A NOVEL TOOL TO CAPTURE NEURAL ACTIVITY ACROSS AN ENTIRE BRAIN USING C-FOS AS AN INDICATOR

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Immunofluorescent detection of the activity-dependent immediate early gene *c-Fos* is a well-known marker of neuronal activation. Neural activity in a region of interest (ROI) is quantified using *c-Fos* by counting the number of immunolabeled cells. While this is a powerful tool for confirming differences in neural activity in the ROI, this technique is time-consuming, inefficient, and ignores valuable information about the widespread network activity across an entire brain. In order to analyze the neural network activity across an entire brain, we developed a **C**omprehensive **E**xpression and **A**ctivity Assessment **T**ool (CEAT). CEAT is a semi-automated tool to identify fluorescently labeled cells, quantify cell activity through a variety of measures, and locate the activity within a region in the brain. Compared to existing image analysis programs, CEAT is fast, inexpensive, and operates on any computer with standard processing power. We used a simple experiment examining visual processing in a mouse model in order to validate CEAT. Subsequent experiments will use CEAT to explore differences in neuronal activity of mouse models for neurological disorders in comparison to wild-type mice. In the following figure, CEAT has been used to identify cells and quantify the activity in a brain slice (original shown in upper left). The activity is mapped from high to low within the slice with red being the most active cells.