

NeuronMetrics: High-Speed Analysis of Cultured Neurons for Drug Screening

Background: Many mutations and drug compounds affect neural function by altering the shape and density of neuron networks, changes that can easily be seen by analyzing still images of prepared neuron cultures that have been genetically altered or exposed to experimental compounds. Drug discovery for developmental brain disorders lags decades behind that in other conditions, however, largely because existing cell-based screening assays are laborious to analyze accurately.

A new software application, NeuronMetrics, can greatly improve the speed and accuracy of neuron-culture image analysis, potentially making it possible to process hundreds of such images each day.

Applications: High-speed analysis of static neuron-culture images for several uses, including:

- *In vitro* screening of potential drug compounds for neural efficacy or toxicity
- *In vitro* studies of genetic or drug effects on neural-net structure

Advantages:

- *Can process roughly 60 two-dimensional images in 60 to 180 minutes*
- *Complementary to other neuron-image processing software tools * Can analyze certain in vivo images*
- *Calculated neural “branch counts” from neurite-contact information, improving analysis accuracy*
- *Automatically “fills” large gaps in the neural network, expanding the accuracy of neural models*

The Technology: The invention comprises a software tool, NeuronMetrics, which functions as a set of modules that run in the open-source program ImageJ. NeuronMetrics features a novel method for estimating neural “branch number” (a measure of the axonal complexity) from two-dimensional images. In addition, the tool features a novel method for modeling neural structure in large “gaps” that result from image artifacts. NeuronMetrics and a detailed user guide will be available for download at iBridge.

The program is user-friendly and easy to learn, making it a useful screening tool for basic and applied research.

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