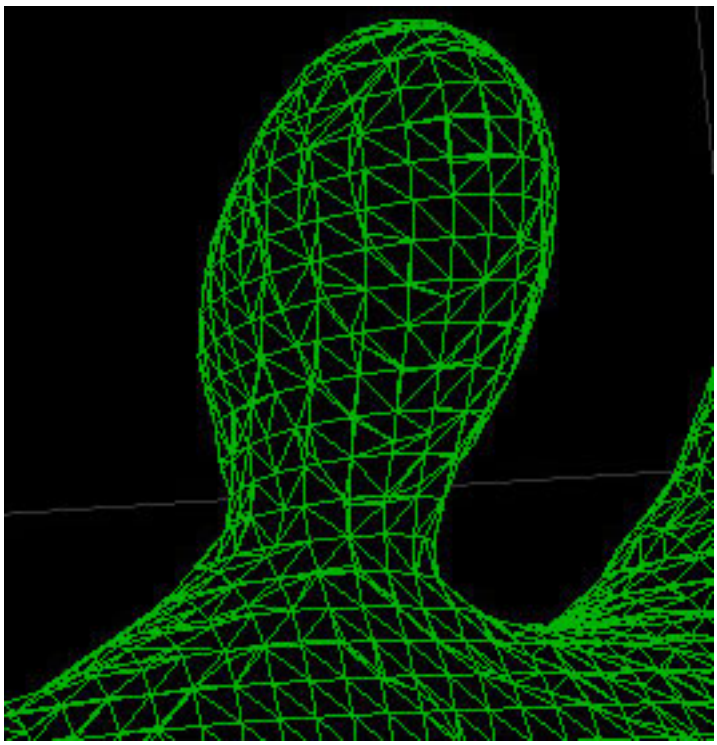

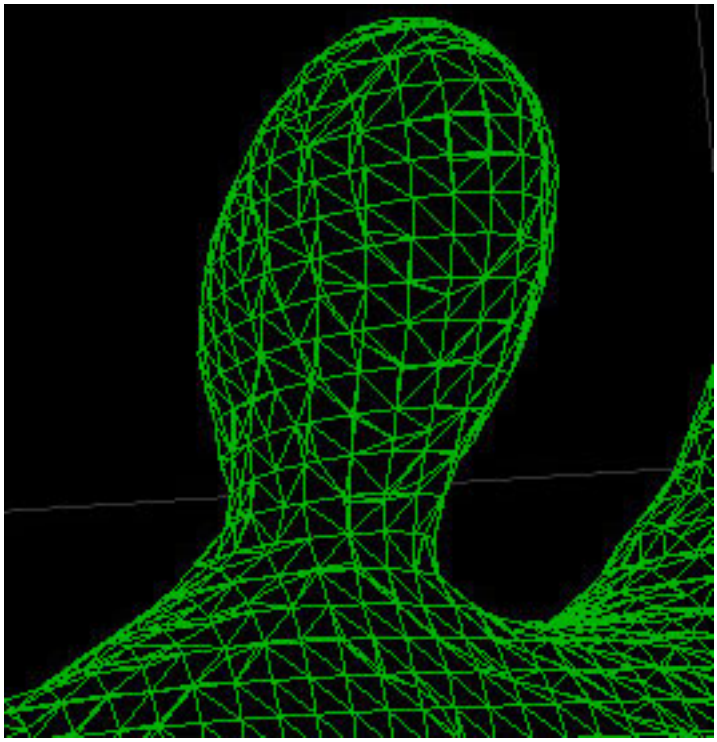

Googly glasses: Three-dimensional modeling shows that neuronal projections in fragile X mice are immature compared with controls.

Computerized three-dimensional (3D) modeling shows nerve cell abnormalities in the hippocampus of fragile X mice — and suggests the importance of raising experimental mice in more natural habitats, according to a poster presented Wednesday at the **Society for Neuroscience annual meeting**.

These mutant mice lack the protein that is missing in people with fragile X syndrome, a genetic disorder associated with cognitive impairment and autism. Studies have shown that in the cerebral cortex, people with fragile X syndrome and fragile X mice both tend to have 'immature' dendritic spines, the parts of the neuron that receive chemical signals from other nerve cells.

Immature dendritic spines are long, thin and numerous. Mature dendritic spines are fat and squat, and have relatively bulbous heads.

In the new study, researchers used a computer program to reconstruct the 3D shape and volume of mouse dendritic spines — a total of 14,000 spines so far. The technique "gives a more macro feeling of what's happening across the neuron," says **Julie Lauterborn**, associate researcher in

anatomy and neurobiology at the University of California, Irvine.

The team zeroed in on the hippocampus, a region of the brain involved in learning and memory that is dysfunctional in people with fragile X syndrome.

Studies of hippocampal neurons in fragile X mice have yielded conflicting results.

When fragile X and control mice are raised in relatively stark laboratory cages, the dendritic spines of their hippocampal neurons show few differences, the researchers found.

But, says Lauterborn, clear differences between the two groups emerge when the mice are raised in an 'enriched' environment — with different chambers to explore, and toys and other elements that more closely resemble a natural habitat.

Under those conditions, the fragile X mice have more immature dendritic spines compared with controls. They show "a huge shift towards smaller spine-head volume," she says, and have fewer short, stubby spines.

In both fragile X and control mice, the researchers found, dendrites are longer and more complex when the mice are raised in the more natural environment — confirming an effect found in other studies.

The standardized rearing conditions that help researchers compare results across studies may deprive mice of the rich sensory input that's necessary for normal brain development, Lauterborn says. "That's kind of the irony of neuroscience."

For more reports from the 2010 Society for Neuroscience meeting, please **click here**.