A Method To Measure Neurotransmitters In Vivo

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BACKGROUND

Neurons in the brain communicate with other neurons, or with non-neuronal cells, by sending or sensing neurotransmitters or neuromodulators. The development of methods to measure the amount of neurotransmitters and neuromodulators *in vivo* in the brain is critical in order to study the large number of pathologies associated with abnormal levels of extracellular signaling molecules. *In vivo* monitoring of biochemical compounds is presently performed by microdialysis methods or by direct electrochemical measurement *in situ*. The main drawback of microdialysis is its temporal resolution, which can be several orders of magnitude lower than the time scale of brain cell electrical activity. Direct *in vivo* electrochemical methods display a lack of chemical sensitivity. Neither of these techniques is capable of measuring two compounds simultaneously and unambiguously.

TECHNOLOGY DESCRIPTION

Scientists at the UC San Diego have developed a method to detect neuroactive substances in the live brain. This technique is designed to measure *in vivo* levels of biochemical compounds (e.g., neurotransmitters or neuromodulators) with high specificity, sensitivity, and temporal resolution. The invention relies on a cell-based bioassay consisting of sensors called sentinel cells that report the presence of a specific neurotransmitter by changing their fluorescence. Sentinel cells are implanted inside the brain and their optical signal is detected *in vivo* with two-photon laser scanning microscopy (TPLSM). The modularity of this technique allows for the realization of different receptor/sensor pairs as a means to detect many kinds of neurochemicals, including neuropeptides.

APPLICATIONS

The superior specificity and temporal resolution of the invention over existing methods allows its use in basic science research and in neurotoxicological studies. This invention can also be applied to assess the effects of novel neurological or neuropsychiatric drugs during pre-clinical, live animal studies. In particular, the demonstrated ability of the method to detect release of cortical acetylcholine is especially suitable to validate cholinergic therapies in animal models of Alzheimer's disease and to develop cognitive enhancers.

OTHER INFORMATION

A patent application has been filed.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,663,604	03/04/2014	2007-283

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OTHER INFORMATION

CATEGORIZED AS

- **Medical**
  - Disease: Central Nervous System
  - Screening

RELATED CASES

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